

Hunnewell Elementary School Feasibility Study

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SBC Meeting

May 16, 2019



Agenda for Tonight's Meeting

- Community Forum Recap
- Site Planning Update
 - Parking update
 - Dover Amendment
- Sustainable Design
 - Energy Model and Finance Cost Analysis
- Design Options Discussion
- Swing Space Updates
- Next Steps & Feasibility Study Schedule Outline

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Public Forum Recap



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Parking Options



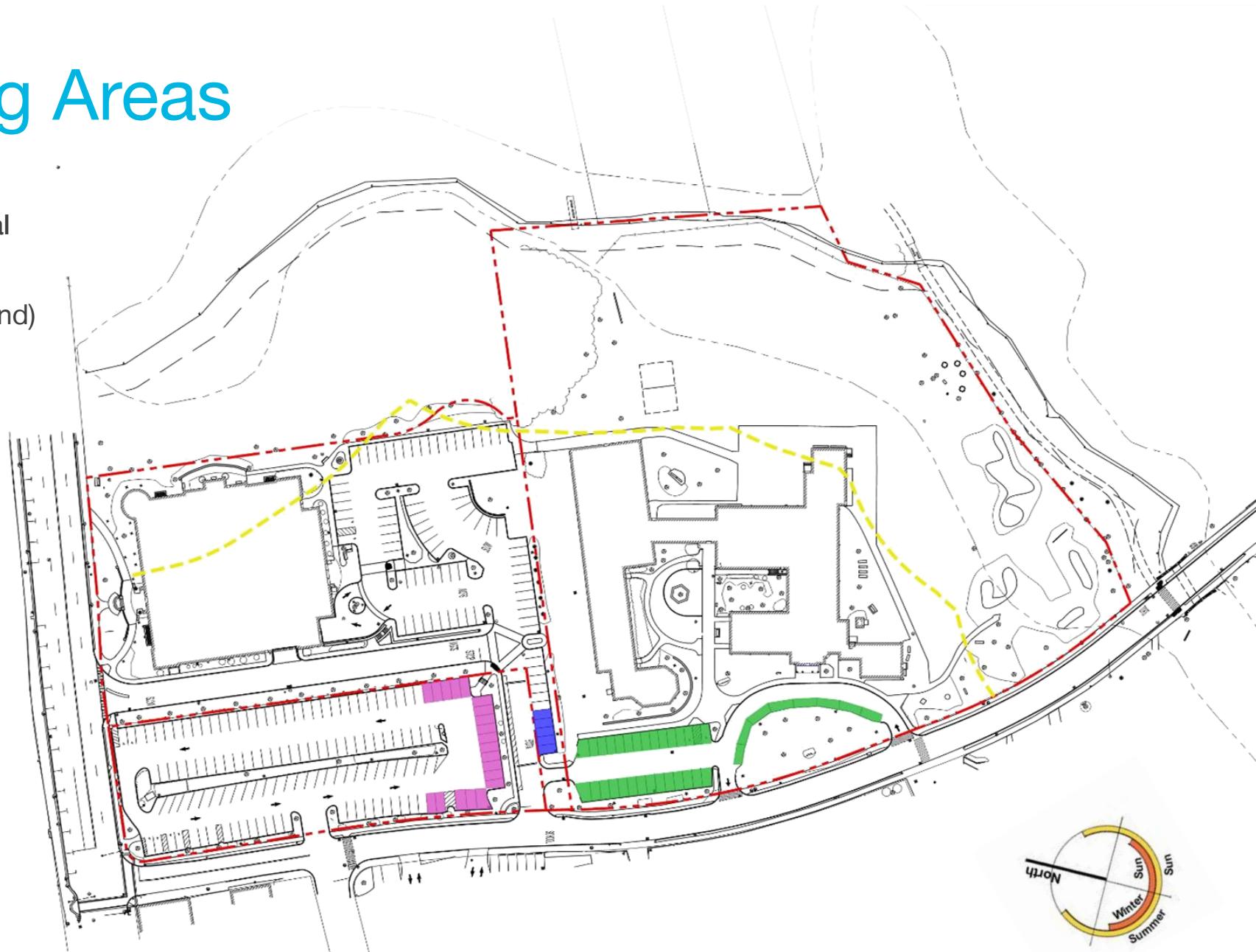
Existing Parking Areas

Existing Surface Spaces: 260 spaces total

- **School Site Spaces:** 36
- **Library Upper Lot:** 87 (+53 Underground)
5 Designated/Shared with School
- **Library Driveway:** 12 (-5 Hunnewell)
5 Designated/Shared with School
- **Cameron Street Lot:** 137

Existing Cameron Lot & Driveway Use:

- Commuter: 94 spaces
- Metered: 39 spaces total
(School Use: 25 Spaces)
- Library: 7 spaces
- Accessible: 4 Spaces



Considerations for Hunnewell Site Parking

• Classroom Teachers	18 spaces
• Specialists (SPED, Music, Art, Library)	15 spaces
• Paraprofessionals	14 spaces
• Travelling Staff (not included above)	3 spaces
• Other (Secretary, Nurse)	2 spaces
• Custodians (non- striped space)	1 spaces
H.C. Parking	3 spaces
EV Parking	2 spaces
<u>Visitors</u>	<u>8 spaces</u>
Total Estimated Number of Striped Spaces Required (40 at Hunnewell Site)	65 Spaces

