



DesignED Studios

Group 15

Ashley Juraschka

Joanna Rywak

Gina Singh

Ralph Snabian

Secord Elementary School Redevelopment

Final Presentation





Agenda

Introduction + Background

Project Overview

Constraints

Design Pillars

Sustainable Design Goals

Architectural Development

Development Concentrations

Architectural

Structural

Building Science

Building Standard Assessment

Indoor Environmental Quality

Building Systems

Construction

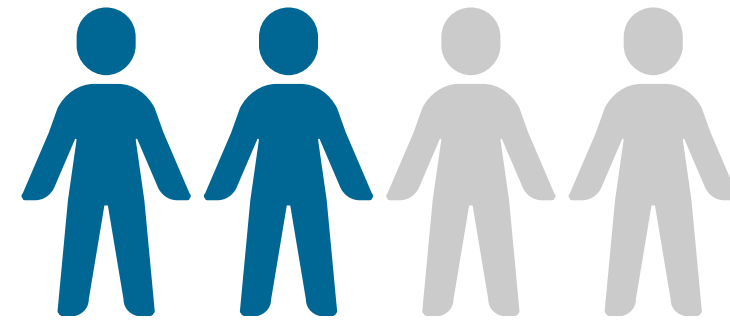
Conclusion

Problem Overview



\$11.4M worth of repairs are unmet

TDSB has decided to build a **new school** rather than renovate as the **existing building is not sustainable** nor efficient, with extremely high operational costs [2]



50% more capacity required

The area is expecting an **influx of new students** due to increasing migration rates, many of which are currently taught in portables [2]



A design gap in older school facilities

Factors that are commonplace in modern building design are not historically incorporated into schools (**net-zero energy** or emissions, **adequate daylighting** conditions)

Constraints

Building Capacity

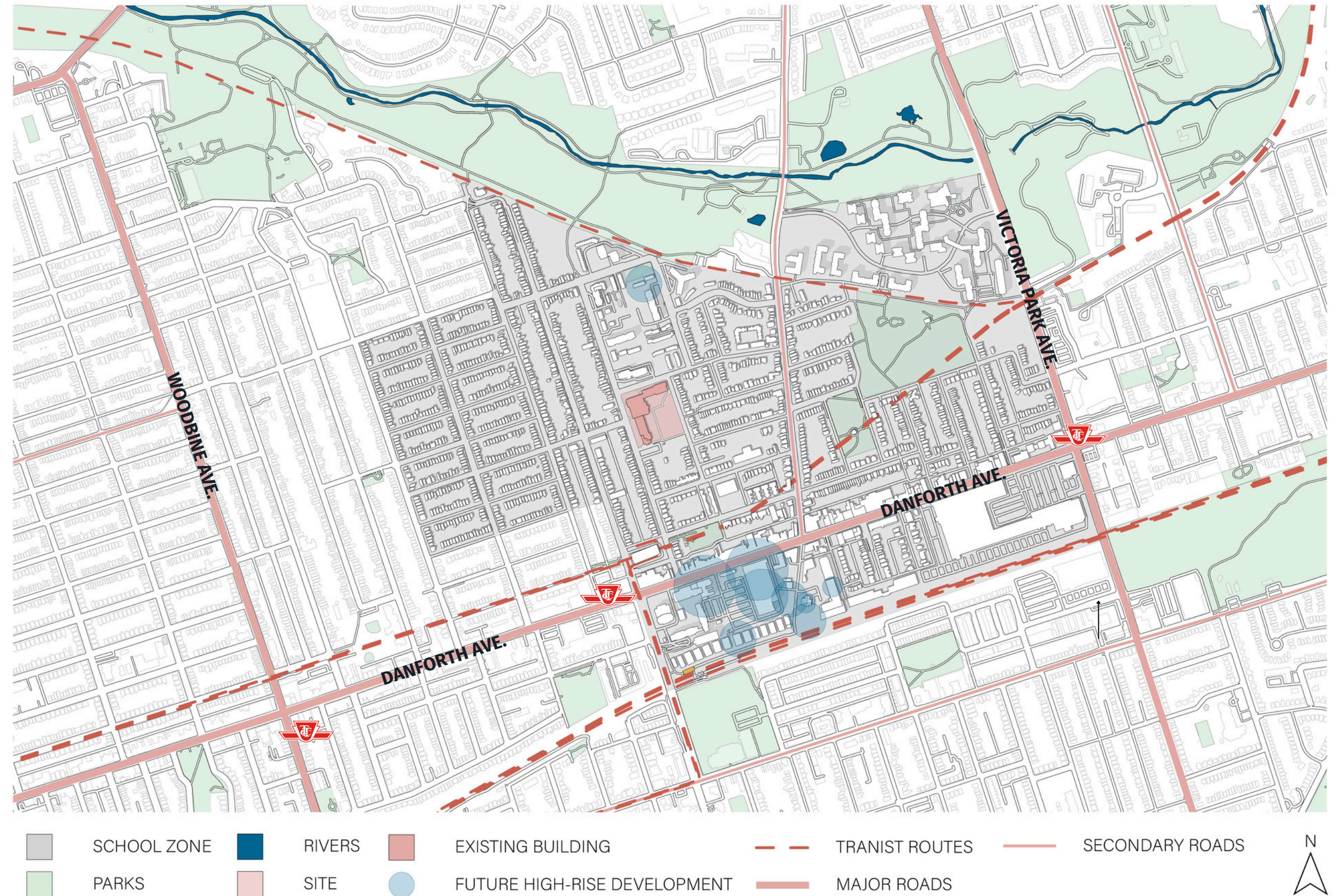
- **930 students** from grades K-5
- **41 classrooms** to support kindergarten, primary, junior, and special education
- Potential for **future expansion**

Site Constraints

- Existing **community center** to remain on-site
- Existing school to **remain in operation during construction** of new school, limiting to the southeast corner of the site to allow the existing facility to remain in operation

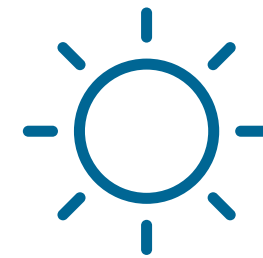
Energy Efficiency

- Adhere to Toronto's Net-Zero by 2024 goal by designing for **net-zero operational energy** to ensure reasonable operating costs throughout the building lifespan





Design Pillars



Daylighting

500 lux in all student facing spaces in adherence with the WELL standard



Indoor Air Quality

Minimum **ACR of 2** in all classroom zones before passive effects as per **ASHRAE 62.1**



Biophilia

Exposure to **natural elements** in **85%** of student-facing spaces

Fostering the minds of the future

"Education is the most powerful weapon which you can use to change the world."
– Nelson Mandela



Improving **occupant health** through improved indoor air quality



Ensuring quality education by **optimizing daylighting** and connection to **nature**



Contributing to the **sustainability of Toronto** by adhering to it's **net-zero** by 2040 **goal**



Incorporating solar panels and geothermal heating to **ensure clean energy**



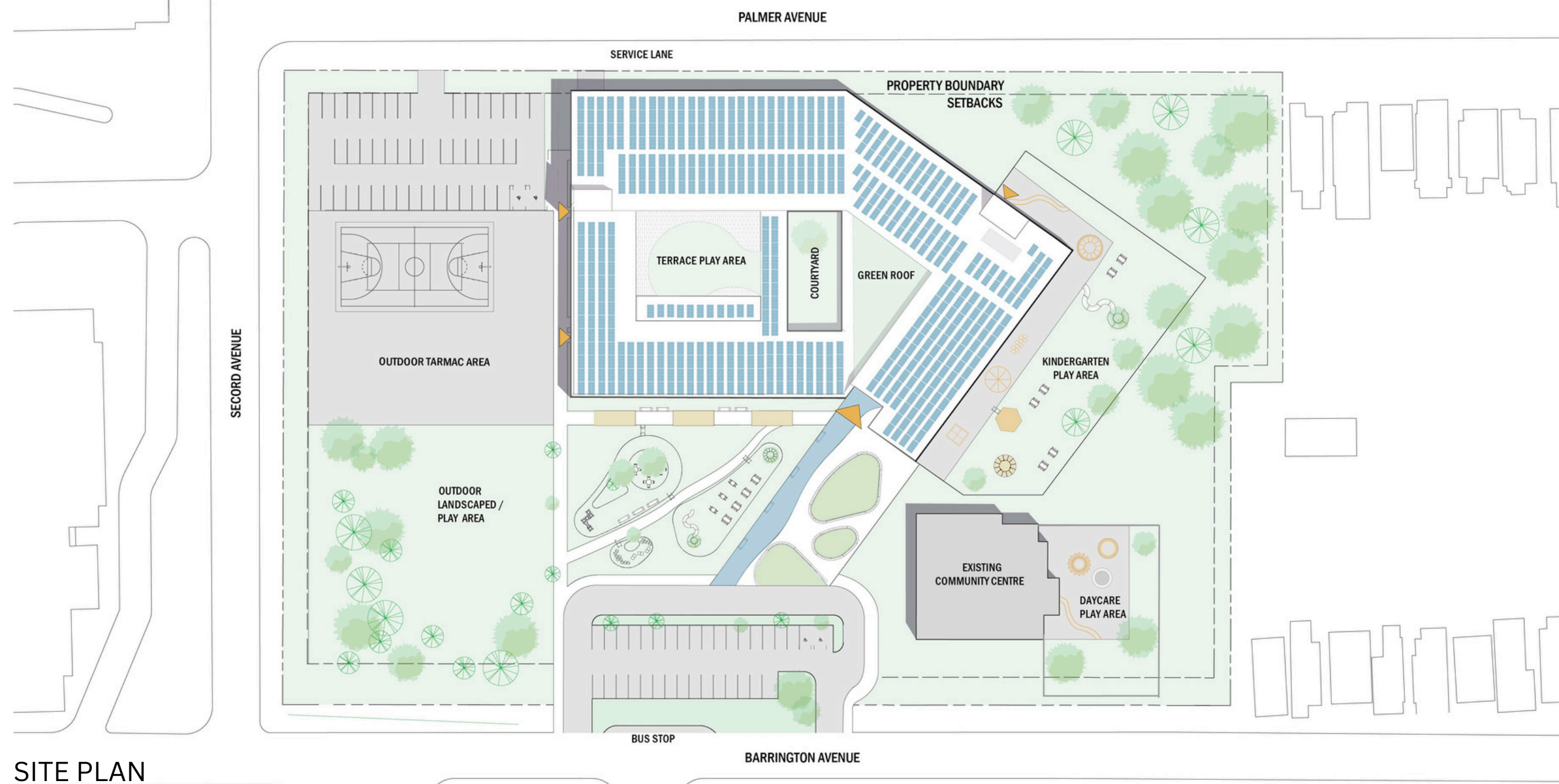
Resourcefully utilizing structural materials to ensure consumption of materials is **responsible**

Site Development

Site features **community space** at front of school, tarmac area and **outdoor landscape** area for Grades 1-5, and large fenced **kindergarten play area**

