

# Hunnewell Elementary School Feasibility Study



# 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



# Hunnewell Elementary School Feasibility Study



# Public Forum Recap





# Hunnewell Elementary School Feasibility Study



# Parking Options





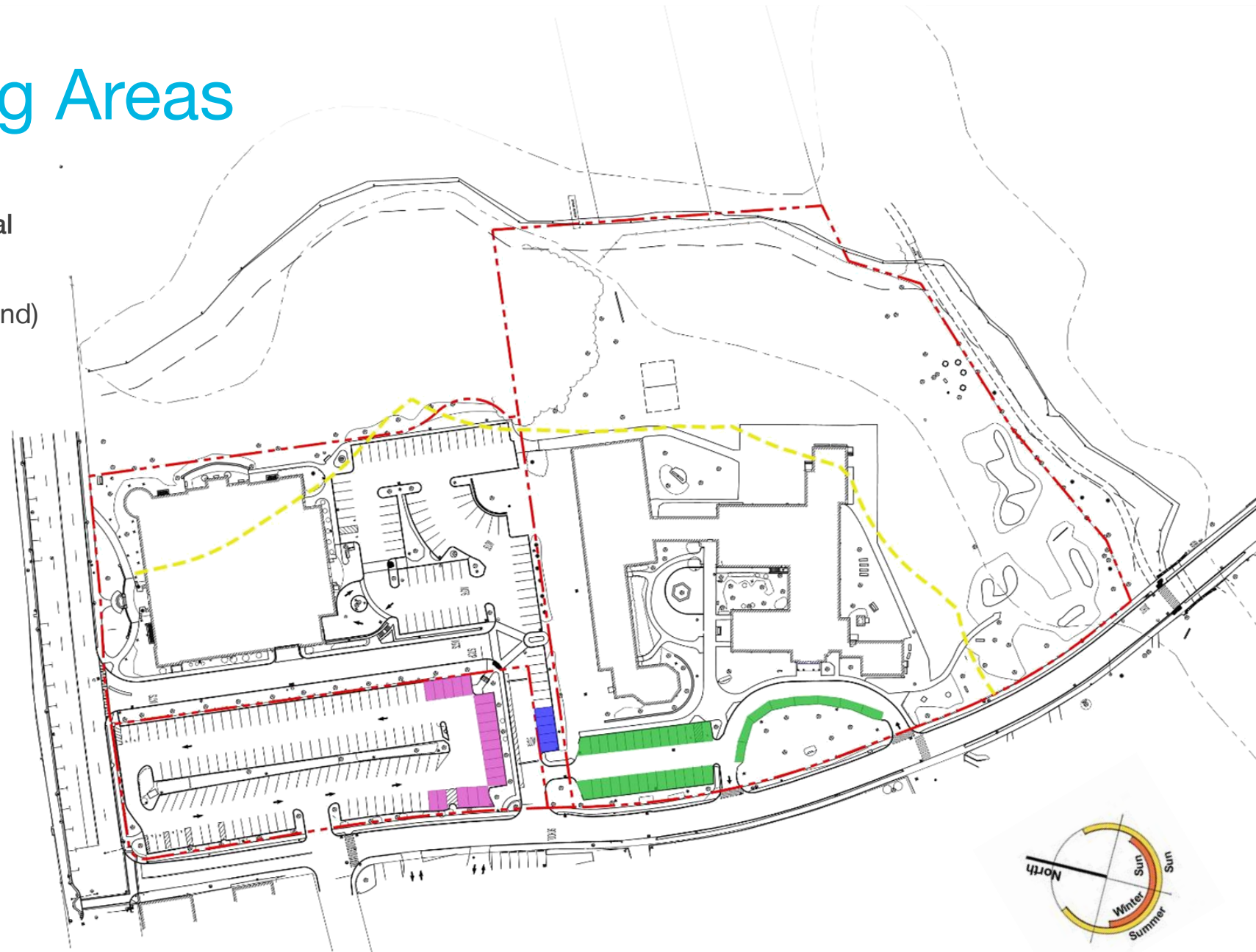
# Existing Parking Areas

## 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

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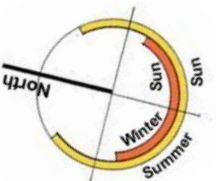
# Parking Scenario Comparison



