

New Willard Elementary School Construction

Concord, MA



Meeting 15



The Office of Michael Rosenfeld, Inc., *Architects*

Agenda

Cost Estimate Update

High Performance Design Analysis

High Performance Design Elements

Typical Classroom Discussion

Materials Presentation/ Discussion



Cost Estimate Update

	Daedalus (Sept 10)	OMR (DD Update #4)
Base	\$24,221,942	\$24,262,218
Alternates	\$210,940	\$167,214
Total	\$24,432,882	\$24,429,432

Items of note:

Escalation Rates

Possible Additional Savings

OMR estimate includes 100K Learning Elements Allowance



High Performance Design Analysis

Summary

	Cost Premium	Annual Cost Savings	% Below MA Energy Code	MA-CHPS points
Operating Cost Savings	\$ 772,180	\$ 40,107	40.5%	14
High Performance Materials	\$ 640,080	\$ -	0%	13
Cost Neutral Design	\$ -	\$ -	0%	18
Green Design Total	\$ 1,412,260	\$ 40,107	40.5%	45

Probable Credit/ Grants \$ 1,000,000

Net Cost to Project \$ 412,260

Payback to Project 10 years



High Performance Design Analysis

Operating Cost Savings

		Cost Premium	Annual Cost Savings	% Below MA Baseline	MA-CHPS points
L	Lighting Related Measures Daylight + Electric Efficiency	\$ 401,290	\$ 19,865	21.2%	6
E	Building Envelope Measures Wall, Roof, Windows	\$ 115,090	\$ 6,934	7%	3
H	HVAC Efficiency Measures Boiler, Motors, Energy Recovery	\$ 154,800	\$ 11,060	12%	3
W	Rain Water Capture cistern, piping, low-flow fixtures	\$ 101,000	\$ 2,248		2
OCS Subtotal		\$ 772,180	\$ 40,107	40.5%	14



High Performance Design Analysis

High Performance Materials

		Cost Premium	Annual Cost Savings	% Below MA Baseline	MA-CHPS points
M	Linoleum	\$ 70,000			1.1
M	Carpet	\$ -			0.5
M	100% Recycled GWB	\$ -			0.4
M	Tack Boards + ACT	\$ -			0.2
M	Formaldehyde Free Particle Bd	\$ -			0.1
M	Countertops -Richlite	\$ 17,760			0.3
M	Wood Panels	\$ -			1.2
M	Other interior finishes	\$ 50,000			0.5
RF	PVC roofing	\$ 173,000			1
CW	Construction Waste -90% recycled	\$ 70,960			1
AC	Acoustic Classroom Treatment	\$ 24,170			2
BR	Bio Retention	\$ 14,190			1
AG	Additional Interior Glass	\$ 110,000			2
ED	Innov- Education theme	\$ 100,000			1
CN	Temp.& Light Controls	\$ 10,000			1
HPM Subtotal		\$ 640,080			13



High Performance Design Analysis

Cost Neutral Design

		Cost Premium	Annual Cost Savings	% Below MA Baseline	MA-CHPS points
SD	site design	\$ -			8
CV	civil stormwater	\$ -			0
LP	light pollution reduction	\$ -			2
	Fly Ash Cement/ Recycled Steel/ Brick	\$ -			0
OP	Maintenance, IEQ Plan, Green Cleaning	\$ -			3
HS	HVAC Specs	\$ -			5
CND Subtotal		\$ -			18



High Performance Design Analysis

Payback

	Cost Premium	Annual Savings	MA-CHPS Points
Green Design Total	\$ 1,412,260	\$ 40,107	45

Probable Credit/ Grants

MSBA
Concord Light
KEYSPAN (Boiler Rebate)