559 Roof-Mounted Solar Panels: 198 panels facing due south (180°), 361 panels facing southeast (144°)

80 Parking Spaces: 34 Parking Spaces by Drive-Through Gym Entrance



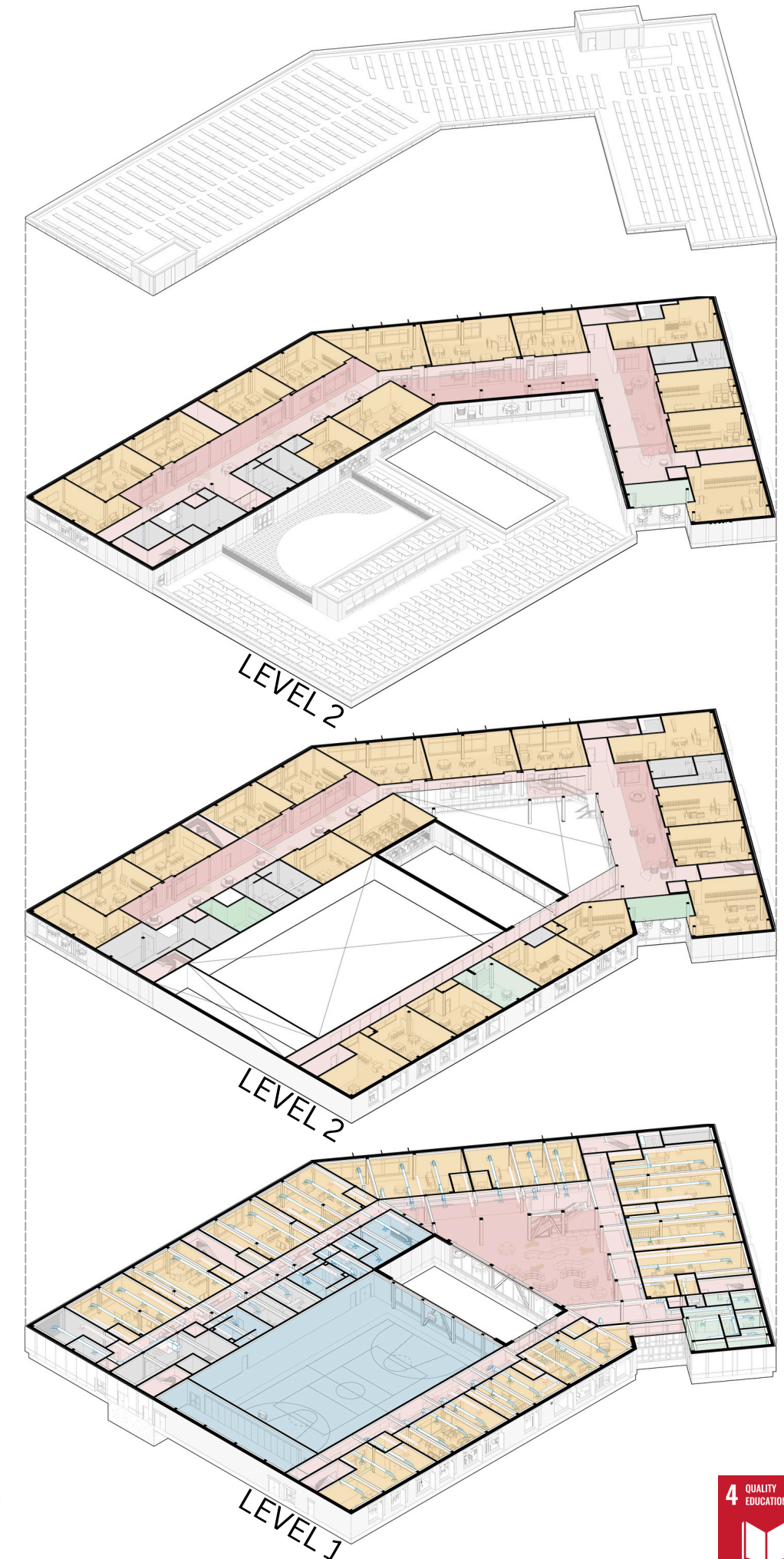
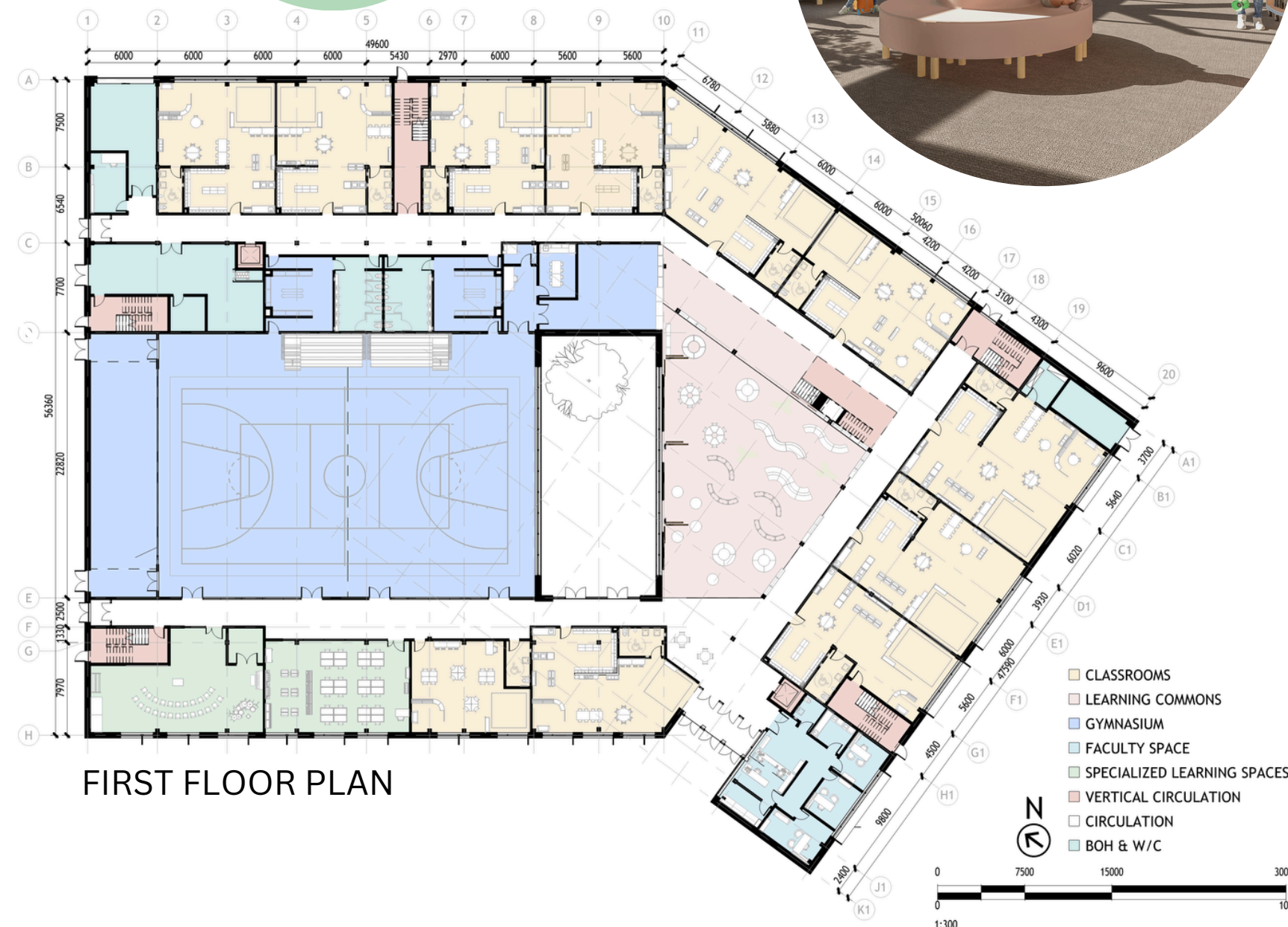
Architectural Development

State of the art **learning commons** and **breakout spaces** to provide flexible learning opportunities

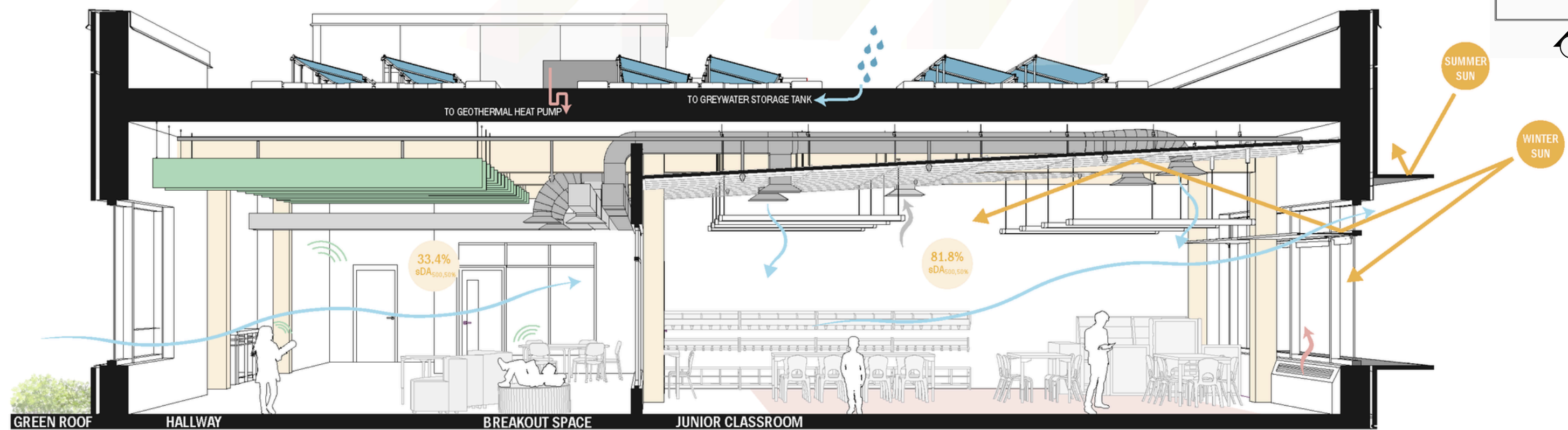


Courtyard and third floor **rooftop classroom** to enhance biophilic views and connection to the outdoors

10 **Kindergarten** Classrooms,
18 **Primary** Classrooms,
10 **Junior** Classrooms,
3 **Special Education** Classrooms



Architectural Development



CLASSROOM SECTION



SOUTH-WEST ELEVATION

DC Overview

 Code Plan	 Daylighting Study
 Framing Plan	 Targeted Indoor Pollutants
 Connection Details	 Biophilia Study
 Building Details	 Mechanical Equipment Selection, Layout, Sizing
 Building Detail Performance Analysis	 HVAC System Plans
 ASHRAE Standards	 Whole Building Energy Model Analysis
	 Capital Construction Cost Estimate

 Architectural

 Structural

 Building Science

 Building Standard
Assessment

 Indoor Environmental
Quality

 Building Systems

 Construction

Name of Practice:

DesignED Studios

200 University Dr, Waterloo, ON

Name of Project:

Secord Elementary School Redevelopment

Location:

101 Barrington Ave, Toronto, ON

Date:

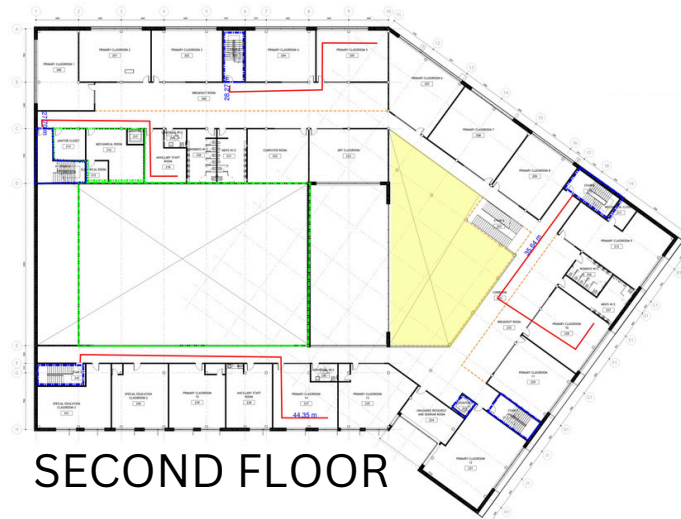
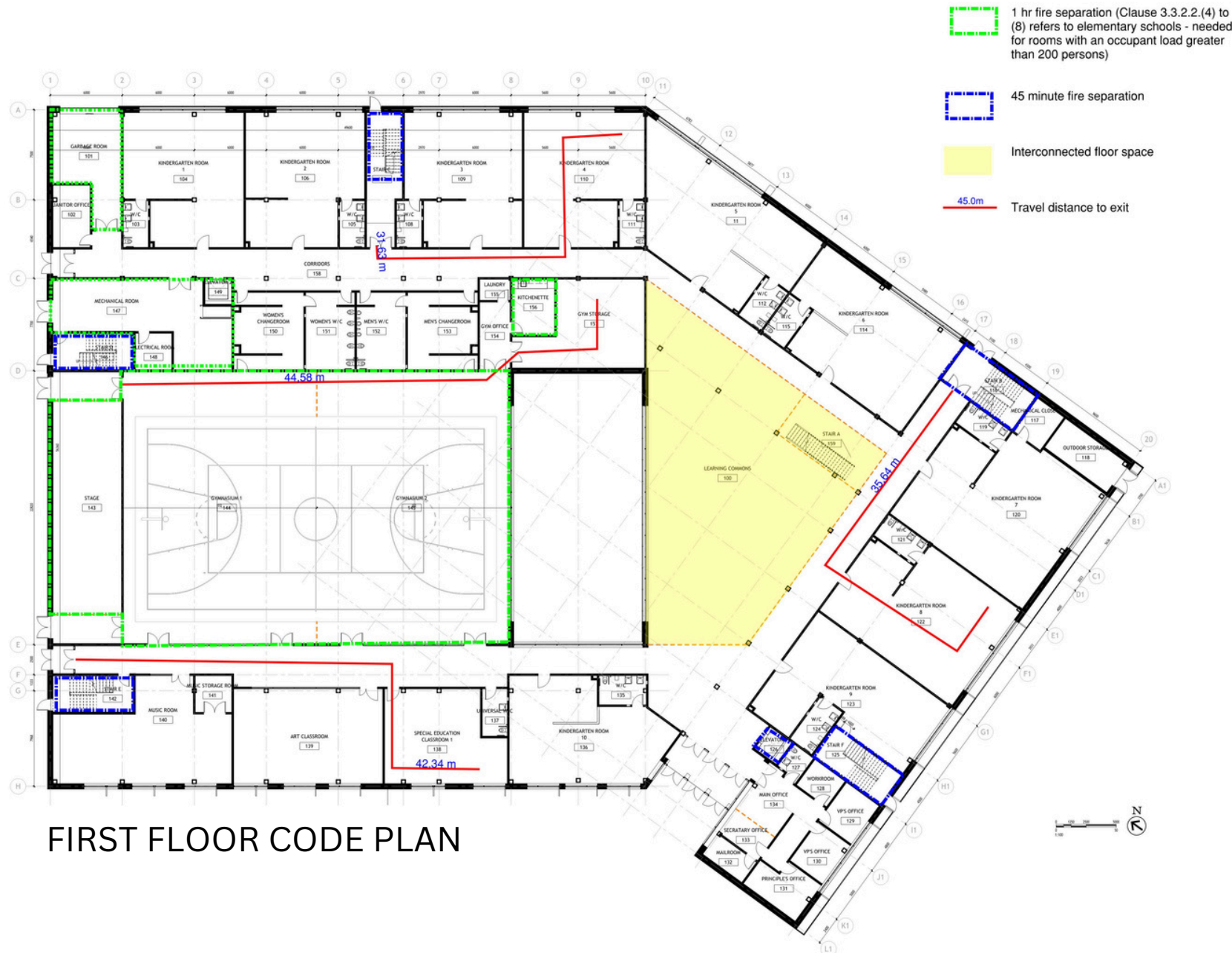
8 February, 2024

