

# DUDLEY-CHARLTON REGIONAL SCHOOL DISTRICT



## Dudley-Charlton Regional School District

### Capital Projects Phase I – 2022



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# DUDLEY-CHARLTON REGIONAL SCHOOL DISTRICT



## Agenda – Capital Planning Meetings

- Overview of past Capital Projects
- What is included in the current request
- What is not included in the current request
- Mass School Building Authority (MSBA) Shepherd Hill project
- Roof Replacements
- School Safety and Communication Upgrades
  - Fire Panels and Devices
  - Radio Communication
  - Camera Systems
- Fiscal Impact
- Future Planning



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## A Brief History of School Capital Projects

### 1973

- Shepherd Hill – new construction - **49 years ago**

### 1989

- Heritage School built – new construction – **33 years ago**
- Charlton Elementary School – renovations
- Original construction 1958 – **64 years ago**



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## A Brief History of School Capital Projects

### 2000

- Dudley Middle and Charlton Middle – new construction - **22 years ago**

Mason Road School – renovations

- Original construction 1963 – **59 years ago**

Dudley Elementary School – renovations

- Original construction 1957 - **65 years ago**

### 2011

Shepherd Hill – Doors and Windows

- Funded through District School Choice funds

### 2014

Shepherd Hill – Field Renovations

- Partially funded through donations



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## What is included in current request?

Priority Items to ensure the viability of our schools and safety related items.

- Roofs
- Fire Panels
- Radio Communication
- Cameras

Also included is money to fund a review of all schools with the exception of Shepherd Hill to identify needed capital projects. With the last round of capital improvements over 20 years ago, there is much deferred maintenance that needs to be addressed to ensure the continued viability of the schools.



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## What is included in current request?

	Charlton Projects	Dudley Projects	Total
<b>Roof Replacements</b>			
CMS Roof	\$ 4,025,000		\$ 4,025,000
DMS Roof		\$ 2,242,500	\$ 2,242,500
Professional fees	\$ 322,000	\$ 179,400	\$ 501,400
<b>Subtotal Roof Replacements</b>	\$ 4,347,000	\$ 2,421,900	\$ 6,768,900
<b>School Safety</b>			
Fire Alarm panels and devices			
<b>Dudley Middle School</b>		\$ 92,487	\$ 92,487
<b>Charlton Middle School</b>	\$ 99,800		\$ 99,800
<b>Dudley Elementary School</b>		\$ 41,668	\$ 41,668
<b>Charlton Elementary School</b>	\$ 85,000		\$ 85,000
<b>Mason Road School</b>		\$ 58,285	\$ 58,285
Cameras and video infrastructure	\$ 105,442	\$ 109,848	\$ 215,290
Radio Communication - D/W	\$ 27,941	\$ 27,467	\$ 55,408
<b>Subtotal School Safety</b>	\$ 318,183	\$ 329,755	\$ 647,938
<b>Future Planning - all schools except Shepherd Hill</b>			
Architectural Review - 6 buildings	\$ 75,000	\$ 75,000	\$ 150,000
<b>Subtotal Future Planning</b>	\$ 75,000	\$ 75,000	\$ 150,000
	\$ 4,740,183	\$ 2,826,655	\$ 7,566,838



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## What is not included in current request?

- Funds for renovations at Shepherd Hill
- Funds for a MSBA Feasibility study
- Athletic Field Bleachers at Shepherd Hill Carmignani Field



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## MSBA Shepherd Hill Project and other school renovations

- Shepherd Hill has been invited into the MSBA program after many years of application. This issue will be put before voters at a future town meeting for action, but participation in the MSBA program will create opportunity for a sizable percentage of the project to be funded by the state – the specific percentage is not known at this time, but should exceed 50%. The MSBA program does have specific requirements, including a feasibility study. Funds for this feasibility study are not part of this request. Renovations at Shepherd Hill through the MSBA program are considered Phase II of the capital plan
- Phase III of the capital plan will come from the results of the architectural study performed at the six other schools in Dudley and Charlton under an approved Phase I capital plan.



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## MIDDLE SCHOOLS ROOF REPLACEMENTS



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# EXISTING CONDITIONS

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## EXISTING CONDITIONS – DUDLEY MIDDLE

8 discreet roof planes at differing elevations, totaling just over 61,000 square feet.

All roofs are covered with a mechanically attached Ethylene Propylene (EP) membrane manufactured by Stevens.