Hunnewell School / Cameron Street Lot Parking Analysis

Options	% Open Space	Variance Required?	Hunnewell Lot	Library Driveway	Cameron Street Lot	Total
			# spaces	# spaces	# of spaces	spaces
EXISTING	20%		36	5/12	20 (137 total - 20 = 117 municipal)	61
ADD/RENO OPTION A						
Option 1	24.8%		24 ±	5/12	53 (137 total - 53 = 84 municipal)	82
Option 2	25%		36 ±	5/12	41 (137 total - 41 = 96 municipal)	82
Option 2.1	28.9%	yes	40 ±	5/12	20 (137 total - 20 = 117 municipal)	65
Option 3	31.8%	yes	82 ±	0/12 (+5 Library)	0 (137 total - 0 = 137 municipal)	82
NEW OPTION C						
Option 1	25%		28 ±	5/12	49 (137 total - 49 = 88 municipal)	82
Option 2	29.5%	yes	40±	5/12	20 (137 total - 20 = 117 municipal)	65

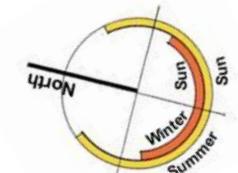
Parking Scenario Comparison



Open Space Requirement: 60,612 SF max (25% of Site Area)
Building Footprint: 49,000 SF = +/-20.0% > 15%
Parking Spaces Shown +/- 40 Spaces (65 total)
Lot Coverage Shown: +/- 28.9% > 25%



Open Space Requirement: 61,612 SF max (25% of Total Site Area)
Building Footprint: 47,000 SF = +/-18.8% > 15%
Parking Space Shown +/- 40 Spaces (65 total)
Lot Coverage Shown: +/- 29.5% >25%



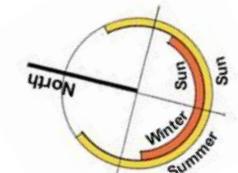
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Sustainable Design Update



Preliminary Energy Performance Summary

Description	Units	NEW	ADD / RENO
		NET ZERO READY (NZR) Option*	NET ZERO READY (NZR) Option*
Building Enclosure			
Roof	U-value	0.017 (R-60)	0.017 (R-60)
Walls	U-value	0.029 (R-34)	0.029 (R-34)
Glazing (Assembly Value)	U-value	0.20 – 0.23	0.20 – 0.23
	SHGC	0.25	0.25
Window/Wall Ratio (WWR)	%	25%	25%
Infiltration	CFM/SF	0.15 CFM/sf @ 75 pascals	0.20 CFM/sf @ 75 pascals
Lighting			
Lighting Power Density	w/SF	0.5 [With advanced networked lighting controls]	0.5 [With advanced networked lighting controls]
Equipment			
Equipment Power Density	w/SF	0.75 [75% receptacles automatically controlled]	0.75 [75% receptacles automatically controlled]
HVAC System Type			
System 1 - VRF	\$46/SF	Fully Electric System	Fully Electric System
Predicted EUI ¹	kBtu/SF/yr.	26.4	28.4
Alternative HVAC System Option			
System 2 - Ground Source Heat Pumps	\$57-65/SF ³		
Predicted EUI ¹	kBtu/SF/yr.	30.5	31.0
		Stretch Code Level Energy Performance**	
System 3 - Boiler/Chiller	\$47.50/SF	Natural Gas Heating and Electric Cooling	
Predicted EUI ¹	kBtu/SF/yr.	42.4	42

1. EUI = Energy Use Intensity

2. Energy cost assumptions - \$0.13/kWh and \$1.18/therm

3. Preliminary estimate provides a range costs, pending a test well (potential well density)

NOTES:

*Net Zero Ready: 30% of renewable Energy provided on site; Diesel emergency generator.

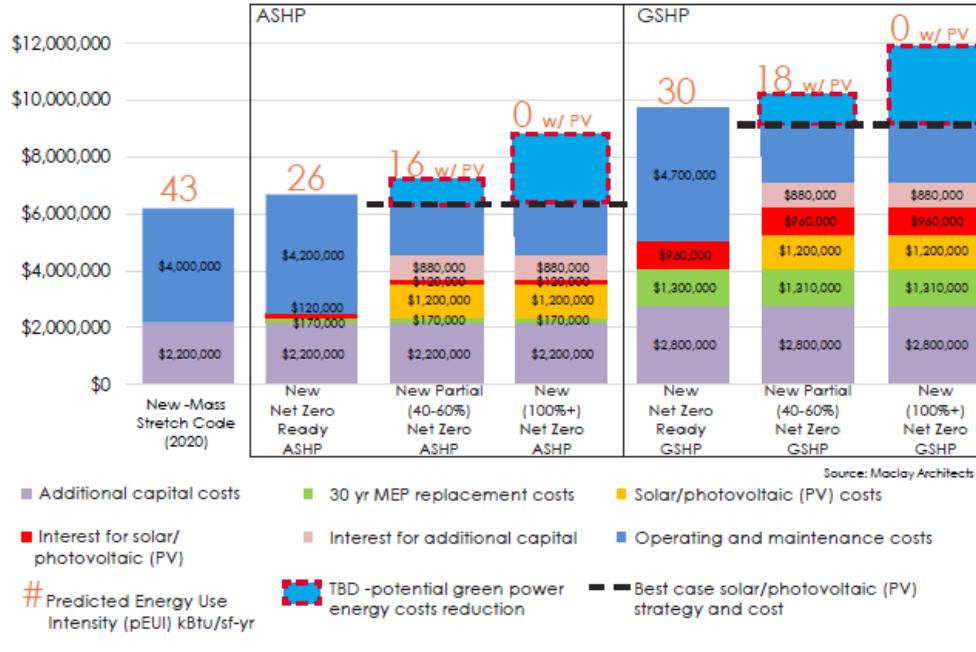
**The Stretch Code HVAC system has a predicted EUI of 42, beyond the pEUI 30 mandated for the project. The Massachusetts Energy Code 1/2022 Revision will likely impact the Stretch Code performance and system costs.

