An aerial photograph of the Concord-Carlisle High School sports complex. The image shows a large baseball field on the left, a tennis court with a scoreboard on the right, and several smaller tennis courts in the center. The school building is visible in the background, surrounded by trees and parking areas.

Amenities Building Assessment and Design Interim Assessment Report

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Executive Summary

This report outlines considerations, recommendations, and alternative options for a stand-alone amenities building at the Concord-Carlisle Regional High School.

To meet the expressed program goals, the Gale team recommends that a version of Option 3 (traditional design, bid, build) procurement/construction method be used for realizing the building. There are still several decisions to be made within this overall Option, however we feel it balances the program, cost, and quality to provide the best long-term value.

Options 1A and 1B investigated skid-type trailer modular restrooms. While this option does present a lower cost, it does not provide a concession stand, and it presents challenges for meeting code for permanent restrooms.

Option 2 investigated a pre-fab modular approach to the building. Based on the information we gathered it does not provide a lower cost. Combined with the fact that this process presents some procurement and customization challenges it does not seem like there are any tangible advantages over one of the Option 3 approaches.

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The Site



Project Discovery

During the discovery phase of the project, the needs, goals, and desired outcomes were further defined by the District's building-based staff.

The previously completed feasibility study was used as the starting point of the discussion, from which the following goals were confirmed.

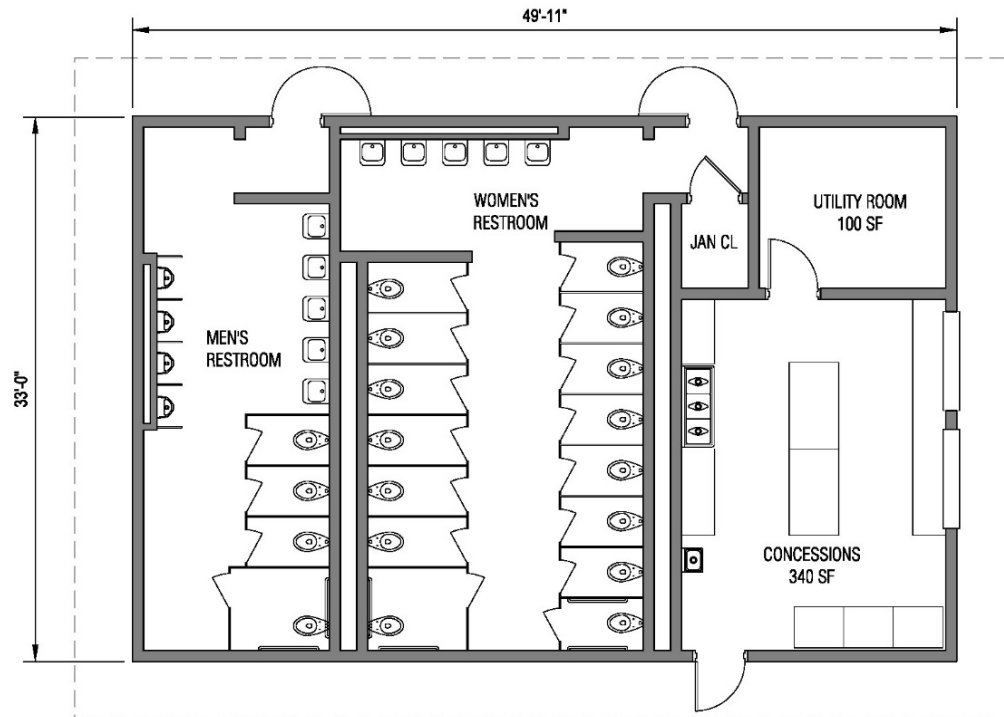
PROJECT GOALS:

- One option should be based on the schematic design developed during the feasibility study of the CCHS campus.
- All options to meet the definition of 'permanent restrooms' as required by MA building code and provide code-required number of restroom fixture counts.
- All options are to have code-required accessible restrooms.
- One option should test the possibility of a lower-cost alternative.

PREVIOUSLY COMPLETED FEASIBILITY STUDY

Floor Plan

Area: 1,650 SF



Code Changes/Requirements

Since the feasibility study was completed, an update to the Uniform MA State Plumbing Code (248 CMR 10.00) became effective on December 8, 2023, and compliance with the new Tenth Edition of the MA State Building Code (CMR 780) will be required for all permit applications received after January 1, 2025.

While most of the code updates do not have a significant impact on the design of the building, the updated Plumbing Code includes significant changes to the restroom fixture quantities required for this type of facility.

The previous version of the Plumbing Code required: 30 WC's and 9 sinks for women, 15 WC's (50% urinals allowed) and 9 sinks for men. Understanding that this requirement was excessive for a high school facility, MA Board of State Examiners of Plumbers and Gas Fitters typically would approve a 50% reduction waiver. This was the approach recommended in the study which resulted in the building being planned to have 15 WC's and 5 sinks for women, 8 WC's (50% urinals allowed) and 5 sinks for men.

The new Plumbing Code assigns different fixture count requirements based on the level of competition of the facility. This recognizes a reduced need for restrooms at the high school level and is consistent with previous waivers that the MA Board of State Examiners of Plumbers and Gas Fitters typically would approve.

