



“ WOCSD will be a nationally recognized system known for high performing schools that produce creative, caring, competent students who take charge of their own learning. ”

WOCSD Vision Statement

*(Educational Planning + Sustainability) x Community Connections
= High Performance Design*

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Existing 1975 Conditions – 89,600 sqft

**Oil-fired Radiant Heat system with Unit vents
Large Air Handlers for assembly spaces**

No Air Conditioning

Operable Window Ventilation (closed in cold weather)

Pneumatic local HVAC controls

Mix of T5, T8, and T12 fluorescent lights; with local on/off control

Metal Halide exterior lighting; with photocell

1” of rigid insulation at exterior wall

3” of roof insulation.

**Aluminum double hung windows with single pane glass
and hollow metal steel doors and frames**

Visioning Process – Non-negotiables

Addition and Renovation:

“..to look and feel like a new school...”

Educational Planning

Site Strategies

Reduce the Loads

***“...as energy-efficient as possible...”* for \$178 per sqft construction budget**

Tier 2 New Building Institute

Advanced Buildings

New Construction Guide

Operations and Maintenance

Renewable Energy-ready



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Visioning Process – New Building Institute Advanced Buildings

Maine Advanced Buildings

Tier 2 Requirements Checklist – Post-Construction

Section 0 and Section 2 of Advanced Buildings New Construction Guide



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Section	Criteria	Complete
Design Process Strategies		
0.1	Identify Design Intent: project team meeting before design process commences to identify MAB requirements and implementation strategies (page 22).	<input type="checkbox"/>
0.2	Design Intent Documentation: 1. Operational Performance Requirements Narrative (created prior to bidding or commencement of construction) – documents the design intent and building features incorporated to support efficient building performance and meet MAB requirements (page 23). 2. Owner/User Guide (completed prior to building occupancy) – provides information to building owner and occupants on how to use and maintain building (page 24) 3. Operations and Maintenance Manual (provided prior to building occupancy) – provides information about building and system maintenance and operation (page 24). 4. Acceptance Testing or Commissioning Plan (completed prior to building construction) – specifies process for meeting project requirements and how operation of systems and equipment will be verified (page 25). 5. Construction Documents and Bid Submittals – requirements on page 25.	<input type="checkbox"/>
0.3	Building Configuration Alternatives: evaluation during conceptual and schematic design phases to address impact of climate, siting, building orientation and shape, HVAC and lighting system selection, and daylighting strategies (pages 27 – 29).	<input type="checkbox"/>
0.4	Mechanical System Design: documentation of design considerations and calculations employed during design process to improve system performance and ensure mechanical system is designed to minimize energy consumption and maximize occupant comfort (pages 30 – 31).	<input type="checkbox"/>
0.5	Operator Training and Documentation: resources, documentation, and training to be provided to owner/occupants during building handoff to ensure building operations team understands how to efficiently operate the building (page 32).	<input type="checkbox"/>
Tier 2 Basic Requirements		
2.1	Energy Code Compliance: building shall meet or exceed applicable state or local energy codes, 2012 IECC, or ASHRAE 90.1-2010, whichever is more stringent (page 84).	<input type="checkbox"/>
2.2	Air Barrier Performance: air barrier performance shall be verified to ensure minimal energy losses through thermal envelope. Verification requirements based on building size (page 85). Material characteristics and construction practices on pages 86 – 87.	<input type="checkbox"/>
2.3	Opaque Walls and Below Grade Assemblies: wall, roof, and floor assemblies that are part of the building thermal envelope shall meet the requirements listed in Table 2.3.1 (page 89). U-Factors for assemblies shall be calculated on an area weighted average basis for the whole wall assembly in accordance with ASHRAE 90.1, Appendix A.	<input type="checkbox"/>
2.4	Glazing System Performance: the weighted average of all fenestration assemblies shall meet the U-Factor and Solar Heat Gain Coefficient (SHGC) requirements listed in Table 2.4.1 (page 91). Vertical fenestration assemblies shall have a Visible Light Transmission (VLT) rating of no less than 1.5 times the SHGC rating. All fenestration assemblies shall be rated according to the NFRC.	<input type="checkbox"/>
2.5	Daylighting: reduce energy consumption attributable to lighting through incorporation of daylighting. Building shall have no less than 35% of its conditioned net floor area within a daylight zone, meeting the requirements listed on page 92.	<input type="checkbox"/>
2.6	Lighting Controls: reduce lighting energy use through installation of automatic lighting controls and adjustable lighting strategies, including bi-level switching and vacancy controls (page 96).	<input type="checkbox"/>
2.7	Lighting Power Density: installed lighting power density shall not exceed the values in Table 2.7.1 (pages 97 – 98). All LED lighting installed shall be listed on the Energy Star Certified Bulbs list or the DesignLights Consortium Qualified Products List.	<input type="checkbox"/>
2.8	Exterior Lighting Efficiency: lamps over 75W used for exterior lighting shall meet the requirements listed on page 99. For sites with a connected exterior lighting load greater than 5KVA, site lighting shall be provided with controls meeting the requirements listed on page 99.	<input type="checkbox"/>
2.9	HVAC System Efficiency: all HVAC equipment shall meet minimum efficiency requirements listed in Tables 2.9.1 through 2.9.7 (pages 101 – 107). Additional criteria for select equipment listed on page 100.	<input type="checkbox"/>



