Value Engineering Study Report



Harbor Learning Center

Aberdeen, WA

Prepared for

Aberdeen School District

Construction Services Group

September 2025

Prepared by

Säzän Group

600 Stewart Street, Suite 1600

Seattle, WA 98101

(206) 267-1700

www.sazan.com

SÄZÄN
GROUP

October 13, 2025

Dax Logson, CCM
Executive Director of Facilities and Capital Projects
Construction Services Group
104 Clover Island Dr., Suite 202
Kennewick, WA 99336
dax.logsdon@esd112.org

Re: Harbor Learning Center
Value Engineering Study Report

Dear Dax:

Transmitted herewith is an electronic copy of the Value Engineering Study Final Report for the Harbor Learning Center project for your review. Please distribute to the project team for their review and comments.

Thank you for your assistance in supporting the VE effort. Should you have any questions please telephone me at 206.576.7233.

Sincerely,

Säzän Group Inc.



Steven Paget, CVS, LEED BD+C
Principal

Acknowledgements

The Säzän VE Team would like to acknowledge the special participation during the formal value engineering process and contributions that supported the success of this VE study.

Aberdeen School District
Lisa Griebel
Amber Diel
Countney Sandstorm
Lynn Green

Construction Services Group
Dax Logsdon
Caren Johnson
Manny Salvidar-Aguirre
Andy Twyman
Drew Pearson

TCF Architecture
JR Mill
Steve Wachtler

Metrix Engineering
Eric Nordlund
Ben Prehoda

LDC Corp
Maggie Howdsen
Ross Jarvis

Degenkolb Engineers
Dan Sloat
David Sommer

Clevenger Associates
Brent Hall

Site Workshop
Luke Vannice
Clayton Beaudoin

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1.0 Introduction

Introduction

A Value Engineering (VE) workshop was conducted to review the 95% Schematic Design (SD) documents for the Harbor Learning Center (HLC) project August 25 to 29, 2025. The owner is Aberdeen School District (ASD) and the owner's representative is Construction Services Group (CSG). TCF Architecture (TCF) is the prime architect/engineer (A/E) consultant. Säzän Group,Inc (Säzän) is the lead consultant and facilitator of the VE study. Representatives from CSG, TCF, and the Säzän VE team participated in the kick-off meeting for the workshop on August 25th, 2025. The study was conducted in accordance with the SAVE International Value Methodology Eight-Step Job Plan. A formal presentation of the workshop findings and recommendations was given to the ASD, CSG and TCF project team on September 3rd, 2025.

Study Timing

The VE study was held following release of the August 12, 2025, 95% schematic design documents which show a total building area of 46,007 SF. The Schematic Design Estimate prepared by RC Cost Group (RCCG), dated August 21, 2025 was considered the baseline for the VE study. The project has a budgeted construction duration of 30 months. The project is planning to bid in August of 2026, with construction scheduled to commence early September 2026 and be completed by February 2028.

Value Methodology

The formal eight-step VE process is an independent third-party review typically completed during the end of schematic design, or early design development in the project design process. The intent is to identify and document alternative solutions to project requirements which can improve performance relative to overall life cycle investment. The workshop follows the value methodology eight-step job plan beginning with pre-study preparations, followed by the information phase in a kick-off meeting with the client, design team, program manager and key stakeholders, progresses through function analysis, design and cost assessment, creative speculation, alternatives evaluation and development, and concludes with a presentation of study results to the project team and other key stakeholders, followed by an implementation phase including the incorporation of the VE ideas into the project design.

During ***1. Preparation***, the goal is to identify what is to be studied (the VM study subject) and when it is to be studied. The focus of the ***2. Information*** phase is to give the VE team an understanding of the program priorities, operations, budget, issues to be considered and goals for the study. The ***3. Function Analysis*** phase develops an understanding of the underlying functions the project must deliver to achieve the program objectives. The ***4. Creative Speculation*** phase identifies solutions to potential deficiencies and opportunities to enhance project value. ***5. Evaluation*** selects ideas with sufficient merit to warrant further analysis. In the ***6. Development*** phase, ideas selected for development into alternatives are analyzed and documented in workbooks for inclusion in the study report. Based on the analysis, the VE team makes a recommendation on the disposition of each alternative. At the conclusion of the workshop, the VE team makes a ***7. Presentation*** of findings and recommendations to the project team and other key stakeholders. During the final phase, ***8. Implementation***, sponsor and/or stakeholder acceptance of VM alternatives are incorporated into the subject under study.

Workshop Scope and Objectives

The purpose of the VE review is to achieve optimum project performance relative to the investment. The overarching VE assessment objectives include confirming that the program functions are being met, improving project quality, performance and sustainability, and reducing project initial and life-cycle costs. Outcomes typically are more cost-effective designs, early identification of deficiencies and omissions, and resolution of mismatches between performance, cost and available funding.

The primary workshop scope for the Harbor Learning Center project was identified as an evaluation of the schematic design set, associated documents and supporting cost estimates. The primary study focus was long term system durability, reliability, and maintenance. The RCCG Schematic Design Estimate shows a total construction cost of just over $38,164,581, including design contingency. This total reflects a project gap of approximately $1,456,520 over the project maximum allowable construction cost (MACC) budget of $36,708,061. This information added to the study a focus on strategies to reduce cost and improve bid responses. The VE team was additionally requested to provide an independent review of the cost estimate.

Specific objectives identified for the workshop include:

- Analyzing energy code implications throughout various disciplines.
- Simplify the site landscape/hardscape/play areas plans.
- Strategies to provide a building that school facilities staff can maintain and repair with minimal need for outside vendors.
- Strategies to provide a long-term durable facility with a 70-100 year life.
- Consider wood structure building; evaluation of whether design team met goals outlined to justify a steel building.
- Strategies to reduce mechanical system cost while retaining cooling.
- Consideration of materials selection relative to marine environment.
- Ideas to optimize grading, balance cut/fill.
- Selection of structural column types.
- Consideration of alternative lateral system.
- Efficient building floor plan for increased longevity.
- Egress pathways that are efficient to floorplan.
- Separation of program age groups adequately.

Evaluation Factors

The project team defined several criteria by which to evaluate the VE alternatives based on the project goals and study objectives. The following is a prioritized listing of these project objectives:

- Retaining district-defined program spaces while ensuring spaces are flexible and easily adaptable to evolving education needs.
- Analyzing program spaces and ensuring they are easily adaptable via an infrastructure/MEP/structural perspective.
- Retaining durable systems with strong longevity.
- Ability to maintain the facility and facility systems locally.
- Maintaining security throughout the campus considering nature of school as alternative high school.

- Connection of grade levels to the larger campus.
- Adhering to the budget.

The criteria were considered when selecting potential VE alternatives to assess and in the evaluation of the alternatives.

Study Team

The VE team members were selected for technical expertise in their discipline, the ability to hold a broad perspective spanning the full project scope, knowledge of the project type and their creative ability to identify alternative solutions achieving the functional, performance and cost objectives of the project. The team members include:

Team lead and facilitator:	Steven Paget, CVS, LEED AP BD+C, Säzän Group
Study assistant:	Natalia Winfield, VMA, Säzän Group
Architectural:	Samantha Wong, AIA, LEED-AP BD+C, Säzän Group
Mechanical:	Steve Sanders, PE, Säzän Group
Electrical:	Robert Grzan, PE, Säzän Group
Constriction Management	Dan Purefoy, CSG
Structural:	Theresa Daniel, PE, Integrus Architecture
Civil:	Chad Oxford, PE, Oxford Consulting Services
Cost Estimation:	Robert Muir, M.AIB, M.AIQS, CPE, Muir Construction Cost Index

Contact information for each team member is listed in the Workshop Attendee List in Appendix G Workshop Information.

2.0 Study Results

Cost Summary

Total VE Team Recommended Cost Avoidance		**-$5,737,000**
VE Proposals	-$4,406,000	
Cost Only Proposals	-$1,631,000	
Total VE Team Recommended Cost Addition		**$64,000**
VE Proposals	$64,000	
Cost Only Proposals	$0	
Total VE Team Recommended Value		**$5,801,000**

Total Owner Accepted Cost Avoidance	-$2,181,319	
Total Owner Accepted Cost Addition	$314,000	
Total Owner Accepted Value		**$2,495,319**

Total Owner Potential Acceptance Cost Avoidance *	-$1,569,000	
Total Owner Potential Acceptance Cost Addition *	$0	
Total Owner Potential Acceptance Value *		**$1,569,000**

NOTE *: Above costs include mutually exclusive concepts.

NOTE *: Potential Acceptance reflects the of 1 VE Proposal that remains "Decision Pending" on the VE Implementation Matrix

Implementation Summary

The typical return on investment (ROI) for Säzän VE Studies is 2,851%. In other words, for every dollar invested in Säzän's VE services, our client's benefit is $28.51 in value added (i.e., 1:29 ROI). In comparison, ASD's ROI for the Harbor Learning Center VE study is calculated to be 3,085%.

Key Findings

The VE team evaluated the design relative to: project goals achieved; functions served; technical considerations, constraints and issues; performance; risk factors; budget and estimated cost; and project delivery. The results of the VE team's evaluation of the design are summarized below.

Overall, the team found that the design team has done a good job of achieving the project goals and program requirements given the restrictions of the baseline building configuration, site layout and location. The VE team identified the following key findings we wish to highlight:

- While the HLC cost per SF for the building at $685 is 10% higher than the average of the comparable projects included in the VE cost model (adjusted for location and escalation), the cost/SF is reasonable for the facility. The sitework at almost $6.65 million or 17.5% of the overall estimated cost is adding considerably to the project cost.
- The VE estimate review opinion is that the design and estimating contingency of 7.5% is low for schematic design and the number of uncertainties remaining to be resolved. The escalation factor of 2.76% to the mid-point of construction could be adequate, however, tariffs and a delay in the project until 2027 could impact the cost.
- There are variations in the forecast tsunami inundation zone that show different levels of inundation around the school which could impact planning and future emergency operations.
- There is a large geotechnical risk without a full geotech assessment due to uncertainty with the extent of unsuitable soils to be over excavated and replaced with structural fill; both the site area and depth between 3 ft to 8 ft requiring attention is unknown resulting in a large variation in the potential cost. If highly expansive soils are not adequately removed, the risk becomes the potential for future movement of the structure and extensive cracking of the slab.
- Design team has indicated that the AHJ will not require major on-site stormwater detention and that stormwater can be discharged after water quality treatment to the municipal conveyance system. The cost estimate is currently carrying approximately $1.5 million for detention that may not be required. A written ruling from the AHJ is needed to resolve this uncertainty in the scope and cost estimate.
- Fire and first responder access to the utility yard and playground appear to be insufficient and not coordinated with fire marshal and code requirements.

- Space plan adjacencies appear to be appropriate for the diverse programming and the overall building layout is efficient. While having the GED suite on the ground floor would make sense from access and supervision perspectives, placement on the 1st floor does not seem feasible and the 2nd floor is appropriate for most adjacencies.
- Overall, building design will accommodate future flexibility for evolving program and pedagogical needs.
- Traditional wood framing does not appear to be an optimal approach. Use of mass timber may be needed to execute the program and architectural vision while maintaining future flexibility. A mass timber building would likely increase project cost, but would reflect the historic importance of the timber industry in Aberdeen.
- Building height appears to be greater than functionally necessary and results in high volume interstitial spaces.
- Lateral bracing of the structure using buckling-restrained brace (BRB) frames is most appropriate for the building design. Estimate appears to have an error with the BRBs - priced in the $4,750 range whereas frames will likely cost an average of $34,000 range, depending on types and quantities, with a potential overall impact of $600,000 - $1,200,000.
- Estimate appears to have underestimated the quantities for loadbearing structural steel using 13 lbs/sf for 2nd floor and 9 lbs/sf for the roof; VE estimate assessment is that potential quantity is upwards of 20 lbs/sf, with a cost impact of potentially up to $1.2 million.
- Selected HVAC system is robust, employs hydronic distribution which school maintenance staff are familiar with, and will serve the school well. It is a more expensive system with the HVAC units, distribution, and controls having greater complexity. Other systems can serve the school almost as well at a lower cost and with less complexity.
- Design power density appears to be greater than the actual projected demand, resulting in larger and potentially unnecessary additional cost for the power distribution.

Additional detail on the findings is provided in Section 4.0 Project Evaluation and Appendix D Cost Analysis.

Key Recommendations

The VE team recommends several key actions and alternatives that emerged in response to the workshop objectives, project goals, issues and shortcomings which were identified and opportunities to improve the project success.

- Tariffs are likely to increase future prices and warrant a contingency be carried of 5% - 7.5%. The other consideration is if the project schedule is pushed out, as was mentioned as a possibility, escalation percentage should be increased to account for this extension in the project schedule.
- Review the estimate and make adjustments to the superstructure pricing to better account for the load and lateral systems. Adjust the sitework estimate to reflect the required extent of over excavation and backfill and adjust accordingly if stormwater detention will not be required by the AHJ as indicated.
- Resolve the variations in the forecast tsunami inundation zone and consider applying the more conservative forecast in setting the building and site developments locations and elevations.
- Complete the geotechnical study in the near future to identify the remaining geotechnical conditions

and update the design, estimate, and construction planning accordingly. Determine if expansive soils will result in movement and slab cracking or if these risks can be mitigated with over excavation and replacement with structural fill. Consider completing a ground-penetrating radar (GPR) survey to identify any potential buried remnants from the demolition of the school building which burned.

- Obtain confirmation in writing that the AHJ will not require on-site stormwater detention and that stormwater can be discharged after water quality treatment to the municipal conveyance system.
- Reduce the building height to that necessary for housing mechanical equipment in an attic mezzanine and adjust the architecture accordingly. Consider simplifying the roof complexity in height and slope variations.
- Use wood sheathing in lieu of brick at select elevations to reflect the historical importance of timber to the community.
- Frame the roof of the classroom wing with steel joists in lieu of wide-flange sub framing.
- Centralize the location of the mechanical and electrical rooms to reduce distribution costs. Stack the electrical rooms for added distribution efficiency.
- Use indirect/direct pendant lighting at the early childcare program and all of the classrooms in addition to the science lab for improved comfort and performance.
- Consider the use of air-source direct expansion (DX) heat pump units and variable refrigerant flow (VRF) distribution of heating and cooling. Employ the system to temper the dedicated outside air system (DOAS) ventilation supply air and duct air directly to terminal devices and eliminate the VAV boxes.
- Consider locating the attic mechanical equipment, or a portion of it, on a low-slope, parapet roof at the gym and eliminate all or a portion of the mechanical mezzanine in the attic space, allowing the building height to be lowered.
- Review how building systems will operate and explore opportunities to limit power requirements to operational needs plus reasonable spare capacity employing demand/diversity factors in sizing of the electrical service and gear. Request AHJ permit approval contingent on the verification of future actual maximum power demand recorded over one year of occupancy.

Several of the key recommendations outlined above are discussed in Section 5.0 Value Improvement Alternatives. Section 5.0 presents several key alternatives the VE team recommends for acceptance or serious consideration.

3.0 Background

Project Description

The Harbor Learning Center (HLC) is a new alternative high school to be constructed on the southern side of Aberdeen. Funded by a seismic safety grant, the project aims to relocate the school out of the tsunami inundation zone and establish a durable, uniform design suitable for the marine environment. Serving six district programs for students ages 1–21, the 46,007 square-foot facility is designed for 410 students and will operate throughout the day and evening. The campus includes an on-site daycare for ages 1–5 with dedicated play and activity areas.

The civil design will expand the existing parking lot while addressing the site's southward slope along N I

Street. Stormwater management will be provided through water quality treatment for both the new and existing parking areas (detention requirements are yet to be verified). The service yard and a grease interceptor will be located at the northwest corner of the site.
The architectural design emphasizes security, durability, and flexible learning environments tailored to diverse student needs. The daycare section will be separate from the night school program area and has its own drop-off/pick-up access. Instructional spaces are strategically organized, with the nursing/phlebotomy lab near the high school, a shared CTE classroom adjacent to the library and maker space, and a second floor that mirrors the middle/high school plan while adding special education classrooms, a GED room, life skills space, business marketing CTE, and a rooftop area for environmental studies. The exterior uses durable masonry and metal finishes inspired by the region's coastal architecture.
The building will utilize shallow foundations, with any necessary soil improvements performed to avoid the need for deep foundations. Lateral stability will be provided through a Buckling-Restrained Braced Frame (BRBF) system, arranged in various configurations to suit the building layout.
The building will feature fully electric mechanical systems, eliminating the need for natural gas. The design incorporates a 4-pipe fan coil unit system paired with a heat pump, providing both heating and cooling. A Dedicated Outdoor Air System (DOAS) will use VAV boxes to provide zoned ventilation throughout the building. Domestic hot water will be supplied by a heat pump water heater. The building will be fully sprinkled in accordance with NFPA 13 standards, and will meet Washington State Energy Code (WSEC) requirements, though no additional energy efficiency targets are specified.
The building's electrical design includes a 1600-amp service and a 480 V switchboard distributes power throughout the facility, supported by an emergency generator. Interior lighting includes 2x4 troffer fixtures throughout most areas and high-bay lighting in the gymnasium. The design incorporates EV chargers with provisions for future expansion and a south-facing 25 kW photovoltaic system on the southwest roof.

Project Goals

Goals for the project outlined by the project team at the design presentation include:

- Locate facility on higher ground outside of the tsunami inundation zone.
- Safety and security of all students and staff both during normal activities and a seismic event.
- Long range durable design and construction given marine climate.
- Simplistic but effective building systems, with easy part procurement.
- Create robust district-wide standards for all current and future facilities.
- Uplift and celebrate the alternative learning programs.
- Flexible modern teaching spaces to serve current and future programs.
- Provide foundational pieces creating a campus feel between it and the high school.

Constraints and Issues

At the introductory meeting for the study, the project team identified several constraints and issues that have defined and impacted the project. These include:

- Atypical school building which will be open at all hours of the day and evening.
- Marine environment conditions degrading systems accelerating remaining useful life, oxidation of steel, water egress
- Tsunami inundation zone encroaches on southern end of site and boundary of inundation may be

incorrect.

Key Functions

Following the study informational meeting and a review of the project documentation, the VE team identified programmatic and facility functions the project must ultimately deliver to meet the program and project requirements and goals. The team analyzed the functional requirements and relationships between functions to better understand the project requirements. Key functions associated with the project performance and cost identified by the VE team include:

- Condition Space
- Deliver Project
- Distribute Power
- Enclose Space
- Express Culture
- Facilitate Maintenance
- Feed Occupants
- Finish Interiors
- Grade Site
- Illuminate Space
- Landscape Site
- Manage Stormwater
- Organize Building Layout
- Organize Site
- Park Vehicles
- Power Building
- Reduce Energy
- Remove Waste
- Support Load
- Ventilate Space

The functions listed above were used by the VE team to guide and organize the generation of creative ideas. A full list of identified functions is included in Appendix C Function Analysis. The VE team evaluated how well the project design is achieving the functional performance. The assessment informed development of several of the value improvement alternatives derived from the creative ideas generated by the VE team.

Additional background information on the project is included in Appendix E Background Documents.

4.0 Project Evaluation

The VE team reviewed the schematic design documents from the perspective of design professionals familiar with the design and construction of similar project types. The team utilized several analytical means to evaluate the project design and cost estimate. These included: peer review and site observation of project elements; function analysis of project requirements; design review; benchmarking of similar educational facilities; and construction estimate and project delivery evaluation.

Cost Analysis

Cost is a core factor in the analysis for all value studies. The value team completed an analysis of the estimated cost of the project and budget in comparison to recently reviewed projects of similar type and scope. This comparative data is useful for relative benchmarking of costs and helps focus the team's efforts on opportunities to improve value. The cost of comparison projects has been adjusted for escalation and location relative to the study project.

