Christina Force

A Youth Crisis Center in Champaign, IL- Improving Psychological Healing Through Design

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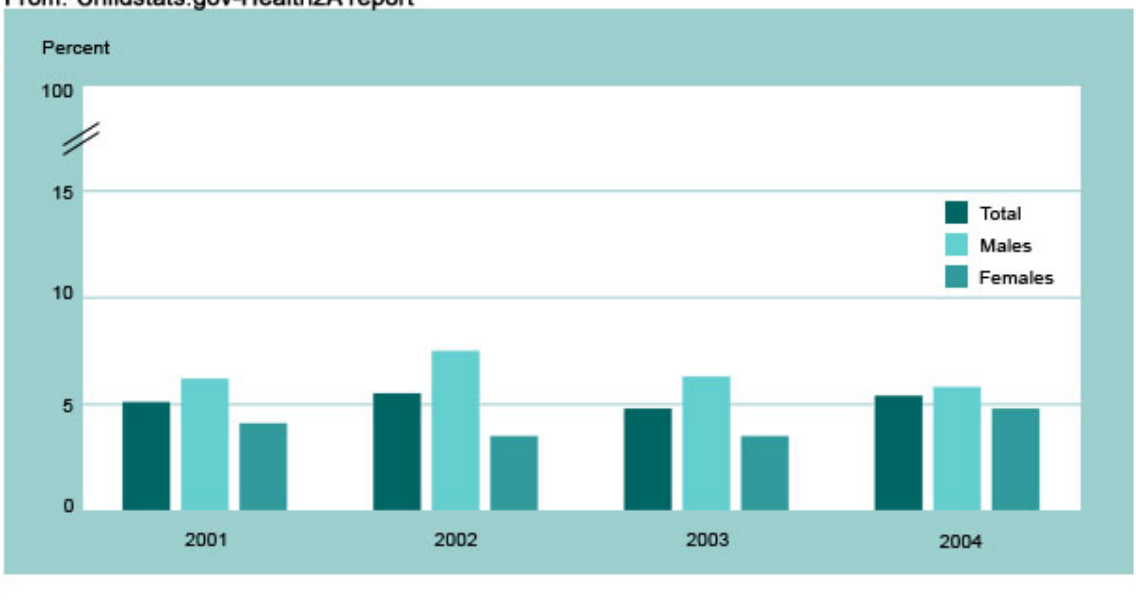
Introduction

Statistics

Indicator HEALTH2: Percentage of children ages 4–17 reported by a parent to have definite or severe emotional or behavioral difficulties, by gender, 2001–2004
From: Childstats.gov-Health2A report



- Preliminary studies indicate that 1 in 5 children/adolescents may have a diagnosable mental disorder.
- An estimated 7.7 to 12.8 million children suffer from mental disorders (Center for Mental Health Services, 1993). These youth are estimated to have severe emotional or behavioral problems that significantly interfere with their daily functioning.
- In 2003, 5 percent of children ages 4–17 were reported by a parent to have definite or severe difficulties with emotions, concentration, behavior, or being able to get along with other people.
- Less than one-third of the children under 18 with a serious emotional disturbance receive mental health services. Often, the services they do receive are inappropriate (Children's Defense Fund, CMHS--Mental Health, U.S., 1994).

Introduction

Thesis Topic

The previous statistics illustrate an issue prevalent in today's society- the numbers of children and adolescents suffering from mental disorders. These disorders may range from a mild Attention Deficit Disorder (ADD) to a life-threatening eating disorder such as Anorexia. Although there is often the temptation to deny the existence of psychiatric issues in children, it is necessary to accept that such disorders not only exist, but can affect school performance, relationships with family and peers, and hamper normal development. Some disorders may continue into adulthood and grow more severe if left untreated.

This thesis is focused on creating a treatment space for children and teenagers suffering from such disorders. This project investigates the potential for spaces to assist in the rehabilitation of patients and families, as well as providing a work environment for employees that allows for recharging from the high stress atmosphere. This project would benefit the community in the rehabilitation of minors with behavioral or psychiatric issues, creating a safe space for them to seek treatment. A well-designed facility may help ease the stigma surrounding the mental health field by projecting an attitude of healing and community rather than a walled-off, locked down facility.

Goals and Objectives

This thesis will investigate methods or theories on the role of architecture in therapeutic environments, specifically, the psychiatric treatment of children and adolescents. In such a space, the utmost concern must be given to the physical and emotional comfort of the users in order to assist in the recovery process.

This thesis will identify best practices for sustainable architecture in an institutional setting, through the investigation of the U.S. Green Building Council's LEED criteria, the national benchmark for sustainable design.

This thesis will attempt to demonstrate the importance of incorporating natural environments and outdoor spaces in a design to support the healing process.

Thesis Questions

The following questions will be investigated in response to the project goals:
1) How to design a safe, secure facility while respecting the special needs of children/ adolescents, such as privacy concerns, contact with peers, self esteem, and the desire to explore surroundings.
2) The question of designing a mental health facility that will lessen the stigma associated with them, and have a neutral or positive reaction from neighbors and the public.
3) Lastly, inquiring into the use and effectiveness of outdoor spaces such as healing gardens, in facilities, and how to adjust for use by children and teens.

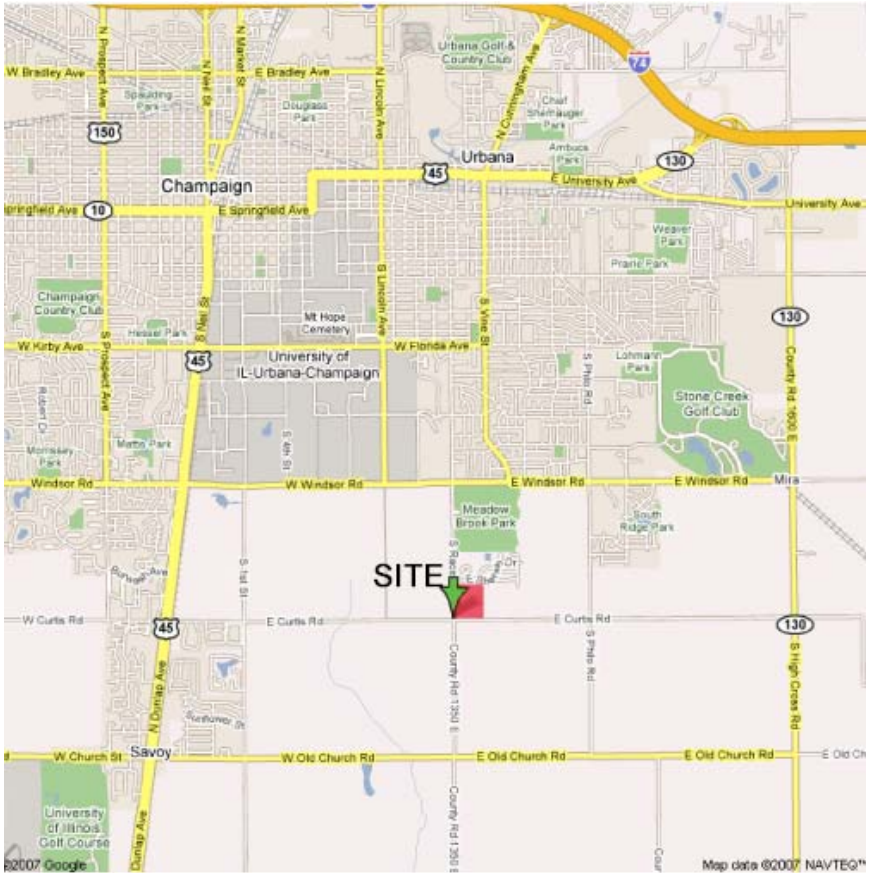
Site

City: Champaign-Urbana, IL

Considerations for site:

As a youth mental health facility, desirable locations would be near a moderate to large-sized town, parks, at least one major road, and located in a quiet residential or mixed use area. In Urbana, one location meeting these conditions would be the intersection of Race St. and Curtis Rd. in Urbana. This area has the benefits of a location near town yet still private, close proximity to Meadowbrook Park for supervised trips, and close access to major roads that connect Champaign, Urbana, and Savoy.

The map below illustrates the location of the site in regards to downtown Champaign, Urbana, Savoy, and Meadowbrook Park. The site is at the Northeast corner of the intersection of Race and Curtis, and is currently agricultural land. In-between the site and Meadowbrook Park is a single family residential neighborhood buffered by mature trees. Also nearby is Clark-Lindsey Village, a retirement community at Race St. and Windsor Rd. Educational Trips and Volunteer relationships to Meadowbrook and Clark-Lindsey Village would be possible from this site.



Site

Photo of Site: Viewing East across Race St.

Aerial Photo of Area:

Showing surrounding farmland, nearby neighborhood, and Meadowbrook Park.

Site

Champaign, IL Site Information

Geology:

Champaign County is located on a layer of bedrock located at approximately 400 - 550 ft.

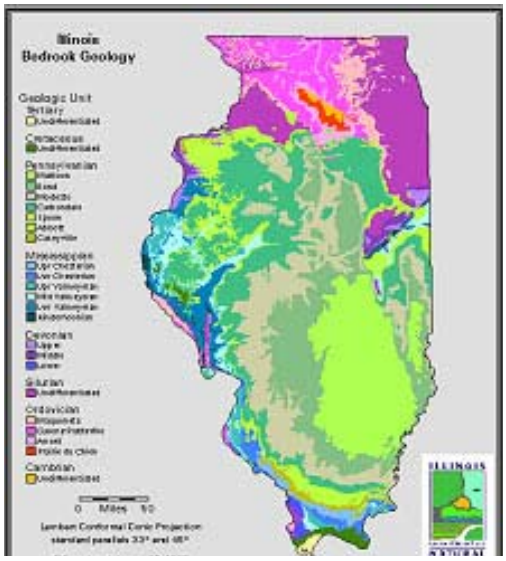


Image from the Illinois State Geological Survey: www.isgs.uiuc.edu

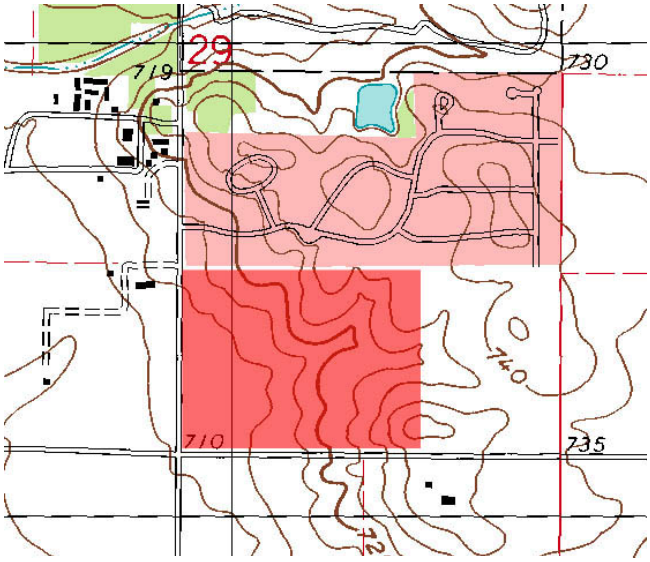


Image from Topozone: www.topozone.com

Topography:
The site topography, shown above, illustrates the approximately twelve foot difference in height between the lower Western side and the Eastern edge. A small drainage gully exists running diagonally from the Northeastern corner of the site towards the western center portion of the site.

Hydrology, Surface, and Ground Water:
Although no surface ground water was apparent while investigating the site, a natural drainage gully runs across the site and is not used as cultivated land. This natural flow will be retained and encouraged in this project. Investigation will determine the potential of developing this feature as a bioswale to further filter water as it drains through this area.

Soils:
The typical soil in most of Illinois is a rich “Illite” suited for farming, and up to hundreds of feet deep in sections of Illinois. This site is assumed to correspond to this soil type.

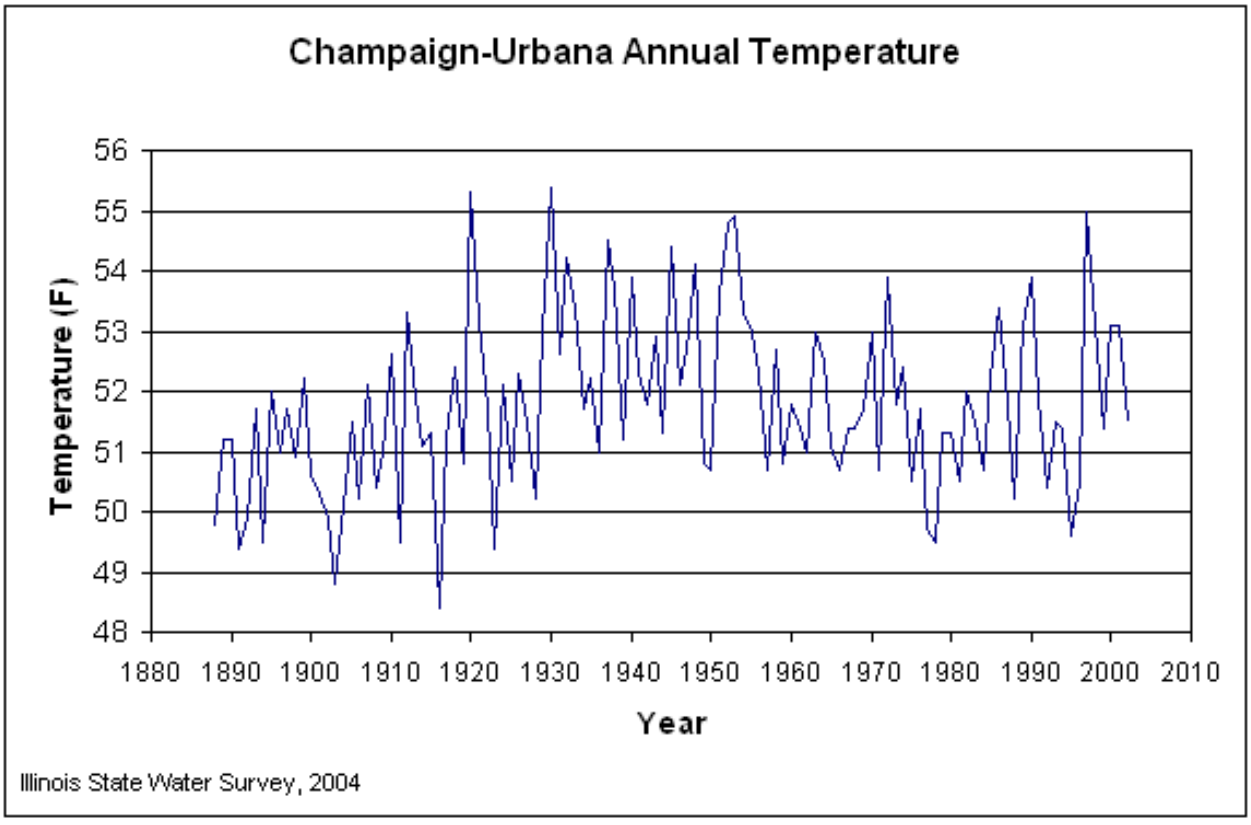
Site

Champaign, IL General Information

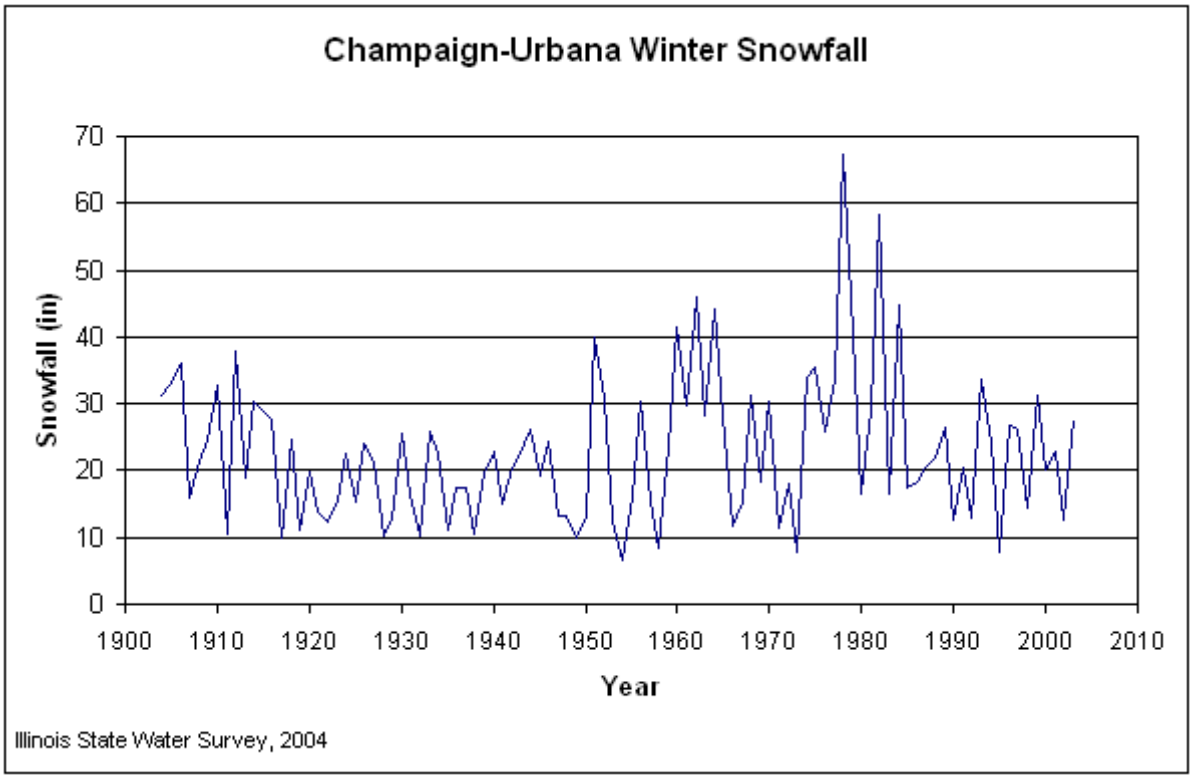
Vegetation and Plant Ecology:
This site is currently used for agricultural purposes and corn cultivation. A undetermined species of mature trees border the northern edge of the site. Native area vegetation will be reintroduced to the site in this project.

