

# SOUTH KINGSTOWN HIGH SCHOOL REPLACEMENT

## Town of South Kingstown

Town Council/School Committee Joint Meeting  
12.18.2024



View from School Street



\*Subject to Change 6



# TODAY'S AGENDA

01

Curtis Corner Athletic  
Field & Stadium Update

02

Project Status Updates  
and Review:

03

Geothermal Test Well  
Feasibility

04

Scope-Budget Estimates &  
Cost Reduction Strategy

05

Environmental Site  
Assessment

06

Financing & Alternative  
Funding Opportunities

# SOUTH KINGSTOWN

## BUDGET-ESTIMATE



### CURTIS CORNER ATHLETIC PROGRAM

- Construction Budget: \$11,000,000
  - Contingency: \$1,500,000
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### SOUTH KINGSTOWN HIGH SCHOOL

- **Construction Budget Goal:** **\$116,266,963**
- Initial Schematic Design Estimate: \$133,062,146\*
- Design & Contingency Adjustments: \$-\$9,532,200
- Proposed Cost Reductions: \$-\$6,227,600
- Potential Fire Dept Fee Reduction: \$-548,500
- **Updated Schematic Design:** **\$116,753,846**
- Current Budget Overage: **\$486,883**
- **Add Alternates:** **\$+782,600**

\*Does not include Owner's Contingency

# SOUTH KINGSTOWN

## Geothermal Feasibility



### PROJECT GOALS

Zero Emission Building with No Fossil Fuels

Full Electrification for Heating & Cooling

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Select the Most Value Added System

Consider Initial, Operating, and Maintenance Costs

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Establish a Low Energy Use Intensity (EUI)

Working Towards to a Net Zero Building

# SOUTH KINGSTOWN

## Geothermal Feasibility



### ZERO EMISSION AND FULL ELECTRIFICATION SYSTEMS

➔ Geothermal with Distributed Heat Pumps \*

➔ Heat Pump Chiller Central Plant \*

\*With Alternative System for Large Spaces (50% Load)