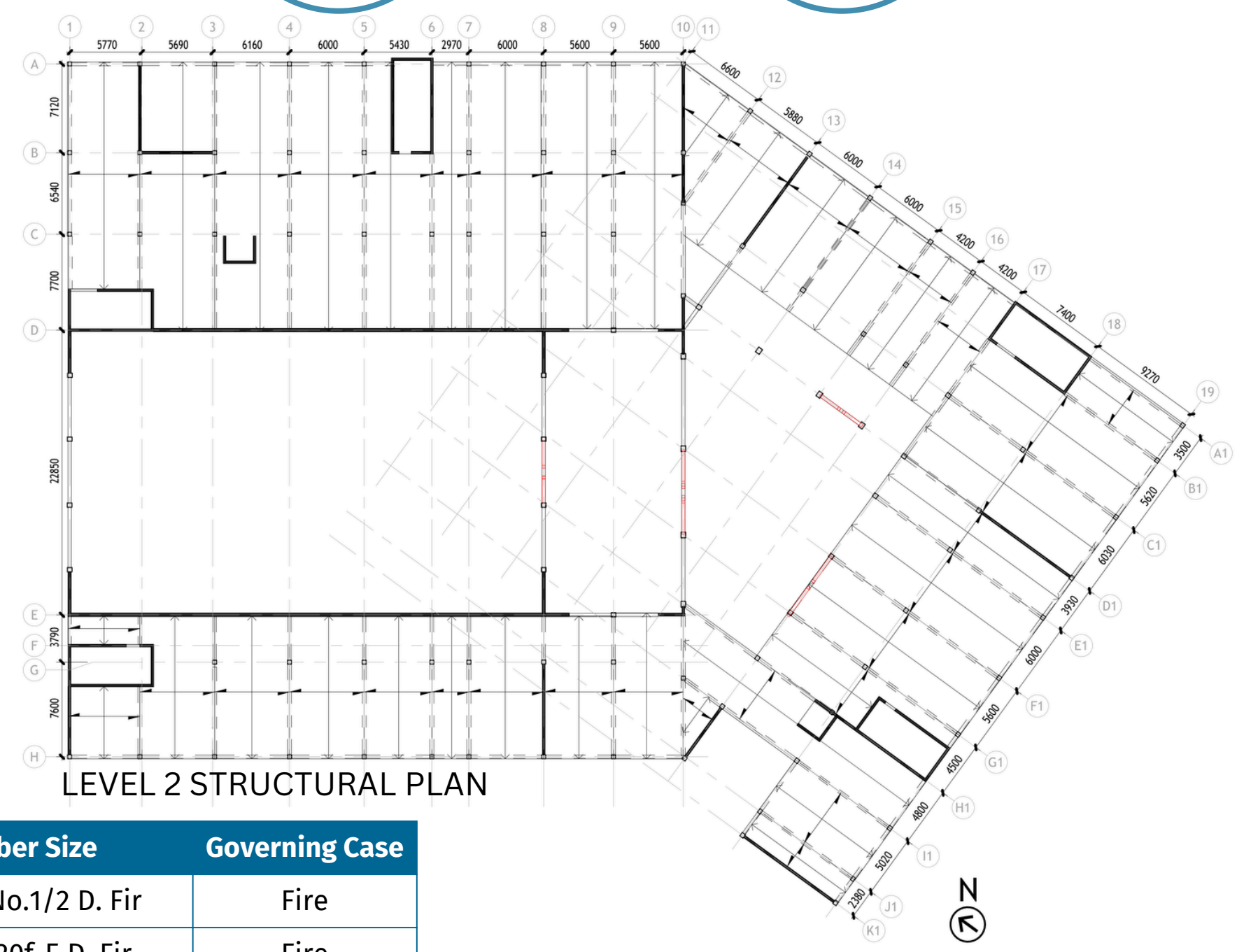
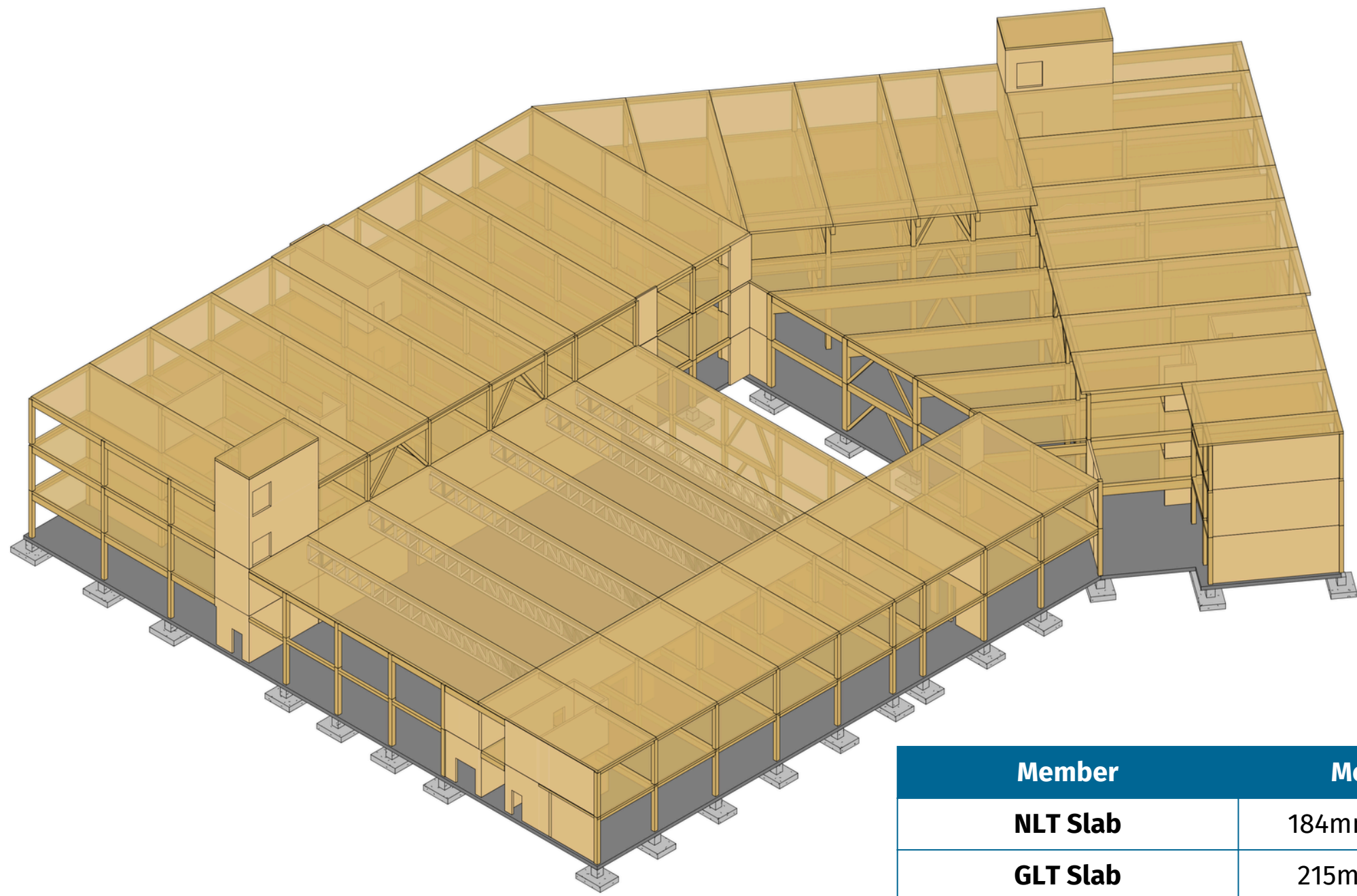
DesignED Studios

Ontario Building Code Data Matrix Part 3				Building Code Reference ¹
3.00	Building Code Version:	O. Reg. 332/12	Last Amendment	
3.01	Project			

3.02	Major O Classific
3.03	Superim Major O
3.04	Building

3.05	Gross Area (m ²)	<u>Description:</u> Total	<u>Existing</u> 0	<u>New</u> 0	<u>Total</u> 0	[A] 1.4.1.2.
3.06	Mezzanine Area (m ²)	<u>Description:</u> Total	<u>Existing</u> 0	<u>New</u> 0	<u>Total</u> 0	3.2.1.1.
3.07	Building Height	<u>3</u> Storeys above grade <u>0</u> Storeys below grade	<u>0</u> (m) Above grade			[A] 1.4.1.2 & 3.2.1.1.
3.08	High Building	☐ No ☐ Yes				3.2.6.
3.09	Number of Streets/ Firefighter access	<u>2</u> street(s)				3.2.2.10. & 3.2.5.
3.10	Building Classification: (Size & Construction Relative to Occupancy)	<u>3.2.2.</u> Group/Div <u>Group A Division 2</u>				3.2.2.20 - 83.
3.11	Sprinkler System	☒ Required ☐ Not Required <u>Provided:</u> ☒ entire building ☐ selected floor areas ☐ in lieu of roof rating Description: _____	☐ selected compartments ☐ basement ☐ none			3.2.1.5. & 3.2.2.17., 3.2.2.18., 3.2.4.8. to 3.2.4.10., and 3.2.5.13
3.12	Standpipe System	☒ Not required ☐ Required				3.2.9.
3.13	Fire Alarm System	☒ Required ☐ Not required <u>Type Provided:</u> ☐ Single stage ☐ Two stage ☐ None				3.2.4.
3.14	Water Service / Supply is Adequate	☐ No ☒ Yes				3.2.5.7.