When comparing project costs, it is important to recognize that each project is developed according to the unique programming and design requirements of each client. Some owners place a higher priority on minimizing the initial cost of construction while others are more interested in minimizing their total cost of ownership, i.e., paying higher first costs to lower the overall life cycle costs of operations and maintenance. The latter paradigm is typically reflected in the selection of higher quality and durability of materials and

building systems with longer expected lifecycle performance. Additionally, each project site and context are highly variable, impacting the cost of the building. Therefore, in evaluating cost comparisons, it is important to recognize that cost estimates inherently reflect unique project constraints and client requirements.

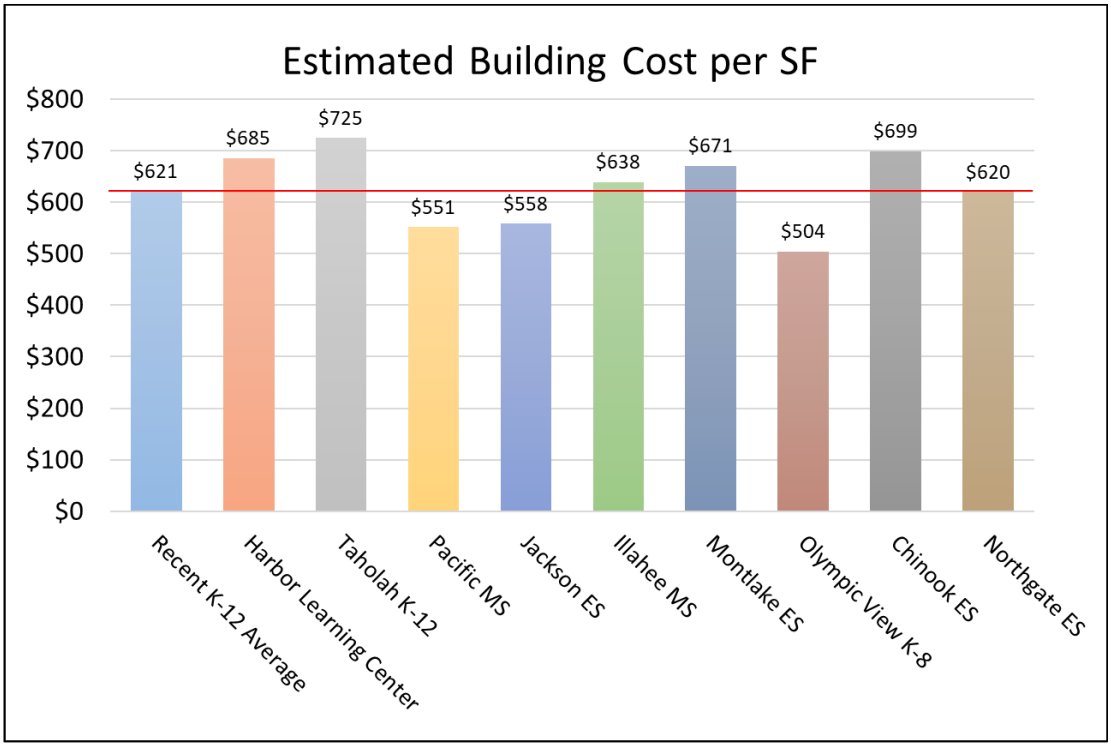
A comparative analysis of the Uniformat building system cost categories was prepared evaluating the project cost estimate relative to the comparison average. Several cost categories stand out as differing from the average. Key areas of concern are:

- Higher than average Electrical
- Higher than average Plumbing
- Lower than average Escalation
- Lower than average Foundations

Further evaluation of these cost categories is warranted. Additional detail is provided in Appendix D.1. Cost Analysis.

Comparison of Building Cost Per Sq. Ft.

The Harbor Learning Center School estimated cost stands out as being 10% above the average.



Of the major building system costs, the sq. ft. costs for several systems are well below the comparison average, and a couple above. Of these, the following stand out as differing significantly and warrant review.

Higher than average cost variances include:

- Exterior Closure +22% or $14 per sq. ft.

- Roofing +21% or $6 per sq. ft.
- Plumbing +37% or $8 per sq. ft.
- Electrical +29% or $20 per sq. ft.
- Equipment +17% or $2 per sq. ft.
- General Requirements +50% or $16 per sq. ft.
- O&P +30% or $8 per sq. ft.

Lower than average costs include:

- Foundations -17% or $7 per sq. ft.
- Superstructure -3% or $2 per sq. ft.
- Escalation -42% or $14 per sq. ft.

Cost Analysis Comments

- The cost estimate appears to be inclusive of the anticipated scope for the project. However, some of the unit pricing is not in line with other project estimates of similar scope.
- Design and Estimating Contingency markup is on the low side at the Schematic Design Phase, when the procurement method is design-bid-build and public bid.
- The wood-framed bid alternate price does not reflect the genuine cost of mass timber construction.

Constructability Comments

- Building layout with double loaded corridors and standardized classrooms is structurally efficient and easy to construct.
- Underlying soil conditions present challenges, contributing to increased time and costs for site preparation and foundational work.
- Site offers ample space for staging materials and equipment.
- Significant delays in delivery lead time are being seen for several sole source items including electrical distribution, mechanical, and elevator equipment.

The detailed cost analysis, estimate review, estimate revision, and risk analysis comments can be found in Appendix D Project Evaluation.

5.0 Value Improvement Alternatives

Following the VE team's review of background information, developing an understanding of the required functions and evaluation of the project design and cost, the team generated a list of 143 ideas addressing project issues and opportunities to improve project value. The team used the list of functions identified during function analysis to guide and organize the generation of ideas. This initial list of ideas was scored by the team using the project goals and study objectives as guidelines. Twenty-three ideas were identified as having sufficient merit to warrant further assessment and selected for analysis and documentation as project alternatives. Twenty self-explanatory ideas were priced but do not include full write-ups. The remaining ideas were either incorporated into the documented alternatives, presented as design considerations to be considered later by the project team, or deemed as not warranting further attention.

Key Recommended Alternatives

The VE team recommends the following alternatives which respond to the workshop objectives, project goals, issues and opportunities to improve the project success are accepted or given serious consideration.

Condition Space

CS-2: Use VRF system for heating and cooling for entire building (-$2,322,000).

Deliver Project

DP-9: Solicit the DAS system as a bid alternate (-$399,000).

Distribute Power

DP-15: Centralize and stack the electrical rooms (-$64,000).

Enclose Space

ES-18: Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere (-$77,000).
ES-20: Reduce the overall building and roof height at the classroom wing (-$532,000).
ES-21: Reduce the extent of curtainwall and use aluminum storefront elsewhere (-$162,000).
ES-25: Reduce glazing on south elevation by 20% (-$522,000).
ES-26: Reduce the extent of brick veneer at the north elevation (-$40,000).

Express Culture

EC-33: Apply wood exterior ILO brick at prominent elevations (-$322,000).

Facilitate Maintenance

FM-40: Use polished concrete ILO VCT/resilient in the corridors and commons on both floors (-$66,000).

Feed Occupants

FO-46: Reduce kitchen equipment allowance by 20% (-$91,000).

Finish Interiors

FI-50: Reduce casework by 20% (-$164,000).
FI-52: Reduce quantity of MDF paneling by 50% (-$165,000).

Grade Site

GS-60: Regrade northeast slope and eliminate retaining wall (-$22,000).

Illuminate Space

IS-68: Use indirect/direct pendant lighting in classrooms ($64,000).

Landscape Site

LS-72: Reduce landscape budget by 25% (-$126,000)

Park Vehicles
PV-101: Use angled parking with a landscape strip on western side of parking lot and remove/reduce site wall (-$65,000).

Reduce Energy
RE-113: Use split-wired controlled/non-controlled duplex receptacles and reduce quantity of controlled duplex receptacles (-$58,000).

Support Load
SL-128: Support building pop-outs between grids H and I on columns at building edge ILO cantilevers (-$19,000).
SL-129: Frame with steel joists ILO wide-flange sub framing at roof over classroom wing (-$521,000).

All documented alternatives are listed on the Value Improvement Matrix, including the estimated cost and the VE team's recommended action for each alternative. The complete list of ideas generated by the VE team is included on the Creative Idea List. It is recommended that the project team review the full list of ideas generated to determine if other ideas warrant further investigation. Additionally, the VE team priced multiple alternatives that include the back-up estimates but do not include full write-ups. The lists, estimates, and detailed workbooks documenting each alternative are included in Appendix B Value Improvement Alternatives. The project team's response to the VE team findings and recommendations is included in Appendix A Owner Implementation.

Appendix A
Owner Implementation

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Owner Implementation Matrix

September 2025

Function - Idea No.	Creative Idea	First-Cost Potential	VE Team Recommendation	Owner Implementation	Owner Accepted Amount	Comments
Condition Space						
CS-1	Use the DOAS system and displacement ventilation for cooling for entire building.	-$319,000	Consider	Reject		Does not meet current WSEC energy code.
CS-2	Use VRF system for heating and cooling for entire building.	-$2,322,000	Accept	Reject		Would not recommend VRF for this District as they are not familiar with system.
CS-3	Use all unitary rooftop equipment for heating and cooling of entire building.	-$855,000	Consider	Reject		Would not recommend for this District. Prefers hydronic systems.
CS-4	Remove all cooling except at administration and preschool wing.	-$285,000	Consider	Reject		Would not recommend as District desires cooling. District has requested cooling as a part of this project.
Deliver Project						
DP-9	Solicit the DAS system as a bid alternate.	-$399,000	Accept	Reject		Would recommend accepting this.
DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.	-$31,000	Consider	Reject		Will review this option. This would increase the main switchboard size, so consideration will need to be made on the tradeoff cost for this.
DP-15	Centralize and stack the electrical rooms.	-$64,000	Accept	Reject		This would require reorientation of the mechanical room and modification of the gym location to a less then ideal layout as the owner requested a direct opening from the gym to the commons area.
Express Culture						
EC-33	Apply wood exterior ILO brick at prominent elevations.	-$322,000	Accept	Reject		District only allows exterior wood in selected weather protected areas such as soffits.
Enclose Space						
ES-18	Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere.	-$77,000	Accept	Reject		District requested a durable wall material around the perimeter of the building.
ES-19	Use a low slope roof at the gym and lower the overall height.	-$236,000	Consider	Reject		District requested to minimize low-slope roof locations.
ES-20	Reduce the overall building and roof height at the classroom wing.	-$532,000	Accept	Reject		In review with mechanical engineer
ES-21	Reduce the extent of curtainwall and use aluminum storefront elsewhere.	-$162,000	Accept	Accept	-$192,360	Design team requested this asked RC to cost model: RC's cost savings was 192,360
ES-22	Over long window spans, use metal siding ILO masonry veneer.	-$38,000	Consider	Reject		Design team will work with structural engineer to minimize impacts by adding vertical steel columns to reduce the span lengths of lintels

Owner Implementation Matrix

September 2025

Function - Idea No.	Creative Idea	First-Cost Potential	VE Team Recommendation	Owner Implementation	Owner Accepted Amount	Comments
ES-24	Replace brick veneer with architectural CMU.	-$104,000	Consider	Reject		District requested brick as a material standard to create a "uniform" appearance with its schools
ES-25	Reduce glazing on south elevation by 20%.	-$522,000	Accept	Modify	-$44,959	Design team is studying some glazing reduction that may be less then 20% Design team modified this portion and established a reduction of 728 SF of window area to be replaced with Metal siding and precast concrete veneer wall assembly
ES-26	Reduce the extent of brick veneer at the north elevation.	-$40,000	Accept	Reject		Owner requested to maximize duarable wall surfaces
ES-27	Eliminate the five clerestories on the south elevation.	-$109,000	Consider	Reject		
ES-28	Use an aluminum window system ILO fiberglass.	$24,000	Consider	Reject		
Finish Interiors						
FI-50	Reduce casework by 20%.	-$164,000	Accept	Reject		Will required greater detail of coordination with district staff Not enough design developed to establish this reduction - will study in design development
FI-51	FRP wall finish ILO ceramic tiling in bathrooms.	-$58,000	Reject	Reject		Druable finishes required at alternative school bathrooms.
FI-52	Reduce quantity of MDF paneling by 50%.	-$165,000	Accept	Accept	-$165,000	Can remove portions in the cooridor and commons area.
Facilitate Maintenance						
FM-40	Use polished concrete ILO VCT/resilient in the corridors and commons on both floors.	-$66,000	Accept	Reject		District has requested to avoid finished concrete floors in primary locations
FM-41	Use polished concrete on first floor corridors and commons.	-$45,000	Reject	Reject		District has requested to avoid finished concrete floors in primary locations
Feed Occupants						
FO-46	Reduce kitchen equipment allowance by 20%.	-$91,000	Accept	Reject		Food service reviewed this request and the need for a type 1 hood for the 6-burner unit. District noted that all food service items noted are required.
Grade Site						
GS-60	Regrade northeast slope and eliminate retaining wall.	-$22,000	Accept	Reject		Area was requested by the district.
Illuminate Space						

Owner Implementation Matrix

September 2025

Function - Idea No.	Creative Idea	First-Cost Potential	VE Team Recommendation	Owner Implementation	Owner Accepted Amount	Comments
IS-68	Use indirect/direct pendant lighting in classrooms.	$64,000	Accept	Accept	$64,000	Could consider, would standardize a classroom look, but does come with a cost increase, and electrical costs are already higher than expected.
Landscape Site						
LS-72	Reduce landscape budget by 25%.	-$126,000	Accept	Accept	-$126,000	Can be reduced without removal of primary scope.
Manage Stormwater						
MS-80	Eliminate detention for stormwater runoff.	-$1,569,000	Consider	Decision Pending	-$1,569,000	Civil engineer has confirmed calculations support removal of detention systems and has forwarded calculations to City Engineer for verifications. Note that pricing will also include additional pipe sizing.
Organize Building						
OB-92	Eliminate the mechanical mezzanine and locate fan coil units above corridor ceilings and DOAS units on gym roof.	-$383,000	Consider	Reject		Owner has provided a requirement that rooftop mechanical equipment is to be reduced to "as-little" as possible for longevity and serviceability.
Organize Site						
OS-96	Eliminate back north retaining wall and walkway.	-$167,000	Consider	Reject		Will trigger additional lateral loads to resist the ground forces. Increases water engress issue risk at saturated soil area
Power Building						
PB-106	Review electrical load estimate for building to right-size service equipment rating.	-$323,000	Consider	Reject		Would not recommend this. The example presented was based on an existing building and using 1-year metered loads, which we don't have. A code reviewer would not sign off on this for a new building. Right-sizing the equipment as loads are dialed in further along in design will occur.
Park Vehicles						
PV-101	Use angled parking with a landscape strip on western side of parking lot and remove/reduce site wall.	-$65,000	Accept	Accept	-$65,000	Design team has studied this option, retaining wall would be minimized to 2' in height - would possibly require a 2:1 slope at planting area.

Owner Implementation Matrix

September 2025

Function - Idea No.	Creative Idea	First-Cost Potential	VE Team Recommendation	Owner Implementation	Owner Accepted Amount	Comments
Reduce Energy						
RE-110	Use ground-source heat pumps.	$231,000	Consider	Reject		Could consider but would anticipate first cost delta to be higher.
RE-111	Increase PV array beyond code minimum.	$438,000	Consider	Reject		Could consider, but the Owner has already expressed a desire for code minimum. Would not need to maximize the entire roof, but could look at options to go beyond code minimum that may fit into the overall budget.
RE-113	Use split-wired controlled/non-controlled duplex receptacles and reduce quantity of controlled duplex receptacles.	-$58,000	Accept	Reject		Would not recommend this. This would, in effect, reduce not only the controlled receptacle count, but also the non-controlled receptacle count. Could consider some targeted locations to be split-wired controlled/non-controlled?
RE-114	Use point-of-use water heater ILO a centralized water heater.	-$387,000	Consider	Reject		Does not meet requirements of WSEC C404.2.1.
Remove Waste						
RW-121	Use flush-tank ILO flush-valve water closets.	-$38,000	Reject	Reject		Would not recommend for a school facility. Vandilisim risk.
Support Load						
SL-128	Support building pop-outs between grids H and I on columns at building edge ILO cantilevers.	-$19,000	Accept	Accept	-$19,000	Is a supportive cost savings, will include new footings that will need to be coordinated.
SL-129	Frame with steel joists ILO wide-flange subframing at roof over classroom wing.	-$521,000	Accept	Reject		Wide-flanges at roof serve the lateral system - Transistion to joists would require a wideflange on every 3rd member - Begins to be complex to mix the two systems and mixing the trades on low-bid project.
SL-130	Support building on mat slab to resist heaving at expansive soils.	$479,000	Reject	Reject		Need feedback from geotech.
SL-131	Install complete drainage under building slab to prevent heaving from expansive soils.	$250,000	Consider	Accept	$250,000	Need feedback from geotech.
SL-132	Use standard composite metal deck ILO concrete topped dovetail metal deck at second floor structure.	-$54,000	Partially Accept	Reject		Per input from structural engineer this may be a cost add: The deeper concrete in the dovetail decking is being used to reduce loads. Going with a typical decking system would require an additional 1" of concrete thickness and additional steel to support this weight.

Owner Implementation Matrix

September 2025

Function - Idea No.	Creative Idea	First-Cost Potential	VE Team Recommendation	Owner Implementation	Owner Accepted Amount	Comments
Ventilate Space						
VS-142	Duct outside air (OA) to terminal devices and eliminate VAV boxes.	-$313,000	Reject	Reject		Does not meet requirements of WSEC C403.7.1.1 or C403.7.2.

Total VE Team Recommended Cost Avoidance	**-$5,737,000**	**-$2,181,319**	**Total Owner Accepted Cost Avoidance**
Total VE Team Recommended Cost Addition	**$64,000**	**$314,000**	**Total Owner Accepted Cost Addition**
Total VE Team Recommended Value	**$5,801,000**	**$2,495,319**	**Total Owner Accepted Value**

NOTES

Pricing Key

Score	Meaning
Cost Neutral	Difference between baseline and alternative costs is negligible.
Not Priced	Cost analysis not prepared.
Project Sugg.	Narrative prepared without a cost analysis.
Priced-Only	Estimate prepared without a full analysis and workbook documentation.

