



# Wood and Wellbeing: DeafSpace Design Strategies

Center for Deaf and Hard of Hearing Youth/  
Washington School for The Deaf

Presented by Brendan Connolly, AIA

**MITHŪN**

*Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.*

“The Wood Products Council” is a Registered Provider with The American Institute of Architects Continuing Education Systems (AIA/CES), Provider #G516.

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

---

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



# Course Description

---

Join us to learn about an exciting project at the intersection of architecture and design for inclusion and access. We'll explore design strategies behind the Center for Deaf and Hard of Hearing Youth in Vancouver, Washington, where designers and researchers translated DeafSpace design principles as a foundation for this deaf-led design process for the bilingual school. This case study presentation explores how an exposed mass timber wood structure reinforced these principles and contributed to the sustainability and inclusivity of the Center, including ADA-compliant and barrier-free design. The biophilic benefits of wood helped frame strategies for multisensory wayfinding and cultural sense of comfort and protection, including a strong reliance on the vibration and heightened sensory reach of floor structures in gathering and teaching spaces. Don't miss this enlightening session on designing inspiring, safe, and inclusive learning environments.

# Learning Objectives

---

1. Identify key strategies for creating a sensory-inclusive learning environment that addresses the diverse needs of students, including those who are deaf or hard of hearing.
2. Evaluate the biophilic benefits of wood and its role in informing design strategies for visual aids and wayfinding within educational facilities.
3. Examine the innovative use of mass timber in the construction of the Center for Deaf and Hard of Hearing Youth and its impact on acoustic vibrations to enhance occupants' sensory experience.
4. Explore the code-compliant, ADA-compliant, and barrier-free design of a mass timber building through a case study example.



GO LAB  
panda

# National Practice



**8 AIA COTE  
TOP TEN GREEN AWARDS**

---

**10+** NET ZERO ENERGY BUILDINGS

---

**AIA 2030 COMMITMENT**

---

**4** Living Building Targeted Buildings

---

**150+** Green Stormwater Projects

**15+** **PROJECTS WITH GREEN  
DISTRICT SCALE SYSTEMS**

---

**500+** Sustainable Design Presentations

---

Carbon Neutral Operations Since **2004**

---

**100+** **LEED Certified Projects**

---

**8** District Projects with  
Healthy Equity Assessments

**5** FITWEL + WELL  
Registered Projects

---

**2** **Ecodistricts Registered Projects**



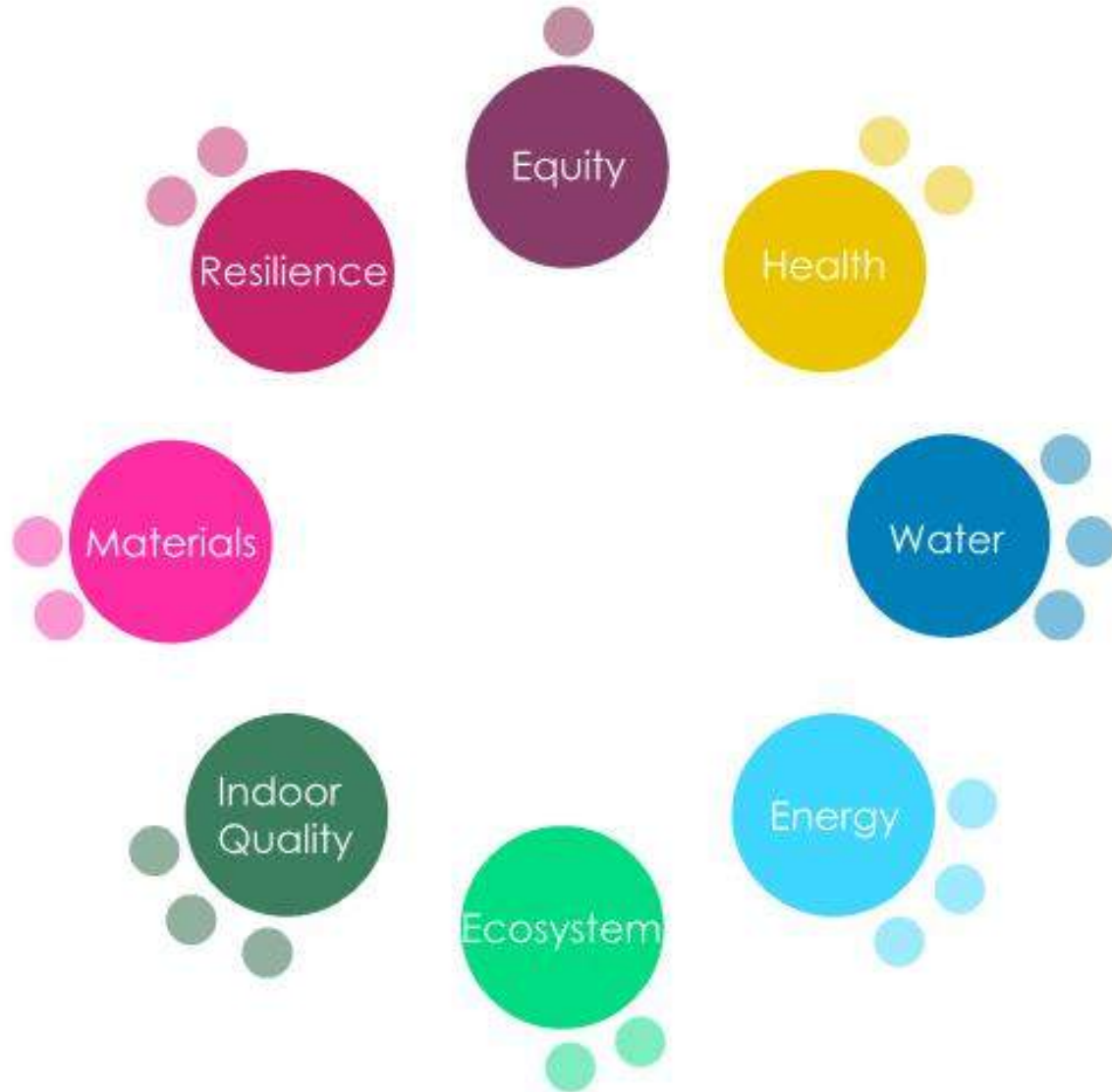
large

medium

small



# Mithun Sustainability Framework—



# Rating Systems—

- LEED v4.0
- WASHINGTON SUSTAINABLE SCHOOLS PROTOCOL
- WELL
- LIVING BUILDING CHALLENGE
- PASSIVE HOUSE
- SUSTAINABLE SITES



Using Wood to Amplify  
Educational Outcomes—

# Timber Frame Sisters

The Bush School  
Upper School Expansion  
Seattle, WA



# Creating Visible Change

The Bush School  
Mass Timber Upper School Expansion  
Seattle, WA



Passive House/Active Home

The Bush School  
Upper School Expansion  
Seattle, WA



Connection to Nature

The Bush School  
Upper School Expansion  
Seattle, WA

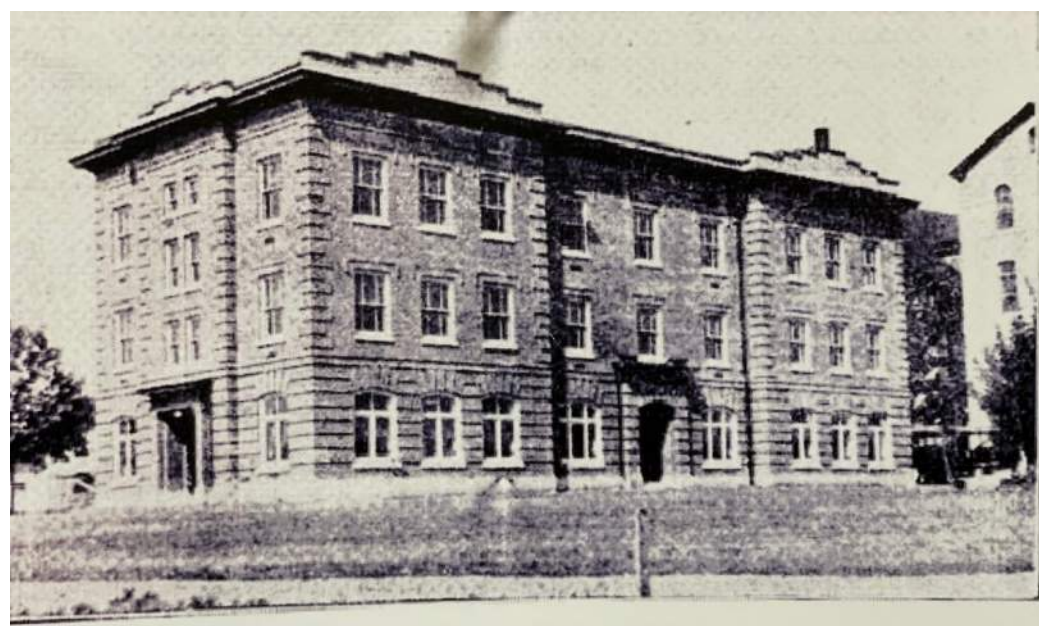




# Current Vision



# 1889 Campus Origins



LOTTIE K. CLARKE HALL,  
Girls' Dormitory Building School for the Deaf, Vancouver, Wash.  
Olof Hanson, Architect

# Connecting a Campus and Community



Integrated Team : Design/Build/Research/Interpretation—

Researchers

Architects

Builder

Interp.

Builder

Builder

Stunt Double

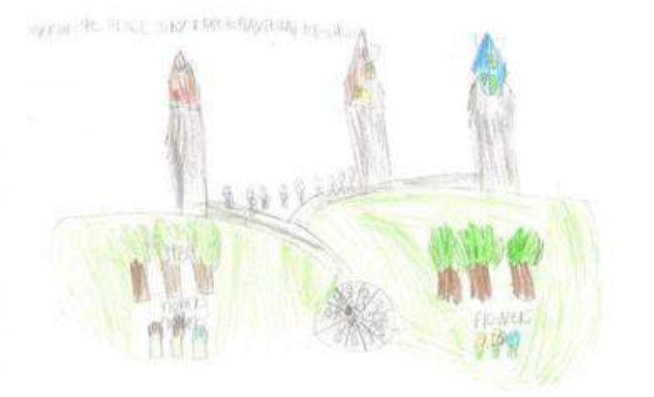
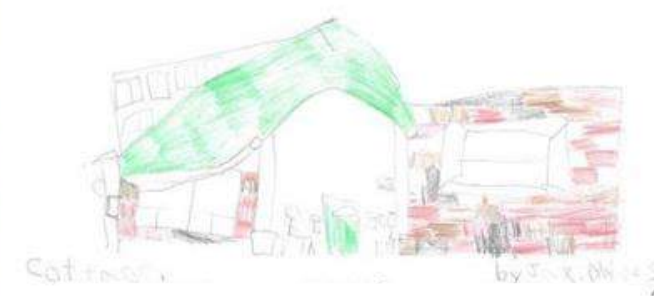


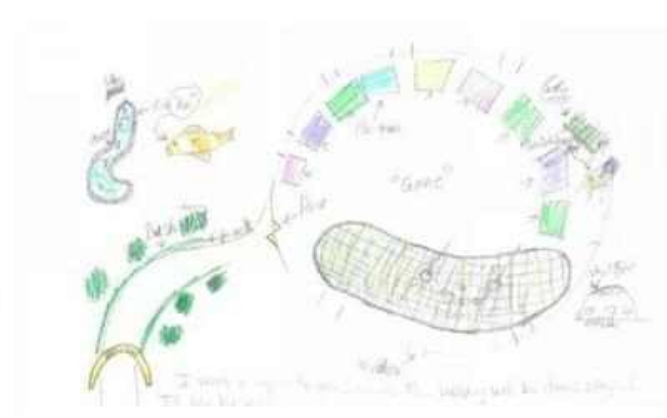
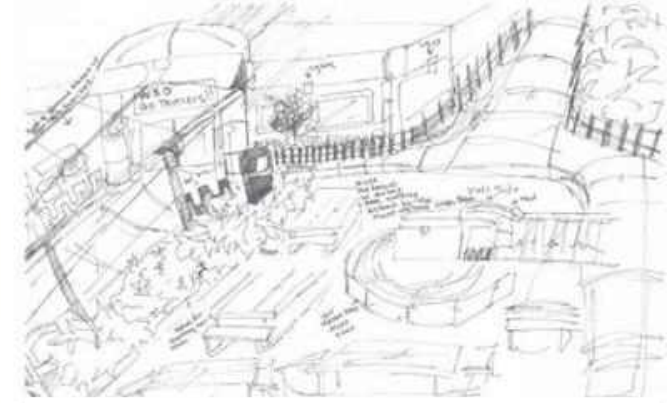


# Stakeholder Engagement—

Design Empathy —







# Project Charter

## Integrated Campus with a Heart

EVERYONE IS TOGETHER

### Measure of Success

When you  
walk in you  
smile!

Mesh existing  
and new

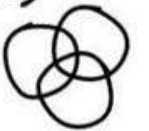
New spaces  
capture the  
feeling of  
Hunter Gym/  
auditorium

Wayfinding  
- you can  
go anywhere  
without a  
sign

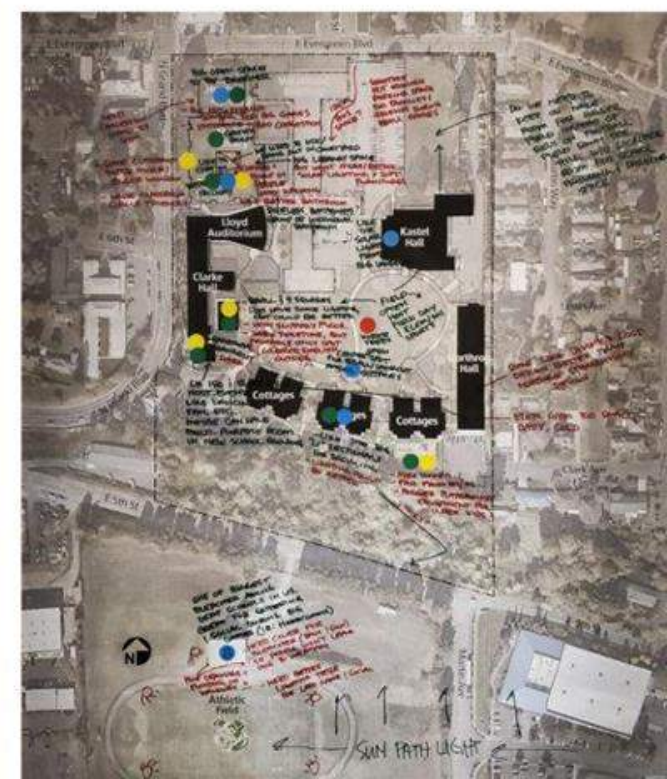
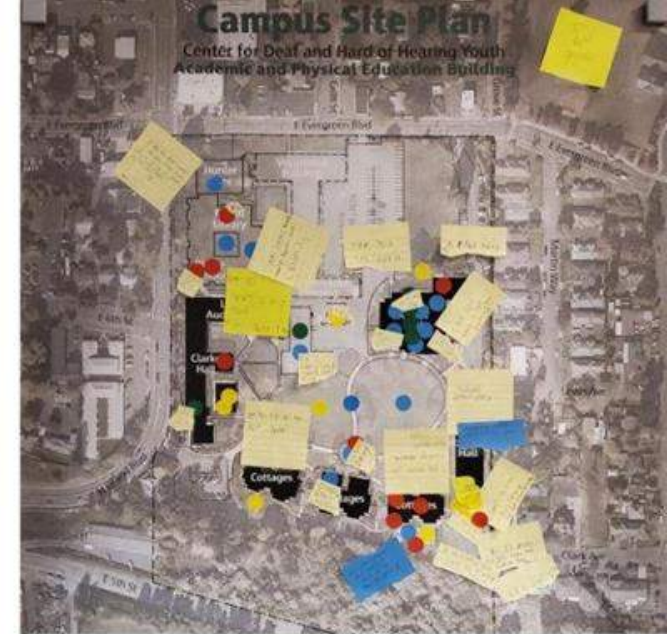
HEART  $\neq$   
BARRIER

Pride +  
De'VIA art  
displays

Visual  
convergence  
between  
programs



# Workshops





# Layers of Inclusion—

	Design	Construction	Experience
<b>Racial + Cultural Diversity + Equity</b>			
<b>Neurodiversity + Cognitive Variation</b>			
<b>Universal Design + Physical Accessibility</b>			



DeafSpace Foundations—

# DeafSpace

## Benchmarking Distribution by Area

School	Age Range	Student : Teacher Ratio*	Private School	Boarding School	Deaf Program	Total Area	Distribution of Area	Classroom SF / Student	Campus SF / Student	% Circulation
Model Secondary School for the Deaf (Existing) Washington, D.C.	15-18	6.10 : 1.00	Y	Y	Y	141,000		45	357	46%
Kendall Demonstration Elementary School (Existing) Washington, D.C.	4-14	4.80 : 1.00	Y	N	Y	139,000		84	428	38%
American School for the Deaf West Hartford, Connecticut	3-21	3.00 : 1.00	Y	Y	Y	47,000		56	268	28%
Rocky Mountain Deaf School Denver, Colorado	0-18	4.49 : 1.00	N	N	Y	47,000		90	406	17%
Ohio School for the Deaf Columbus, Ohio	0-22	-	N	Y	Y	68,000		92	389	20%
Exeter Royal Academy for the Deaf Exeter, England	6-22	-	Y	Y	Y	39,000		65	320	32%



**Robert T. Sirvage**  
DeafSpace Research Specialist



**Hansel Bauman**  
DeafSpace Planning Integration

## Benchmarking Students + Major Program Elements

American School for the Deaf					
	Total SF	Count	Avg. SF	Students per Room	Total Students
Pre K - K	3,472	7	496	8	56
1-5	2,625	5	525	8	40
6-8	-	-	-	-	-
Highschool	3,840	10	384	8	80
College	-	-	-	-	-
Administration	6,243	35	-	-	-
Student Services	3,830	22	-	-	-
Shared Space	7,613	6	-	-	-
Extra Curricular	3,153	8	-	-	-
Circulation	13,000	-	-	-	-
Campus Resource	3,359	-	-	-	-
<b>Total</b>	<b>47,135</b>				<b>176</b>