Maine Advanced Buildings

Tier 2 Requirements Checklist – Post-Construction

Section 0 and Section 2 of Advanced Buildings New Construction Guide



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2.10	Economizer: ensure optimal energy savings from the proper performance of outside air economizers. When economizers are required/installed, they shall incorporate the features listed on page 109.	<input type="checkbox"/>
2.11	Duct Construction: requirements for all heating and cooling distribution ductwork and ventilation air intake ductwork are listed on page 111.	<input type="checkbox"/>
2.12	Fan Power Reduction: reduce energy consumption of fans by increasing the efficiency of the duct and distribution systems and increasing the efficiency of the fan motors. All air distribution systems shall be designed to meet the requirements listed on page 113.	<input type="checkbox"/>
2.13	HVAC Controls: reduce energy associated with HVAC loads through the use of effective controls. All HVAC systems shall be provided with controls that meet the requirements listed on page 115.	<input type="checkbox"/>
2.14	HVAC – Fault Detection and Diagnostics (FDD): all HVAC systems shall be provided with built-in or add-on FDD equipment and be capable of communicating the faults. Specific criteria are listed on page 117.	<input type="checkbox"/>
2.15	Water Heating: reduce energy consumption from hot water loads by improving equipment efficiency, reducing standby losses and heat losses from distribution, and offsetting loads in high hot water usage applications. Specific criteria are listed on pages 119 – 120.	<input type="checkbox"/>
2.16	Acceptance Testing: ensure the equipment is installed and operating as intended by the construction documents (developed under Section 0.2). Acceptance testing and document review requirements listed on pages 121 – 122.	<input type="checkbox"/>
2.17	Whole Building Metering: provide building with energy measuring equipment listed on page 123 and implement a protocol to collect data and analyze energy use quarterly.	<input type="checkbox"/>
Tier 2 Enhanced Measures (Optional)		
2.18	Enhanced Opaque Walls	<input type="checkbox"/>
2.19	Enhanced Glazing System Performance	<input type="checkbox"/>
2.20	Enhanced Requirements for Lighting Power Density	<input type="checkbox"/>
2.21	Premium Package Rooftop HVAC	<input type="checkbox"/>
2.22	Energy Recovery Ventilation	<input type="checkbox"/>
2.23	Demand Control Ventilation	<input type="checkbox"/>



Maine Advanced Buildings Program – Post-Construction Acknowledgement

Project Name: _____

Project Number: _____ Address: _____

Owner Incentive Amount:
\$189,232.50 = \$1.45 per sqft

A/E team Incentive Amount:
\$31,538.75

New Design – 129,700 sqft - Tier 2 NBI Advanced Buildings
NH, ME, VT = Climate Zone 6A = Simple & Cost Effective Measures

Natural Gas Fired Hydronic Heat with Electric Chiller system and Solar Hot Water – all geothermal ready (designed as bid alternate)

Fully Air Conditioning of learning spaces with partial AC gyms

Operable Window with full mechanical DOAS Ventilation with CO2 controls

**Complete energy recovery and economizer +
BAS whole building monitoring and metering controls**

**Mix of T5, HPT8, and LED lighting; with occupant and daylight controls
(all Energy Star and Design Consortium's Qualified listed fixtures)**

Enhanced Envelope = Tier 2 NBI Advanced Buildings

**Fiberglass single hung and fixed windows with thermally broken HP
aluminum curtain wall, storefront, and exterior doors**