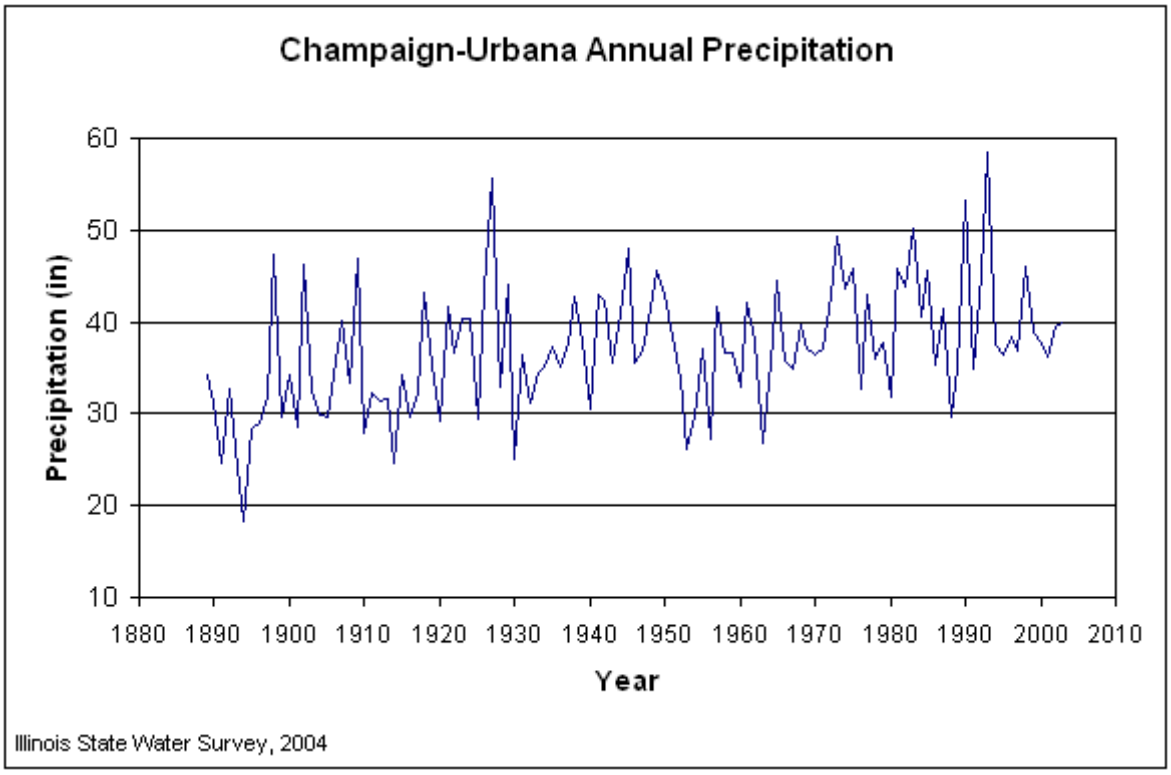
Wildlife and Habitats:
No wildlife was observed on the site during visits, although the area is frequented by many species of forest and prairie wildlife, such as Whitetail Deer, opossum, and fox. 19 endangered species are listed for Champaign county, including the Barn Owl and Franklin's Ground Squirrel.

Climate:
Charts below from the Illinois State Water Survey illustrate Champaign-Urbana's typical precipitation, snowfall, and temperature.



Site


Champaign-Urbana Winter Snowfall
Snowfall (in)
70
60
50
40
30
20
10
0
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year
Illinois State Water Survey, 2004

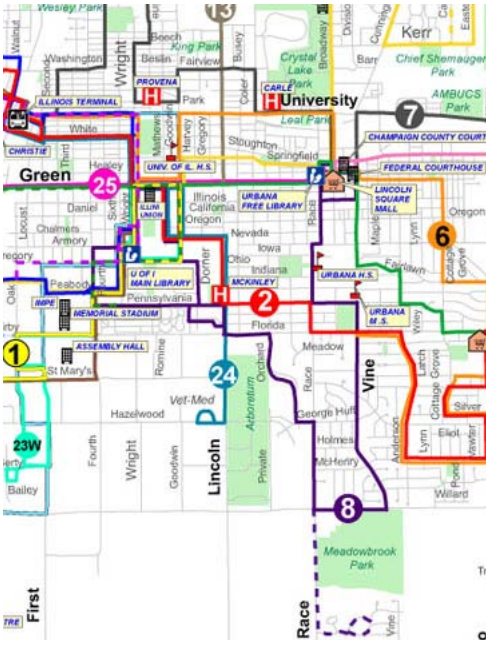

Champaign-Urbana Annual Precipitation
Precipitation (in)
60
50
40
30
20
10
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year
Illinois State Water Survey, 2004

Site

Cultural Factors

Existing Land Use:
Currently the site is used for agricultural purposes.

Traffic and Transit near site:
The site is at the intersection of Race St. and Curtis Rd. Traffic is light in the immediate vicinity, although the roads provide convenient direct access to Urbana and Savoy. A block North is Windsor Rd., a major East-West running road connecting Champaign, the University of Illinois, and Urbana.
Race St. , down to Curtis Road, is serviced by limited bus routes from the Champaign-Urbana Mass Transit District.



Map of bus routes near site. The Orchard Downs 8 (purple line) route connects the site to meadowbrook, Clark– Lindsey, and U of I. Image from cumtd.com

Density and Zoning:
The area surrounding the site is mostly agricultural. Directly North of the site is a small single-family residence neighborhood.

Socioeconomic Factors:
Champaign, as of the 2000 census, was comprised of a population density of 1,534/km^2, a racial makeup of 73.16% White, 15.62% African American, .24% Native American, 6.83% Asian, .03% Pacific Islander, and the rest other.

The median income for a household was $32,795 , for a family $52,628. The per capita income was $18,664, with 22.1% of the population below the poverty line. The 2205 median home value was $131,000.

Aesthetic Factors:

Existing Buildings:
This site has no existing buildings

Historic Factors:
There are no known historical factors associated with the site .

Program and User Needs

Users		Behaviors (What users will do in project)
	Patients	Sleep, therapy, visit with family, attend partial school
	- Children (Ages 5-11)	above + play
	- Adolescents (Ages 12-18)	above + interact with others in age group
	Counselors/Therapists	give therapy/counseling, meet with families
	Nurses	oversee health of patients (combine with desk staff?)
	Pharmacist/Pharmacy staff?	Dispense medications
	Desk Staff	oversee admissions, scheduling, records, phone, visitor waiting
	Security? (may double as desk staff)	ensure people are where they are supposed to be
	Visitors (parents, families)	waiting, counseling, visit patients
	Janitorial/housekeeping?	clean, laundry (if not done by patients)
	Teachers for partial school program?	teach special partial day classes, oversee trips
	Management/Administration	Oversee running of center, hiring, budget
	food service workers	prepare and serve meals

Quantity	Space name/function	Adjacencies	Size (ea)	Total sq ft (all)
22	Private Dormitory rooms for patients w. Bath	Nurse desk, social area	120	2640
11	semi-private baths	bedrooms	70	770
2	living/social areas	bedrooms, nurse desk, (food?)	1000	2000
3	classrooms	possibly food	500	1500
5	private offices/counseling	none essential	150	750
1	computer lab	near teen living area,	340	340
4	desk areas (nurses/admissions/security)	near entrance, =< 1/floor	100	400
1	Exam	near admissions	60	60
1	conference room	near exam, admissions	150	150
1	Head nurse office	Near records, admission	110	110
1	Kitchen / Serving areas	near dining, lounge	500	500
6	public restrooms	scattered	110	660
3	Counseling Suites	near administrative	240	720
3	Administrative offices	near counseling offices	250	750
1	Visiting lounge/ admissions/ waiting	near entrance	1500	1500
8	additional lobby / interaction spaces	scattered	300	2400
2	Special Activity Rooms (events, crafts, plays)	bedrooms, lounges	2000	4000
1	cafeteria/dining area	near lounges/social areas	900	900
1	employee break room (w changning, kitchen)	away from treatment areas	1000	1000
3	Employee restrooms (unisex)	near desk stations, break room	50	150
5	Patient/visitor restrooms	near lounges/social areas	150	750
1	records storage	near admissions	80	80
2	Laundry / Service	Near mechanical, bedrooms	200	400
2	Mechanical	one per wing	400	800
2	Group Meeting/ Therapy Rooms	near public area	300	600
1	Play therapy/Observation room	Near main playrooms/ counseling	180	180
1	young children's playroom	near lounges/social areas	1500	1500

Total Building spaces	25610

Precedents

Sub-Acute Treatment for Adolescent Rehabilitation Services-San Leandro, CA

Architect: John Boerger, The Design Partnership, working with Psychologist and Hospital Administrator Peter Zucker.

Location: San Leandro, CA.

Constructed: 1997 (on 10 acres)

Description of project:

This project provides emotional and behavioral care for adolescents. The design is centered around a courtyard/play area, around which is placed the Psychiatric Health facility (PHF), group home cottages, day treatment program; on site school, and administration/support. The facility houses 16 people in the PHF, and 32 in the group home. The major design features are the group cottages, which allow for a more residential 'attitude' and the landscaped central courtyard, which aids in easy access and visibility from the buildings, and prevents the need for fencing around the outdoor space. According to the Architect's site, this project received a Citation for design excellence from the AIA, Committee on Architecture for Health and Modern Healthcare magazine.

Precedents

Sub-Acute Treatment for Adolescent Rehabilitation Services-San Leandro, CA

Application to thesis:

This project is an informative precedent for this thesis proposal due to the focus on adolescent rehabilitation, outdoor spaces, and the arrangement of treatment spaces. I am particularly interested in the use of the 'cottages' to provide a smaller, more residential feel to an institution, and foster a closer relationship and working ratio between patients and staff. The analysis on the outdoor space is fascinating, in that it specifically mentions the behavioral patterns of the adolescent patients to go to certain areas of the site- it states:

> "A 5 ft graffiti wall, built along the entry ramp to the school, serves as a vertical surface for students to draw on. Because of its height and placement, the wall has also become popular because it is one of the few places where clients can hide from monitor's view. While the staff has had to take extra precautions in monitoring this area, the administration has decided that the wall does not pose enough of a threat to necessitate its removal" (Sachs 275)

View of STARS courtyard and amphitheater steps.
(Image taken from *Healing Gardens*, page 274)

Sketch of the courtyard and surrounding cottages at the STARS campus.
(Drawing by the Design Partnership, San Francisco CA)

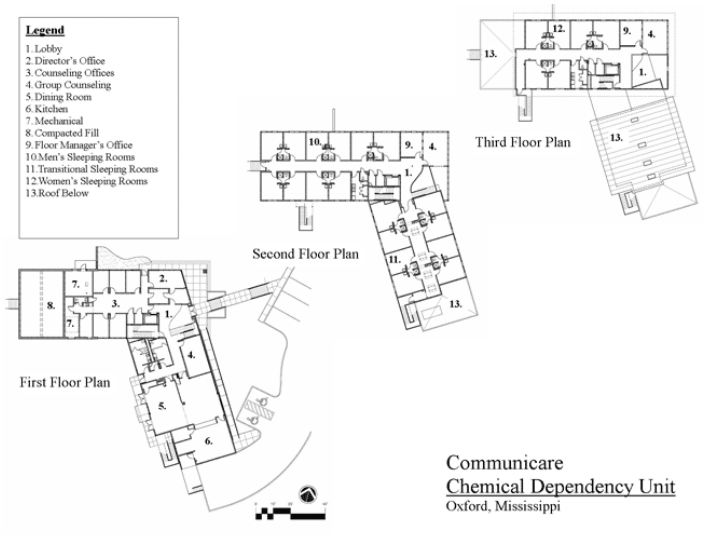
Precedents

Communicare Chemical Dependency Unit- Oxford Miss.

Architect: Howorth & Associates Architects

Location: Oxford, Miss.

Constructed: 2001 (3 acre site)



Images of Communicare Chemical Dependency Unit (Taken from Architectural Record, June 2006)

Description of project:

This is a 14,899 sq. ft. chemical dependency counseling/treatment center with 48 beds. It contains counseling facilities, conference rooms, lounges, dormitory rooms (double occupancy), kitchen, and dining room. The major design challenge with this project was separating the sexes through design rather than creating a lockdown facility.

Application to thesis:

Certain elements of this project that can be applied to this thesis – the site size is about as large as is available in Champaign proper, likewise the size of the project is close to the initial project starting estimate. This example will be useful in determining basic functions necessary per floor in a residential facility, and the concern on how to separate and monitor the sexes could be very relevant with my adolescent population.

Precedents

Burrell Center for Child and Adolescent Development- Springfield MO

Architect: Dennis Spencer, Spencer Architects

Location: Springfield, MO

Constructed: 2004

Description of project:
This is a 46,500 sq. ft. center that offers child psychiatric care, day treatment, play therapy, family therapy, and adolescent substance abuse treatment. The design focused on daylighting aspects, containing many glass curtain walls and skylights. Geometric Shapes and bright furnishing colors were used to appeal to children.

Application to Thesis:

This project is much larger than the proposed thesis, though it offers basically the same set of services. This project caught my eye from the extensive use of glass and geometric shapes, as well as the dramatic cone skylights. Although I would prefer this thesis project to be more residential feeling than this project, this project is an interesting alternative stylistic reference.

Precedents

Timberline Knolls- Lemont, Illinois

Architect: Not Found

Location: Lemont, Illinois

Constructed: 2006 (43 acre site)

Description of project:

This project provides emotional health services for teenage women 12 to 21 years old, for time periods of 1-3 months. Programs and services include: Counseling, group and family therapy, fine art and movement therapy (artistic expression and dance), an equine program, physical health classes, chef designed menus, and an on site academy. Treatments are available for eating disorders, substance abuse, mood disorders, self-injuring, social issues, and post-traumatic stress disorder. It is designed to look and feel residential in nature, with fireplaces and separate lodges for different patient groups (4 each with 28 beds). Unfortunately, the articles referencing this facility do not provide information regarding architectural analysis, however, it appears to have many common elements with this proposed thesis project.

Application to thesis:

This project is similar to the proposed thesis in scope of treatment services and target age group. Although supporting a much larger number of patients (and extra patient services) than would be appropriate for this thesis project, the services available and adolescent focused design are very applicable. Located near Chicago, it is also near enough to undertake multiple visits if necessary for reference material. Ideally, a site visit would be undertaken over Summer break and additional information gathered on adolescent centered design.

Precedents

Rosencrance Griffin Williamson Adolescent Campus (Adolescent Substance Abuse Treatment Center) – Rockford, IL

Architect: Larson & Darby Group

Location: Rockford, Illinois

Constructed: 2004

Description of project:

A 68,000 sq. ft / 78 bed project, the Rosecrance Health Network Adolescent Substance Abuse center is set on a 50 acre wooded site. The design intent was to create a less institutional setting, and focus on natural views and access. One technique through which this was accomplished was by spreading out living spaces on the site into three wings, which have interior private courtyards containing 'Healing Gardens', with one, the Serenity Garden, design by renowned landscape architect Hoichi Kurisu. Hallways are curved with views of the garden to prevent monotony. The exterior is finished in stone and wood, again, leading to more of a lodge or residential feel. The facilities include a gym, fitness center, lounges, chapel, school, and support spaces.

Application to thesis:

The focus of this project on outdoor spaces, views, and healing gardens complements one of the goals of this thesis project – to include outdoor "healing gardens", and maximize natural views. This precedent also focuses on adolescent treatment, and is located within travel distance for a visit and interview meeting over the summer break. The use of wood and natural materials is also a technique that would be well suited for this thesis project.