One issue is that the sink count requirements were not reduced in the code update, however, we have received a waiver for reducing the sink count in another similar project under the new code and are recommending the same approach for this project.

The requirements and calculations for the required restrooms under the current Uniform MA State Plumbing Code (248 CMR 10.00), and our recommendation for pursuing a waiver for the quantity of sinks are on the following page.

Code Changes/Requirements

The total fixed-seat spectator capacity for Stadium Field is 1,800 people. For this capacity, the code requires; 9 WC's and 12 sinks for women, 7 WC's (67% urinals allowed) and 12 sinks for men. For WC's the building is sized to meet the code having 8 WC's for women, 1 WC single-user restroom, 3 WC's and 4 urinals for men.

The code requirement for more sinks than toilets has been recognized as a code issue through approval of recent waivers granting a reduction. The waiver proposed in this study is for a reduction to 5 sinks for women, 1 sink in single-user restroom, and 5 sinks for men. This puts the sink count at 2/3 of the toilet/urinal count, which is a more typical ratio.

CCHS Amentities Building - Fixture Count NEW CODE

Plumbing Fixture requirements

248 CMR 10 - Uniform State Plumbing Code

Mass. Register #1510, effective 12/8/2023)

Reference: 10.10 Table 1: Minimum Facilities for Building Occupancy		Toilets				Lavatories			
		Females		Males		Female		Male	
Secondary School	up to 300	1 per	60	up to 360	1 per	75	1 per	75	75
Outdoor Stadiums	over 300	1 per	150	over 360	1 per	75	1 per	75	75

Occupancy	Toilets						Lavatories			
1800 Total	Females			Males*			Female		Male	
		CALCULATION	ROUND UP		CALCULATION	ROUND UP	CALC.	ROUND UP	CALC.	ROUND UP
900 Each Gender	300	5	5	360	3	3	12	12	12	12
	600	4	4	540	3.6	4				
REQUIRED TOTALS	9			7			12		12	
Recommended Plumbing Code Waiver (sinks 2/3 of toilet count)	no waiver			no waiver			6		5	

Program Confirmation

Once the overall project goals, and code implications were reviewed, the team confirmed the building program needs. A base program was defined that included the minimum program spaces that all options should include. Additional program elements were identified that would be needed to meet the primary goals that were defined for the project.

BASE PROGRAM:

Women's Restroom: Compliant accessible restroom with code required number of fixtures modified by appropriate waiver request.

Men's Restroom: Compliant accessible restroom with code required number of fixtures modified by appropriate waiver request.

Single-User Restroom: Compliant accessible gender-neutral/family single fixture restroom. This restroom will count towards the code fixture count required for women.

Utility Rooms: Water service/electrical rooms as required.

FULL PROGRAM:

Outdoor Water Fountain: Compliant accessible water fountain/bottle filler.

Concessions: Warming kitchen to heat/serve/sell pre-prepared and packaged food and drinks

Options Tested

OPTION 1

Semi-Permanent, Skid pre-fab units



Portable and trailer restrooms were investigated, but these solutions do not meet the code requirement for permanent restrooms.

Skid pre-fab units, if mounted to a foundation and connected to a sanitary waste system are acceptable to the MA Plumbing Board as 'permanent' if the local building inspector gives approval. An accessible walkway/deck system will be needed, and screening can improve the aesthetics.

OPTION 2

Modular Construction



Modular construction would need to follow the alternate procurement process in M.G.L. c. 149, § 44E(4).

Modular construction can meet the program and code requirements of the project. For this delivery process, typically a GC acquires the permit, builds the foundation, slab, and makes the final utility connections. The modular building company builds, delivers, and places the building. There are some material choices and options that can be customized.

OPTION 3

Traditional design/bid/build



This option is based on the previously completed feasibility study, and can provide the full program needs, and be fully code compliant.

This option has the most design customization possible to meet the aesthetic needs of the project.

OPTION 1

Semi-Permanent, skid pre-fab units

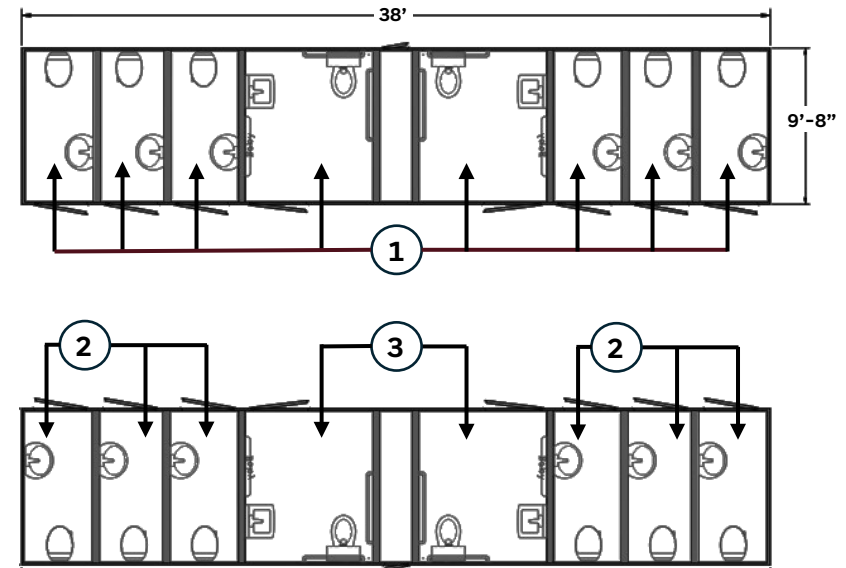
This option investigates the potential to have a lower cost than traditional construction but does have some trade-offs. Modular skid-type restroom units can be permanently mounted to a foundation.