- Site Limitations
- Use Patterns



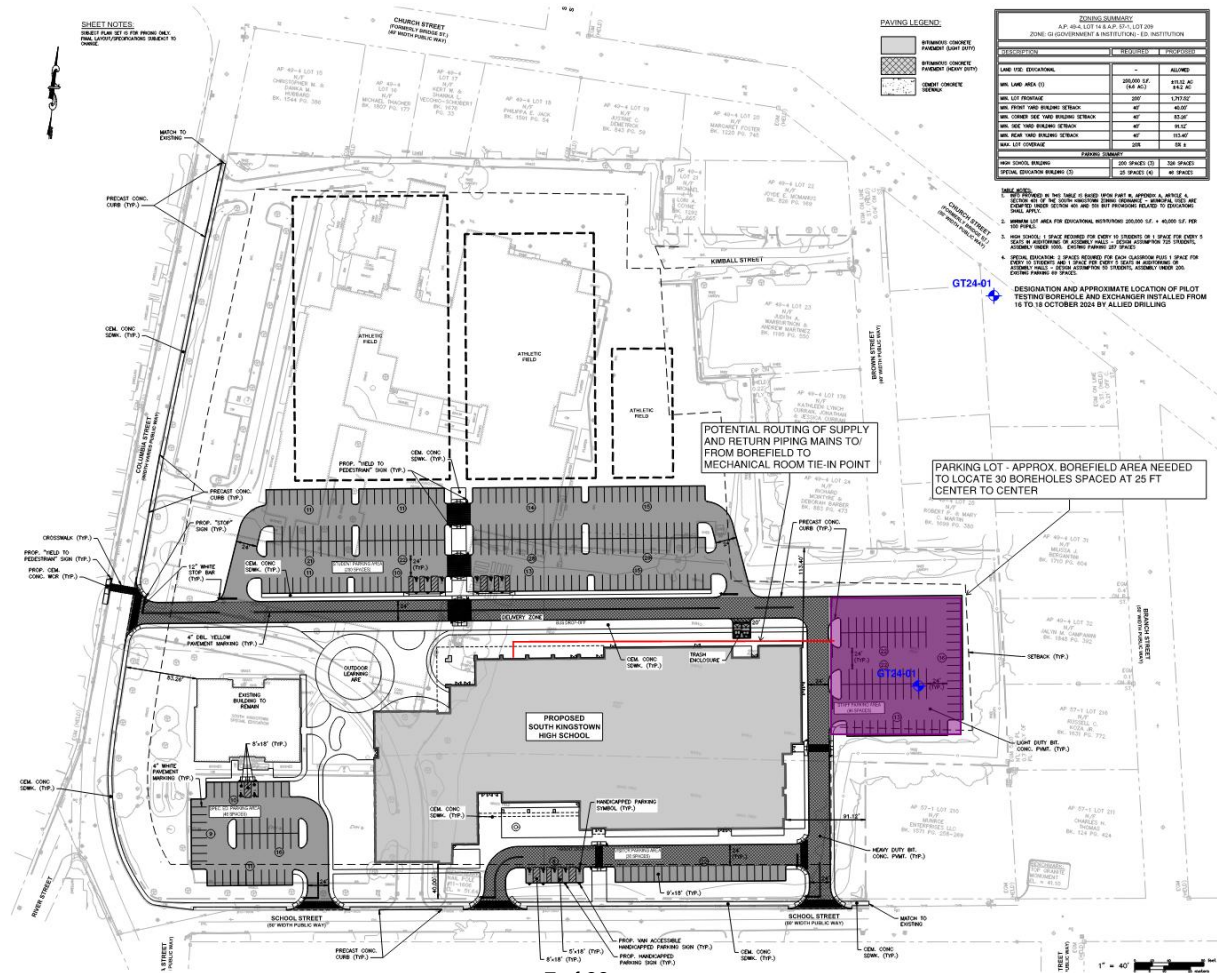
## ZERO EMISSION AND FULL ELECTRIFICATION SYSTEMS

### Site Limitations

- According to the geothermal analysis accommodating 80% to 100% of the heating & cooling loads would require over 100 wells
- For 50% of the load, geothermal report suggests 30 wells ( Cost Estimate @ 40 wells). See Fig.01

# SOUTH KINGSTOWN

## Geothermal Feasibility



**SHEET NOTES**  
 SHEET PLAN SET IS FOR PRINT ONLY.  
 FOR ANY INFORMATION SHEET IS  
 DATED.

**PAVING LEGEND**

- PRIMARY CONCRETE PAVEMENT (8" MIN)
- SECONDARY CONCRETE PAVEMENT (6" MIN)
- CONCRETE CURB

**NOTING SUMMARY**

DESCRIPTION	REVISIONS	REASON
LAND USE EDUCATIONAL	-	ALLOWED
MIN. LAND AREA (S)	20,000 S.F.	41.12 AC
MIN. LOT FOOTPRINT	200'	1,212 S.F.
MIN. FRONT YARD SETBACK	40'	40.00'
MIN. CORNER SIDE YARD SETBACK	40'	33.00'
MIN. SIDE YARD SETBACK	40'	33.00'
MIN. REAR YARD SETBACK	40'	33.00'
MAX. LOT COVERAGE	25%	58.8%

1. THE SITE IS ZONED FOR EDUCATIONAL USE AND IS NOT PROHIBITED BY ANY ZONING ORDINANCE.
2. THE SITE AREA FOR EDUCATIONAL PURPOSES IS 20,000 S.F. + 45,000 S.F. PER ZONING ORDINANCE.
3. THE SITE AREA IS 65,000 S.F. AND IS NOT PROHIBITED BY ANY ZONING ORDINANCE.
4. SPECIAL EXCAVATION IS REQUIRED FOR EACH CLASSROOM PLUS 1 SPACE FOR EACH TO PROVIDE THE 1' SPACE FOR THE 1' SPACE AS REQUIRED BY THE ZONING ORDINANCE.