Life Safety and Accessibility

Building occupancy classifications

Uses of this building will include Offices, Counseling, and overnight accommodations for patients. It is possible that medical treatments will be conducted via prescription medications. It is possible that physical restraints or lockdown procedures may be used, but I feel this facility would have more emphasis on psychological methods of treatment, thus, I believe patients would be capable of exiting under emergency situations without special assistance. This would put the main classification under **Institutional Group 1**, with "more than 16 people living under supervised conditions on a 24 hour basis that can respond to emergencies with little or no assistance from staff… such as halfway houses and group homes" (26). I-2 would include hospitals; a more severe mental health facility in a hospital would fall under I-3.

Building heights and areas

Appendix 1 - Table from page 400 of The Architect's Studio Companion by Edward Allen.

The minimum requirement for a group I-1 building is type III-B (mixed system) construction is a 3story building with 10,000 sq. ft per floor, and max building height of 55'. With an approved sprinkler system, it ups to 4 floors with up to 30,000 sq. ft per floor, and max building height of 75'.

Interior finishes

Appendix 2 – Page from Building Codes Illustrated (106-107) showing classification chart of Flame Spread Index, and application.

Typically the lower the number for each measurement, the slower the flames spread and the less smoke is generated. Once materials are tested, they are classified as A, B or C. The classifications, per § 803.1 are:

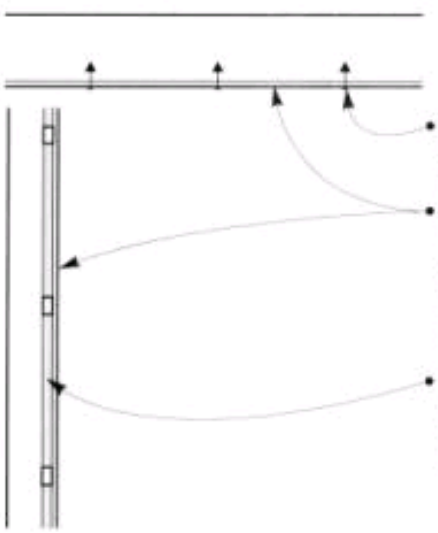
	Flame-Spread Index	Smoke-Developed Index
Class A	0–25	0–450
Class B	26–75	0–450
Class C	76–200	0–450

Life Safety and Accessibility

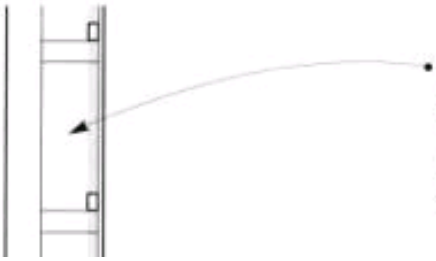
Application

§ 803.3 governs the application of materials over walls or ceilings required to be fire-resistance rated or of noncombustible construction.

Where materials are set off from fire-resistive construction by more than the distances noted, the finish materials must be Class A except where sprinklers protect both the visible and the concealed side of the finish materials.



- § 803.2 requires finish materials be securely attached so that they will remain in place for at least 30 minutes at 200°F (93°C).
- § 803.3 states that wall and ceiling finishes in fire-resistance-rated or noncombustible construction must be placed directly against the backing material, or the spaces behind must be furred with furring strips less than 1-3/4" (44.5 mm) deep.
- The spaces between the furring strips filled with fire-resistive inorganic or Class A materials, or the furring must be fire-blocked every 8' (2438).



- Alternately, where stand-off finishes are desired without sprinklers, a second layer of noncombustible construction may be used to build out the walls with furring as noted above when it is not feasible to sprinkler both sides of the set-out.

Finish type is determined by occupancy with or without sprinkler systems, with egress paths requiring a higher classification of finish materials. As an institutional building, this project would most likely fall under the most stringent class of finishes of Class A, with a Flame Spread Index of 0-25.

Floor finishes for an I-1 sprinkler-ed building should consist of FF1 materials. (Chart below)

	Unsprinklered		Sprinklered	
	Vertical Exits Exit Passageways Exit Access Corridors	All Other Areas	Vertical Exits Exit Passageways Exit Access Corridors	All Other Areas
Occupancy				
I-2, I-3	Class I	FF-1	Class II	FF-1
A, B, E, H, I-4 M, R-1, R-2, S	Class II	FF-1	FF-1	FF-1

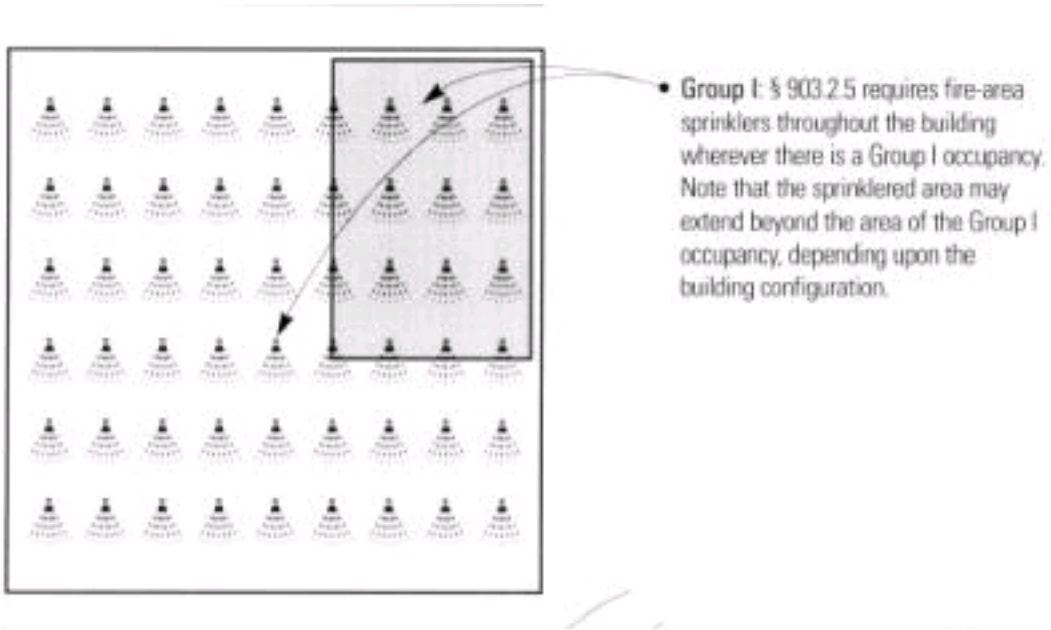
Life Safety and Accessibility

Foundation, wall, and roof construction

Minimum requirement is for a type III-B mixed system construction utilizing both combustible and non-combustible materials.

Fire protection systems (sprinkler system requirements and design)

For I-1 Occupancy:Device type – Manual Fire Alarm, detectors in each sleeping room



903.25 – an automatic sprinkler system shall be provided throughout buildings with a group I fire area, although a system installed in accordance with section 903.3.1.2 or 903.3.1.3 shall be allowed in Group I-1 facilities.

For I-1 buildings, manual fire alarm boxes in patient sleeping areas shall not be required at exits if located at all nurse's control stations, provided such stations are visible and continuously accessible. Corridors and habitable spaces other than sleeping units and kitchens and waiting areas that are open to corridors shall be equipped with an automatic smoke detection system. Required to have units in each sleeping room and on the ceiling or wall outside of each sleeping area.

Life Safety and Accessibility

Materials used in construction

Minimum requirement is for a type III-B mixed system construction utilizing both combustible and non-combustible materials.

Elevators and escalators

Elevators may be used as a means of egress when provided with emergency power and with operation and signal devices per 211, and is required in buildings with four or more stories.

Elevators, Escalators and Moving Walks

§ 1003. 2.9 does not permit any of these modes of transportation to be used as components of a means of egress. The only exception is for elevators per § 1003.2.13.3, where they are provided with emergency power and also with operation and signal devices per § 211 of ASME A17.1.

Elevators must be accessible with minimum dimensions of 5’8” by 4’3” with at least a 3’ entrance. (diagram in appendix).

Already existing structures

This project would be built separate from existing structures.

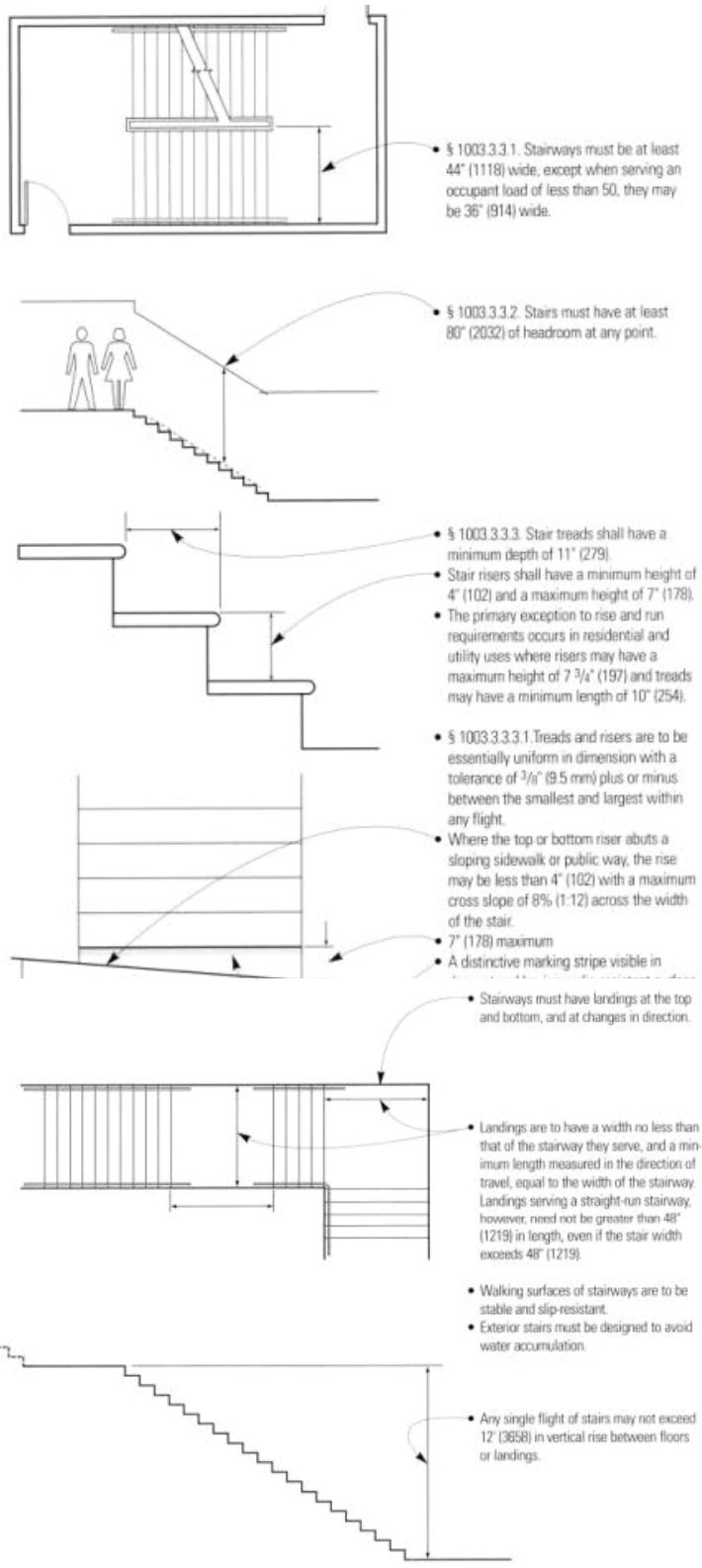
Means of egress

Exit-access travel distance: In I-1, with an automatic sprinkler system, the allowable exit access travel distance is from 250 to 300 feet. (page 166 BCI)

Two exits shall be provided per story.

Corridor width – Not less than 44” excepting for access to mechanical systems (24”), occupancies less than 50 persons or dwelling unit (36”), Dead ends in corridors should be no more than 20’ in length.

Life Safety and Accessibility



Stairways- not less than 44” wide excepting for occupancy under 50 persons, in which it may be 36” wide. At this point, this project will be assuming occupancy above 50 persons. Stairs must have at least 80” of headroom, stair risers closed.

There must be landings at the top, bottom, and at any changes of direction of the stairs with the length equal to the width of the stairway.

Any single run of stairs may not exceed 12’ vertical rise in between floors or landings.

Life Safety and Accessibility

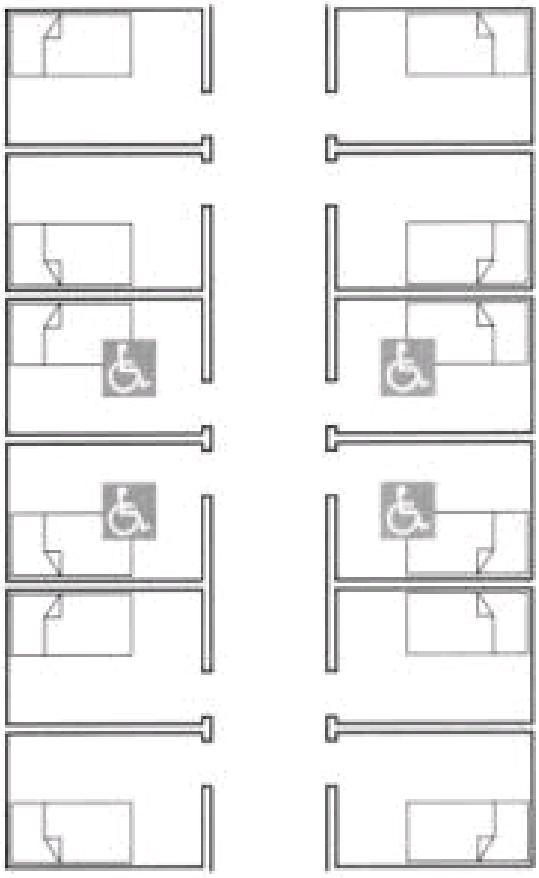
Accessibility

Sleeping areas:
This project will have at least 5 %, if not all, of the sleeping areas accessible.

SPECIAL OCCUPANCIES

Group I Occupancies

Group I occupancies have detailed special requirements that recognize the institutional nature of this occupancy group. Typically, the requirements for the number of accessible spaces is higher than for other occupancies as these facilities have a higher proportion of people with disabilities than other occupancies. Where facilities specialize in treatment of conditions affecting mobility, up to 100% of the rooms may be required to be accessible.



Life Safety and Accessibility

Egress and Accessibility:

This project will provide areas of refuge for persons unable to navigate stairs to await assistance during emergency egress. As this building type is required to be fully sprinkler-ed, the 48” width requirement for stairway egress is not applicable; though designing to this criterion may give an extra measure for life-safety. (Illustrations of refuge areas and stair width below)

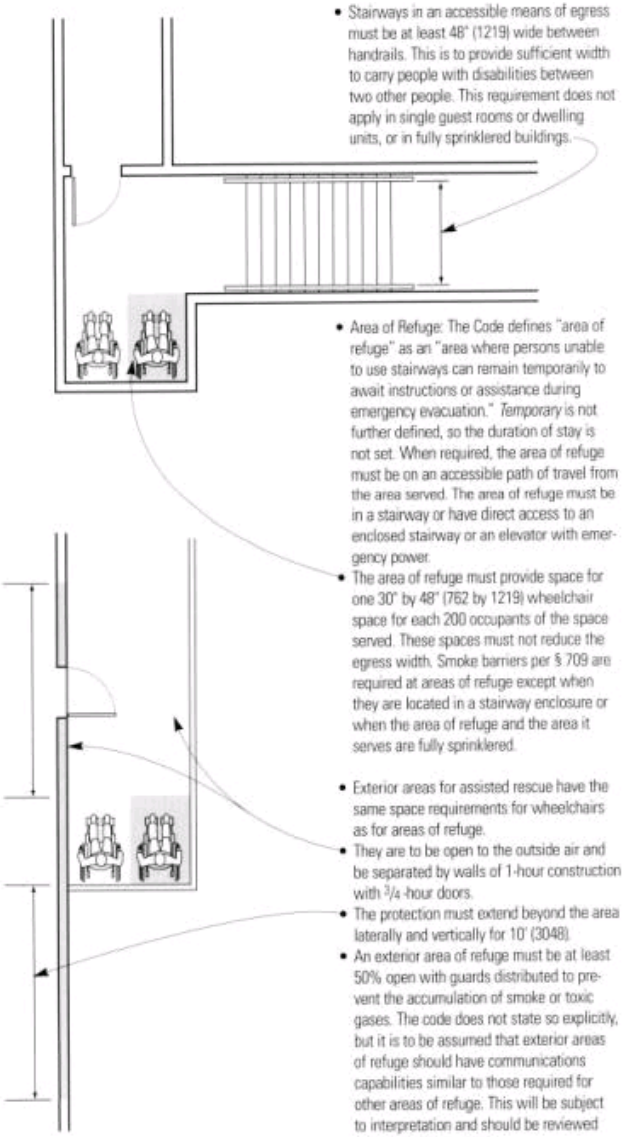
Accessible Means of Egress

§ 1003.2.13 addresses the egress requirements for people with disabilities. The basic requirement is that accessible spaces in a building must have an accessible means of egress.

