Dover Community Center
Peer Review
November 11, 2022

SCOPE OF THIS REVIEW

This report is a review of the design documents recently produced for the new Dover Community Center addition and renovation project. The responsive qualified low bid was approximately $2.7M over the budget. The goal of this review is to develop "value engineering" recommendations of modifications and changes to wholly or partially return to the original construction budget of $14.18M. While the main focus of the peer review is to find changes that do not impact the size of the program spaces, the correlation of the program to the building layout will be reviewed for design efficiencies. The review scope includes the following bullet items.

- Review the cost estimate and current bid results from comparable projects
- Review building and site layouts
- Review parking, including spaces provided, and basis for determining the optimal number
- Review specified building materials
- Review systems such as civil, structural, mechanical, electrical, plumbing, and fire protection
- Review the schedule and room utilization schedule based on the anticipated programs
- Review anticipated occupancy levels for spaces and floors
- Review results of visioning sessions and building program

The review team includes architects as well as a separate MEP/FP engineer. Review in this context means that which can be accomplished within approximately 60 hours. It is not a full detailed review of every document, but rather a review intended to help the community guide its decision making going forward.

Note that it is not the purpose of this review to self-edit suggestions. It is clear that project decisions documented in the bid documents were made with a reason. The Town could thus dismiss all of the suggestions offered in this report. In that case, the value of the peer review will be the vehicle that confirmed the project direction. There are items where a logical decision-making process came to a valid conclusion that one might still alter for various reasons. The methodology in review of the suggestions is to retain an open mind, understanding that this is not a personal challenge to the design team, but rather a series of suggestions that may or may not make sense to the Town and the A/E team.

INTRODUCTION

The review team had access to cost estimates for similar community centers bid in a comparable time period from the same estimator. We also had access to actual filed sub-bids and general contractor bids from comparable projects. These offered better true market comparison of alternatives. The comparable project coincidentally included similar demolition and abatement of an existing brick school so that the general conditions and project requirements were also well aligned and comparable.

In the discussion below, cost factors are analyzed in certain cases. For each square foot of building space eliminated, one does not achieve the full cost per square foot of the project in savings. For example, the cost per square foot of the Dover CC is $830. Eliminating one square foot of space may not affect the site work scope so that portion of the project cost goes unchanged. The basic needs of the electrical system, water supply, stairs, elevators and other components also go

unchanged. In general, a square foot space reduction results in approximately 66% of savings of the total cost per square foot.

Another thing to consider is the relation of a trade cost to the bid cost, the latter of which includes the general contractor's mark-up for insurance, bonds, general conditions, general requirements, and escalation. The overhead mark-ups total approximately 20% of the trade cost meaning that for every dollar in trade costs, the total cost reduction would in theory be $1.20. For this analysis, we only used the trade cost savings which then does not touch the overhead and profit which likely make the evaluation more realistic.

BUILDING LIFE EXPECTANCY

In evaluating certain alternative materials or layouts, it should be appreciated that buildings have a long life cycle. A good example is the reuse portion of the Dover CC; a 1910 school wing now 112 years old is being re-purposed. While it is impossible to project future needs and trends, it can be expected that the Dover CC will have a 50 to 100 year life span; decisions should be seen in that context.

COST ANALYSIS

Dover's Community Center project is 20,335 sf and the low submitted bid was $16,887,700, not counting the alternates. This translates into a per square foot cost of $830. To reach the target per square foot cost of $700 psf (rounded), a savings of $2,707,700 is required. The assignment is to explore how to achieve or approach this level of cost reduction without impact to the size of the program spaces.

ESCALATION TO BID DATE

Whatever numbers are accepted by the Town, moving forward will need to be adjusted for anticipated escalation. Assuming that Dover's CC is re-bid in May of 2023, the escalation factor is estimated to be 6.67%

COMPARISON

Pembroke's CC was designed over a similar time frame, estimated by the same cost estimator within 5 weeks of each other and bid by the same general contractor. We thus have excellent comparative cost data. Pembroke's CC was bid three months <u>after</u> Dover's CC so escalation had a 2% negative impact on Pembroke's cost in comparison. To make the comparative numbers easier to track, this escalation is not factored in.

The buildings are somewhat different in their approach. Dover's community center is brick clad with a load bearing masonry construction system for part of the projects and a steel frame with concrete for other parts. The building is architecturally more detailed and spaces such as the multi-purpose room are designed in a more institutional manner than Pembroke's. Pembroke's building is more akin to the white wood New England Town Center buildings, several of which are near the Pembroke site.

Due to cost escalation and the goal of reducing embodied carbon, Pembroke's CC utilizes a wood structure. Cost and contextual factors lead to pitched asphalt shingle roofs, and simple building forms. Cost escalation also resulted in very closely managed circulation space in the building.

The Pembroke building is 27,835 sf while Dover's is 20,335 sf (both rounded). The building programs are very similar with the main difference being Pembroke's full double court gym with

the regulation basketball court expanded in width and length to accommodate a walking/running track on the second floor, above the gym floor. Pembroke's cost per square foot is $646.

Dover's construction budget was $14,180,000 and given the building area, the budget cost per square foot is $698. The budget is $54 psf above the Pembroke low bid cost. It could thus be assumed that the DCC could be "simplified and re-specified" with some "extras" included if the Town choses to make a modification.

The buildings being similar in program, location, and bidding period, the actual filed sub-bid numbers provide a good point of reference for where potential savings may be achieved. The chart on the following page lists the filed sub-bids (fsb's) by value and per square foot of building area. There are some areas where the fsb values are very different. This is due to items such as masonry, metal windows that are contained in the DCC and which are fsb's whereas PCC specified products that are not fsb's.

The chart, where the scope is similar, provides some guidance as to where savings may be sought. For example, the Allied Consulting Engineering peer review (included at the end of this report) discusses differences in approach; these are perhaps identified in the per square foot differential between the fsb's for mechanical, electrical and plumbing trades. The large delta in the fire protection fsb is due to the difference in system necessitated by limitations to Dover's water supply.