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Appendix B
Value Improvement Alternatives

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Value Improvement Matrix September 2025

Function - Idea No.	Creative Idea	Program	Aesthetics	Durability	TCO	Sustainability	Schedule	Constructability	Comfort, Safety, Performance	First-Cost Potential	VE Team Recommendation
Condition Space											
CS-2	Use VRF system for heating and cooling for entire building.	=	-	-	+	=	+	+	=	-$2,322,000	Accept
CS-3	Use all unitary rooftop equipment for heating and cooling of entire building.	=	-	+	+	-	+	+	-	-$855,000	Consider
CS-4	Remove all cooling except at administration and preschool wing.	Priced-Only								-$285,000	Consider
Deliver Project											
DP-9	Solicit the DAS system as a bid alternate.	Priced-Only								-$399,000	Accept
DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.	=	=	+	+	=	+	+	+	-$31,000	Consider
DP-15	Centralize and stack the electrical rooms.	+	=	+	+	+	+	+	+	-$64,000	Accept
Express Culture											
EC-33	Apply wood exterior ILO brick at prominent elevations.	=	+	-	-	+	=	+	=	-$322,000	Accept
Enclose Space											
ES-18	Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere.	=	-	=	+	=	=	=	=	-$77,000	Accept
ES-19	Use a low slope roof at the gym and lower the overall height.	=	-	=	=	=	=	+	=	-$236,000	Consider
ES-20	Reduce the overall building and roof height at the classroom wing.	=	=	=	+	+	=	=	=	-$532,000	Accept
ES-21	Reduce the extent of curtainwall and use aluminum storefront elsewhere.	=	-	-	+	=	=	=	-	-$162,000	Accept
ES-22	Over long window spans, use metal siding ILO masonry veneer.	=	=	=	+	=	+	+	=	-$38,000	Consider
ES-24	Replace brick veneer with architectural CMU.	Priced-Only								-$104,000	Consider
ES-25	Reduce glazing on south elevation by 20%.	Priced-Only								-$522,000	Accept
ES-26	Reduce the extent of brick veneer at the north elevation.	Priced-Only								-$40,000	Accept
ES-27	Eliminate the five clerestories on the south elevation.	Priced-Only								-$109,000	Consider
ES-28	Use an aluminum window system ILO fiberglass.	Priced-Only								$24,000	Consider
Finish Interiors											
FI-50	Reduce casework by 20%.	Priced-Only								-$164,000	Accept
FI-51	FRP wall finish ILO ceramic tiling in bathrooms.	Priced-Only								-$58,000	Reject
FI-52	Reduce quantity of MDF paneling by 50%.	Priced-Only								-$165,000	Accept

Value Improvement Matrix September 2025

Function - Idea No.	Creative Idea	Program	Aesthetics	Durability	TCO	Sustainability	Schedule	Constructability	Comfort, Safety, Performance	First-Cost Potential	VE Team Recommendation
Facilitate Maintenance											
FM-40	Use polished concrete ILO VCT/resilient in the corridors and commons on both floors.	Priced-Only								-$66,000	Accept
FM-41	Use polished concrete on first floor corridors and commons.	Priced-Only								-$45,000	Reject
Feed Occupants											
FO-46	Reduce kitchen equipment allowance by 20%.	Priced-Only								-$91,000	Accept
Grade Site											
GS-60	Regrade northeast slope and eliminate retaining wall.	-	-	+	+	-	+	+	=	-$22,000	Accept
Illuminate Space											
IS-68	Use indirect/direct pendant lighting in classrooms.	+	+	+	=	=	=	+	+	$64,000	Accept
Landscape Site											
LS-72	Reduce landscape budget by 25%.	Priced-Only								-$126,000	Accept
Manage Stormwater											
MS-80	Eliminate detention for stormwater runoff.	=	=	+	+	-	+	+	=	-$1,569,000	Consider
Organize Building											
OB-92	Eliminate the mechanical mezzanine and locate fan coil units above corridor ceilings and DOAS units on gym roof.	=	=	-	+	=	+	-	=	-$383,000	Consider
Organize Site											
OS-96	Eliminate back north retaining wall and walkway.	=	-	-	+	+	+	-	=	-$167,000	Consider
Power Building											
PB-106	Review electrical load estimate for building to right-size service equipment rating.	=	=	=	+	+	+	+	=	-$323,000	Consider
Park Vehicles											
PV-101	Use angled parking with a landscape strip on western side of parking lot and remove/reduce site wall.	=	=	=	=	=	+	+	+	-$65,000	Accept

Value Improvement Matrix September 2025

Function - Idea No.	Creative Idea	Program	Aesthetics	Durability	TCO	Sustainability	Schedule	Constructability	Comfort, Safety, Performance	First-Cost Potential	VE Team Recommendation
Reduce Energy											
RE-110	Use ground-source heat pumps.	=	=	+	+	-	+	+	-	$231,000	Consider
RE-111	Increase PV array beyond code minimum.	+	+	+	+	+	-	-	+	$438,000	Consider
RE-113	Use split-wired controlled/non-controlled duplex receptacles and reduce quantity of controlled duplex receptacles.	Priced-Only								-$58,000	Accept
Remove Waste											
RW-121	Use flush-tank ILO flush-valve water closets.	Priced-Only								-$38,000	Reject
Support Load											
SL-128	Support building pop-outs between grids H and I on columns at building edge ILO cantilevers.	=	=	=	+	+	+	+	=	-$19,000	Accept
SL-129	Frame with steel joists ILO wide-flange subframing at roof over classroom wing.	=	=	=	+	+	+	=	=	-$521,000	Accept
SL-130	Support building on mat slab to resist heaving at expansive soils.	Priced-Only								$479,000	Reject
SL-131	Install complete drainage under building slab to prevent heaving from expansive soils.	Priced-Only								$250,000	Consider
SL-132	Use standard composite metal deck ILO concrete topped dovetail metal deck at second floor structure.	Priced-Only								-$54,000	Partially Accept
Ventilate Space											
VS-142	Duct outside air (OA) to terminal devices and eliminate VAV boxes.	=	=	+	+	+	+	+	=	-$313,000	Reject

Value Improvement Matrix

September 2025

Function - Idea No.	Creative Idea	Program	Aesthetics	Durability	TCO	Sustainability	Schedule	Constructability	Comfort, Safety, Performance	First-Cost Potential	VE Team Recommendation

Total Gross Cost Reduction	**-$10,345,000**
Total Gross Cost Addition	**$1,486,000**
Count of Avoidance	**35**
Count of Addition	**6**

Total VE Team Recommended Cost Avoidance	**-$5,737,000**
Total VE Team Recommended Cost Addition	**$64,000**

NOTES

Pricing Key

Score	Meaning
Cost Neutral	Difference between baseline and alternative costs is negligible.
Not Priced	Cost analysis not prepared.
Project Sugg.	Narrative prepared without a cost analysis.
Priced-Only	Estimate prepared without a full analysis and workbook documentation.

Creative Idea List September 2025

Idea No.	Function - Score	Resp.	Creative Idea
Condition Space			
CS-1	F		Use the DOAS system and displacement ventilation for cooling for entire building.
CS-2	A	SS	Use VRF system for heating and cooling for entire building.
CS-3	A	SS	Use all unitary rooftop equipment for heating and cooling of entire building.
CS-4	B	RM	Remove all cooling except at administration and preschool wing.
CS-5	C	0	Use a two-pipe change-over hydronic system for heating and cooling.
CS-6	F	0	Seek an energy code exception for the use of a hydronic boiler and air-cooled chiller and VAV system by defining the occupancy as a critical factor for heating/cooling control.
CS-7	C	0	Use rooftop hydronic equipment.
CS-8	C	0	Use chilled beam system and unit ventilators.
Deliver Project			
DP-9	B	RM	Solicit the DAS system as a bid alternate.
DP-10	C	0	Define ATS/Allerton as the basis of design building control system and list 2-3 vendors as bid alternates.
DP-11	C	0	Change the utility yard and trash enclosure walls to metal screen ILO brick veneer.
DP-12	C	0	Allow PEX piping on applicable pipe sizes for branch piping.
DP-13	C	0	Solicit unit prices and define associated allowances for overexcavation, backfill, and any applicable soil treatment.
Distribute Power			
DP-14	A	RG	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.
DP-15	A	RG	Centralize and stack the electrical rooms.
DP-16	C	0	Allow larger electrical feeders to be aluminum ILO copper.
DP-17	C	0	Allow use of MC cable for branch distribution ILO conduit and wire.

Creative Idea List September 2025

Function - Idea No.	Score	Resp.	Creative Idea
Express Culture			
EC-33	A	SW	Apply wood exterior ILO brick at prominent elevations.
EC-34	C	0	Provide space for local art installations.
EC-35	G	0	Provide outdoor open space for shared community learning.
EC-36	C	0	Employ a concrete pattern that reflects the maritime environment.
EC-37	C	0	Highlight history of native community through display boards/exhibits/art installations.
EC-38	D	0	Use wood or faux wood ceraclad at exterior entries.
EC-39	G	0	Use gym as community space (express culture through functionality).
Enclose Space			
ES-18	A	SW	Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere.
ES-19	A	TD	Use a low slope roof at the gym and lower the overall height.
ES-20	A	DP	Reduce the overall building and roof height at the classroom wing.
ES-21	A	SW	Reduce the extent of curtainwall and use aluminum storefront elsewhere.
ES-22	A	TD	Over long window spans, use metal siding ILO masonry veneer.
ES-23	C	0	Eliminate outside roof deck.
ES-24	B	RM	Replace brick veneer with architectural CMU.
ES-25	B	RM	Reduce glazing on south elevation by 20%.
ES-26	B	RM	Reduce the extent of brick veneer at the north elevation.
ES-27	B	RM	Eliminate the five clerestories on the south elevation.
ES-28	B	RM	Use an aluminum window system ILO fiberglass.
ES-29	C	0	Use single-ply TPO or EPDM roofing at all areas that aren't sloped and/or exposed to view.
ES-30	C	0	Reduce extent of covered roof coverage over 2nd floor outside deck.
ES-31	C	0	Eliminate exterior window at Health Room.
ES-32	E	0	Provide green roof ILO outside roof deck.

Creative Idea List September 2025

Function - Idea No.	Score	Resp.	Creative Idea
Finish Interiors			
FI-50	B	RM	Reduce casework by 20%.
FI-51	B	RM	FRP wall finish ILO ceramic tiling in bathrooms.
FI-52	B	RM	Reduce quantity of MDF paneling by 50%.
FI-53	C	0	Use alternative product to MDF wainscot (i.e. wheat board).
FI-54	C	0	Eliminate linear wood ceiling.
FI-55	C	0	Install blocking at gym walls for future equipment installations.
FI-56	E	0	Use locally sourced maple wood flooring in the gym.
FI-57	G	0	Use MDF wainscot.
FI-58	G	0	Add acoustical panels to gym and commons dining areas.
Facilitate Maintenance			
FM-40	B	RM	Use polished concrete ILO VCT/resilient in the corridors and commons on both floors.
FM-41	B	RM	Use polished concrete on first floor corridors and commons.
FM-42	C	0	Use fluid applied vapor barrier on slab to mitigate high water table and expedite installation.
FM-43	E	0	Extend mechanical attic, locate all HVAC equipment on mezzanine, and eliminate mechanical room.
FM-44	E	0	Use terrazzo on first floor corridors and commons.
FM-45	G	0	Appy anti-graffiti coating on brick veneer.
Feed Occupants			
FO-46	B	RM	Reduce kitchen equipment allowance by 20%.
FO-47	C	0	Remove the oven and range and use a Type II hood ILO Type I.
FO-48	E	0	Eliminate kitchen and use adjacent high school cafeteria for food service.
FO-49	E	0	Use food trucks ILO of food service.
Grade Site			
GS-59	C	0	Use H-pile retaining wall ILO cantilevered concrete wall at south site retaining wall.
GS-60	A	CO	Regrade northeast slope and eliminate retaining wall.

Creative Idea List September 2025

Function - Idea No.	Score	Resp.	Creative Idea
GS-61	C	0	Complete a ground-penetrating radar (GPR) scan of school site to identify any unforeseen conditions from original school facilities.
GS-62	C	0	Where over-excavating install drainage at base of the over-excavation to drain water retained by silt and clay soils.
GS-63	C	0	Eliminate mechanical room and reduce cut at north side.
GS-64	D	0	Minimize grading.
GS-65	E	0	Move building south and reduce depth of cut at north side.
GS-66	E	0	Reuse excavated soil from under foundation as fill in parking lot.
GS-67	E	0	Use rockery retaining structure ILO cantilevered concrete wall at south site retaining wall.
Illuminate Space			
IS-68	A	RG	Use indirect/direct pendant lighting in classrooms.
IS-69	C	0	Use linear indirect lighting in daycare to improve visual comfort of occupants.
IS-70	C	0	Use warmer color fixtures.
IS-71	C	0	Use flicker free LED lights.
Landscape Site			
LS-72	B	RM	Reduce landscape budget by 25%.
LS-73	C	0	Reduce quantity of trees along N 5th St.
Mitigate Corrosion			
MC-82	C	0	Use marine-grade treated wood materials.
MC-83	C	0	Specify a higher level of galvanizing at exposed steel.
MC-84	C	0	Specify stainless steel for intake ductwork.
MC-85	C	0	Specify corrosion resistant outdoor mechanical units/coils.
MC-86	C	0	Specify powder-coating of exposed steel.
MC-87	C	0	Specify marine-grade coatings/paints for exposed steel.
MC-88	C	0	Specify corrosion resistant coatings for site metal, outdoor play equipment.
MC-89	C	0	Specify NEMA 4X enclosures for all outdoor gear.

Creative Idea List September 2025

Idea No.	Function - Score	Resp.	Creative Idea
Maintain Flexibility			
MF-74	C	0	Add toilet in infant room for future flexibility of use.
MF-75	C	0	Add double doors between CTE and adjacent labs.
MF-76	C	0	Repurpose kitchen area in pre-k/daycare and utilize main kitchen.
MF-77	E	0	Eliminate bariatric TLT bathroom.
MF-78	C	0	Locate CNA Lab next to Phlebotomy Lab per ed spec.
MF-79	D	0	Relocate electric rooms.
Manage Stormwater			
MS-80	A	CO	Eliminate detention for stormwater runoff.
MS-81	E	0	Use shallow surface stormwater retention, i.e., raingardens, swales, etc. ILO underground detention if possible with soil conditions.
Organize Building Layout			
OB-90	C	0	Eliminate the stairs in the admin dedicated to the GED area and use the main stairs.
OB-91	C	0	Move GED suite to first floor.
OB-92	A	DP	Eliminate the mechanical mezzanine and locate fan coil units above corridor ceilings and DOAS units on gym roof.
OB-93	C	0	Eliminate secondary GED corridor on second floor.
OB-94	D	0	Centralize the mechanical and electrical rooms and minimize distribution runs.
OB-95	D	0	Flip the locations of mechanical/electrical rooms and the gym.
Organize Site			
OS-96	A	CO	Eliminate back north retaining wall and walkway.
OS-97	C	0	Move trash enclosure adjacent to service yard entry and reduce retaining wall separation.
OS-98	C	0	Increase width of fire lane at playfield.
OS-99	E	0	Add ecology block retaining walls ILO cast-in-place concrete walls.
OS-100	C	0	Separate drop-off/pick-up from parking.

Creative Idea List September 2025

Function - Idea No.	Score	Resp.	Creative Idea
Power Building			
PB-106	A	RG	Review electrical load estimate for building to right-size service equipment rating.
PB-107	C	0	Reduce generator rating to 40kW to meet anticipated demand load.
PB-108	C	0	Add UPS battery backup to support BAS and similar systems.
PB-109	D	0	Size PV array to net-zero energy use.
Park Vehicles			
PV-101	A	CO	Use angled parking with a landscape strip on western side of parking lot and remove/reduce site wall.
PV-102	C	0	Angle parking along drop-off/pick-up lane.
PV-103	C	0	Add striping marker between drop-off/pick-up lane and parking.
PV-104	C	0	Direct vehicle circulation with signage to improve efficiency.
PV-105	F	0	Eliminate half of the parking stalls near main entry.
Reduce Energy			
RE-110	A	SS	Use ground-source heat pumps.
RE-111	A	RG	Increase PV array beyond code minimum.
RE-112	G	0	Install exterior louver shades on south and west facing facades.
RE-113	B	RM	Use split-wired controlled/non-controlled duplex receptacles and reduce quantity of controlled duplex receptacles.
RE-114	F		Use point-of-use water heater ILO a centralized water heater.
RE-115	C	0	Use energy recovery from the hoods and exhaust.
RE-116	C	0	Reduce spacing of 2x4 troffer lighting to reduce quantity and wattage.
RE-117	E	0	Locate electrical rooms on exterior walls with louvers and eliminate mechanical cooling.
RE-118	D	0	Use 208v ILO 480v equipment to reduce cooling load of electrical rooms.
RE-119	E	0	Plant additional trees along southwest elevations.

Creative Idea List September 2025

Idea No.	Function - Score	Resp.	Creative Idea
RE-120	G	0	Use manual roller shades.
Remove Waste			
RW-121	B	RM	Use flush-tank ILO flush-valve water closets.
RW-122	C	0	Eliminate the kitchen three-compartment sink and grease trap.
RW-123	C	0	Capture roof runoff for irrigation.
RW-124	E	0	Use sanitary gray water for irrigation.
RW-125	E	0	Use an acid waste neutralization (AWN) system for hazardous waste.
Secure Access			
SA-126	C	0	Shift stair layout to better accommodate GED access.
SA-127	E	0	Provide security barrier between GED upstairs access and admin/waiting area.
Support Load			
SL-128	A	TD	Support building pop-outs between grids H and I on columns at building edge ILO cantilevers.
SL-129	A	TD	Frame with steel joists ILO wide-flange subframing at roof over classroom wing.
SL-130	B	TD	Support building on mat slab to resist heaving at expansive soils.
SL-131	B	TD	Install complete drainage under building slab to prevent heaving from expansive soils.
SL-132	B	TD	Use standard composite metal deck ILO concrete topped dovetail metal deck at second floor structure.
SL-133	C	0	Use geopiers to mitigate soil conditions and to drain water under building.
SL-134	C	0	Use steel-tube gravity columns ILO steel wide-flange gravity columns.
SL-135	C	0	Provide two full-height braced frames ILO two partial-height frames at brace frames 5 on grid 7.
SL-136	E	0	Employ a CMU load-bearing/shearwall building with composite metal floor deck and wood roof structures ILO a steel structure.
SL-137	E	0	Employ a wood load-bearing/shearwall building with gypcrete topped wood floor structure and wood roof structures ILO a steel structure.

Creative Idea List September 2025

Idea No.	Function - Score	Resp.	Creative Idea
SL-138	E	0	Use wood roof subframing/deck ILO steel subframing/deck and expose to view from second floor spaces.
SL-139	E	0	Construct canopies with plywood over wood 2x decking ILO metal decking and expose to view.
SL-140	E	0	Construct overhangs with wood 2x decking ILO metal decking and expose to view.
SL-141	E	0	Use wood roof subframing/deck ILO steel subframing/deck and expose to view from second floor spaces.

Ventilate Space

VS-142	A	SS	Duct outside air (OA) to terminal devices and eliminate VAV boxes.
VS-143	E	0	Use the mechanical attic as an outside air plenum.

NOTES

VE Team

Abbrev.	Meaning
CO	Chad Oxford
DP	Dan Purefoy
RG	Robert Grzan
RM	Robert Muir
SS	Steve Sanders
SW	Samantha Wong
TD	Theresa Daniel

Scoring

Score	Meaning
A	Selected for evaluation by VE team
B	Selected for pricing-only by VE team
C	Project suggestion for evaluation by design team
D	Incorporated into a developed alternative
E	Not recommended
F	Fatal flaw/highly unlikely to be accepted
G	In the baseline design

Creative Idea List September 2025

Idea No.	Function - Score	Resp.	Creative Idea

Evaluation Criteria

Retaining District-defined program spaces while ensuring spaces are flexible and easily adaptable to evolving education needs.

Analyzing program spaces and ensuring they are easily adaptable via an infrastructure/MEP/structural perspective.

Retaining durable system with strong longevity.

Ability to maintain the facility and facility systems locally.

Maintaining security throughout the campus considering nature of school as alternative high school.

Connection of grade levels to the larger campus.

Having campuses be adjacent but also a manner of linking facilities together.

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Workbook ID: CS-1	Use the DOAS system and displacement ventilation for cooling for entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Baseline Concept:

The existing HVAC system is based on using chilled water fan coils to provide cooling/heating to the classroom areas. Makeup or outside air (OA) is provided to the classrooms with a Dedicated Outdoor Air System (DOAS) with VAV boxes and demand occupancy control. The gym and common area are served with air handlers that provide OA to the respective spaces.

Alternative Concept:

Eliminate the chilled water fan coils and VAV boxes from the classroom, admin, and entire southern area of the building. Provide all heating and cooling to the classroom areas with the DOAS unit only. Each DOAS unit will become a constant volume central station air handler served by hydronic heating and cooling coils.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**+**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**+**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**--**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 985,000	$ NA	$ NA
Alternative Concept	$ 666,000	$ NA	$ NA
Cost Difference	**$ -319,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: CS-1	Use the DOAS system and displacement ventilation for cooling for entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Recommendation:

Consider accepting the alternative to reduce system complexity, save money, and facilitate in-house maintenance.