Where more than one means of egress is required, based on occupancy or occupant load, then at least two accessible means of egress are to be provided. Note that this requirement for two accessible means of egress applies even when three or more exits may be required based on occupant load. This provision applies only to new construction; it is not required for alterations to existing buildings, although work in altered areas must comply with code requirements for the altered area.

For buildings with four or more stories, one accessible means of egress is to be provided by elevator with standby power and signal devices per § 1003.2.13.3. This section seems to reduce the floor elevation threshold for fully sprinklering buildings.

- Because an area of refuge is defined as being a place to await instruction, two-way communications are required between the area of refuge and a central control point, or via a public telephone if the central control is not continuously attended. The communications shall be both visual and audible.



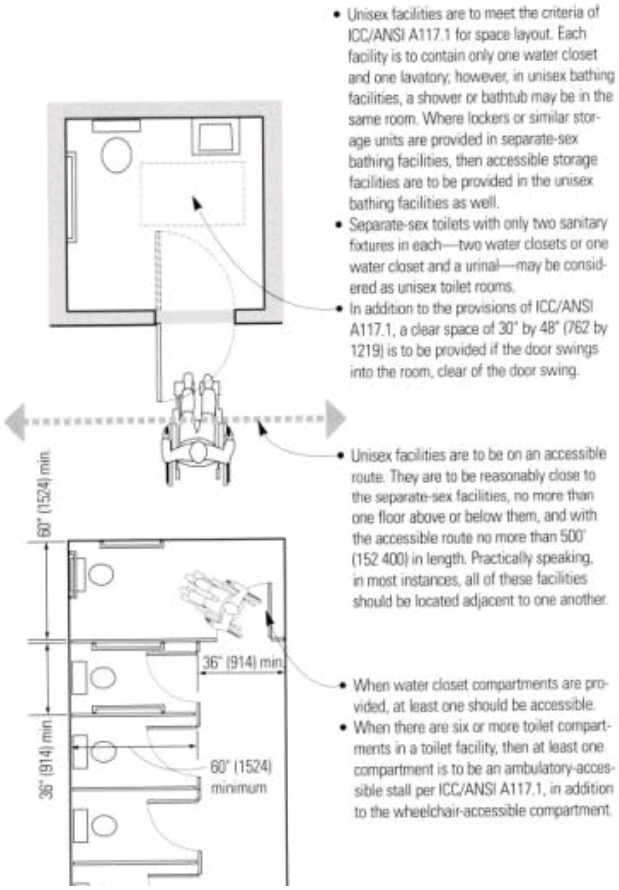
- Stairways in an accessible means of egress must be at least 48" (1219) wide between handrails. This is to provide sufficient width to carry people with disabilities between two other people. This requirement does not apply in single guest rooms or dwelling units, or in fully sprinklered buildings.
- Area of Refuge: The Code defines "area of refuge" as an "area where persons unable to use stairways can remain temporarily to await instructions or assistance during emergency evacuation." *Temporary* is not further defined, so the duration of stay is not set. When required, the area of refuge must be on an accessible path of travel from the area served. The area of refuge must be in a stairway or have direct access to an enclosed stairway or an elevator with emergency power.
- The area of refuge must provide space for one 30" by 48" (762 by 1219) wheelchair space for each 200 occupants of the space served. These spaces must not reduce the egress width. Smoke barriers per § 709 are required at areas of refuge except when they are located in a stairway enclosure or when the area of refuge and the area it serves are fully sprinklered.
- Exterior areas for assisted rescue have the same space requirements for wheelchairs as for areas of refuge.
- They are to be open to the outside air and be separated by walls of 1-hour construction with $^{3}/_{4}$-hour doors.
- The protection must extend beyond the area laterally and vertically for 10' (3048).
- An exterior area of refuge must be at least 50% open with guards distributed to prevent the accumulation of smoke or toxic gases. The code does not state so explicitly, but it is to be assumed that exterior areas of refuge should have communications capabilities similar to those required for other areas of refuge. This will be subject to interpretation and should be reviewed carefully with the AHJ.

(From BCI, 150)

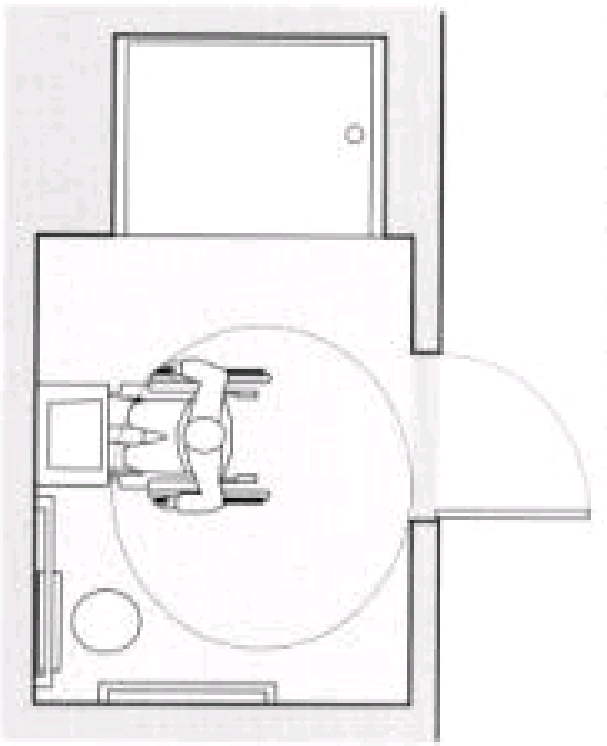
Life Safety and Accessibility

Accessibility and Restrooms:

At least one of each type of fixture per restroom is required to be accessible. All Unisex restrooms will be designed with accessibility space layouts.



Accessible unisex restroom and water closet compartment layouts. (BCI 204)



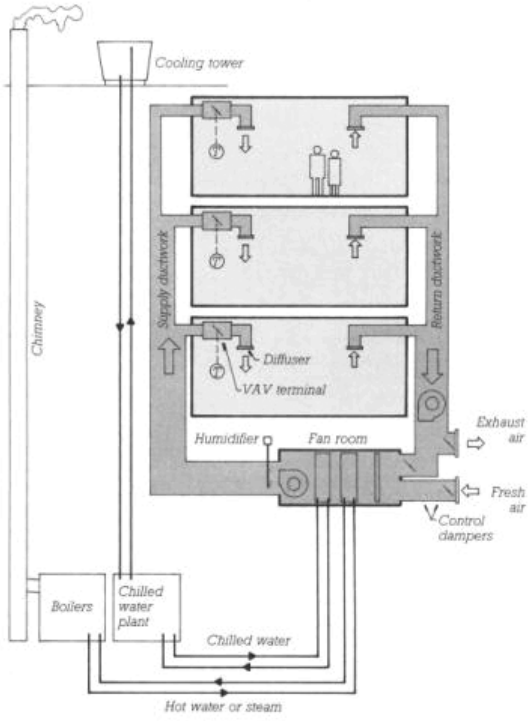
Accessible restroom with bathing facilities (BCI 203)

Building Systems Integration

Mechanical Systems:

The page below right illustrates guidelines in choosing a mechanical system for a building according to the specific needs of that building. For this project, priorities in air handling will be to maximize efficiency, minimize cost, and minimize noise for a quieter environment. According to this chart from page 140 of *The Architect's Studio Companion,* types of systems that should be consider are Variable Air Volume, Single Duct, constant air volume, closed-loop heat pump, and Hydronic convectors.

Page 144 of the same book, also illustrated at right, charts type of systems commonly installed by building type. Looking at both the hospital and dormitory rows, VAV is commonly installed for both types. The advantages of this type of system include amount of control over local temperature, and that it is self-balancing and economical. The disadvantage is that is cannot handle a zone that needs heating at the same time as one that requires cooling without additional systems.



VAV air system, from p148 of *The Architect's Studio companion*

SOME TYPICAL CHOICES OF HEATING AND COOLING SYSTEMS FOR LARGE BUILDINGS

OCCUPANCY	Variable Air Volume (VAV) (page 148)	VAV Reheat (page 149)	VAV Induction (page 149)	Dual-Duct VAV (page 149)	Single Duct, Constant Air Volume (CAV) (page 150)
Apartments					
Arenas, Exhibition Halls	●*				●*
Auditoriums, Theaters*	●				●
Factories	●*	●			●*
Hospitals	●	●		●	
Hotels, Motels, Dormitories	●				
Laboratories	●	●		●	●

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DESIGN CRITERIA FOR THE SELECTION OF HEATING AND COOLING SYSTEMS FOR LARGE BUILDINGS

If you wish to minimize first cost of the heating and cooling system:	Choose the simplest possible all-air system: Single duct, constant air volume (pages 150–151) or choose a system that involves no ductwork or piping: Through-the-wall and packaged terminal units (page 158)
If you wish to minimize operating cost:	Choose systems that convert fuel to heating and cooling energy with maximum efficiency: Variable air volume (pages 148–149) Single duct, constant air volume (pages 150–151) Hydronic convectors (pages 156–157) or choose a system that uses ambient heat from the surrounding environment: Closed-loop heat pump system (page 155)
If you wish to maximize control of air quality and air velocity:	Choose one of the all-air heating systems: Variable air volume (VAV) (pages 148–149) VAV reheat (page 149) VAV induction (page 149) Dual-duct VAV (page 149) Single duct, constant air volume (pages 150–151) Multizone (page 151)
If you wish to maximize individual control over temperature in a number of rooms or zones:	Choose a system that can react separately to a number of thermostats: Variable air volume (VAV) (pages 148–149) VAV reheat (page 149) VAV induction (page 149) Dual-duct VAV (page 149) Constant air volume reheat (page 151) Multizone (page 151) Air-water induction (pages 152–153) Fan-coil terminals (page 154) Through-the-wall and packaged terminal units (page 158)
If you wish to minimize system noise:	Choose a system that operates at low air velocities and whose moving parts are distant from the occupied spaces, such as: Any all-air system other than an induction system (pages 148–151)

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Considerations for choosing heating and cooling systems. From *The Architect's Studio Companion*

Building Systems Integration

Mechanical Equipment Spacing and Location:

Mechanical equipment rooms and vertical shafts typically occupy between 3 and 10 percent of the building's floor plan area.

Central Equipment typically located in basement or on roof to isolate noise and can be easily accessed. Placing in basement is less problematic structurally, but placing on roof allows for sinking of heat and unlimited headroom. For this project , placement in basement is likely.

The Illustrations below indicate distribution layout of HVAC systems, and the typical layout of a boiler room.

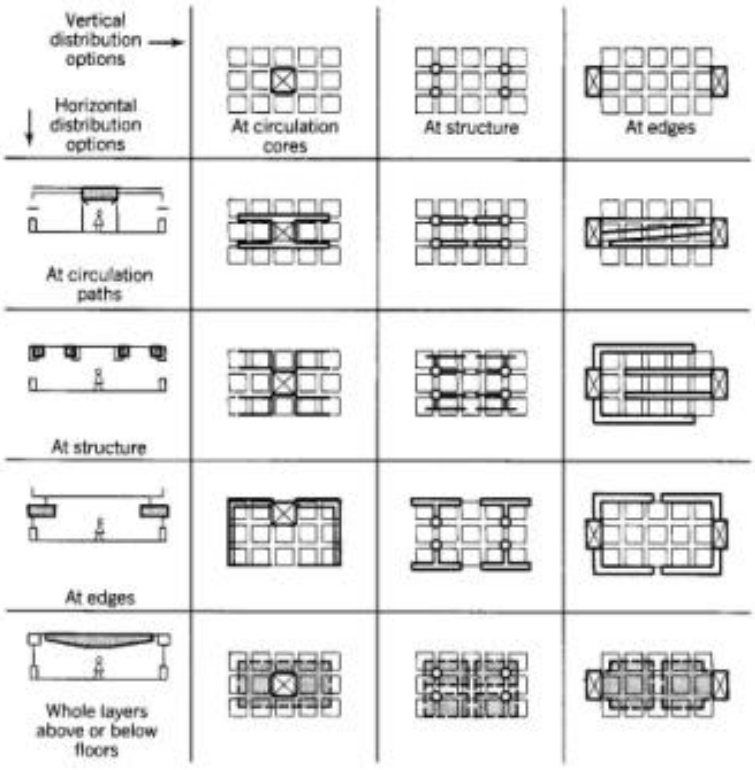
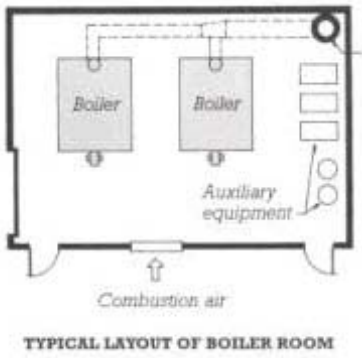


Fig. 10.9 Distribution tree placement options, both vertical (with impact on the plan) and horizontal (with impact on the section). (From class notes developed by G.Z. Brown, University of Oregon.)

Distribution Options (from *Mechanical and Electrical Equipment for Buildings 380)*:



TYPICAL LAYOUT OF BOILER ROOM

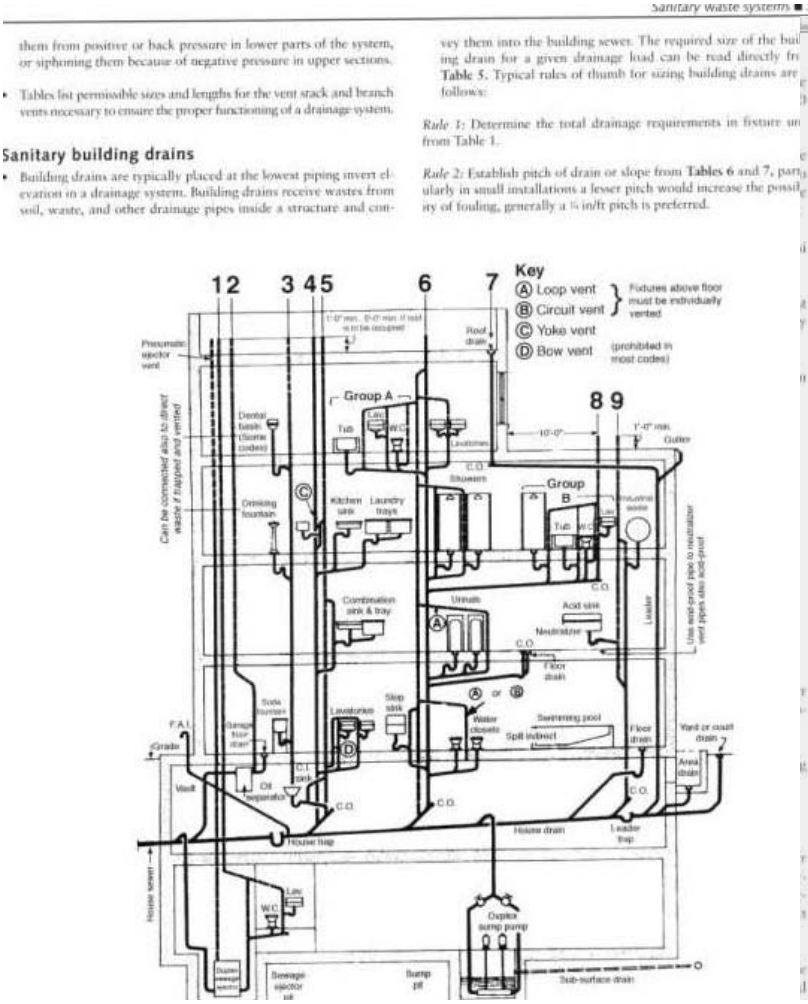
Typical Layout of Boiler Room. From *The Architect's Studio Companion p 160*

Building Systems Integration

Plumbing:

For an institutional, residential care facility, the minimum number of facilities are as follows: Water Closets—1 per 10 people; Lavatories– 1 per 10; Showers—1 per 8; Drinking fountains– 1 per 100, and one service sink. For a rough estimation of an average of 30 patients, 20 staff, and 10 visitors at any time, this project would require at least 6 W.C., 6 Lavs, 7 showers, and one drinking fountain. This project is planned to exceed the minimum requirements.

Below is illustrated a drainage system layout and estimator for daily water requirements for a building, based on the requirements for a boarding school, an institution such as the one proposed would use roughly 75-100 gallons of water per person, per day. This information may be used to size the water systems.