	Filed Sub Bid Comparison and Analysis for Potential Cost Savings			
	project bid during similar time period, used the same cost estimators and same contractor responded to questions			
	cost component	Dover CC	Pembroke CC	note
1	Masonry	$949,000	$99,815	brick façade @ DCC is filed sub bid, hardie board at PCC is not a filed sub bid
		$47	$4	
2	Miscellaneous Metals	$259,059	$338,038	
		$13	$12	
3	Waterproofing	$188,000	$329,450	
		$9	$12	
4	Roofing	$797,000	$392,600	roofing includes roofing details which are more complex at DCC
		$39	$14	
5	Windows	$384,985	$289,797	metal window at DCC is FSB, fiberglass window at PCC is not
		$19	$10	
6	Glass & Glazing	$27,864	$9,432	this is interior glass & mirrors
		$1	$0.34	
7	Acoustical Tile	$147,800	$114,800	area of ACT is similar in both buildings
		$7	$4	
8	Resilient Floor	$173,877	$155,419	unlike DCC, gym floor in PCC is wood which is not a filed sub bid
		$9	$6	
9	Painting	$86,840	$108,560	
		$4	$4	
10	Tile	$17,750	$148,893	
		$1	$5	
11	Fire Protection	$1,116,300	$226,220	DCC includes the fire pump and storage system that PCC does not have
		$55	$8	
12	Plumbing	$608,200	$538,000	
		$30	$19	
13	HVAC	$1,258,600	$1,157,000	
		$62	$42	
14	Electrical	$1,497,000	$1,639,000	
		$74	$59	
15	Demolition & Abatement (estimates)	$618,417	$1,218,070	both projects involve demo & abatement
		$30	$44	
16	bid amount	$16,887,000	$17,977,000	base bid amount does not include the add alternates that were bid
		$830	$646	
17	building area	20,335	27,835	

PEER REVIEW EVALUATION

This review focuses on these main topics of potential cost reduction or suggestion. Once again, these are only suggestions and not meant to cast blasé. We reiterate that none of the decisions in the bid documents were made without diligent evaluation and discussion. The points of review are as follows.

- First, what is the impact of re-specifying certain items of construction to value engineer the cost to a reduced figure?
- Second, are there elements of the site that could be reconsidered to lower the construction cost in light of the cost overrun?
- Third, are there architectural plan issues that can be considered that would reduce the overall area without impacting the specific program areas?
- Finally, we will offer a few suggestions related to the site parking and building configuration that we think are relevant and may or may not be of interest to the Town.

COST SAVINGS

A summary of suggested general cost savings is listed below. The Subtotal seen below will need to be adjusted for escalation. Escalation is projected to be around 6.5% from the time that these numbers were provided up to the point of bidding next spring. Assuming an actual bid next spring, the above cumulative savings would be $866,000 (rounded). The costs include a 15% contingency factor. A/E and OPM costs may also have to be included into the final cost savings analysis.

Potential Savings				
	item	trade costs		note
1	Structural Frame Modification	$75,000		wood reduces embodied carbon, is a renewable resource & is less expensive; A/E changes would be time-consuming and expensive
2	Exterior Façade Cladding	$430,000		brick to fiber cement boards; reduce extent of re-pointing existing brick wall
3	Eliminate Closed Cell Insulation; simplify wall	$30,000		inside face of existing brick mass walls
4	Window frame modification	$65,000		metal windows ($125 psf) to fiberglass ($100 psf)
5	Roofing	$25,000		would require a roof structure change at MPR
6	Building Configuration & Detailing Modification			multi-purpose room gutter and soffit; other details/
7	Delete Skylight & Metal Roof at MPR	$25,000		
8	Site Furniture	$50,000		defer for fundraising alternative
9	Exterior Basketball Court	$65,000		defer for other funding
10	Parking Lot Relocation			tbd if applicable
11	Landscape Material Reduction	$15,000		trees & planting
12	Parking Lot reconfiguration	$25,000		this change is more of a functional change than a cost change
13	HVAC modifications	$40,670		cumulative modifications discussed in peer review letter allow $2 psf
14	Electrical modifications	$20,335		cumulative modifications discussed in peer review letter allow $1 psf
15	Light Fixtures	$10,000		modify selection of certain decorative fixtures
16	Plumbing modifications	$20,335		cumulative modifications discussed in peer review letter allow $1 psf
17	**Subtotal**	**$896,340**		

DETAIL DISCUSSION OF THE SAVINGS

Structural Framing

The savings here is in wood frame construction versus a combination of load bearing masonry walls and steel frame with concrete floors as the Dover CC is designed around. On typical 15,000 sf community buildings, the savings has been calculated to be between $100,000 and $200,000. A further rational for this change is that wood is a carbon absorber whereas steel and concrete used are carbon emitters. Embodied carbon refers to the carbon used in manufacturing, transportation, installation, maintenance, and disposal of building materials. Embodied carbon in buildings is significant and certain municipalities are looking to reduce this embodiment.

Framing

We have successfully met the energy codes with wood framing without resorting to exterior insulation. While exterior insulation is ideal, 8" wood studs could be used to frame these two major rooms. This cavity filled with high performance insulation may allow elimination of the exterior insulation. This in turn simplifies installation of the exterior siding. It may be that the recreation court space would remain steel framed with light gauge metal framing in which case exterior insulation is required by default. This framing alternative should be less costly than the load bearing masonry walls the space is currently constructed with.

Changing construction of the recreation court would make it similar to the rest of the building and eliminate a filed sub-bid trade from construction sequencing of this space. One structural system would facilitate schedule and likely make the 14-month schedule realistic. As it stands, with both load bearing masonry and steel frame, there will be coordination and time lag involved as the masonry wall is erected more slowly than a steel frame wall.

Exterior Facade

There will be a reason for each decision and the use of brick is an obvious decision noted for various reasons. There are other components of the wall system that can be explored (in the next section). The combined exterior envelope cost for the Dover CC appears to be $1,668,000 while the comparable scope for the Pembroke CC is $1,308,000. Pembroke's building is 137% larger This points to potential cost savings.

Exterior cladding

Could the additions to the 1910 brick building be some material other than brick which would serve to save money and perhaps make clear the distinction between the original building and new construction? There is a potential savings of $430,000 by switching to a fiber cement product like Hardie Board versus brick. Alternatives could be Cera Clad, Swiss Pearl, SVK, Nichia, or other high density fiber cement board for slightly less savings.

The above example demonstrates mixing of brick and traditional fiber cement board for scale and cost purposes.

The savings attributed to a "non-brick" material emanate from various sources including the sheathing system, the insulation, and the brick attachment system. An alternative siding can be nailed directly into the SIPS sheathing panel used for exterior insulation such as the ZIP product. Brick also requires a more robust windowsill when compared to other wall systems. It appears that precast is used at the DCC.

Existing Building Brick Exterior Walls

The inside face of many mass masonry brick buildings like at Dover's 1910 school building are not being insulated. This may sound counterintuitive, but solid mass masonry brick walls do not have a drainage cavity. Any moisture that is entrapped in the wall can reside in the wall. When the walls are uninsulated, they are naturally maintained dry and tight. When insulated, water can be trapped within cracks in the wall which then freezes. This freeze/thaw process causes deterioration of the brick wall. The existing condition of the brick wall is a good example of a building enduring the past 112 years.

This is not to say the roof should not be insulated. Much more heat escapes through the roof than the walls so roof insulation is a necessary component and is provided in the design.

An energy model can demonstrate the energy value of the interior insulation. With the relatively small area of brick wall, the extent of service rooms against the brick wall (25% of the perimeter) will likely show a diminimous return on insulating the perimeter.