**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%**





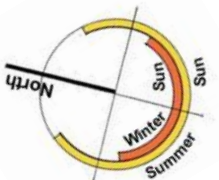
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# Hunnewell Elementary School Feasibility Study



# Sustainable Design Update





# Preliminary Energy Performance Summary

		NEW	ADD / RENO
Description	Units	NET ZERO READY (NZR) Option*	NET ZERO READY (NZR) Option*
<b>Building Enclosure</b>			
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
<b>Lighting</b>			
Lighting Power Density	w/SF	0.5 [With advanced networked lighting controls]	0.5 [With advanced networked lighting controls]
<b>Equipment</b>			
Equipment Power Density	w/SF	0.75 [75% receptacles automatically controlled]	0.75 [75% receptacles automatically controlled]
<b>HVAC System Type</b>			
<b>System 1 - VRF</b>	\$46/SF	<b>Fully Electric System</b>	<b>Fully Electric System</b>
Predicted EUI <sup>1</sup>	kBtu/SF/yr.	<b>26.4</b>	<b>28.4</b>
<b>Alternative HVAC System Option</b>			
<b>System 2 - Ground Source Heat Pumps</b>	\$57-65/SF <sup>3</sup>		
Predicted EUI <sup>1</sup>	kBtu/SF/yr.	30.5	31.0
<b>Stretch Code Level Energy Performance**</b>			
<b>System 3 - Boiler/Chiller</b>	\$47.50/SF	<b>Natural Gas Heating and Electric Cooling</b>	
Predicted EUI <sup>1</sup>	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.



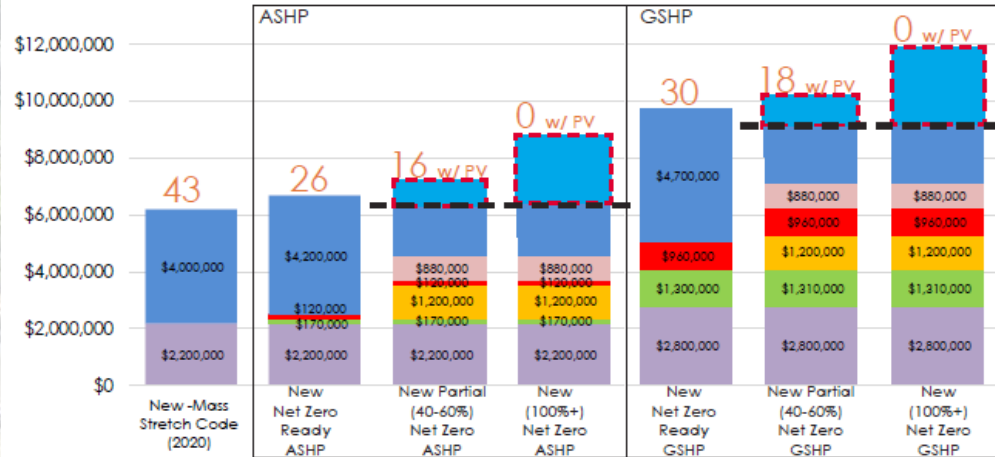
# Sustainability & MEP Considerations: Solar Photovoltaics

		NEW	ADD / RENO
Description	Units	NZR Option	NZR Option
<b>Preliminary Solar Photovoltaic (PV) Analysis</b>			
<b>Preliminary Solar PV Offset Required<sup>1</sup></b>	<b>kW</b>	<b>735 (VRF) – 857 (GSHP)</b>	<b>785 (VRF)</b>
<b>Solar PV area required<sup>2</sup></b>	<b>SF</b>	<b>73,484 – 85,720</b>	<b>78,531</b>
Available school roof area <sup>3</sup>	SF	30,000	25,000
<i>Additional area required</i>	SF	48,484 – 60,720	53,531
<b>Total Preliminary Solar PV Estimated Cost</b>	<b>\$</b>	<b>\$3.4 - \$3,6 Millions</b>	<b>\$3.5 Millions</b>
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)