Alternative Concept

Advantages	Disadvantages
• Reduces or eliminates much of the controls and complexities of the HVAC airside system	• Less control for comfort and energy management
• Less equipment to purchase and maintain	• Reduces reliability – depending upon one or two air handlers means that a larger portion of the building may be out of service for a longer period during equipment failure
• Reduces space requirements	• Reduces comfort – system won't be able to accommodate significant difference in temperature or loads in adjacent spaces
• Provides consistent system across the entire building (Gym HVAC concept matches Classroom HVAC)	•
• Less hydronic piping to run in the building	•
• Reduces chiller capacity/free-cooling (economizer)	•

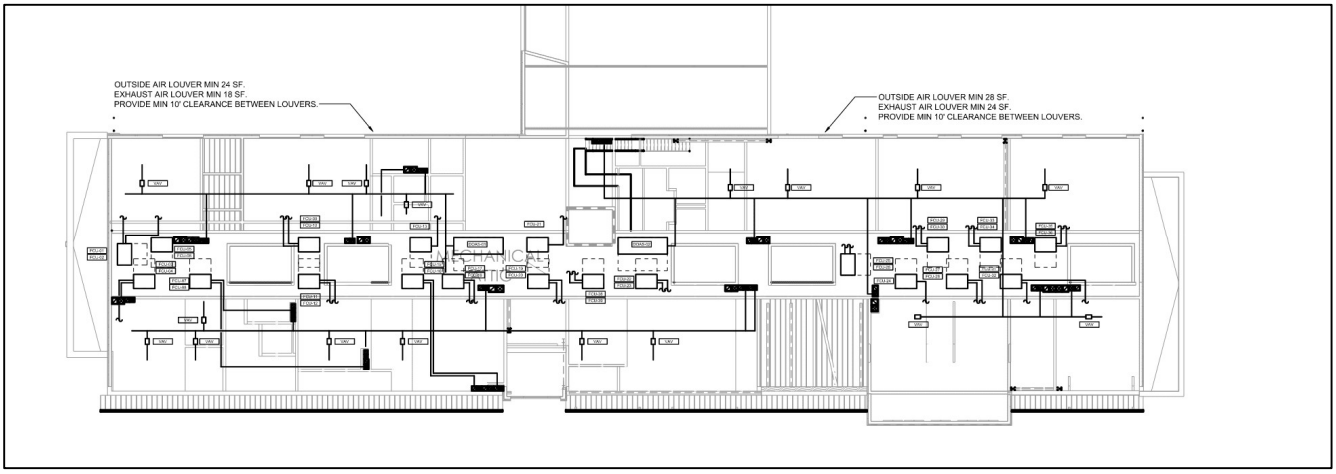
Analysis and Justification:

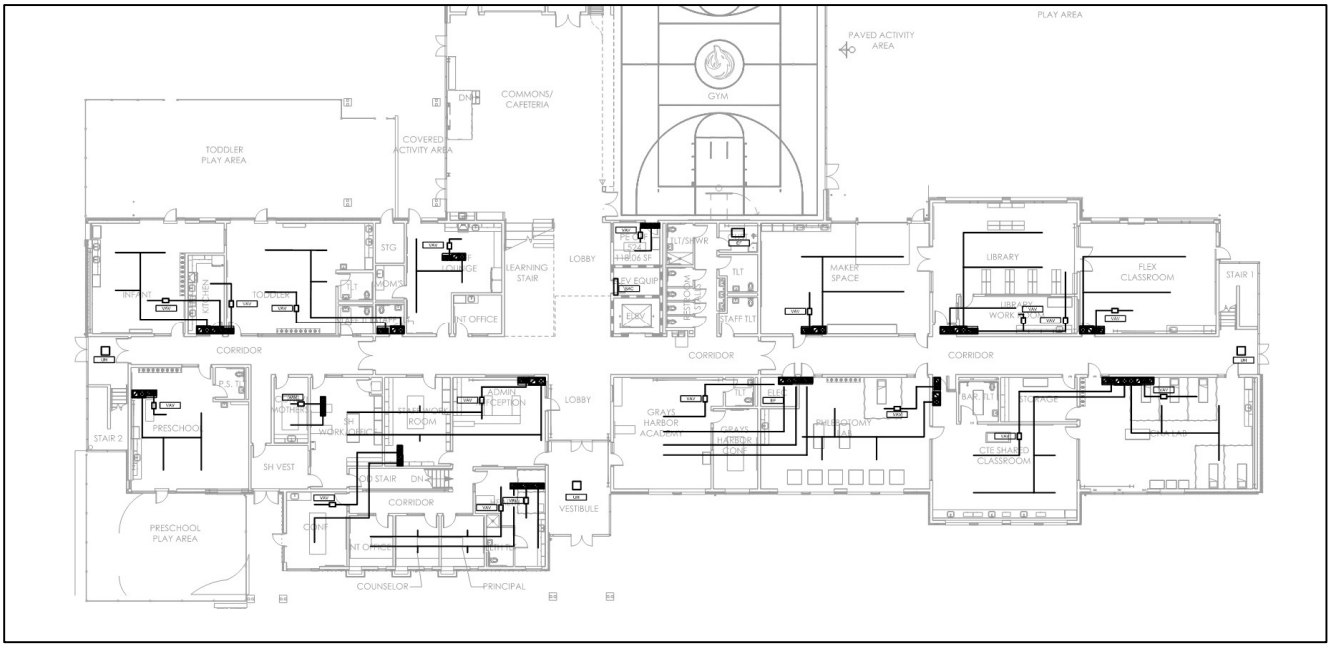
Per Washington State Code ventilation requirements, a DOAS unit or something of a similar configuration will be required. Due to the limited number of cooling hours/days in the Aberdeen marine environment, the classroom spaces can be designed to use displacement ventilation. This strategy will mean that the use of fan coils and VAV boxes for the classroom spaces can be avoided. The use of direct ventilation also is consistent with the other HVAC installations within the school district where there is no cooling/air conditioning provided to the classrooms.

For cost estimating purposes, assume that the existing baseline system is based on two (2) Air-Water Source Heat Pumps each rated at 100 Tons cooling (1500 MBH heating). Assume classroom space is ½ of plant load. Approximately 25kCFM of VAV airflow.

Workbook ID: CS-1	Use the DOAS system and displacement ventilation for cooling for entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Baseline Concept Illustration

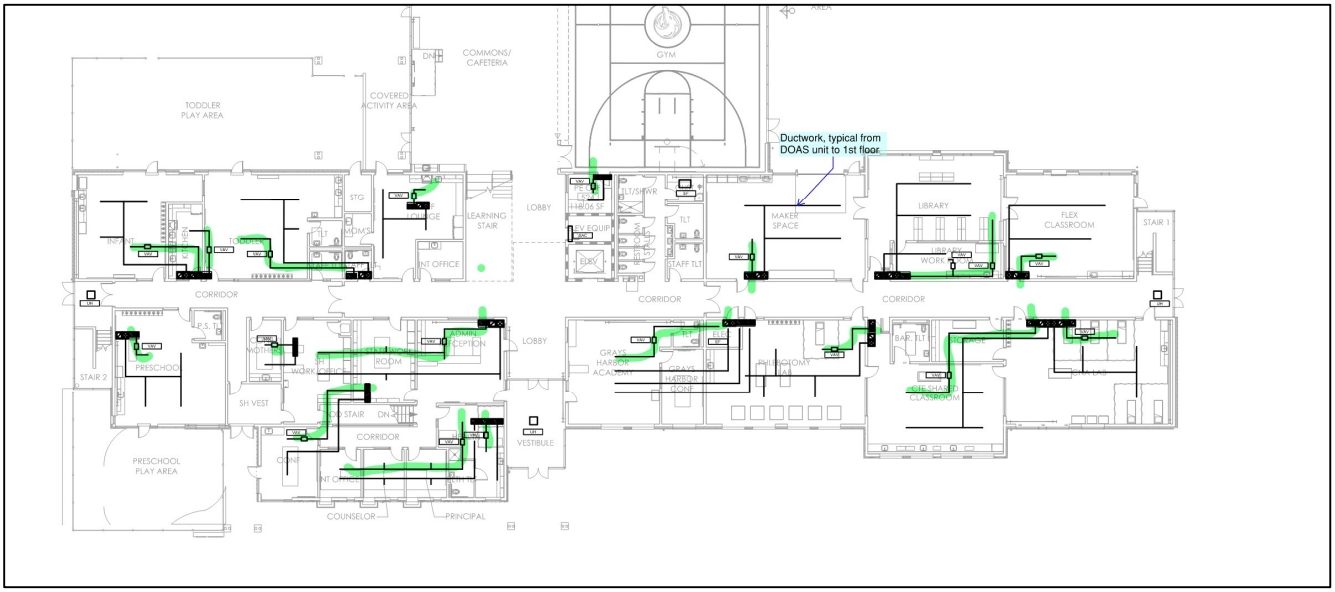


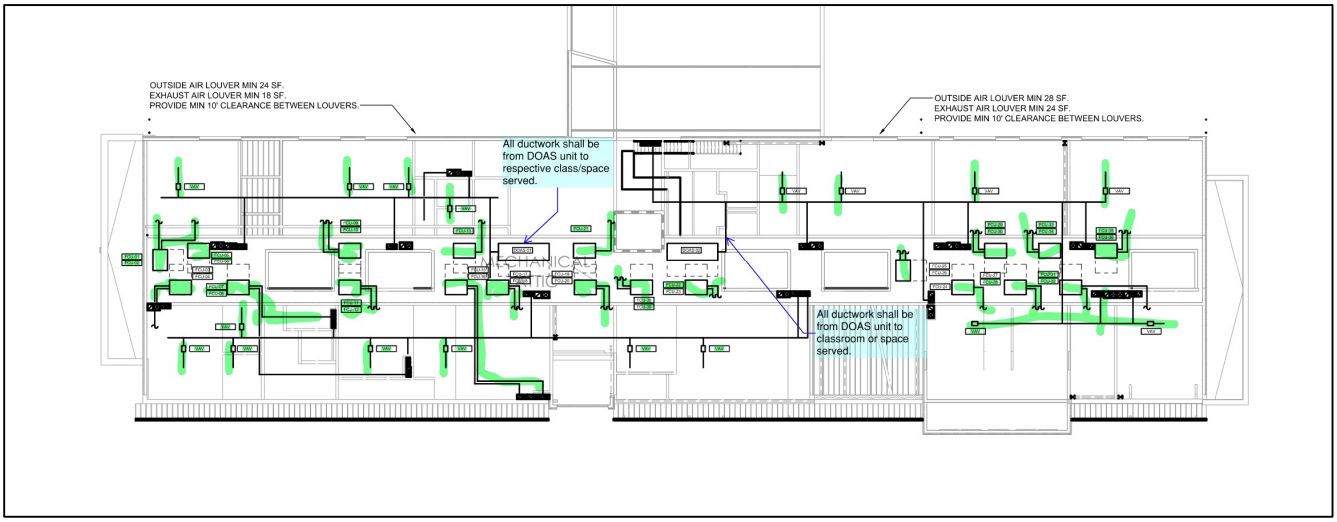


Baseline HVAC Plan

Workbook ID: CS-1	Use the DOAS system and displacement ventilation for cooling for entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Alternative Concept Illustration





Alternative Concept DOAS Duct Work Plan

Workbook ID: CS-1	Use the DOAS system and displacement ventilation for cooling for entire building.							
Function(s): Condition Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Eliminate chilled water fan coils	27.03%	LS	1	259,700	329,897			
Eliminate VAV Boxes from the building	27.03%	LS	1	22,662	28,788			
Eliminate chilled water piping to the building, 50% of the hydronic piping	27.03%	LS	1	81,720	103,809			
Eliminate 50% of the Instrumentation & controls for HVAC system and costs	27.03%	LS	1	281,793	357,962			
Remove two hydronic pumps	27.03%	EA	2	4,973.50	12,636			
Heating and cooling with DOAS system only; add 25% to capacity	27.03%	SF				1	79,625	101,148
Add Air-water source heat pumps (2) rated 100 Tons cooling, 1500 MBH heating and assume the classrooms are half the plant load, 25,000 cfm	27.03%	EA				2	222,483	565,240
Reduce the size of the mechanical attic by 25% due to less equipment		SF	435	350.00	152,250			
Note: This alternate assume the heat pumps are placed in the mechanical attic space								
TOTAL COSTS*					**985,000**			**666,000**
							TOTAL (PROPOSED less BASELINE)	**-319,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: CS-2	Use VRF system for heating and cooling for entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Baseline Concept:

The baseline HVAC system is based on using chilled water fan coils to provide cooling/heating to the classroom areas. Makeup or outside air (OA) is provided to the classrooms with a Dedicated Outdoor Air System (DOAS) with VAV boxes and demand occupancy control. The gym and common area are served with air handlers that provide OA to the respective spaces.

Alternative Concept:

The alternative concept replaces all fan coils and chilled water/hot water with Variable Flow Refrigeration (VRF) equipment. Proposed DOAS system will be composed of VRF coil(s) and heat exchangers to provide OA to the spaces.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**=**
Aesthetics	**--**	Schedule	**+**
Durability & Reliability	**--**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 3,020,000	$ NA	$ NA
Alternative Concept	$ 698,000	$ NA	$ NA
Cost Difference	**$ -2,322,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: CS-2	Use VRF system for heating and cooling for entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Recommendation:

Highly recommend accepting this alternative for budget and maintenance expectations.

Alternative Concept

Advantages	Disadvantages
• Use of DX equipment simplifies replacement and repairs	• Noise/compressor near classroom environment
• Decreases installation cost	• Less efficient/lower energy savings over baseline
• Eliminates HVAC equipment in the mechanical room	• Requires rooftop equipment or exterior access for split-system condensing units
•	• Potential future risk of needing to replace distribution lines to match available refrigerant
•	• Exposes rooftop equipment to marine environment
•	•

Analysis and Justification:

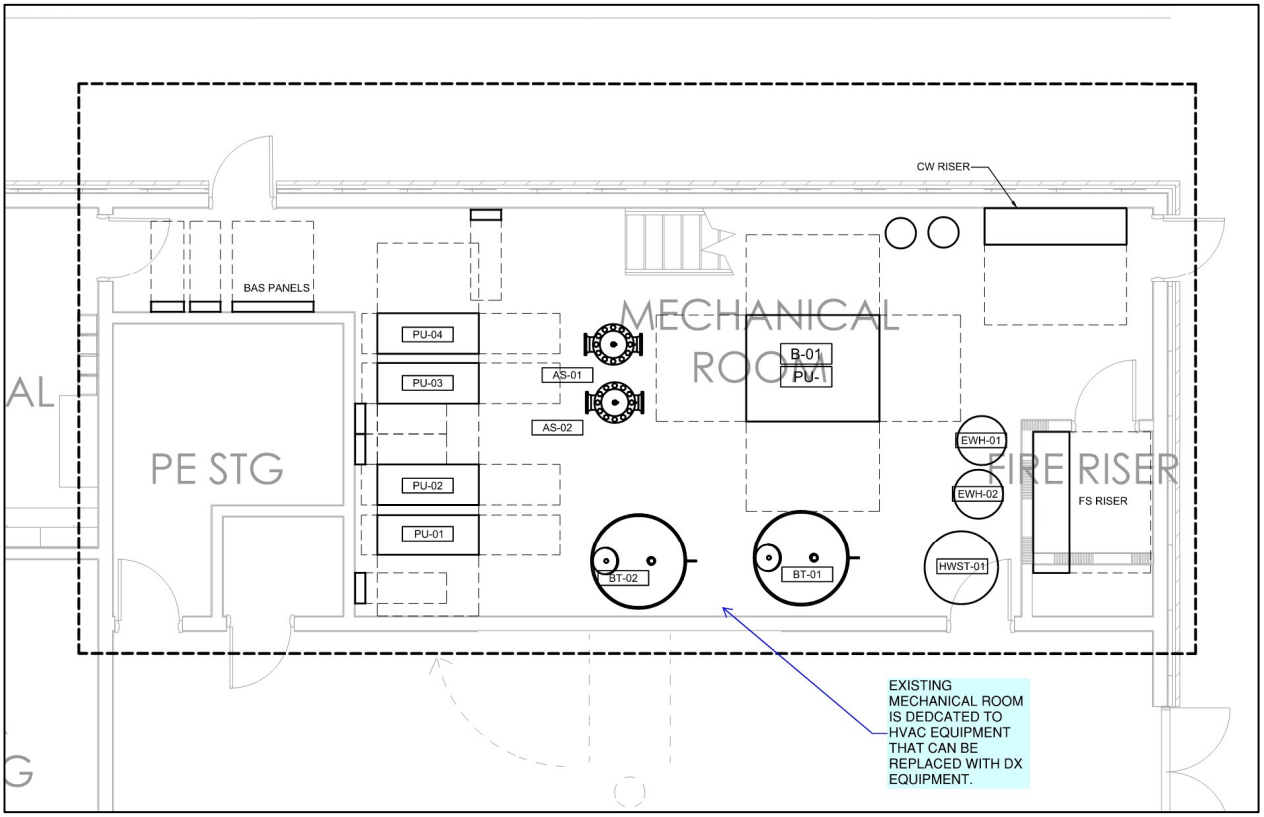
While the use of hydronic systems is preferred, DX equipment offers a closer match to the School District's expectation of reducing facility costs and easily implement future equipment replacement. VRF and DX equipment is readily available, and repairs or changes are much less costly than might be seen with a hydronic system.