For this study, the option does not include a concessions area. Concession trailers are common, but skid-type 'permanent' units would need to be custom manufactured, and present challenges in meeting the more stringent Health Department requirements for permanent food service kitchens. The team discussed that if this option moved forward, the current concessions would be continued with the option of bringing in a food truck for larger events.

To meet the restroom count, two eight (8) fixture units are recommended. These units each include two (2) accessible restrooms which could be designated as shown to meet the restroom count required for each gender.

Floor Plan

Interior Area: 754 SF



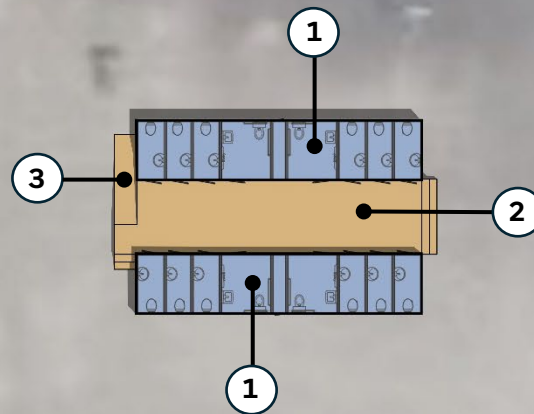
① WOMEN'S RESTROOM

② MEN'S RESTROOM

③ SINGLE-USER/FAMILY RESTROOM

OPTION 1

Semi-Permanent, skid pre-fab units



SITE PLAN

- ① RESTROOM SKID UNITS
- ② ELEVATED DECK/PATIO
- ③ RAMP

OPTION 1

Skid pre-fab units – on foundation

While the aesthetic look of this option presents a challenge, there are things that can be done to improve the design. These examples show some ideas of how these skid-type trailer units can be made to look more permanent.

OPTION 1A – Vinyl Wrap Graphics

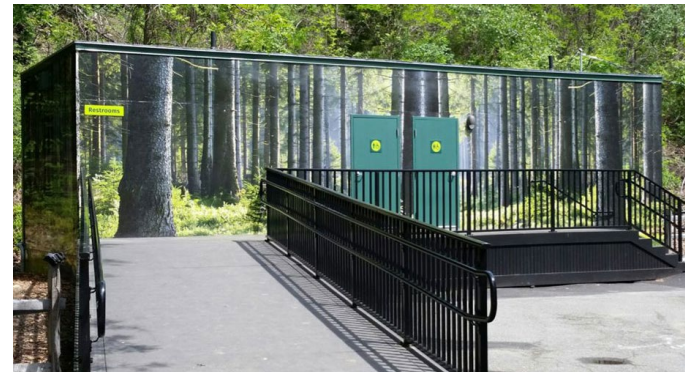
- School branding could be used
- Ramp makes access feel more permanent

OPTION 1B – Deck and screen walls

- Use the need for an elevated walkway to bring natural materials
- Screen units to create a sense of place



Basic skid-unit (not on foundation)