Visioning Process – Reduce the Loads

Distributed CHW Low Temperature HVAC System – Hybrid for Geothermal option.. **reduced boiler plant size**

Mix of LED and T8 Lighting on daylight and sensor controls

Enhanced Exterior Envelope

R26.4 new walls (ci)...which is just shy of the required R27.7****

R7 existing walls (ci)

R36 min (ci) + tapered roof areas...actual average is R47.5 (Grey Roof)****

R5 below new slab areas + R10 at radiant heat areas

All new windows and doors

U=0.22 (30-40% window to wall ratio)...better than required 0.29 (0-30%)****

U=0.70 doors

Energy Modeling Results:

As designed = 3203.7 MBH.....Baseline NBI Tier 2 = 3230.7 MBH

As designed = 195.3 Tons.....Baseline NBI Tier 2 = 198.5 Tons

Visioning Process – Energy Savings

Energy Star – Target Finder: 83

Site EUI = 33

Source EUI = 109

Total Energy Cost per year = \$1.24 per sqft

Actual – Energy Savings (1 year of operation)

Energy Star – Target Finder: 95

Site EUI = 37.1

Source EUI = 78.4

Total Energy Cost per year = \$0.89 per sqft



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Deluca-Hoffman Associates, Inc. **SEBAGO**