Closed cell foam was used for insulation. This foam is installed on a mesh type system to maintain an air barrier between the wall and the foam. This does keep the inside face dryer, but the wall remains un-tempered by virtue of the insulation. In addition, there is a cost to the installation method, which is added to the cost of the closed cell foam.

Once again, there is logic to the documents. If the Town opted to retain insulation at the perimeter walls, it could be done with an insulated panel as part of the room sheathing GWB system for a similar level of savings.

Windows

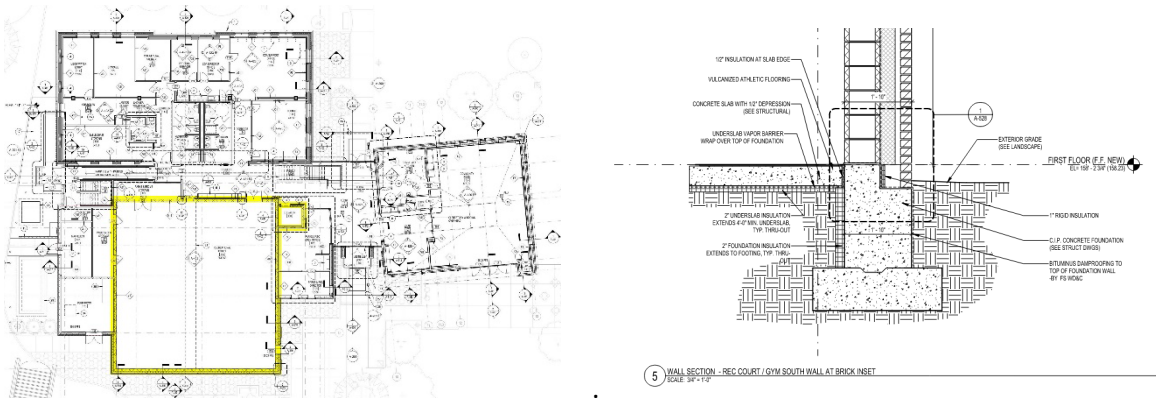
Metal windows and storefront in roughly equal proportions are specified for the Dover CC. A common value engineering substitution is to use a pultruded fiberglass framed window in lieu of metal windows. With a sharp-edged profile due to the manufacturing process, this frame provides an aesthetically acceptable window with higher energy efficiency rating. The window is often specified for its thermal value. An alternative is a Passive House pvc framed window such as made by Intus or Rehau. The fiber glass frame would result in a trade savings based on results from two recent CC bids. The metal window is a filed sub-bid while the fiberglass framed window is not.

Roofing

Roofing on the Dover CC is a combination of membrane roofing, metal roofing, and asphalt shingle roofing. The membrane roof is over the recreation court. To replace this with an asphalt shingle roof would require a sloped roof necessitating a change to the design and structure. Depending on the roof shape, there could be additional wall surface with a pitched roof, i.e., gable end sections. The cost difference in the fsb numbers has a great deal to do with the complexity of the roof edge in the MPR which is discussed below.

Exterior Wall Construction and Foundations

The scope of this peer review does not cover structural calculations but from experience, the structural foundation sizes appear large. As mentioned above, use of brick brings collateral cost impacts and a reason for the thick foundation walls is the 12' load bearing masonry wall which then has exterior insulation and brick cladding. The wall is twice as thick as would be a wall for a framed structure (with a framed structure other measures can be installed inside the recreation court to protect the walls). This would take more engineering design to exactly prescribe any savings but comparison of Dover's CC with a conventionally framed CC of similar size shows the concrete costs to be approximately $50,000 higher for Dover.



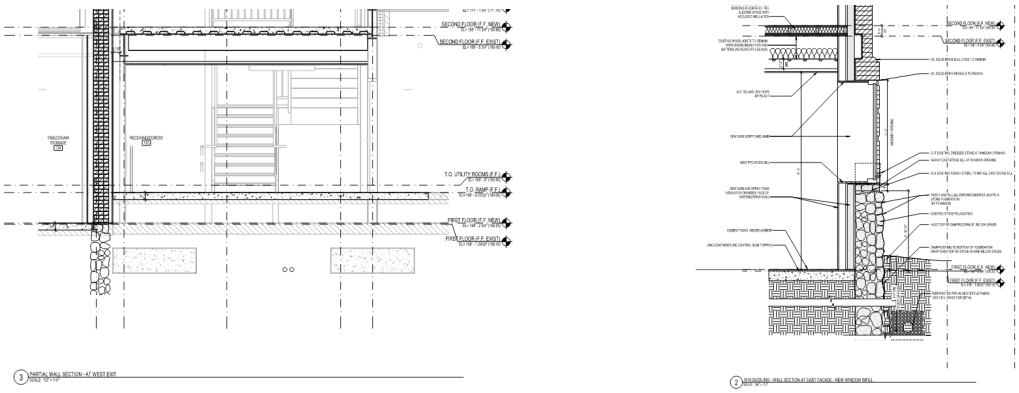
The left image above shows the extent of load bearing masonry walls. The drawing on the right shows the foundation condition required for load bearing masonry and the attendant extra concrete material involved as compared to a conventional wall.

The above illustrates other treatments for recreational courts to protect the walls when framed. These treatments can add to the aesthetics of the room when compared to painted concrete block.

Constructability

Sheet A317 and other sections reveal locations where new construction encroached on the existing rubble masonry foundation (see sketch below). This drawing appears to show the existing wall within the zone of influence from the new foundation wall. Excavating and forming this wall in such proximity to the existing foundation is difficult and likely accounted for in the cost. No cost savings has been attributed to this. However, if alternative structural systems were considered, the lateral bracing and attendant large footings could be re-examined.