Sustainability & MEP Considerations: Solar Photovoltaics

		NEW	ADD / RENO
Description	Units	NZR Option	NZR Option
Preliminary Solar Photovoltaic (PV) Analysis			
Preliminary Solar PV Offset Required ¹	kW	735 (VRF) – 857 (GSHP)	785 (VRF)
Solar PV area required ²	SF	73,484 – 85,720	78,531
Available school roof area ³	SF	30,000	25,000
Additional area required	SF	48,484 – 60,720	53,531
Total Preliminary Solar PV Estimated Cost	\$	\$3.4 - \$3.6 Millions	\$3.5 Millions
School Roof Array only (\$3.95/w)	\$	\$1.2 Million	\$1.0 Million

1. Assumes all building loads are electric, using NREL PV harvesting factor of 1.1 AND a 15% contingency (NZE projects size PV 15-20 % larger to account for operational adjustments: schedules/user behaviors, etc.)
2. Assumes 10 w/SF as preliminary assessment (installed panels efficiency may be up to 12 w/SF)
3. The available roof area is subject to change as the project moves into schematic design and further defines HVAC system roof equipment.
4. NZR = Net Zero Ready
5. VRF = Variable Refrigerant Flow System (Air Source Heat Pumps), GSHP = Ground Source Heat Pumps (geo-thermal)

30 Year Cumulative Capital, Maintenance, Energy, and Finance Costs with Solar:

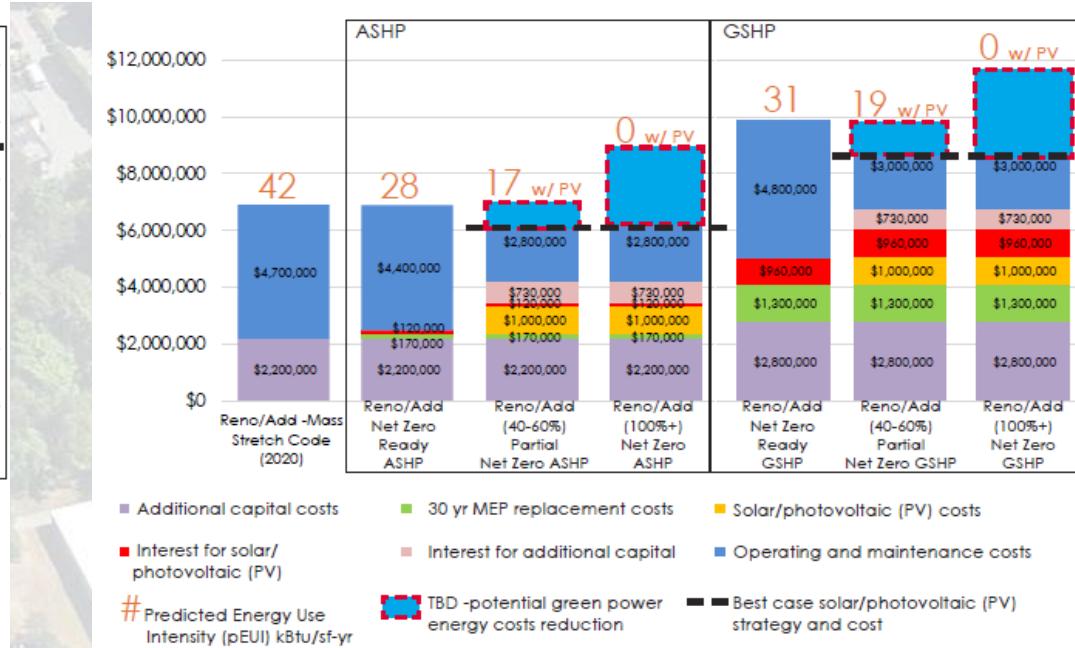


NOTES:

- 30% solar/photovoltaic (PV) size contingency above Net Zero Ready EUI energy model requirements
- The partial Net Zero option assumes 300 kW roof mounted solar/photovoltaic (PV) array that covers 40% of operating costs
- To make the project Net Zero, the remaining 40-60% operating energy to be negotiated through the town with a potential green power energy provider
- This project has no access to the SMART solar/photovoltaic (PV) program
- Solar/photovoltaic (PV) cost varies from \$3.96 for roof top system to \$4.70/watt for Net Zero options - with a mix of carports and rooftop
- 30 yr Mechanical/Electrical/Plumbing (MEP) replacement costs include replacement of heating/cooling systems