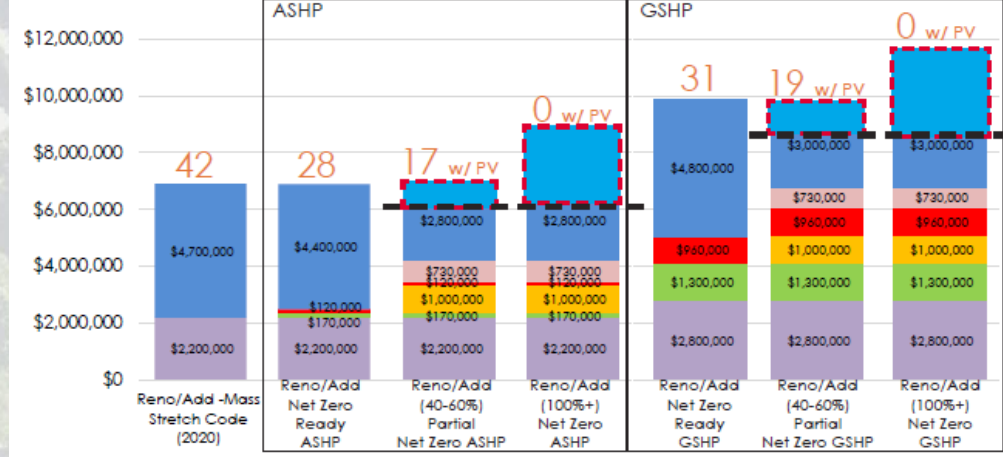
# 30 Year Cumulative Capital, Maintenance, Energy, and Finance Costs with Solar:



■ Additional capital costs ■ 30 yr MEP replacement costs ■ Solar/photovoltaic (PV) costs  
 ■ Interest for solar/photovoltaic (PV) ■ Interest for additional capital ■ Operating and maintenance costs  
 # Predicted Energy Use Intensity (pEUI) kBtu/sf-yr ■ TBD -potential green power energy costs reduction ■ Best case solar/photovoltaic (PV) strategy and cost

**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



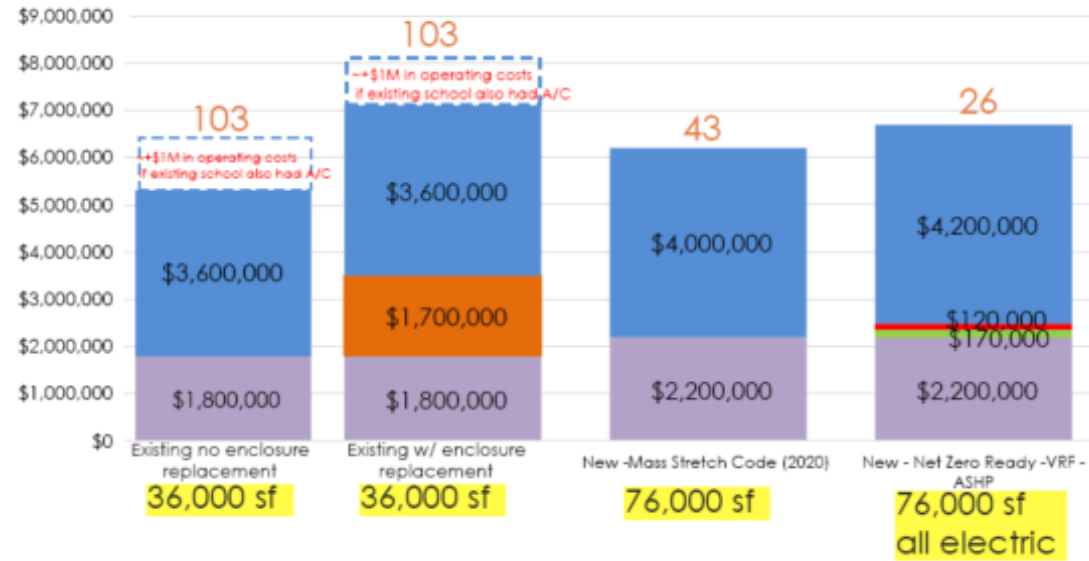
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# 30 Year Cumulative Capital, Maintenance, Energy, and Finance Costs Comparing Existing Hunnewell to New:



■ 30 yr MEP Replacement Costs   
 ■ Additional Capital Costs   
 ■ Interest Additional Capital  
■ 30 yr enclosure repair/replacement   
 ■ Operating and Maintenance Costs   
 # 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



# Hunnewell Elementary School Feasibility Study



## 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

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



*Addition &  
Renovation*



*New  
Construction*



# Add-Reno & New Construction Comparison

## Site Plan

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



*Addition &  
Renovation*



*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

- ▲ Main Entrance
- ▲ Loading & Service
- Circulation





# Add-Reno & New Construction Comparison

## *First Floor Programming Plan*



*Addition &  
Renovation*

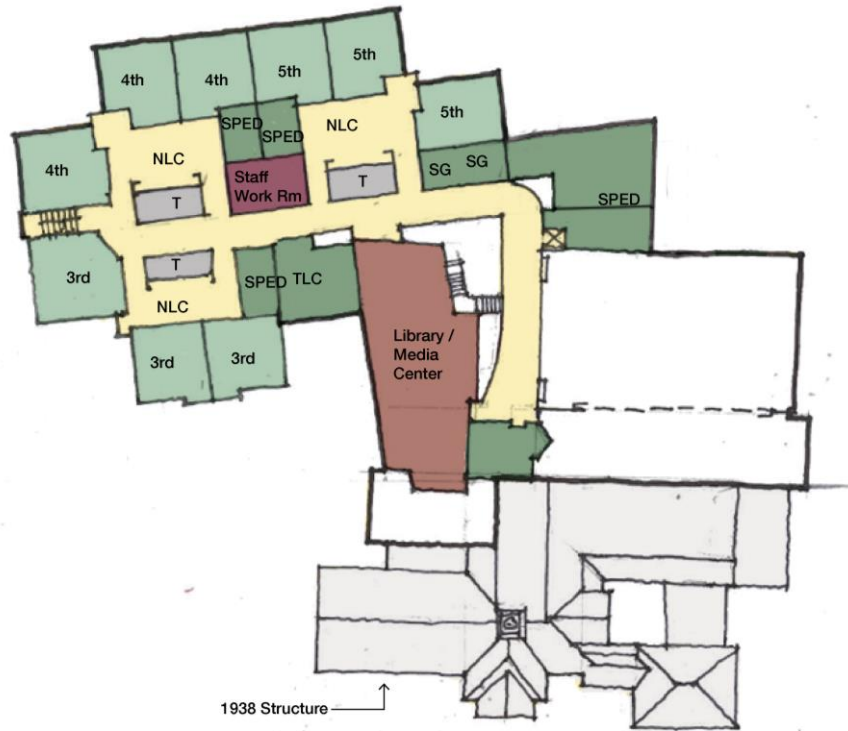


*New  
Construction*



# Add-Reno & New Construction Comparison

## *Second Floor Programming Plan*



*Addition &  
Renovation*

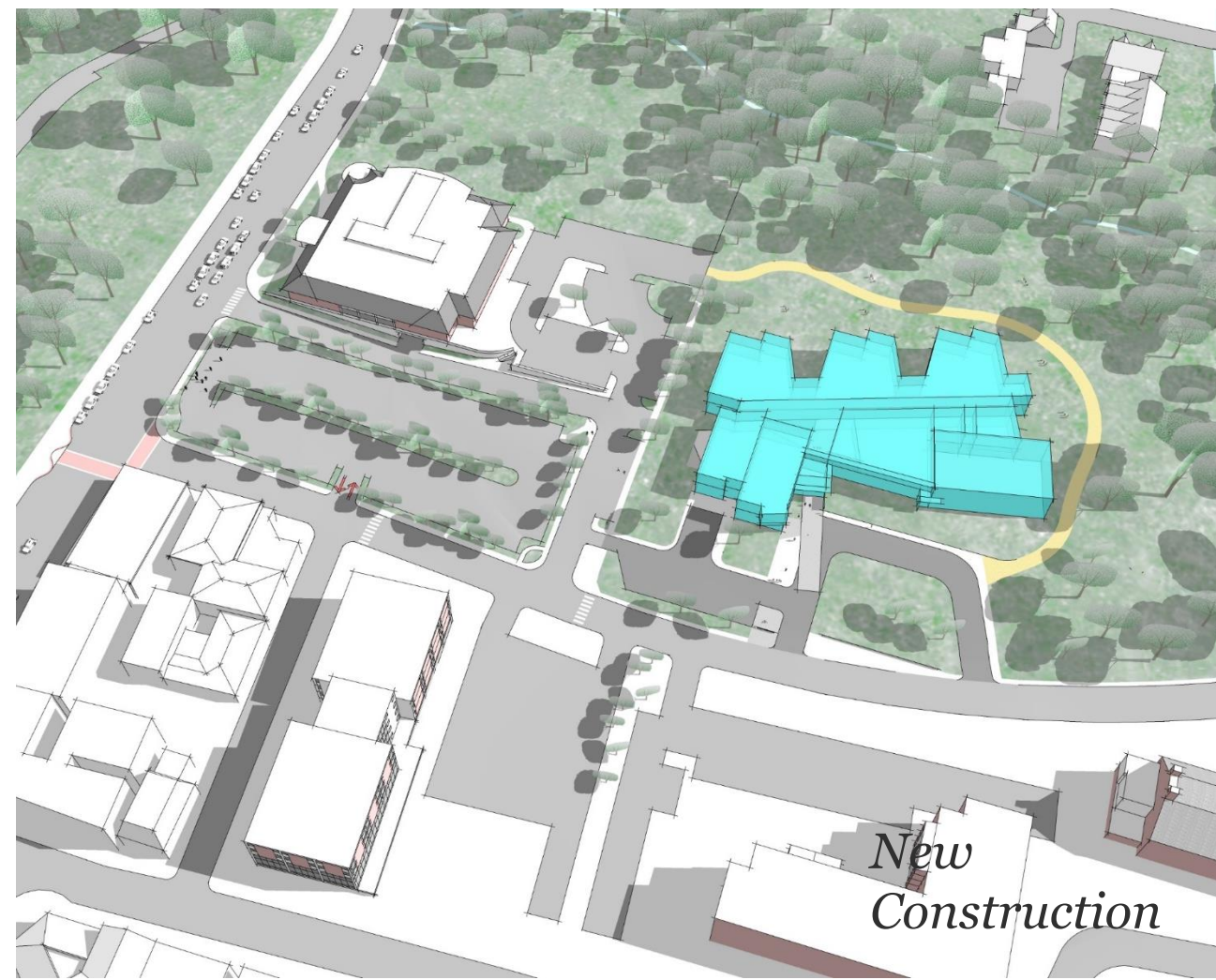
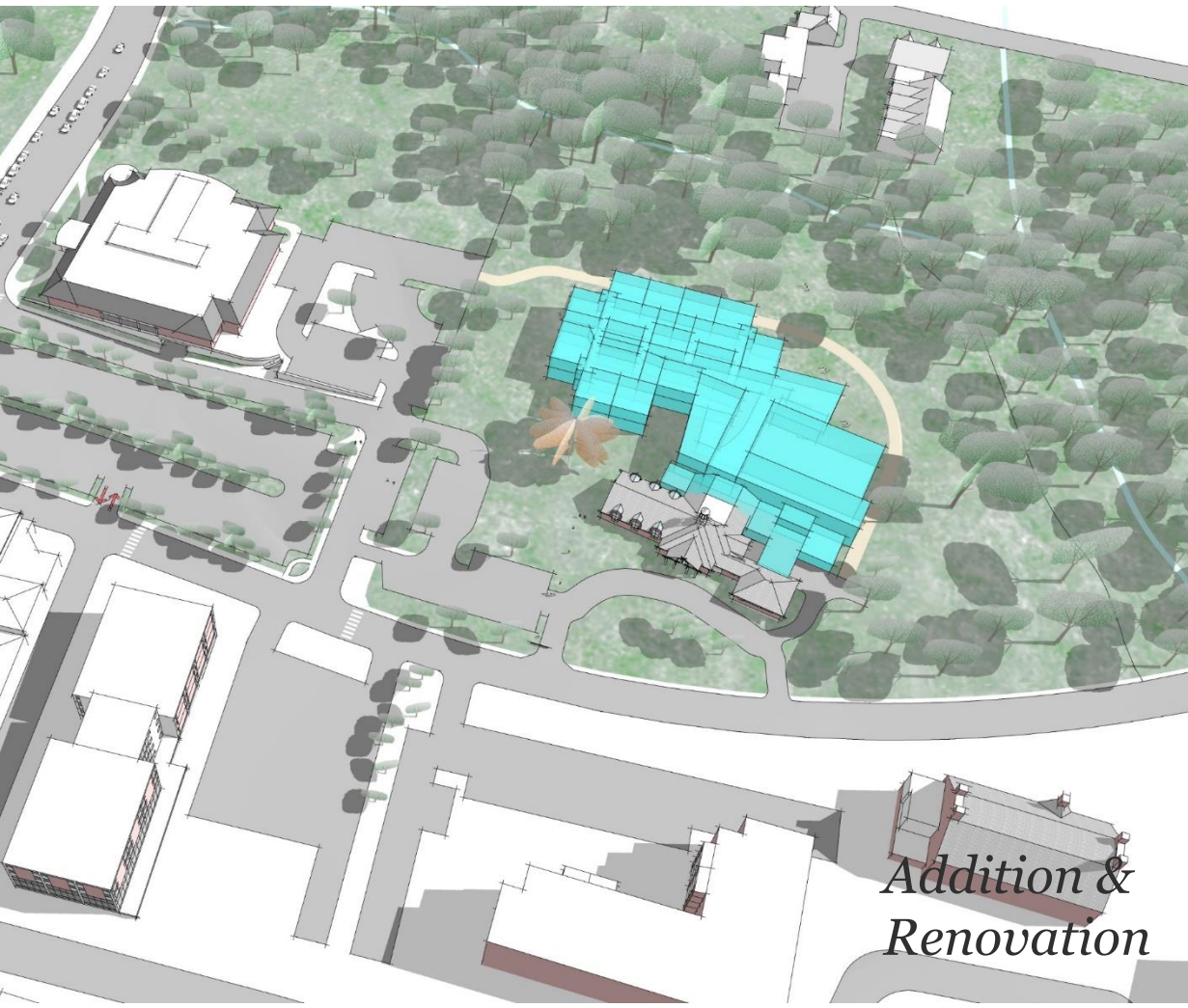