Three roof assemblies were installed in various locations of the building:

- A. Two layers of 2" polyisocyanurate rigid insulation over 5/8" gypsum board
- B. Two layers of 2" polyisocyanurate insulation without gypsum board
- C. One layer of 2" polyisocyanurate insulation



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## EXISTING CONDITIONS – CHARLTON MIDDLE

7 discreet roof planes totaling just over 111,000 square feet.

Same mechanically attached Ethylene Propylene (EP) roofing as Dudley Middle School,

Two different roof assemblies installed in various locations:

- A. Two layers of 2" polyisocyanurate rigid insulation over 5/8" gypsum board
- B. Two layers of 2" polyisocyanurate insulation without gypsum board.





## PROBLEMS



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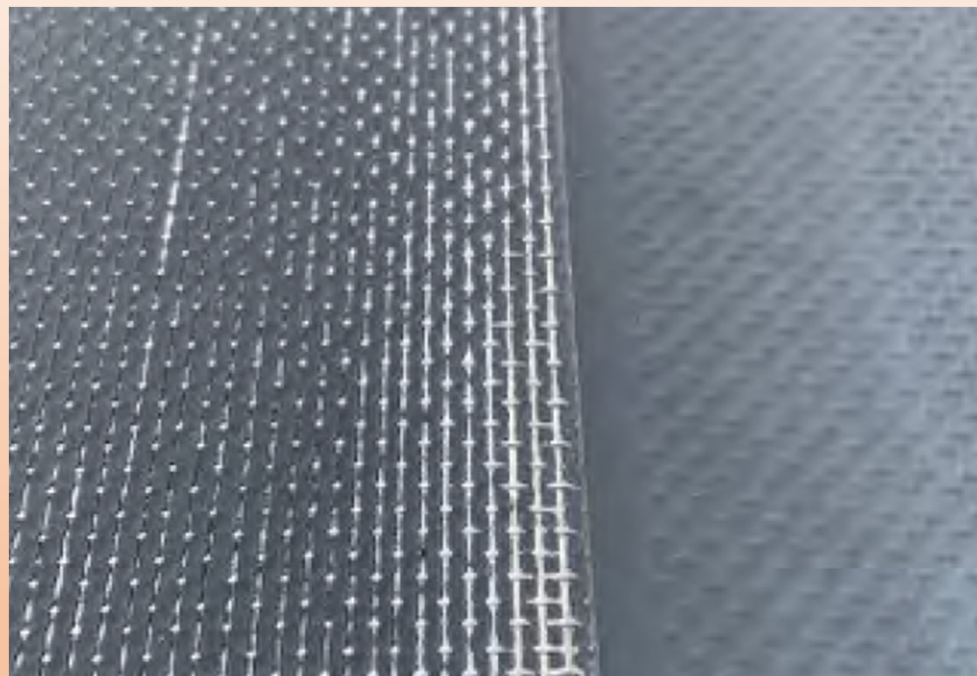


EP membrane a hybrid between EPDM and TPO, having the appearance of a rubber roof (EPDM) but being seamed by heat welding like a plastic roof (TPO).

The manufacturer, Stevens Roofing Systems, was purchased by Dow Chemicals in 2008 and ceased the production of all roofing membranes in 2011.

Scrim layer sandwiched between two layers of rubber to reinforce them.

- Thickness of the scrim reduces the thickness of the rubber
- Rubber delaminates (“flaking”) exposing the scrim
- Membrane splits leaving small pinholes to leak.



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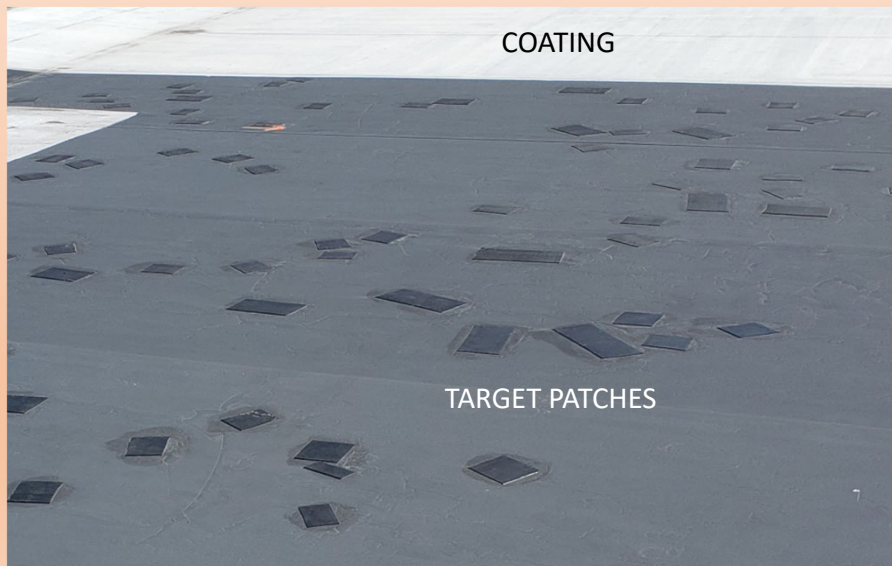