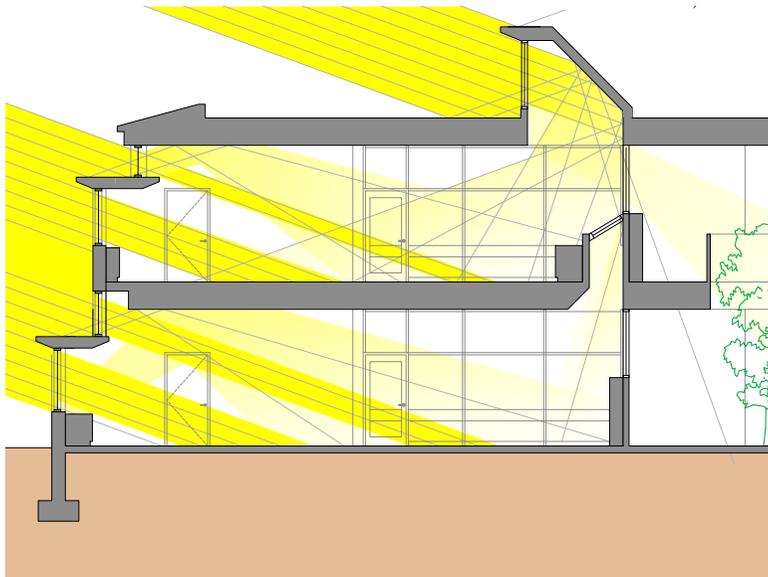
\$ 1,000,000

Net Cost to Project	\$ 412,260
Payback to Project	10 years



High Performance Design Elements

Lighting Related Measures



- Overhangs for south facing windows
- Reduced lighting power density (entire building)
- Occupancy sensors in most spaces
- Daylight harvesting controls for whole building