POTENTIAL ROUTING OF SUPPLY AND RETURN PIPING MAINS TO MECHANICAL ROOM TIE-IN POINT

PARKING LOT - APPROX. BOREFIELD AREA NEEDED TO LOCATE 30 BOREHOLES SPACED AT 25 FT CENTER TO CENTER



## ZERO EMISSION AND FULL ELECTRIFICATION SYSTEMS

### Use Patterns

Use Patterns – Large Spaces such as Auditorium, Cafeteria, and Gymnasium are best served by dedicated units/systems

- Occupancy Schedule
- Activity Levels

# SOUTH KINGSTOWN

## Geothermal Feasibility



### ZERO EMISSION AND FULL ELECTRIFICATION SYSTEMS

#### Approach 1

- ➔ Geothermal Heat Pump System used for the Educational Core, Classrooms, Offices, and Smaller Spaces
- ➔ Roof Top Air Source Heat Pumps used for Cafeteria, Gymnasium, Auditorium, and Larger Spaces

# SOUTH KINGSTOWN

## Geothermal Feasibility



### ZERO EMISSION AND FULL ELECTRIFICATION SYSTEMS

#### Approach 2

→ Heat Pump Chiller Central Plant used for the Educational Core, Classrooms, Offices, and Smaller Spaces

→ Roof Top Air Source Heat Pumps used for Cafeteria, Gymnasium, Auditorium, and Larger Spaces



### EFFICIENCY & LIFE CYCLE COSTS

#### Coefficient of Performance (COP)

Indicates how much energy can be moved for every unit of energy used, (A high COP indicates greater efficiency)

1. Geothermal Heat Pump is approx. 3 to 5
2. Heat Pump Chiller is approx. 3 to 4
3. Roof Top Air Source Heat Pump is approx. 3 to 5

# SOUTH KINGSTOWN

## Geothermal Feasibility



### EFFICIENCY & LIFE CYCLE COSTS

#### Life Cycle Cost Analysis (LCCA)

Assess total cost of a system including initial, service / preventive maintenance, and utility costs

Approach Description	First Cost	Annual Maintenance Cost	Annual Utility Cost	Life Cycle Cost (20 years)
Geothermal Heat Pump	\$17,193,594	\$234,561	\$155,638	\$21,271,360
Heat Pump Chiller	\$15,567,397	\$219,130	\$166,583	\$19,598,280

# SOUTH KINGSTOWN

## Geothermal Feasibility



## EUI & HIGH PERFORMANCE BUILDING

### Factors

Climate Zone

Form & Shape

Window-to-Wall Ratio

Shading

Building Envelope

User Behavior

Schedule & Use

Lighting

Natural Ventilation

Air & Vapor Infiltration

Daylighting

Heating & Cooling Loads

Mechanical Systems

Renewables

# SOUTH KINGSTOWN

## Geothermal Feasibility



### EUI & HIGH PERFORMANCE BUILDING

#### Net Zero Building Target EUI\*

For Climate Zone 5A (South Kingstown) is 19.1

National Median in 2024 for K-12 Schools is 48.5\*\*

Schematic Design Target is 25 to 28

\* ASHRAE, DOE, USGBC, 2018 “Achieving Net Zero”

\*\* ENERGY STAR Portfolio Manager, 2024 “Technical Reference U.S. Energy Use Intensity by Property Type”

# SOUTH KINGSTOWN

## Geothermal Feasibility



### EUI & HIGH PERFORMANCE BUILDING

#### Schematic Design Target EUI (25 to 28) kBtu/ft<sup>2</sup>

Subject to change as the Project develops

May be lower than expected but can not be proven, even with modeling, until the Project is complete and operational