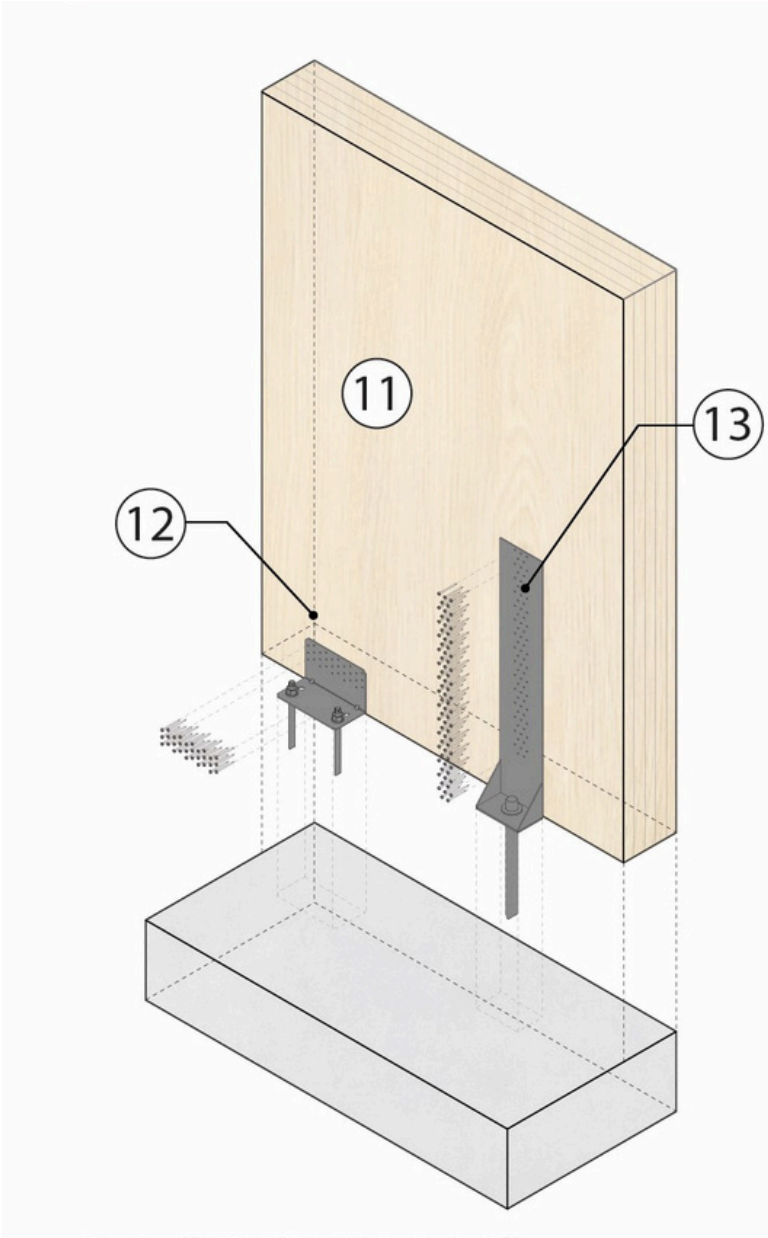




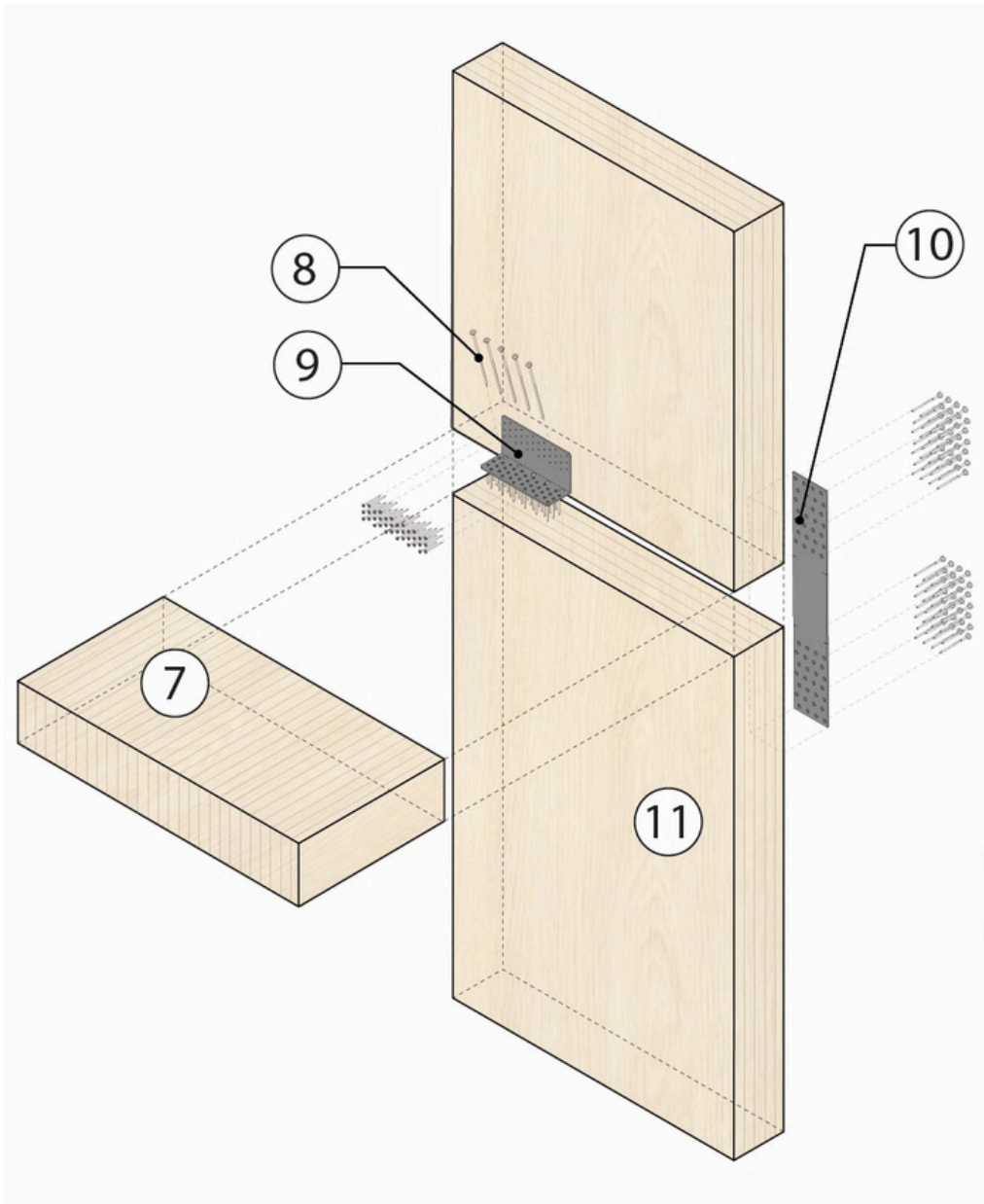
Member	Member Size	Governing Case
NLT Slab	184mm No.1/2 D. Fir	Fire
GLT Slab	215mm 20f-E D. Fir	Fire

Member	Member Size	Governing Case
South Typical Beam	315x722 24f-E D. Fir	Deflection
North Typical Beam	315x532 24f-E D. Fir	Fire
Learning Commons Beam	365x1292 24f-E D. Fir	Deflection

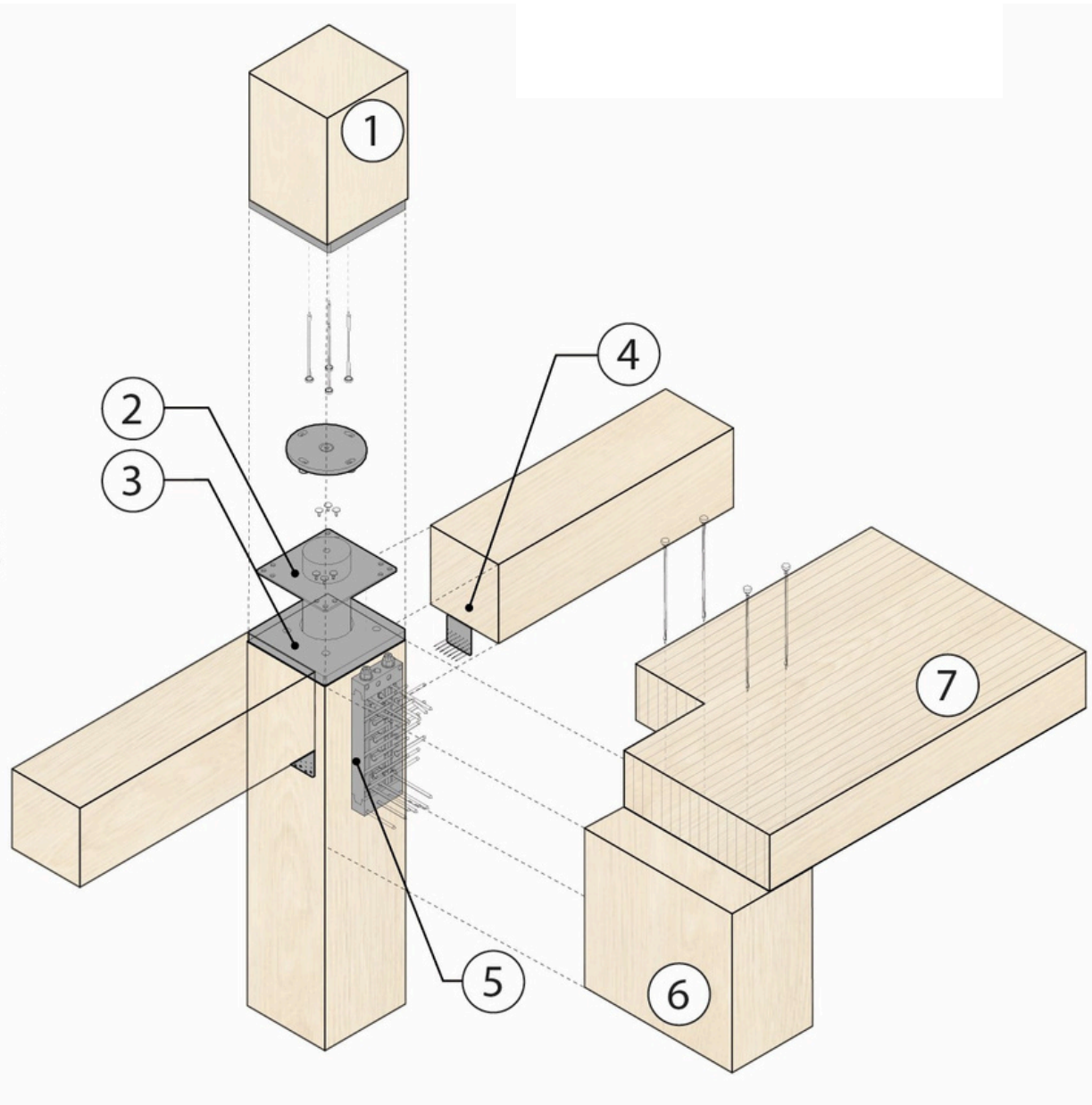
Member	Member Size	Governing Case
Typical North Column	315x304 12c-E SPF	Fire
Governing South Column	315x342 12c-E SPF	Fire
Learning Commons Column	365x456 12c-E SPF	Deflection



TYPICAL CLT WALL TO
CONCRETE SLAB CONNECTION



TYPICAL NLT TO CLT WALL
CONNECTION



TYPICAL GLULAM BEAM TO
COLUMN SHEAR CONNECTION

- 1 - 315x314 Spruce Pine-Fir Column
- 2 - 4x VDS1150 150mm Depth Fully Threaded Screw & Upper Plate
- 3 - Rothoblaas Pillar 120S20 Column-to-Column Connection & Disk
- 4 - Simpsons Strong-Tie Angle Bracket
- 5 - MEGANT 430x150 Concealed Beam Hanger with 64x ASSY Fully Threaded Screw, Estimated Capacity 160kN
- 6 - 315x532 24F-E Douglas-Fir Beam
- 7 - 184mm No. 1/No.2 D. Fir Latch NLT
- 8 - 5x Rothoblaas Fully Threaded Screw
- 9 - Titan V Angle in Full Pattern with 72x LBS560 Screws
- 10 - Rothoblaas WHTPT720 Steel Plate
- 11 - 5-ply E-1 Grade CLT Shear Wall
- 12 - Titan N Timber to Concrete Shear Base Joint, Nominal Capacity 80 kN
- 13 - Rothoblaas Timber to Concrete Tensile Joint

DESIGN CONCENTRATION

Building Details

DELIVERABLE

Building Details

KEY DECISIONS:

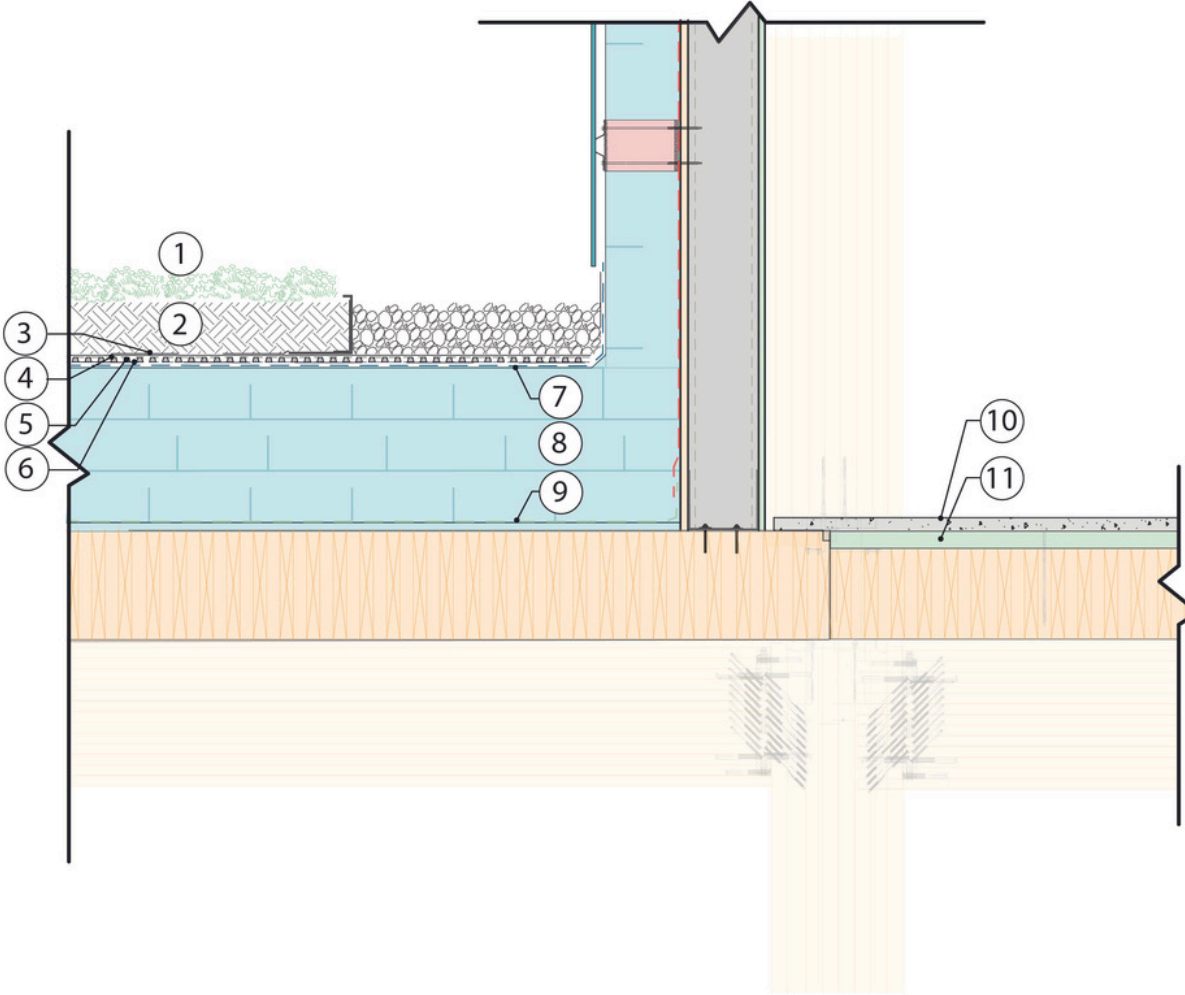
R-35 Walls
R-60 Roof
R-20 Slab

Cascadia
Clips as
Thermal
Break

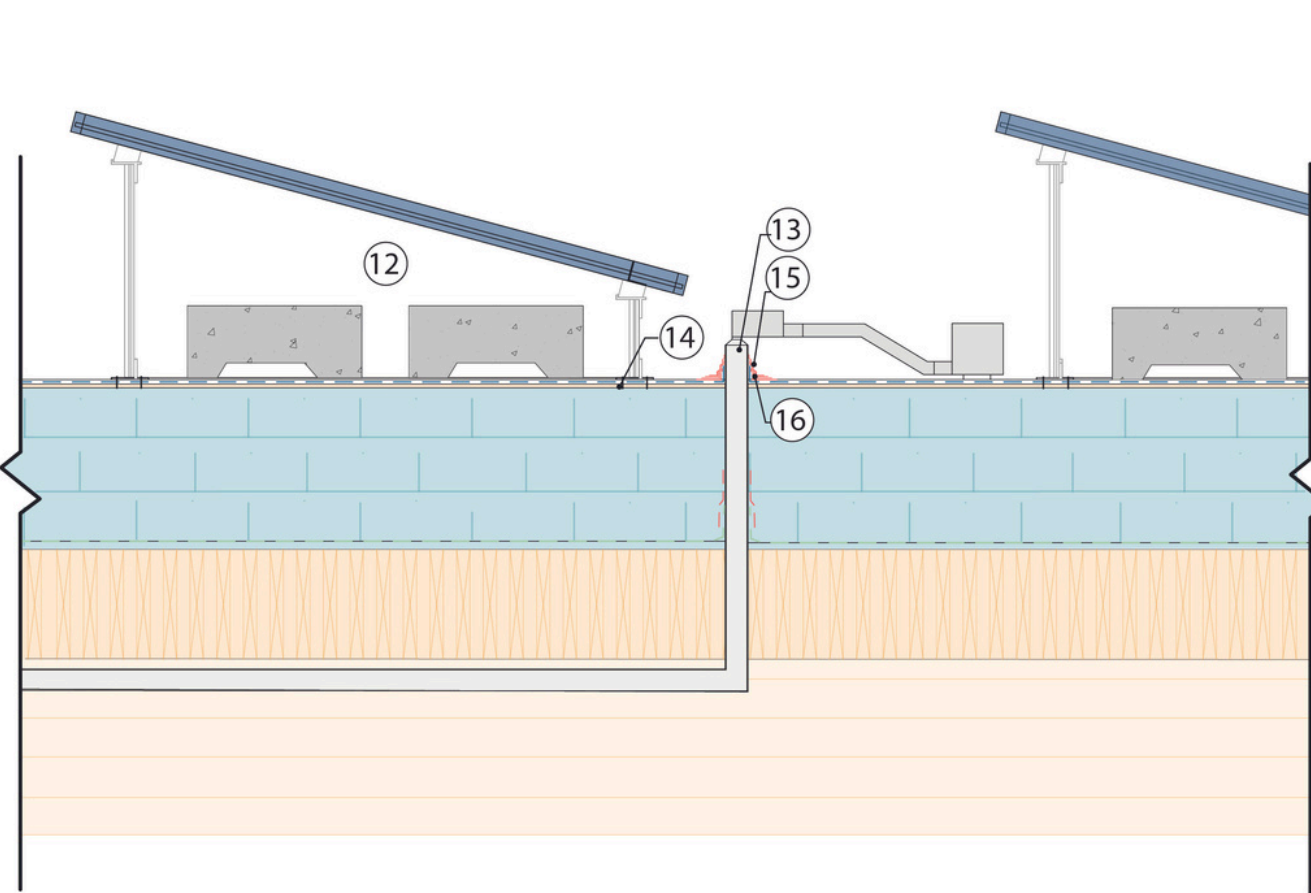
2-ply Mod.
Bitumen
Roof
Membrane

Enhanced
AVB on
Timber Deck

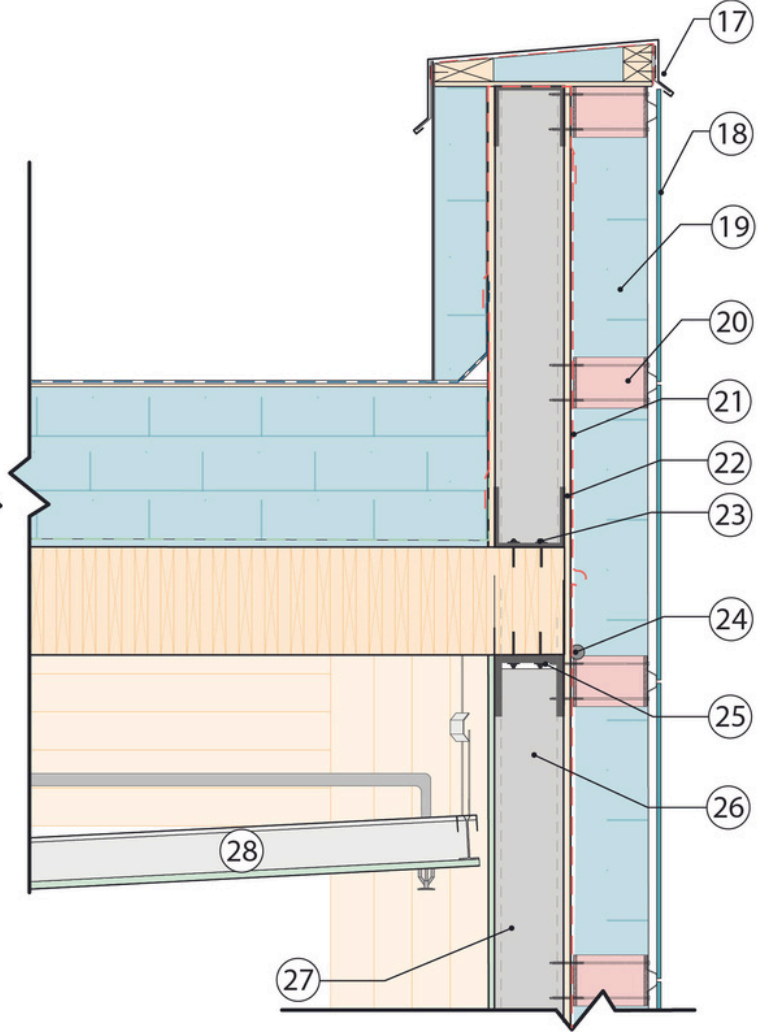
- 1 & 2 - Vegetation & Topsoil
- 3 - Soprafilter
- 4 - Sopratentio Mat
- 5 - Sopradrain Eco-5
- 6 - Soprabarrier
- 7 - 2-Ply Mod. Bit. (Cold Applied)
- 8 - 3x 102mm Rigid Rockwool Insulation
- 9 - 2-1 Soprasmart Rock Sanded 15.9mm, Taped Joints (AVB)
- 10 - 25.4mm Concrete Topping
- 11 - 20mm Acoustic Mat
- 12 - Solar Array with Ballasted Mounting System
- 13 - Conduit for DC Wiring
- 14 - Support Panel
- 15 & 16 - Alsan Flashing (2 Layers) & Polyfleece
- 17 - Metal Flashing
- 18 - 7mm ACM w/ 15mm Air Gap
- 19 - 152mm Rigid Rockwool Insulation
- 20 - Cascadia Clip and Horizontal Girt
- 21 - Blueskin SA A/W/V Barrier
- 22 - 15mm Fibreglass Mat
- 23 - Bottom Plate
- 24 & 25 - Backer Rod & Steel Top Track
- 26 - 92mm x 41mm Steel Studs
- 27 - 12.5mm Latex Paint
- 28 - Acoustic Ceiling Tiles



GREEN ROOF TO WALL



SOLAR PANEL CONDUIT PENETRATION



WALL TO ROOF TYPICAL

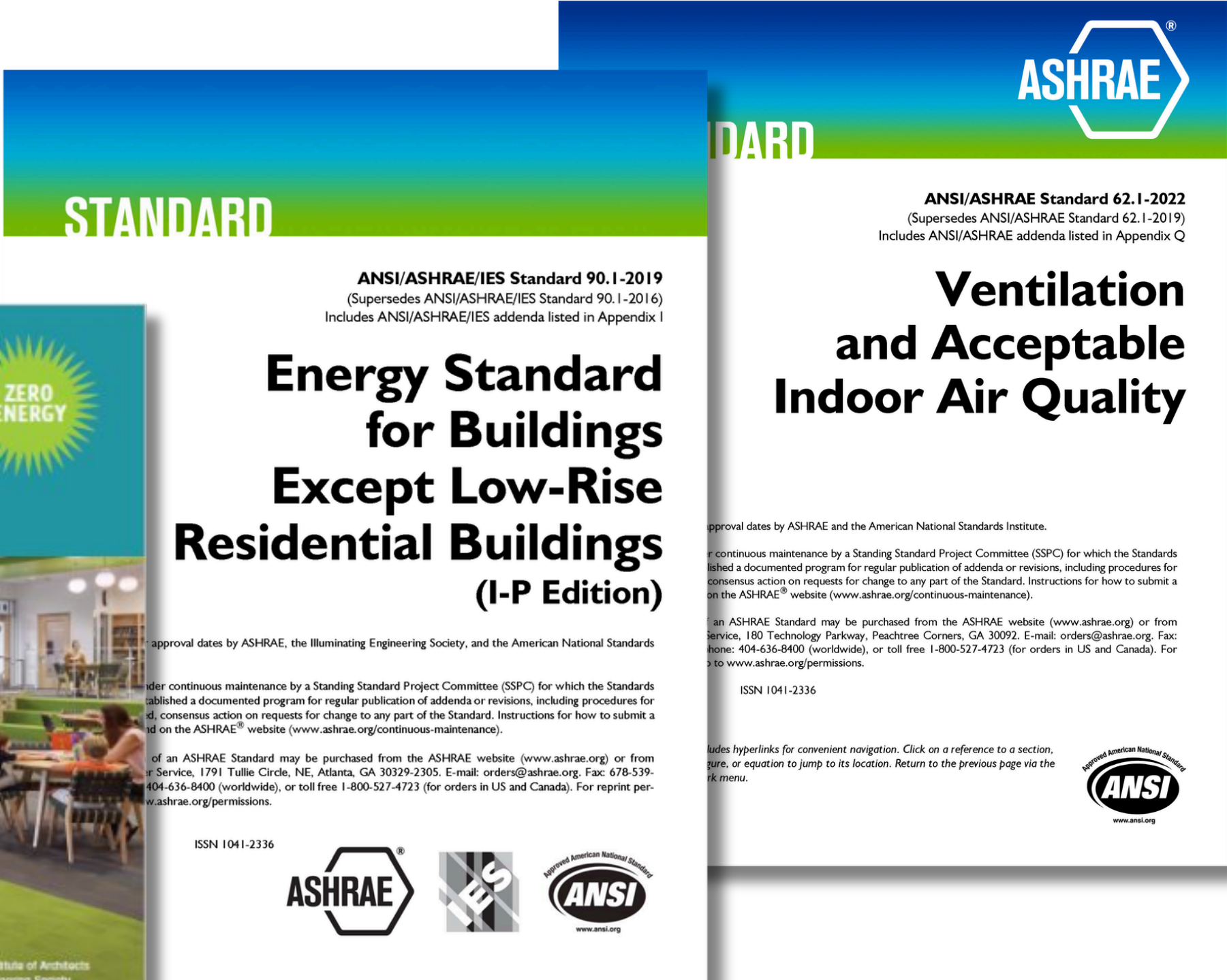
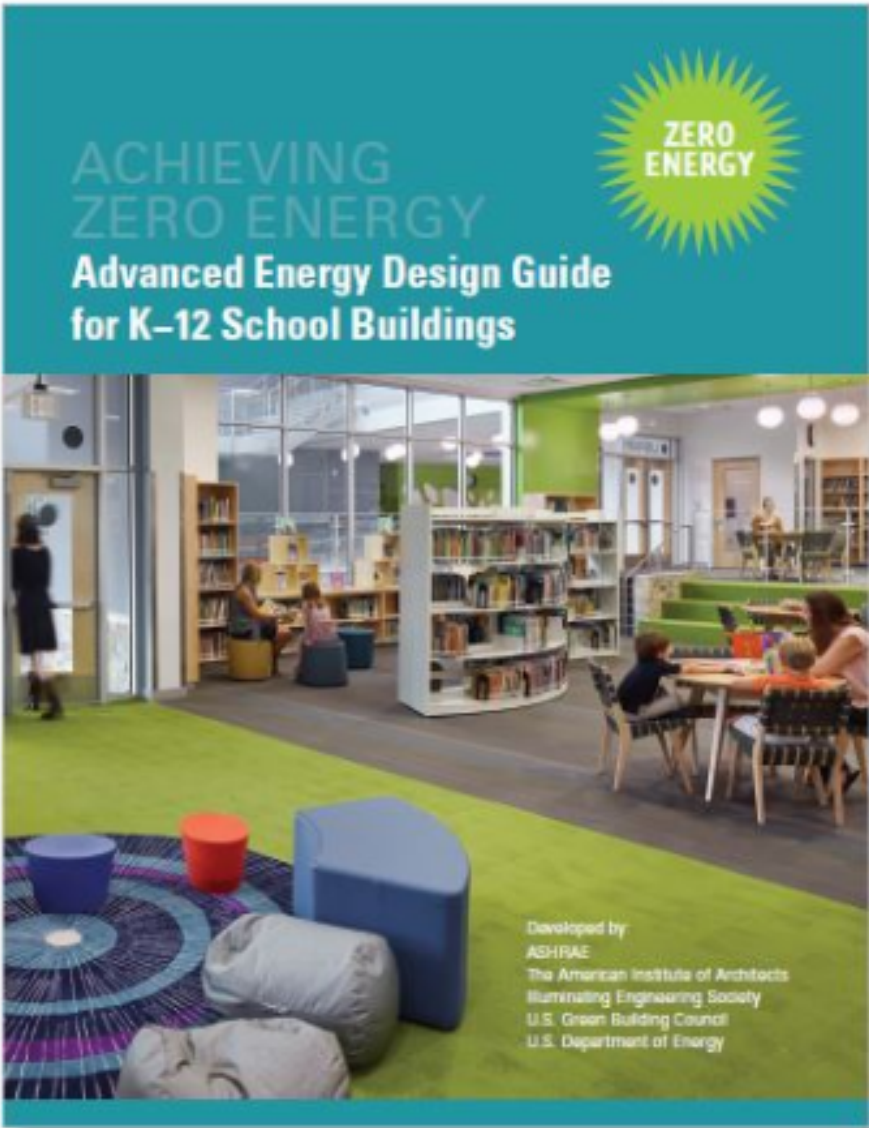
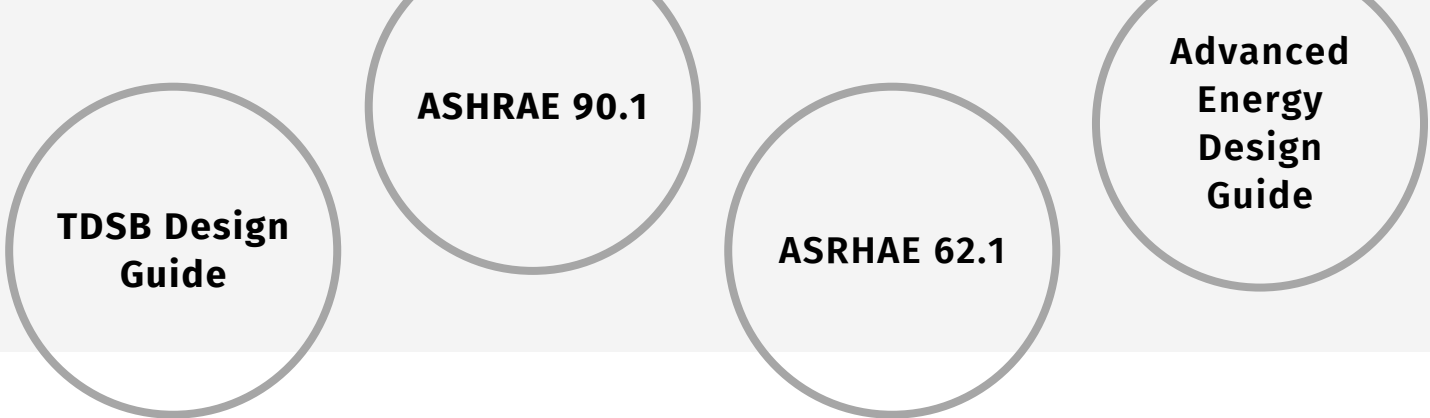
DESIGN CONCENTRATION