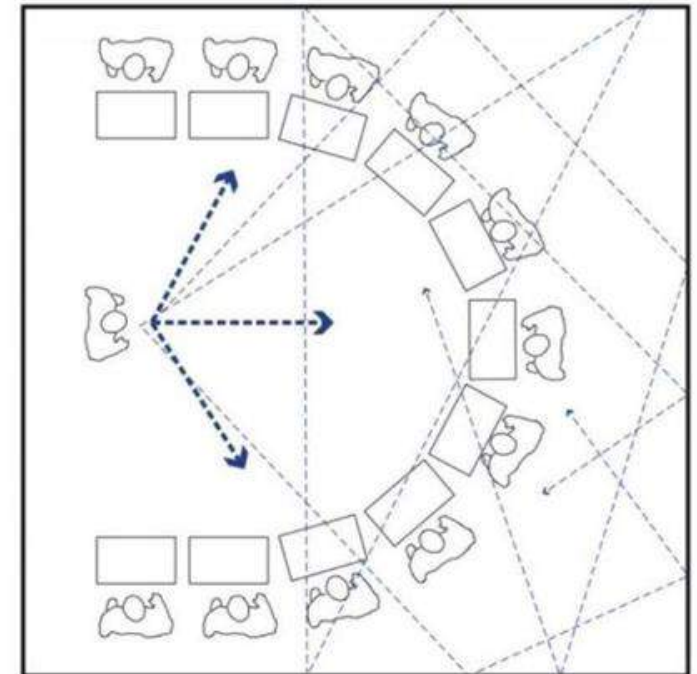
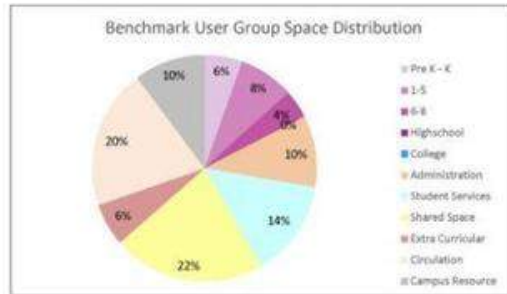
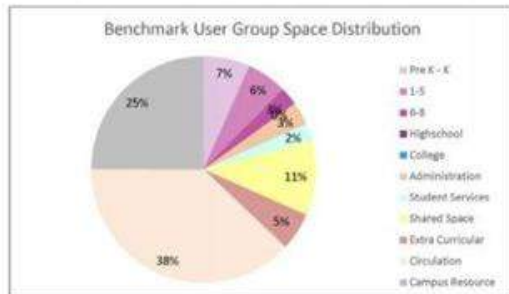
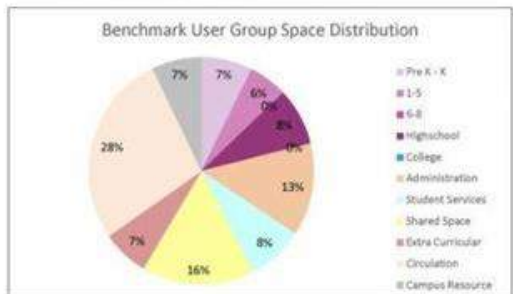
Classroom SF / Student: 56  
Campus SF / Student: 268  
Program / Circulation: 28%

KDES Existing Program					
	Total SF	Count	Avg. SF	Students per Room	Total Students
Pre K - K	9,347	11	800	12	132
1-5	8,098	11	700	12	132
6-8	3,548	5	750	12	60
Highschool	-	-	-	-	-
College	-	-	-	-	-
Administration	4,581	-	-	-	-
Student Services	3,270	-	-	-	-
Shared Space	14,923	-	-	-	-
Extra Curricular	7,497	-	-	-	-
Circulation	52,746	-	-	-	-
Campus Resource	34,590	-	-	-	-
<b>Total</b>	<b>138,600</b>				<b>324</b>

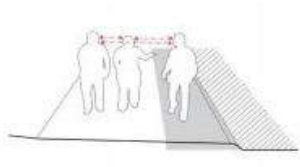
Classroom SF / Student: 84  
Campus SF / Student: 428  
Program / Circulation: 38%

KDES Proposed Program					
	Total SF	Count	Avg. SF	Students per Room	Total Students
Pre K - K	11,678	12	973	19	228
1-5	16,896	20	845	9.6	192
6-8	8,667	11	787.909	6.545455	72
Highschool	-	-	-	-	-
College	0	-	-	-	-
Administration	21,936	-	-	-	-
Student Services	29,681	-	-	-	-
Shared Space	46,943	-	-	-	-
Extra Curricular	13,058	-	-	-	-
Circulation	42,689	-	-	-	-
Campus Resource	21,898	-	-	-	-
<b>Total</b>	<b>213,446</b>				<b>492</b>

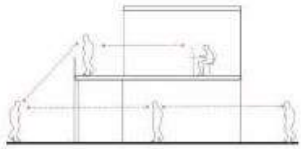
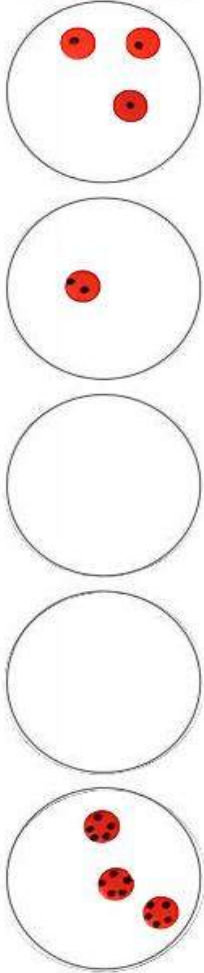
Classroom SF / Student: 76  
Campus SF / Student: 434  
Program / Circulation: 20%



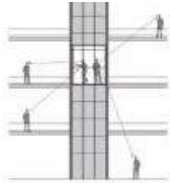
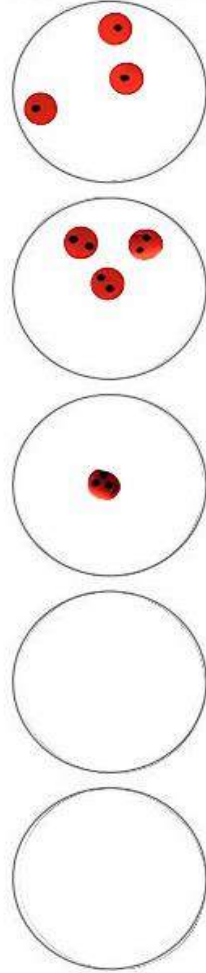
# DeafSpace Considerations



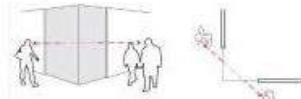
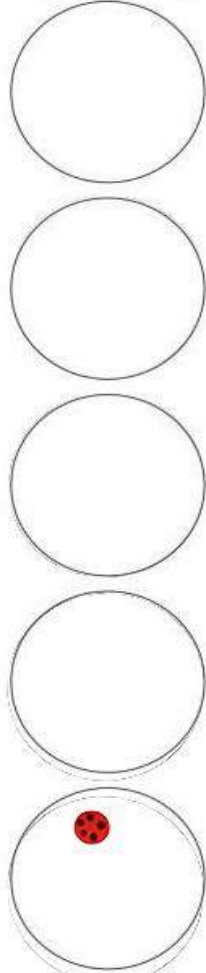
**Corridor Width**



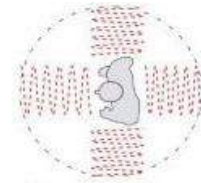
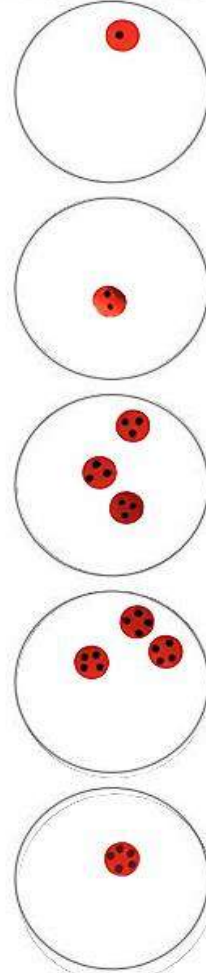
**Visual Connection**



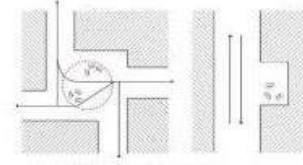
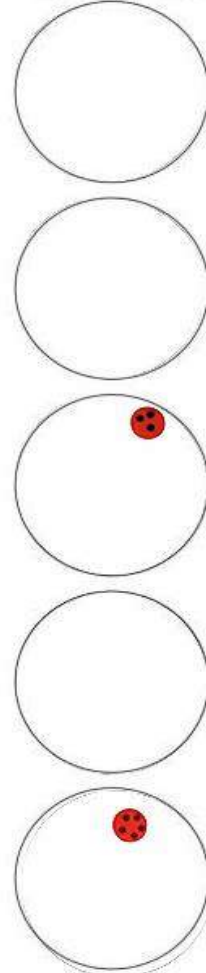
**Glass Elevator**



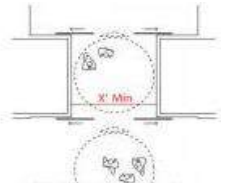
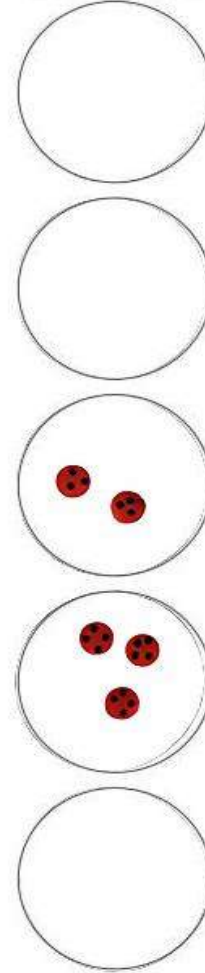
**Transparent Corners**



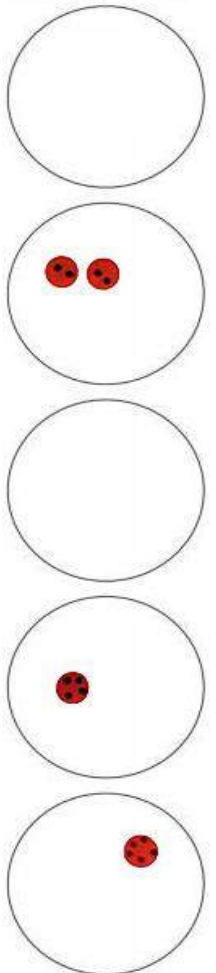
**Vibratory Cues**



**Nodes / Eddies**

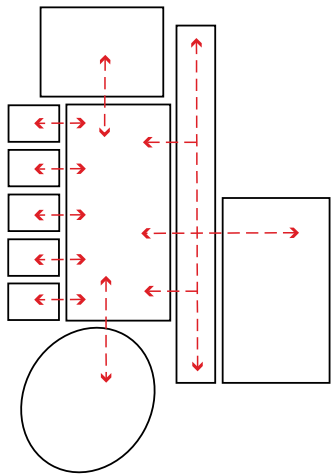


**Sliding Doors**



# Building Layout —

Density + Connectivity

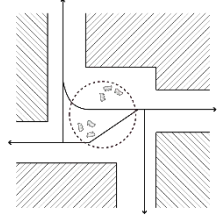


1.3.1 Program Distribution

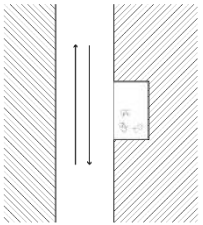


# Building Layout

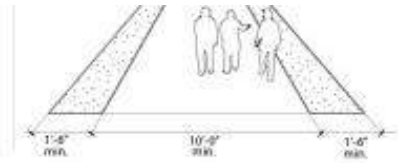
Circulation + Connectivity



1.3.2 Nodes



1.3.3 Eddies



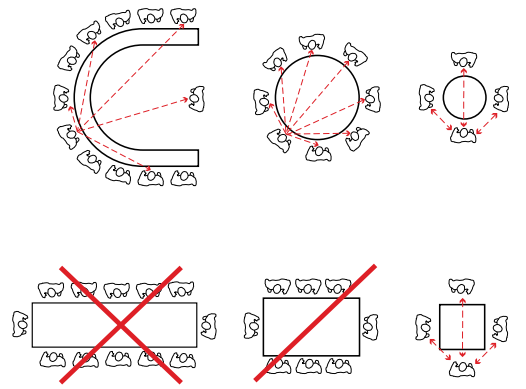
3.1.7

sign



# Space Size + Shape

## Learning Spaces



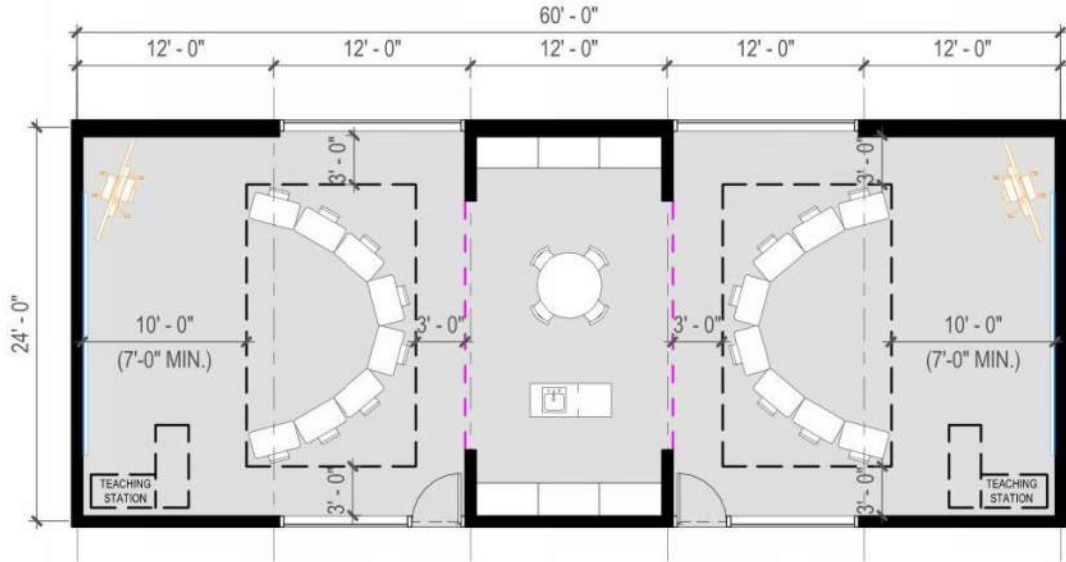
1.2.1 Groups + Seating Arrangements



# Classroom Clusters

## Select Instructional Space Diagrams

The following room data sheet diagrams are provided for reference to help validate the program and square footage allocated to instructional space. The diagrams are not intended to be a representation of the final design, but rather showing potential "test-fits" of how the space might be organized. Furniture, fixture and fittings are shown for illustrative reference only. Casework in classrooms may be open shelving with brackets and standards where locking cabinetry is not required.



**Classroom / Lab**  
**540nsf**

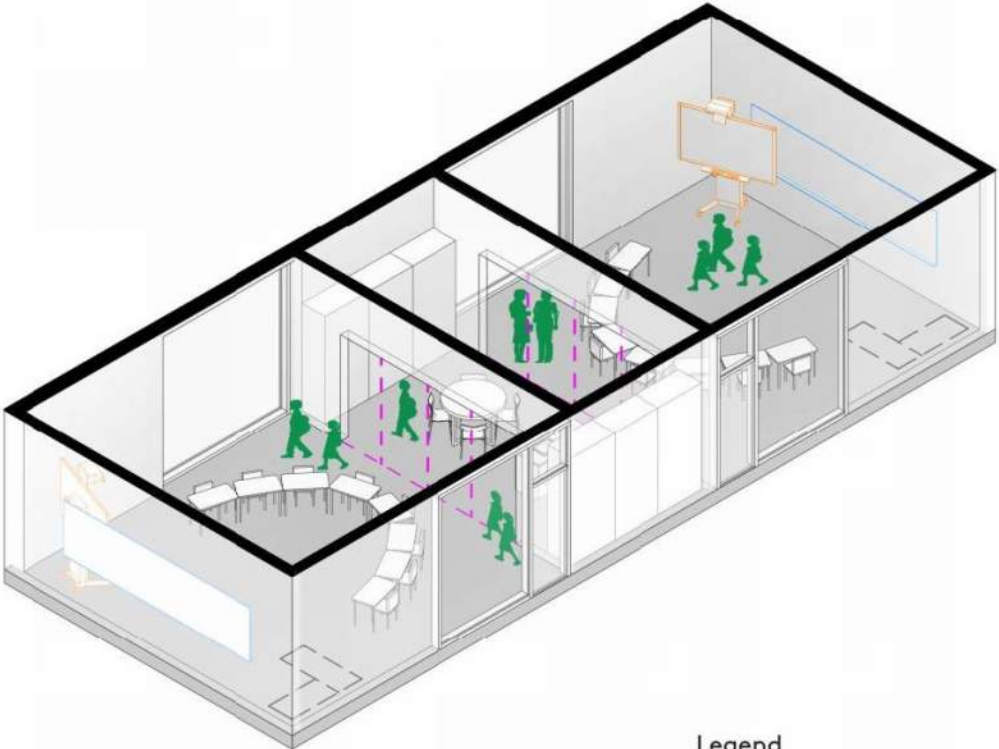
- Elementary (2-6)
- Secondary (7-12)

**PBL / Storage**  
**270nsf**

- Option A

**Classroom / Lab**  
**540nsf**

- Elementary (2-6)
- Secondary (7-12)



**Legend**

- Mobile Smart Screen
- Dry Erase Board
- - - Operable Partition

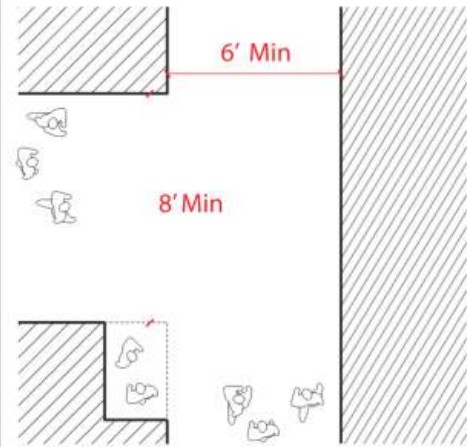
# Flexible Connected Classrooms



# Circulation + Flow

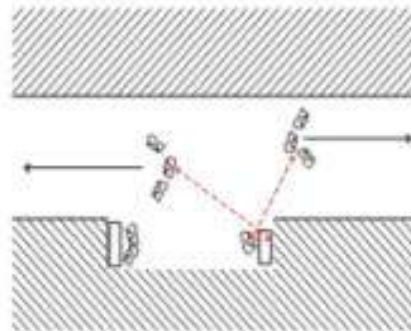
## 3.1.1 Corridor Dimensions

Primary corridors should be a minimum of 8 feet wide and secondary corridors should be a minimum of 6 feet wide. Corridors should be designed to provide conversation nodes located outside of the pathway flow. (See 3.1.2, 3.1.3)



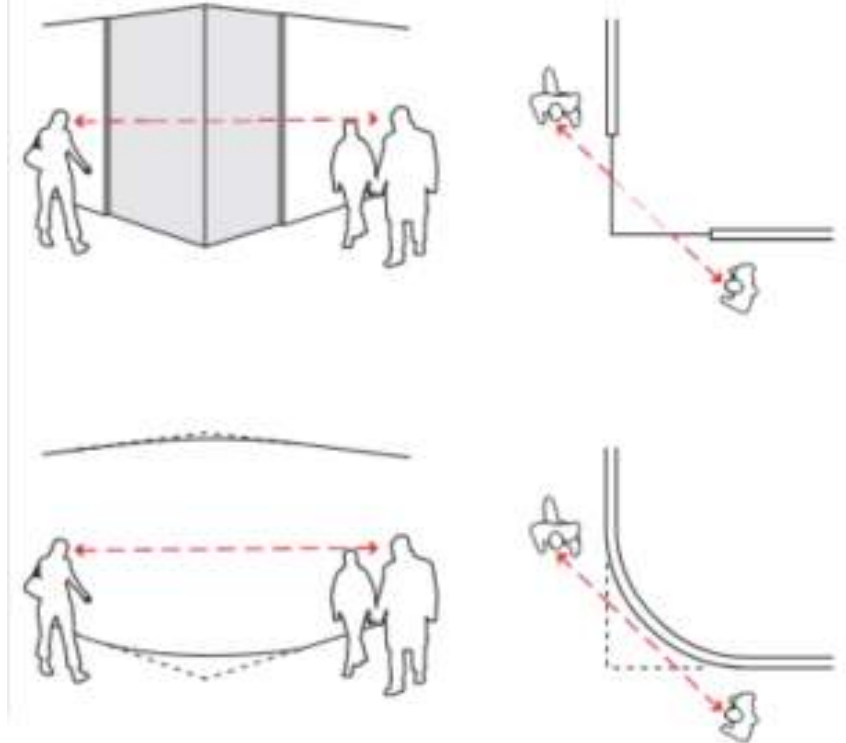
## 3.1.3 Corridor Ancillary Uses

Major circulation routes such as building corridors, campus walks and public sidewalks often require non-circulatory uses to be located adjacent to or within them. This includes, but is not limited to, drinking fountains, building directories, display furniture, waste receptacles and video phone booths. These items should be placed within adjacent Shoulder Zones (See 3.1.8) or corridor Conversation Eddies and out of the clear path of travel (See 3.1.2). Elements such as drinking fountains and phone booths should orient the user parallel to the flow of traffic and should utilize reflective wall surfaces (See 2.4.3) to enable continuous visual connection.