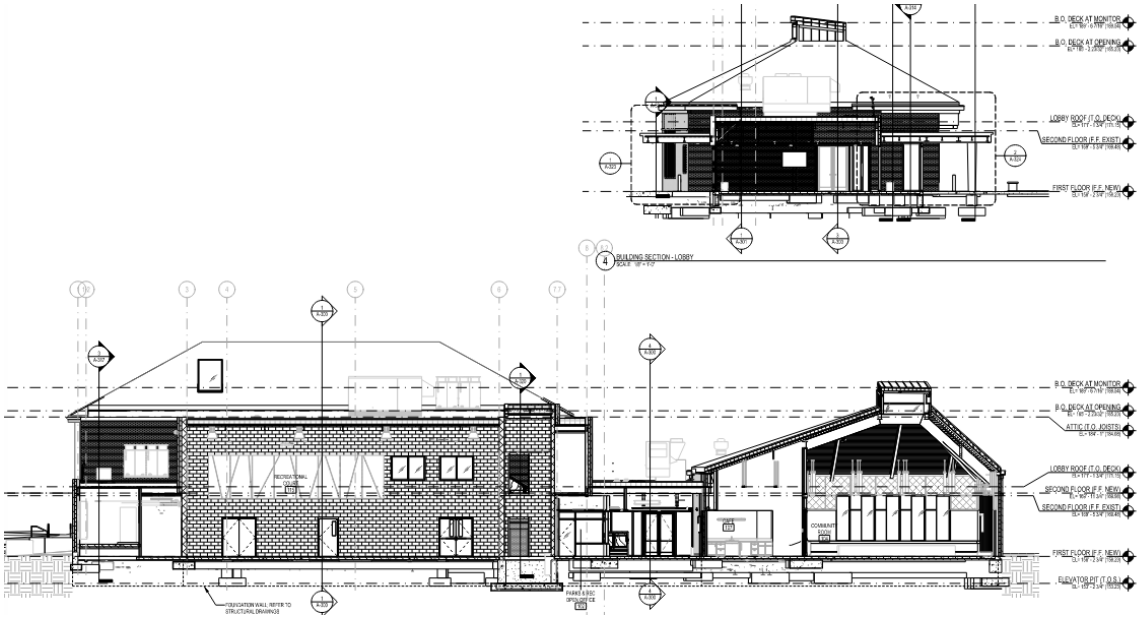
Another way to consider slimming down the perimeter foundation is to thin down the 12" concrete block wall in the recreation court. As the wall is grouted and reinforced, it is likely that a thinner block may be useable resulting in savings. This is not yet factored into the cost analysis.

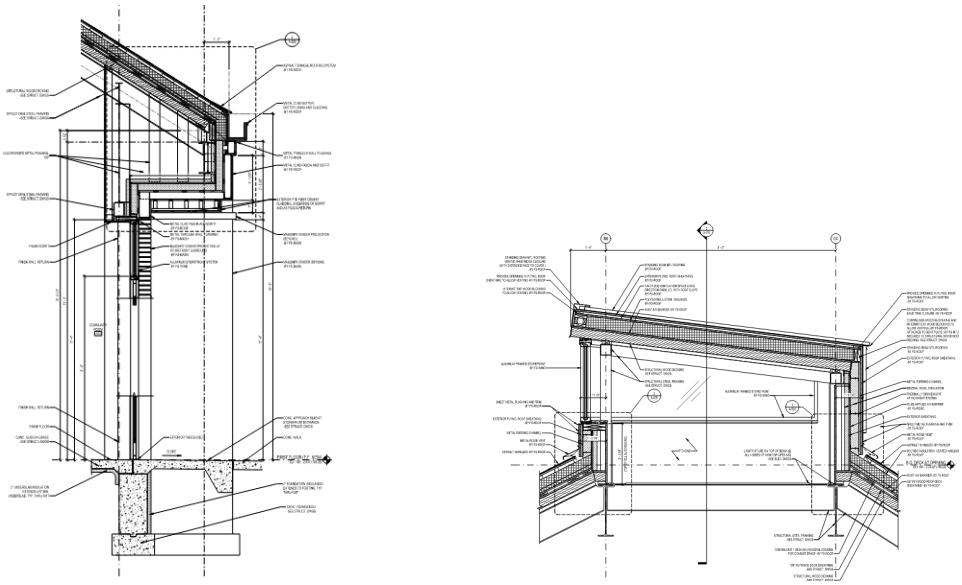


The drawing above left shows foundations near the rubble masonry wall. These large footings can only be poured after excavating the ground floor slab of the 1910 building. The right hand drawing shows exterior grade up against the masonry rubble wall. We suggest an interior or exterior water break wall for this condition as the earth against the perimeter should be lower in an ideal condition.

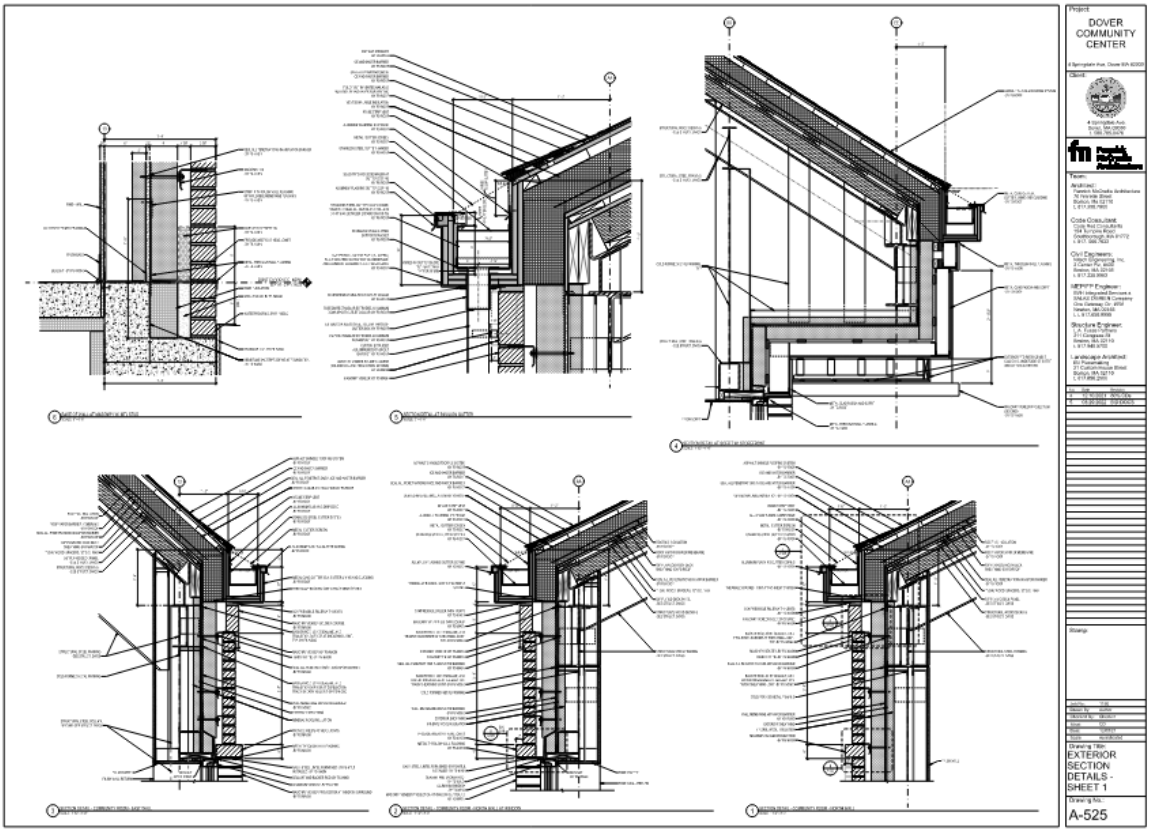
Simplify the Building "Shapes"

With the goal of advising where potential cost savings can be found we will come up against reasons for the design being what it is. Without judging the design, we can point to some obvious areas where cost is incurred. These include the shape of the MPR, the roof monitor, the use of steel beams in the roof form and the built in gutter system shown on details below. Storefront is employed in the MPR. An alternative is to explore use of Passive House type PVC storefronts such as made by INTUS which are less expensive or to explore mulling together large format fiberglass windows which are approximately 80% less costly than storefront systems.