Building Standard Assessment

DELIVERABLE

ASHRAE Standards

KEY DECISIONS:



DESIGN CONCENTRATION

Indoor Environmental Quality

DELIVERABLE

Daylighting Study

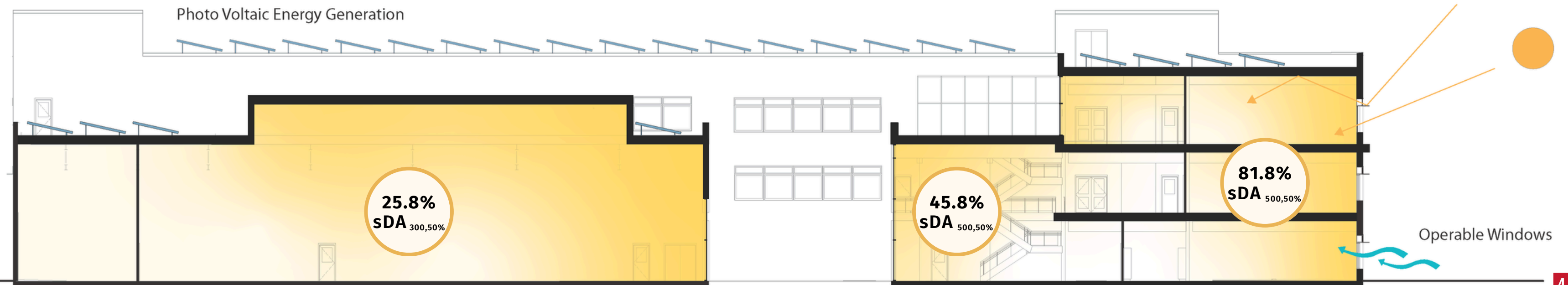
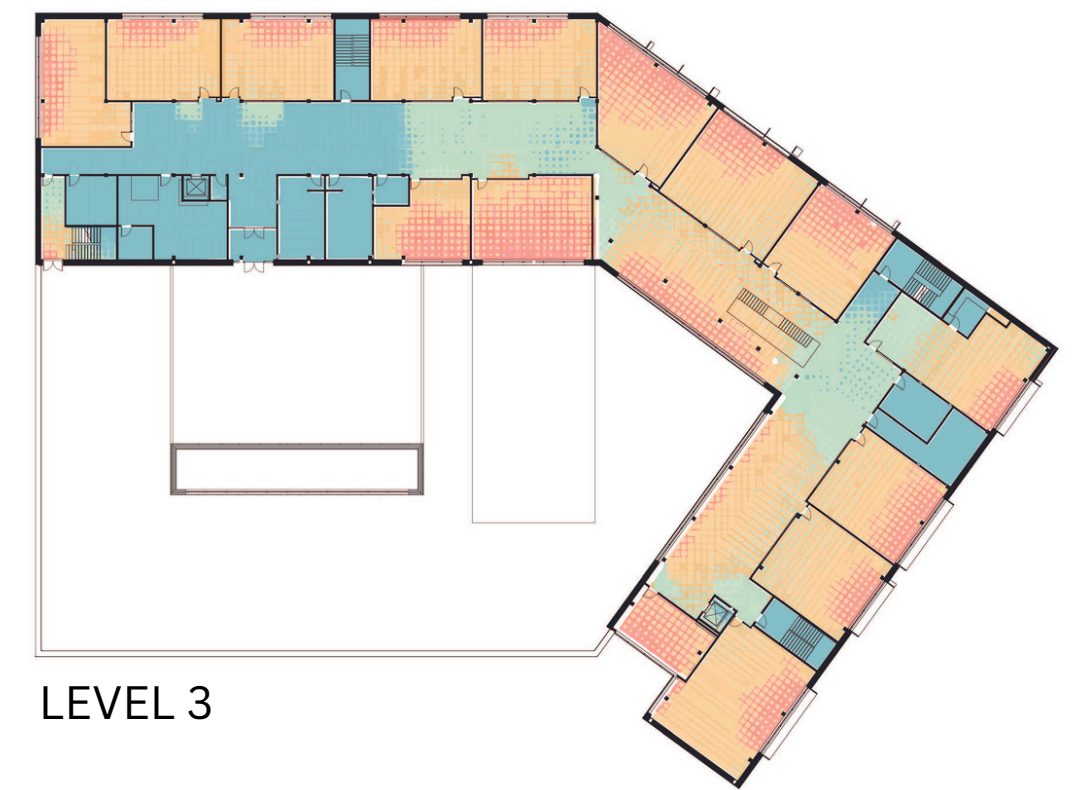
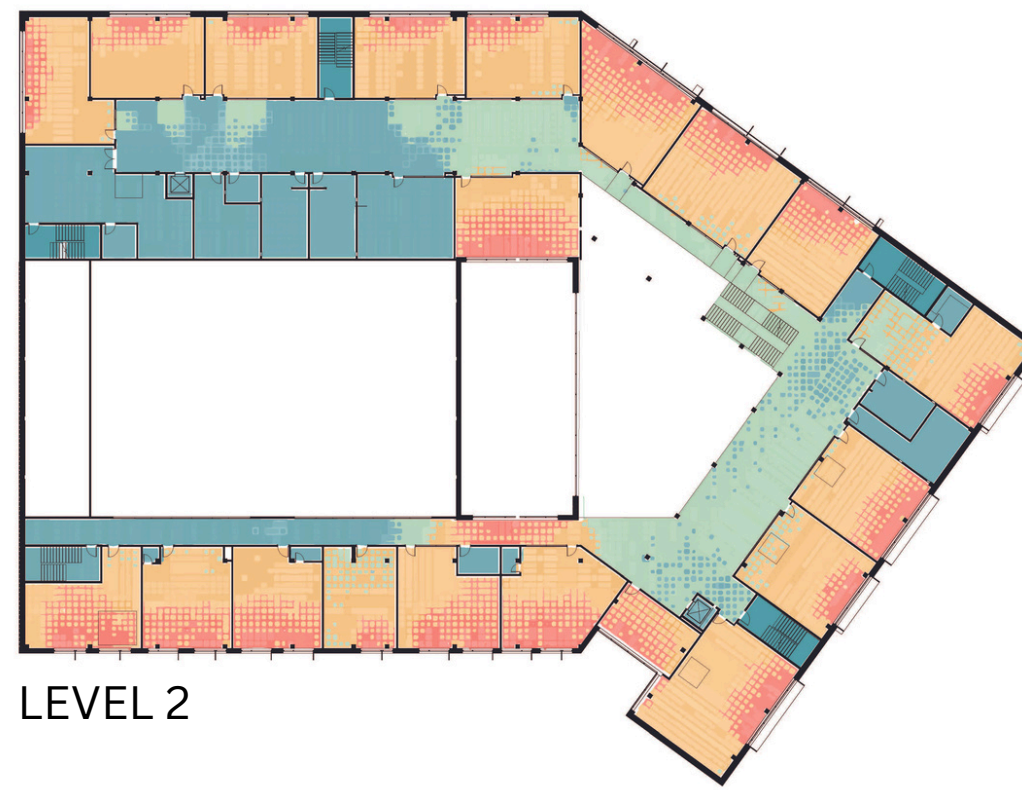
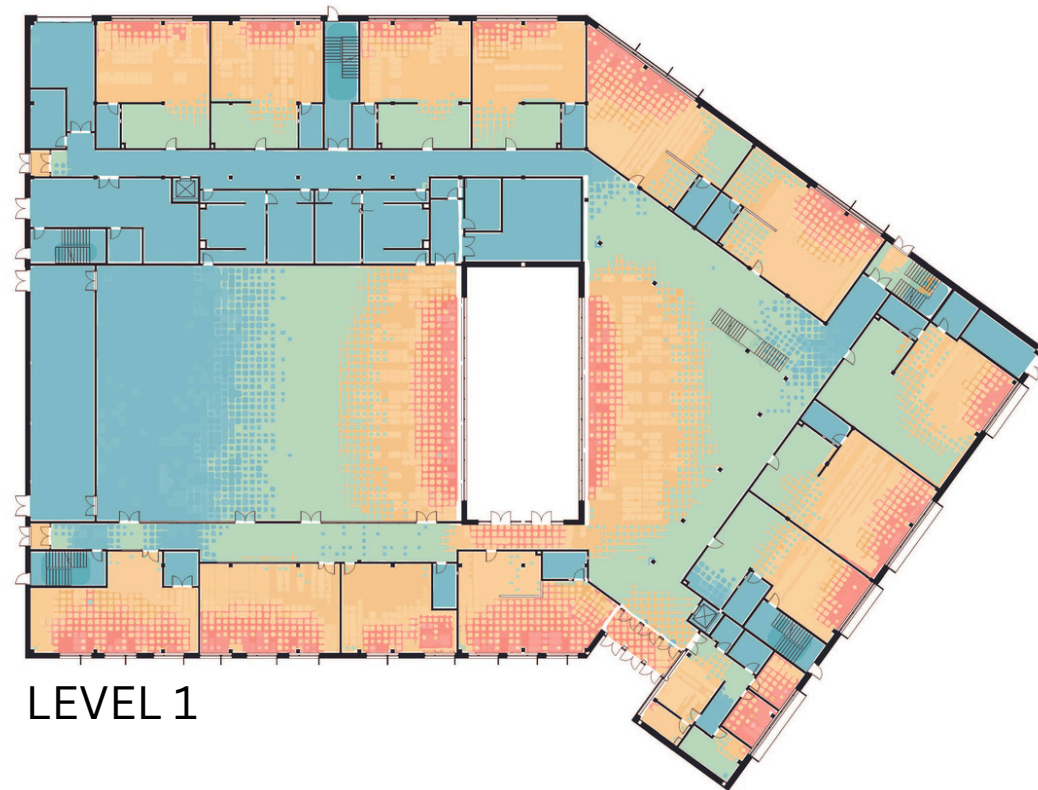
KEY DECISIONS:

Window-to-Wall Ratio:
33.30 %

U-Val = 0.73
SHGC= 0.56
VT = 0.70

Horizontal and Vertical
Exterior
Shading

Operable
Blinds to
Mitigate
Glare



DAYLIGHTING SECTION

Increased Ventilation

Low-VOC Furniture and Paint

Continuous slab-on-grade VB

Separate Exhaust for Pollution Sources

MEMO

Indoor Air Quality Strategy

To: Toronto District School Board
From: DesignED Studios (Group 15)
Subject: Secord Elementary School Redevelopment
Date: February 6, 2023

 **DesignED Studios** | Ashley Juraschka, Joanna Rywak, Gina Singh, Ralph Snabian

Introduction

As part of the Secord Elementary School Redevelopment project, DesignED Studios is pleased to present this memo outlining the indoor air quality (IAQ) strategy, including targeted indoor pollutant sources and mitigation measures. IAQ was identified as one of our three core areas of focus related to occupant health and comfort at the start of the project and is an essential part of student well-being. Numerous studies (cite) have shown a correlation between increased attendance and academic performance in classrooms with increased IAQ.