Target assumes no photovoltaic sources at this time

# SOUTH KINGSTOWN

## Geothermal Feasibility



### EUI & HIGH PERFORMANCE BUILDING

#### Some Alternatives to lowering EUI further

Photovoltaics (NECHPS - PV “ready”)

Structural accommodations in place

Min 65% of the roof area is clear

Site PV over parking is considered

Infrastructure in place (Electrical Conduits, Room Size, Penetrations)

Building Design & Use Decisions

# SOUTH KINGSTOWN

## Geothermal Feasibility



### EUI & HIGH PERFORMANCE BUILDING

#### RIDE SBA required EUI

None specifically published but < 40 for NECHPS

#### Green Building Reimbursement Incentives

(200 R.I. Code R. 200-RICR-20-05-4.13 - Housing Aid Reimbursement and Incentive)

#### 4.13.2 Energy and Water Efficiency Incentives.

Additional reimbursement funds are available to approved new construction projects that demonstrate energy and water efficiency cost reduction beyond the minimum school construction threshold requirements as defined in the Northeast-CHPS.

# SOUTH KINGSTOWN

## Geothermal Feasibility



### EUI & HIGH PERFORMANCE BUILDING

#### 4.13.2 Energy and Water Efficiency Incentive

(2) Additional Points – 30% better than code\*

(3) Additional Points – 40% better than code\*

(4) Additional Points – 50% better than code\*

\*Baseline is 2009 International Energy Conservation Code

# SOUTH KINGSTOWN

## Geothermal Feasibility



### EUI & HIGH PERFORMANCE BUILDING

#### Opportunity for Achievement

Although a 30% reduction in Energy may be feasible, a 30% reduction in Water use would require a grey water system / rain water collection system

- Additional Initial Cost (not estimated currently)
- Increased Maintenance & Operations Costs

# SOUTH KINGSTOWN

## Geothermal Feasibility



### INCENTIVE BONUS POINTS

#### South Kingstown Incentive Eligibility:

17.5% (half of Base Rate) + up to 4% additional Green Building Points

Per RIGL 16-105-3(19) no district shall receive a combined total of more than twenty (20%) “incentive percentage points”

Maximum Reimbursement up to 55%

# SOUTH KINGSTOWN

## Geothermal Feasibility



### INCENTIVE BONUS POINTS

#### Current Incentive Targets:

Health & Safety – 5%

Educational Enhancements – 5%

Increase Utilization or Replacement – 5%

Total Additional Incentives – 15% + 35% Base

Total Reimbursement Target – 50%

# SOUTH KINGSTOWN

## Geothermal Feasibility



### INCENTIVE BONUS POINTS

#### Assessment

South Kingstown may only be able to achieve additional Green Building reimbursement with additional funds allocated for the following:

- Grey Water / Rain Water Collection System
- Geothermal System

# SOUTH KINGSTOWN

## Geothermal Feasibility



### OBSERVATIONS

#### Project Goals

Zero Emission Building with No Fossil Fuels

Geothermal  
System



Central Plant  
System



Full Electrification for Heating & Cooling



Select the Most Value Added System



Establish a Low Energy Use Intensity (EUI)



Working Towards to a Net Zero Building



# SOUTH KINGSTOWN

## Geothermal Feasibility



### OBSERVATIONS

#### Recommendation

1. Move forward with a Central Plant Approach
2. Pivot renewable focus to “Photovoltaics” to lower EUI
3. Utilize the Geothermal Test Well as a “Teaching Tool” to heat & cool  
Construction Tech area