The above details show the roof monitor which brings with it metal roofing and a sub frame for its structure. The left drawing shows the complication of the perimeter wall. It is nicely designed and detailed but does add a cost factor to the project and alternatives are feasible albeit with a different aesthetic.



MECHANICAL AND ELECTRICAL SYSTEMS

There is an attached report from Allied Consulting Engineering commenting on the plans. Understanding the impact of their suggestions will require more analysis and pricing by the cost estimator. See the letter peer review included at the end of this document.

Light fixtures also appear to be a cut above what would be typical for a public community center from our experience. It is a nominal cost but approximately $10,000 in trade costs might be saved by re-evaluating the light fixture selections.

SITEWORK AND FURNISHINGS

The sitework is often a cost savings target and it is apparent that there could be some cost savings to the plan. Some of the landscape costs were add alternates and we did not include those in this evaluation of the base bid price.

Site Furniture

There is a fair amount of site furniture that could be deleted or deferred to some other date. Other communities have used site furniture as a fundraising opportunity. The direct trade cost is approximately $54,000.

Exterior Basketball Court

Whether this is essential to be in the base bid or not, an outside basketball court is an easy item to phase in at a later date. Using the PM&C cost estimate, the value of the outdoor court is estimated to be almost $100,000. In our experience, an outdoor court with fencing and access sidewalks is worth $65,000.

Paving

There is a fair amount of paving on the site. The scope could be reduced by approximately 10% in our opinion resulting in a $15,000 savings. Some of that savings could be achieved by relocating the parking lot.

Landscape Material (trees)

Trees are beneficial but again, something that can easily be added later through fund raising or other appropriations. They are not essential to the mission and thus, some trees could be eliminated from the plan resulting in a $15,000 savings.

ARCHITECTURAL PLAN CONSIDERATIONS FOR COST SAVINGS

Clearly, changes to the project specification and design of the buildings will not bring the project to the appropriated funding level. This begs the question; can the building be made smaller without sacrificing the program spaces?

Mechanical Rooms

Comparing the DCC to the PCC shows 1,770 sf versus 990 sf of space for electrical and mechanical systems respectively. Both projects have generators and while the DCC has provision for future solar the PCC includes solar in the project as bid. Thus, the infrastructure needs are similar. Let's eliminate the fire pump room from the analysis as that is a unique DCC requirement. The PCC is overall 30% larger than DCC and the mechanical rooms are approximately 500 sf larger. To verify if this is an anomaly, we also reviewed the just completed Sandwich Community / Senior Center.

With full building generator and rooftop solar, and a similar VRF system to Dover's, the mechanical spaces total 900 sf.

The fire suppression room adds a unique component to the Dover mechanical and utility space needs. Again, at the cost per square foot that building are running at, a small savings in space can become a significant cost savings.

Storage

The adage is that there is never enough storage and it is obvious from the project minutes that this is true in Dover. There is 1,355 sf of storage rooms in the building not counting the custodial storage room. At the cost per square foot, that translates to over $1M in construction cost or over $50,000 per year in principal payments alone over the next 20 years.

Alternatives we often see is the use of pods or off-site private storage for sport league equipment which is less expensive. Sudbury for example used this model. Table and chair storage may be evaluated if specific tables and chairs and counts are determined. We would typically see 200 sf for table and chair storage for rooms of this size.

Each community is different but, for a similar sized CC building we have 500 sf of storage space which for Dover could translate into either a cost reduction or another 855 sf program space.

Circulation and Other Overhead Space

In review of the plan, we note that there is a significant amount of circulation space totaling approximately 4,000 sf. At the cost per square foot of this building, that is a significant total cost. Our experience, even when utilizing inefficient existing construction such as the 1910 building, is that the circulation could use less area. As a point of comparison, the PCC has 2,200 sf of circulation space.

We include a chart below which generally categorizes the spaces within a community center and compare the Dover CC with those in Pembroke and Sandwich. Both alternatives include full court gyms which explains the overall difference in area.

Comparison of Building Areas between current similar Community Centers

Building Area	Dover CC	Pembroke CC	Sandwich CC
Program Spaces	7,700	8,400	8,200
Recreation Court	3,550	10,900	8,100
Walking Track		3,120	2,300
Circulation Space	4,460	2,200	2,800
Mechanical & Building Services	1,770	990	1,050
Restrooms	1,050	1,110	1,950
Storage	1,770	580	1,200
TOTAL	**20,300**	**27,300**	**25,600**

Footprint Reduction
The best savings come from reduction of area. Can the building area be reduced in any way? Likely, this will meet resistance but we offer it as an option to consider.

We would target the one-story element on the west side of the gym and do whatever is possible to reduce this area. Again, there is logic to the design. This area houses the water pump room, storage, electrical closet and parks and rec storage. The space totals 955 sf. If one assumes the water pump has to remain near this location, there may still be some space that can be eliminated.

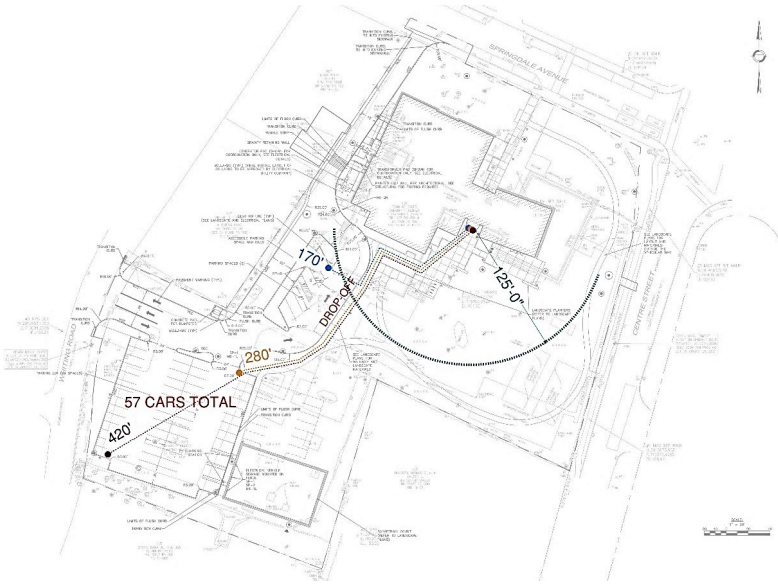
Another option to consider is locating space on the second floor behind the elevator. This would be inexpensive space because you already own roof, walls, and foundations. They are just moved around if you add on the second floor and the sf cost is on the order of 50% of total new space.