Permanent foundation / vinyl wrap



Deck and wood screens

OPTION 2

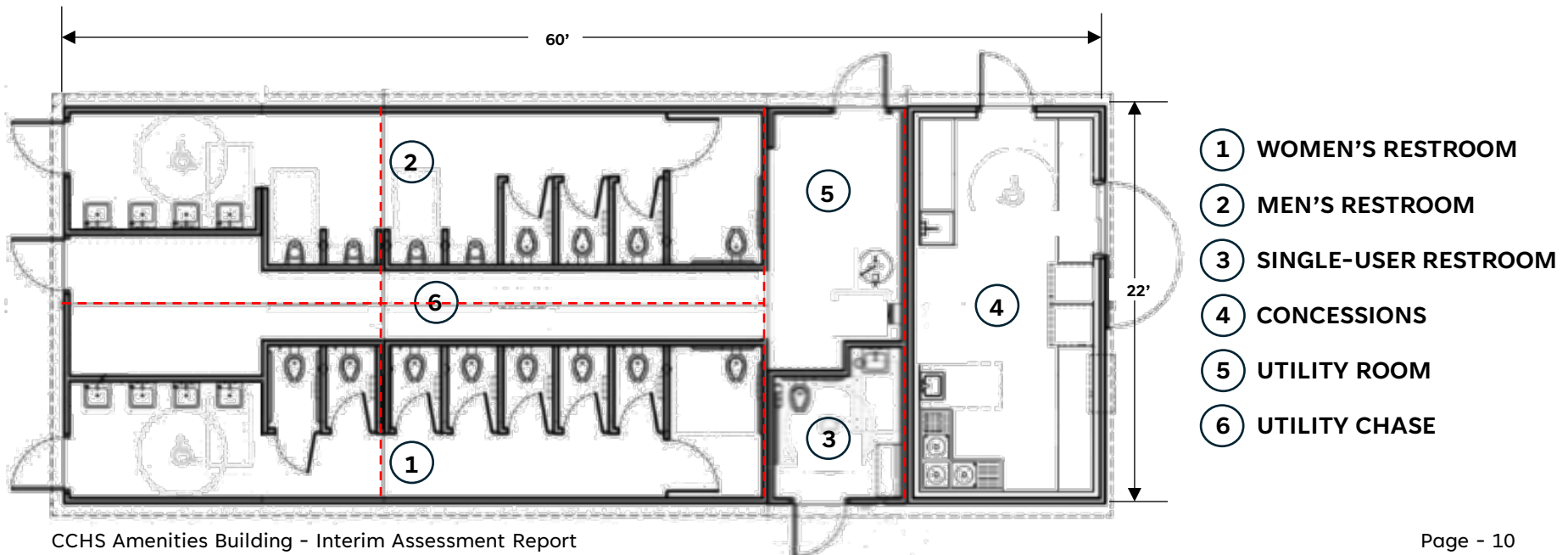
Modular Construction

Modular construction is an option that can provide the full program. Depending on the manufacturer, this approach can be highly customized, however this will impact the cost. For this study, we assembled a floor plan based on standard units to provide the program at the lowest cost. The red dashed lines indicate each module. As stated earlier this approach would need to be procured under M.G.L. c. 149, § 44E(4). These procedures apply to

the acquisition and installation of modular buildings, including the solicitation and evaluation of proposals, the award of contracts, and the installation of modular units. Site preparation work, construction of foundations and attachment of modular buildings to utilities can be included as part of the modular building procurement or can be bid separately through the conventional construction bidding procedures.

Floor Plan

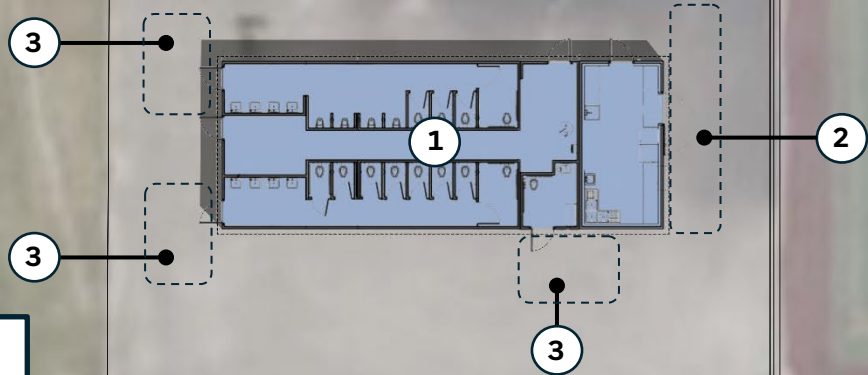
Interior Area: 1,320 SF



OPTION 2
Modular Construction

SITE PLAN

- ① MODULAR BUILDING
- ② CONCESSIONS QUEUING
- ③ RESTROOM QUEUING



OPTION 2

Modular Construction

The size and number of modules needed to achieve this project's program will likely impact the cost savings typically seen in this type of construction. In addition, the fixtures inside the building will need to be listed for use in Massachusetts, which also adds cost.

There are several customizations that can enhance the appearance over the standard modular building. While these customizations will also increase the cost, some examples have been provided for reference.

The cost range provided for Option 2 represents the cost range to be expected with the low-end representing a standard configuration and the upper range some level of customization. The manufacturer that assisted in providing costs noted that the pricing would need to be confirmed with the level of customizations that were requested.