Drainage system for a commercial building, illustrating connections and slopes of piping. From *Building Codes Illustrated.*

Table 1. Design criteria for daily water requirements based on building occupancy

Source: International Plumbing Code (2003)

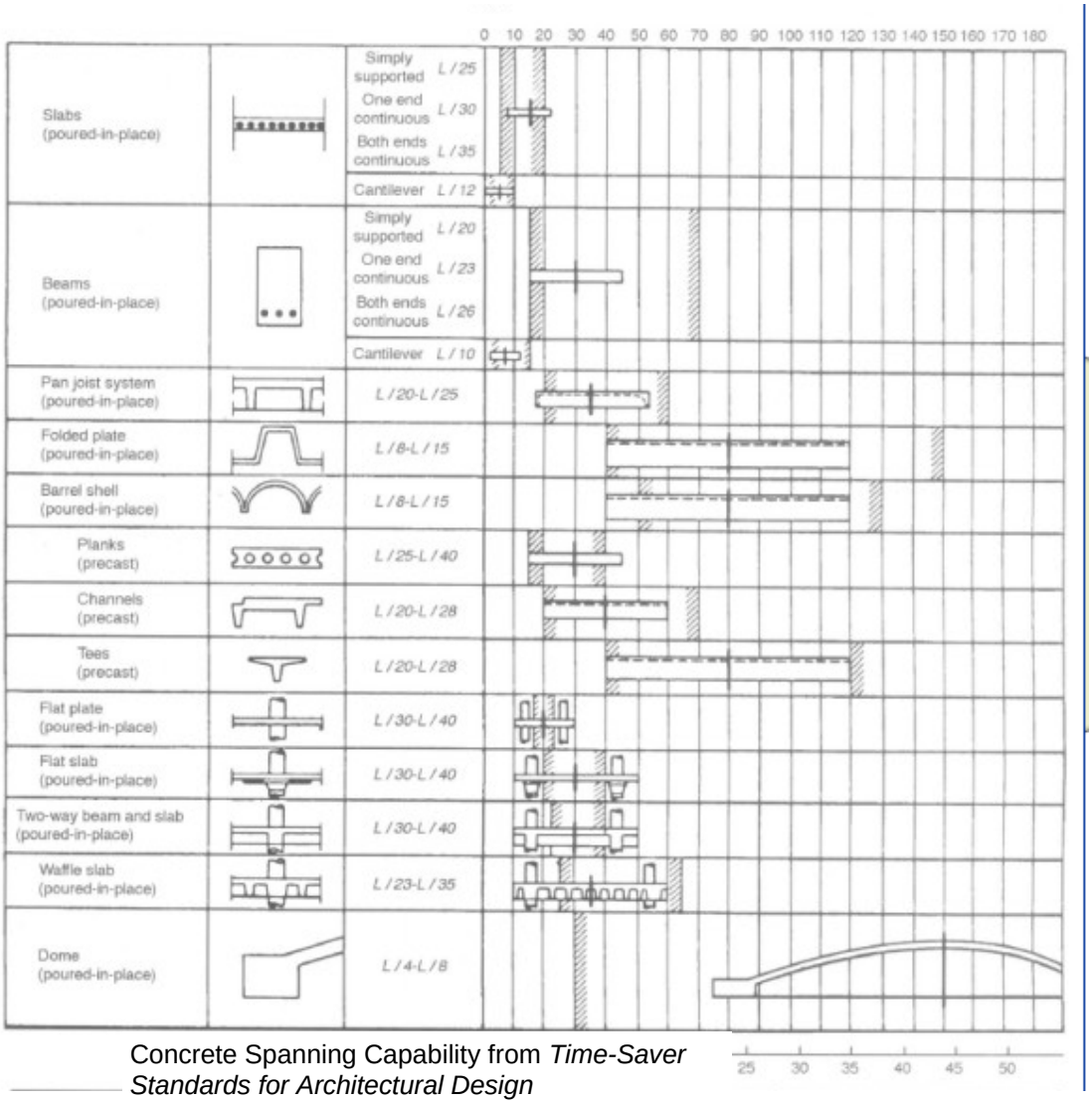
Type of occupancy	*Minimum quantity of water per person per day in gallons (or as indicated)*
Small dwelling and cottages with seasonal occupancy	50
Single family dwellings	75
Multiple family dwellings (apartments)	60
Rooming houses	40
Boarding houses	50
Additional kitchen usage for nonresident boarders	10
Hotels without private baths	50
Hotels with private baths (2 persons per room)	60
Restaurants (toilet and kitchen usage per patron)	7 to 10
Restaurants (kitchen usage per meal served)	2 1/2 to 3
Additional for bars and cocktail lounges	2
Tourist camps or trailer parks with central bathhouse	35
Tourist camps or mobile home parks with individual bath units	50
Resort camps (night and day) with limited plumbing	50
Luxury camps	100 to 150
Work or construction camps (semipermanent)	50
Camp (with complete plumbing)	45 (Ind.w.s.)
Camp (with flush toilets, no showers)	25 (Ind.w.s.)
Day camp (no meals served)	15
Day schools, without cafeteria, gymnasiums, or showers	15
Day schools with cafeterias, but no gymnasiums or showers	20
Day schools with cafeterias, gymnasiums and showers	25
Boarding schools	75 to 100
Day workers at schools and offices (per shift)	15
Hospitals (per bed)	150-250
Institutions other than hospitals (per bed)	75 to 125
Factories (gallons per person per shift, exclusive of industrial wastes)	15 to 35
Picnic parks [toilet usage only (gallons per picnicker)]	5
Picnic parks with bathhouses, showers and flush toilets	10
Swimming pools and bathhouses	10
Luxury residences and estates	100 to 150
Country clubs (per resident member)	100
Country clubs (per nonresident member)	25
Motel (per bed space)	40
Motels with bath, toilet, and kitchen range	50
Drive-in theaters (per car space)	5
Movie theaters (per auditorium seat)	5

Daily water requirements for building based on occupancy. From *Building Codes Illustrated.*

Building Systems Integration

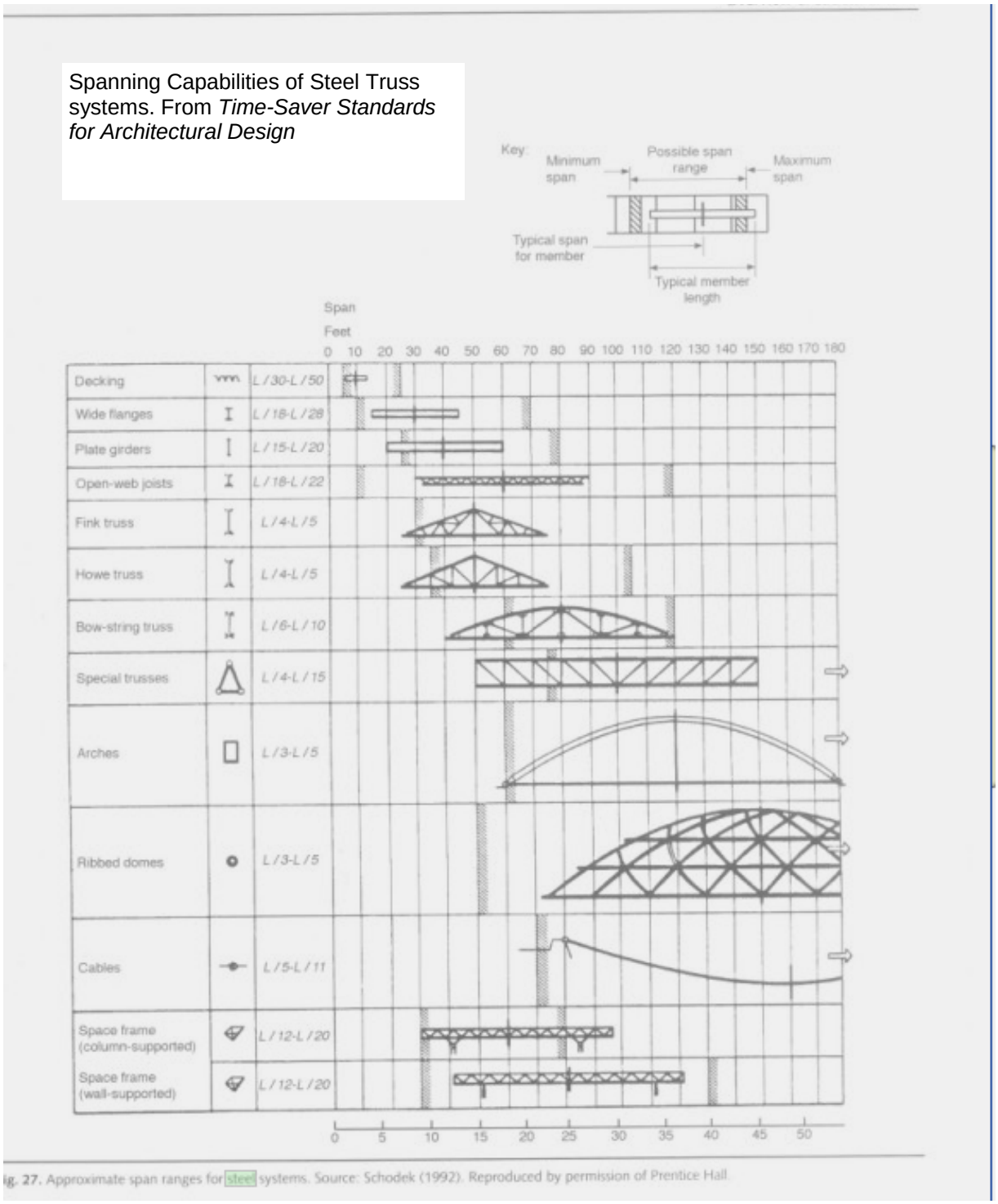
Structural Spanning Capabilites:

Type of Structure used determines Floor to Floor height, column spacing, and bays. Area in between floors for a concrete slab type structure can be minimized, as the structure is only 7-9in thick and can be used as the finished ceiling. Trusses and steel are normally between 10-15 in deeper, and often are covered by a hung ceiling. (Source http://media.wiley.com/product_data/excerpt/26/04712267/0471226726.pdf. Page 3) However, a hung ceiling with truss structure allows for mechanical and electrical equipment to be ran through openings and easily accessed. For this project, either a steel truss or a concrete flat-plate system will be used, due to the need for non-combustible building structure. Spans for this type of building will not be with a max span of 40’ or less in the cafeteria and gym.



Concrete Spanning Capability from *Time-Saver Standards for Architectural Design*

Spanning Capabilities of Steel Truss systems. From *Time-Saver Standards for Architectural Design*

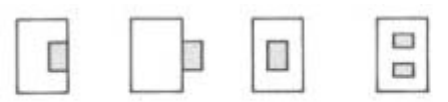


g. 27. Approximate span ranges for steel systems. Source: Schodek (1992). Reproduced by permission of Prentice Hall.

Building Systems Integration

Service Core Placement:

Service core placement characteristics and considerations are shown in the chart below. For this thesis, rental area size and flexibility is not a concern. Day lighting and clear circulation, however, are priorities. With these priorities, the best core placements according to this resource are having two separate, interior cores, or a detached, exterior core. Corner cores also is rated higher in day lighting, and medium in circulation clarity, warranting consideration. Further research into this area will be done at a later time, when space planning is underway.



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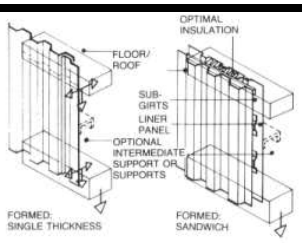
CHARACTERISTICS OF CORE PLACEMENTS

1 = Best 5= Worst	Edge	Detached	Central	Two	Corners	Scattered
Flexibility of typical rental areas	2	1	3	4	2	5
Perimeter for rental areas	4	3	1	1	5	2
Ground floor high-rent area	3	1	3	4	2	5
Typical distance of travel from core	4	5	2	1	3	3
Clarity of circulation	3	4	2	1	3	5
Daylight and view for core spaces	2	1	5	5	1	4
Service connections at roof	3	4	2	1	5	3
Service connections at ground	3	4	2	1	5	3
Suitability for lateral bracing	4	5	1	1	2	3

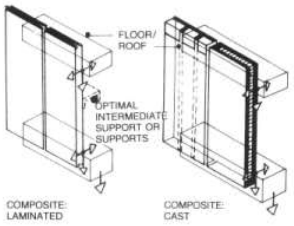
Service Core placement characteristics. From *The Architect's Studio Companion*.

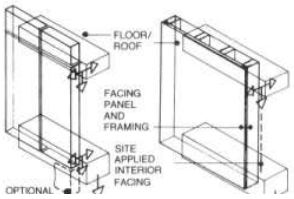
Building Systems Integration



Curtain Wall Systems:

Linear Channel Glazing is a translucent system of structural glass that obscures direct sight into the building, but still allows natural day lighting into spaces. It uses glass channels in an extruded metal frame, reduces noise transmissions, and can be used in curved or serpentine walls. It is unlikely that this thesis would use a large scale curtain wall or structural glass system, but the possibility exists for smaller-scale use. The translucent Linear Channel Glazing would work well in areas where privacy would be a concern, yet including daylight is necessary, such as restrooms and some counseling spaces.



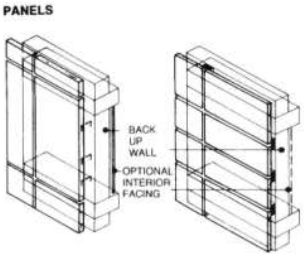


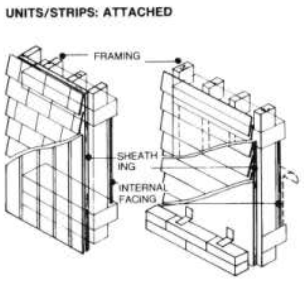
Curtain wall system details, above, and cladding below, from *Time-Saver Standards for Architectural Design*

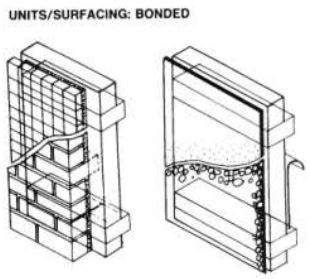
Photos of Linear channel glazing and structural glass systems. From:http://www.tgpamerica.com/structural_glass/profilit.asp

Cladding:

For this project, since one goal is to create a residential feel rather than institutional, cladding and exterior appearance is an important element in the perception of the facility. Due to this, all effort will be given to use cladding materials in a way that will blend in with any surrounding residential areas while still retaining the necessary fire ratings. One cladding type that fits these requirements is brick veneer, illustrated at right.







Sustainability

Sustainability:
Figure 1: Free or Low- Cost strategies for Sustainable Design:

Site & Design	Water Efficiency	Energy Efficiency	Materials/ Resources	Indoor Air Quality
* maximize glazing on N & S side *Reduce Parking *Install secure bi-cycle parking *Provide pedestrian friendly pathways *Install motion sensors on site lighting	*Design drought tolerant landscapes *Design for natural stormwater management	*Design opening for natural ventilation *Specify a "cool roof" *Specify ceiling fans *Hydronic heating systems *Low-e double glazed windows *Energy Star appli-ances	*Replace 30% of Portland cement with flyash *Engineered lumber *Recycled content carpet and insula-tion *Efficient framing techniques such as studs 24"o.c. *Local materials *Recycle construc-tion and demolition waste	*Low-or No-VOC paint *Use products withou formaldehyde *vent bathrooms and range hood to outsid *No formaldehyde in-sulation *Carbon Monoxide de-tectors

LEED Certification:

The U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) rating system provides 5 categories in which a building is assessed and scored. These areas are sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. Although there are not a specific LEED guidelines set up for Institutional/Healthcare settings, the LEED guidelines for new construction will be referenced for this project and applied where possible (figure 2).

Energy and Water Conservation:

As shown in figure 1, some strategies available to conserve water include designing the landscaping to use the least amount of additional maintenance and watering possible, through use of native vegetation and drought resistant plans. Storm water management, providing natural pathways for water to drain into natural ground is ideal to prevent over reliance on artificial drainage systems, and allow for plants and soils to natural filter and drain water back into local aquifers.

To conserve energy, options available include use of passive heating, cooling, and ventilation techniques (Figures 3 and 4); use of a "cool" or green roof that moderates the flow of heat through the top of a building, use of ceiling fans, hydronic heating systems, energy-saving Low-e double glazed windows, and Energy Star brand appliances, which use less energy to run than standard appliances.

Figure 2: LEED project checklist for New Construction, illustrating breakdown of points available in five categories.