## THREE TYPES OF REPAIRS IMPLEMENTED

1. LARGE AREA PATCHES
2. TARGET PATCHES
3. COATINGS

## REPAIRS NOT LASTING

- PATCHES ARE ONLY AS GOOD AS WHAT THEY ARE STUCK TO
- COATINGS APPLIED OVER WET MATERIAL FAIL AND FLAKE OFF



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# OPTIONS

## Repair or Replace?

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## REPAIRS

Repairs of the existing roof are no longer a cost effective option, other than to stop immediate leaks. The membrane has deteriorated to the point where patching materials no longer remain adhered to the sheet, and those areas not repaired are deteriorating quickly. While coating the roof is technically possible, it would require removal of all existing coatings and all wet roof insulation to be eligible for warranty.

Infrared scans were performed in 2021 to identify areas of wet insulation by visualizing the heat transfer (wet insulation conducts more heat than dry insulation).

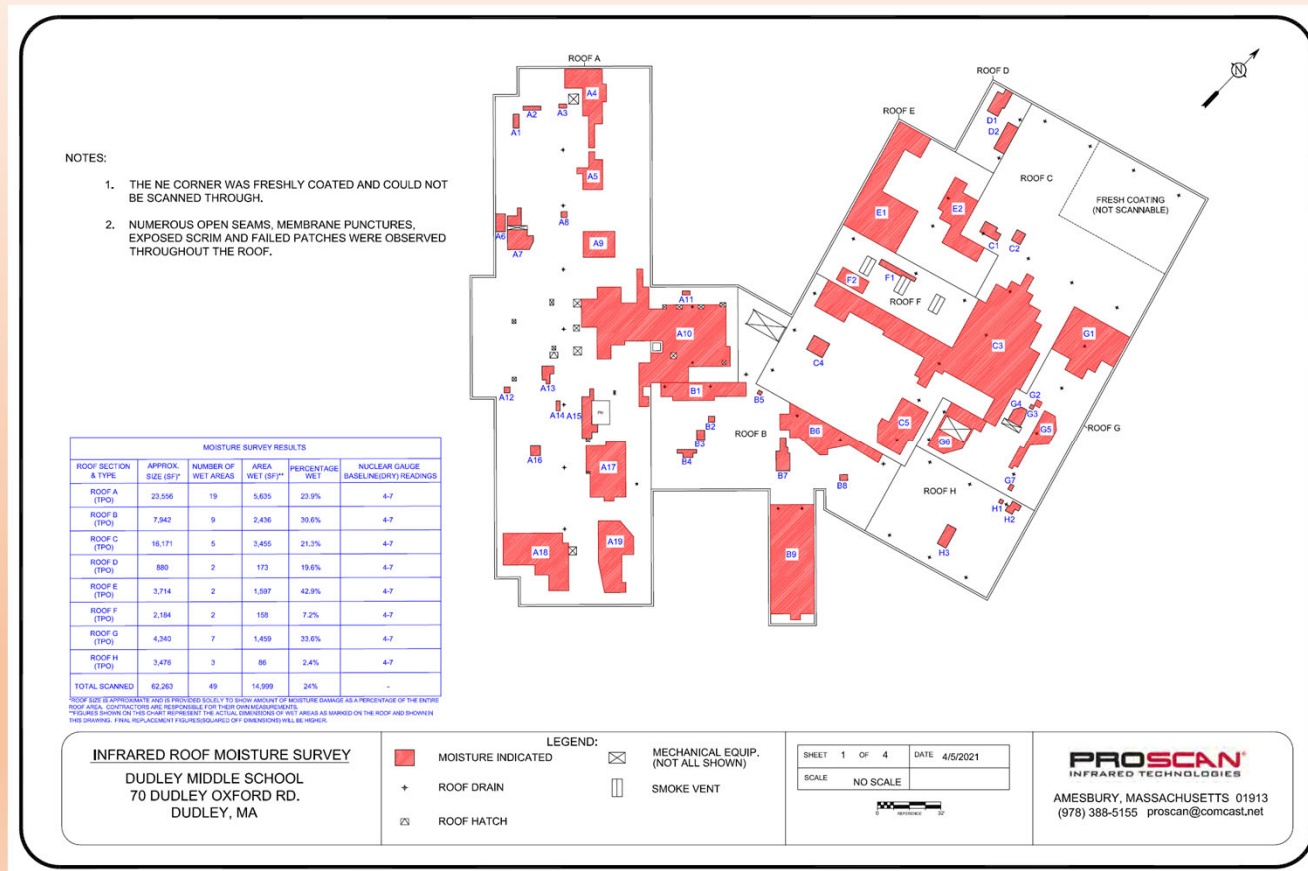
Similar scans were performed in 2015, revealing that the damage to the roofing has increased considerably over the last 6 years.