VE analysis assumes:

- Eight 5-ton units for the classroom spaces
- Two 10-ton DOAS units for the classroom area
- Two 15-ton DOAS units for the kitchen/common area

Workbook ID: CS-2	Use VRF system for heating and cooling for entire building.
Function(s): Condition Space	**Includes Idea(s)**:

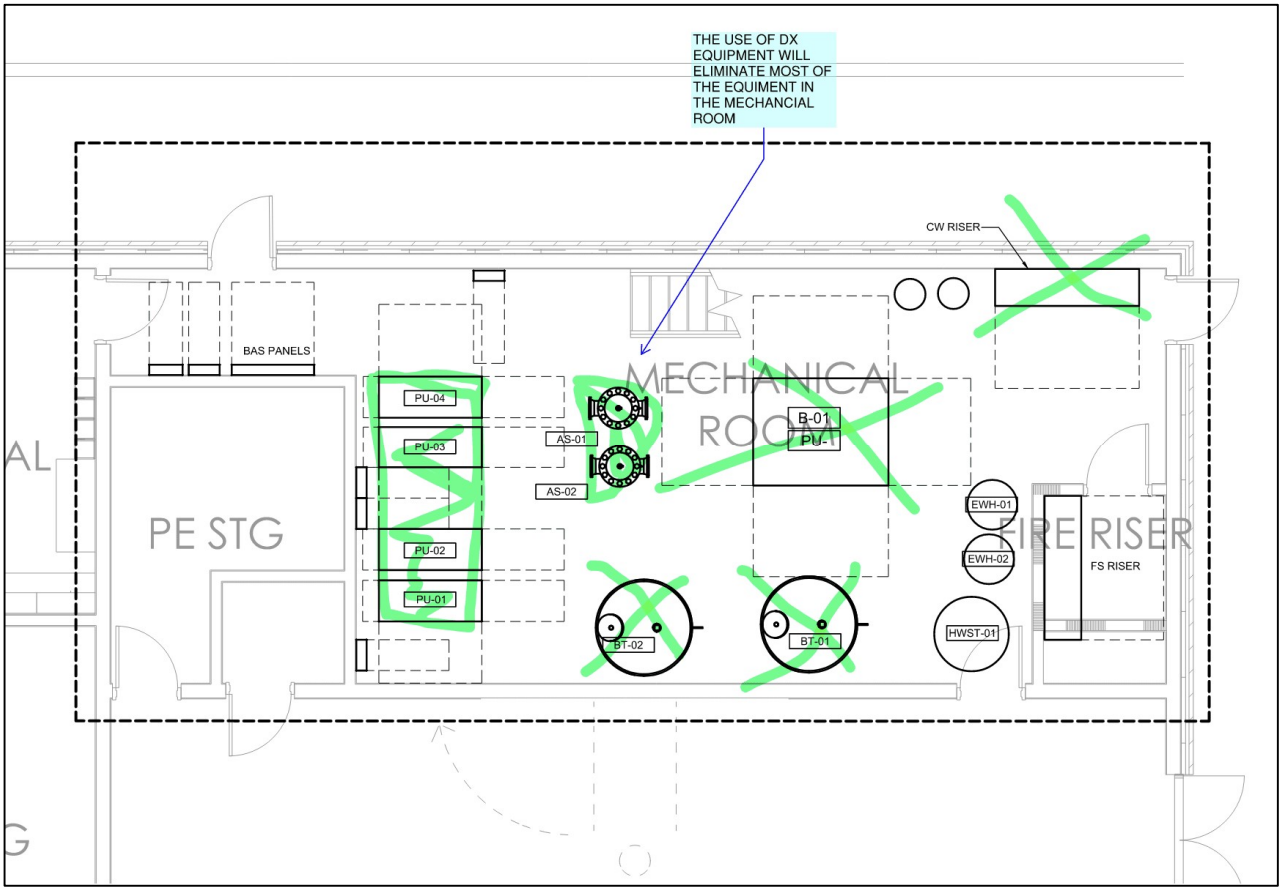
Baseline Concept Illustration



Baseline Mechanical Room Plan

Workbook ID: CS-2	Use VRF system for heating and cooling for entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Alternative Concept Illustration



Alternative Mechanical Room Concept Using DX Equipment

Workbook ID: CS-2	Use VRF system for heating and cooling for entire building.							
Function(s): Condition Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Eliminate chilled water fan coils	27.03%	LS	1	259,700.00	329,897			
Eliminate VAV Boxes from the building	27.03%	LS	1	22,662.00	28,788			
Eliminate chilled water piping for the hydronic piping	27.03%	SF	46,007	14.70	859,108			
Eliminate hydronic piping specialties	27.03%	SF	46,007	3.55	207,472			
Remove two hydronic pumps	27.03%	LS	1	23,052.00	29,283			
Remove 50% of Instrumentation	27.03%	SF	23,003	12.25	357,954			
Baseline: (2) Air-water source heat pumps, 50 Tons cooling (1500 MBH heating).	27.03%	EA	2	135,000.00	342,981			
Reduction to size of Mechanical room by 67% due to moving to the different system	27.03%	SF	1,166	350.00	518,321			
DX-split sytem, 5 Ton, 1st floor	27.03%	EA				4	25,000.00	127,030
DX-Unitary package 5 Ton units, 2nd floor	27.03%	EA				4	16,750.00	85,110
Ductwork with altered route and quantity	27.03%	LBS				132	14.50	2,431
(2) 15 Ton DOAS units for Kitchen/Common areas	27.03%	EA				2	54,750.00	139,098
Curbs for equipment relocated from Mechanical attic to Gymnasium roof	27.03%	LS				1	30,000.00	38,109
Remove metal roofing system with substrate to sloped Gymnasium roof	27.03%	SF	6,664	36.50	308,983			
Structural savings by eliminating the slope from the Gym roof considered a wash due to steel load upgrades for units		Note						
Assess the change to roof plumbing and flashings between the sloped and flat roof as a wash		Note						
Remove shiplap paneling to gym soffit	27.03%	SF	656	45.00	37,499			

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Workbook ID: CS-2	Use VRF system for heating and cooling for entire building.							
Function(s): Condition Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Add back Single ply roofing system with substrate inside new parapets	27.03%	SF				6,144	28.50	222,435
Add parapets, 44" high to outside perimeter, posts, framing, inside finish (panels on the outside shown below) (Length approx. 264lf):	27.03%	SF				924	47.00	55,167
Add parapet exterior metal panel finish to two sides as the third is the west elevation that can be coordinated with the design change	27.03%	SF				574	39.50	28,802
TOTAL COSTS*					**3,020,000**			**698,000**
							TOTAL (PROPOSED less BASELINE)	**-2,322,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: CS-3	Use all unitary rooftop equipment for heating and cooling of entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Baseline Concept:

The baseline HVAC system is based on using chilled water fan coils to provide cooling/heating to the classroom areas. Makeup or outside air (OA) is provided to the classrooms with a Dedicated Outdoor Air System (DOAS) with VAV boxes and demand occupancy control. The gym and common area are served with air handlers that provide OA to the respective spaces.

Alternative Concept:

The alternative concept eliminates all hydronic systems. Modify roof or building (and exterior ground level) for installation of condensing units/condenser coils. Install DX unitary package units for 2nd floor. Install DX split system for first floor. Route DOAS ductwork as shown in baseline concept and design DOAS unit to use DX coils.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**--**
Aesthetics	**--**	Schedule	**+**
Durability & Reliability	**+**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**--**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 2,159,000	$ NA	$ NA
Alternative Concept	$ 1,304,000	$ NA	$ NA
Cost Difference	**$ -855,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: CS-3	Use all unitary rooftop equipment for heating and cooling of entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Recommendation:

Consider this alternative to reduce complexity of the system and save money.

Alternative Concept

Advantages	Disadvantages
• Reduces or eliminates much of the controls and complexities of the HVAC airside system	• Decreases ability to control comfort and/or energy management
• Less equipment to purchase and maintain	• Less efficient/higher energy cost
• Reduces space requirements	• Reduces comfort as system won't be able to accommodate significant differences in temperature or loads in adjacent spaces
• Eliminates hydronic piping	• Exposes outdoor equipment to marine environment
• Eliminates mechanical room HVAC equipment	•
• Eliminates mechanical mezzanine	•

Analysis and Justification:

Aberdeen School District's expectation includes the need for reliable and easy to access replacement equipment. DX equipment offers the best option for easy access to replacement equipment. Additionally, DX equipment is cheaper to install with lower installation cost and flexibility for construction and zoning.

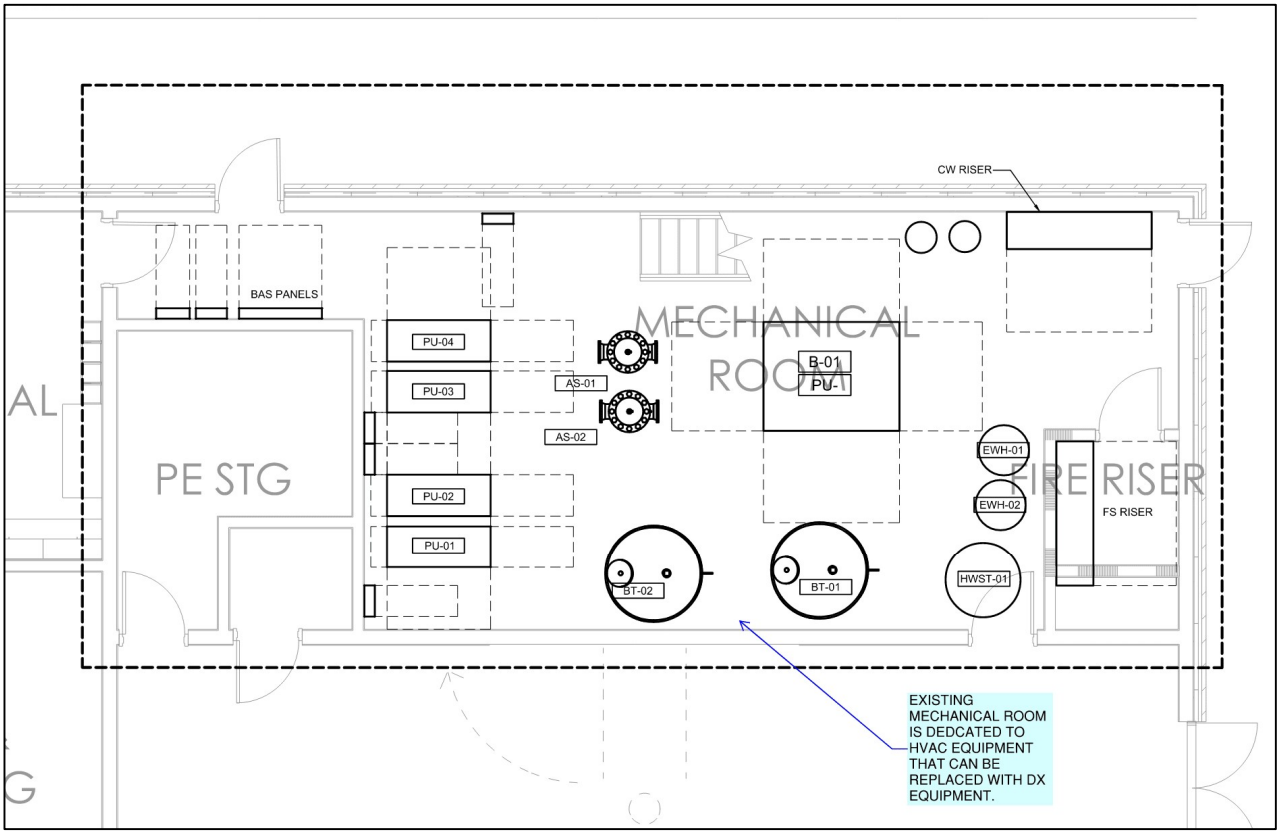
For cost estimating purposes, assume that the existing baseline system is two air-water source heat pumps each rated at 50 tons cooling (1500 MBH heating).

We assume:

- Four (4) 5-ton units for the 2nd level classrooms
- Four (4) 5-ton split systems for the 1st level
- Two (2) 10-ton DOAS units for the classroom areas
- Two (2) 15-ton DOAS units for the Kitchen/Common Area

Workbook ID: CS-3	Use all unitary rooftop equipment for heating and cooling of entire building.
Function(s): Condition Space	**Includes Idea(s)**:

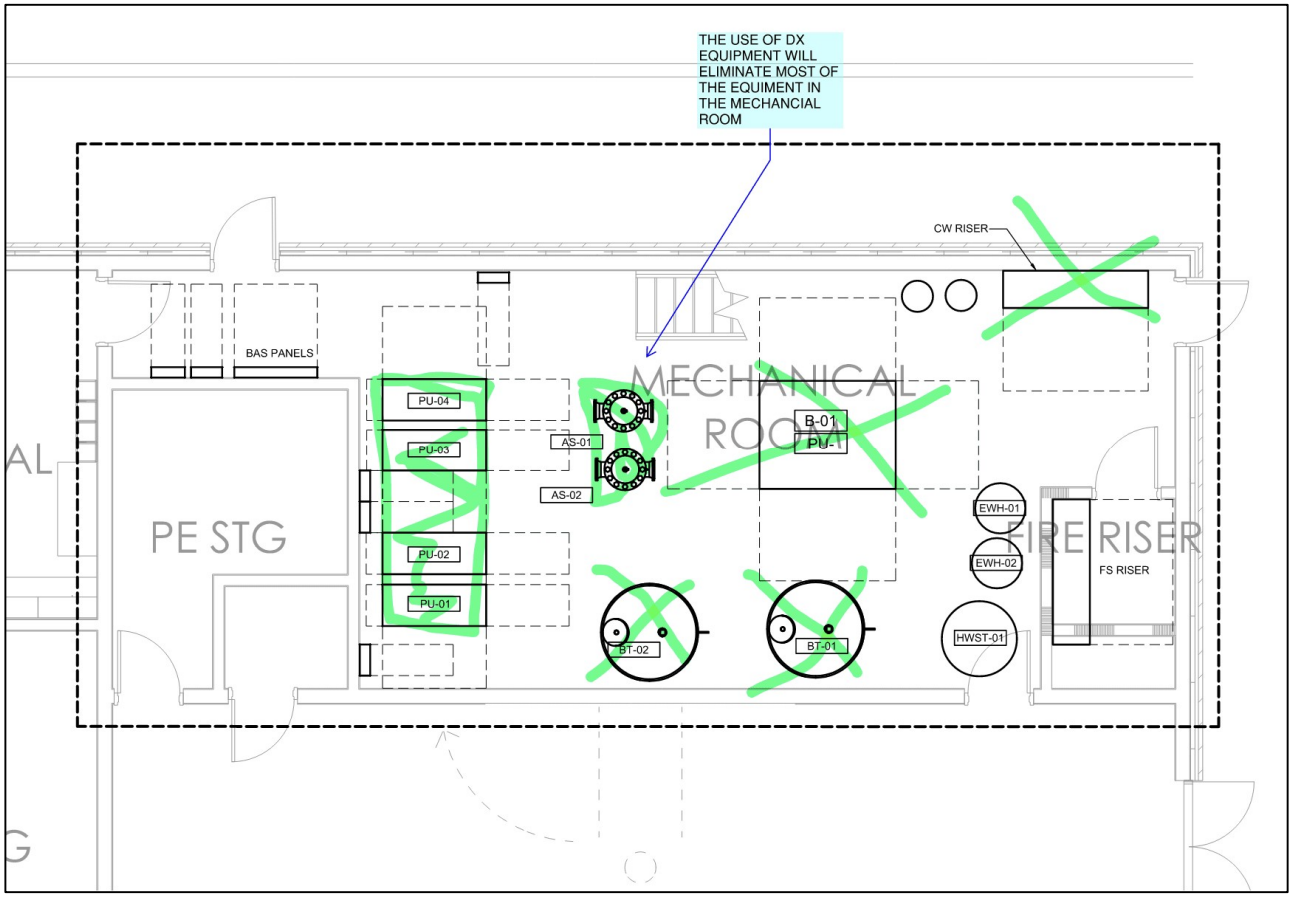
Baseline Concept Illustration



Baseline Mechanical Room Plan

Workbook ID: CS-3	Use all unitary rooftop equipment for heating and cooling of entire building.
Function(s): Condition Space	**Includes Idea(s)**:

Alternative Concept Illustration



Alternative Mechanical Room Concept Using Unitary Rooftop Equipment

Workbook ID: CS-3	Use all unitary rooftop equipment for heating and cooling of entire building.							
Function(s): Condition Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Eliminate chilled water fan coils	27.03%	LS	1	259,700	329,897			
Eliminate VAV Boxes from the building	27.03%	LS	1	22,662	28,788			
Eliminate chilled water piping for the hydronic piping	27.03%	SF	46,007	14.70	859,108			
Eliminate hydronic piping specialties	27.03%	SF	46,007	3.55	207,472			
Remove two hydronic pumps	27.03%	LS	1	23,052	29,283			
Remove 50% of Instrumentation & controls	27.03%	SF	23,003	12.25	357,954			
Baseline: (2) Air-water source heat pumps, 50 Tons cooling, 1500 MBH heating	27.03%	EA				2	135,000	270,000
DX-split sytem, 5 Ton, 1st floor	27.03%	EA				4	25,000	127,030
DX-Unitary package 5 Ton units, 2nd floor	27.03%	EA				4	16,750	85,110
(2) 15 Ton DOAS units for Kitchen/Common areas	27.03%	EA				4	54,750	278,196
(2) 10 Ton DOAS units for Classroom areas	27.03%	EA				4	34,250	174,031
Curbs for equipment relocated from Mechanical attic to Gymnasium roof	27.03%	LS				1	50,000	63,515
Remove metal roofing system with substrate to sloped Gymnasium roof	27.03%	SF	6,664	36.50	308,983			
Structural savings by eliminating the slope from the Gym roof considered a wash due to steel load upgrades for units.		Note						
Assess the change to roof plumbing and flashings between the sloped and flat roof as a wash		Note						
Remove shiplap paneling to gym soffit	27.03%	SF	656	45.00	37,499			

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Workbook ID: CS-3	Use all unitary rooftop equipment for heating and cooling of entire building.							
Function(s): Condition Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Add back Single ply roofing system with substrate inside new parapets	27.03%	SF				6,144	28.50	222,435
Add parapets, 44" high to outside perimeter, posts, framing, inside finish (panels on the outside shown below) (Length approx. 264lf)	27.03%	SF				924	47.00	55,167
Add parapet exterior metal panel finish to two sides as the third is the west elevation that can be coordinated with the design change	27.03%	SF				574	39.50	28,802
TOTAL COSTS*					**2,159,000**			**1,304,000**
							TOTAL (PROPOSED less BASELINE)	**-855,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: CS-4	Remove all cooling except at administration and preschool wing.							
Function(s): Condition Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Hydronic piping	27.03%	SF	46,007	14.70	859,108			
Hydronic piping specialties	27.03%	SF	46,007	3.55	207,472			
Diffusers, registers & grilles	27.03%	SF	46,007	1.35	78,898			
Hydronic piping	27.03%	SF				34,525	14.70	644,699
Hydronic piping specialties	27.03%	SF				34,525	3.55	155,693
Diffusers, registers & grilles	27.03%	SF				34,525	1.35	59,207
TOTAL COSTS*					**1,145,000**			**860,000**
							TOTAL (PROPOSED less BASELINE)	**-285,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: DP-9	Solicit the DAS system as a bid alternate.							
Function(s): Deliver Project						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original DAS system per original design	27.03%	LS	1	318,500	404,591			
Alternate moves DAS system out of base bid into Bid Add Alternates	27.03%	LS				1		
Alternate adds back the conduit pathway for the future Antenna cabling	27.03%	LF				250	20.00	6,352
TOTAL COSTS*					**405,000**			**6,000**
							TOTAL (PROPOSED less BASELINE)	**-399,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.
Function(s): Distribute Power	**Includes Idea(s)**: 118

Baseline Concept:

The baseline building electrical service is 480y/277v with transformation to 208Y/120v.

Alternative Concept:

The alternative concept serves building at 208y120v instead of 480y/277v to save space dedicated to transformers and to reduce cooling load of electrical rooms.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**=**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**+**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**+**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 219,000	$ NA	$ NA
Alternative Concept	$ 188,000	$ NA	$ NA
Cost Difference	**$ -31,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.
Function(s): Distribute Power	**Includes Idea(s)**: 118

Recommendation:

Accept this alternative if DP-15 (Centralize and Stack Electrical Rooms) is not taken.

Alternative Concept

Advantages	Disadvantages
• Saves floor space	• Requires larger conductors
• Reduces heat buildup in electrical rooms	• Requires larger panels
• Eliminates need for transformer replacement	• Some mechanical equipment may only be available in 480v and require transformation up
• Eliminates transformer hum and RFI	• Requires more lighting circuits
• Eliminates long lead time for transformers	•
•	•

Analysis and Justification:

There is a wide borderline when deciding whether to use a 480v versus 208v system to serve a building. Large mechanical equipment at a great distance from the source is more efficiently served at 480v. In the baseline plan, the mechanical room is adjacent to the main electrical room, so the distance advantage is reduced.

One of the reasons given for placing the step-down transformer in the main electrical room was to save space in the other electrical rooms. A typical 225kVA transformer can take up 3ft of wall space and be nearly 3ft deep. In addition, there needs to be clear space around it for ventilation and access to check connections. However, bringing the voltage down immediately upon entering from the back of the building removes one of the advantages of having a 480v primary feeder, which is to allow smaller, less costly conductors to reach those remote supporting electrical rooms. Normally, that is where you would transform the voltage. The baseline already effectively makes the rest of the building 208v service.

Some other things to consider include the potential for radio frequency interference equipment if there is a large transformer near MDF equipment, this introduces another possible point of failure in the distribution system with a long lead time for replacement.