Project Checklist

Sustainable Sites — 14 Possible Points

Prereq 1	**Construction Activity Pollution Prevention**	Required
Credit 1	**Site Selection**	1
Credit 2	**Development Density & Community Connectivity**	1
Credit 3	**Brownfield Redevelopment**	1
Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
Credit 4.3	**Alternative Transportation**, Low Emitting & Fuel Efficient Vehicles	1
Credit 4.4	**Alternative Transportation**, Parking Capacity	1
Credit 5.1	**Site Development**, Protect or Restore Habitat	1
Credit 5.2	**Site Development**, Maximize Open Space	1
Credit 6.1	**Stormwater Design**, Quantity Control	1
Credit 6.2	**Stormwater Design**, Quality Control	1
Credit 7.1	**Heat Island Effect**, Non-Roof	1
Credit 7.2	**Heat Island Effect**, Roof	1
Credit 8	**Light Pollution Reduction**	1

Water Efficiency — 5 Possible Points

Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
Credit 2	**Innovative Wastewater Technologies**	1
Credit 3.1	**Water Use Reduction**, 20% Reduction	1
Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Energy & Atmosphere — 17 Possible Points

Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Prereq 2	**Minimum Energy Performance**	Required
Prereq 3	**Fundamental Refrigerant Management**	Required
Credit 1	**Optimize Energy Performance**	1–10
Credit 2	**On-Site Renewable Energy**	1–3
Credit 3	**Enhanced Commissioning**	1
Credit 4	**Enhanced Refrigerant Management**	1
Credit 5	**Measurement & Verification**	1
Credit 6	**Green Power**	1

Materials & Resources — 13 Possible Points

Prereq 1	**Storage & Collection of Recyclables**	Required
Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
Credit 1.2	**Building Reuse**, Maintain 95% of Existing Walls, Floors & Roof	1

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Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
Credit 3.1	**Materials Reuse**, 5%	1
Credit 3.2	**Materials Reuse**, 10%	1
Credit 4.1	**Recycled Content**, 10% (post-consumer + 1/2 pre-consumer)	1
Credit 4.2	**Recycled Content**, 20% (post-consumer + 1/2 pre-consumer)	1
Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regionally	1
Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regionally	1
Credit 6	**Rapidly Renewable Materials**	1
Credit 7	**Certified Wood**	1

Indoor Environmental Quality 15 Possible Points

Prereq 1	**Minimum IAQ Performance**	Required
Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Required
Credit 1	**Outdoor Air Delivery Monitoring**	1
Credit 2	**Increased Ventilation**	1
Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
Credit 5	**Indoor Chemical & Pollutant Source Control**	1
Credit 6.1	**Controllability of Systems**, Lighting	1
Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
Credit 7.1	**Thermal Comfort**, Design	1
Credit 7.2	**Thermal Comfort**, Verification	1
Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Innovation & Design Process 5 Possible Points

Credit 1.1	**Innovation in Design**	1
Credit 1.2	**Innovation in Design**	1
Credit 1.3	**Innovation in Design**	1
Credit 1.4	**Innovation in Design**	1
Credit 2	**LEED Accredited Professional**	1

Project Totals 69 Possible Points

Certified 26–32 points Silver 33–38 points Gold 39–51 points Platinum 52–69 points

Passive Energy Systems:

Passive heating and cooling design strategies shown below in figures 2 and 3:

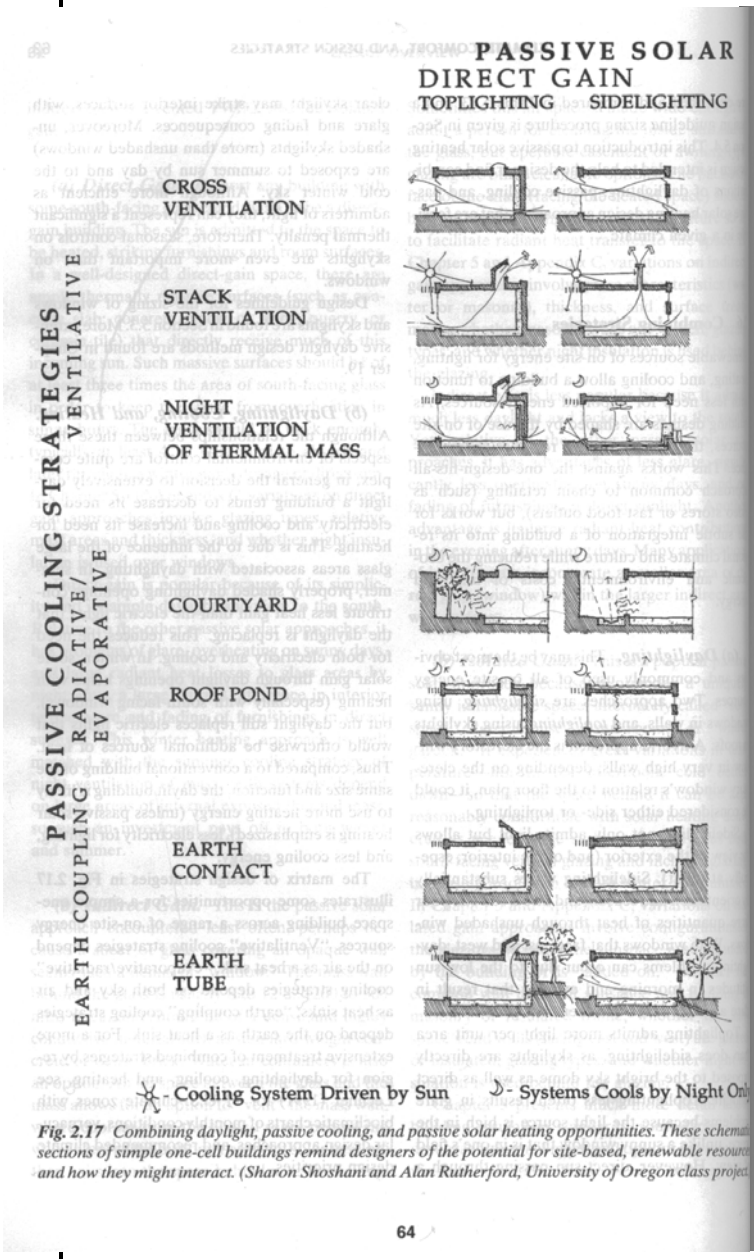


Figure 3: Passive Cooling Strategies

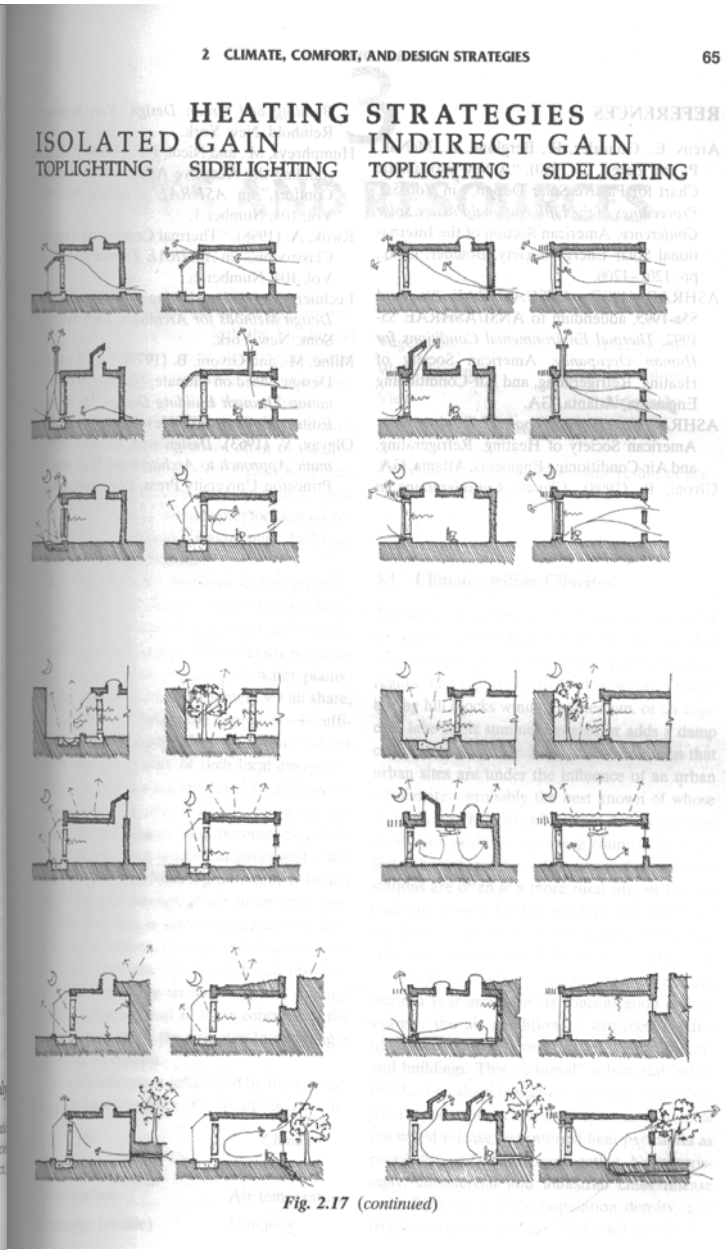


Figure 4: Passive Heating Strategies (From Stein and Reynolds, 64-65)

Sustainability

Material Selection:

Many considerations must be taken into account with regard to choosing materials, among these, location of harvest or construction; travel distance; made from renewable or recycled content; ability to be salvaged; durability; wastes created during manufacturing; and toxicity of material or off-gassing. A Life-Cycle Assessment takes these considerations into account and determines the total environmental impact of a material over its entire existence. For this project, preference will be given to materials that have a positive LCA score, or display positive attributes according to the criteria shown above.

Site Design (Plantings)

As mentioned previously, the use of native vegetation assists in sustainability efforts though minimizing additional water, maintenance, and chemical treatments. Figure 4 illustrates some landscaping vegetation native to the Midwest that may be used in this project.

Figure 4: Native Midwestern Vegetation

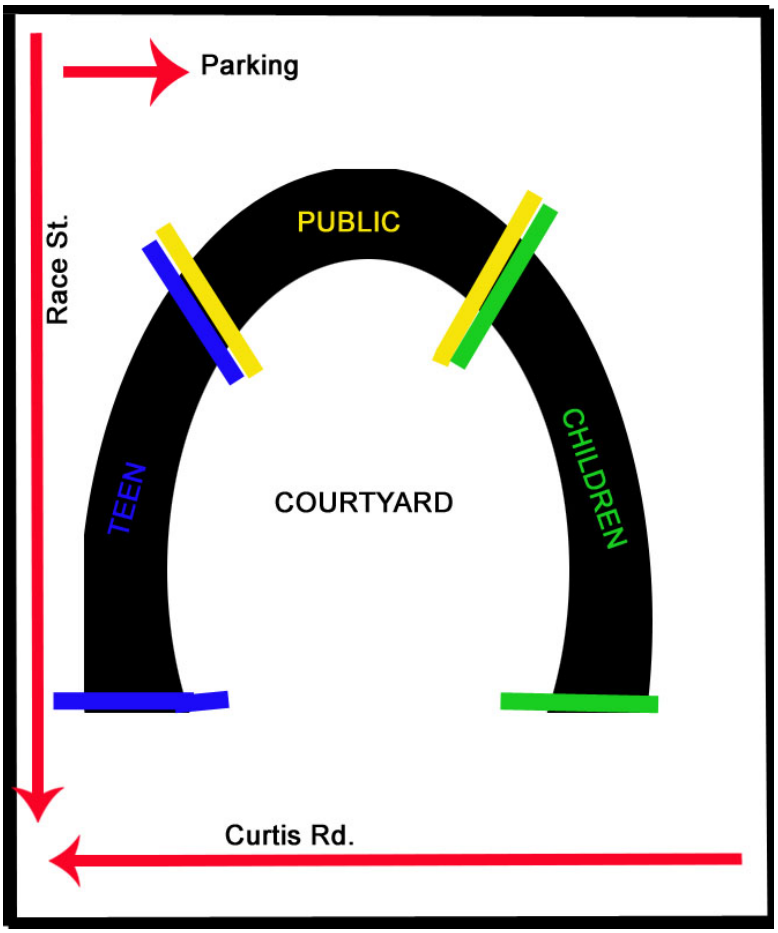
Final Design: Concept Development

In order to take advantage of Southern light exposure, create a courtyard for outdoor recreation, provide privacy, and create separate zones for children and teenage user groups, a "U" shaped parti was conceived as a conceptual diagram. The open area of the diagram faces south but is visually blocked from Curtis road through the use of earth berms and landscape techniques.

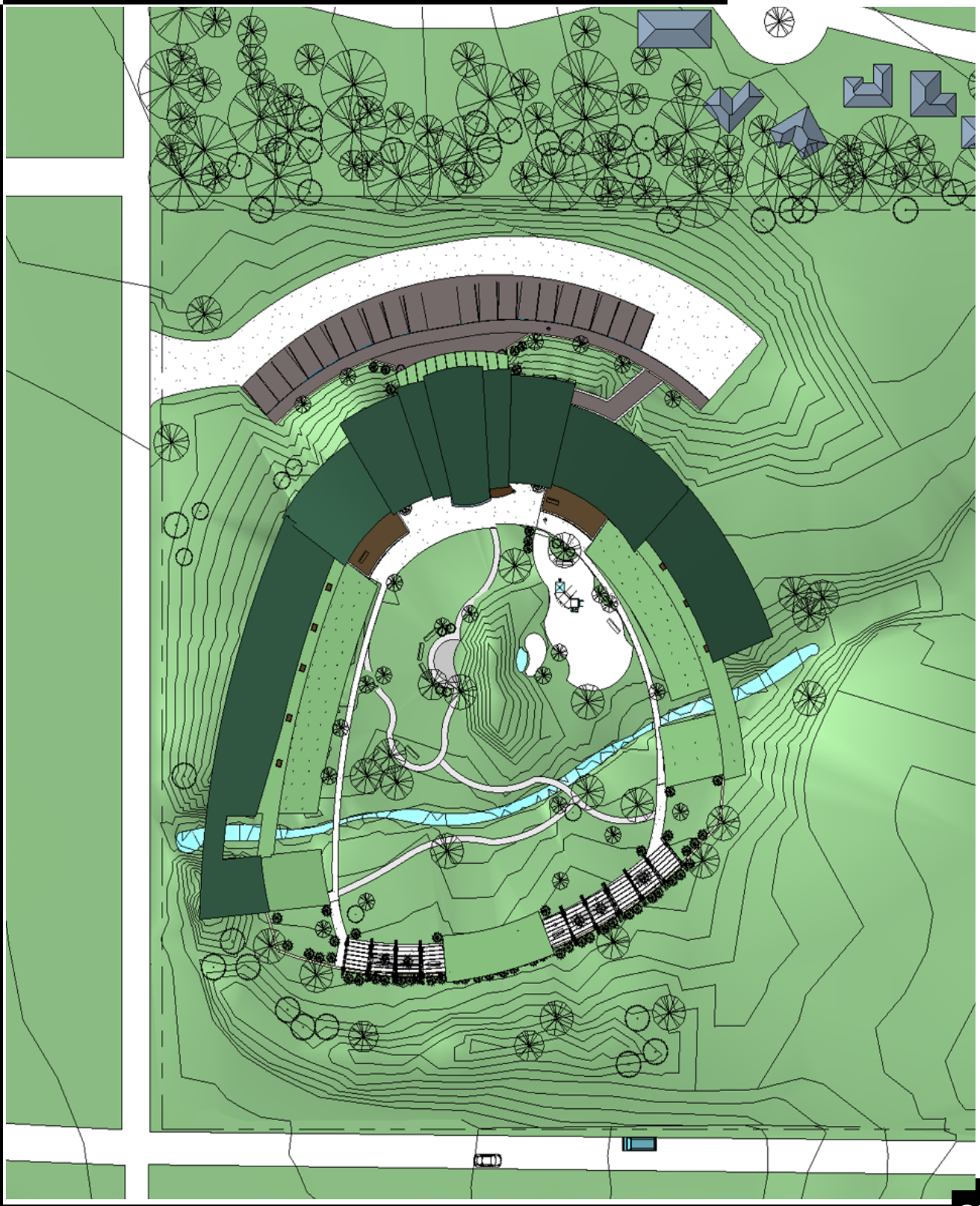
The exterior walls of the "U" will be earth-integrated in order to reduce the visible impact of the building in relation to the surrounding landscape, provide sheltering and redirecting of harsh Winter winds, and moderate the interior temperature of the facility.

Spatially, the diagram is divided so that public, communal spaces, counseling offices, and administrative areas are located near the entrance at the top of the "U". One leg of the diagram contains the teen bedrooms, classrooms, lounge, and meeting areas, with some services., the other designated for younger children with bedrooms, play areas, and play-oriented therapy rooms. Capping each wing is a 'special event' space for each age group.