*New  
Construction*



# Add-Reno & New Construction Comparison

## *Massing*





# Hunnewell Elementary School Feasibility Study



# 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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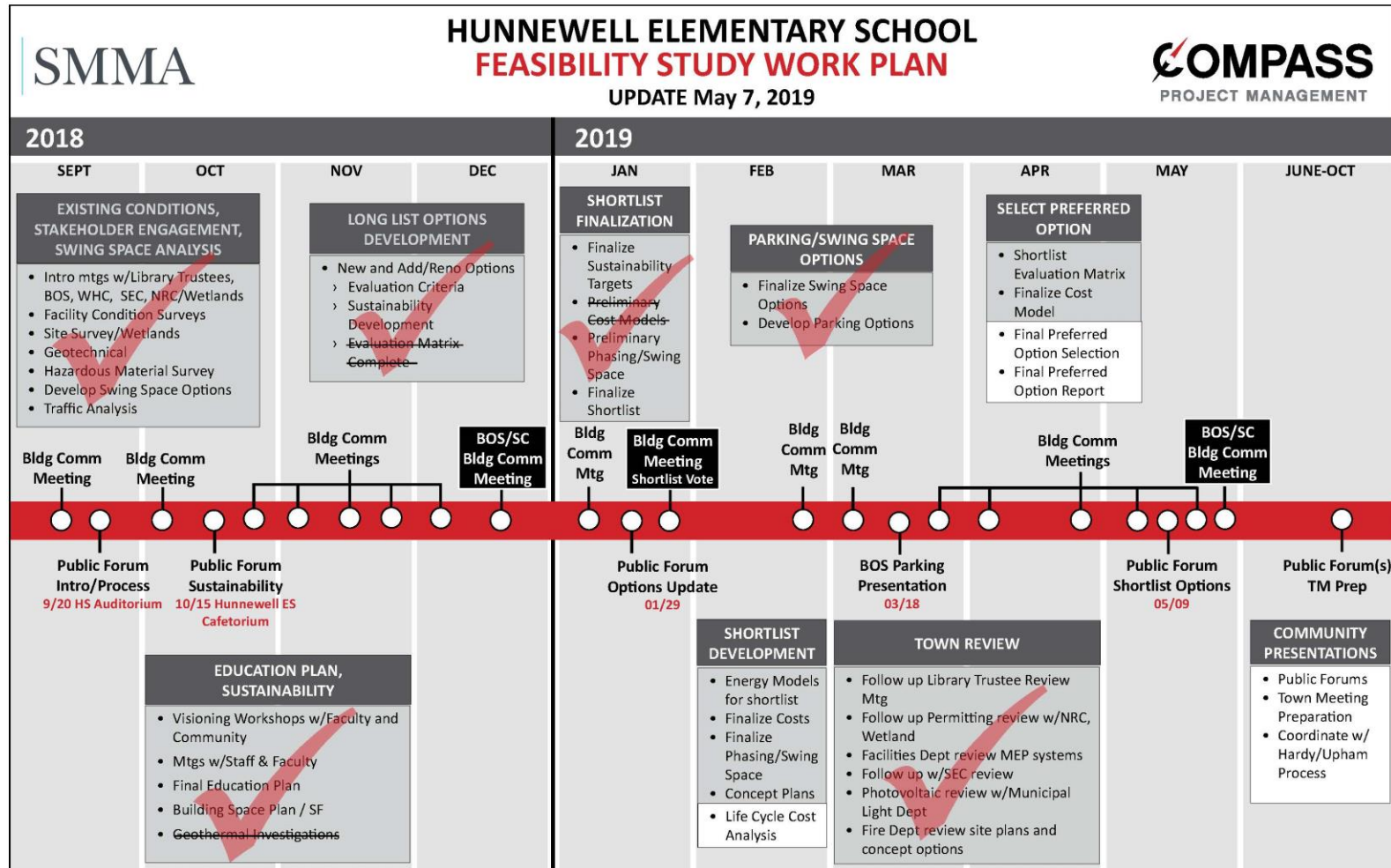


# Conceptual Project Budget





# 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		\$1,200,00
Conceptual Project Budget (April 2019)*, **,	\$56,000,000		\$56,400,000
Fall 2019 Appropriation	\$5M		\$5M
* Does not include the previously approved & funded \$1.0 Million for the feasibility study			
** Estimates above do not include Swing Space cost			
*** Photovoltaics only include arrays on building, not adjacent sites.			



# 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



# Hunnewell Elementary School Feasibility Study



# Questions?

# Thank You!