Standard Concrete Block



Porch, some added materials/details



Porch, with additional added materials/detail

OPTION 3

Traditional design/bid/build

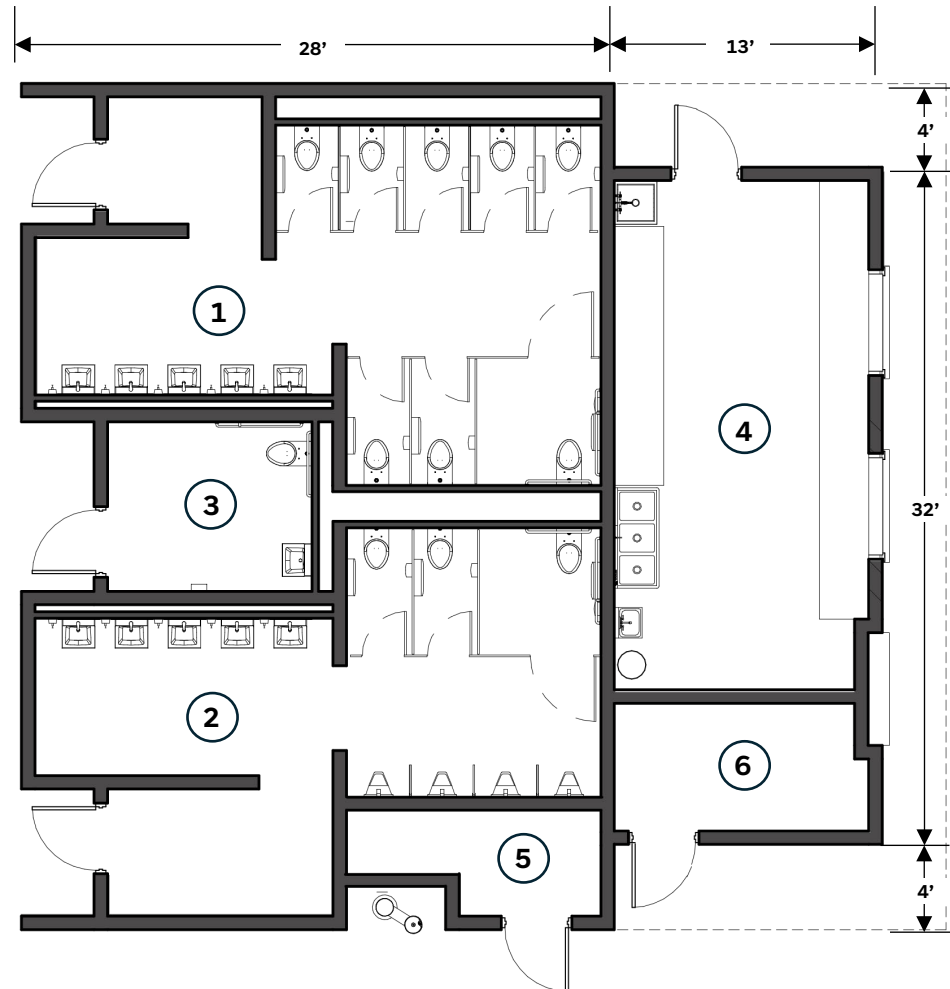
This design option modifies the feasibility study plan with the reduced number of plumbing fixtures per updated code. The program has not significantly changed. However, the updated configuration of the building creates better spectator access, allows views of the field from the concessions area, and provides ample space for service vehicle access around the perimeter.

- ① WOMEN'S RESTROOM
- ② MEN'S RESTROOM
- ③ SINGLE-USER RESTROOM
- ④ CONCESSIONS
- ⑤ WATER SERVICE ROOM
- ⑥ ELECTRICAL ROOM

TOTAL AREA: 1,450 GSF

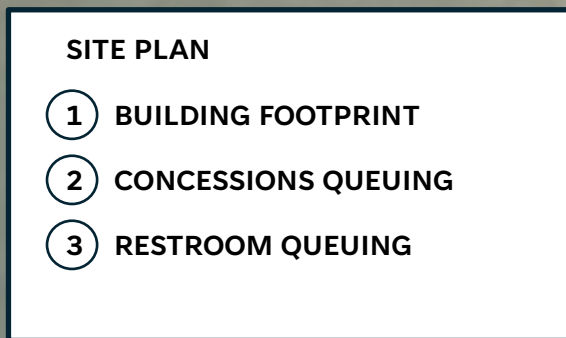
Floor Plan

Interior Area: 1,450 SF



OPTION 3

Traditional design/bid/build



OPTION 3

Traditional design/bid/build

If this option is selected, the building look, materials and details will be developed and refined in the next design phase. As part of the interim study, the design team was asked to investigate the following alternates for Option 3.

OPTION 3A – Architectural Concrete Block, seasonal

- Single wythe concrete block walls
 - Decorative CMU exterior
 - Painted CMU interior
- Seasonal building
- Ventilation, no heat or AC

OPTION 3B – Wood Frame, seasonal

- Wood frame stud walls
 - Siding exterior
 - Tile / FRP panel /painted GWB interior
- Seasonal building
- Ventilation, no heat or AC

OPTION 3C – Wood Frame, year round

- Wood frame stud walls
 - Siding exterior
 - Tile / FRP panel /painted GWB interior
- Heat and AC – fully insulated (energy code)
 - **3C-1** Add Heating Only
 - **3C-2** Add Heating and Cooling