Annual Cost Savings: \$19,865

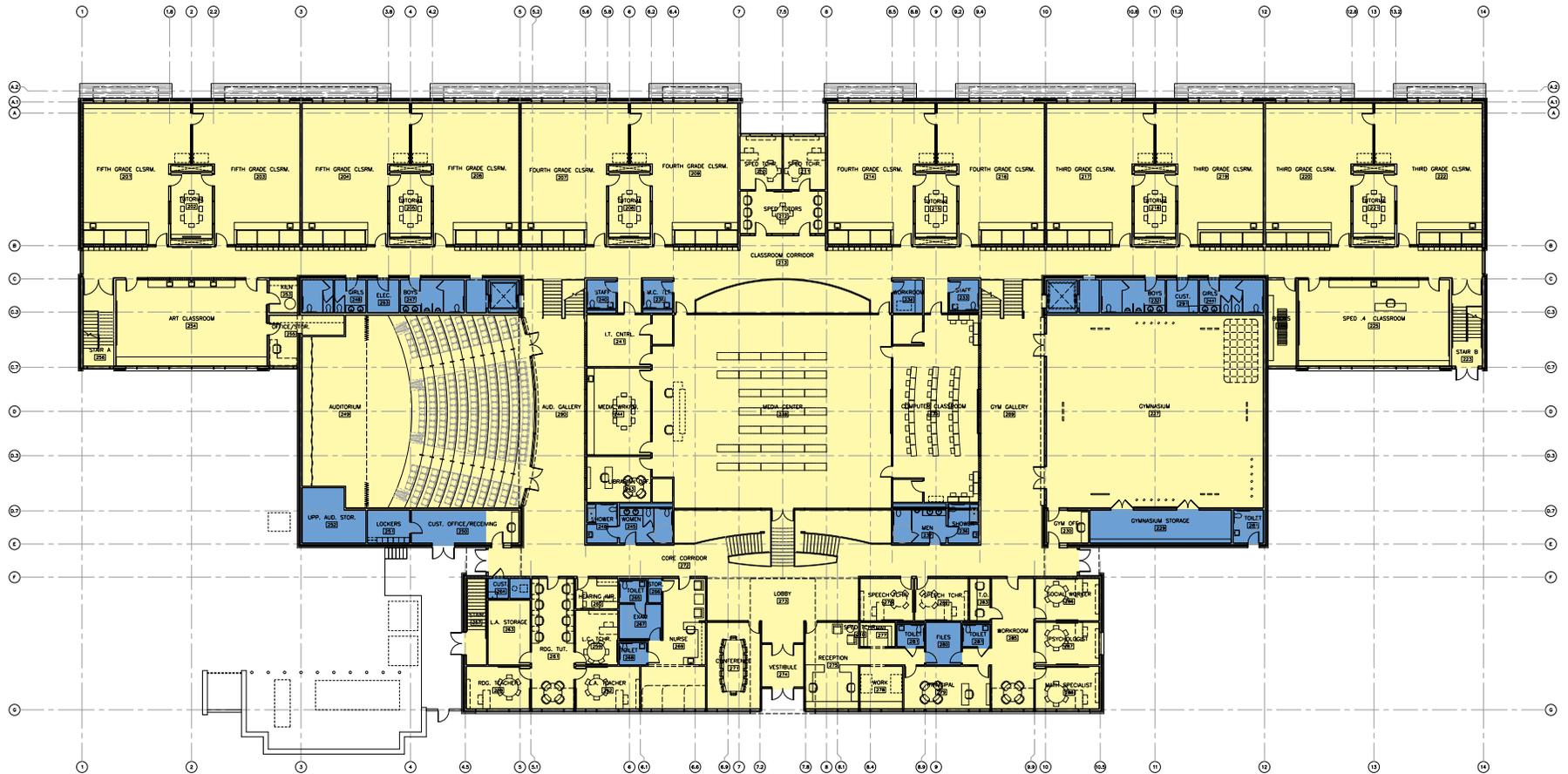
MA-CHPS points 6



High Performance Design Elements

Lighting Related Measures

Spaces with Natural Light



High Performance Design Elements

Building Envelope Measures



Spray Foam Insulation

- Combined Air Barrier / Insulation
- Highly Effective Air Barrier
- Cost Neutral Compared to 2 Part System
(Air Barrier sheet + Rigid Insulation)
- Higher R-Value in same cavity (R-13 vs. R-10)

Annual Cost Savings: \$6,934

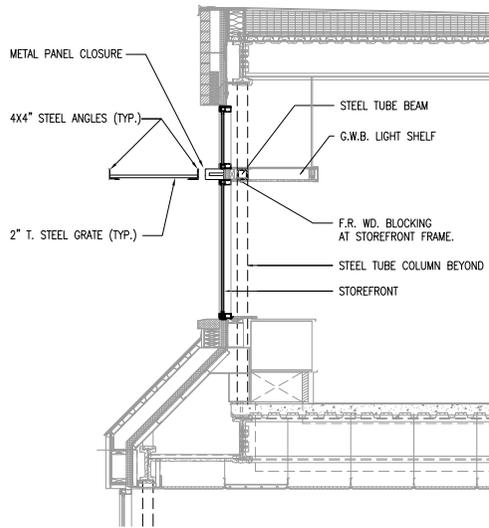
MA-CHPS points 3



High Performance Design Elements

Building Envelope Measures

Storefront



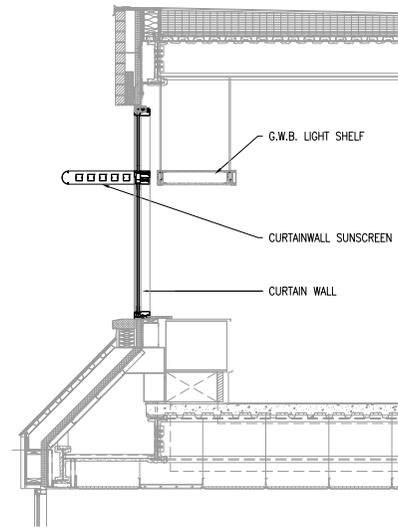
PROS

- TYPICALLY MORE COST EFFECTIVE

CONS

- LOWER THERMAL PERFORMANCE (U-VALUE = .67)
- POOR MOISTURE MANAGEMENT
- MULTIPLE TRADES (MISC. MTL, WINDOW, THERMAL)
- ADDITIONAL STRUCTURAL STEEL (960 LF)

Curtainwall



PROS

- BETTER THERMAL PERFORMANCE (OVERALL U-VALUE = .50)
- GOOD MOISTURE MANAGEMENT
- SINGLE TRADE (DIVISION 8500 - WINDOWS)
- INTEGRATED SUPPORT (SCREEN & LIGHT SHELF)