## 3.1.6 Soft Intersections

Eased, or "soft" corners allow pedestrians to see others and avoid collisions.

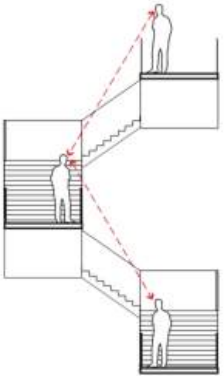




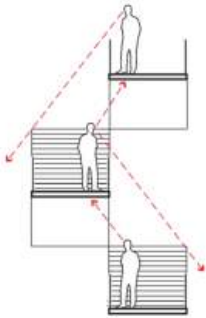
# Vertical Connections

### 3.2.1. Stair Configuration

Stairs that have a vertical opening between switchback flights allow more graceful movement as well as views to others across the open space. Seeing a colleague descending the opposing stair flight reduces the chance of collision on the intersection.



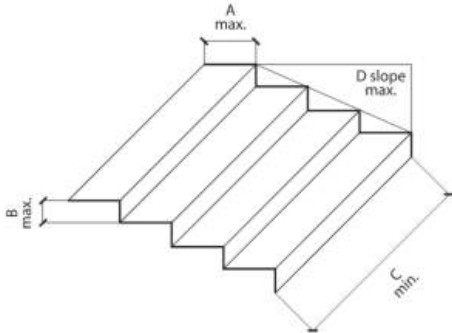
GOOD



BAD

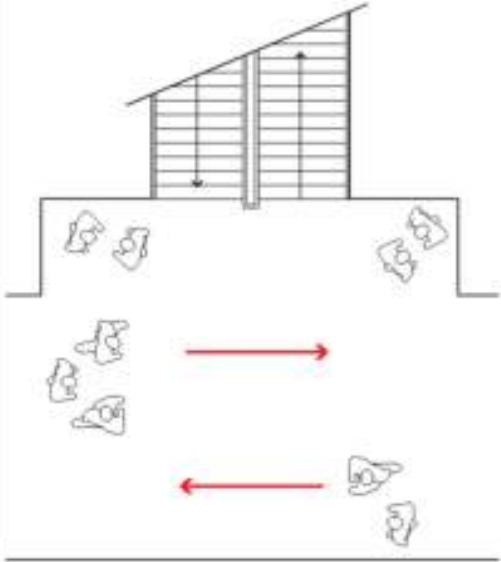
### 3.2.2 Stair Dimensions

Like paths and corridors, wider stairs are preferred. Stairs should have gentle rise/run ratios.



### 3.2.4 Stairs & Cross Circulation

When stairs empty into a circulation path like a corridor or campus pathway, extra dimension should be provided to allow uninterrupted flow in all directions.



# Vertical Connections



# Illumination

## 4.2.1 Avoiding Backlighting

Bright windows located behind people or focal points in spaces cause high contrast between subject and environment. A person standing in front of a bright window will be silhouetted, causing difficulty in reading facial expressions and making eye contact.

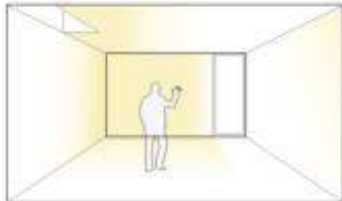


## 4.2.2 Wash Surfaces with Light

Lighting surfaces rather than spaces helps avoid hotspots and shadows that can compromise visual communication. Windows and skylights should not be located in the middle of rooms, but should be located so that they wash walls, floor and ceiling surfaces with natural light.



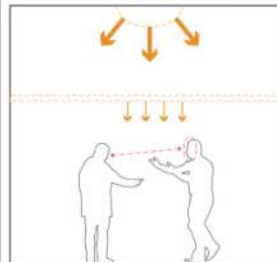
BAD



GOOD

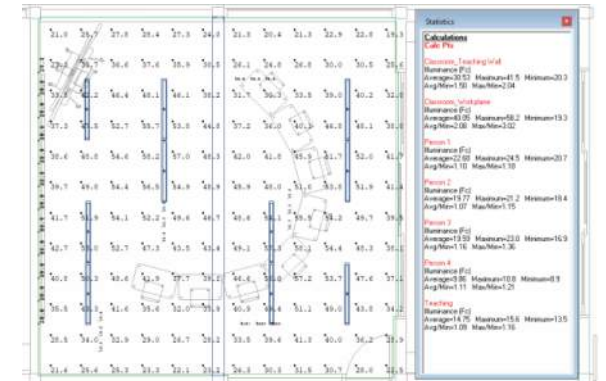
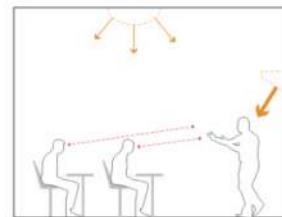
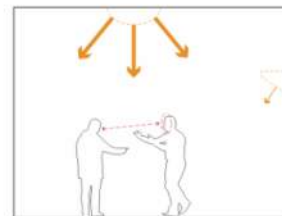
## 4.3.1 Shaping Space: Light Layers

Layers of illumination built up from multiple sources and fixture types should be used to break down large spaces into sub-spaces that are tailored to the needs of deaf individuals and the programs being enacted within each zone. For example, in tall collective spaces, a horizontal datum of light can create sub-spaces that introduce a human scale that encourages more intimate signed conversations. Other spaces might utilize light layers in a different way to facilitate comfort and ease of communication.



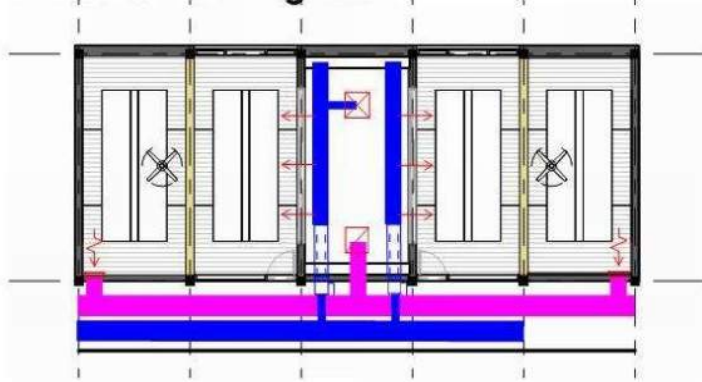
## 4.3.2 Light Dimming: Comfort & Control

The ability to control and revise light levels depending on how a room is being used is particularly important in the visu-centric Deaf community. To ensure that lighting levels are appropriate for a given space or activity, users should be given access to methods of dimming the lighting in their environment.

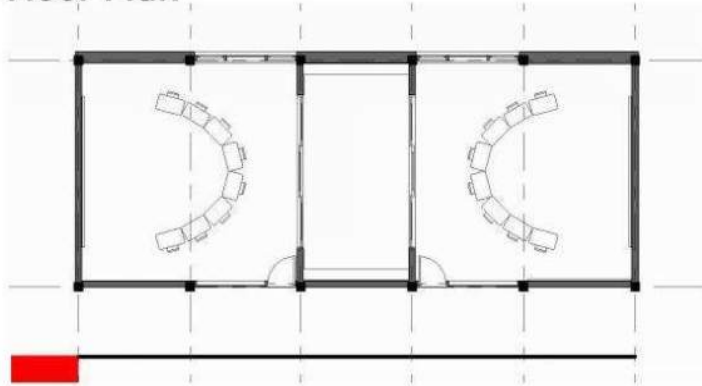


# Illumination

## Reflected Ceiling Plan



## Floor Plan



## Advantages

- Ductwork isolated to PBL's in typical classroom
- Maintains square footage of teaching spaces and PBL's

## Challenges

- Shaft space taken from corridor, near toilets
- Lower ceiling height in corridor
- Large rooftop units

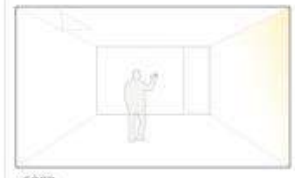
## Vignette \_Typical 540sf Teaching Space



# Balanced Daylight + Glare Avoidance—

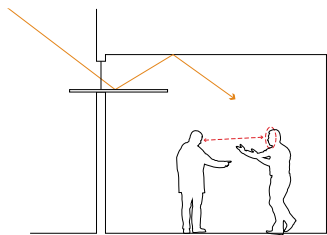


BAD



GOOD

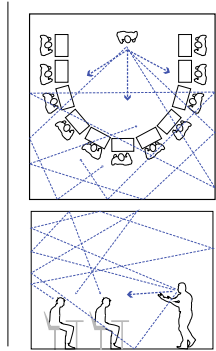
4.2.2 Wash Surfaces with Light



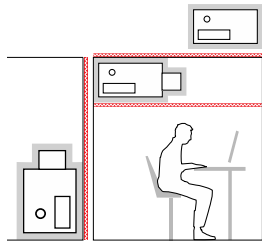
4.2.5 Light Shelves



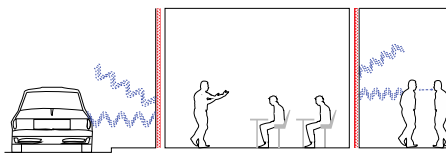
# Acoustic Performance



5.1.1 Sound Reverberation



5.1.2 Equipment Noise



5.1.3 Background Noise

## SECTION 808 ENHANCED ACOUSTICS FOR CLASSROOMS

**808.1 General.** Classrooms not exceeding 20,000 cubic feet (565 m<sup>3</sup>) and required to provide enhanced acoustics shall comply with Section 808.

**808.2 Reverberation time.** Classroom reverberation times shall comply with either Section 808.2.1 or Section 808.2.2, depending on the size of the room.

**808.2.1 Performance method.** For each of the octave frequency bands with center frequencies of 500, 1000, and 2000 Hz, the reverberation time (T60) shall not exceed the times specified below:

1. 0.6 seconds in classrooms with volumes up to and including 10,000 cubic feet (285 m<sup>3</sup>).
2. 0.7 seconds in classrooms with volumes of more than 10,000 cubic feet (285 m<sup>3</sup>), but less than 20,000 cubic feet (566 m<sup>3</sup>).

Reverberation times shall apply to fully-furnished, unoccupied classrooms. Reverberation times shall be field verified via measurements over a minimum 20 dB decay in each octave frequency band in accordance with ASTM E2235 listed in Section 106.2.13.

**808.2.2 Prescriptive method.** The Noise Reduction Coefficient (NRC) ratings for floor, wall and ceiling surface finishes shall conform to the following equations:

For a classroom with a volume less than or equal to 10,000 cubic feet (285 m<sup>3</sup>):

$$(NRC_{Floor} \times SFloor) + (NRC_{Ceiling} \times SCeiling) + (NRC_{Wall} \times SWall) \geq Volume/12$$

For a classroom with a volume between 10,000 cubic feet (285 m<sup>3</sup>) and 20,000 cubic feet (565 m<sup>3</sup>):

$$(NRC_{Floor} \times SFloor) + (NRC_{Ceiling} \times SCeiling) + (NRC_{Wall} \times SWall) \geq Volume/14$$

Where:

NRC<sub>Floor</sub> = NRC rating of the floor finish material

S<sub>Floor</sub> = floor area in square feet

NRC<sub>Ceiling</sub> = NRC rating of the ceiling finish material

S<sub>Ceiling</sub> = ceiling area in square feet

NRC<sub>Wall</sub> = NRC rating of the wall acoustical treatment

S<sub>Wall</sub> = wall treatment area in square feet

Volume = room volume in cubic feet

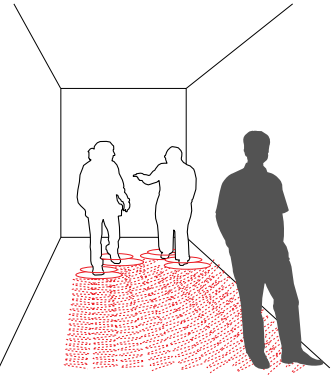
Where a floor, ceiling or wall has multiple surface finishes, the NRC x S product for each surface finish shall be added to the left side of the equation.

**808.3 Ambient sound level.** Classroom ambient sound levels shall comply with Sections 808.3.1 and 808.3.2. Ambient sound levels from sound sources outside and inside the classroom shall be evaluated individually. The greatest one-hour averaged sound levels shall be evaluated at the loudest usable location in the room at a height of 36 inches (915 mm) to 42 inches (1065 mm) above the floor and no closer than 36 inches (915 mm) from any wall, window or object. The ambient sound level limits shall apply to fully-furnished, unoccupied classrooms, and with only permanent HVAC, electrical and plumbing systems functioning. Classroom equipment, including, but not limited to, computers, printers and fish tank pumps shall be turned off during these measurements.

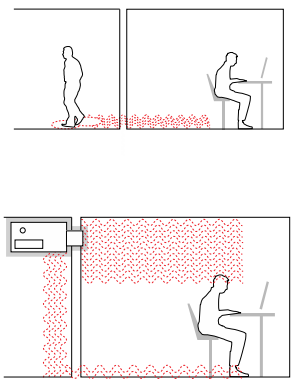
**808.3.1 Sound sources outside of the classroom.** Classroom ambient sound levels shall not exceed 35 dBA and 55 dBC due to intruding noise from sound sources outside of the classroom, whether from the exterior or from other interior spaces.

**808.3.2 Sound sources inside the classroom.** Classroom ambient sound levels shall not exceed 35 dBA and 55 dBC for noise from sound sources inside the classroom.

# Sensory Vibration



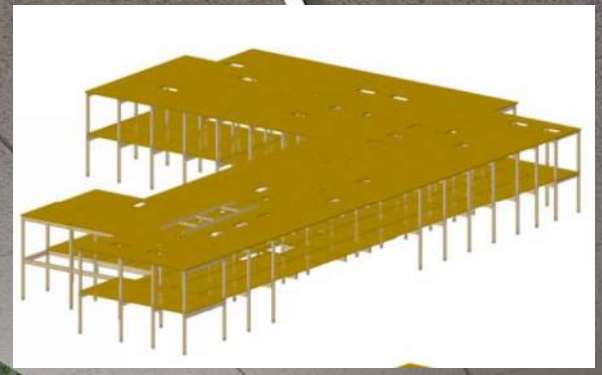
2.5.2 Vibration Zones



4.5.3 Reduce Unwanted Vibration



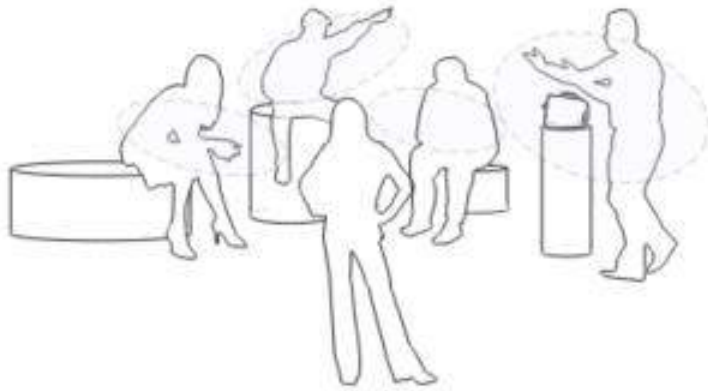
# Sensory Vibration



# Transparency

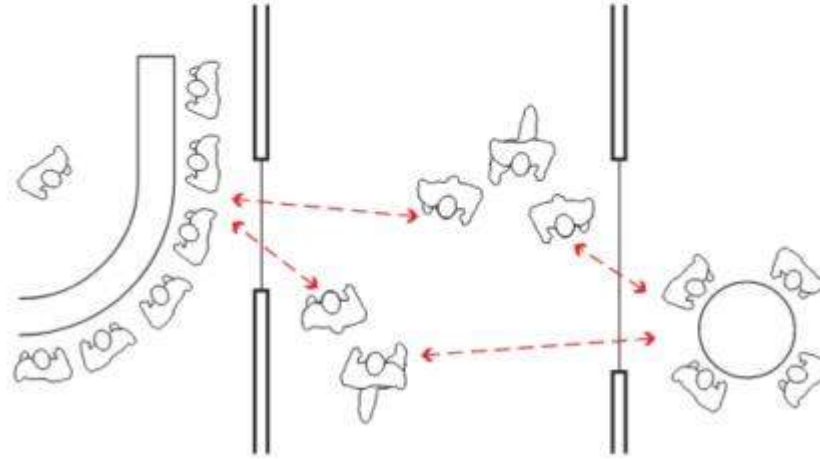
## 1.3.8 Fixed Casual Seating Arrangements

Architectural elements which can be used as seating or simply a place to set down one's belongings encourage gathering and conversation. These elements should be located in casual indoor and outdoor social spaces and configured such that a group of 2 or more individuals may sit within 1'-6" to 3'-0" of one another. When arranged in clusters, this allows individuals to circulate freely and choose their place in a group as it forms. The seating elements should vary slightly in height to allow clear sightlines among a variety of participants. Conversation pedestals and shelves should be included in these clusters (1.3.9).



## 2.1.6 Transparency in Movement Spaces

In hallways, corridors and other movement spaces within buildings, it is desirable to provide transparency into adjacent spaces, allowing visual access to the activities taking place throughout the building.



## 3.3.1 Sliding Entrances

Providing automatic sliding doors at major building entrances helps ease flow into and out of buildings, especially for those engaged in signed conversations.



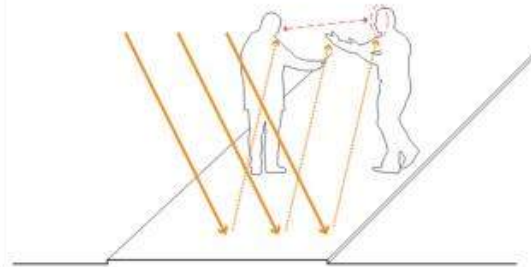
Transparency



# Colors & Finishes

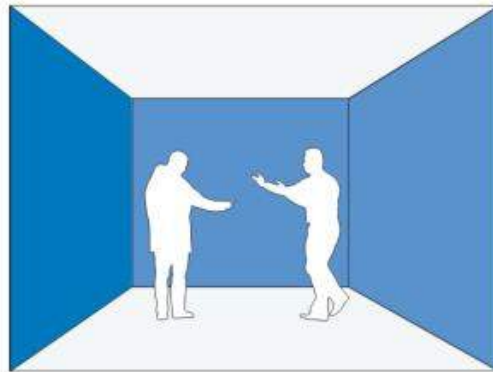
## 4.1.3 Surface Glare: Mobility & Communication

Glare on surfaces can be distracting and disorienting for people holding a signed conversation. Highly reflective or specular surfaces for building skins, signage and other elements should be limited in order to reduce exterior glare. For example, brushed metal surfaces should be used instead of polished metal. Plastics should be matt finished instead of gloss. Stone surfaces should be textured or honed instead of polished.