Architectural Concrete Block

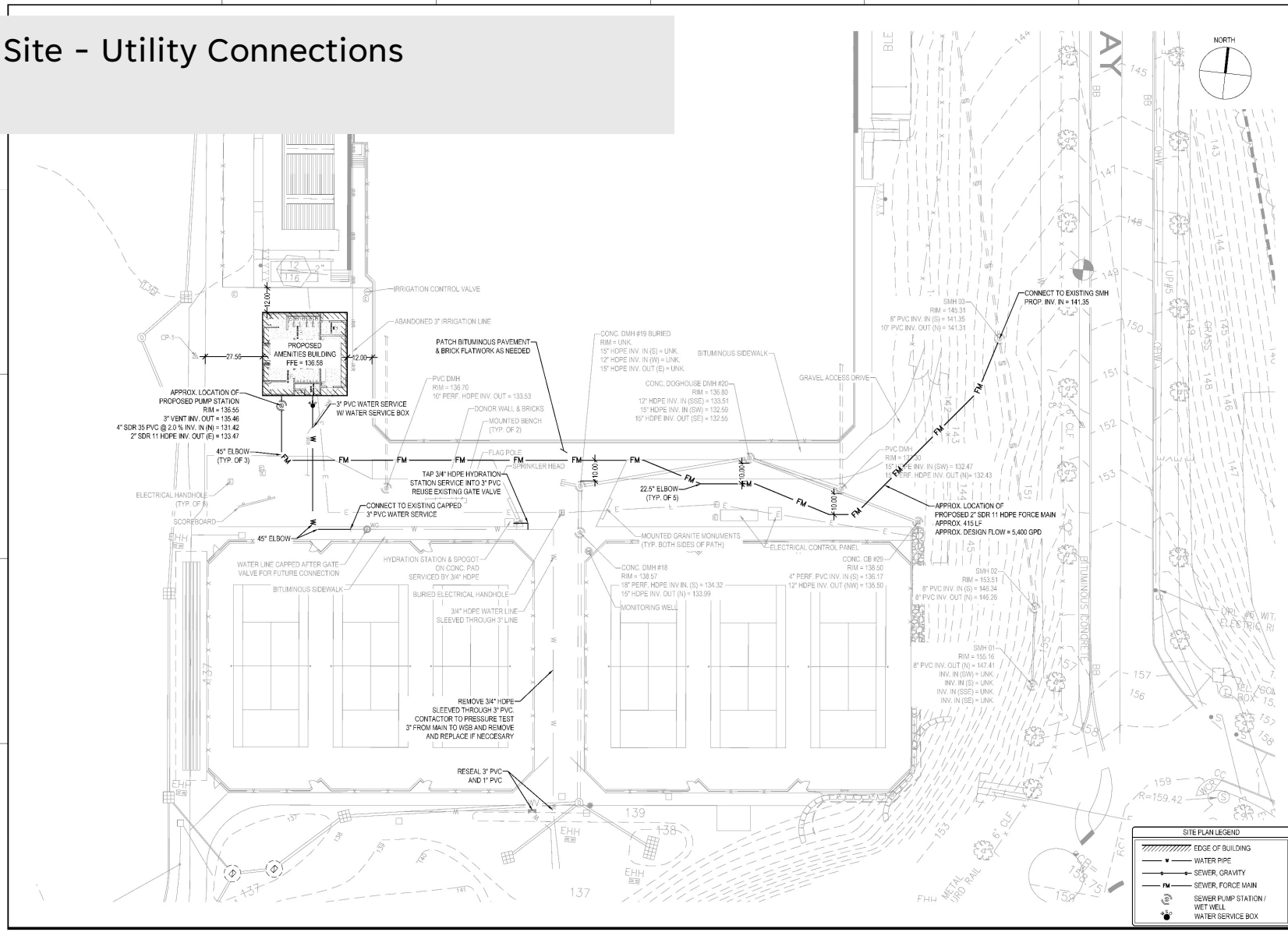


Wood Frame / Siding



Wood Frame / Board + Batten

Site - Utility Connections



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Dorchester Portland

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SCHEMATIC

PROJECT
**AMENITIES BUILDING ASSESSMENT & DESIGN
CONCORD-CARLISLE REGIONAL HIGH SCHOOL
500 WALDEN STREET
CONCORD, MA 01742**

OWNER
**CONCORD-CARLISLE REGIONAL SCHOOL DISTRICT
150 LEE ROAD
CONCORD, MA 01742**

NO.	DATE	DESCRIPTION	BY
1	11/06/2024	PROJECT NO. 71900	
2	11/06/2024	CADD FILE 71900_CADD	
3		DESIGNED BY CRR	
4		DRAWN BY CRR	
5		CHECKED BY MPK	
6	11/06/2024	DATE	
7	11/20	DRAWING SCALE	
8		GRAPHIC SCALE	
9		SHEET TITLE	

SITE PLAN LEGEND

- EDGE OF BUILDING
- WATER PIPE
- SEWER, GRAVITY
- SEWER, FORCE MAIN
- SEWER PUMP STATION / WET WELL
- WATER SERVICE BOX

SITE PLAN
AMENITIES BUILDING
CONCEPT

DRAWING NO.
C101

1 OF TOTAL

HVAC System Considerations

Seasonal Building:

The majority of secondary school amenities buildings are seasonal, designed with a plumbing system that can be drained and winterized. Late November games can be a challenge, however portable heaters are typically used to keep the building temperature from falling below freezing in late November.

Providing heat triggers the requirements of the stretch energy code. The primary challenge this presents is that it eliminates a single wythe CMU for the exterior wall. This simple system is commonly used due to its ability to provide a low-maintenance structure that can provide a durable interior and exterior wall finish in one system. The energy code's insulation requirements require a more complex wall system which increases the cost of these buildings. While heat certainly can make the building more comfortable, it is only needed for a short time during the outdoor sports season. Winterizing these buildings is still more energy efficient than conditioning year-round, even with the most efficient systems and thermal envelope.

In a seasonal building, a small heater is used to maintain 50°F in the water utility room. If conditioning the spaces is desired, and within the budget, CCHS can either provide heating alone or both heating and cooling as described here:

Seasonal Building:

- Exhaust ductwork from each space to a rooftop exhaust fan – 2,350 cfm.
- Louvers at each room to provide ventilation air and makeup the exhaust air.
- 3 kW unit heater for the utility room.
- Temporary space heaters can be used in November.
- Building drained down and winterized.