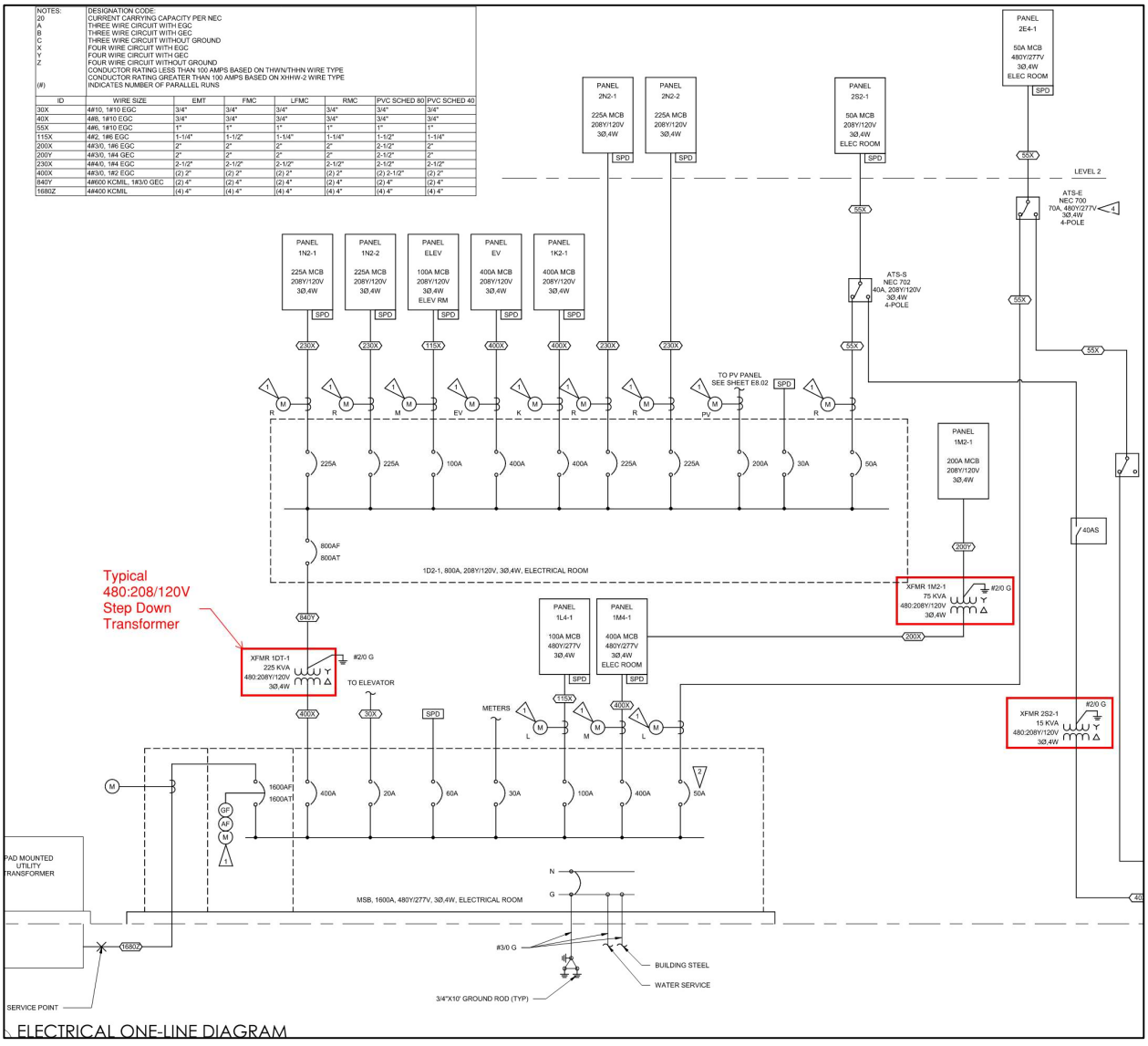
Workbook ID: DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.
Function(s): Distribute Power	**Includes Idea(s)**: 118

Rooms with transformers will eventually accumulate heat to an uncomfortable level. Even with the current high efficiency types, the heat rejection losses still amount to about 2% of the transformer kVA ratings. Therefore, eliminating the need for a 225kVA and 75kVA transformer in this example means there would no longer be a constant 6kW source of heat generated from them, and this would reduce the amount of cooling required. On the other hand, there would be a proportional increase in size of panels, conductors, and wiring for the 208/120v system. Depending on the configuration and lengths involved, the cost may turn out to be about the same.

If the advantages of a 480v system cited above can be better utilized (e.g. by moving the step-down transformers out to where their loads are), then we would recommend staying with the baseline. Otherwise, if the room configurations stay the same, we would recommend the 208v service.

Workbook ID: DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.
Function(s): Distribute Power	**Includes Idea(s)**: 118

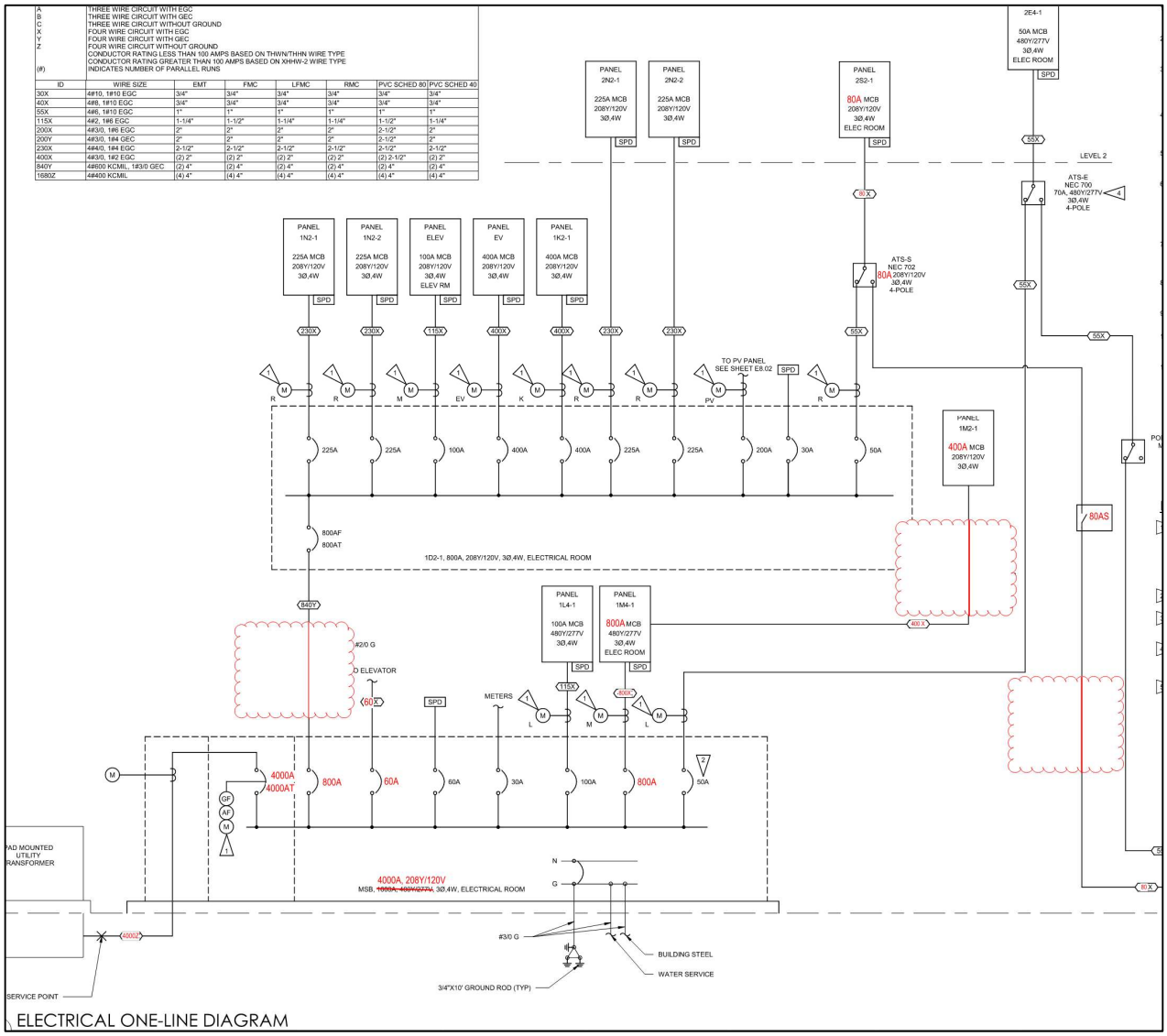
Baseline Concept Illustration



Transformation to lower voltage occurs early and in the main electrical room reducing some advantages of 480V system

Workbook ID: DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.
Function(s): Distribute Power	**Includes Idea(s)**: 118

Alternative Concept Illustration



Change Service to 208/120v

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Workbook ID: DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.							
Function(s): Distribute Power						**Includes Idea(s):** 118		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
1600A 480Y/277V Switchboard with Main Circuit Breaker, Metering section, and Distribution Breakers section	27.03%	Ea	1	84,744	107,650			
Reference One - Line Diagram on Sheet E8.01 Feeder '400X' from Main Distribution Section to Transformer '1DT-1'; (2)2" EMT Conduit, 10ft distance	27.03%	LF	20	70.00	1,778			
Feeder '400X' from Main Distribution Section to Transformer '1DT-1'; (4)#3/0 Copper per Conduit, 10ft distance	27.03%	LF	80	64.00	6,504			
Feeder '400X' from Main Distribution Section to Transformer '1DT-1'; #2 Copper Conductor per Conduit, 10ft distance	27.03%	LF	20	6.80	173			
Feeder '840Y' from Transformer '1DT-1' to Distribution Panel '1D2-1' (2)4" EMT Conduit, 10ft distance	27.03%	LF	20	70.00	1,778			
Feeder '840Y' from Transformer '1DT-1' to Distribution Panel '1D2-1'; (4)600kcmil Copper Conductors per conduit; 10ft distance	27.03%	LF	80	126.72	12,878			
Feeder '840Y' from Transformer '1DT-1' to Distribution Panel '1D2-1'; 3/0 Copper Grounding Conductor per conduit; 10ft distance	27.03%	LF	20	16.00	406			
225kVA 480:208Y/120V Dry Type Transformer K-13 rated	27.03%	EA	1	43,900	55,766			

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Workbook ID: DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.							
Function(s): Distribute Power						**Includes Idea(s):** 118		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
75kVA 480:208Y/120V Dry Type Transformer	27.03%	EA	1	20,577	26,139			
4000A 208Y/120V Switchboard with Main Circuit Breaker, Metering section, and Distribution Breakers section	27.03%	EA				1	134,862	171,315
Feeder '840Y' from 208V Switchboard to Distribution Panel '1D2-1' (2)3-1/2" EMT Conduit, 10ft distance	27.03%	LF				20	130.00	3,303
Feeder '840Y' from 208V Switchboard to Distribution Panel '1D2-1'; (4)600kcmil Copper Conductors per conduit; 10ft distance	27.03%	LF				80	126.72	12,878
Feeder '840Y' from 208V Switchboard to Distribution Panel '1D2-1'; 1/0 Copper Eqpt Grounding Conductor per conduit; 10ft distance	27.03%	LF				20	10.15	258
Exhaust 1/4hp fan for cooling electrical rooms (not required if transformer is removed)	27.03%	EA	2	2,500.00	6,352			
TOTAL COSTS*					**219,000**			**188,000**
							TOTAL (PROPOSED less BASELINE)	**-31,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: DP-15	Centralize and stack electrical rooms.
Function(s): Distribute Power	**Includes Idea(s)**: 79, 94, 95

Baseline Concept:

In the baseline concept, the main electrical service and distribution equipment are collocated in the northwest corner of the building and there is no stacking of electrical rooms between the first and second floors.

Alternative Concept:

The alternative concept creates an electrical room with distribution panels closer to the center of the building and stacks the second floor electrical room directly above.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**+**	Environmental Sustainability	**+**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**+**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**+**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 64,000	$ NA	$ NA
Alternative Concept	$ 0	$ NA	$ NA
Cost Difference	**$ -64,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: DP-15	Centralize and stack electrical rooms.
Function(s): Distribute Power	**Includes Idea(s)**: 79, 94, 95

Recommendation:

Accept this alternative as it presents a more efficient layout for the distribution of power within the building.

Alternative Concept

Advantages	Disadvantages
• Improves reliability by using shorter feeders	• Requires use of a chase in the baseline design
• Lowers future installation costs	• Best when combined with mechanical room revision
• Allows increased area for adjacent spaces	•
• Removes unnecessary access through MDF	•
•	•
•	•

Analysis and Justification:

The current main switchboard includes a 480v distribution section that feeds a transformer and 208v distribution panel which are all located at the northwest corner of the building near the utility transformers.

Per Washington State Code, there needs to be a service disconnect within 15ft from where power enters the building. However, the distribution equipment need not be next to this main disconnect. It should be close to where most of the branch panels and their circuits will be concentrated as well as where the largest loads are.

In addition, neither of the electrical rooms are stacked. This requires feeders to future branch panels serving the classroom portion of the building to be routed across long horizontal distances through program space corridors.

To minimize future disruptions, it is often preferable to place electrical panels near spaces that are less prone to move during the life of the building. These areas include stairways and/or bathrooms. However, in the baseline plan, there is an electrical room located by the phlebotomy lab which could potentially end up in the way of a desired new floor arrangement at some point in the future.

Workbook ID: DP-15	Centralize and stack electrical rooms.
Function(s): Distribute Power	**Includes Idea(s)**: 79, 94, 95

The alternative concept attempts to solve these deficiencies. We propose centralizing and stacking electrical rooms which will allow distribution panels to serve future branch panels via a riser to the next floor within the room.

The main electrical room will still contain the main service disconnect, utility metering, and cable pull sections. The space can be reduced in size which will allow more space for adjacent rooms to expand.

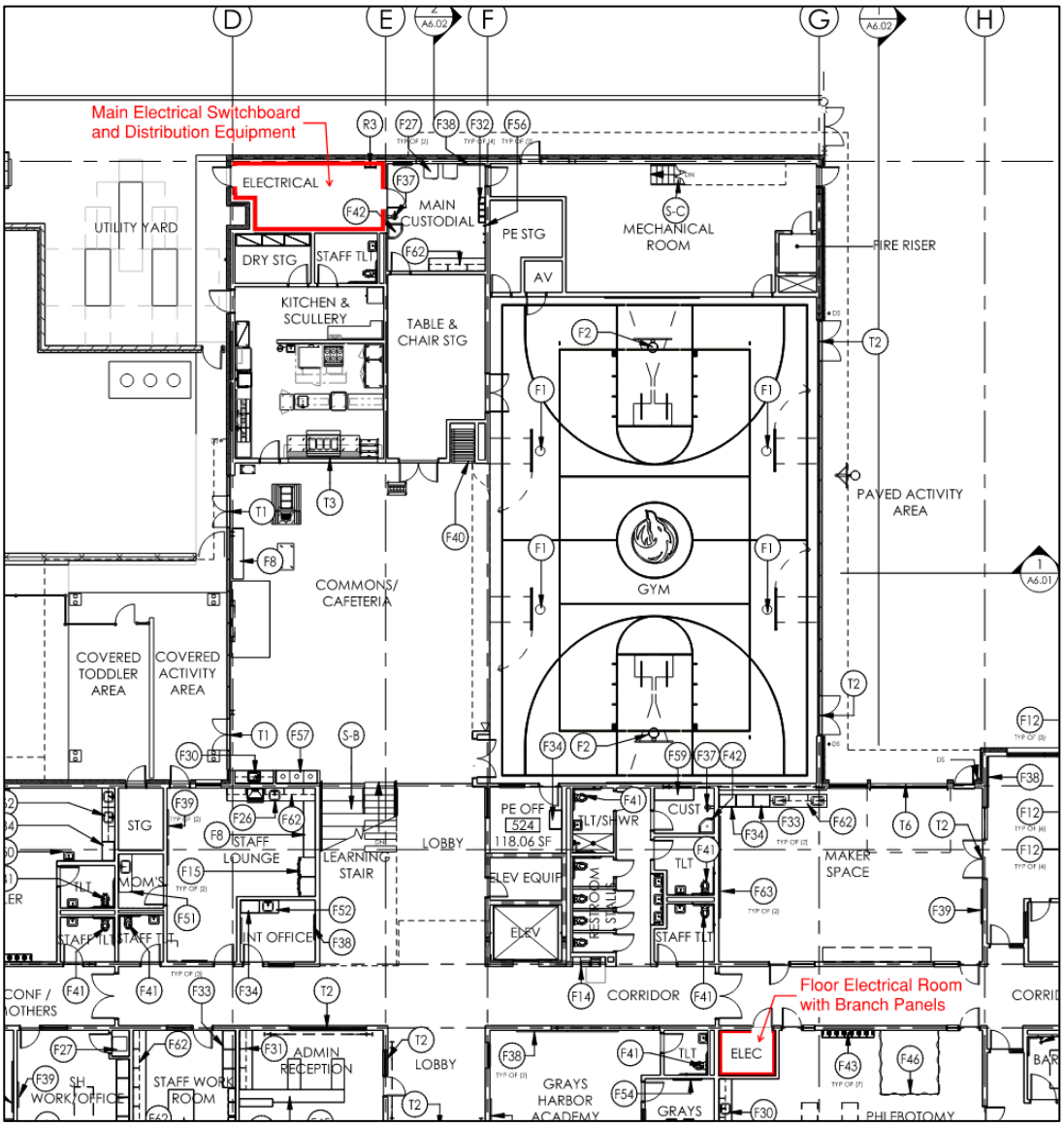
The main 480v distribution section, the step-down transformer, and the 208v distribution and branch panels would move to the central electrical room taking advantage of the smaller 480v conduit and wiring that is upstream of the transformer for this horizontal distance.

The baseline mechanical room is adjacent to the main electrical room but its location can also be optimized by placing the HVAC systems closer to the classrooms that they will serve.

The suggested architectural changes to improve both the electrical and HVAC distribution can be found in the following illustrations.