CONS

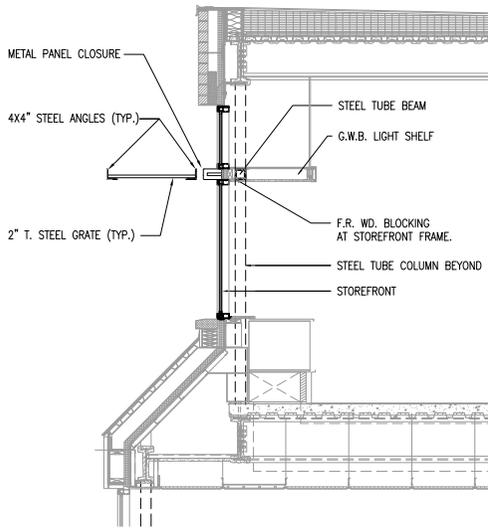
- TYPICALLY MORE COSTLY



High Performance Design Elements

Building Envelope Measures

Storefront \$460,246



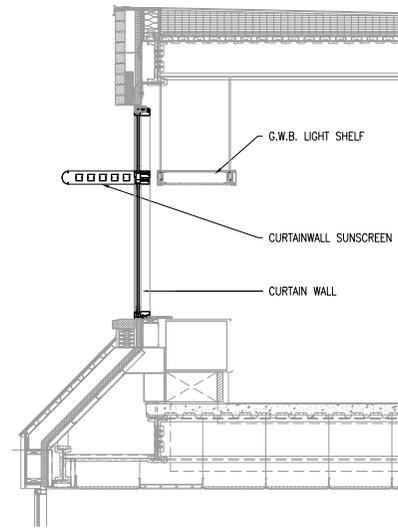
PROS

- TYPICALLY MORE COST EFFECTIVE

CONS

- LOWER THERMAL PERFORMANCE (U-VALUE = .67)
- POOR MOISTURE MANAGEMENT
- MULTIPLE TRADES (MISC. MTL, WINDOW, THERMAL)
- ADDITIONAL STRUCTURAL STEEL (960 LF)

Curtainwall \$476,822



PROS

- BETTER THERMAL PERFORMANCE (OVERALL U-VALUE = .50)
- GOOD MOISTURE MANAGEMENT
- SINGLE TRADE (DIVISION 8500 - WINDOWS)
- INTEGRATED SUPPORT (SCREEN & LIGHT SHELF)