Add Heating Only:

- 2,350 cfm ERV with outside air and exhaust air ductwork to each space. Unit shall have a 50 kW heating coil.
- Supplemental 8 kW coil for the Concessions area.
- 3 kW unit heater for the utility room.
- Option to winterize or keep open.

Add Heating/Cooling:

- 2,350 cfm ERV with outside air and exhaust air ductwork to each space. Unit shall have a 35 kW heating coil.
- 3 kW unit heater for the utility room.
- 2 Ton Heat Pump type split unit for Concessions.
- 1.5 Ton Heat Pump type split unit for Men's Room.
- 1.5 Ton Heat Pump type split unit for Women's Room.
- Alternate to individual splits – 5 Ton Heat Pump type VRF system with 3 terminal units.
- Option to winterize or keep open.

Budgetary Cost Comparison



Option 1A:
Skid pre-fab units
with graphics

Estimated Cost:
\$445,000 – \$534,000

Advantages:

- Lower cost
- Shorter schedule
- Small upcharge for heat/AC
- Simple to winterize

Disadvantages:

- Requires AHJ approval as 'permanent bldg.'
- +/- 10-year life-span
- MA plumbing code requires customization
- Look and feel
- No Concessions stand
- Multiple procurements /contractors



Option 1B:
Skid pre-fab units
with screening

Estimated Cost:
\$538,000 – \$646,000

Advantages:

- Lower cost
- Shorter schedule
- Small upcharge for heat/AC
- Simple to winterize
- Aesthetics can be improved through simple screening

Disadvantages:

- Requires AHJ approval as 'permanent bldg.'
- +/- 10-year life-span
- MA plumbing code requires customization
- Look and feel
- No Concessions stand
- Multiple procurements /contractors



Option 2:
Modular Construction

Estimated Cost:
\$1,600,000 – \$1,900,000

Advantages:

- Provides full program
- Durability/Maintenance
- Duration of on-site construction shorter
- Many customization options

Disadvantages:

- MA plumbing code requires customization
- Multiple procurements /contractors
- Does not appear less expensive
- Long lead times possible
- Seasonal building (Thanksgiving game)



Option 3A:
CMU
design/bid/build

Estimated Cost:
\$1,550,000 – \$1,850,000

Advantages:

- Provides full program
- Overall design flexibility/aesthetics
- Durability/Maintenance
- Single source GC procurement/responsibility
- All elements will meet MA code/school standards

Disadvantages:

- Longer on-site construction schedule
- Seasonal building (Thanksgiving game)
- Can feel utilitarian



Option 3B:
Frame
design/bid/build

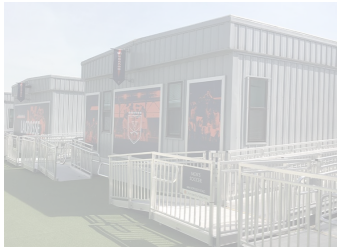
Estimated Cost:
\$1,420,000 – \$1,700,000

Advantages:

- Provides full program
- Overall design flexibility/aesthetics
- Less utilitarian feel
- Single source GC procurement/responsibility
- All elements will meet MA code/school standard

Disadvantages:

- Longer on-site construction schedule
- Seasonal building (Thanksgiving game)
- Less durable



Option 1A:
Skid pre-fab units
with graphics

Estimated Cost:
\$445,000 – \$534,000

Advantages:

- Lower cost
- Shorter schedule
- Small upcharge for heat/AC
- Simple to winterize

Disadvantages:

- Requires AHJ approval as ‘permanent bldg.’
- +/- 10 year life-span
- MA plumbing code requires customization
- Look and feel
- No Concession stand
- Multiple procurements /contractors



Option 1B:
Skid pre-fab units
with screening

Estimated Cost:
\$538,000 – 646,000

Advantages:

- Lower cost
- Shorter schedule
- Small upcharge for heat/AC
- Simple to winterize
- Aesthetics can be improved through simple screening

Disadvantages:

- Requires AHJ approval as ‘permanent bldg.’
- +/- 10 year life-span
- MA plumbing code requires customization
- Look and feel
- No Concession stand
- Multiple procurements /contractors



Option 2:
Modular Construction

Estimated Cost:
\$1,600,000 – \$1,900,000

Advantages:

- Provides full program
- Durability/Maintenance
- Duration of on-site construction shorter
- Many customization options

Disadvantages:

- MA plumbing code requires customization
- Multiple procurements /contractors
- Does not appear less expensive
- Long lead times possible
- Seasonal building (Thanksgiving game)



Option 3A:
CMU
design/bid/build

Estimated Cost:
\$1,550,000 – \$1,850,000

Advantages:

- Provides full program
- Overall design flexibility/aesthetics
- Durability/Maintenance
- Single source GC procurement/responsibility
- All elements will meet MA code/school standards

Disadvantages:

- Longer on-site construction schedule
- Seasonal building (Thanksgiving game)
- Can feel utilitarian