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Dudley Middle School's 2015 scan showed only 2% of the insulation to be wet.

The 2021 scan shows this has increased **900%** to 24% of the total roof area being wet (red areas).



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Charlton Middle School's 2015 scan showed only 1.7% of the insulation to be wet.

The 2021 scan shows this has increased **800%** to 14% of the total roof area being wet (red areas).

## NOTES:

1. NUMEROUS OPEN SEAMS, MEMBRANE PUNCTURES, EXPOSED SCRIM AND FAILED PATCHES WERE NOTED THROUGHOUT THE ROOF.
2. SEE DRAWINGS 2-6 FOR DIMENSIONS OF WET AREAS AND PHOTO ORIENTATION.

MOISTURE SURVEY RESULTS				
ROOF SECTION & TYPE	APPROX. SIZE (SQ FT)	NUMBER OF WET AREAS	AREA WET (SQ FT)	PERCENTAGE WET
ROOF A (TPO)	23,516	23	3,028	9.3%
ROOF B (TPO)	14,474	23	3,889	25.4%
ROOF C (TPO)	4,054	5	485	11.8%
ROOF D (TPO)	17,812	19	1,867	10.4%
ROOF E (TPO)	15,280	14	2,305	15.1%
ROOF F (TPO)	22,912	26	2,424	11%
ROOF G (TPO)	14,284	14	1,310	10.9%
ROOF H (TPO)	2,220	4	102	4.9%
TOTAL SCANNED	113,692	128	18,030	14%

NOTE: THIS IS AN APPROXIMATE VALUE TO PROVIDE A GENERAL INDICATION OF MOISTURE DAMAGE AS A PERCENTAGE OF THE ENTIRE ROOF AREA. CONTRACTORS ARE RESPONSIBLE FOR THEIR OWN ASSESSMENT OF MOISTURE DAMAGE AND FOR THE ACTUAL DIMENSIONS OF WET AREAS AS SHOWN ON THE ROOF AND SHOWN IN THIS DRAWING. FINAL REPLACEMENT REQUIREMENTS (IF DETERMINED) WILL BE REDUCED.

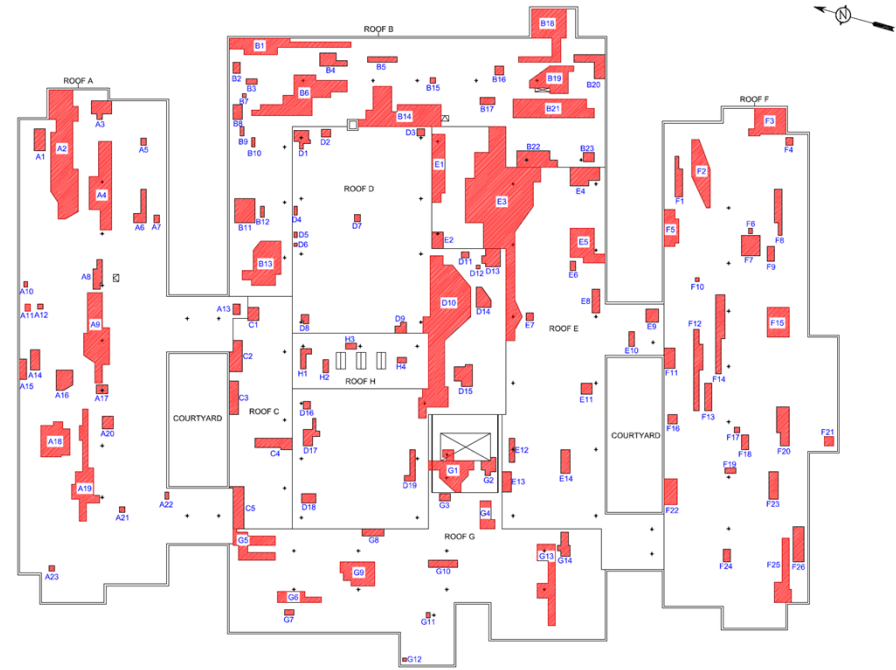
INFRARED ROOF MOISTURE SURVEY  
CHARLTON MIDDLE SCHOOL  
2 OXFORD RD.  
CHARLTON, MA