With the storage calibration and the footprint reduction one could either save a significant amount of space or, get the recreation court within 500 feet of being a full useable court. With this option before them, the committee and Town could make an informed decision. Any of these options will require a recalibration of the thinking about this DCC.

SUPPLEMENTAL PEER REVIEW PLAN ISSUES
In review of the documents a few items stood out that will be discussed below.

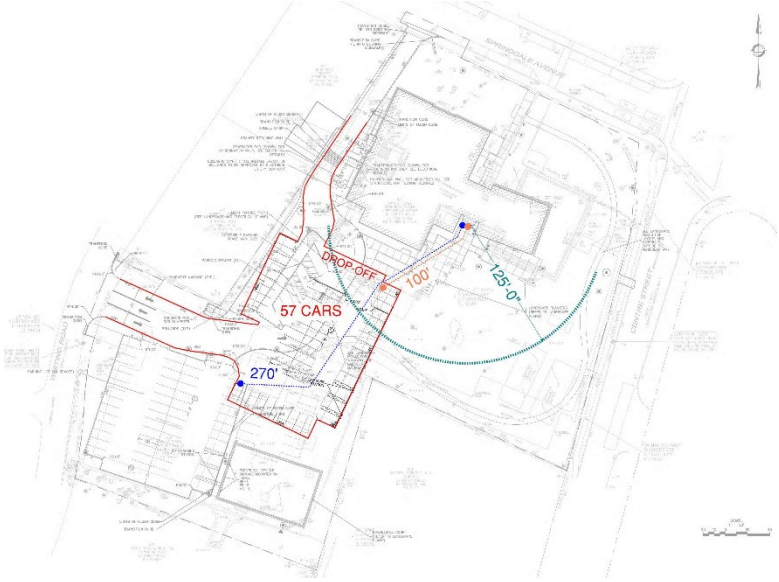
Parking and Access
Not all seniors or users are disabled and not all that have mobility challenges have “handicapped stickers” for their cars. With senior center programs, we have found it to be a “best practice” to locate 50% of the parking within 125 feet of the front door. The reason being that it is human nature to park in a space as close to the front door as possible. By having a reasonable number of parking spaces within proximity of the front door, more opportunities are available for the mobility challenged.

With the as designed site plan, the closest accessible parking space is located at a travel distance of 170 feet from the front door. The main parking lot with all of the non-accessible parking is at 280 feet from the front door to the first space with the rear corner being 420 feet from the door. This is a long distance for people to walk with mobility or weather-related challenges. We encourage Dover to study if this can be improved. We understand the benefits of reconstructing the existing paved area for the new lot but there are alternatives that would provide much improved drop-off and access to the front door for your users. Some examples are shown below.

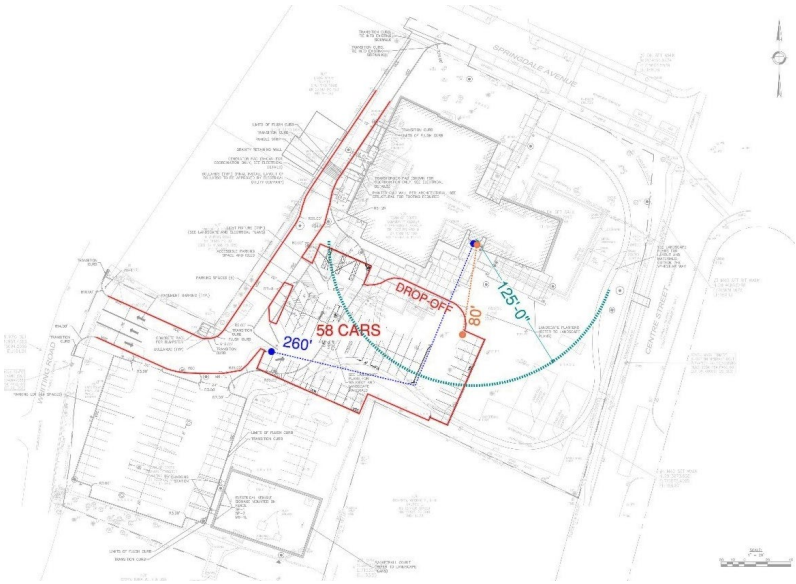


The drawings below represent the as designed site parking as presented in the construction documents

This drawing demonstrates an option to move the parking and drop off closer to the building entry for improved accessibility while reducing the scope of the sitework by reduction of paving, curbs, drainage, and sidewalks. It maintains the paved areas outside of the MPR.



This alternative demonstrates the parking and drop off even closer to the building entry for accessibility while reducing the scope of the sitework by reduction of paving, curbs, drainage, and sidewalks. Parking in front of the building is likely less attractive options.



ALLIED ENGINEERING REPORT

The mechanical, electrical, plumbing and fire protection review follows. The difference per square cost of each of these filed sub-bids between the reference projects is significant enough that, with the aid of Allied's comments, $1 or $2 per square foot should be achievable as a savings for each trade.

CONCLUSION

With some diligent work, up to $1M in cost savings may be achievable. None of the changes will be easy to make and all will meet with resistance. Its natural to buy into decisions especially ones that were thought about as much as the DCC has been. The peer review team was charged with coming up with ideas and of necessity these create a challenge. The peer review is not meant to cast blame as the project as designed and documented is consistent, supported and documented. However, it is also evident that should the Town want, a less expensive project can be achieved but to achieve those savings the PCC exhibits would take work.

Dover Community Center
4 Springdale Ave,
Dover, MA 02030

November 11, 2022

Final Bid Documents Peer Review

Allied Consulting Engineering Services conducted a design peer review of the HVAC, Plumbing, Electrical, and Fire Protection final bid drawing set for the Dover Community Center. The set is marked as Revision #5 and dated 03/29/2022. We did not have the specs to review. The peer review was intended to identify items that could be refined or simplified.

HVAC

General

1. We did not perform heating and cooling load calculations for the building so cannot carefully analyze adequacy of the fancoil and RTU sizing. We did look at several spaces on a sqft basis and will comment below.
2. The building is heated and cooled by three different systems.
3. System 1 - VRF system consisting of (2) 12-ton air cooled Trane heat pumps with multiple indoor fancoil units. The system is divided by floor.
4. System 2 – The Gym is served by a rooftop unit with DX cooling, heat pump and electric heat and an energy recovery ventilator (ERV) section.
5. System 3 - The Community Room, Kitchen and Café are served by a rooftop unit with DX cooling, heat pump and electric heat and an ERV section. There are three (3) VAV boxes, 1 for each space.
6. Mechanical ventilation is provided for the building by a 100% dedicated outdoor air unit with DX cooling, heat pump and electric heat, and an energy recovery wheel.