CONS

- TYPICALLY MORE COSTLY

CW Premium

\$16,576

CW Energy Savings

\$1,964

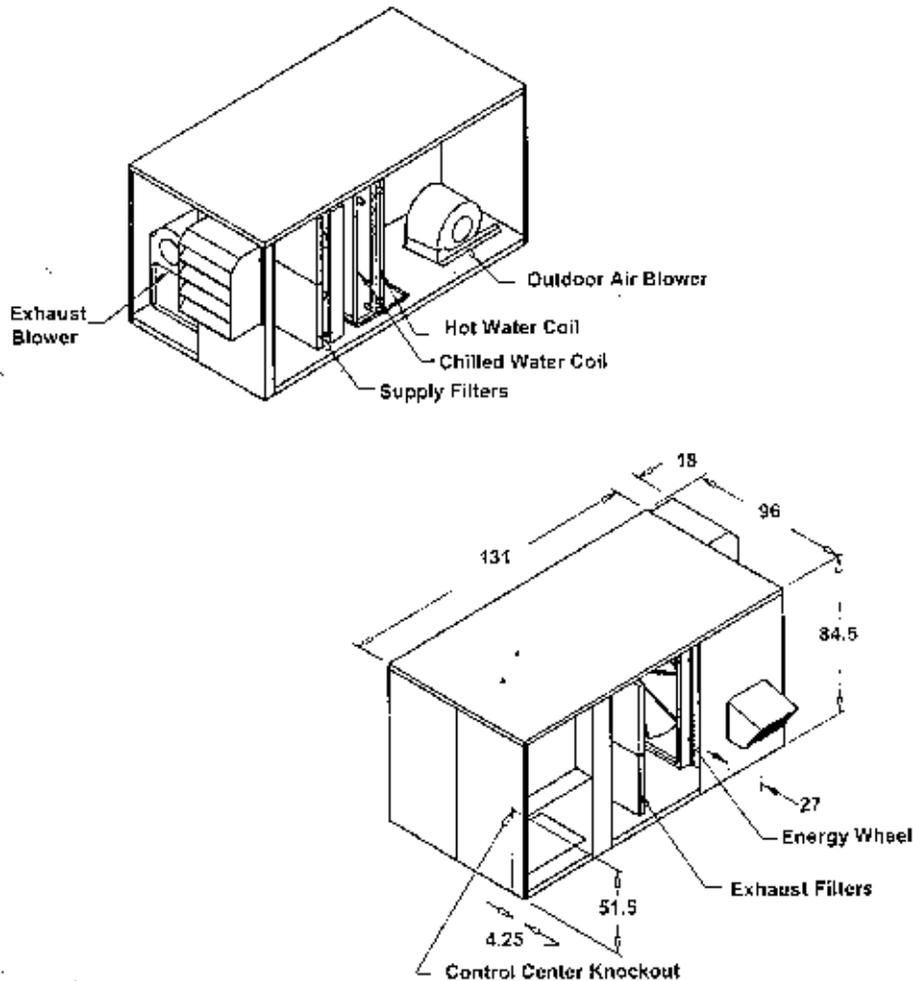
Payback

8.4 Years



High Performance Design Elements

HVAC Efficiency Measures



- Energy Recovery Wheels at Classroom AHUs
- Displacement Ventilation
- Variable Frequency Drive Motors
- CO² Demand Ventilation

Annual Cost Savings: \$11,060

MA-CHPS points 3



High Performance Design Elements

Rain Water Capture

Estimated Potential Annual Water Saved: 473,337 gallons



- cistern cost \$101,000
- annual operation & maintenance \$800
- calculated tank reliability of 86.5%
- water rate \$3.55/ 100 cubic feet

Annual Cost Savings: \$2,248

MA-CHPS points 2

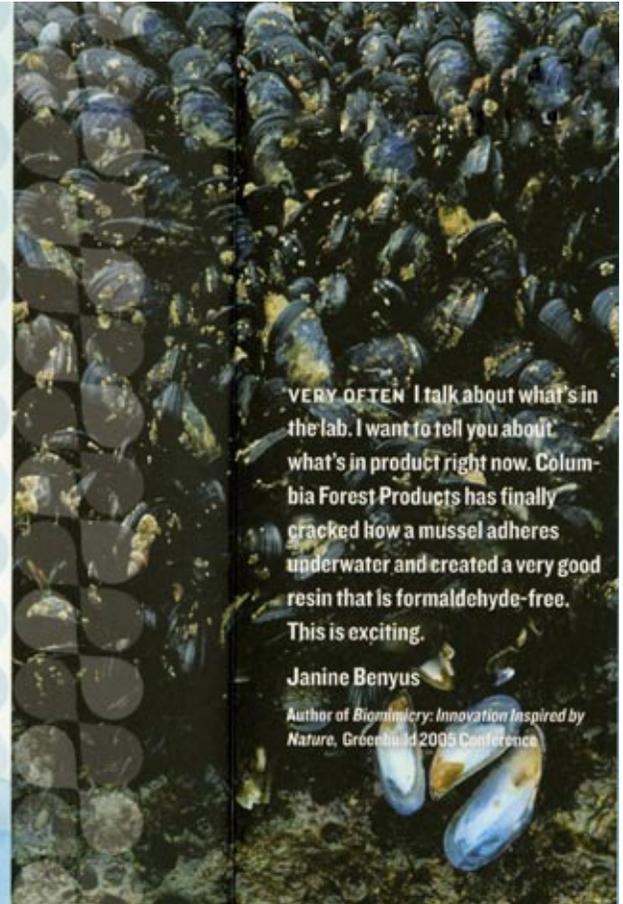


High Performance Design Elements

PureBond

100% FSC Certified/ No Urea-Formaldehyde

Columbia Forrest Products' **PureBond** formaldehyde-free technology involves a patented, soy-based adhesive cooperatively developed by Columbia, the College of Forestry at Oregon State University and Hercules Incorporated. Hercules has awarded Columbia a license to utilize its patented adhesive system on an exclusive basis for all of Columbia's North American decorative panel markets.



Traditional UF plywood and PureBond plywood after ANSI HP-1-2004 cyclic boil test

VERY OFTEN I talk about what's in the lab. I want to tell you about what's in product right now. Columbia Forest Products has finally cracked how a mussel adheres underwater and created a very good resin that is formaldehyde-free. This is exciting.