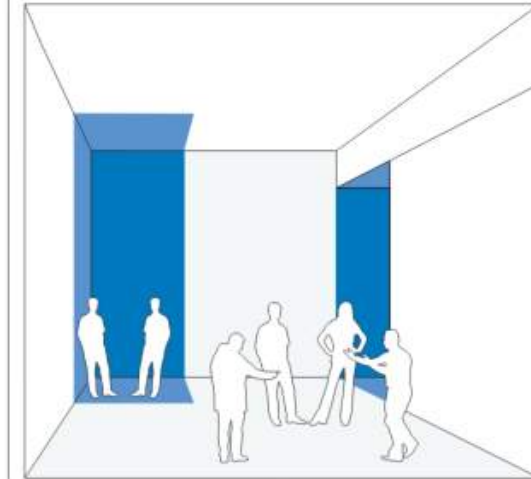
## 4.1.4 Color: Contrasting Surface & Visual Language

Since communication between deaf and hard of hearing individuals is so dependant on visual clarity, colors that are contrasting and complimentary to skin colors are best for backgrounds to sign language. Blues and greens contrast with most skin colors. In addition, blues and greens visually calm space by avoiding overstimulating eyes and providing a restful backdrop for movement and signing. In large and active spaces, painting surfaces blue or green will help deaf and hard of hearing individuals better and more comfortably communicate.



## 4.1.2 Color Eddies: Shaping Space

Intimate spaces for signed conversations should be created off of main movement and gathering spaces. Darker colors applied to surfaces in select smaller spaces can create an intimate experience that arises from a feeling of being enveloped. Color and floor pattern can create feelings of intimacy for smaller conversations while allowing a connection to a larger space (see 1.3.3, 3.1.2, 3.1.3, 4.2.6).



# Colors + Finishes —

Enhancing Interaction



Higher level of finishes at select locations enhance social gathering.

# Visual Communication Systems—

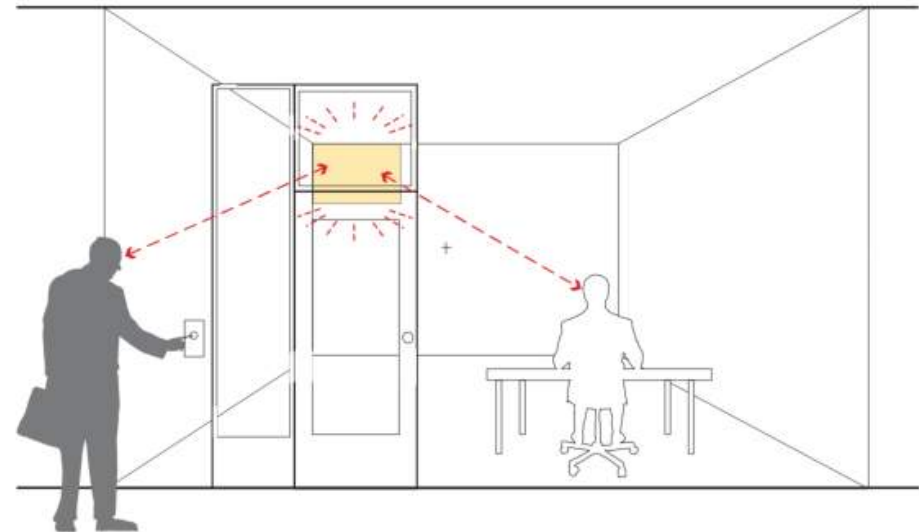
- Lighting as attention getting
- Visual Communication Devices
- Elevators
- Door hardware (occupancy indicator @ restrooms)
- Fire Alarm, Etc

## 2.7.2 Visual Doorbell

A visual doorbell is simply a light fixture switched from outside the entry point of an enclosed, private, or semi-private space that allows a visitor contact the room occupant by switching the light within the room. While these systems are effective care should be taken to locate and design the light fixture to be easily visible from all points in the room without being too obtrusive and startling.

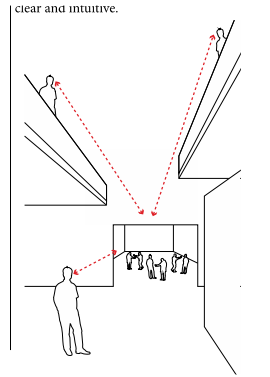
## 2.7.3 Strobes

The Americans with Disabilities Act requires that visual strobes be installed in conjunction with emergency alarm systems to alert deaf individuals. For buildings that specifically serve the deaf community it is recommended that the ADA required strobes may need to be augmented with additional devices and or be used in conjunction with shaking devices (See 2.7.4) to ensure that all occupants are alerted

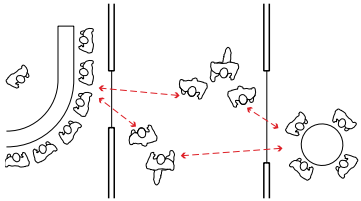


# Occupant Experience

## Visual Connection



2.1.5 Visible Destinations Within Buildings



2.1.6 Transparency In Movement Spaces



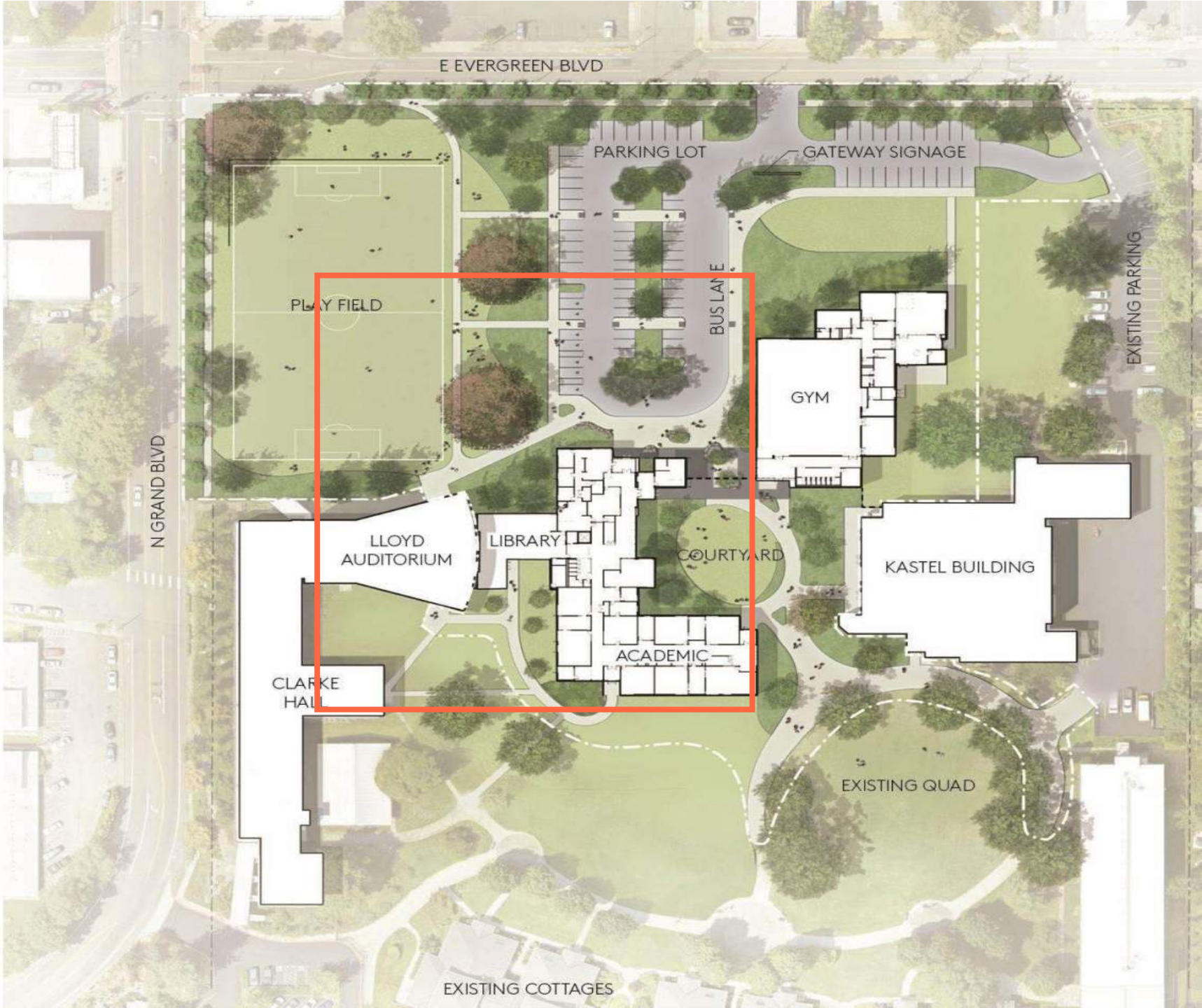


Site Design—

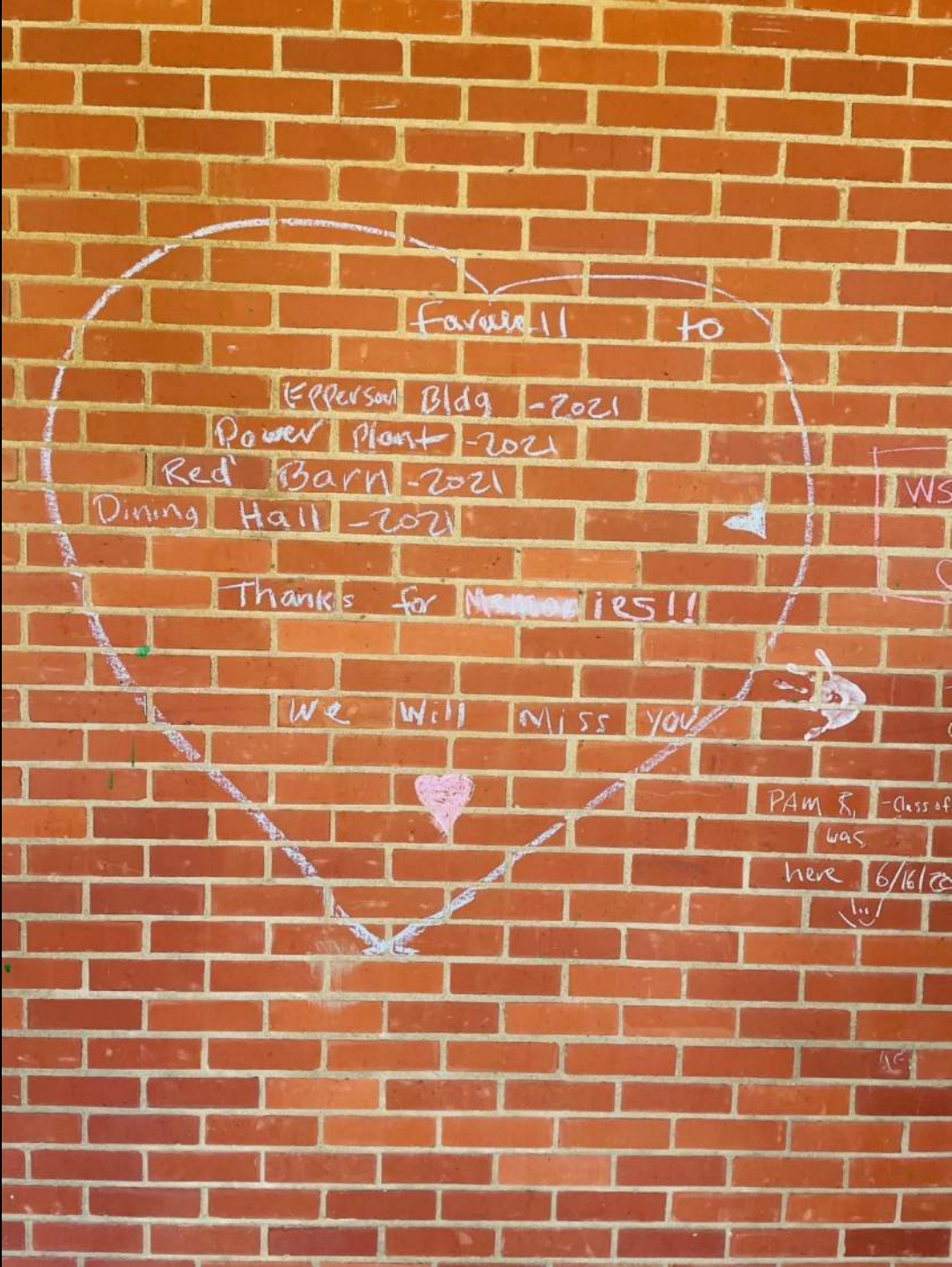
# Site Plan



# Site Plan



# Honoring Memories of the Past—



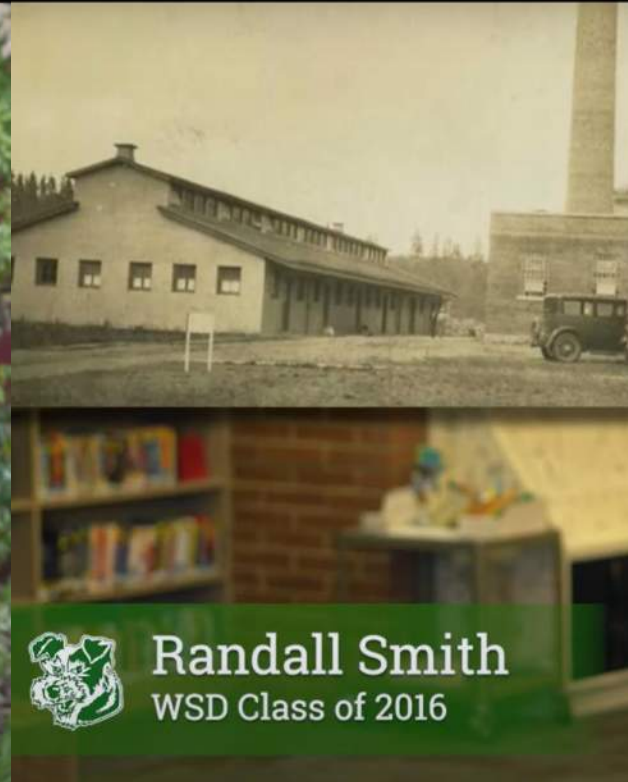
# Honoring Memories of the Past—

A History of the Washington School for the Deaf



**Shauna Bilyeu**  
WSD Superintendent

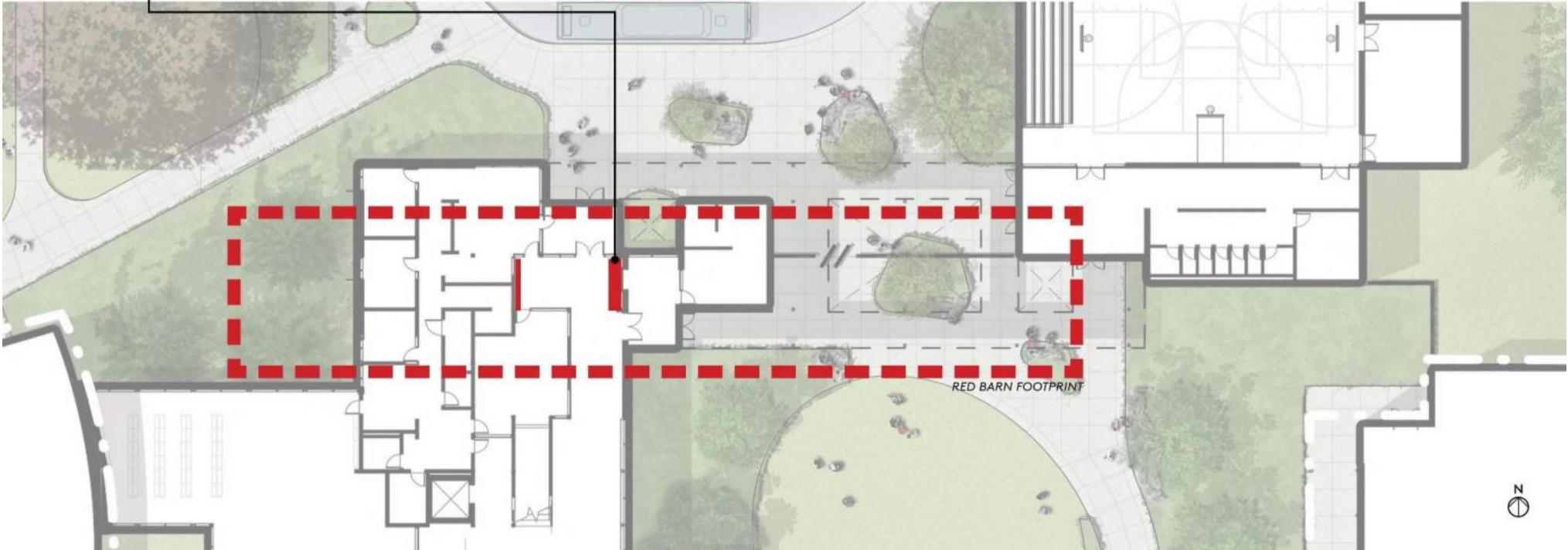
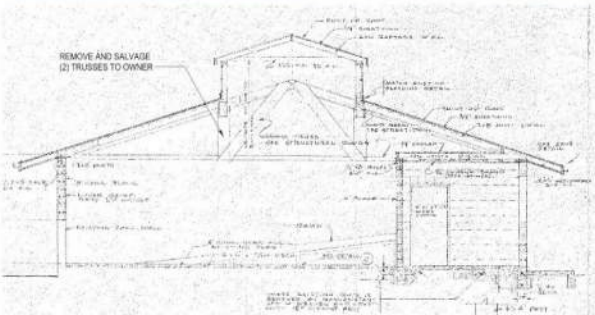
A History of the Washington School for the Deaf



**Randall Smith**  
WSD Class of 2016



# Honoring Memories of the Past—



# Celebrating Culture



Commissioned artist Christian Moeller photographed hands of various San Jose residents for San Jose Airport garage



Custom pucks snapped on chain link mesh, 1200' long, 7 stories high



Museum of Portable Sound Strobe photographs



San Jose garage



Custom perforated panel



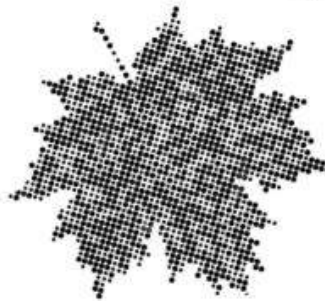
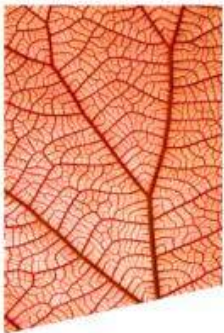
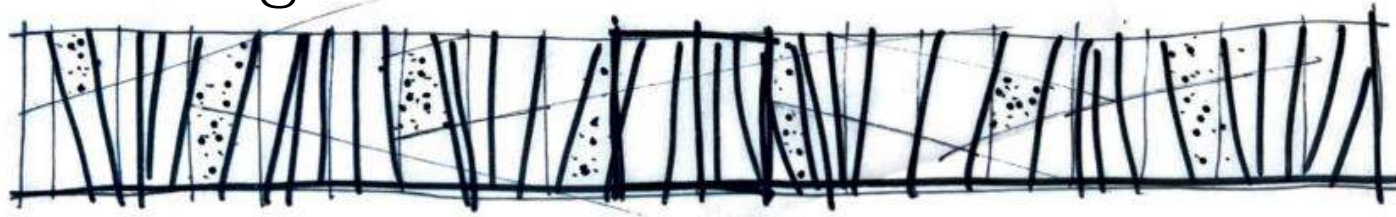
## CONCEPT 1 - Celebration of ASL

- Highlights the language of learning & communication central to this campus
- Large scale gesture across all panels
- Lyrical energy & movement
- Unique to WSD

### Considerations:

- What should actual message be?
- Where to source image?
- Photography better than illustration
- How to retain transparency?