Option 3B:
Frame
design/bid/build

Estimated Cost:
\$1,450,000 – \$1,750,000

Advantages:

- Provides full program
- Overall design flexibility/aesthetics
- Less utilitarian feel
- Single source GC procurement/responsibility
- All elements will meet MA code/school standard

Disadvantages:

- Longer on-site construction schedule
- Seasonal building (Thanksgiving game)
- Less durable

3C-1 heating add:
+ \$55,000 – \$65,000
3C-2 heating/AC add:
+ \$90,000 – \$105,000

Draft Schedule Comparison

Option 1A: SKID/TRAILER RESTROOMS with graphics/branding		2024		2025											
	duration	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	
Foundation/site design - documentation	30 days														
Deck and screen design - documentation	30 days														
Bidding/foundation - Bidding/Procuring units	30 days														
Permitting	30 days														
Unit Manufacture worst case (lead time can vary significantly)	60-120 days														
Foundation Construction/utilities:	45 days														
Unit Delivery install (includes utility connections)	15 days														
Deck, ramp, stair construction	30 days														
Option 1B: SKID/TRAILER RESTROOMS with graphics/branding + screens		2024		2025											
	duration	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	
Foundation/site design - documentation	30 days														
Deck and screen design - documentation	30 days														
Bidding/foundation - Bidding/Procuring units	30 days														
Permitting	30 days														
Unit Manufacture worst case (lead time)	200 days														
Foundation Construction/utilities:	45 days														
Unit Delivery install (includes utility connections)	15 days														
Deck, ramp, stair, screen construction	45 days														
Option 2: MODULAR RESTROOMS		2024		2025											
	duration	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	
Bidding/Procurement Modular building Manufacturer	30 days														
Modular Building design customization	30 days														
Foundation/site design (owners engineers)	45 days														
Permitting	30 days														
Modular Building Manufacture (NTP + approved architectural submittal)	240 days														
Bidding: site/foundations contractor	30 days														
Foundation Construction/utilities	45 days														
Modular Delivery Install	15 days														
Final utility connections	15 days														
Option 3A + 3B: DESIGN/BID/BUILD CMU or frame w/ siding		2024		2025											
	duration	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	
Building/Site Design	90 days														
Bidding	30 days														
Permitting	30 days														
Construction	180 days														
Option 3C-1 + 3C-2: DESIGN/BID/BUILD frame w/ siding - heat, cooling		2024		2025											
	duration	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sept	Oct	Nov	
Building/Site Design	90 days														
Bidding	30 days														
Permitting	30 days														
Construction	210 days														

Composting Toilet Analysis

Under the Title 5 Regulations (310 CMR 15.000), MassDEP must approve an innovative/alternative septic-system technology before it can be used in Massachusetts. General Use systems must provide a level of environmental protection at least equivalent to that of a conventional on-site system designed in accordance with Title 5. Since a composting toilet is a plumbing fixture, the Board of Registration of Plumbers and Gas Fitters must also approve the units.

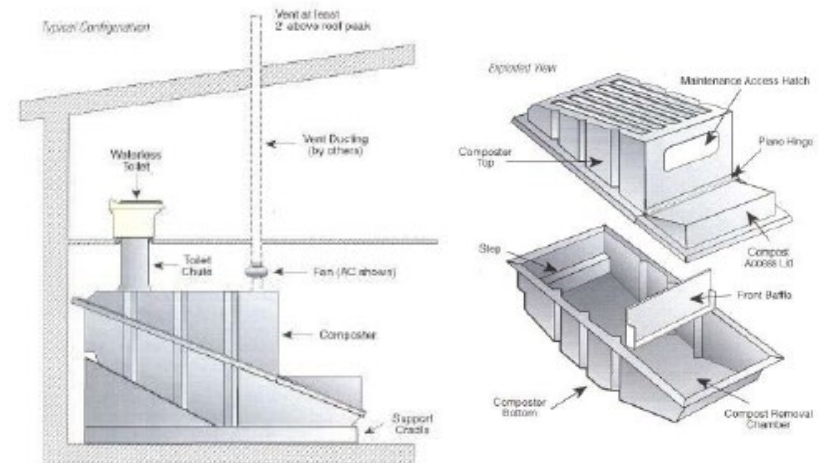
Based on our team's research and experience, the list of approved units only includes one system (Clivus Multrum) that would be appropriate for this application. Our team has experience with a successful installation of this system. However, it was only used on two second-floor toilets, due to the way in which the system works.

This system uses gravity to drain toilets to a tank below. The tank processes the waste, and the treated effluent is then pumped into the sanitary system. The tanks would require a full basement with an access bulkhead under the building to house the area needed for the tanks. The largest tanks available would likely only serve 2-3 toilets and have a footprint of 6'x9'.

The composting system is fairly low maintenance but additional building systems are needed to keep it operating efficiently. These include:

- A moistening system feeding the tanks
- Effluent removal pump system
- Dedicated ventilation system
- Fire suppression system (ABC dry chemical)

System diagram:



Composting Toilet Analysis

Budgetary Cost:

Additional cost for basement:	\$90,000
Additional cost for composting system:	\$190,000
<hr/>	
Total estimated added cost:	\$280,000



Basement for Composting Tanks