# SOUTH KINGSTOWN

## Cost Reduction Strategy

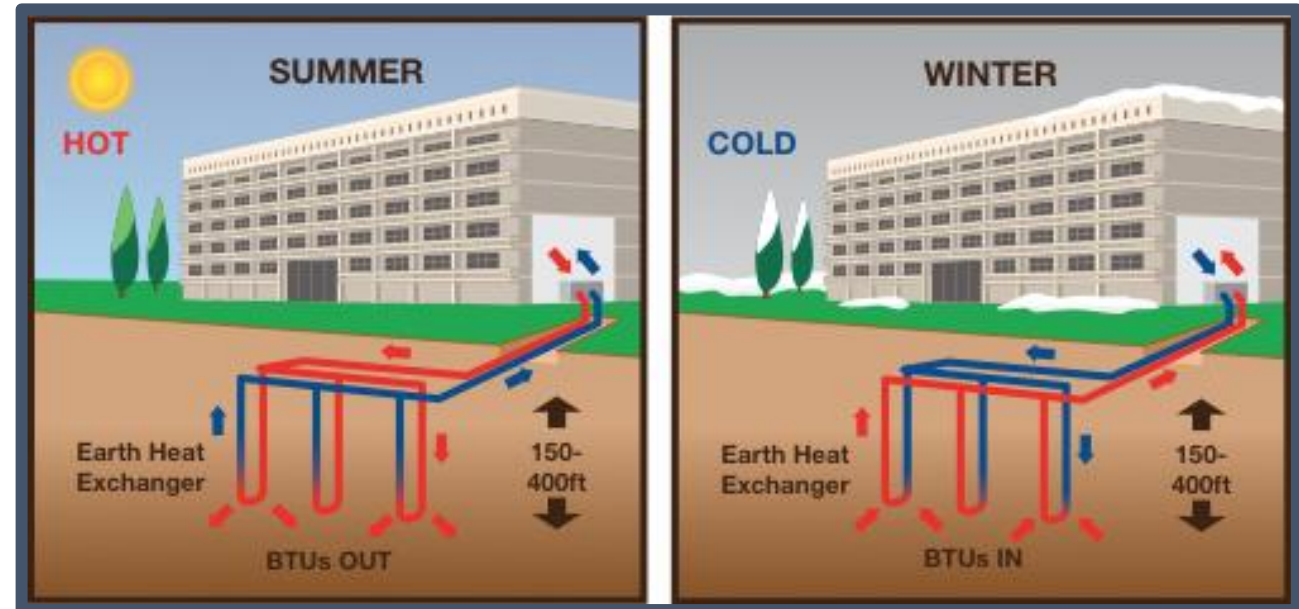


### M-VE1

➔ Change from Geothermal Loop to Air Cooled Chiller Loop

- Test Well Complete
- Potential Hybrid System – ROI to be reviewed
- Feasibility of System Size under review with Engineers – **Cost Based on 40 wells**