Workbook ID: DP-15	Centralize and stack electrical rooms.
Function(s): Distribute Power	**Includes Idea(s)**: 79, 94, 95

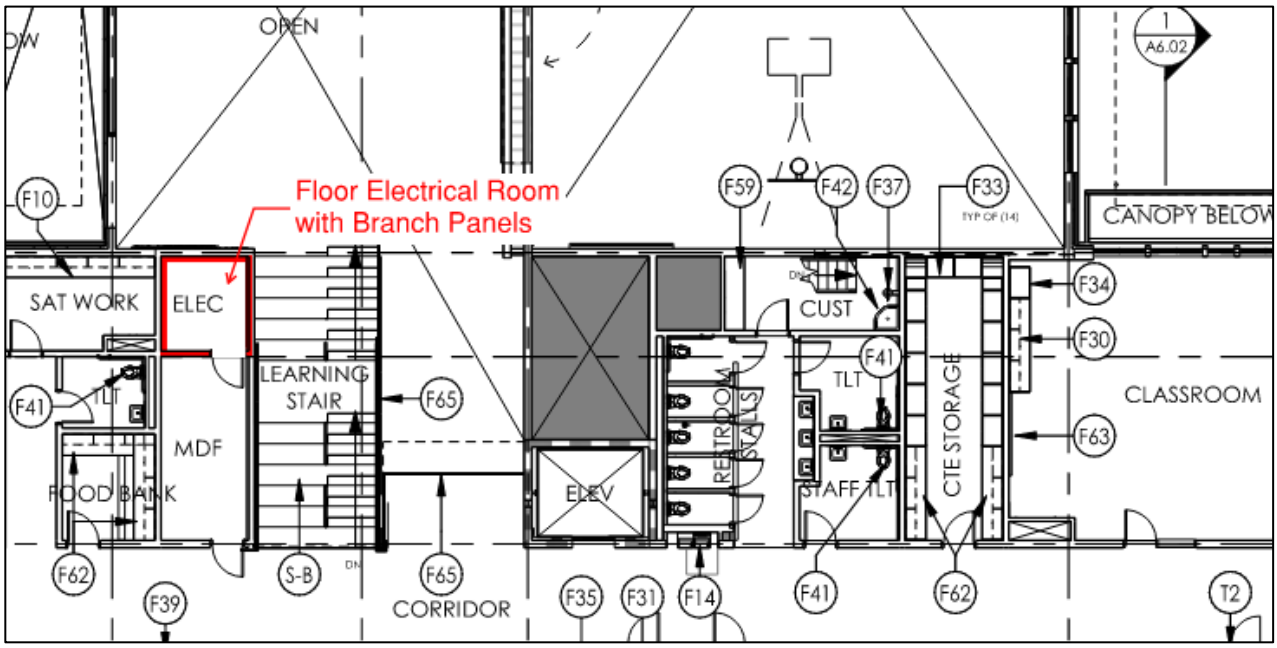
Baseline Concept Illustration



Baseline Location of Electrical Rooms on First Floor

Workbook ID: DP-15	Centralize and stack electrical rooms.
Function(s): Distribute Power	**Includes Idea(s)**: 79, 94, 95

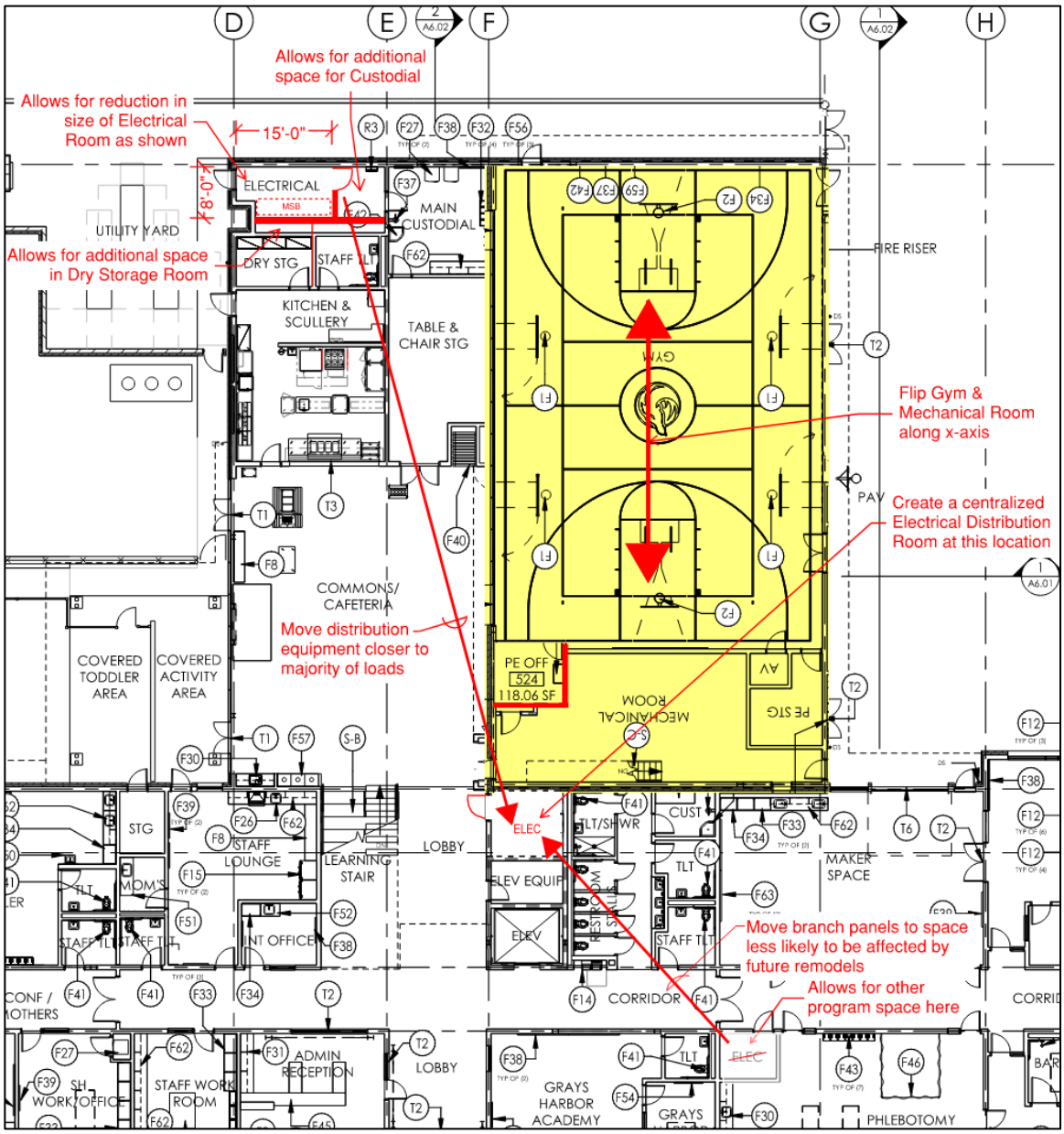
Baseline Concept Illustration



Baseline Location of Electrical Room on Second Floor

Workbook ID: DP-15	Centralize and stack electrical rooms.
Function(s): Distribute Power	**Includes Idea(s)**: 79, 94, 95

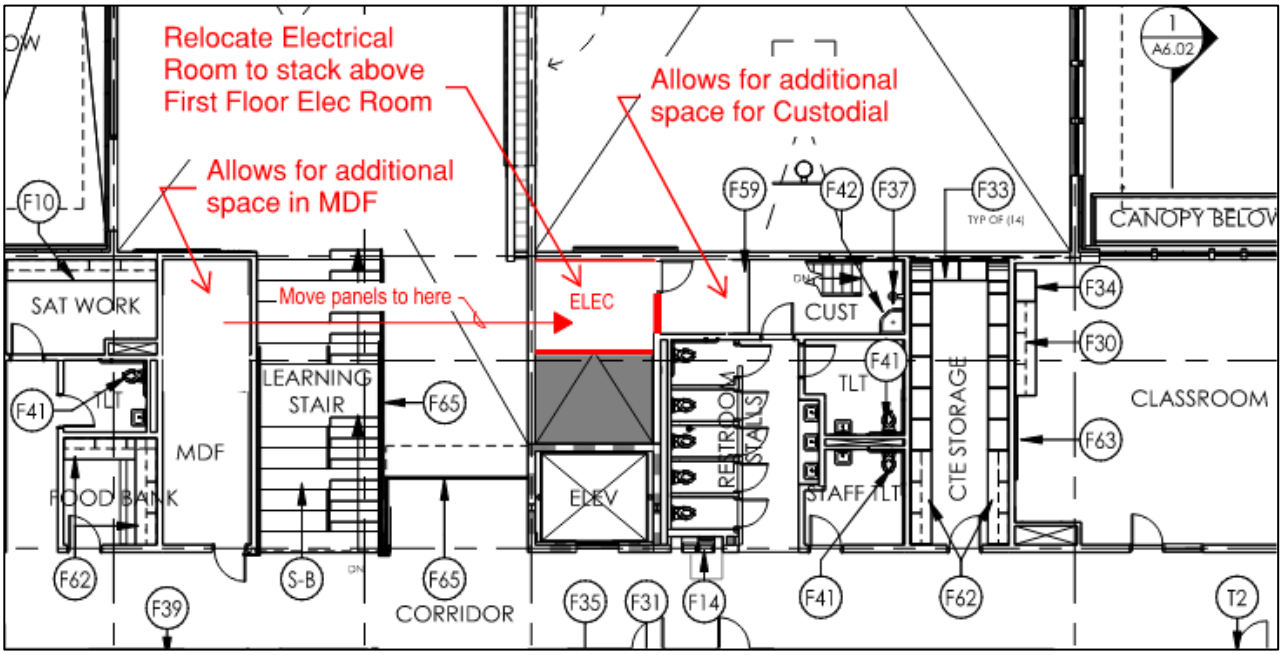
Alternative Concept Illustration



Relocation of Electrical Rooms on First Floor

Workbook ID: DP-15	Centralize and stack electrical rooms.
Function(s): Distribute Power	**Includes Idea(s)**: 79, 94, 95

Alternative Concept Illustration



Relocation of Electrical Rooms on Second Floor

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Workbook ID: DP-15	Centralize and stack electrical rooms.							
Function(s): Distribute Power						**Includes Idea(s):**	79, 94, 95	
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Savings approximated for stacking electrical rooms and re-orienteering mechanical room and equipment	27.03%	LS	1	50,000	63,515			
TOTAL COSTS*					**64,000**			
							TOTAL (PROPOSED less BASELINE)	**-64,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: EC-33	Apply wood exterior ILO brick at prominent elevations.
Function(s): Express Culture	**Includes Idea(s)**: 38

Baseline Concept:

The baseline concept does not include wood siding on the facades; exterior wood materiality is expressed at the underside of exterior soffits.

Alternative Concept:

The alternative concept includes the use of wood siding to express the historical, local timber industry culture.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**+**
Aesthetics	**+**	Schedule	**=**
Durability & Reliability	**--**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 578,000	$ NA	$ NA
Alternative Concept	$ 256,000	$ NA	$ NA
Cost Difference	**$ -322,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: EC-33	Apply wood exterior ILO brick at prominent elevations.
Function(s): Express Culture	**Includes Idea(s)**: 38

Recommendation:

Recommend acceptance of this alternative.

Alternative Concept

Advantages	Disadvantages
• Celebrates the regional and historical context of the wood material	• Moderately higher maintenance
• Reduces upfront costs	• Increases variety of required exterior materials
• Enhances wellbeing via biophilic design	• Decreases durability
• Ease of construction and related logistics	• Decreases material life cycle
• Quicker assembly and installation	•
• More sustainable	•

Analysis and Justification:

It was expressed during the design reviews and group discussions that the preferred materials should reflect the historical and cultural context of the Aberdeen area, where wood is predominately used as exterior cladding. In addition to potentially reducing the initial direct cost related to brick, which was also identified as a contextual material of the region, wood appears to express the cultural significance more directly. To retain some brick expression, brick is still shown at the east and west facades, as related to building exits and staircases. All other areas of brick are shown replaced with wood siding.

The use of wood also has added benefits related to it being a more sustainably sourced material, with health and wellness related effects due to its biophilic nature. It is also a lightweight material that contributes to the ease of construction logistics, transportation, handling and installation. The overall material weight reduction, pending design team input, reduces the overall structural load and material at walls and foundation.

Workbook ID: EC-33	Apply wood exterior ILO brick at prominent elevations.
Function(s): Express Culture	**Includes Idea(s)**: 38

Baseline Concept Illustration



Baseline Elevations

Workbook ID: EC-33	Apply wood exterior ILO brick at prominent elevations.
Function(s): Express Culture	**Includes Idea(s)**: 38

Alternative Concept Illustration



Alternative Elevations with Wood Siding

Workbook ID: EC-33	Apply wood exterior ILO brick at prominent elevations.							
Function(s): Express Culture						**Includes Idea(s):** 38		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Brick veneer	27.03%	SF	9,654	46.50	570,252			
Accent panel	27.03%	SF	111	54.00	7,614			
North elevation - substitute wood paneling for brick	27.03%	SF				4,486	25.00	142,464
East elevation - substitute wood paneling for brick	27.03%	SF				1,012	25.00	32,139
South elevation - substitute wood paneling for brick	27.03%	SF				1,716	25.00	54,496
West elevation - substitute wood paneling for brick	27.03%	SF				850	25.00	26,994
		We note the estimate has the equivelant of a rainscreen system covered under exterior sheathing so the cost shown is for the exterior wood paneling						
TOTAL COSTS*					**578,000**			**256,000**
							TOTAL (PROPOSED less BASELINE)	**-322,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-18	Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere.
Function(s): Enclose Space	**Includes Idea(s)**:

Baseline Concept:

The baseline concept includes brick veneer at all façades.

Alternative Concept:

The alternate concept reduces the amount of brick veneer by limiting its use to only major entrances and most prominent façades. Architectural CMU and metal paneling replace the brick veneer at selected locations.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	=	Environmental Sustainability	=
Aesthetics	--	Schedule	=
Durability & Reliability	=	Constructability	=
Total Cost of Ownership / Lifecycle Cost	+	Occupant Comfort, Safety, Performance	=

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 354,000	$ NA	$ NA
Alternative Concept	$ 277,000	$ NA	$ NA
Cost Difference	**$ -77,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: ES-18	Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere.

Function(s): Enclose Space	**Includes Idea(s)**:

Recommendation:

Accept this alternative if needed for budget control. Reduce the amount of brick exterior material and replace with a more cost-effective material.

Alternative Concept

Advantages	Disadvantages
• Reduces costs	• Decreases use of preferred materials
• Keeps existing building geometry	• Metal siding replacement is less durable
• Emphasizes interior program and circulation	•
• Maintains some use of preferred materials	•
•	•
•	•

Analysis and Justification:

It is understood that brick veneer is a preferred exterior cladding material of the District standards. However, the cost per SF is higher than other options. Overall cost savings may be achieved by minimizing the amount of brick veneer for a more cost-effective option. The alternative illustration shows a complete removal of brick veneer at the north façade, and a 40%-60% visual reduction of the brick veneer at the south, east and west facades. The noted replacement exterior cladding material utilizes baseline exterior cladding material as shown on A5.01.

Workbook ID: ES-18	Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere.
Function(s): Enclose Space	**Includes Idea(s)**:

Baseline Concept Illustration



Baseline Façade Design

Workbook ID: ES-18	Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere.
Function(s): Enclose Space	**Includes Idea(s)**:

Alternative Concept Illustration



Reduction of Brick Veneer on Building Façade

Workbook ID: ES-18	Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere.							
Function(s): Enclose Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
North elevation - change part to Metal panel	27.03%	SF	176	46.50	10,396	176	39.50	8,831
North elevation - change part to CMU	27.03%	SF	3,080	46.50	181,932	3,080	35.00	136,938
East elevation - change part to Metal panel	27.03%	SF	1,243	46.50	73,423	1,243	39.50	62,370
South elevation - change part to Metal panels	27.03%	SF	462	46.50	27,290	462	39.50	23,182
West elevation - change part to CMU	27.03%	SF	1,030	46.50	60,817	1,030	35.00	45,777
TOTAL COSTS*					**354,000**			**277,000**
							TOTAL (PROPOSED less BASELINE)	**-77,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-19	Use a low slope roof at the gym and lower the overall height.							
Function(s): Organize Building						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Remove metal roofing system with substrate to sloped Gymnasium roof	27.03%	SF	6,664	36.50	308,983			
Eliminate the slope from the Gym roof, taking the height down to approx. 25' high	27.03%	SF	6,664	3.00	25,396			
Remove shiplap paneling to gym soffit	27.03%	SF	656	45.00	37,499			
Add back Single ply roofing system with substrate as a flat roof	27.03%	SF				6,144	19.50	152,192
Add back tapered insulation for drainage in lieu of sloped steel roof	27.03%	SF				6,144	5.00	39,024
Assess the change to roof plumbing and flashings between the sloped and flat roof as a wash, no cost change to be shown at present		Note						
Add parapets, 44" high to outside perimeter, posts, framing, inside finish	27.03%	SF				924	47.00	55,167
Add parapet exterior metal panel finish to two sides as the third is the west elevation that can be coordinated with the design change	27.03%	SF				574	39.50	28,802
Remove area of wall on west elevation, eliminating exterior wall and metal paneling	27.03%	SF	1,200	39.50	60,212			
Remove exterior and interior wall sheathing systems on the West elevation by eliminating part area to walls by making the Gym roof flat	27.03%	SF	1,200	51.70	78,809			
TOTAL COSTS*					**511,000**			**275,000**
							TOTAL (PROPOSED less BASELINE)	**-236,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-20	Reduce the overall building and roof height at the classroom wing.
Function(s): Enclose Space	**Includes Idea(s)**:

Baseline Concept:

The baseline concept elevation is 32'10" to the bottom of decking at grid 2 as shown on section 3/A6.01, 33' to the bottom of decking at the centerline stud near grid 7, and 28' to top of concrete at the mechanical attic.

Alternative Concept:

The alternative concept lowers the overall height of the classroom wing by 3'. Referencing building section 3/A6.01, lower the elevation to 29'10" at the bottom of decking at grid 2, to 30' at the bottom of decking at the centerline stud near grid 7, and retaining 28' to top of concrete at the mechanical attic.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**+**
Aesthetics	**=**	Schedule	**=**
Durability & Reliability	**=**	Constructability	**=**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 532,000	$ NA	$ NA
Alternative Concept	$ 0	$ NA	$ NA
Cost Difference	**$ -532,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: ES-20	Reduce the overall building and roof height at the classroom wing.
Function(s): Enclose Space	**Includes Idea(s)**:

Recommendation:

Lower the overall building height in the classroom wing by 3’ or more if feasible.

Alternative Concept

Advantages	Disadvantages
• Decreases overall project cost	• Potential impact to aesthetics
• Provides energy savings	• Reduces interstitial space above corridor ceiling at mechanical mezzanine
• Enhances building proportions	•
•	•
•	•
•	•

Analysis and Justification:

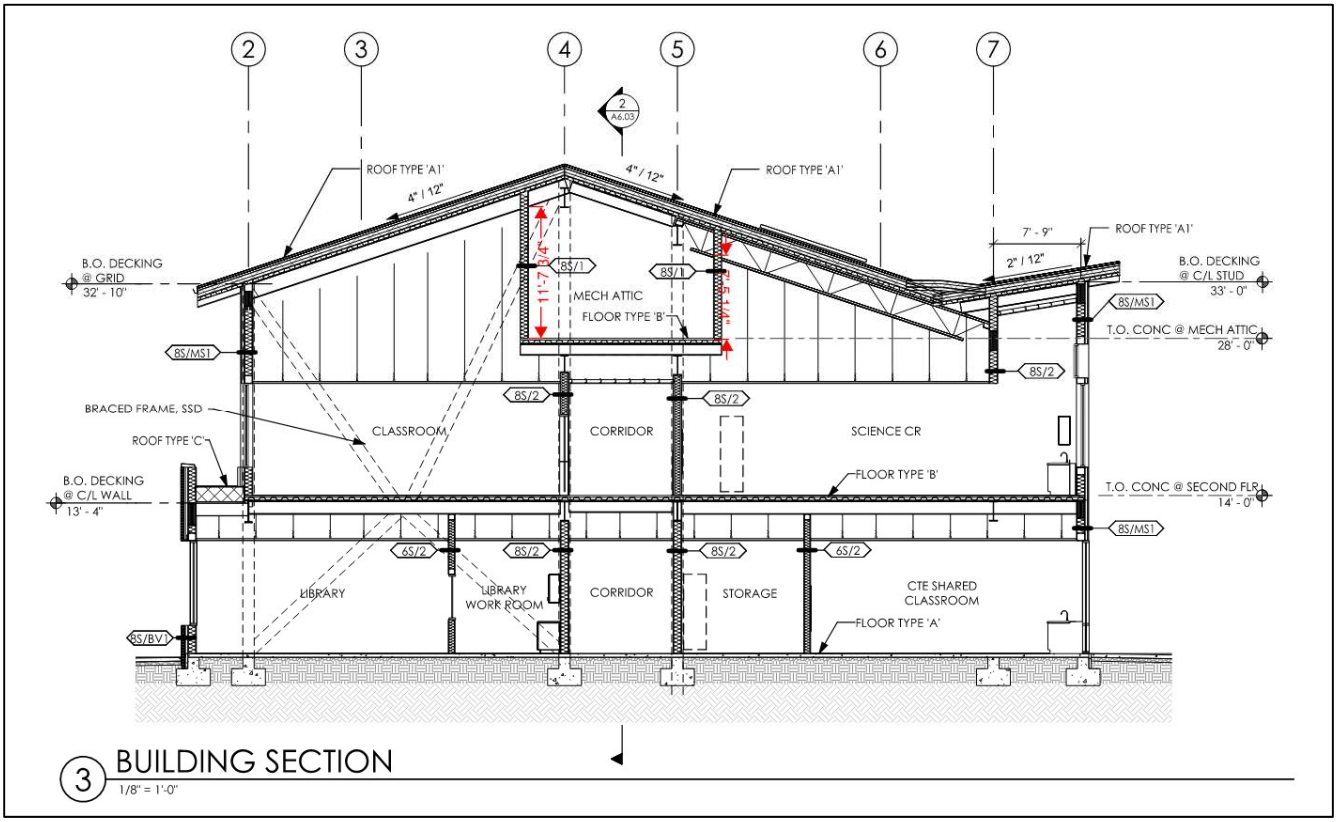
Material and Labor Savings: Lowering the overall height of the building will produce a sizeable reduction in the required amount of structural steel framing, steel stud framing, building envelope systems including metal panels, insulation, drywall etc. A reduction of these material quantities will lead to substantial material and labor cost savings.