This strategy focuses on four of the most common indoor pollutants: PM2.5, PM10, VOCs, and CO2, along with preventative measures for biological pollutants and radon. Although the whole indoor environment is part of the analysis, special consideration is given to the individual classrooms, which have a smaller volume than some of the larger common spaces, and are more likely to contain higher concentrations of pollutants from furnishings and increased occupancy. The goal of this memo is to provide a high-level assessment and implementation strategy to prevent and maintain an elevated level of IAQ in the building. Ongoing monitoring and cooperation from the building staff will be required to meet these goals. Targeted pollutants and areas of focus

Products and Testing

and interior finishes were chosen and specified to present this memo outlining the indoor air or pollutant sources and mitigation measures. areas of focus related to occupant health and essential part of student well-being. Numerous between increased attendance and academic

focuses on four of the most common indoor along with preventative measures for biological oor environment is part of the analysis, special oms, which have a smaller volume than some of y to contain higher concentrations of pollutants he goal of this memo is to provide a high-level revent and maintain an elevated level of IAQ in ation from the building staff will be required to

location in Toronto along with its significant PM10 are of concern from vehicle pollution. area of concern during the past summer, with forming part of the "fresh air supply" for many source of PM2.5 is from printers and copiers casionally used.

tinuing the project and is on track to complete 24, which will conclude the contract with the do not hesitate to reach out.

Ashley Juraschka, Joanna Rywak, Gina Singh, Ralph Snabian

DESIGN CONCENTRATION

Indoor Environmental Quality

DELIVERABLE

Biophilic Views

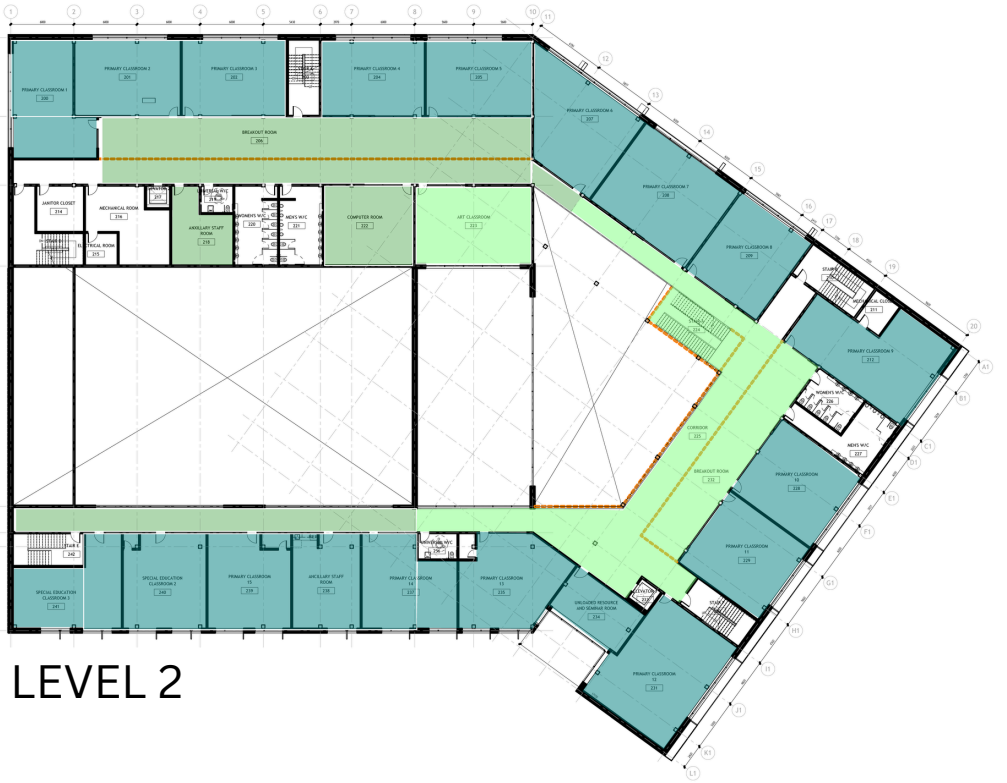
KEY DECISIONS:

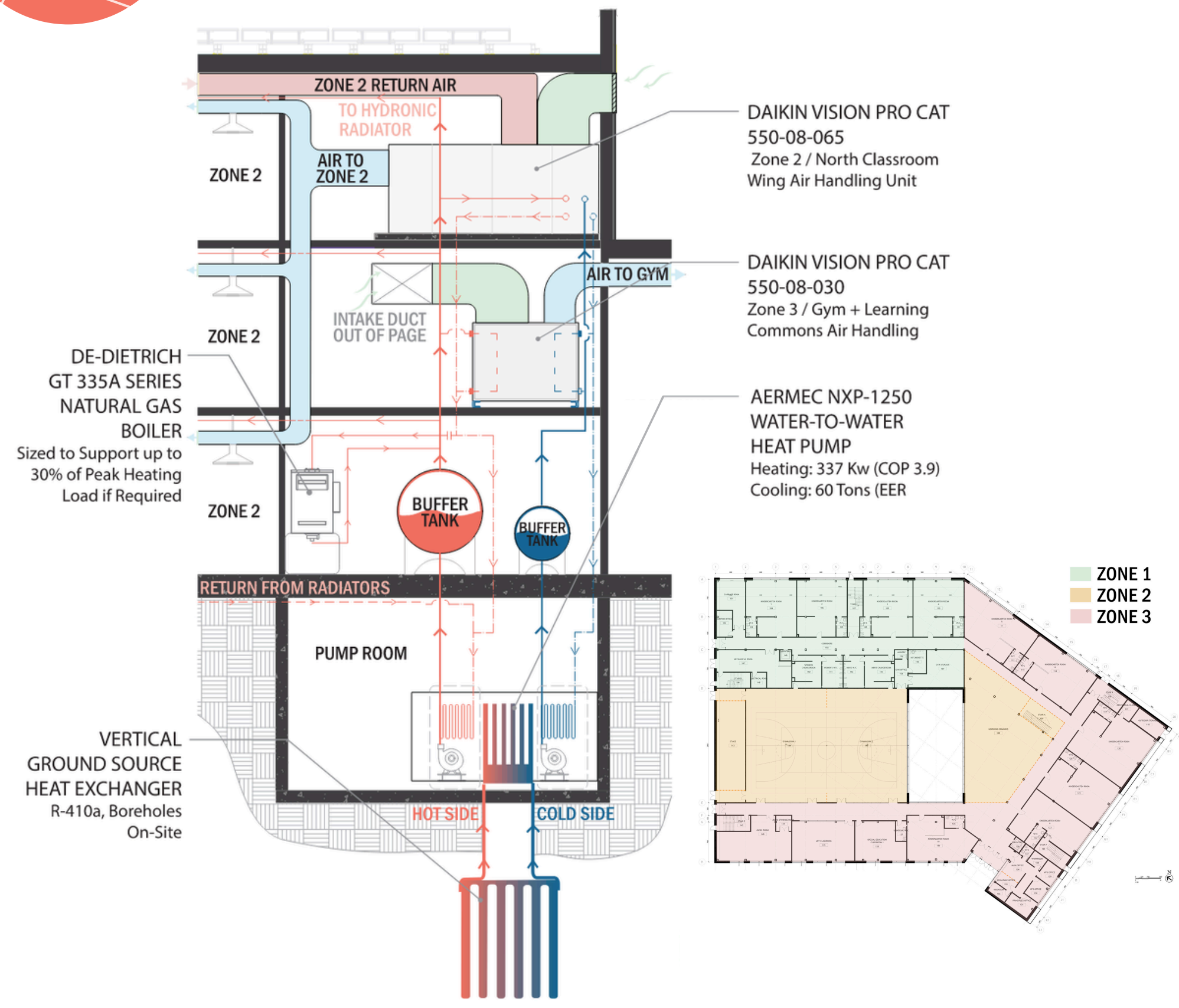
Achieved in 85% of Indoor Spaces

Mass Timber Structural Elements

Views to Courtyard and Green Roof

Views to Exterior from Each Classroom





MECHANICAL SYSTEM SELECTION SUMMARY			
Zone #	1	2	3
Zone Description	South Wing	North Wing	Gym / Commons
ACR Req.	3.87	3.22	3.07
CFM Req.	29864	22099	17458
Total Pop	1000	600	N/A
Design Pop.	1404	992	587
Area	3254	2914	1138
Handler Selected	Daikin Vision Pro CAT 550-8-065	Daikin Vision Pro CAT 550-8-050	Daikin Skyline - 065 OAH
VAV / CAV	CAV	CAV	VAV
CFM delivered (Max.)	54000	40000	26500
ACR (Max.)	7.0	5.8	4.6
ACR (standard operation)	4.8	3.9	3.1
HEPA Filters	X	X	X
VFD + Recovery Wheel	X	X	X
Return air?	X	X	

DESIGN CONCENTRATION

Building Systems

DELIVERABLE

HVAC Systems Plans

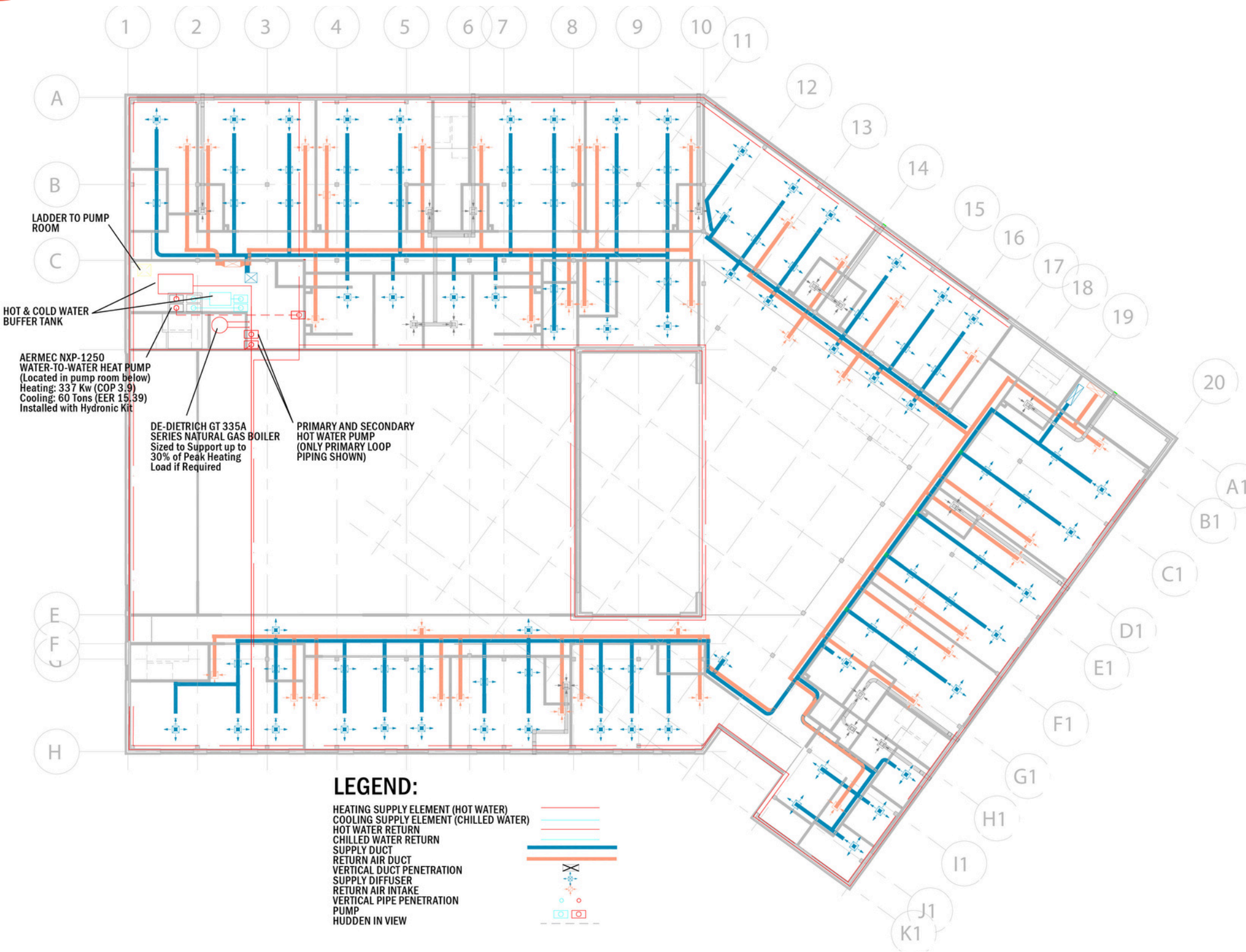
KEY DECISIONS:

Backup Boilers for 30% Peak Load

No Refrigeration Within Shell

DAIKIN-brand Air Handlers

3.9 COP and 15 EER



DESIGN CONCENTRATION

Building Systems

DELIVERABLE

Whole Building Energy Model Analysis

KEY DECISIONS:

Massing
Designed for
Energy
Efficiency

Occupant
Driven
Building
Operation

Reduced
Lighting
Load

Energy
Efficient
Appliances



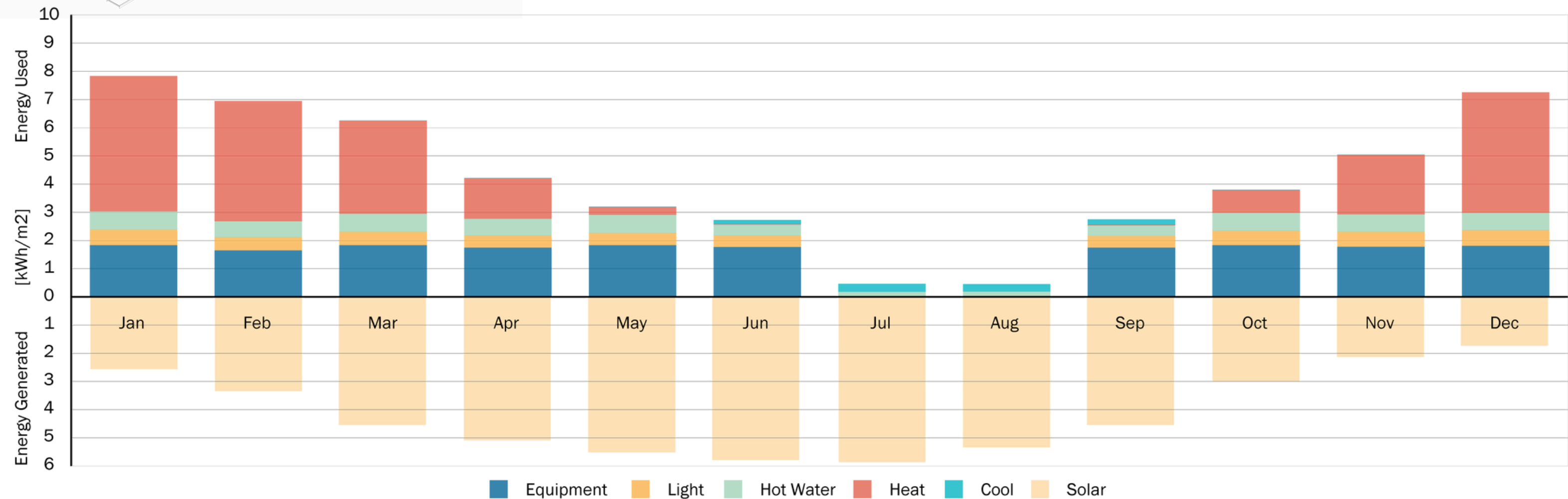
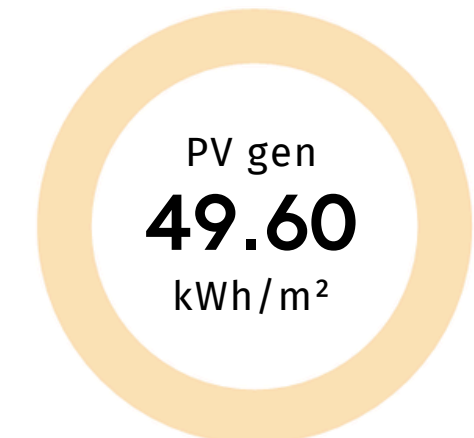
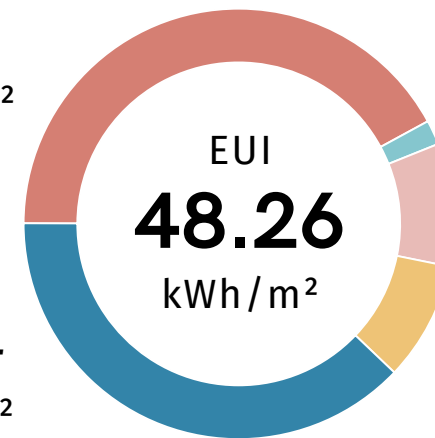
HEATING
20.20 kWh/m²

COOLING
0.89 kWh/m²

HOT WATER
4.46 kWh/m²

LIGHTING
4.32 kWh/m²

EQUIPEMENT
18.30 kWh/m²



DESIGN CONCENTRATION

Building Systems

DELIVERABLE

Whole Building Energy Model Analysis

KEY DECISIONS:

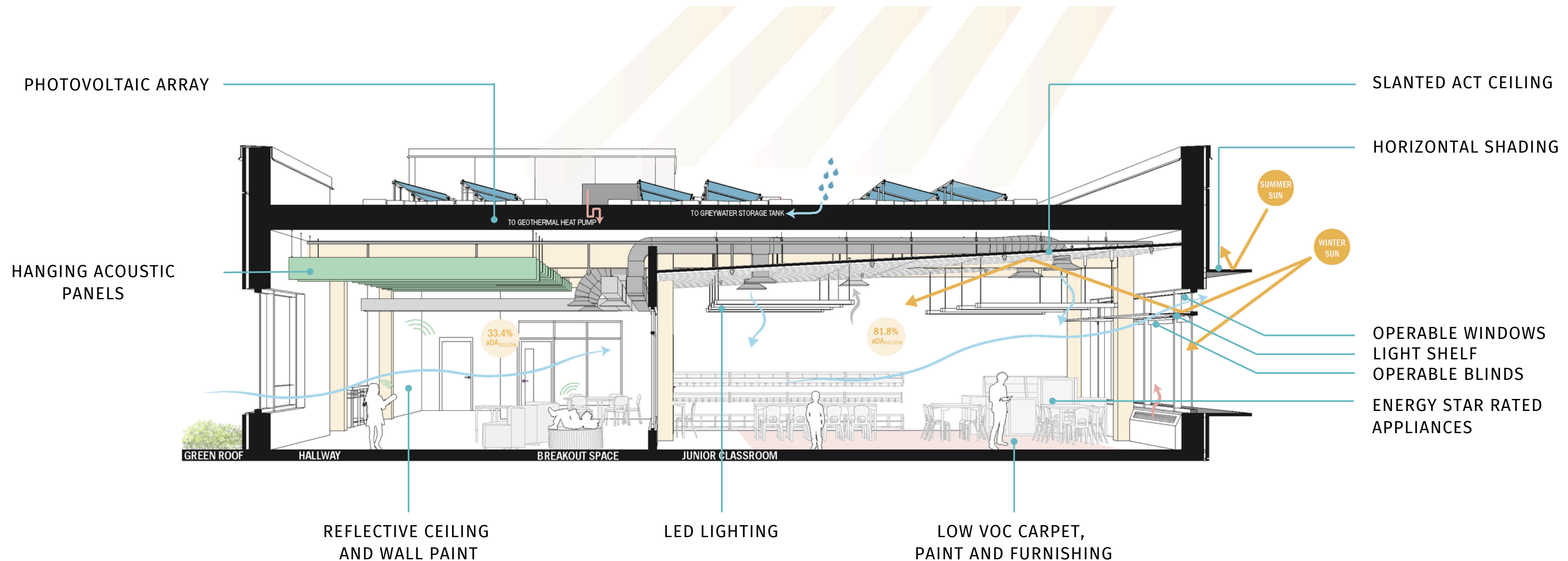
Conditioning Setback Outside of Peak Hours

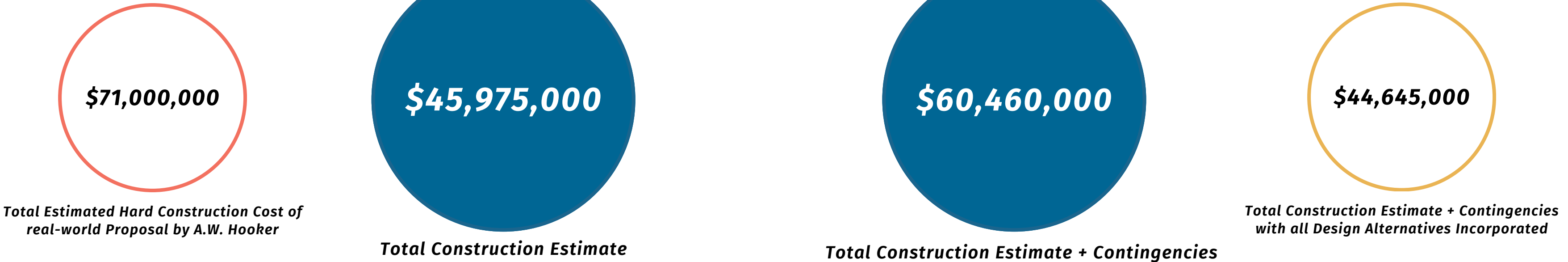
Building Turned Off During Summer

Operable Windows & Baseboard Heating

Low-Flow Fixtures

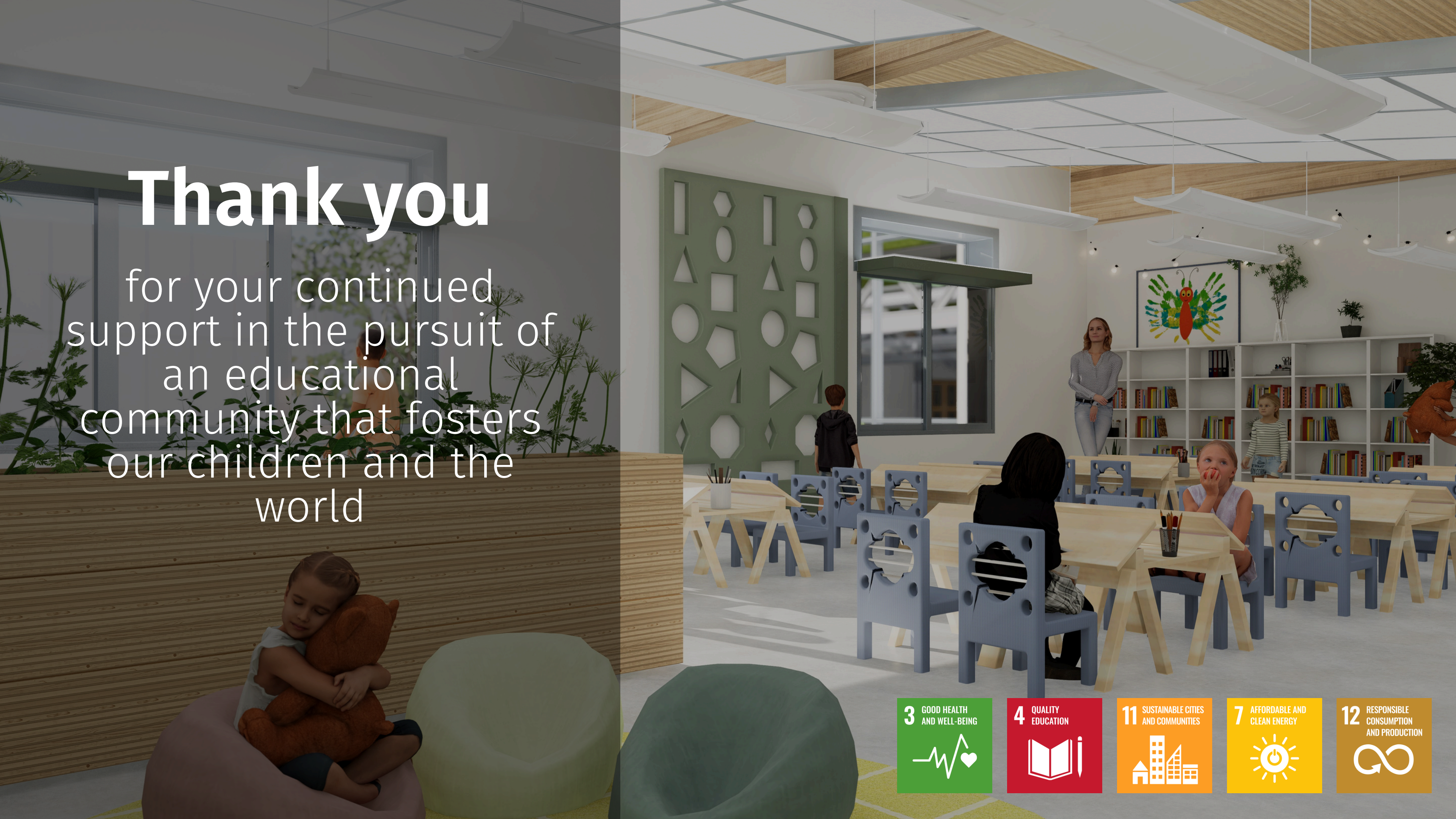
Efficiency Strategies





Item	Alternative	\$ Saved	Disadvantage / Drawback
Mechanical System	Switch to 4-pipe system with cooling tower / condenser and boilers	\$4,500,000	Significant increase in EUI, net-zero no longer feasible
Structural System	Switch to Reinforced Concrete	\$2,100,000	Significantly higher embodied carbon, < 10% biophilic views
Roofing System	Eliminate all Green-roofs and opt for R-40 assembly	\$1,125,000	Slight EUI increase, reduction in outdoor programmed spaces and biophilic views
On-site Electrical	Replace solar array with municipal electrical supply	\$1,050,000	Net-zero no longer feasible
Site	Eliminate Courtyard and develop less of site (12000~ m2)	\$300,000 + \$1,700,000	Significantly less exterior programmed space
Breakout Spaces	Replace breakout spaces with conventional hallways to reduce GFA	\$1,250,000	Less programmed space, inhibits future classroom expansion

Total Potential Savings **\$12,025,000**



Thank you
for your continued
support in the pursuit of
an educational
community that fosters
our children and the
world

3

GOOD HEALTH
AND WELL-BEING

4

QUALITY
EDUCATION

11

SUSTAINABLE CITIES
AND COMMUNITIES

7

AFFORDABLE AND
CLEAN ENERGY

12

RESPONSIBLE
CONSUMPTION
AND PRODUCTION