ASSUMPTIONS:

- 4% bond rate, 30 years - solar/photovoltaic (PV) and additional capital financed
- \$0.138/kWh and \$1.18/therm starting fuel rates from FMD, with 3% annual escalation until year 28, then no additional inflation
- Nominal inflation rate equals the nominal discount rate, therefore 0% used - which assumes 2019 dollars
- Energy model for generating operating costs developed by SMMA
- Net Zero option has no energy costs (assumes meters/connection charges the same for all options and therefore not shown and a 1 to 1 credit for each kWh produced)
- Solar/photovoltaic (PV) is financed at the same rate as the additional capital costs



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30 Year Cumulative Capital, Maintenance, Energy, and Finance Costs Comparing Existing Hunnewell to New:



Source: Maclay Architects

- 30 yr MEP Replacement Costs
- 30 yr enclosure repair/replacement
- Operating and Maintenance Costs
- Additional Capital Costs
- Interest Additional Capital
- Predicted Energy Use Intensity (pEUI) kBtu/sf-yr

NOTES:

- Existing School area is 36,441 sf, the new schools are proposed at 76,000 sf
- Existing electric use is 143,037 kWh and 41,481 therms (5 yr average) per SMMA
- Current electric use is 4 kWh/sf without A/C, similar vintage schools with AC have 7-8 kWh/sf per SMMA (~\$1M over 30 years)
- 30 yr Building Enclosure repair/replacement costs required for the existing building and not required for new construction are shown as two conditions: \$0-\$1.7M due to unknown conditions
- 30 yr Mechanical/Electrical/Plumbing (MEP) replacement costs include replacement of heating/cooling (if applicable) systems
- Annual existing operating costs are included as \$10,500/yr for the 36,000 sf school per SMMA

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Concept Plans Addition Renovation New Construction



Educational Plan: Vision for New Hunnewell

- Neighborhood Learning Communities
- Flexible Spaces
- Indoor / Outdoor Connectivity
- Safety and Security
- Sustainability
- Compact Design