# Celebrating Culture



1886



## CONCEPT 3 - Celebration of New Campus Integration

- Extension of architectural language
- Linear but not static
- Implies movement, flow & directionality
- knitting together architecture & expression by embedding imagery in selected segments

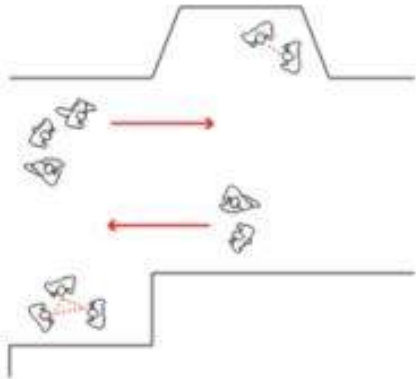
### Potential Insertion Images:

- Expression of the senses
  - Communication w/hands, eyes, mouth, gestures
  - Smile, all are welcome, kiss fist
  - Hand-in-hand
  - Heart "new transplant heart that integrates campus & is not a barrier"
- Landscape snippets
- History snippets, dates, etc.

# Site Design Considerations

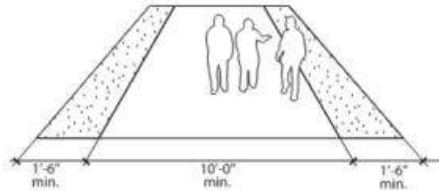
## 3.1.2 Conversation Eddies & Pathway Flow

Along campus paths and primary corridors, provide space to allow small groups to have stationary conversations outside of the flow of traffic. These conversation nodes can be relatively small for standing conversations or can be larger in instances where it is appropriate to incorporate loose seating. These nodes are especially valuable at campus entrances, decision points and crossroads as well as along long interior corridors. (See 1.3.2)



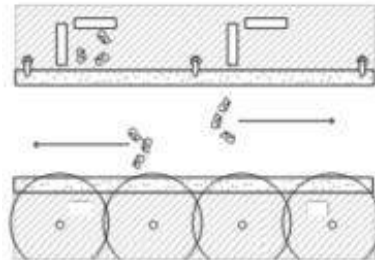
## 3.1.7 Sidewalk & Pathway Dimension & Design

Sidewalks and paths should be a minimum of ten feet wide to allow for several groups of signers to pass each other easily. Textured edges on the ground plane placed along walkways and can provide subtle clues to the presence of edges.



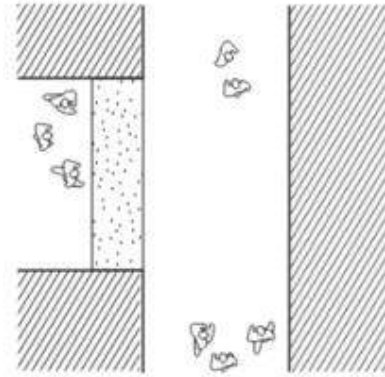
## 3.1.8 Shoulder Zones

In order to maintain the desired uninterrupted path of travel, Ancillary Uses (see 3.1.3) and Conversation Eddies (See 3.1.2) should be located within "Shoulder Zones"- dedicated zones parallel to one or both sides of the path of travel. The width of these zones as well as the number and type of uses within them will vary but at a minimum, should accommodate a comfortable layout for signed conversation. Shoulder Zones along sidewalks that parallel streets play a dual role as a safety buffer between vehicular and pedestrian traffic. Street elements such as signage, pole lighting, fire hydrants and trees should be located within Shoulder Zones.



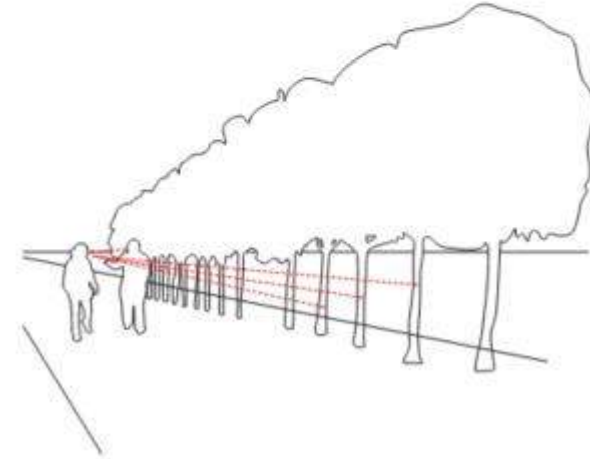
## 3.3.4 Textured Transitions

Textured edges on the ground plane at transitions between different paths can provide subtle clues to the presence of thresholds, entrances and decision points.

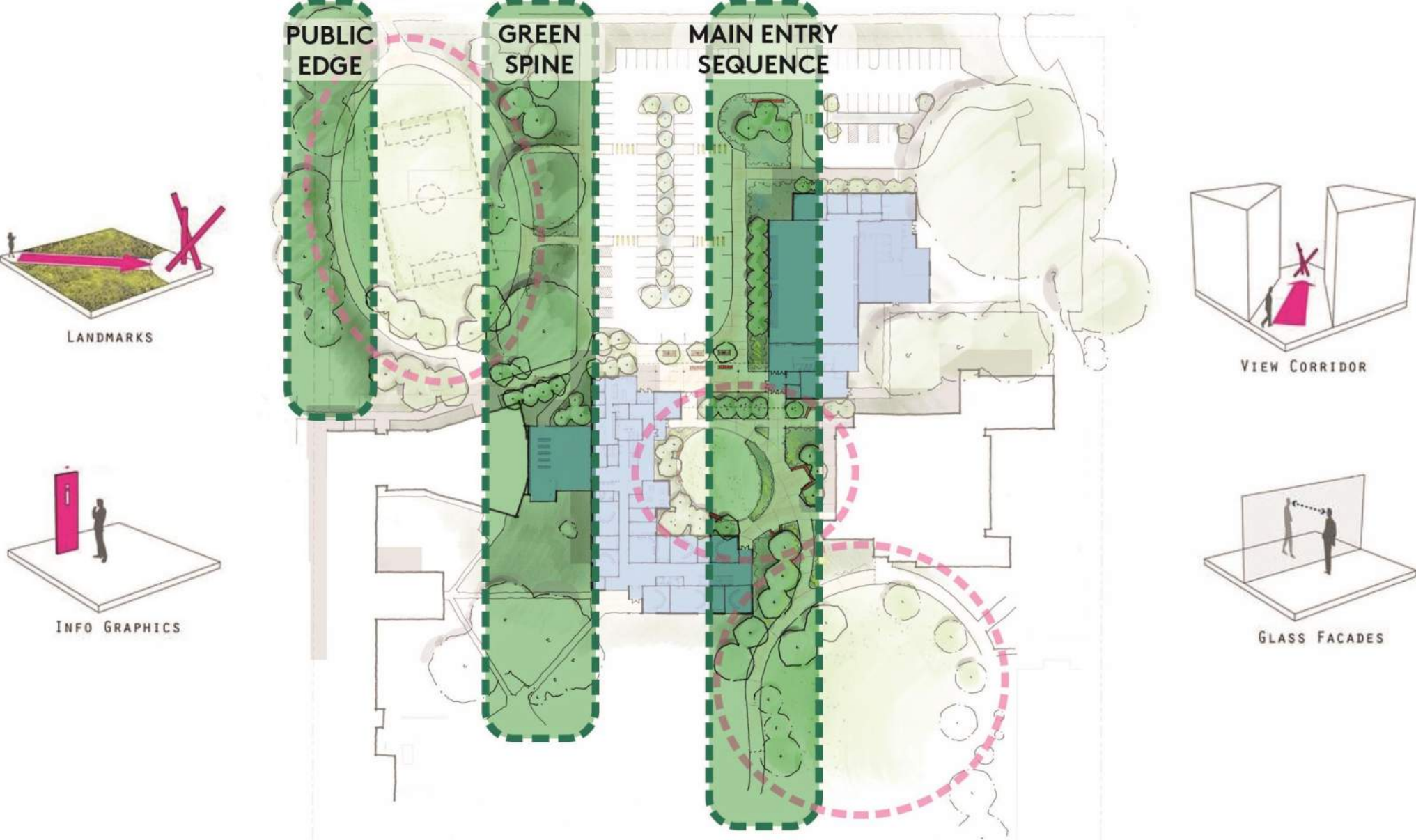


## 3.4.4 Landscape

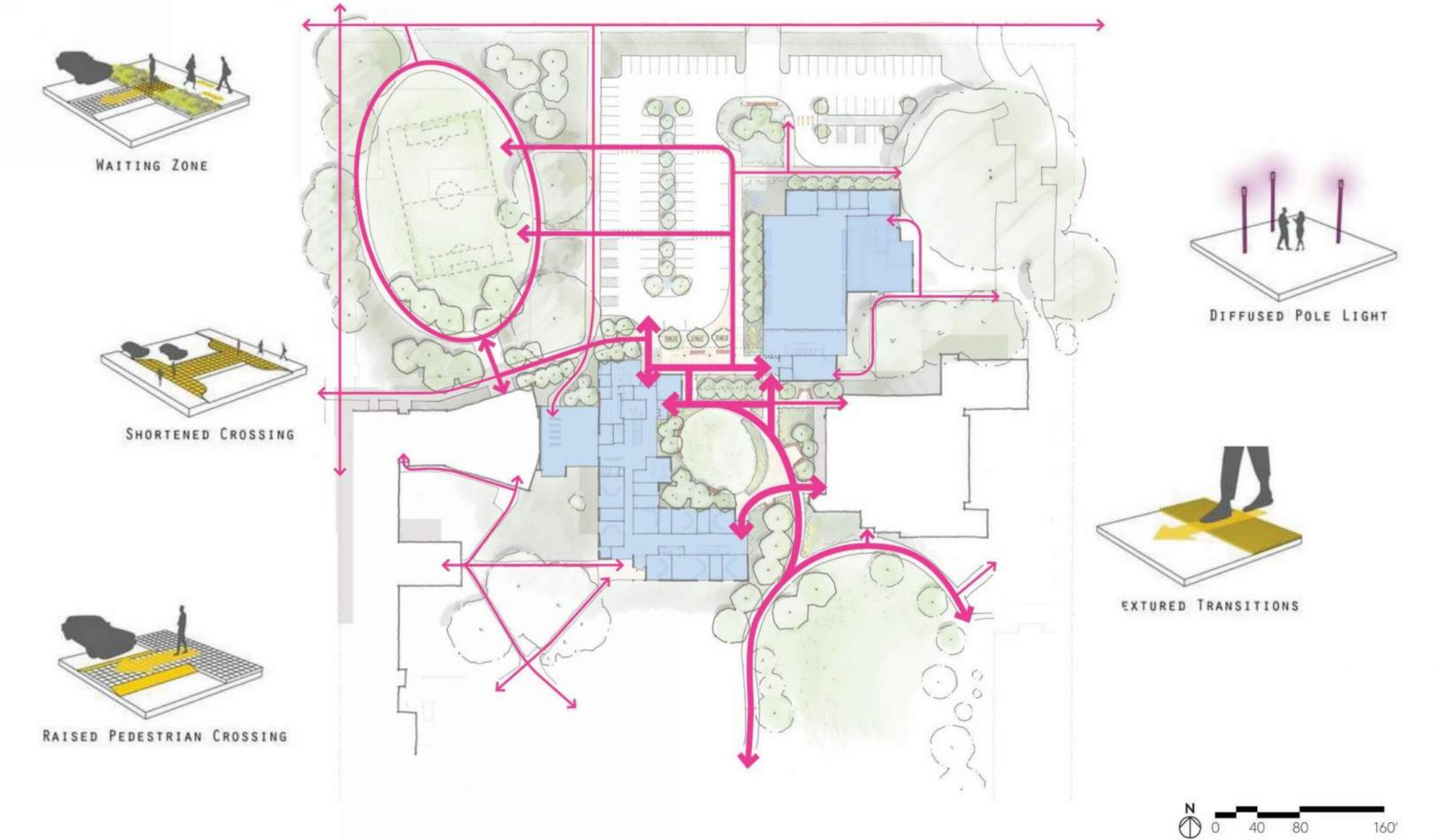
Landscape elements and vegetation should be used along major paths of travel to provide a recognizable, and continuous, visual reference for signers. Placement of trees, light standards or other elements should be placed in an easily understood rhythmic pattern relating to pedestrian cadence.



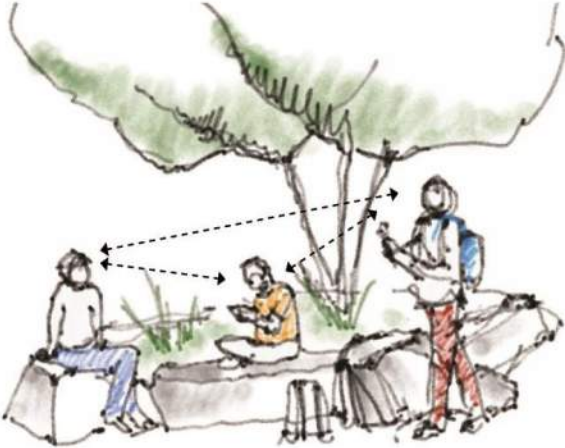
# Site Design Layering



# Pedestrian Circulation







# Conversation Triangles



CONVERSATION TRIANGLES



# Planting Strategy

-  LAWN
-  LOW (UNDER 3 FEET)
-  MEDIUM (3-5 FEET)
-  TREES (LIMBED UP TO 8')



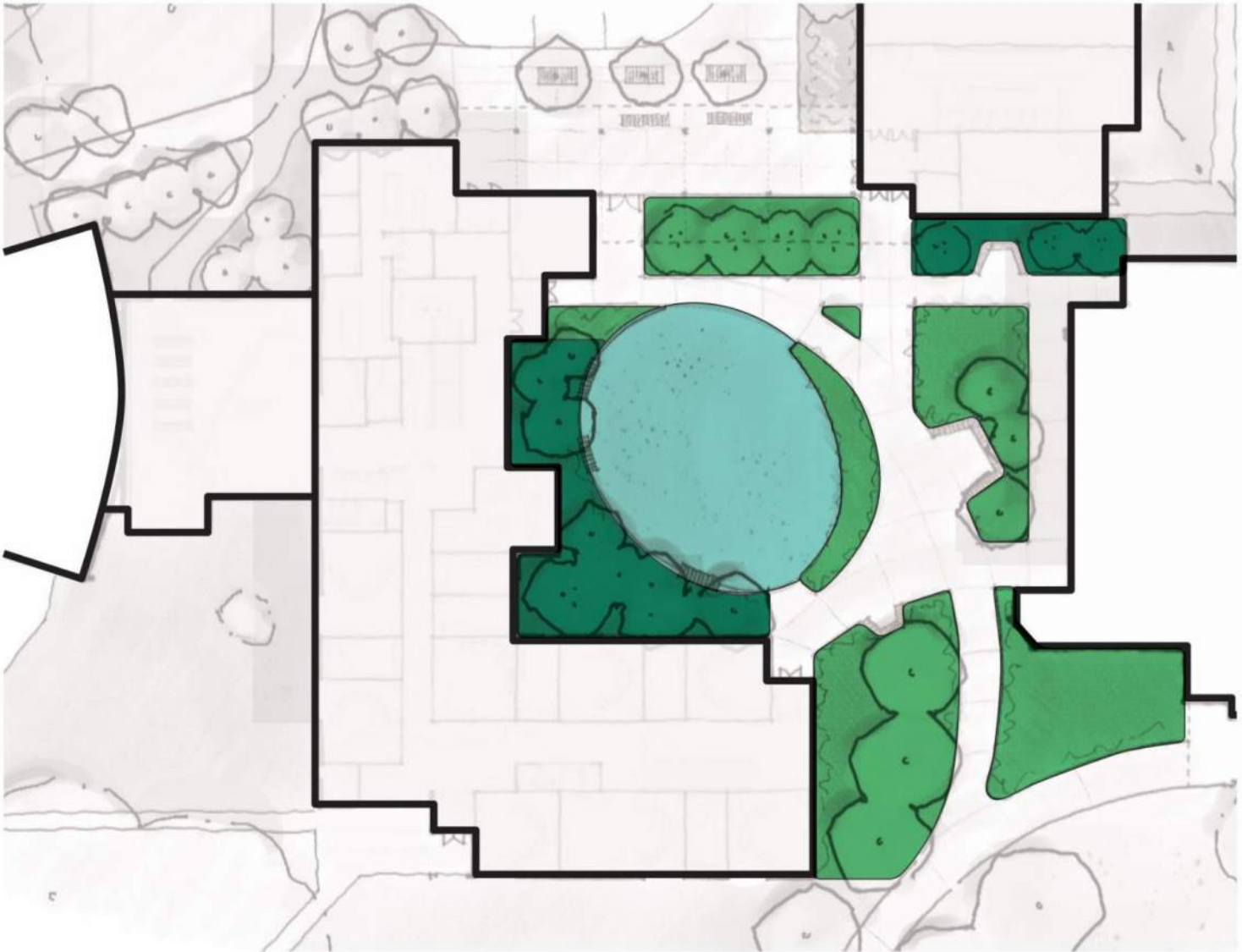
CLEAR SIGHT ZONE



SOFT GROUND PLANE



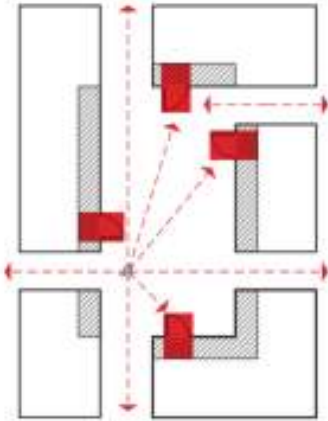
GREEN BUFFER



# Clear Wayfinding

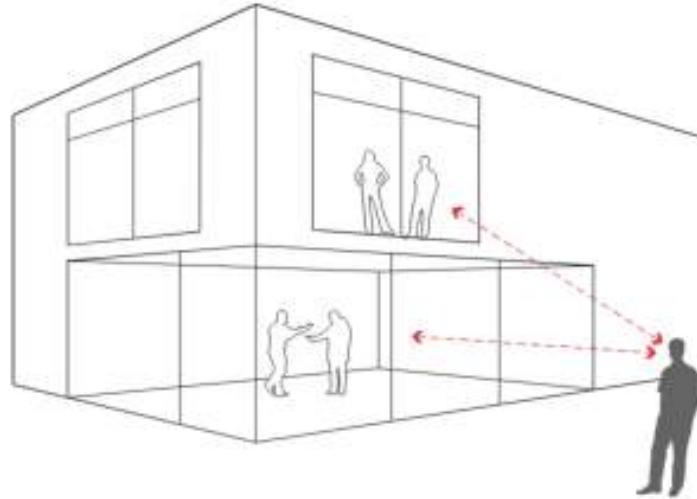
## 2.1.3 Location of Building Entrances

Primary building entrances should be located such that they are highly visible from decision points along major campus circulation and from open spaces.