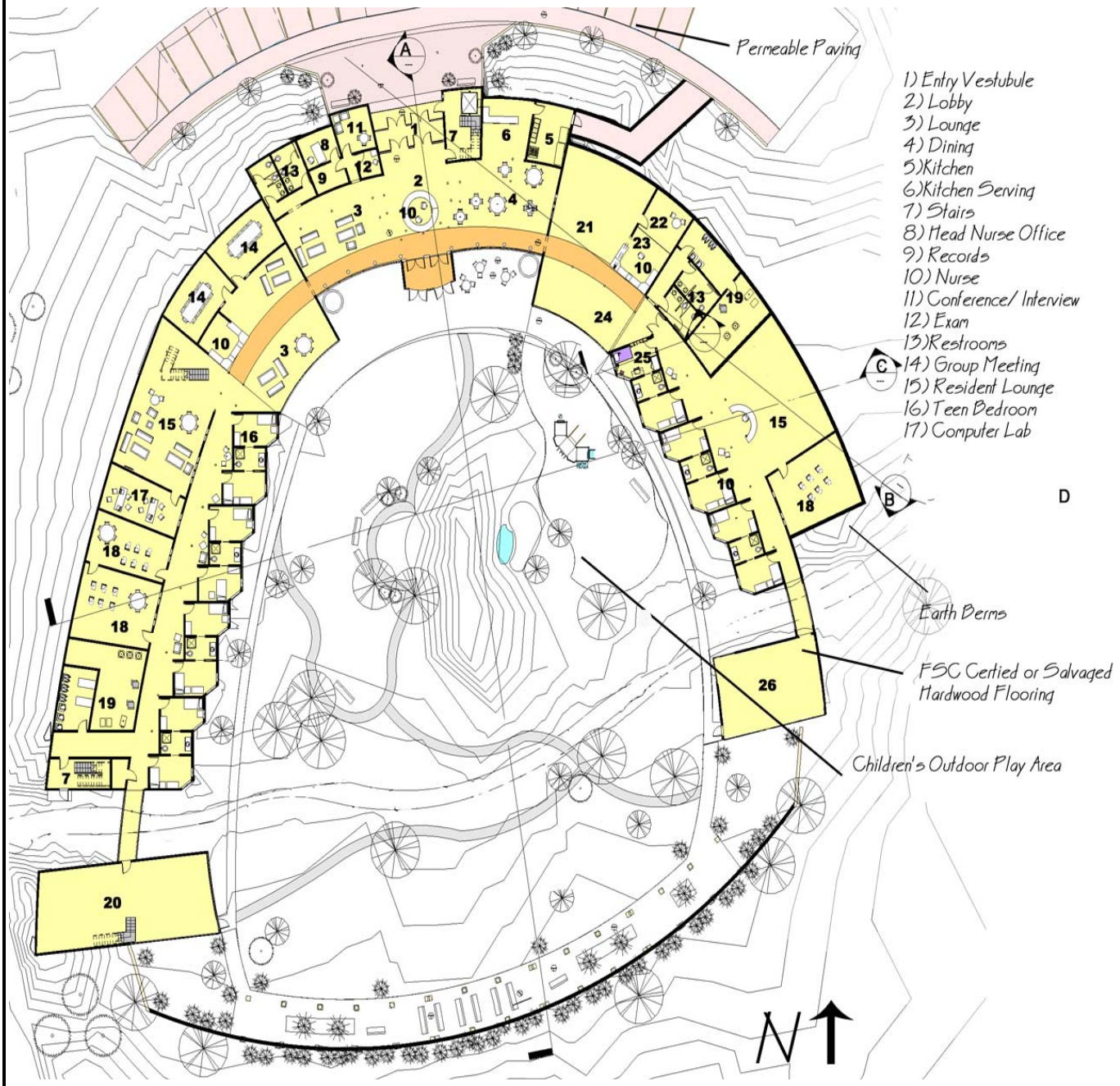
The following pages contain images of presentation boards for this concept.



Final Design - Site Plan

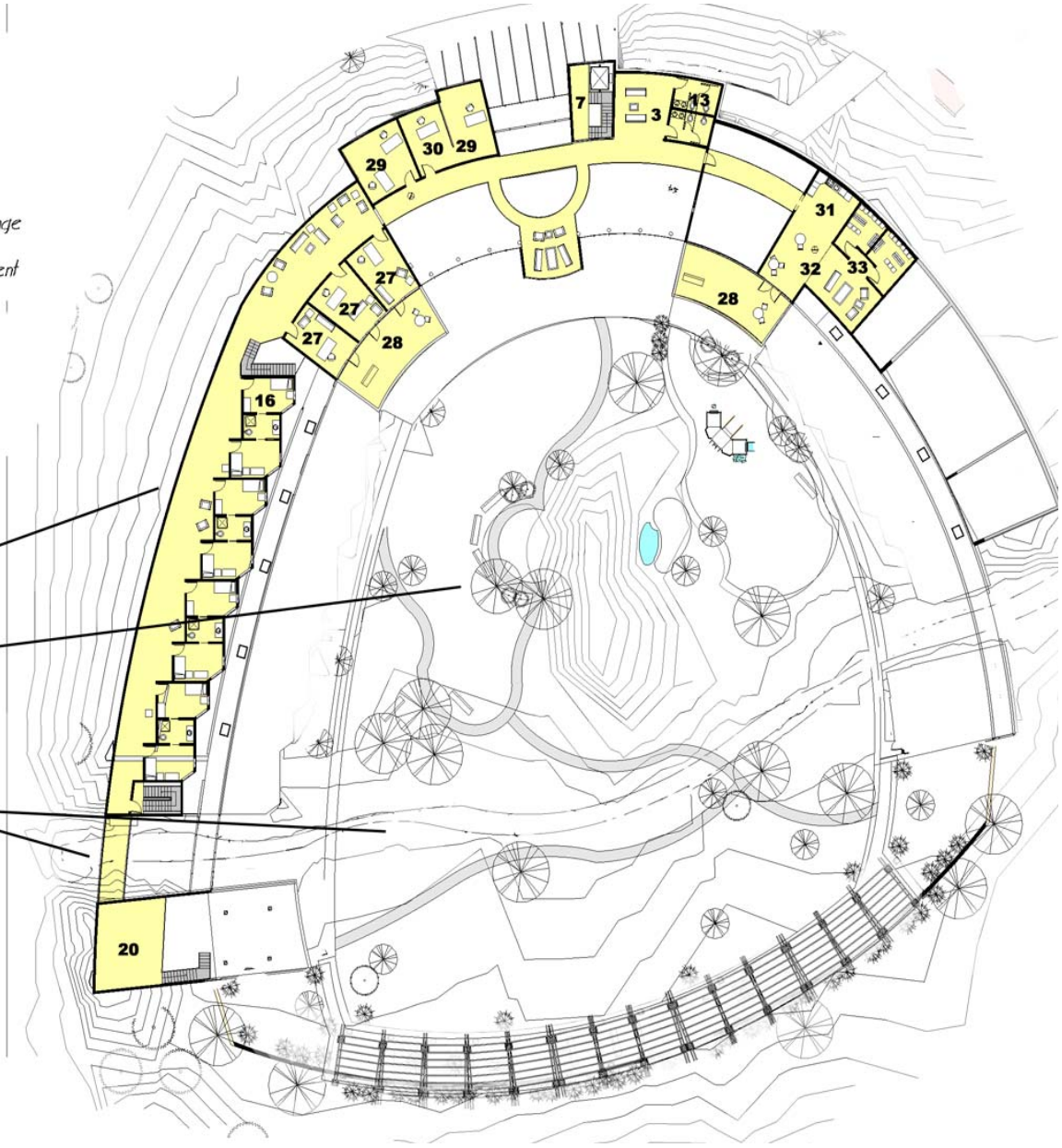


Final Design - First Floor Plan



Final Design - Second Floor Plan

18) Classroom
19) Service
20) Teen Special Event
21) Children Play area
22) Play Therapy Room
23) Observation
24) Children's Play / Lounge
25) Children's Bedroom
26) Children's Special Event
27) Counseling Suite
28) Patio
29) Office
30) Administrative
31) Kitchenette
32) Break Room
33) Staff Lockers

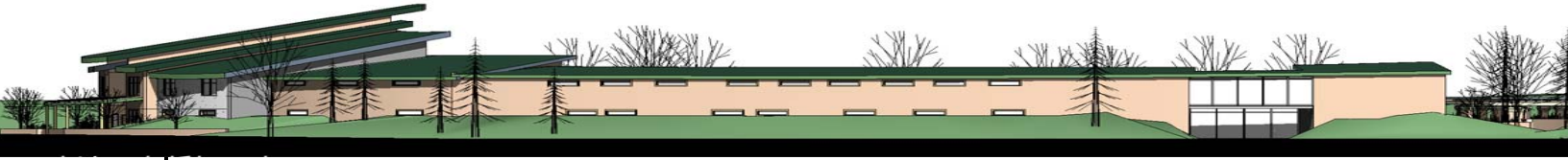


Final Design - Elevations

North Elevation

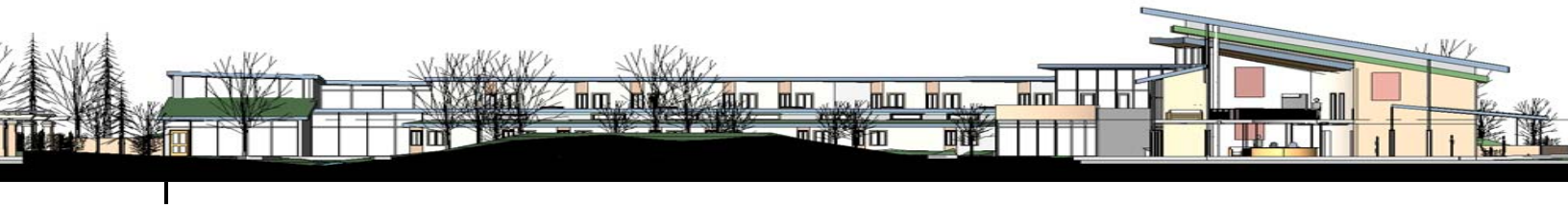
South Elevation

East Elevation



West Elevation

Final Design - Sections



Section “A”

Section “B”

Section “C”

Final Design - Structural Diagram

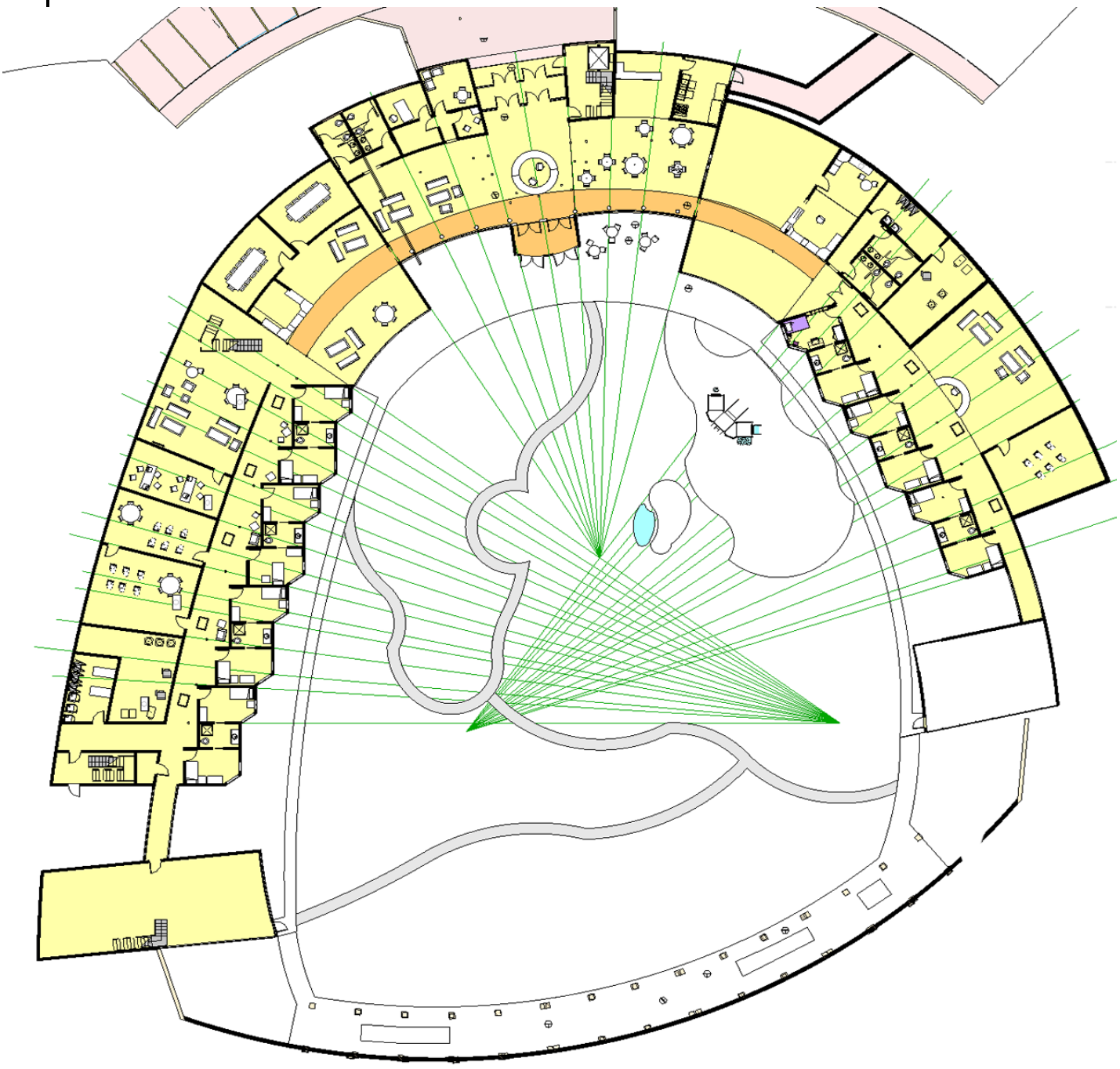
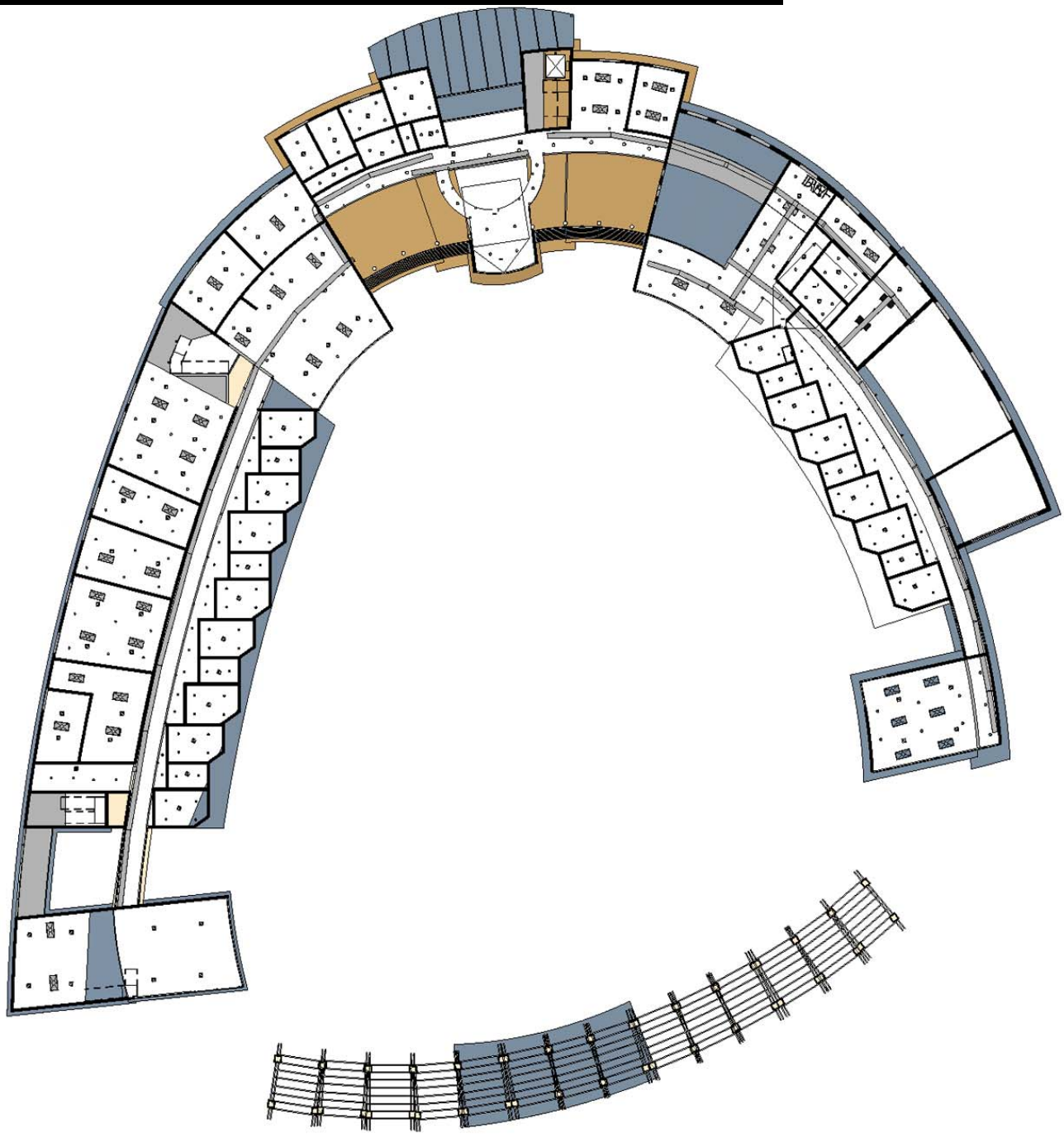