Add-Reno & New Construction Comparison

Site Plan



*Addition &
Renovation*

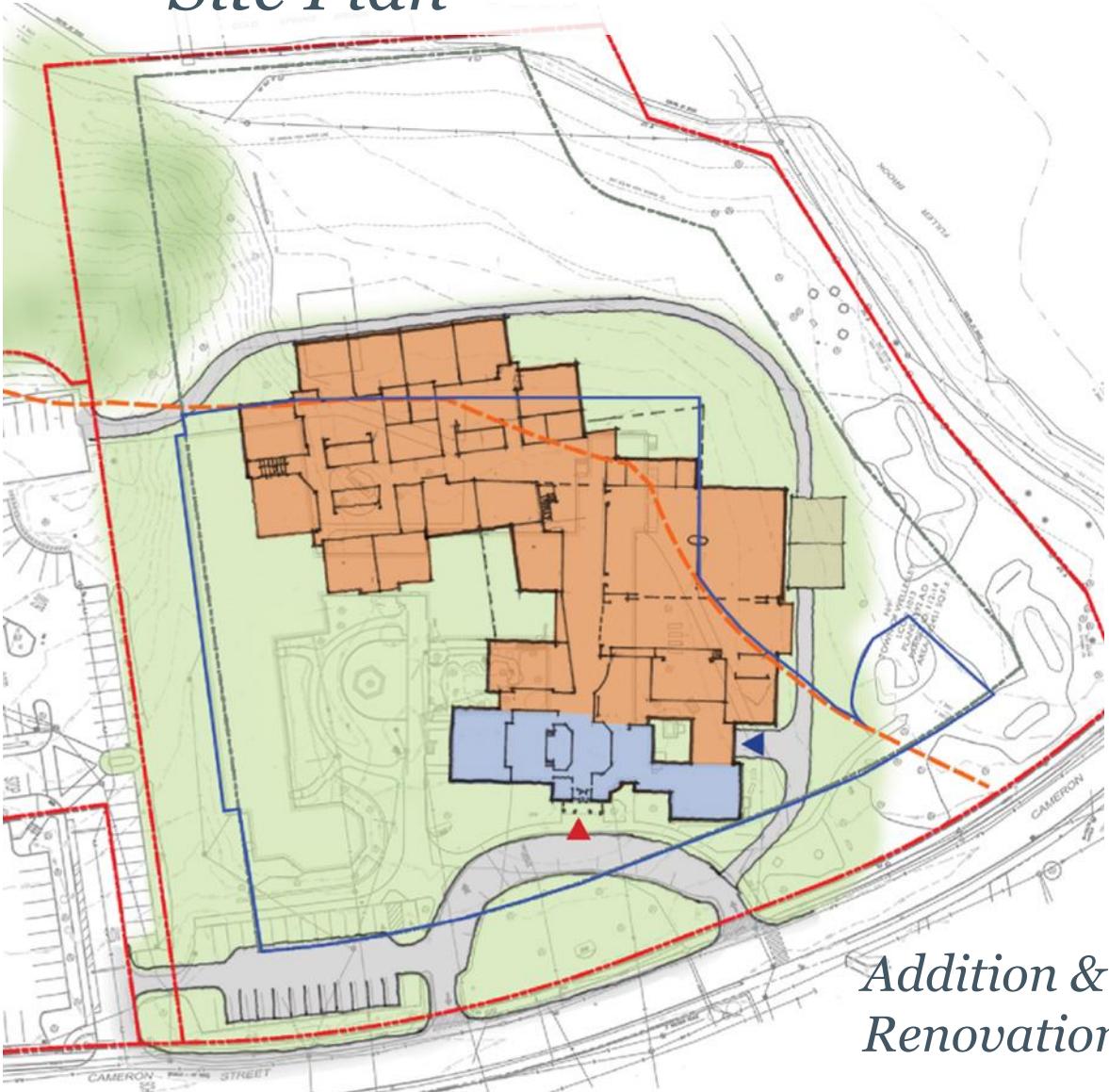


*New
Construction*

- ▲ Main Entrance
- ▲ Loading & Service
- Existing to Remain
- New Construction

Add-Reno & New Construction Comparison

Site Plan



- ▲ Main Entrance
- ▲ Loading & Service
- Existing to Remain
- New Construction

Thoughts on – “Characteristics” for Additions and Renovation Options

- Save only most valued (front) portion of 1938 Building
 - Option should not depend upon attempt to preserve the Oak tree
- Classroom Neighborhood Learning Commons Configuration less optimal
- Core Educational environment at quiet side of site less optimal
- Cafetorium & Gym link to outdoor play environments
- Maximize Outdoor play area at back of site