➔ Estimated Value  
\$2,846,700



# SOUTH KINGSTOWN

## Cost Reduction Strategy



### C-VE4



Change From Underground Infiltration System to Above Ground Retention Ponds

- Target 50% Reduction
- Locations and Feasibility to be studied



Estimated Value  
\$261,500



# SOUTH KINGSTOWN

## Cost Reduction Strategy



### S-VE1

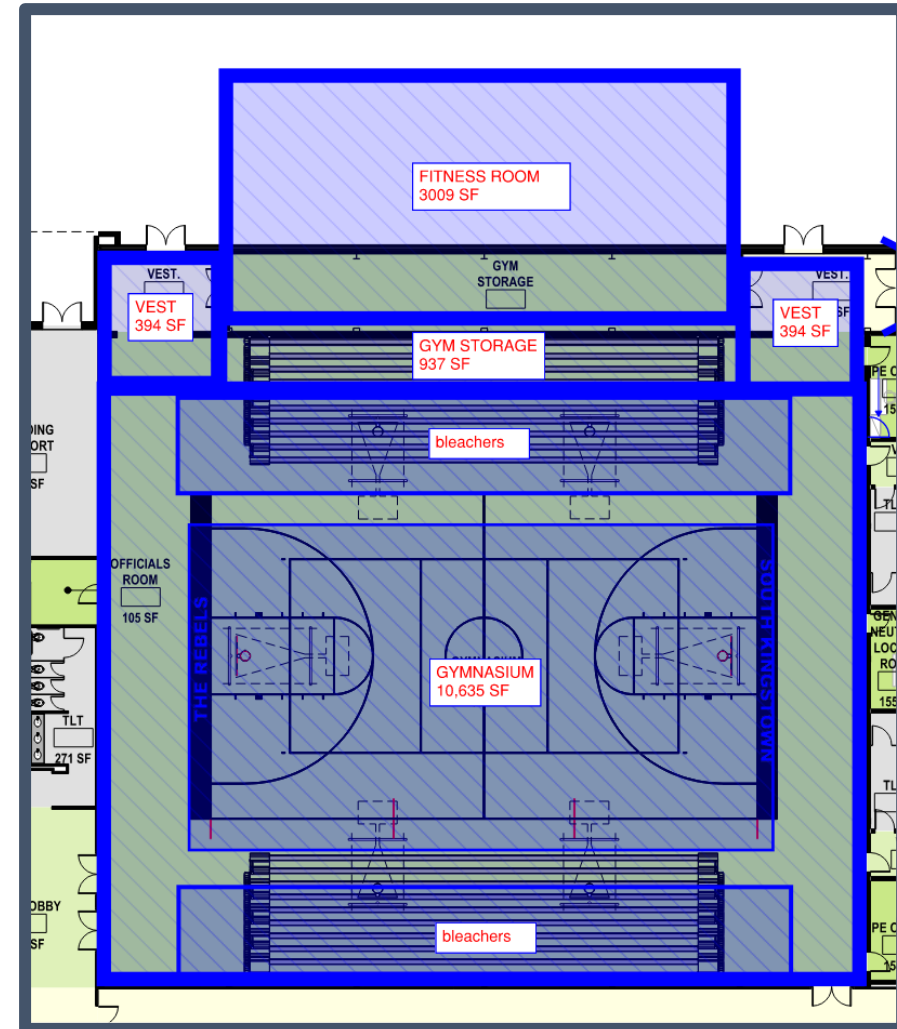


#### Delete Interior Walking Track

- Stretch bleacher length left-right (keep capacity) which reduced their depth when fully open. Storage Room further pulled into Gymnasium
- Move Fitness/Weight Room from 2nd Floor to 1<sup>st</sup> Floor – Remove Stair Tower #4
- Final space reconfiguration under review



Estimated Value  
\$634,400



# SOUTH KINGSTOWN

## Cost Reduction Strategy



### S-VE2



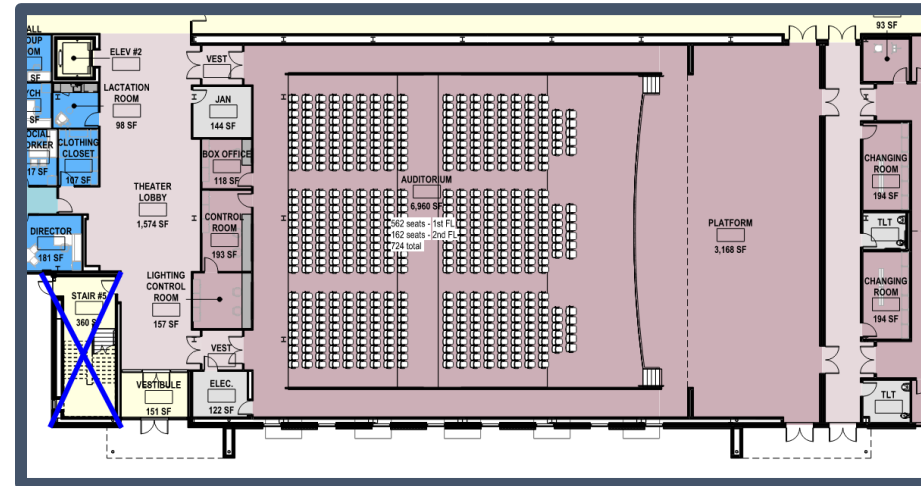
#### Auditorium Balcony

- Remove 162 Seats from 2<sup>nd</sup> Floor balcony
- Remove Stair Tower #5, Elevator #2, Toilet Rooms, Support Space @ Balcony Lobby.
- 546 Seats will Remain in 1<sup>st</sup> Floor Auditorium