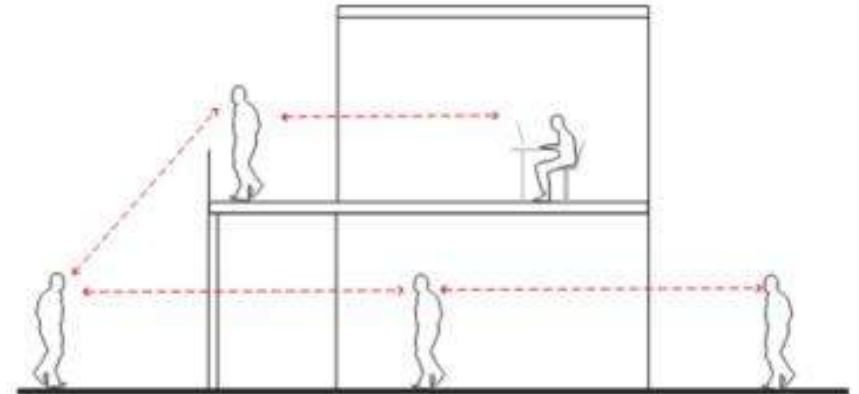
## 2.1.4 Building Legibility

Primary building uses, especially interior social spaces like lounges, conference rooms and large assembly spaces, should be made legible from the outside whenever possible. This legibility aids in wayfinding at both the campus and building scale. (see 2.1.2)



## 1.3.6 Linking Exterior & Interior Spaces

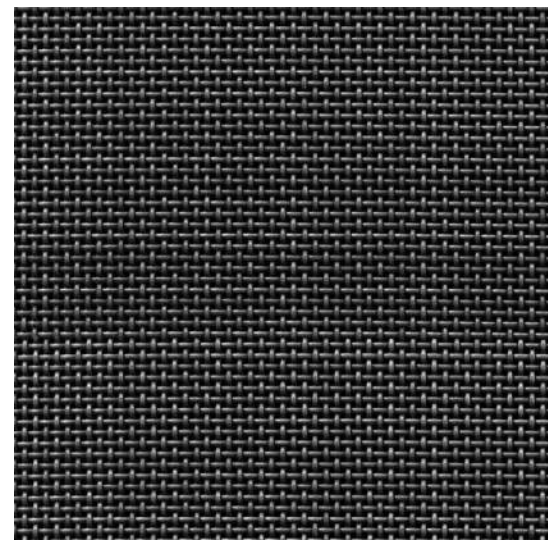
It is highly desirable to open up interior building spaces, especially social spaces such as conference rooms, lounges, building lobbies and eating areas to exterior circulation paths and common areas. Making a ground floor that is as transparent as possible is an effective means for achieving this, but upper level building spaces may communicate with outdoor areas as well (see 2.1.4). Highly transparent glazing should be used and heavily reflective or tinted glass should be avoided.



# Clear Wayfinding



# Testing Through Mockups





# Mass Timber Design—

# Structural Systems

Steel

Tilt up Concrete

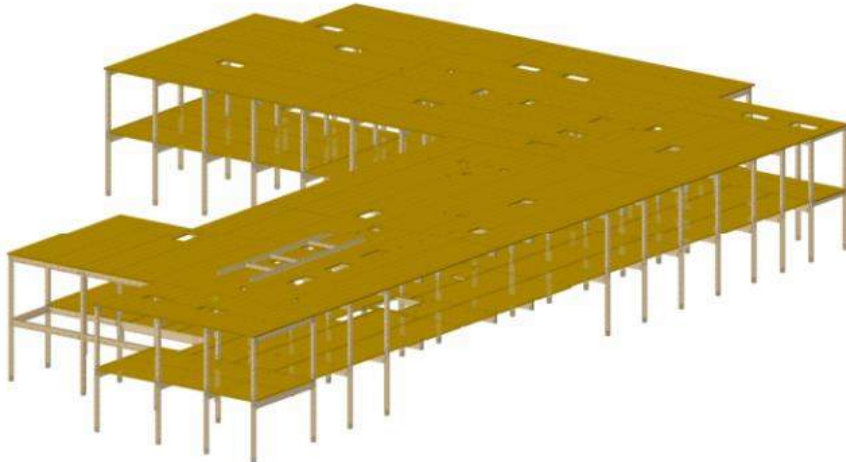
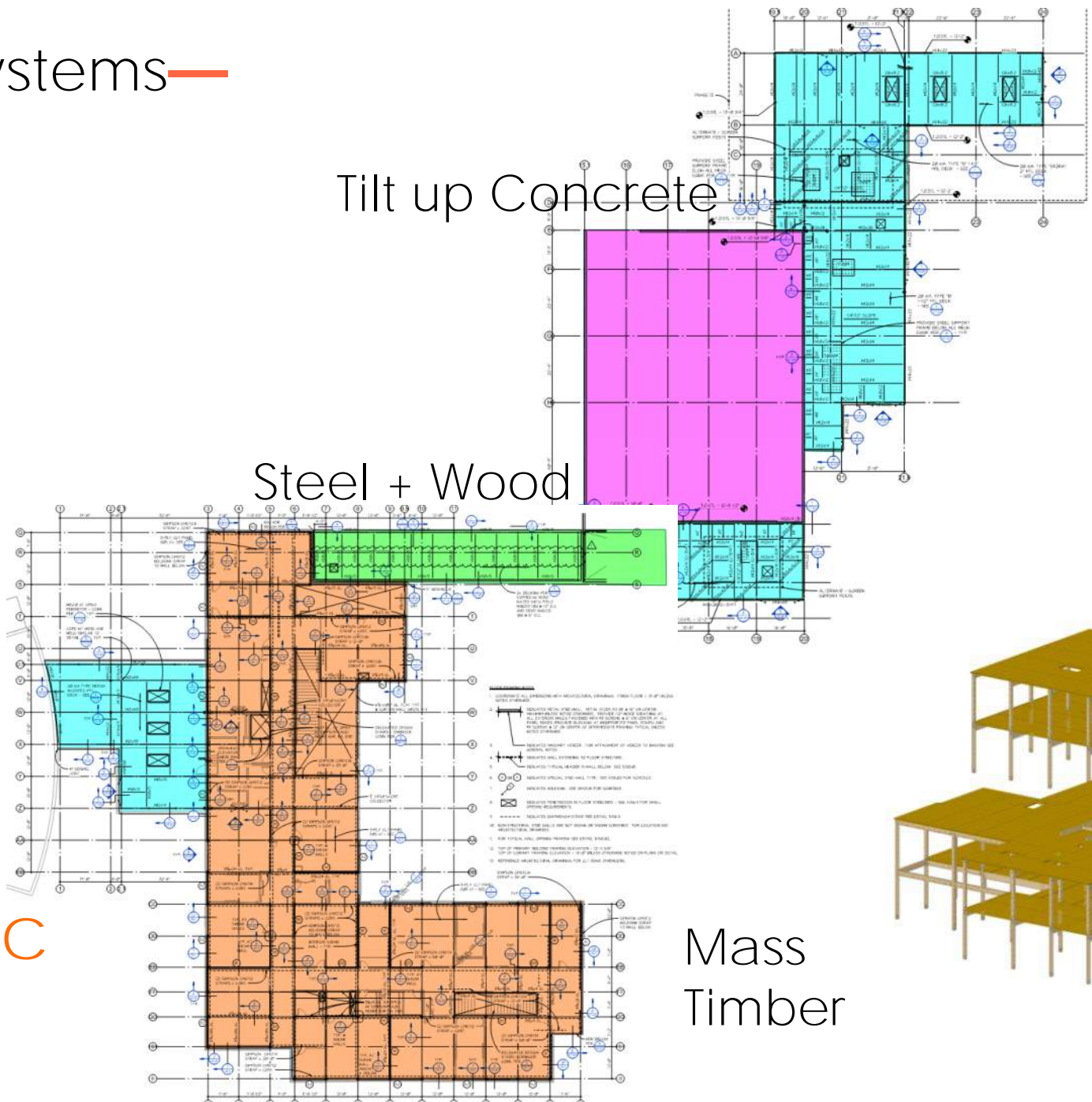
PE Wing

Steel + Wood

Steel

Academic Wing

Mass Timber



# Designing with Mass Timber—

There is a growing body of research that associates biophilic spaces with student health and cognitive benefits.

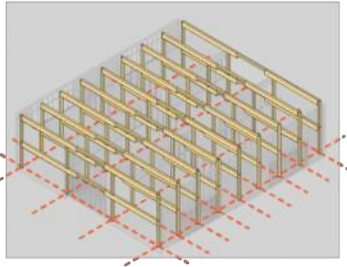
+

Emerging mass timber technology is positively impacting the way we design and construct buildings.

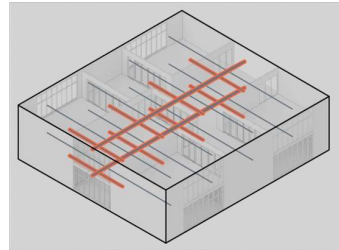
=

By combining timber technology and growing biophilic research, we can Build Better Schools.

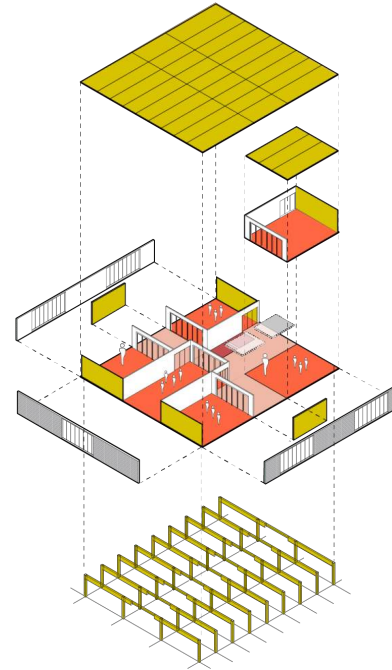
STRUCTURAL BONES



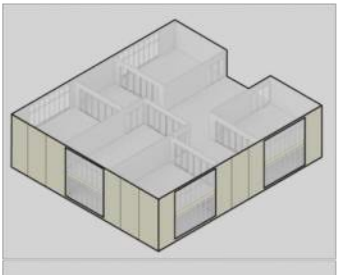
MECHANICAL SYSTEM



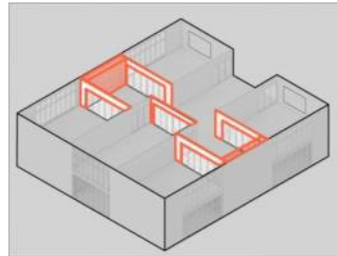
KIT-OF-PARTS



EXTERIOR ENCLOSURE

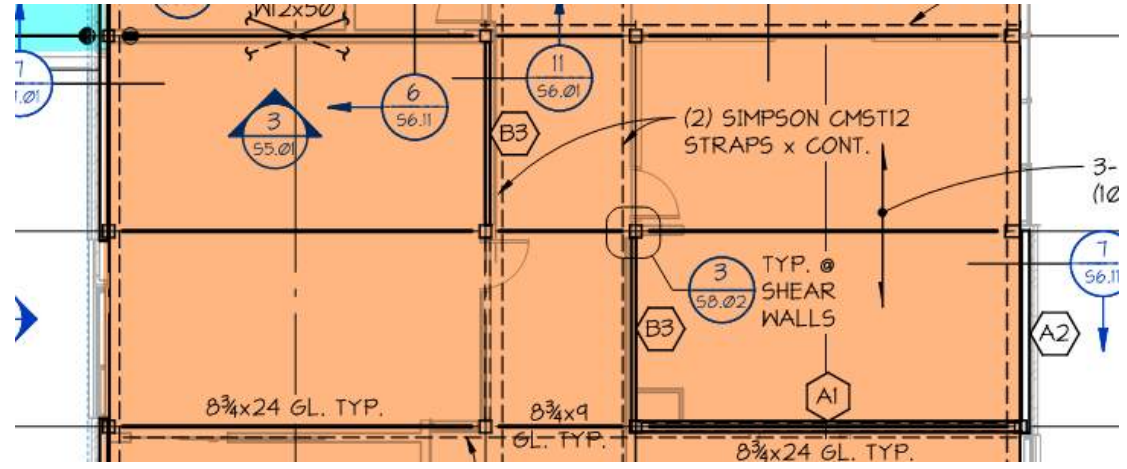
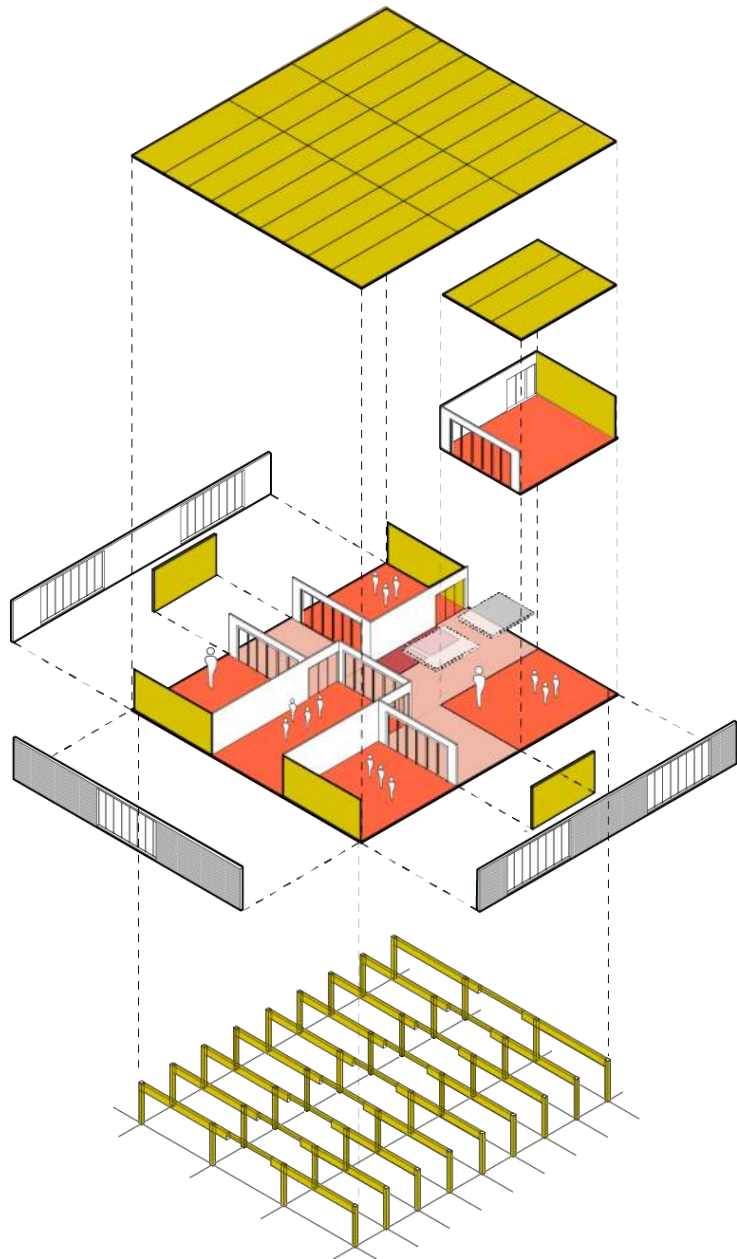


INTERIOR FLEXIBILITY

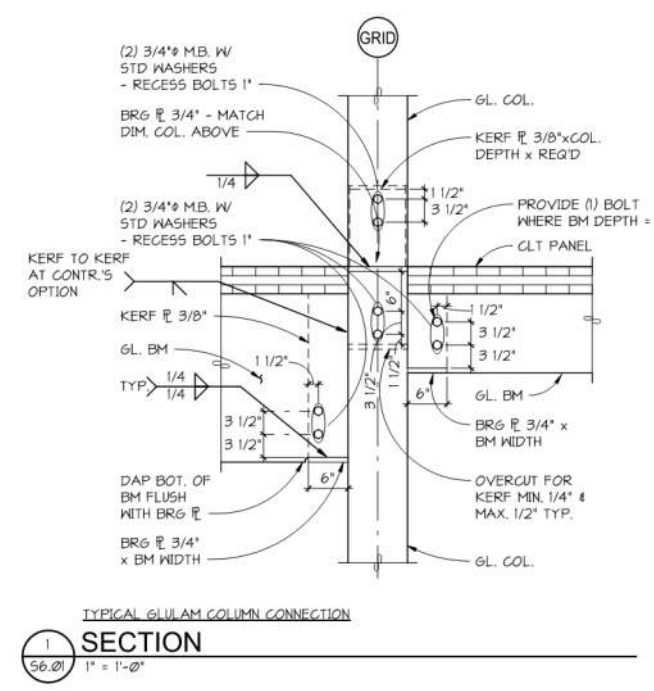
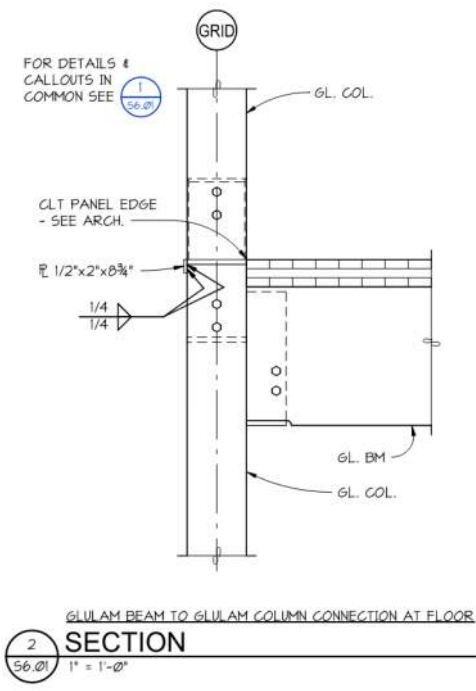