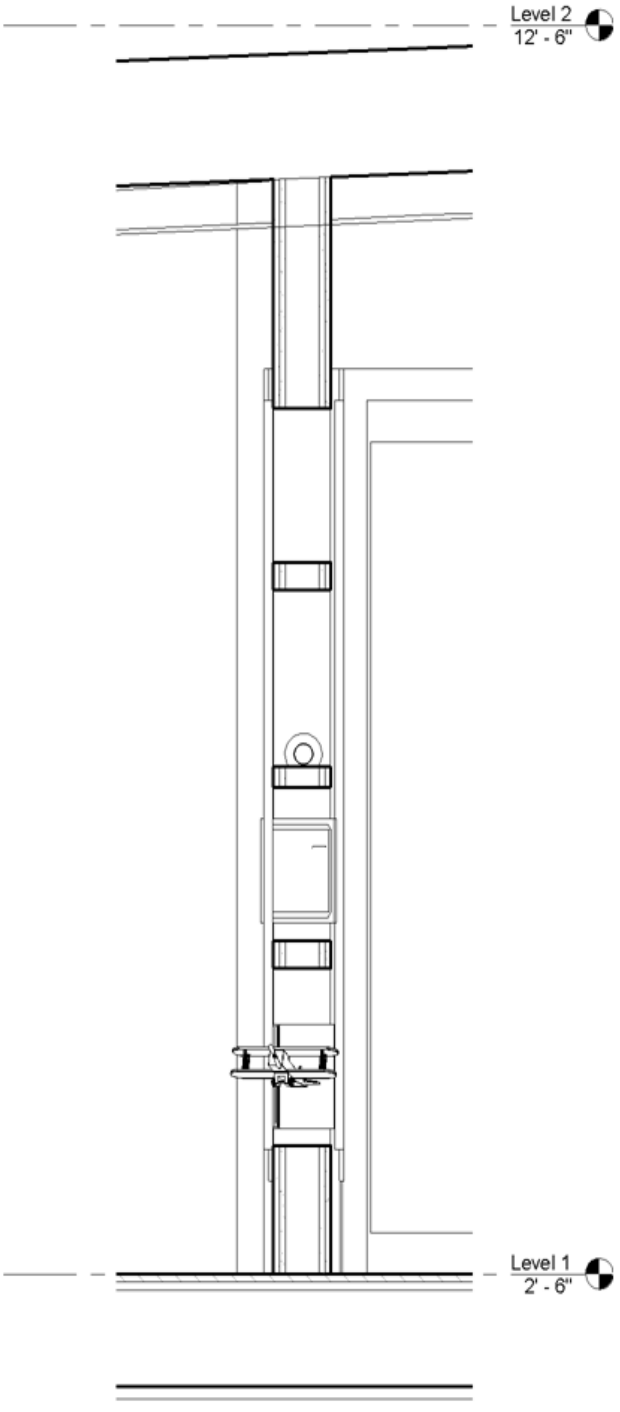
Diagram illustrating radial structure arrangement with foci. Structure is based off a steel column grid supporting floating concrete slab floors.

Final Design - Lighting / HVAC

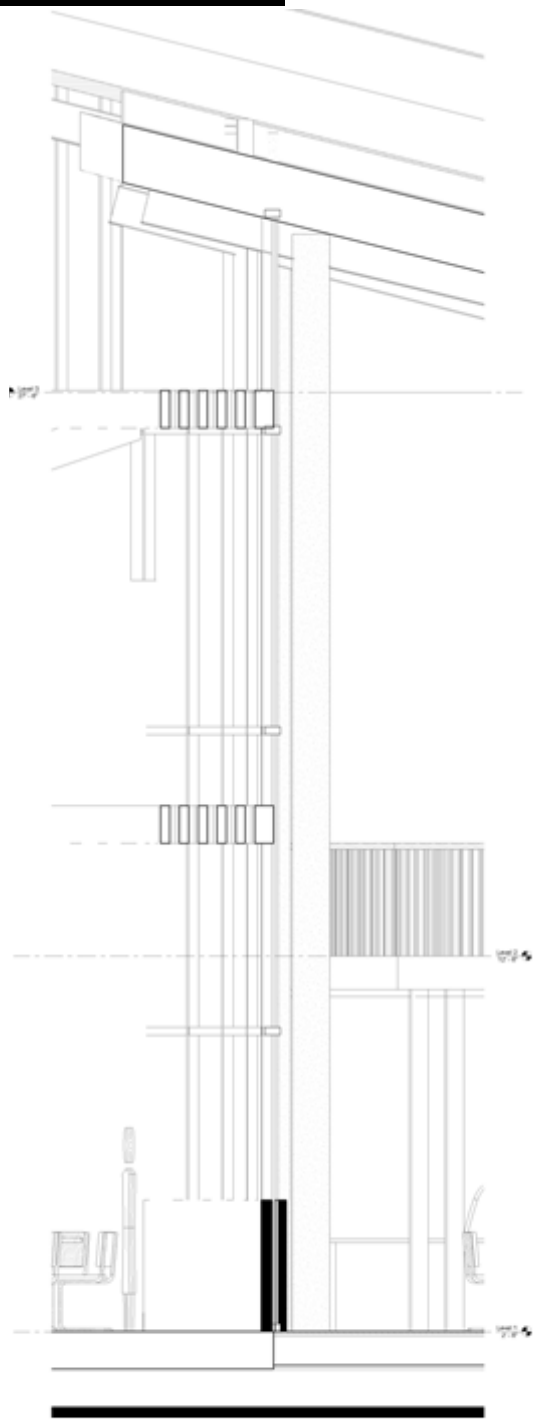


Reflected Ceiling Plan showing Lighting and HVAC arrangements. Hvac is split into 3 zones, one zone for each wing, and a third for the public central area. Supply ducts are ran through the circulation spaces (15’-20’ O.C), with tamper-proof diffusers serving the patient spaces (10’-12’ spacing). Likewise, care is given to specify tamper proof lighting fixture in patient bedrooms

Final Design - Detail Sections



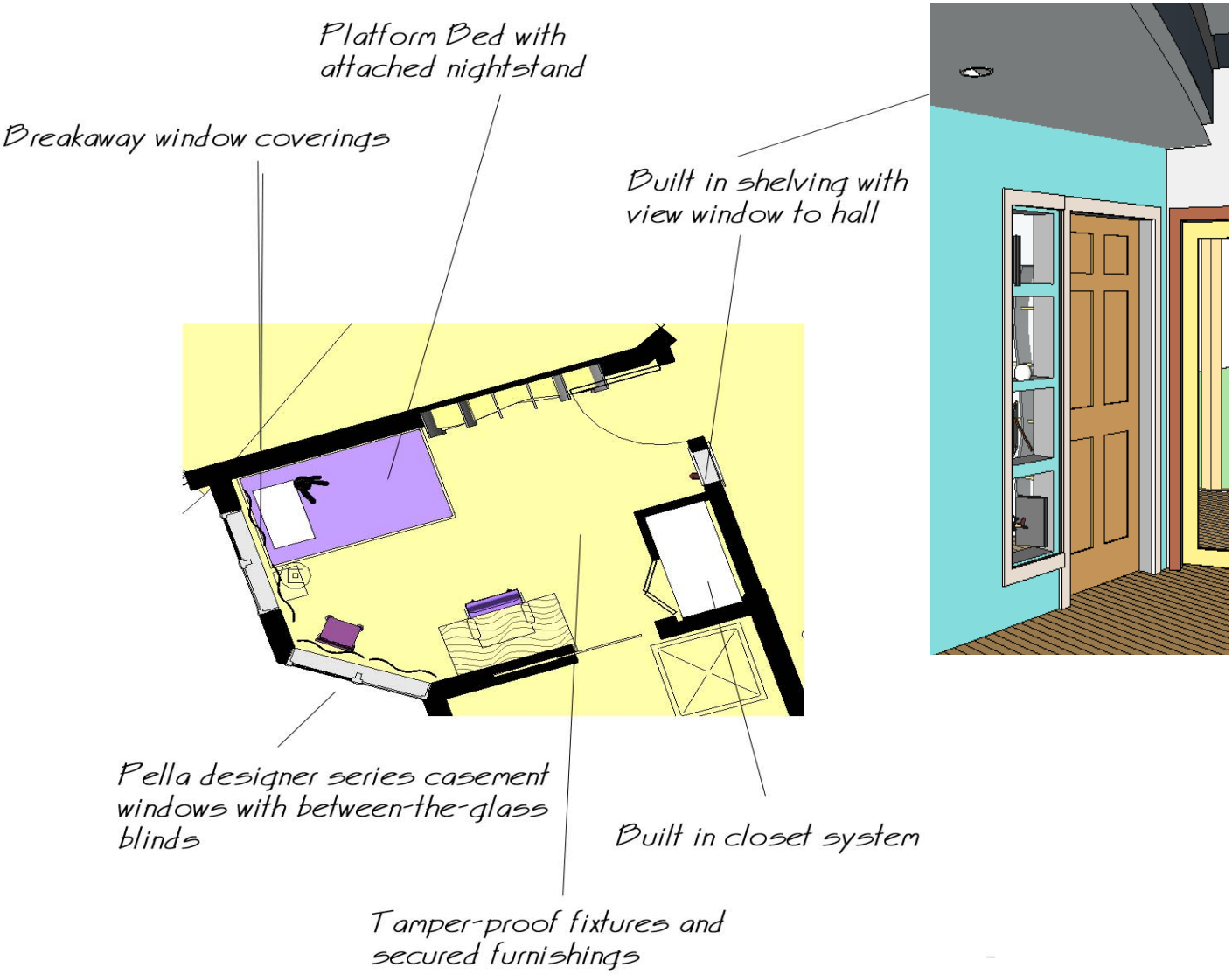
Wall Section with Built -in Shelf



Glazing Section

Final Design - Bedroom Detail

Bedroom details and image of built in transparent/translucent windowed shelving from corridor. This detail allows for additional personalization of entrance while providing increased security monitoring.



Final Design - LEED Checklist

It is estimated that this project, when combined with additional sustainable construction techniques, would have a potential LEED rating of “Gold”

LEED_US...

LEED for New Construction v2.2
Registered Project Checklist

Project Name:
Project Address:

Yes	?	No			
12			**Sustainable Sites**		**14 Points**
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
			Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
1			Credit 5.1	**Site Development,** Protect or Restore Habitat	1
1			Credit 5.2	**Site Development,** Maximize Open Space	1
1			Credit 6.1	**Stormwater Design,** Quantity Control	1
1			Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
1			Credit 8	**Light Pollution Reduction**	1
3			**Water Efficiency**		**5 Points**
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
1			Credit 2	**Innovative Wastewater Technologies**	1
			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
			Credit 3.2	**Water Use Reduction**, 30% Reduction	1
8			**Energy & Atmosphere**		**17 Points**
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
				***Note for EAc1**: All LEED for New Construction projects registered after June 26th, 2007 are required to achieve at least two (2) points under EAc1*	
5			Credit 1	**Optimize Energy Performance**	1 to 10
				10.5% New Buildings or 3.5% Existing Building Renovations	1
				14% New Buildings or 7% Existing Building Renovations	2
				17.5% New Buildings or 10.5% Existing Building Renovations	3
				21% New Buildings or 14% Existing Building Renovations	4
				5 24.5% New Buildings or 17.5% Existing Building Renovations	5
				28% New Buildings or 21% Existing Building Renovations	6
				31.5% New Buildings or 24.5% Existing Building Renovations	7
				35% New Buildings or 28% Existing Building Renovations	8
				38.5% New Buildings or 31.5% Existing Building Renovations	9
				42% New Buildings or 35% Existing Building Renovations	10
			Credit 2	**On-Site Renewable Energy**	1 to 3
				2.5% Renewable Energy	1
				7.5% Renewable Energy	2
				12.5% Renewable Energy	3
1			Credit 3	**Enhanced Commissioning**	1
1			Credit 4	**Enhanced Refrigerant Management**	1
1			Credit 5	**Measurement & Verification**	1
			Credit 6	**Green Power**	1

continued...

Yes	?	No			
8			**Materials & Resources**		**13 Points**
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	**Building Reuse**, Maintain 95% of Existing Walls, Floors & Roof	1
1			Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
1			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
1			Credit 3.1	**Materials Reuse**, 5%	1
1			Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regi	1
			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regi	1
			Credit 6	**Rapidly Renewable Materials**	1
1			Credit 7	**Certified Wood**	1
10			**Indoor Environmental Quality**		**15 Points**
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
1			Credit 1	**Outdoor Air Delivery Monitoring**	1
1			Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
			Credit 7.1	**Thermal Comfort**, Design	1
			Credit 7.2	**Thermal Comfort**, Verification	1
1			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1
				Innovation & Design Process	**5 Points**
			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
			Credit 1.4	**Innovation in Design**: Provide Specific Title	1
			Credit 2	**LEED® Accredited Professional**	1
41			**Project Totals** (pre-certification estimates)		**69 Points**

Certified: 26-32 points, **Silver:** 33-38 points, **Gold:** 39-51 points, **Platinum:** 52-69 po

Final Design -Renderings

Images of the North Entrance. Features illustrated include permeable parking and patio surfaces, earth integration, native vegetation, and

View of Dining room and main public zone, showing FSC certified wood and/or bamboo flooring, lodge–like interior design, and a southern window wall with shading louvers.

Final Design -Renderings

Image of second floor ‘Eagle’s Nest’ lounge area and path to administrative and counseling areas.

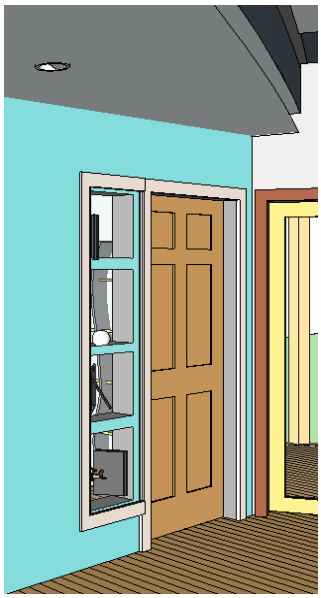
View of reception desk and entry area. To the left is the dining area, to the right, lobby seating. The reception desk is situated to provide maximum views and security for the public zone, north entrance, and courtyard entrance. Above the courtyard vestibule is the ‘Eagle’s Nest’

Final Design -Renderings

Image of the Children's Play room. This room is 2 stories tall in the rear portion shown, with clerestory windows. This room features wall cutouts giving the impression of a forest. Custom designed play furniture set on recycled rubber flooring mats provides a fun and safe area for young children to play.

View of the Children's Lounge. This lounge is centrally located by the children's bedrooms, and features custom designed lounge furniture. One piece, the "Nest", combines multiple free form openings to allow children varied lounging options. The nest would also feature reading lights and private headphone jacks. This room, like the playroom, features southern clerestory windows.

Final Design -Renderings



Typical Bedroom Layout. The bedrooms feature bolted down furniture, built in shelving, and features such as Pella “Between the Glass” window shades which support both safety and personal design options. Each bedroom also has a viewing window/ shelf unit between it and the corridor, which can be transparent or translucent for security, yet offers the user a chance to personalize the entrance to their space.

View of the Teen corridor. Both wings feature corridors designed to incorporate personalization space and seating outside of each room. These indents, along with structural columns, provide visual interest while walking through the hall. Views are provided into function spaces along the hall.

Final Design -Conclusion

What has been learned while developing this Thesis:

This thesis project was, in part, chosen due to my inexperience with the building type. I felt certain it would provide plenty of opportunity to include supportive detail design elements and a focus on healing environments. This was indeed the case, but on top of those elements, I also learned that the level of detail required in behavioral health facilities goes much deeper than originally anticipated. In my research, I learned that specifications would need to be made for special small-grille diffuser units, tamper-proof lighting fixtures, bolted down furniture, and breakaway window coverings and closet rods. These are all to mitigate risks from aggressive or suicidal behavior. Learning about these limitations provided an opportunity to seek solutions that provided the same safety level, but also felt more home-like to the user. One example in which I discovered an alternative solution was with the bedroom window design—I specified Pella Designer series windows with between-the-glass shading systems, which provided more safety than window blinds and more design options customizable to each room. I also learned additional detail on sustainable design techniques such as building orientation, earth integration, prevailing winds, and material choice, which were incorporated into the design concept.

Some challenges encountered while developing this project included the aforementioned safety detailing, how to encourage access to the outdoors while still providing a secure facility, and how to design the facility to give it more of a lodge or luxury hotel air to it rather than an institutional feeling. Along with that, the challenge of providing a variety of home-like areas to support individual's socialization moods (or lack thereof), while still providing the function of an institution was difficult, but I feel this solution provides that service more so than originally anticipated.

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