Janine Benyus

Author of *Biomimicry: Innovation Inspired by Nature*, Greenbuild 2005 Conference



High Performance Design Elements

Richlite

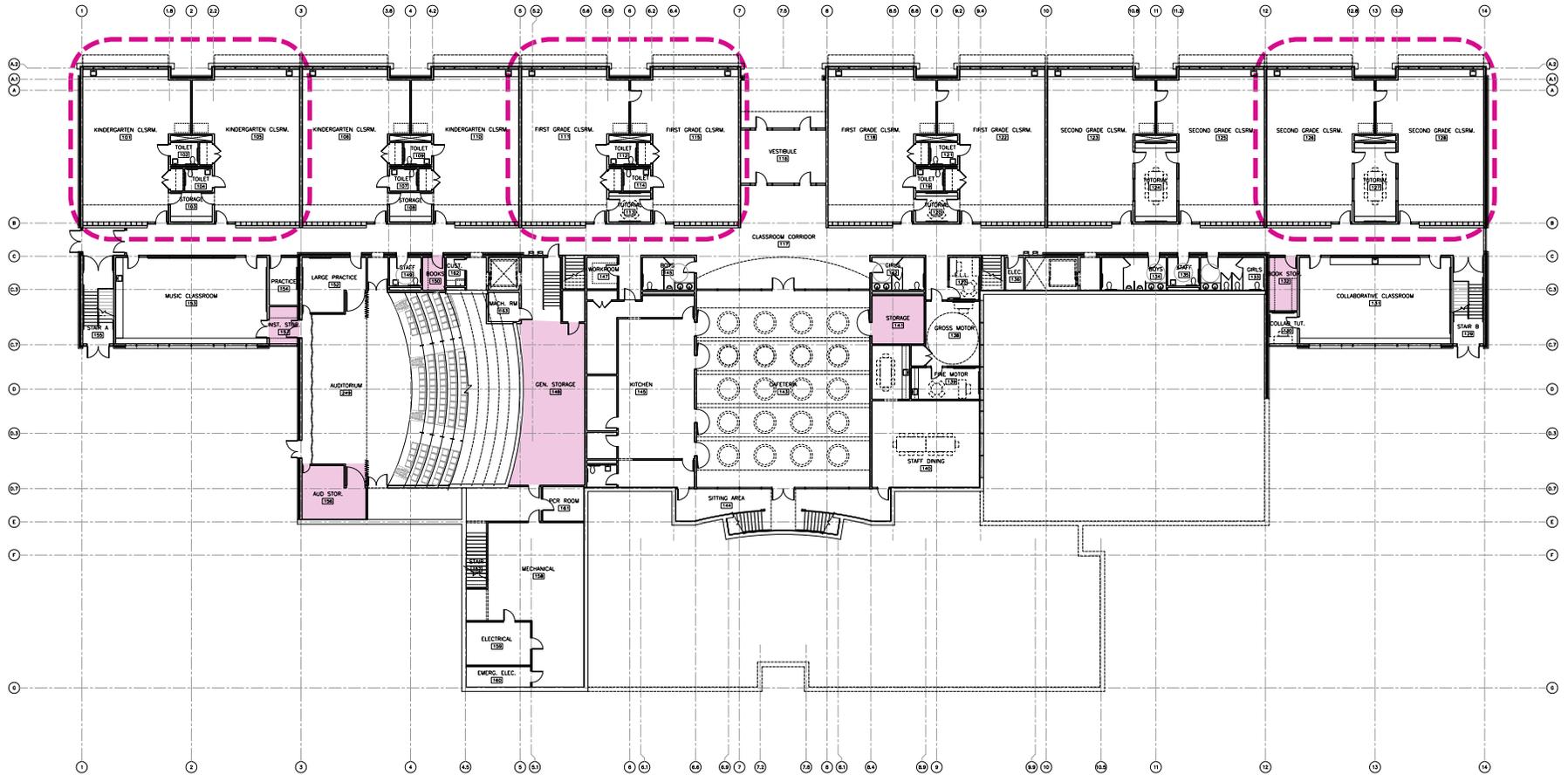
65% Bio-based/ No Urea-Formaldehyde



- Stain Resistant
- Thru-body color
- Paper Based in Phenolic Resin
- Strong and Durable - Marine and Industrial Applications for over 30 years