- Access to Community Uses less optimal
- Main Entrance (Identity)
- Safety & Security



Thoughts on – “Characteristics” for New Construction Options

- Classroom Neighborhood Learning Commons Configuration
 - Compact closely organized “community” of spaces
 - Locate Core Educational environment at quiet side of site
- Orient building entrance to face the neighborhood
- Cafetorium & Gym link to outdoor play environments
- Maximize Outdoor play area at back of site
- Access to Community Uses
- Service areas less optimal
- Main Entrance (Identity)
- Safety & Security



Add-Reno & New Construction Comparison

Circulation



*Addition &
Renovation*



*New
Construction*

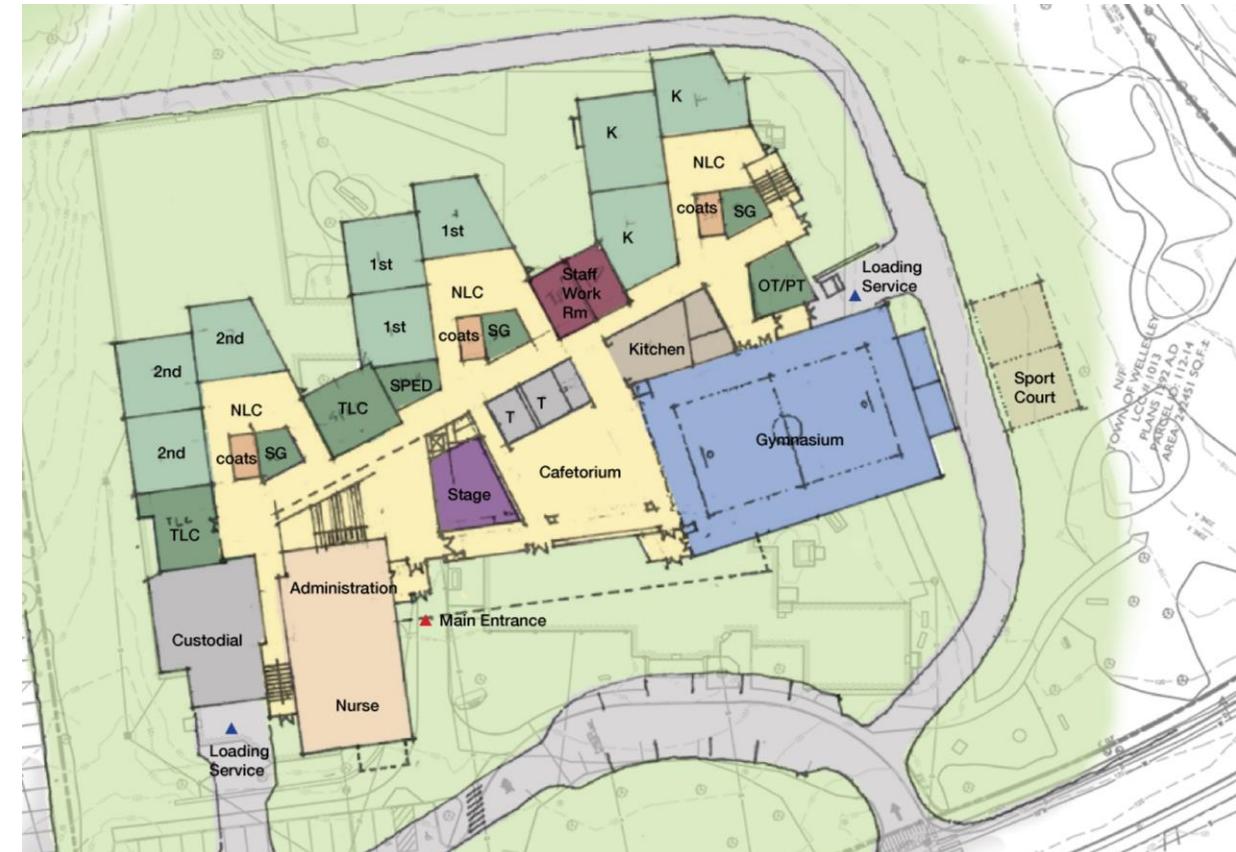
- ▲ Main Entrance
- ▲ Loading & Service
- Circulation