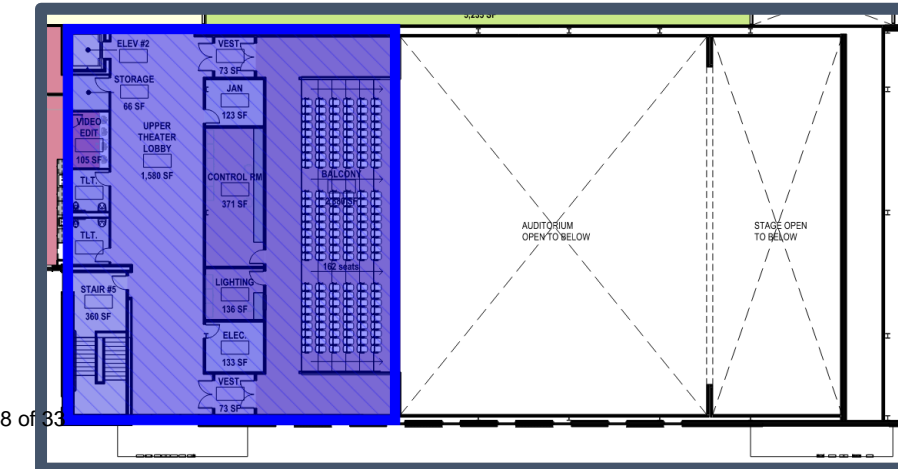


Estimated Value  
\$544,300

First Floor



Second Floor



# SOUTH KINGSTOWN

## Cost Reduction Strategy



### S-VE3

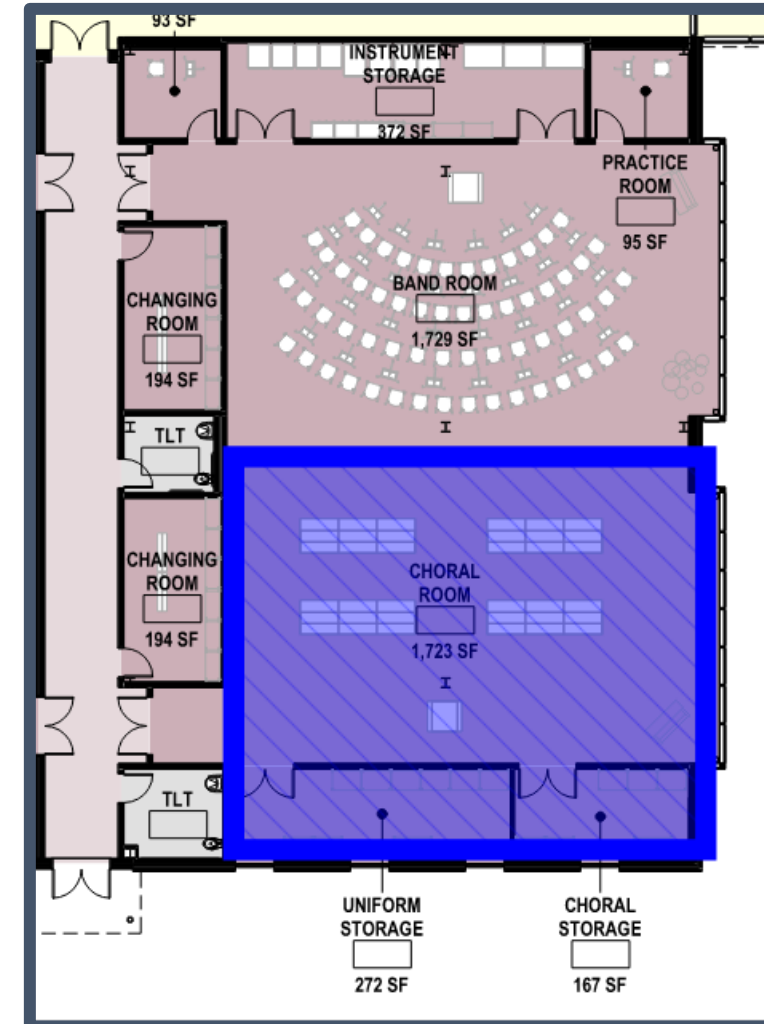


#### Choral Room

- Include design as Add-Alternate for possible inclusion after bidding
- Choral Program to utilize Platform in Auditorium



Estimated Value  
\$597,500



# SOUTH KINGSTOWN

## Cost Reduction Strategy



### S-VE8

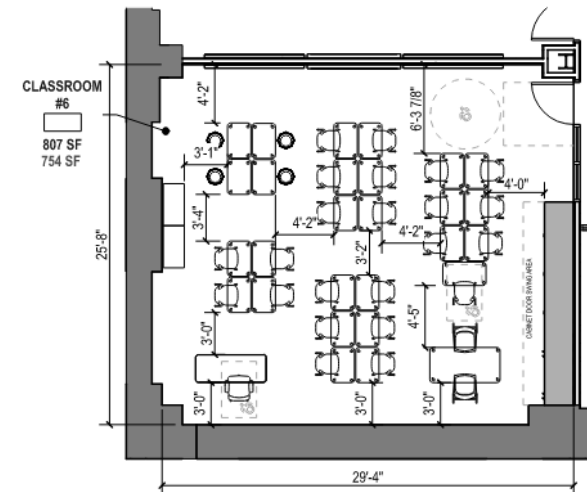
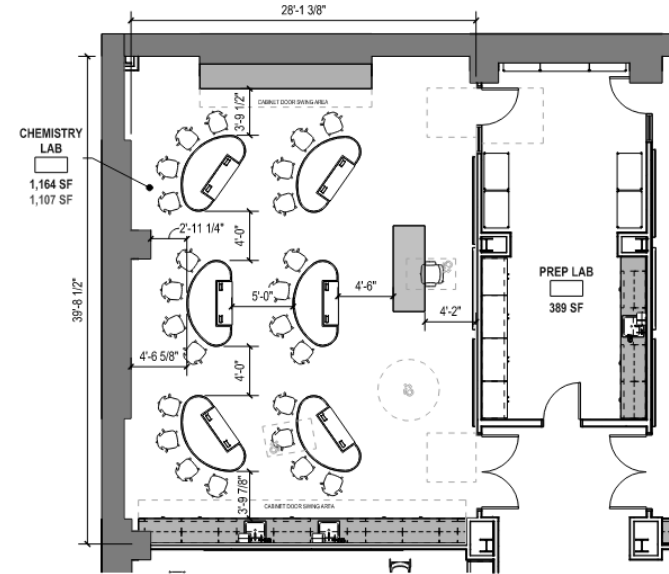


Reduce Building Perimeter by 12”

- “Squeeze Building In”
- Retain classroom SF to fit maximum class size



Estimated Value  
\$266,900



# SOUTH KINGSTOWN

## Cost Reduction Strategy



### A-VE1, A-VE2, A-VE12, A-VE13, A-VE14, A-VE28

#### → Adjust Exterior Façade

- Reduced Glazing
- Increased use of Brick Veneer
- Introduction of alternate materials, i.e. Ground Face Block
- Remove Metal Panel
- More aligned with surrounding architecture

→ Estimated Value  
\$1,076,300



# SOUTH KINGSTOWN

## Exterior Façade



### Inspiration Images



# Questions & Answers