Zoning

1. In general each room served by the VRF system has an individual fancoil unit, which means each space is a zone and will have its own thermostat.
2. The Gym is a single zone, which seems appropriate.
3. The Community Room, Kitchen and Café each have a VAV box which provides individual temperature control.

Sizing (general discussion)

1. We did not perform heating and cooling load calculations for the building so cannot carefully analyze adequacy of the fancoil and RTU sizing. However we did do a basic sfft analysis as noted below.
2. ACCU-1 (12.5 tons) is sized for ~525 sqft/ton, which is fairly nominal.

   a. There are ~14.5 tons of fancoils connected, which is also fairly nominal. A good feature of the VRF system is that the outdoor units can be sized for the peak load of the building rather than the sum of the peak loads of the individual spaces.

3. ACCU-2 (12.5 tons) is sized for ~440 sqft/ton, which is also fairly nominal.
   a. There are ~11.25 tons, which is less than the capacity of the heat pump. There is not much difference, so it is likely that a smaller outdoor unit would be too small. There is also some benefit to having both ACCU-1 & 2 be the same model and size.
4. RTU-1 (Gym) provides 15 tons of cooling to the space, which works out to ~234 sqft/ton. This is a lot of cooling, but the space has a high people load (at times), and the unit is variable speed and will ramp up and down to meet the load.
   a. The amount of outdoor air provided in RTU-1 (2500 cfm) might be somewhat high. Per the architects plans, there are 236 people in in the space. At 5 cfm/person this is 1140 cfm, plus 0.06 cfm/sf * 3519 sf = 211 for a total of ~1350 cfm. The outdoor air modulates based on CO2, so it may never run at full outdoor airflow.
5. RTU-2 (Community) provides 1.6 cfm/sqft., which like the Gym is a little higher than normal, but again the space is people intensive at times and the unit modulates.

Potential Cost Savings / Additional Design Comments

We obviously didn't design the building and don't know all the reasons for different design decisions, but we noted a few items that could be considered for cost savings if needed.

1. The outdoor air system is designed to provide supply and exhaust to each space, regardless of size. For the spaller spaces such as offices, it might be possible to only provide supply to the space and let the excess air leave via the door crack/undercut, and have fewer central exhaust locations, which would reduce ductwork.
2. In some areas the outdoor air supply could be introduced into the ducted fancoil return, which would eliminate the supply grille.
3. It is our understanding that the outdoor air unit will ramp up and down in response to CO2 in the building. We could not locate the CO2 sensors, but the sequence of operation seems to say that the unit will ramp up and down in response to any particular sensor exceeding 800 PPM. If there is any particular room that generally has more people a lot of the time, then it appears that the rest of the building will be over-ventilated. Consideration might be given to providing automatic dampers in spaces with high variability in ventilation demand (flex rooms, fitness), to be able to control the outdoor air to those rooms based on CO2 sensors or occupancy sensors in those rooms. This will still allow the RTU to ramp up and down, but it will be more precise. The dampers could be Aldes 2-stage units, with a high and low cfm.
4. This design includes a DDC system in addition to the controls provided by the VRF and RTU manufacturers. We are assuming that there is a town-wide DDC system that this will be connected to, but if it does not, the controls could be greatly simplified, saving cost and operational issues.

Electrical

1. The fire pump does not need to have a 1600 amp breaker – this is optional and could be deleted as a cost-saving measure.
2. Verify the building loads and the need for a 1600A switchboard.
3. A voice-evacuation system does not appear to be required for this building – confirm as this could be a potential cost-saving measure.

Plumbing

1. The building will be provided with a new 4" domestic water service. This seems more than adequate for the building.
2. Domestic hot water is provided by a 150 gallon electric tank-type water heater. The water heater serves 110 and 140 degree water to the building and kitchen. There is a recirculation system for each loop and a thermostatic mixing valve.
3. There is a new 4" sanitary discharge and 4" grease waste for the building.
4. There is a 6" and 8" storm drain for the building.
5. Secondary containment system for oil interceptor #1 is not required by code. We don't know if there are local requirements. Consider the use of "Striem" OS-50 or equivalent as alternate to currently specified oil interceptor.

Fire Protection

1. The sprinker system for the building consists of a (2) 30,000 gallon underground water tanks and an electric fire pump. It is our understanding from the Town water provided that the residual flow throughout the area is low and that this tank and fire pump system is similar to others required in Town.
2. We did not have hydraulic calculations to be able to review the system demand and verify the tank and fire pump sizing, but it is our understanding from the design team that the scope of the tanks and system was reviewed with the fire department and there are no reductions allowable.
3. The attic sprinkler system shows traditional upright style sprinklers spaced throughout. Specialty attic style sprinklers could possibly be used to reduce head count and overall water demand.

End of Review

APPENDIX

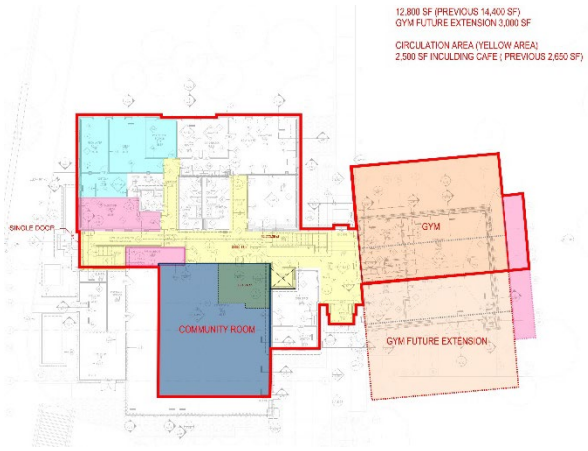
The Community Center Feasibility Study is an impressive document that uses several methods of assembling and analyzing data. "Choosing by Advantage" is a collaborative and transparent decision-making system that depends on all participants being equally well informed and experienced to articulate and select advantages. We once worked with the director of a major community center who comment to the design team was, "you may need to tell us what we need, not what we want." In other words, he was commenting on the reliance of feedback rather than experienced input. An experienced design professional can often bring something to the table that is at odds with consensus, but is viable in certain circumstances. In our review of the cost and value engineering suggestions, we saw certain decisions made and we offer alternative ideas here in the appendix. As an appendix, these can simply be discarded without impact to the rest of the review if desired.

The gym can be a programmatically responsive space in a community center serving sports, meetings, and certain cultural activities, if properly designed. It does have practical smaller limits. A decision was made based on the project budget for the "recreation court" (i.e., the gym) to be a half court, 3,500 sf space. The smallest sized gym with a recreation regulation court is +/- 5,500 sf.