Add-Reno & New Construction Comparison

First Floor Programming Plan



*Addition &
Renovation*



*New
Construction*

Add-Reno & New Construction Comparison

Second Floor Programming Plan



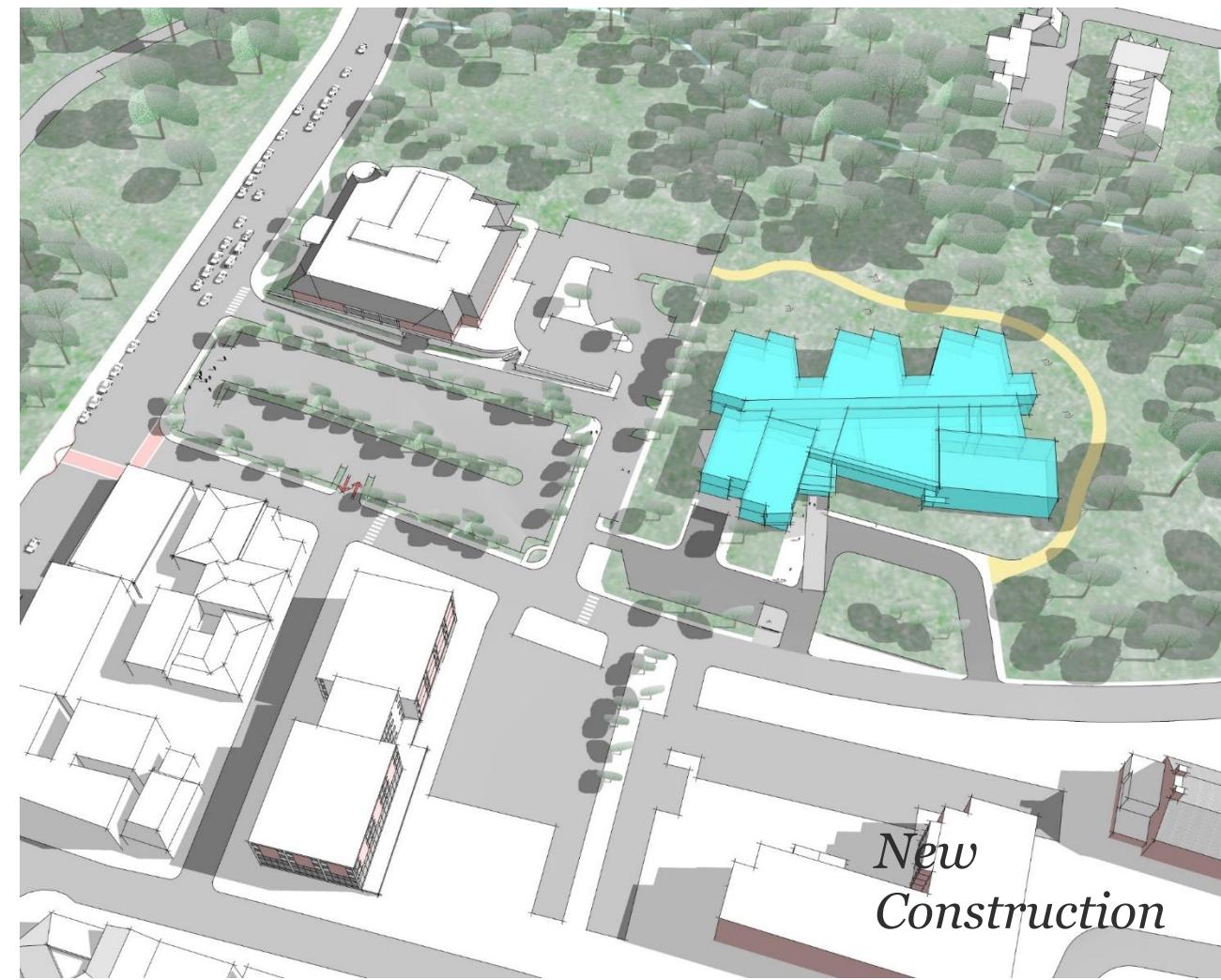
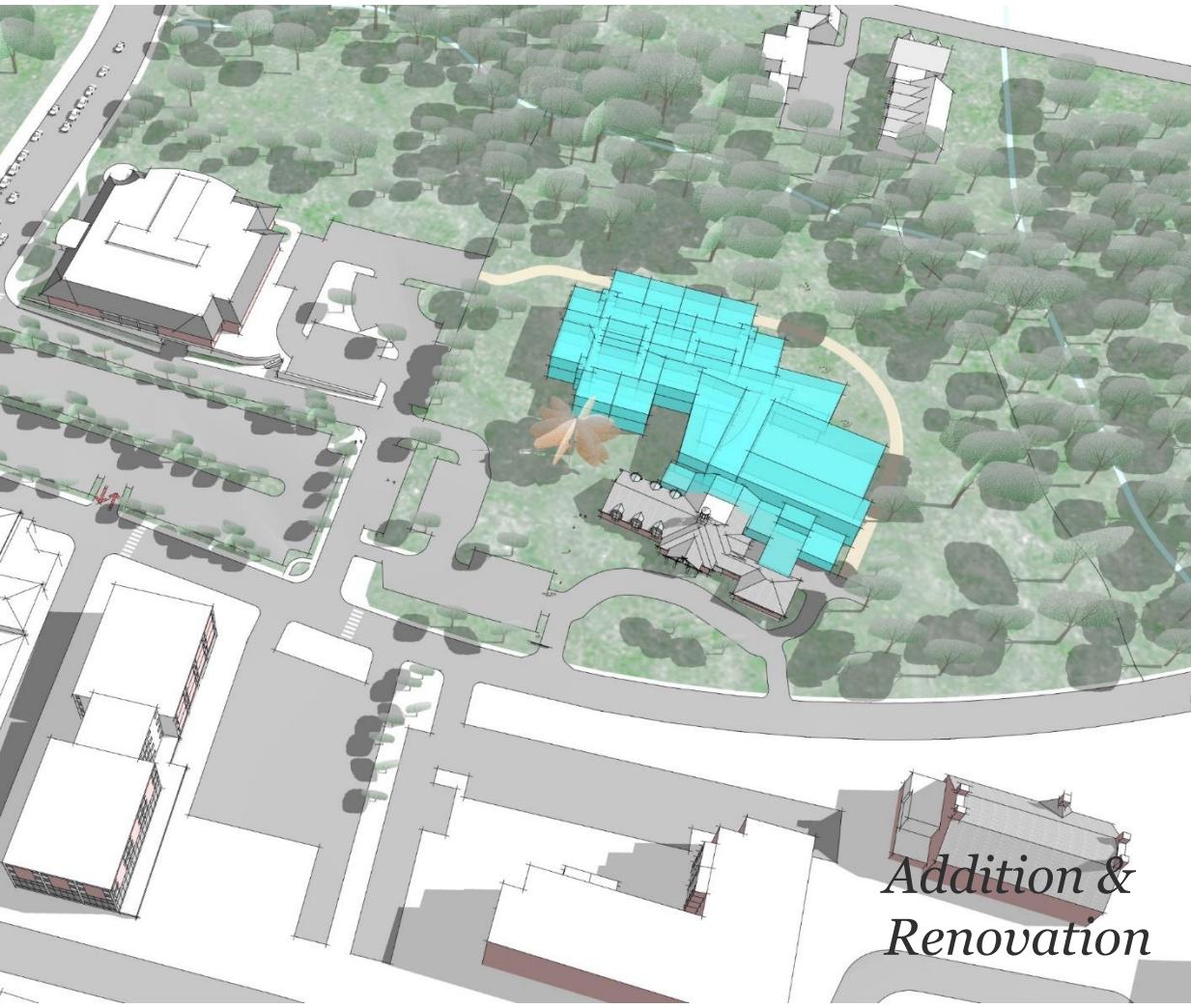
*Addition &
Renovation*