LEGEND:  
■ MOISTURE INDICATED  
+ ROOF DRAIN  
□ ROOF HATCH

□ MECHANICAL EQUIP. (NOT ALL SHOWN)  
□ SMOKE VENT

SHEET 1 OF 6 DATE 4/6/2021  
SCALE NO SCALE  
0 REFERENCE 64'

PROSCAN  
INFRARED TECHNOLOGIES  
AMESBURY, MASSACHUSETTS 01913  
(978) 388-5155 proscan@comcast.net



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## REPLACEMENT

Three primary systems exist for the replacement of the roofs:

1. Elastomeric – “Rubber Roofing” with the most popular technology being EPDM
2. Thermoplastic – typically PVC or TPO
3. Multi-Ply/Built-Up – most commonly a two or three-ply SBS modified bitumen system

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## ELASTOMERIC ROOFING

A single-ply membrane constructed of vulcanized rubber, with or without a reinforcing scrim. Sheets are typically adhered to rigid insulation and seams are made tight by two-sided adhesive seam tape. The base warranty term is 15 years, with 30-year warranties available if thicker sheets and extra cover boards are used.

Advantages are:

- Relatively easy repairs

Disadvantages are:

- Solar heat absorption
- Seam longevity
- High overall life cycle cost
- Easily punctured
- Sheets are typically only 60 mil (roughly the thickness of a bike tire), 90 mil sheets are available
- Thermal bridging caused by fasteners tend to lead to premature failure



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## THERMOPLASTIC ROOFING

A single-ply membrane constructed of polymers, typically Polyvinyl Chloride (PVC) or Thermopolyolefin (TPO) with a reinforcing scrim. Sheet is adhered to rigid insulation and seams are made tight with a hot-air welder, melting the plastic sheets together. Warranties start at 15 years but are available up to 30 years with material upgrades.

Advantages are:

- Solar heat reflection (white or gray sheets)
- Low risk of seam failure

Disadvantages are

- Solar glare
- Extremely slippery with dew or frost
- Requires specialized tools to patch
- Punctures easily, leaks are difficult to find
- Tend to crack prematurely due to harsh New England weather and extreme temperature fluctuations
- Sheets are typically only 60 mil (roughly the thickness of a bike tire), 90 mil sheets are available
- High overall life cycle cost



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## BUILT-UP ROOFING

A 2 or 3 ply system made of base sheet(s) with a white or gray modified bitumen cap sheet. Plies are set in cold asphaltic adhesive and seams are heat welded with hot-air welder. Standard warranties are available for 30 years with 40 year warranties available.

Advantages are:

- Redundancy, due to multiple layers
- Solar heat reflectance
- Easily patched with no special tools
- Stands up extremely well to foot traffic and impacts
- Overall thickness ranges from 225 mil to 265 mil

Disadvantages are:

- Smaller sheets result in more seams



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## RECOMMENDATIONS

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Repairing the roof is not recommended, because current repairs are not holding, as evidenced by the amount of wet insulation increasing 800% - 900% over a span of 6 years.

Coating the roof is not an economical choice, because it requires removing prior coatings and wet insulation. The standard metric for ROI on coating projects are roofs with less than 10% wet insulation; these roofs were at 17%/24% in 2021. Additionally, any membrane with coating would need to be removed as well.

Replacement is the responsible recommendation, based on the conditions of the roofs. Completely replacing the roofs will afford an opportunity to repair steel roof decking which has rusted from roof leaks, and to increase the thickness of roof insulation to code minimum, reducing heating and cooling costs.