When the design was configured, it was done in such a way that the gym could not be added onto in the future. The structure has load bearing masonry walls and the width dimension is not ideal for expanding the length. This turned a current financial decision on a 50-100 year building into a multi-generational decision. We'd like to offer that future generations may have the resources or see the advantages of a full court gym that are not evident today, so why preclude that flexibility. Can the Town plan for an expanded gym if it is ever decided it was necessary?

We suggest that the gym and the MPR could exchange locations. Of course, this changes the MPR and associated outdoor space. If switched, the outdoor space may have to be redesigned or relocated. It also changes the relationship of the space to the outdoor commons. This can be advantageous. North Andover located their gym onto a Town Common as did Pembroke. These gyms open to the common space creating new opportunities for indoor/outdoor community art shows, seasonal fests, or camp activities.

This community also located their CC on the town common. They made the gym an interactive feature with the green space. The transparent and interactive nature of the CC is carried into the inside with the use of heavy duty glazing systems. They utilized the small but full court faciltiy to increase use, simultaneously accommodating various age groups via dividers.



A simple diagram over the plan of the DCC suggesting that the "recreation court" could be located to allow it to become a larger a larger room in the future assuming that the end walls of the room are not load bearing masonry walls as now configured, thus enabling future expansion. This plan would have to be balanced with site plan and parking concerns discussed earlier.

There are several things to consider with community center multi-use space.

1. Setting up and taking down to switch from one program to another takes time and staff or volunteers. If pickleball is scheduled at 10-11, setting up and taking down nets will take time at both ends of this time slot.
2. Half-size isn't always half-use. The current "recreation court" will house one court; in a 5,500 sf room, you can have three or less courts at double the size. A single court facility of four players is not an ideal use of the 3,000 sf space. Finally, the larger space will allow two concurrent programs such as seniors and preschoolers simultaneously resulting in greater use of the space.
3. This will double or triple the programming you can provide in the space and allow for convenient use. Recent Senior Community Centers in Newton, Sandwich, Pembroke, Randolph, Falmouth, and Scituate opted to include gyms with or adjacent to their new CC facilities.

MULTI-PURPOSE ROOMS

The proposed Dover multi-purpose room is not sub-dividable and its dimension of 1,400 sf is on the small size from what we have seen in other communities. It is a very specific room, architecturally extremely nice with a vaulted ceiling with a clerestory cupola type window. The configuration has not been set for any sub-division that may want to occur over the life expectancy of the building.

On the left, a multi-purpose room is converted from dining to activity; it takes time and staff. Even affluent communities such as Cohasset may have a meals, coffee, or social program in the MPR. Typically, tables remain "set up" in 1/3 of the MPR space while the other 2/3 is more flexible. This keeps your staff from having to constantly put up and take down assemblies, allows for chance social use, and allows faster transition between events (the room may not have to be totally taken down after use).

BUILDING EFFICIENCY

The overall efficiency of the building is on the low side. This is in large part due to reuse of the 1910 building. Its two-story structure requires 2 stairs, an elevator, and rather inefficient internal circulation. It also required expensive cross bracing for lateral loading. The community overwhelmingly voted to keep the 1910 wing, so it is understandable why it exists. However, of the 5,880 sf on the 2nd floor, there is only program space for

- One subdividable MPR (949 sf)
- One fitness room (1,163 sf)
- One conference room (229 sf)
- This is a total of 2,341 sf useable space out of 5,880 sf, not an extremely efficient use.

The building has 23% circulation and a net to gross ratio of 1.41. A building housing this program in a more efficient footprint or layout could be smaller or have more program space.

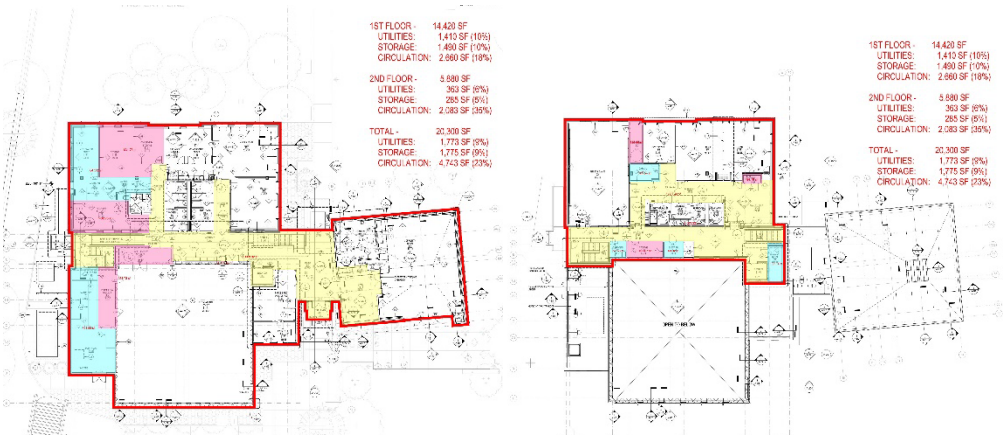
The DCC design is appealing, yet it is likely that more could have been achieved with a simpler and more efficient footprint. Here is how the building measures out.

	1st Floor	2nd Floor	Total*
Program Space	8,860 sf	3,149 sf	12,009 sf
Circulation Space	2,660 sf	2,083 sf	4,743 sf
Utility/Mechanical Space	1,410 sf	363 sf	1,773 sf
Storage Space	1,490 sf	285 sf	1,775 sf
TOTAL BUILDING AREA			**20,300 sf (rounded)**

Storage and Utility space are important, but due to their overall cost to the project, one might study if these spaces can be made more efficient. The same goes for circulation; this is a large area for non-program space. As a point of comparison, a 28,000 sf community center with gym has 450 sf of total utility/mechanical space. There is no sprinkler pressure tank at the referenced CC but, the difference in space allocation is 4-fold.

This will double or triple the programming you can provide in the space and allow for convenient use. Senior Community Centers in Newton, Sandwich, Pembroke, Randolph, and Scituate have all opted to include gyms with or adjacent to their new facilities.

Some potential plan diagrams below suggest that the floor layout may yield a higher level of program space especially on the second floor.



First and second floor plans showing open and circulation space in yellow with storage and mechanical rooms in blue.

PARKING

Any reduction in the amount of pavement is beneficial for the environment and the stormwater drainage system. The drawings show 55 striped paved spaces, 3 accessible spaces for a total of 58 paved spaces. There are 13 overflow spaces; our understanding is that these are on an unpaved surface. The provided parking appears to meet the requirements of the Planning Board decision.

The traffic report provided for this peer review (file dated 2021-10-28) used ITE metrics to state a requirement of 63 paved spaces, 3 accessible and 22 overflow spaces for a total of 88 spaces. Our experience with CC buildings of this size is that between 70 and 80 spaces are needed for staff and users. We only mention this as the Town may want to be prepared to pave the overflow spaces in the future should the need be required.