**BUILDING BETTER SCHOOLS**

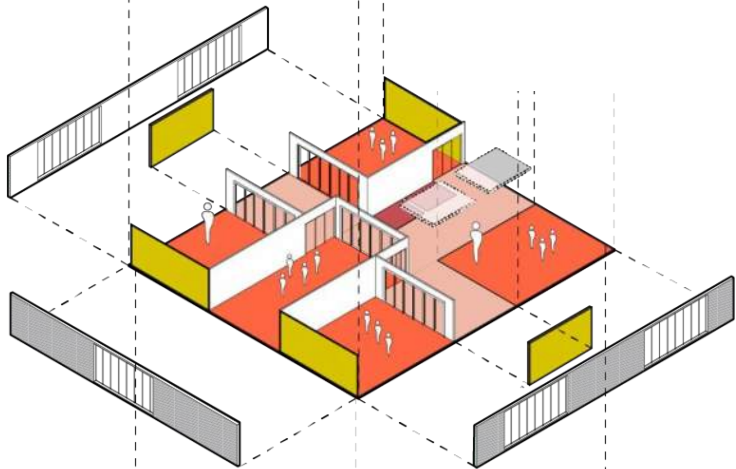
# Mass Timber System



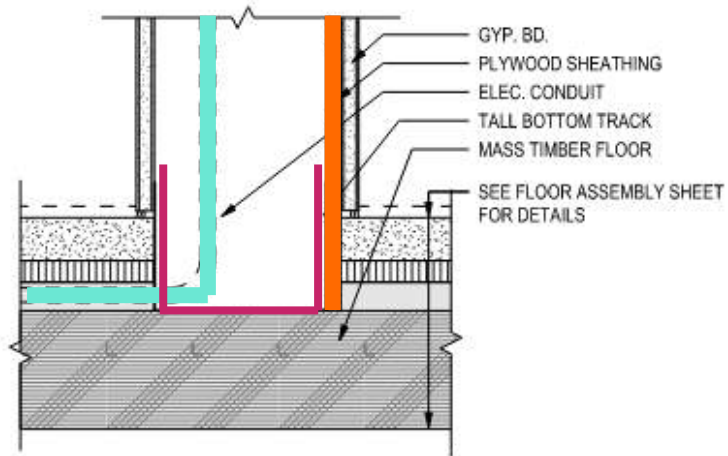
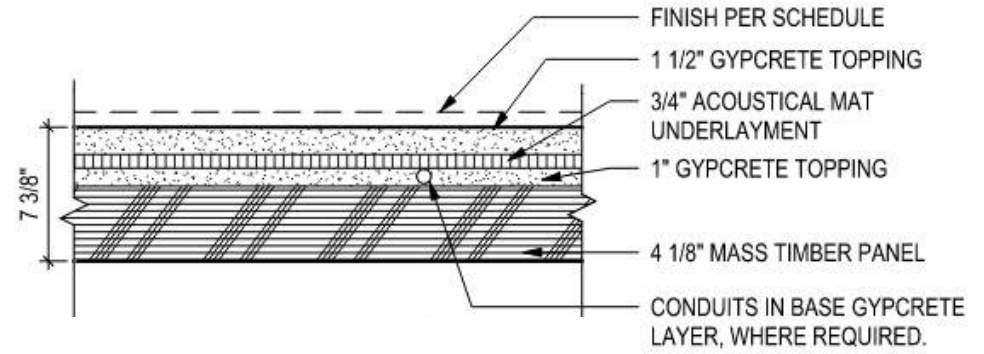
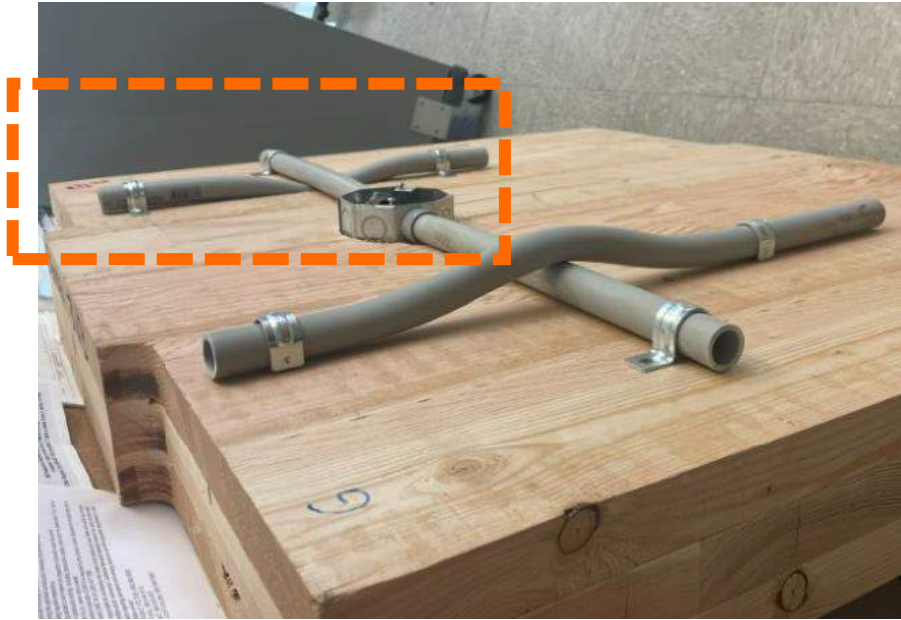
**12' x ~24' grid**



# Mass Timber | Shear

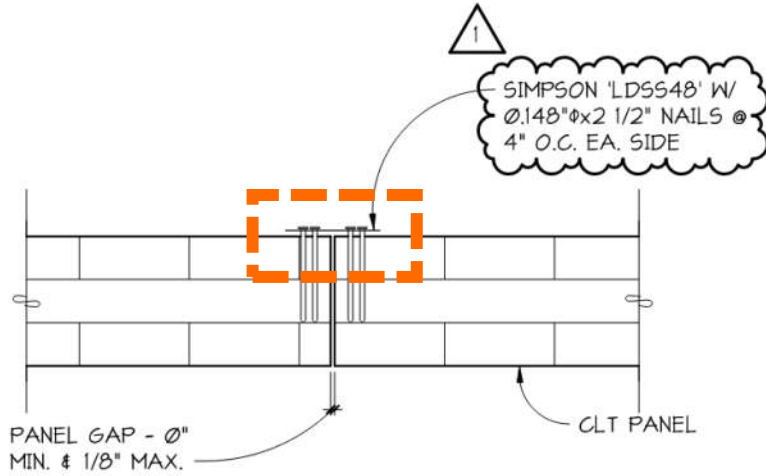


# Mass Timber Details w/ Contractor Input



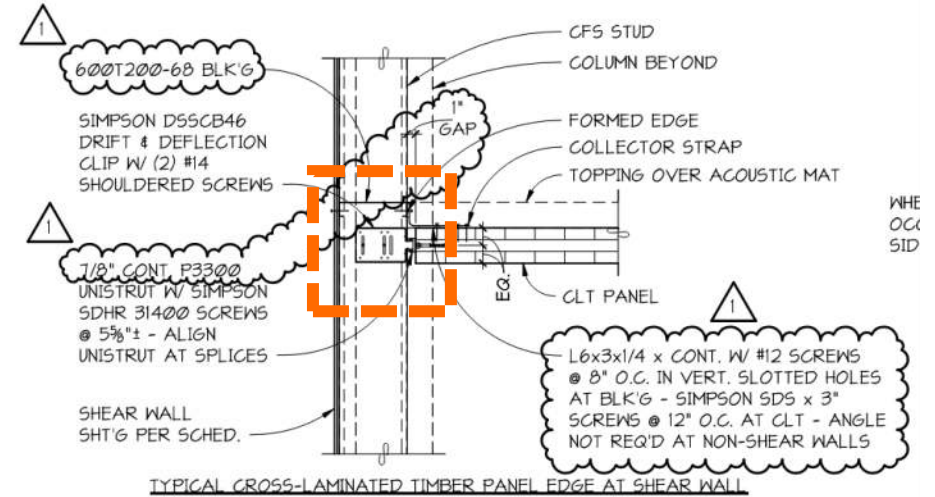
# Mass Timber Details w/ Contractor Input

NOTE:  
WHERE BOXED JAMB  
STUD OCCURS, PROVIDE  
CLIP EACH SIDE.



3-PLY CROSS-LAMINATED TIMBER PANELS

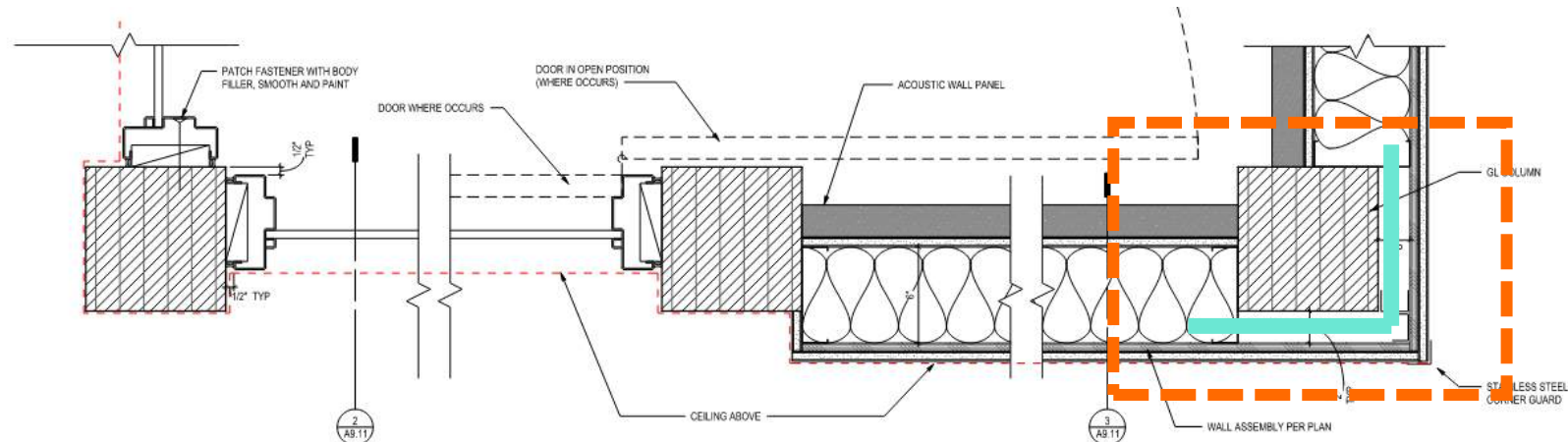
1  
56.11 3" = 1'-0"



TYPICAL CROSS-LAMINATED TIMBER PANEL EDGE AT SHEAR WALL

7  
56.11 1" = 1'-0"

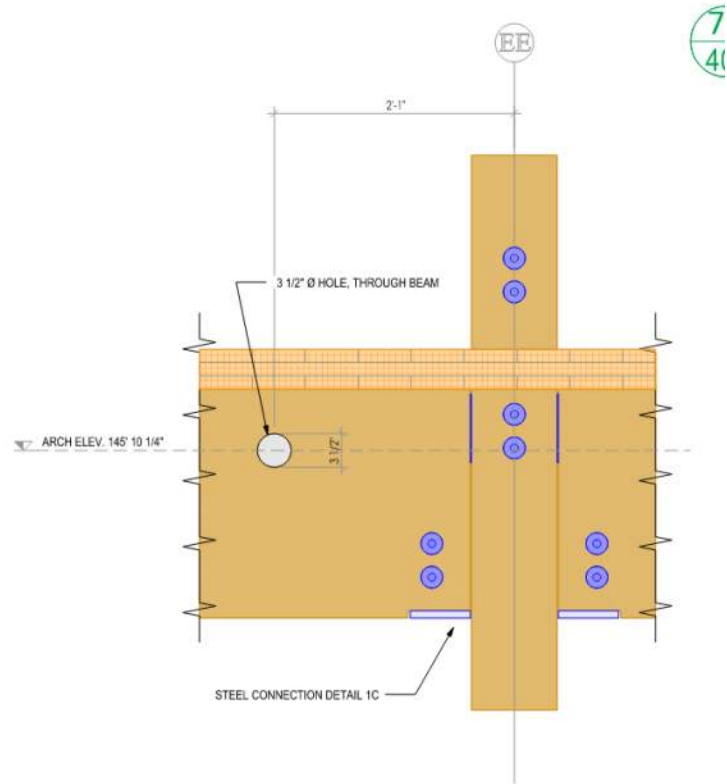
8  
56.



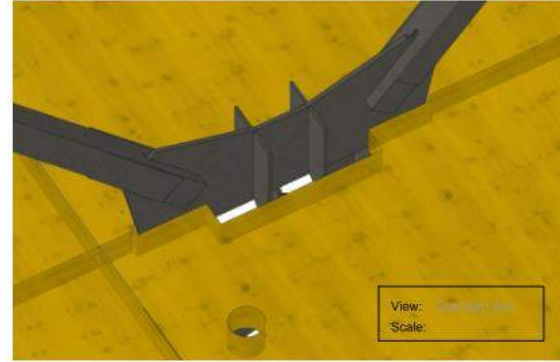
1 CORRIDOR COLUMN PLAN DETAILS  
3" = 1'-0"



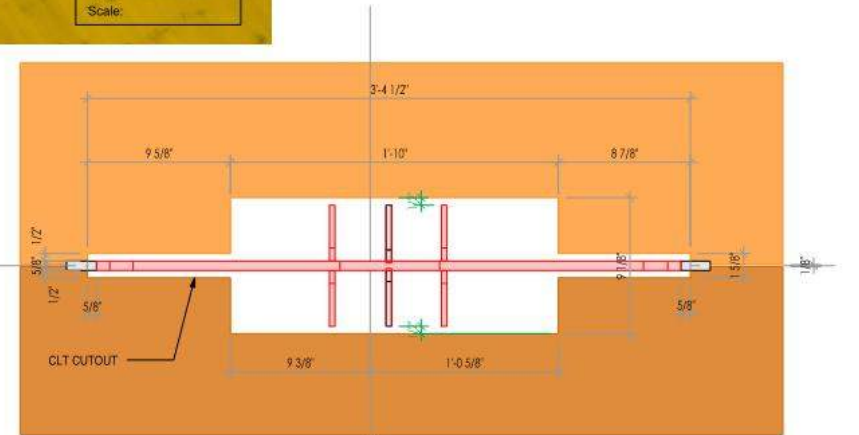
# Mass Timber Shop Drawings



**11** FIRE PROTECTION PENETRATION  
**402** SCALE 1" = 1'-0"



W & Z



**8** CLT CUTOUT AROUND STEEL BRACE  
**402** SCALE 1 1/2" = 1'-0"

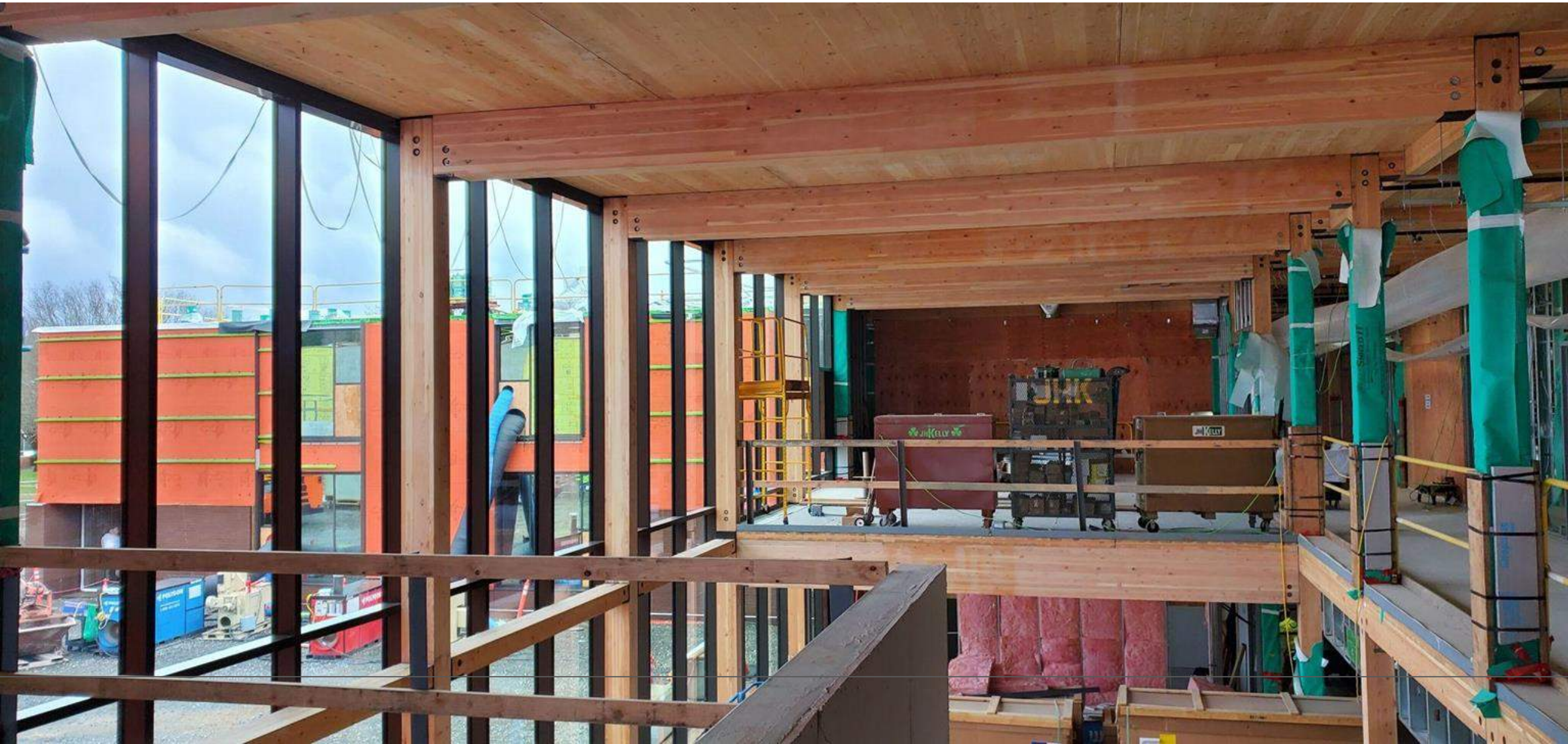
4



# Sense of Home



# Construction Progress —



# Construction Progress





Sharing Knowledge—

CLT RESEARCH + INNOVATION

# Building Better Schools—



# Kit-of-Parts

The mass timber kit-of-parts for core learning areas is comprised of a series of elements that are adaptable to a range of educational pedagogies. The kit-of-parts is designed around the structural grid framework that optimizes the amount of wood fiber used on the project for cost and material efficiency.

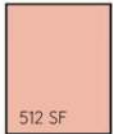
The interior space planning is defined with mass timber walls located strategically at teaching walls. Metal stud and gypsum board walls support operable glazed interior partitions to allow for classroom expansion to shared learning and provide visual transparency to adjacent learning areas. 3-ply CLT ceiling panels are left exposed where possible above learning areas, with ceiling clouds only necessary for acoustics or MEP integration.

\*CLT shear walls can be used depending on the building's construction type. In instances where combustible material in the exterior wall is not permitted by code, steel braced frames are used for the lateral system design.

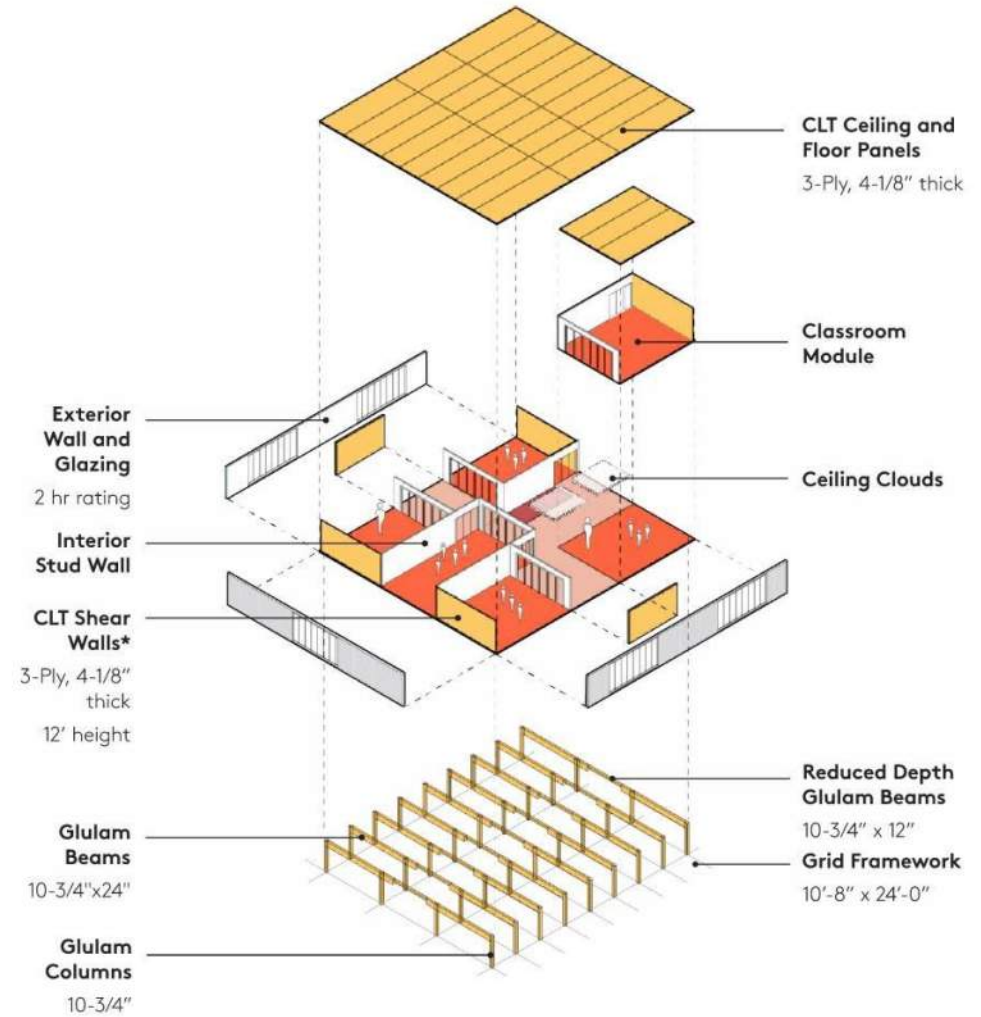
## Primary Classroom



## Shared Learning



## Small Group

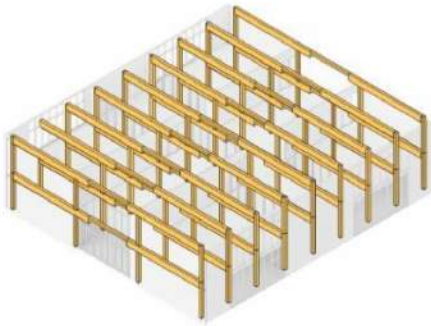


Reducing the volume of wood fiber by using 3-ply CLT panels for floors and ceilings is a key factor in the success of the kit-of-parts.