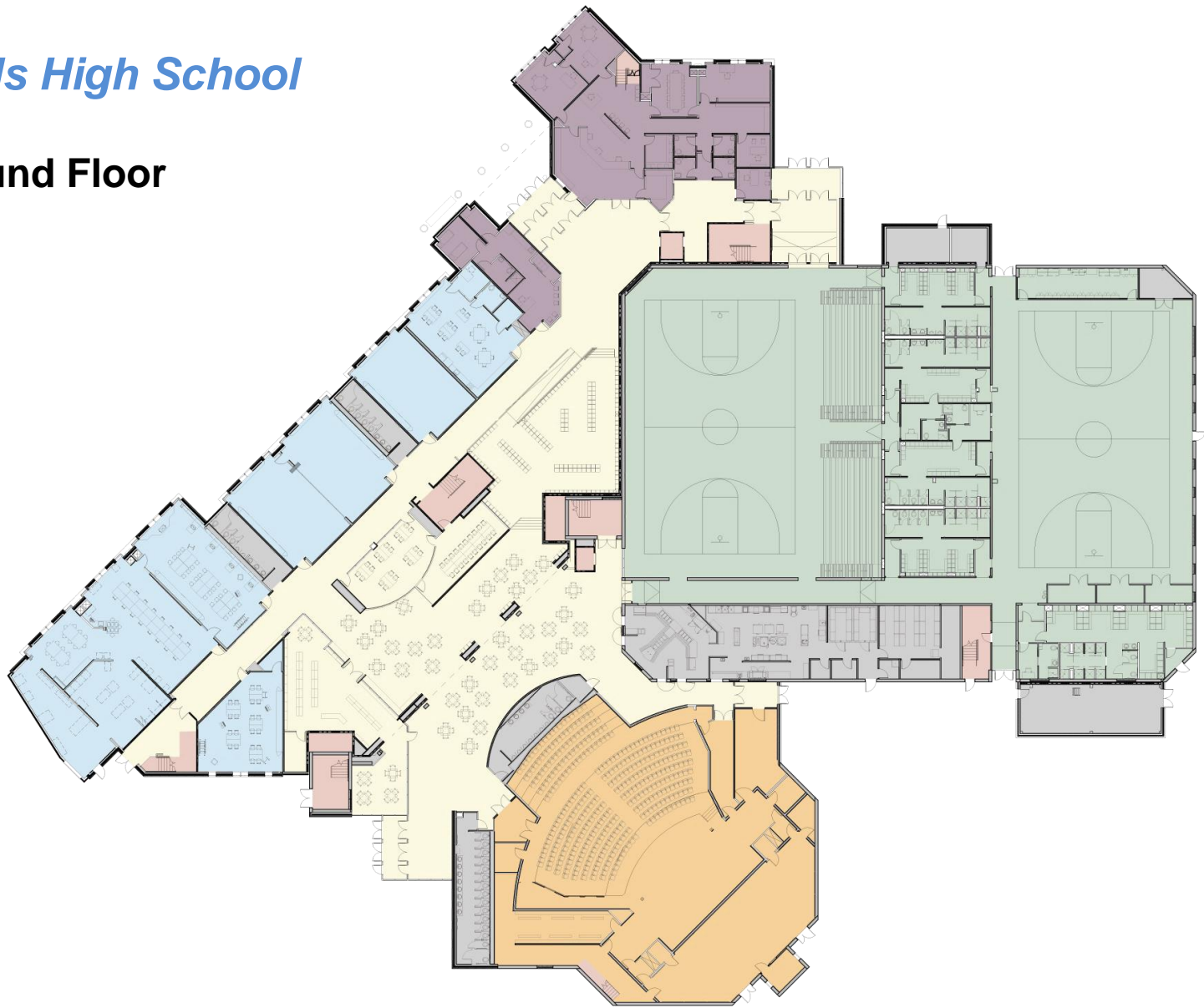
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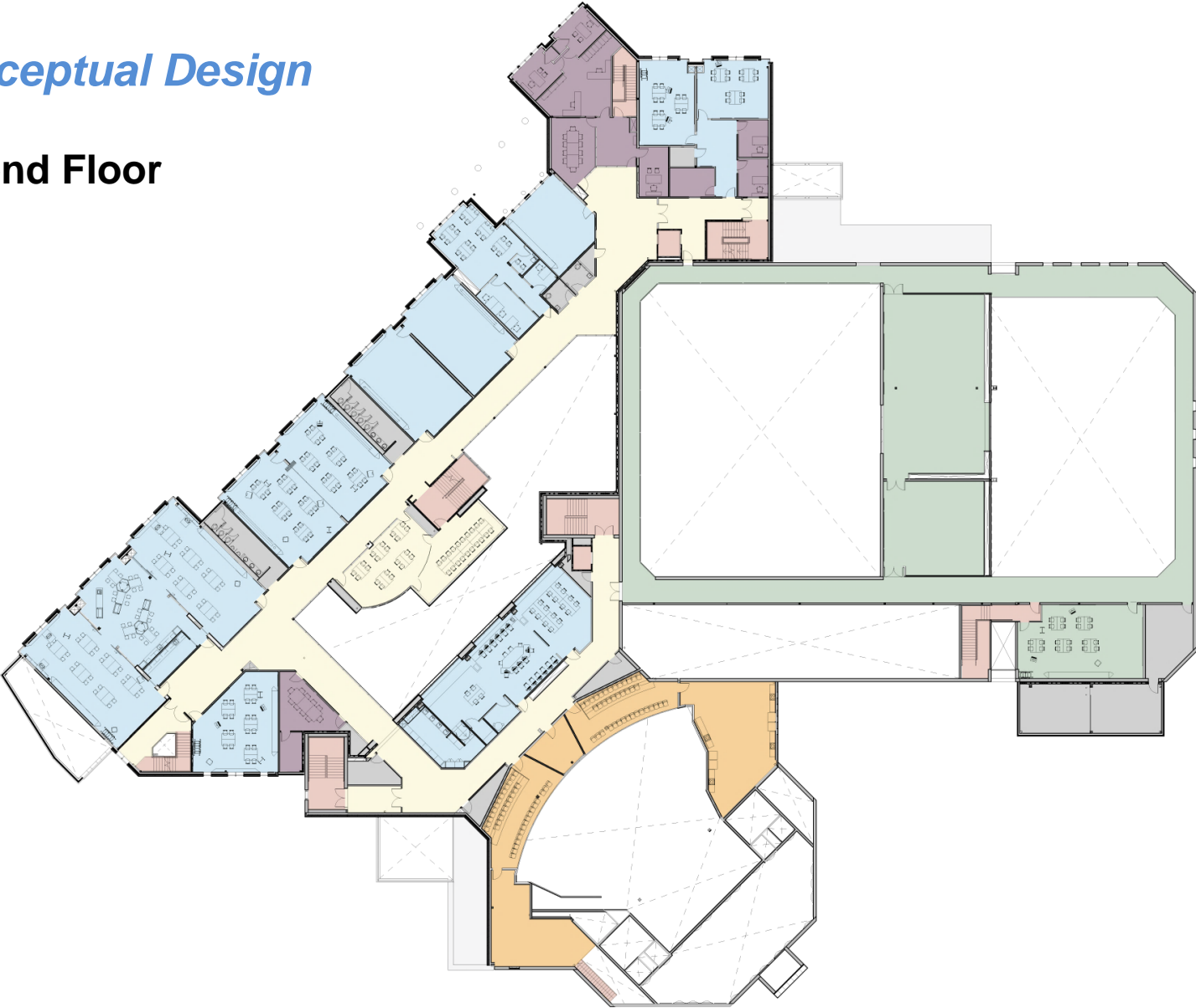
Wells High School