*New
Construction*

Add-Reno & New Construction Comparison

Massing



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Swing Space



Remaining Swing Space Options Under Consideration

Report back to SBC mid June & ongoing study through Summer 2019

- St. Paul's School, update to 2018 report

Or Delay Opening until 2026

- Late Hunnewell with redistricting two schools on one campus (Hardy and/or Upham School w/ Modulars)
- Late Hunnewell without redistricting uses both vacated schools – three sites/split Hunnewell campus

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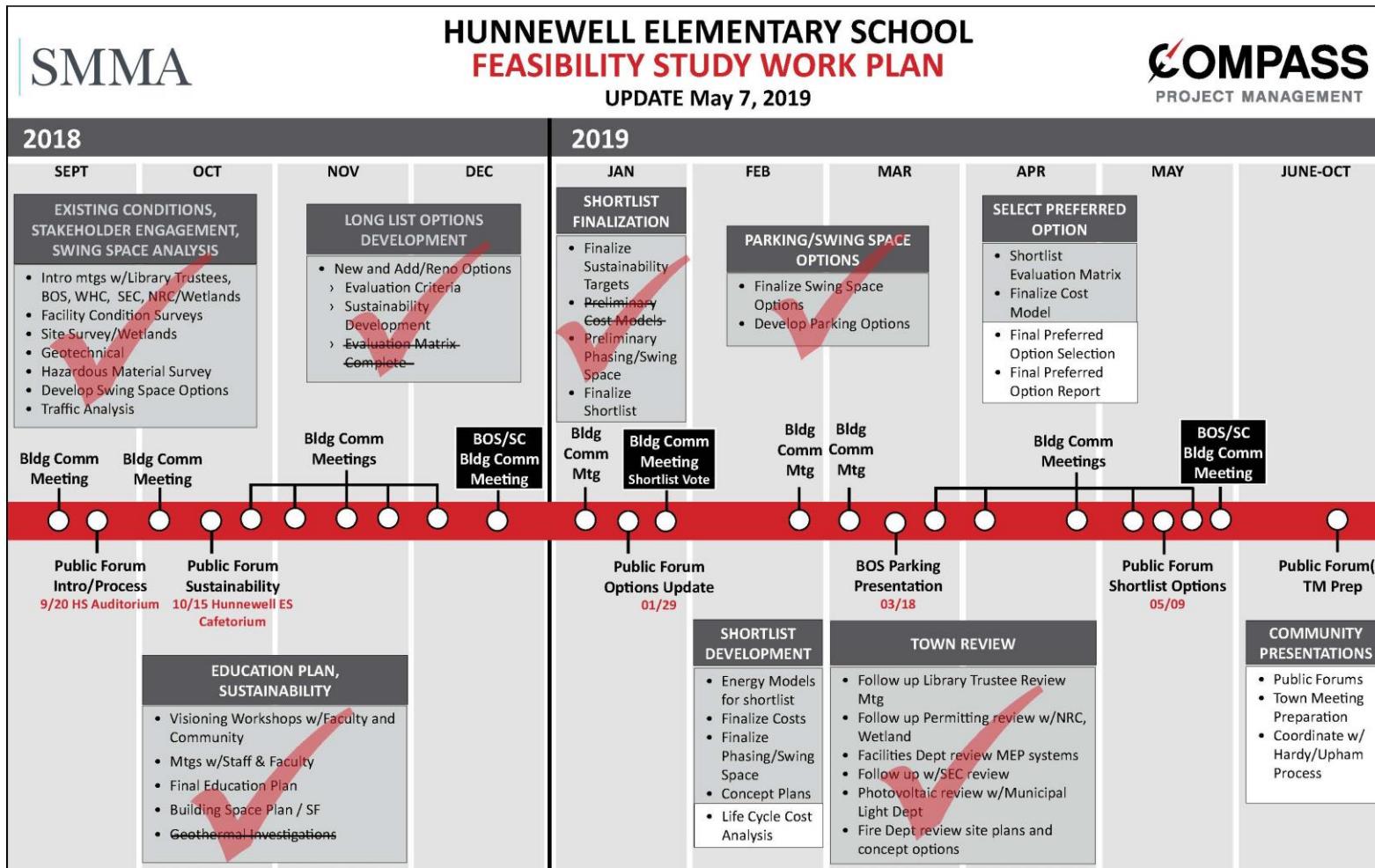
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Conceptual Project Budget



Project Schedule



Hunnewell Building Solution

Conceptual Project Budget Summary

Description	Addition & Renovation Costs	New Construction Costs
Building Construction	\$44,200,000	\$44,400,000
Site Construction	Included Above	Included Above
Furniture, Equip. & Technology	\$1,200,000	\$1,200,000
Design and Consultant Fees	\$4,500,000	\$4,500,000
Project Management & Onsite Rep.	\$1,900,000	\$1,900,000
Other Administrative Costs	\$600,000	\$600,000
Contingencies	\$2,600,000	\$2,600,000
Photovoltaics (Larger capacity on New) ***	\$1,000,000	\$1,200,000
Conceptual Project Budget (April 2019)*,**,	\$56,000,000	\$56,400,000
Fall 2019 Appropriation	\$5M	\$5M
<small>* Does not include the previously approved & funded \$1.0 Million for the feasibility study</small>		
<small>** Estimates above do not include Swing Space cost</small>		
<small>*** Photovoltaics only include arrays on building, not adjacent sites.</small>		

Swing Space Options

Conceptual Project Budget Summary

Description	Internal Swing Space	Modular Full School at Sprague	Modular Half Sch at Sprague & Schofield	Description	* Late Hunnewell No Redistrict	* Late Hunnewell Redistrict
Building Construction	2 Mods** \$500,000	\$5,700,000	\$6,500,000	Building Escalation	\$6,300,000	\$6,300,000
Site Construction	\$1,000,000	Incl. Above	Incl. Above	Delay Demo	\$1,000,000	\$0
Furniture, Equip. & Tech.	\$0	\$100,000	\$100,000	Modulars	\$0	\$2,000,000
Consultant Fees	\$400,000	\$700,000	\$800,000	Consultant Fees	\$300,000	\$300,000
Operational & Staff Costs	\$2,500,000	\$900,000	\$1,000,000	Operational & Staff Costs	\$1,000,000	\$1,000,000
Other Administrative Costs	\$100,000	\$200,000	\$200,000	Soft Cost Escalation	1,400,000	1,400,000
Contingencies	\$200,000	\$400,000	\$400,000	Contingencies		
Conceptual Project Budget	\$4,500,000	\$8,000,000	\$9,000,000	Concept Budget	\$10,000,000	\$11,000,000
* Late options costs are derived from escalation & other premiums to delay						
2020 Appropriation	\$4.4M	\$8M	\$9M	Part Full School	TBD	TBD

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Questions?

Thank You!