## A Systems Based Approach

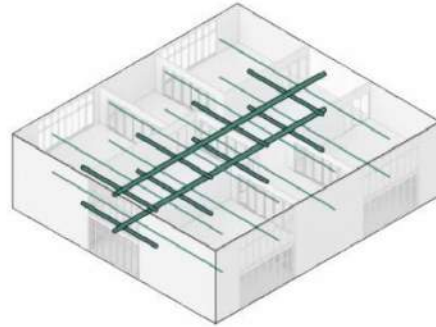
To promote flexibility, economy, and customization of the kit-of-parts, a systems-based design approach is taken, integrating the building's structural 'bones', air distribution systems, exterior enclosure and key interior components.

### Structural "Bones"



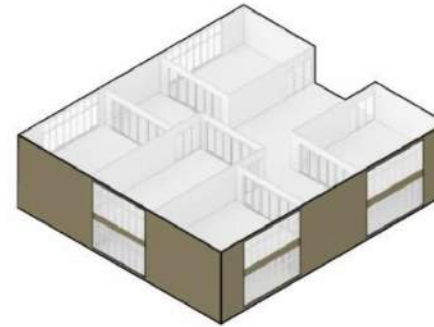
The structural grid and framework optimizes beam span, removes girders, and mass timber panel thickness, while considering mechanical routing and exterior glazing heights for daylight.

### Mechanical System



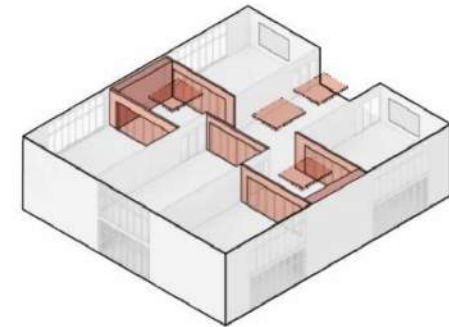
The mechanical distribution approach is centralized with strategic routing primary at shallow center beams.

### Exterior Enclosure



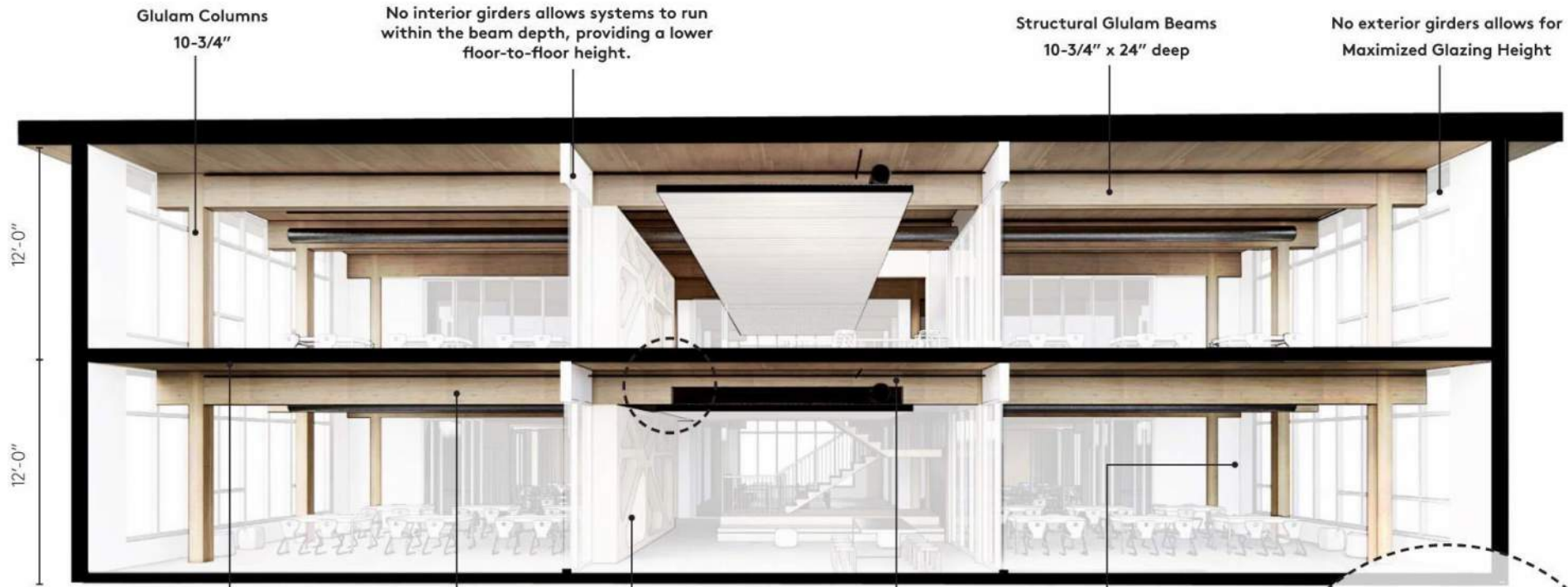
Exterior skin maximizes glazing to the underside of the CLT ceiling for improved daylighting. The repetitious grid provides opportunities for pre-fabricated exterior wall panels as an additional layer to the kit-of-parts.

### Interior Flexibility



Interior layouts are designed to maximize options and long term flexibility. Ceiling solutions, where needed, may be incorporated as a pre-fabricated cloud solution including MEP components, acoustics and lighting.

# A Systems Based Approach: Structure



To achieve a cost competitive and efficient mass timber system, three primary structural parameters include:

### Reduce the Amount of Wood Fiber

To utilize the 3-Ply CLT floor and allow it to remain exposed, the building construction type should not require a floor rating. This is achieved with buildings of Type III-B and V-B Construction. 3-ply CLT floor and wall panels are the optimal number of laminated plies to limit the amount of cubic meters of wood fiber in the project. Panels are produced in maximum lengths to

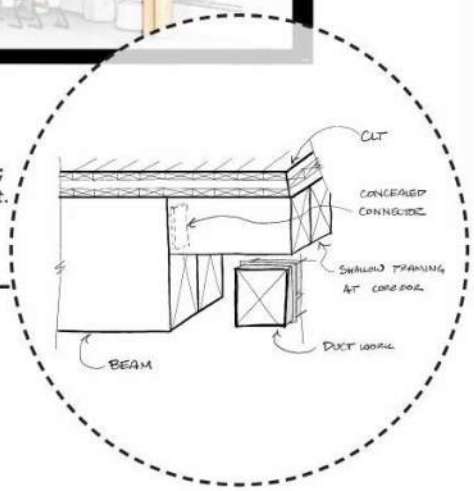
achieve trucking efficiencies.

### Perimeter CLT Lateral System

The building seismic design uses 3-ply Cross-Laminated Timber (CLT) shear walls at building perimeter to allow for maximum future interior flexibility. This also eliminates the steel trade on-site.

### Eliminate Girders & Provide Shallow Beam Depth to Allow for MEP Distribution

The framing system is comprised of glulam beams and columns. Columns are spaced at an approximate interval of 10'-8" in order to eliminate girders to achieve efficient air distribution routing and potential floor-to-floor height savings. The central structural bay also uses a shallow beam, permitting the main mechanical ducts to distribute to classrooms without significant impact to ceiling height at the expanded learning core.



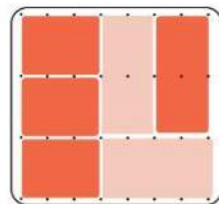
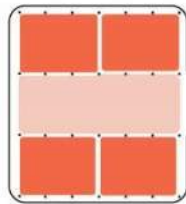
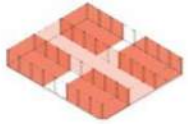
# Modeling of Kit-of-Parts: Adaptability

The framework and kit-of-parts maximize adaptability to serve a wide range of teaching pedagogies and learning area requirements. It is designed to expand and contract based on the desired amount of shared learning space and number of classrooms. Possible adaptability variations are shown below.

...And there are infinite more variations to promote a dynamic, engaging learning environment!

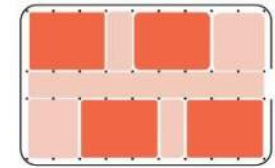
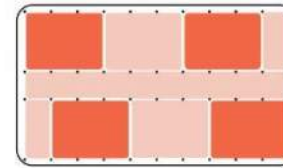
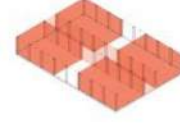
## 4-UP Program

Expanded Learning Core



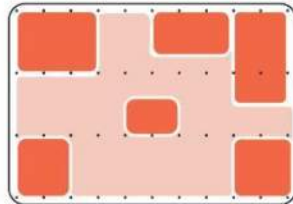
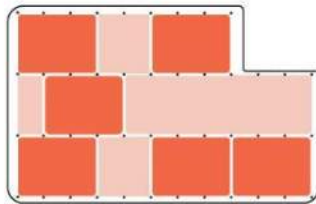
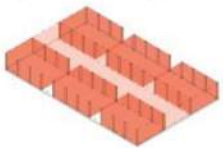
## 4-UP Program

Lengthened Learning Core



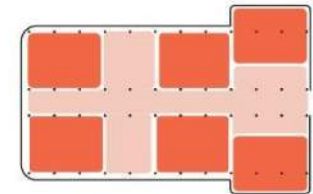
## 6-UP Program

Expanded Learning Core



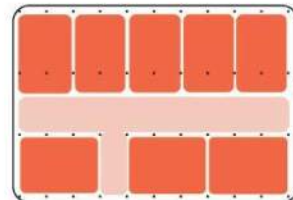
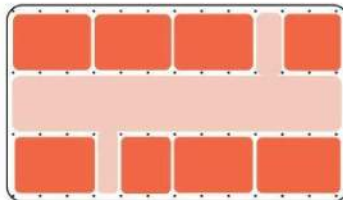
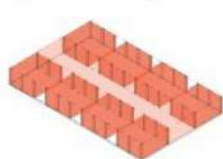
## 6-UP Program

Lengthened Learning Core



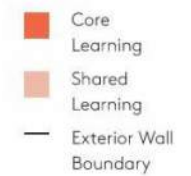
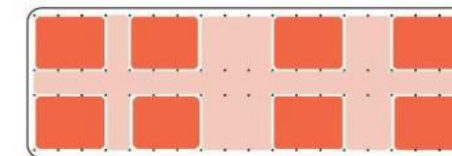
## 8-UP Program

Expanded Learning Core



## 8-UP Program

Lengthened Learning Core

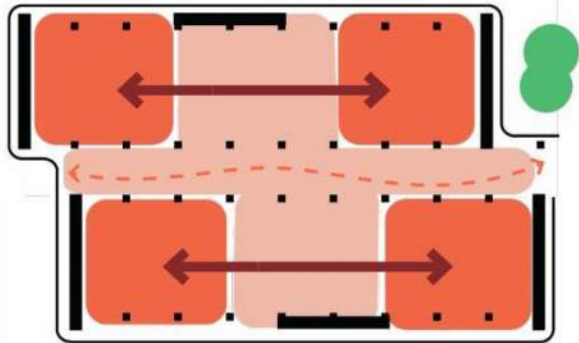


# Modeling Learning Environment Agility Model Concepts

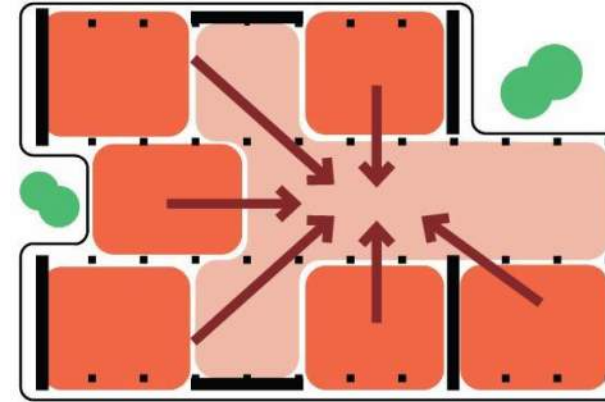
While there are an infinite number of classroom solutions, three examples are designed in more detail to illustrate the adaptability of the kit-of-parts. Each model studies different opportunities for shared learning, classroom sizing, access to the exterior and circulation through the classroom block to demonstrate design agility.

Three configurations models are explored in more detail to illustrate the kit-of-parts possibilities.

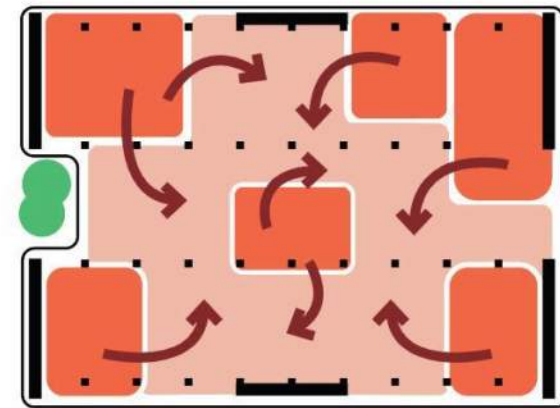
### Paired Learning Partners



### Central Learning Hub



### Variable Learning Blocks

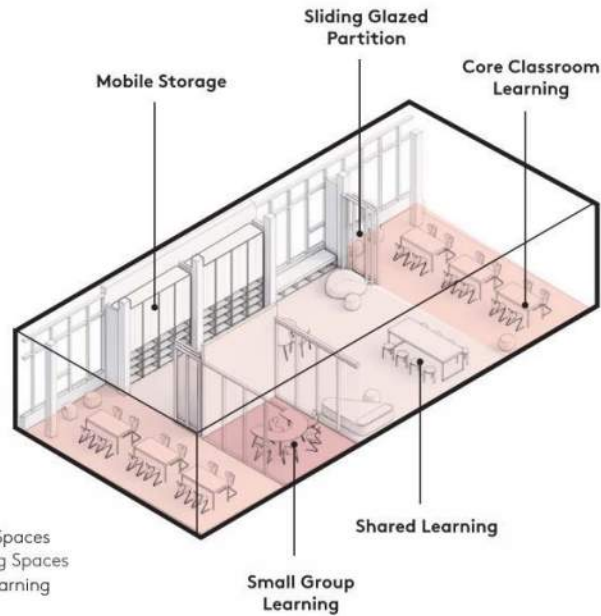
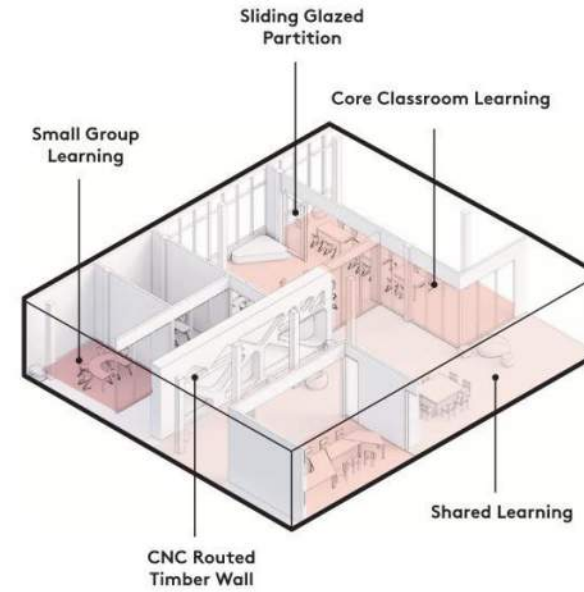


- Core Learning
- Shared Learning
- Exterior Wall Boundary
- Shear Wall Location

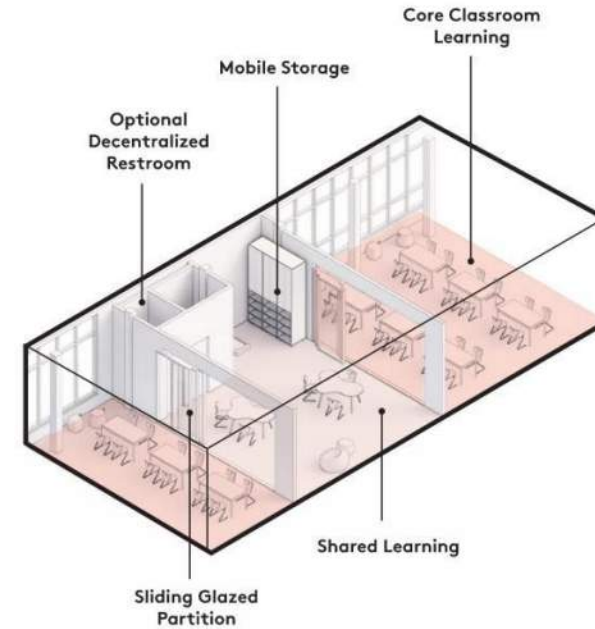
# Adaptive Shared Learning Studies

Shared learning spaces are an important part of teaching pedagogies, especially in a pandemic-ridden society where learning communities benefit from connected but partitionable and/or expandable learning space in order to safely accommodate the same amount of students. Shared learning spaces also allow for flexible interior design to accommodate different teaching 'zones' and styles.

The kit-of-parts approach allows for endlessly customizable shared learning spaces depending on district's needs or teaching style.



- Core Learning Spaces
- Shared Learning Spaces
- Small Group Learning



Thank  
You—



# QUESTIONS?

This concludes The American Institute  
of Architects Continuing Education  
Systems Course

---

**Brendan Connolly, AIA**

**MITHŪN**

brendanc@mithun.com

# Copyright Materials

This presentation is protected by US and International Copyright laws. Reproduction, distribution, display and use of the presentation without written permission of the speaker is prohibited.

© The Wood Products Council 2023

*Funding provided in part by the Softwood Lumber Board*

**Disclaimer:** The information in this presentation, including, without limitation, references to information contained in other publications or made available by other sources (collectively “information”) should not be used or relied upon for any application without competent professional examination and verification of its accuracy, suitability, code compliance and applicability by a licensed engineer, architect or other professional. Neither the Wood Products Council nor its employees, consultants, nor any other individuals or entities who contributed to the information make any warranty, representative or guarantee, expressed or implied, that the information is suitable for any general or particular use, that it is compliant with applicable law, codes or ordinances, or that it is free from infringement of any patent(s), nor do they assume any legal liability or responsibility for the use, application of and/or reference to the information. Anyone making use of the information in any manner assumes all liability arising from such use.