Ground Floor



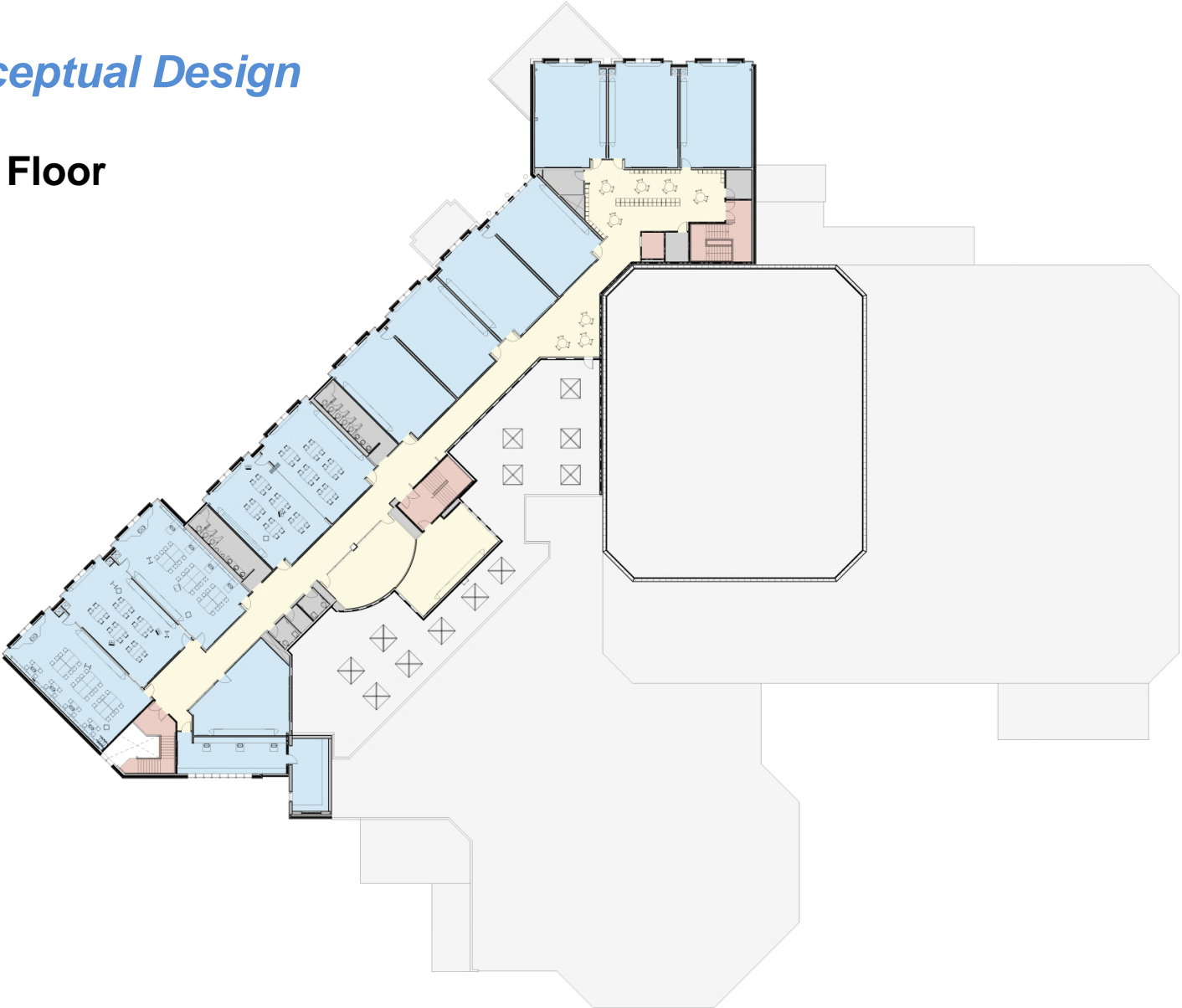
Conceptual Design

Second Floor



Conceptual Design

Third Floor





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