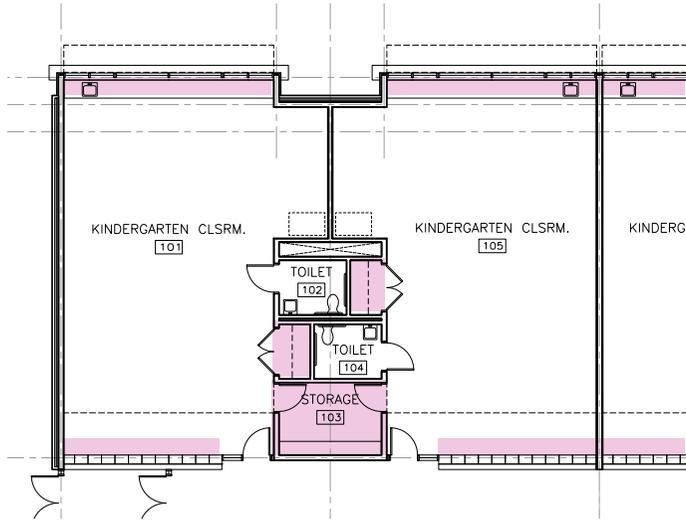


Storage

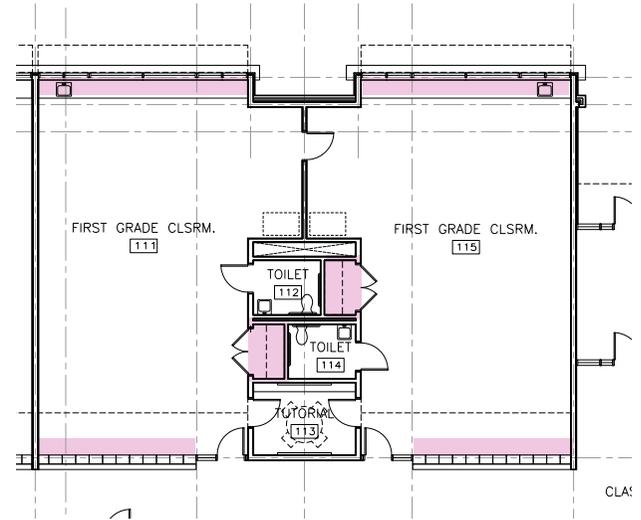


Storage

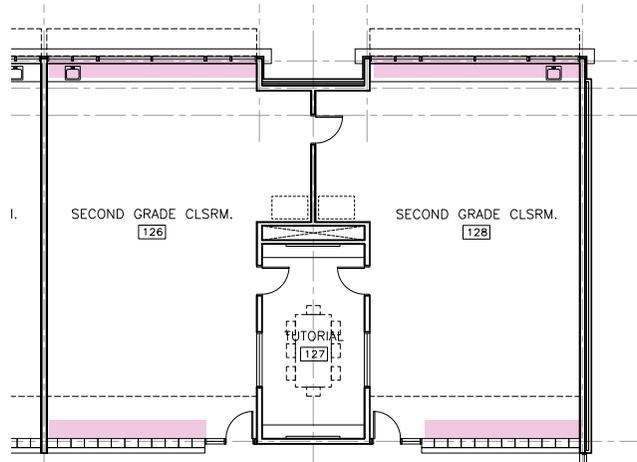
Kindergarten



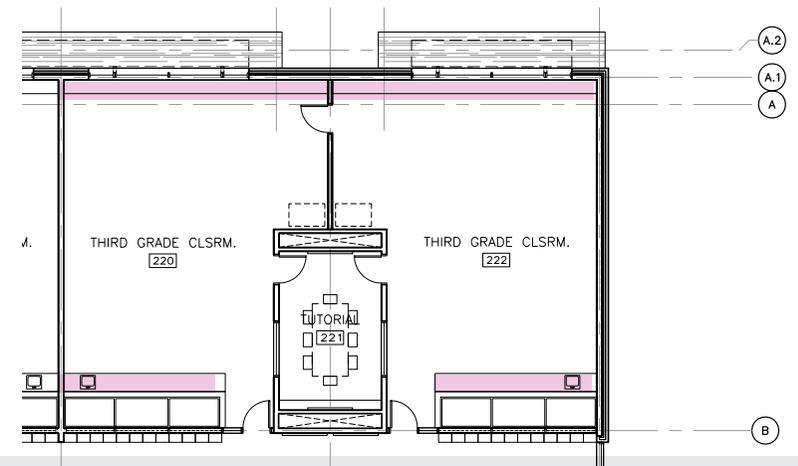
1st Grade



2nd Grade



Upper Level



End of Presentation