While all three roofing technologies have their advantages and disadvantages, the recommended roofing system for these schools would be the Built-Up option because of its multi-ply construction, high initial warranty term without material upgrades, low overall life cycle cost and ease of repair without specialized tools or materials.

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## SAFETY AND COMMUNICATION

### Fire Panels and Devices - Fire Panels

With the last round of district-wide capital improvements in the 1998-2000 time frame, the fire alarm systems at Mason Road, Dudley Elementary and Charlton Elementary were upgraded. The two middle schools were also constructed with new fire alarm systems.

20+ years later the useful life expectancy of this equipment has past, and replacement parts are no longer manufactured, making replacement parts challenging to find now, and it is expected that this situation will only get worse as more time passes. The panels at Charlton Middle, Dudley Middle and Dudley Elementary have been replaced.



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## SAFETY AND COMMUNICATION

### Fire Panels and Devices - Devices

While the panels at Charlton Middle, Dudley Middle and Dudley Elementary have been replaced, each detecting device needs to also be replaced.

The District discussed the situation with the Fire Departments in each town and was given specific timeframe to make this investment, with the understanding that the work would be completed within five years.



# DUDLEY-CHARLTON REGIONAL SCHOOL DISTRICT



## SAFETY AND COMMUNICATION

### Camera Infrastructure

The camera systems at each school in the District are not uniform, and for the most part remain analog cameras that may or not be recorded. In the spring of 2020 the District received a grant which allowed us to install a door entry system, including keyless fob entry devices and door entry intercom systems. These digital devices are all the same, and fit into the Avigilon system.

The next necessary step is to replace existing analog cameras with newer digital models and expand the Avigilon system so it is based in each building, rather than centrally at Shepherd Hill. An added benefit of this system is that it is able to be accessed remotely by Public Safety officials which will maximize efficient response to any incident.



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## SAFETY AND COMMUNICATION

### Radio Communication

The radio system in the District is solid and has decent range and coverage at each of our schools – within each individual town. The intention is to upgrade to a digital platform which will allow for better communication, cross-town communication, and channels for school staff to immediately reach 911 Dispatch in each town as well as an emergency operations channel in the event it was ever needed.

These are capabilities we want available but hope are never needed!



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## Fiscal Ramification

### What will Phase I cost taxpayers?

#### Town of Dudley

Based on FY2022 Information

Average Single Family Value	\$308,378	
Current Tax Rate	\$ 11.70	
Increase for first 5 years of bond	\$ 0.34	(First 5 years)
Increase for last 10 years of bond	\$ 0.17	(Last 10 years)
Average Increase per tax bill per year	\$ 104.85	(First 5 years)
Average Increase per tax bill per year	\$ 52.43	(Last 10 years)

Assuming debt is excluded from Prop 2 ½.



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## Fiscal Ramification

## What will Phase I cost taxpayers?

### Town of Charlton

Based on FY2022 Information

Average Single Family Value	\$345,202	
Current Tax Rate	\$ 13.29	
Tax Increase for first 5 years of bond	\$ 0.31	(First 5 years)
Tax Increase for last 10 years of bond	\$ 0.18	(Last 10 years)
Average Increase per tax bill per year	\$ 107.62	(First 5 years)
Average Increase per tax bill per year	\$ 61.02	(Last 10 years)

Assuming debt is excluded from Prop 2 ½.



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## Future Planning

We are excited that Shepherd Hill Regional High School has finally been invited into the Massachusetts School Building Authority (MSBA) program. This is viewed as Phase II of the District capital planning.

No costs for this potential project are included here, but we do need to ensure that all of our other buildings are brought up to date for infrastructure, building envelope and remain viable, safe buildings for the next twenty years.

Phase I capital funds will pay for an architectural review of all of our buildings with the exception of Shepherd Hill. This architectural review will be the basis for future capital planning (Phase III).



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## Future Planning

### Public Meetings to review Phase I

- Tuesday June 21 – Charlton Middle School - 6PM
- Tuesday June 28 – Dudley Middle School – 6PM

### School Vote to Authorize Debt

- Wednesday June 22

### Special Election to Authorize Debt

- Tuesday September 27, 2022 (POTENTIAL DATE)

### Phase II

- Feasibility Study – Spring 2023
- Project Authorization – Spring 2024

### Phase III – based on architectural review

- Potentially in conjunction with Phase II



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## QUESTIONS?



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