Energy Efficiency: Reduced wall surface area lowers heating and cooling demands, improving building energy performance, and lowering long-term operating costs.

Reduction of interstitial space above corridor ceilings will require ductwork and piping to be run adjacent to the corridors and mechanical mezzanine.

Workbook ID: ES-20	Reduce the overall building and roof height at the classroom wing.
Function(s): Enclose Space	**Includes Idea(s)**:

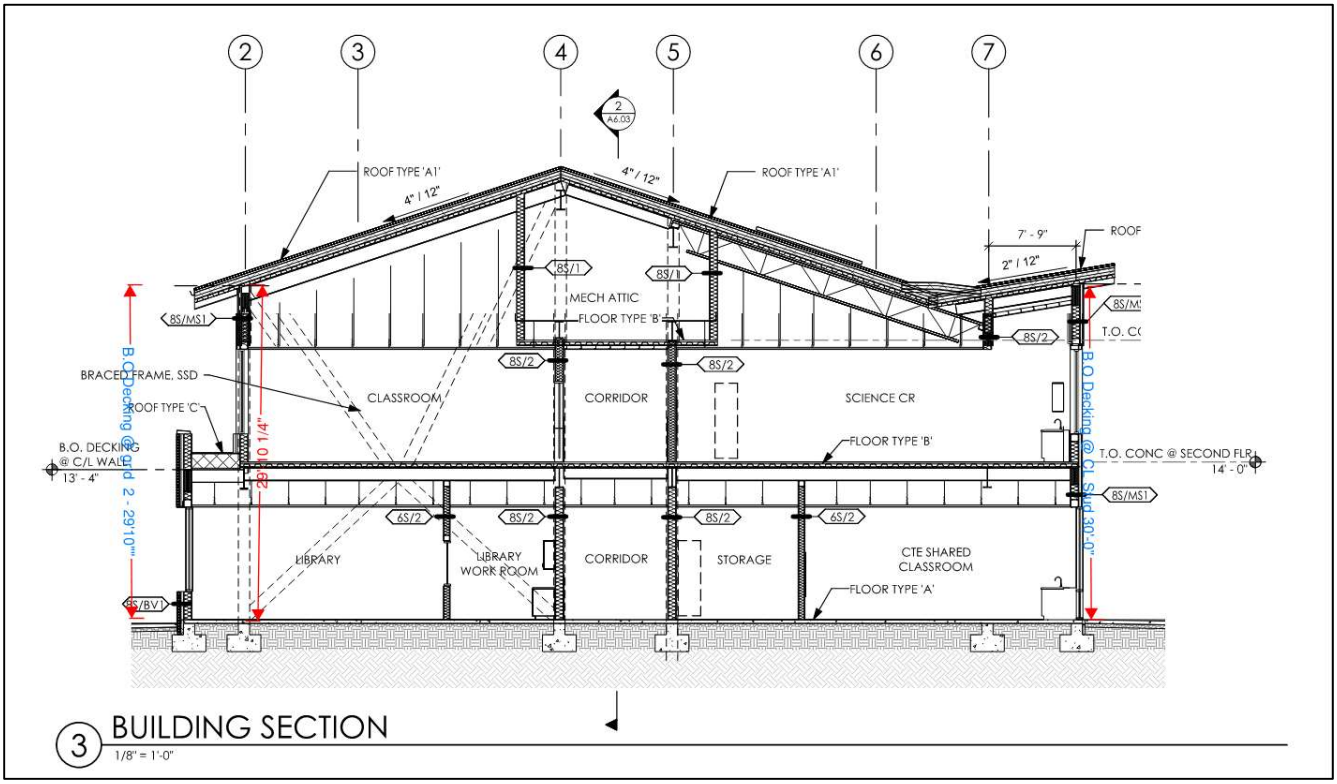
Baseline Concept Illustration



Baseline Roof Height

Workbook ID: ES-20	Reduce the overall building and roof height at the classroom wing.
Function(s): Enclose Space	**Includes Idea(s)**:

Alternative Concept Illustration



Reduction in Building Roof Height

Workbook ID: ES-20	Reduce the overall building and roof height at the classroom wing.							
Function(s): Enclose Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Reduce vertical elements of steelwork by 3 feet	27.03%	SF	22,680	5.18	149,094			
Reduce the exterior wall elements by 3 feet to the perimeter of the classroom wing at second floor	27.03%	SF	2,364	95.35	286,335			
Reduce interior walls / partitions by 3 feet through the second floor classroom wing	27.03%	SF	3,972	16.91	85,322			
Remove any additional finishes at the second floor	27.03%	SF	3,972	2.20	11,100			
TOTAL COSTS*					**532,000**			
							TOTAL (PROPOSED less BASELINE)	**-532,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-21	Reduce the amount of curtainwall systems and go to aluminum storefronts.
Function(s): Enclose Space	**Includes Idea(s)**:

Baseline Concept:

The baseline concept includes curtainwalls located at each elevation.

Alternative Concept:

The alternative concept replaces all baseline curtainwall system with storefront or window wall.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**=**
Aesthetics	**--**	Schedule	**=**
Durability & Reliability	**--**	Constructability	**=**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**--**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 589,000	$ NA	$ NA
Alternative Concept	$ 427,000	$ NA	$ NA
Cost Difference	**$ -162,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: ES-21	Reduce the amount of curtainwall systems and go to aluminum storefronts.
Function(s): Enclose Space	**Includes Idea(s)**:

Recommendation:

Accept this alternative if needed for budget control.

Alternative Concept

Advantages	Disadvantages
• Reduces costs	• Decreases durability against weather or impact
• Maintains overall design concept and transparency	• Decreases thermal advantage compared to curtainwall
• Easier installation	• Alters the massing and reduces transparency at staircases
• Requires less maintenance	• Requires structural members and either solid façade material or spandrel glazing at double height areas
•	•
•	•

Analysis and Justification:

The curtainwall SF pricing is currently 150% of the storefront and window pricing. Replacing curtainwall with storefront and window design may reduce overall costs. Although this will alter the overall massing, specifically at the double height staircases, overall glazing and transparency are mostly maintained. Storefront installation is easier and quicker to accomplish, as well as to maintain.

Note that the baseline estimate is adjusted to reflect the VE cost opinion for curtainwall systems.

Workbook ID: ES-21	Reduce the amount of curtainwall systems and go to aluminum storefronts.
Function(s): Enclose Space	**Includes Idea(s)**:

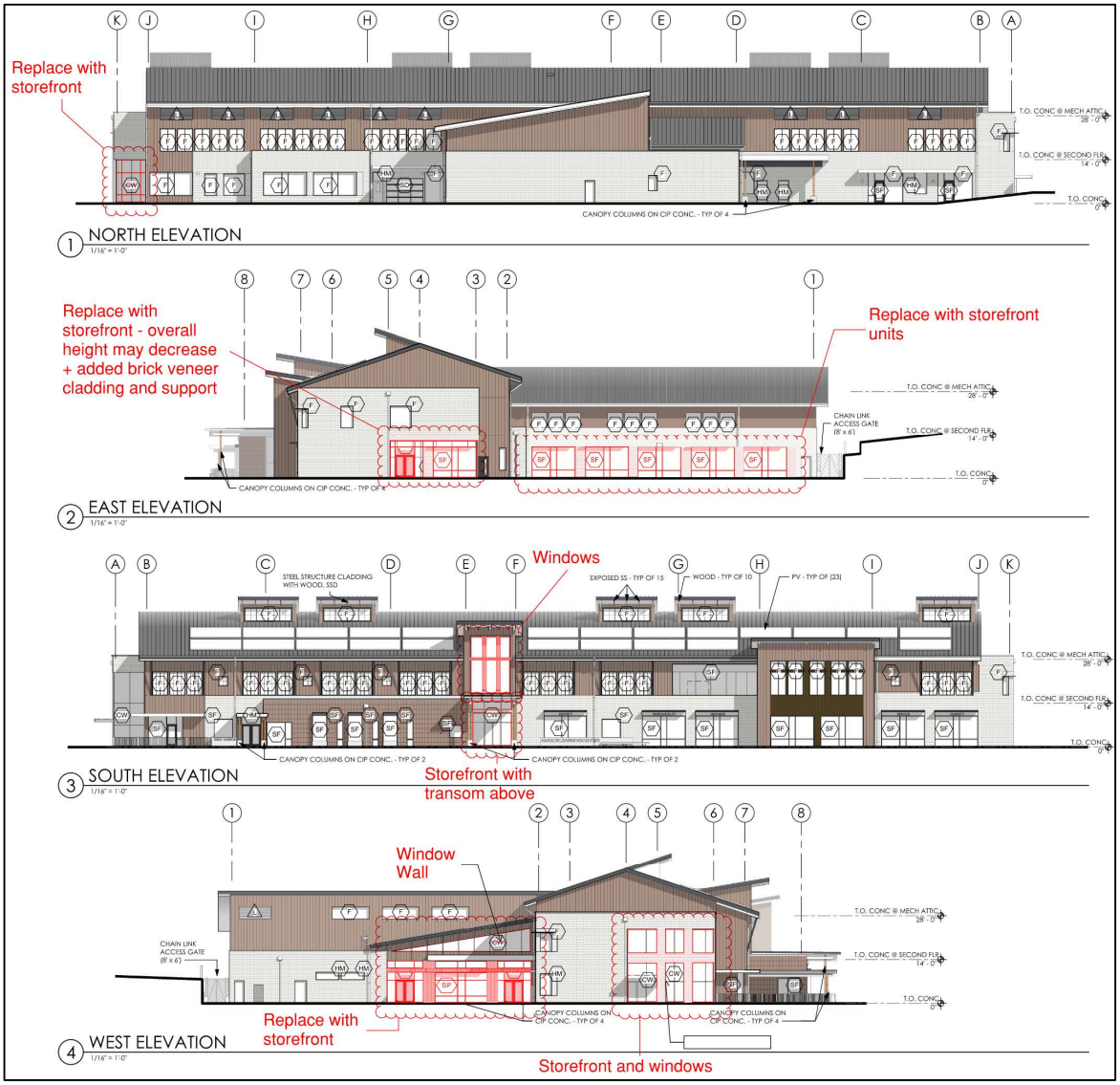
Baseline Concept Illustration



Baseline Curtainwall Glazing Systems

Workbook ID: ES-21	Reduce the amount of curtainwall systems and go to aluminum storefronts.
Function(s): Enclose Space	**Includes Idea(s)**:

Alternative Concept Illustration



Reduction of Curtainwall Replaced with Storefront Glazing

Workbook ID: ES-21	Reduce the amount of curtainwall systems and go to aluminum storefronts.							
Function(s): Enclose Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original building design utilizes curtainwall		SF	3,365	130.00	437,450			
VE adjustment to curtainwall system pricing		SF	3,365	45.00	151,425			
North elevation - change to storefront	27.03%	SF				114	85.00	12,352
East elevation - change to storefront	27.03%	SF				303	85.00	32,663
East elevation - change to aluminum windows	27.03%	SF				660	92.50	77,552
South elevation - change to storefront	27.03%	SF				528	85.00	57,011
West elevation - change to storefront	27.03%	SF				774	85.00	83,616
West elevation - change to window wall, angled	27.03%	SF				242	105.00	32,278
West elevation - change to windows	27.03%	SF				413	92.50	48,470
East, add steelwork	27.03%	LBS				2,800	4.30	15,294
South, add steelwork	27.03%	LBS				2,800	4.30	15,294
West, add steelwork	27.03%	LBS				7,500	4.30	40,967
North elevation brick veneer	27.03%	SF				50	46.50	2,953
East elevation brick veneer	27.03%	SF				140	46.50	8,270
TOTAL COSTS*					**589,000**			**427,000**
							TOTAL (PROPOSED less BASELINE)	**-162,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-22	Over long window spans, use metal siding ILO masonry veneer.
Function(s): Enclose Space	**Includes Idea(s)**:

Baseline Concept:

In the baseline concept exterior finish at walls over long window spans is masonry veneer.

Alternative Concept:

In the alternative concept exterior finish over long window spans is metal siding.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**=**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**=**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 98,000	$ NA	$ NA
Alternative Concept	$ 60,000	$ NA	$ NA
Cost Difference	**$ -38,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: ES-22	Over long window spans, use metal siding ILO masonry veneer.
Function(s): Enclose Space	**Includes Idea(s)**:

Recommendation:

At exterior walls, consider replacing masonry veneer with metal siding over long spans of windows.

Alternative Concept

Advantages	Disadvantages
• Reduces cost	• Alters aesthetic
• Decreases construction schedule	•
• Improves constructability	•
•	•
•	•
•	•

Analysis and Justification:

Significant supporting structural steel and attached lintel angles are required to support masonry over long spans of openings. Minimal light gauge steel can be used to frame around openings when not required to carry the load of a brick veneer. Providing metal siding over long span openings improves constructability and reduces schedule for construction at these areas. Eliminating the need for significant structural steel and associated angles will save cost as well.

Workbook ID: ES-22	Over long window spans, use metal siding ILO masonry veneer.
Function(s): Enclose Space	**Includes Idea(s)**:

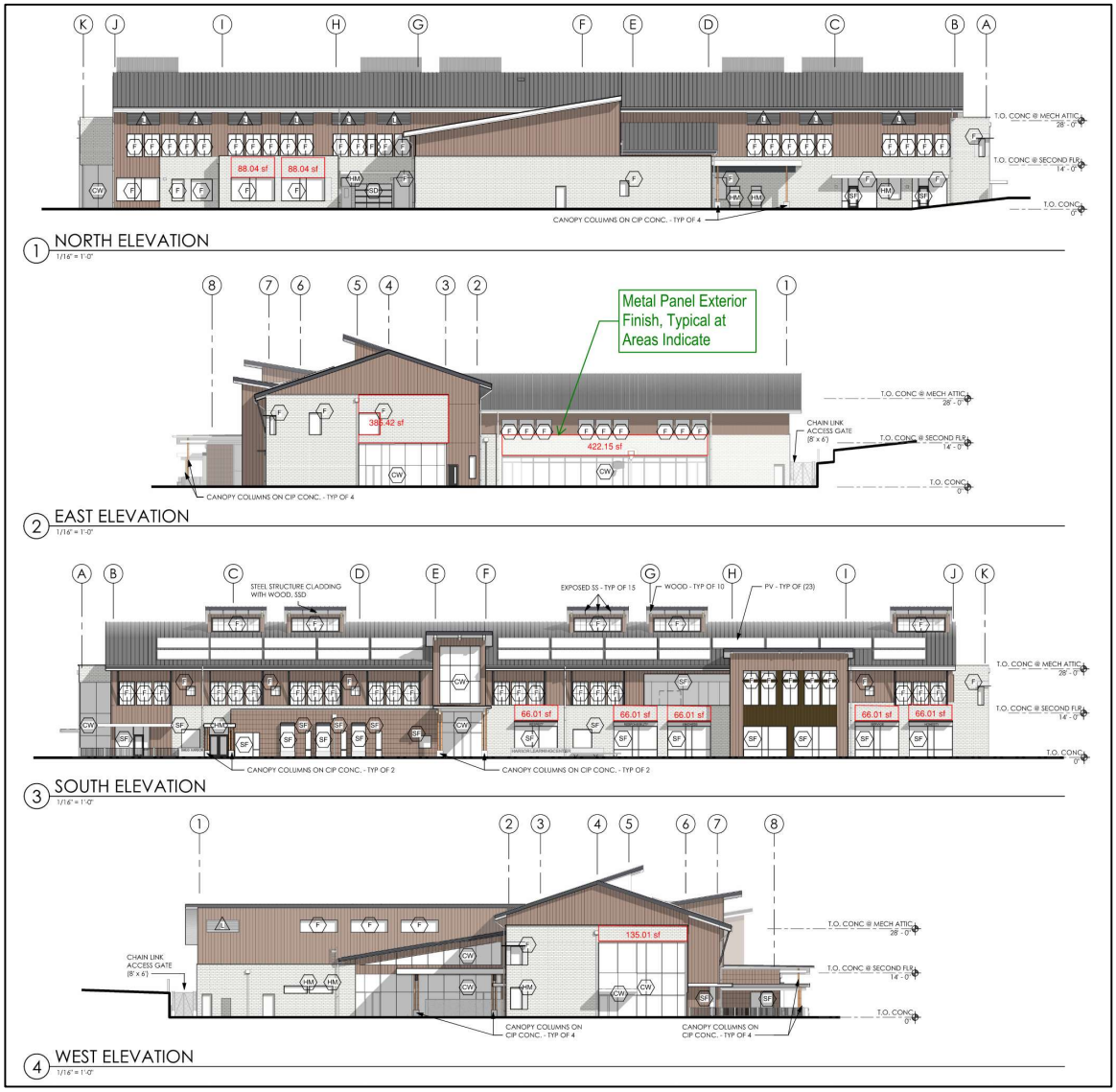
Baseline Concept Illustration



Baseline Elevations

Workbook ID: ES-22	Over long window spans, use metal siding ILO masonry veneer.
Function(s): Enclose Space	**Includes Idea(s)**:

Alternative Concept Illustration



Alternative Exterior Areas to Replace with Metal Siding

Workbook ID: ES-22	Over long window spans, use metal siding ILO masonry veneer.							
Function(s): Enclose Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Brick veneer including sealing	27.03%	SF	1,200	46.50	70,883			
Structural Steel	27.03%	LBS	6,250	3.40	26,994			
Metal panel	27.03%	SF				1,200	39.50	60,212
TOTAL COSTS*					**98,000**			**60,000**
							TOTAL (PROPOSED less BASELINE)	**-38,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-24	Replace brick veneer with architectural CMU.							
Function(s): Enclose Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original design with brick veneer	27.03%	SF	9,654	46.50	570,252			
Alternate using architectural CMU block	27.03%					9,654	38.00	466,012
TOTAL COSTS*					**570,000**			**466,000**
							TOTAL (PROPOSED less BASELINE)	**-104,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-25	Reduce glazing on south elevation by 20%.							
Function(s): Enclose Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original glazing at south elevation	27.03%	SF	3,365	130.00	555,693			
VE aadjustment for curtainwall pricing	27.03%	SF	3,365	45.00	192,355			
Alternate reduces the glazing by 20%	27.03%	SF				673	175.00	149,610
Add back brick veneer exterior wall system with exterior sheathing system and interior wall system	27.03%	SF				673	89.50	76,515
TOTAL COSTS*					**748,000**			**226,000**
							TOTAL (PROPOSED less BASELINE)	**-522,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-26	Reduce the extent of brick veneer at the north elevation.							
Function(s): Enclose Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Brick veneer, North elevation	27.03%	SF	1,666	46.50	98,409			
Brick veneer, East elevation	27.03%	SF	1,117	46.50	65,980			
Brick veneer, West elevation	27.03%	SF	918	46.50	54,225			
CMU, North elevation	27.03%	SF				1,666	38.00	80,420
CMU, East elevation	27.03%	SF				1,117	38.00	53,919
CMU, West elevation	27.03%	SF				918	38.00	44,313
TOTAL COSTS*					**219,000**			**179,000**
							TOTAL (PROPOSED less BASELINE)	**-40,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-27	Eliminate the five clerestories on the south elevation.							
Function(s): Enclose Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Remove five clerestory windows	27.03%	SF	375	88.90	42,349			
Remove cladding to wall around clerestory windows	27.03%	SF	225	46.50	13,291			
Remove clerestory pop out roof framing	27.03%	SF	1,500	17.00	32,393			
Remove wood to clerestory soffits	27.03%	SF	300	45.00	17,149			
Remove wall frame & wall system behind wall cladding	27.03%	SF	225	15.00	4,287			
Alternate maintains a consistent roofline.								
TOTAL COSTS*					**109,000**			
							TOTAL (PROPOSED less BASELINE)	**-109,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: ES-28	Use an aluminum window system ILO fiberglass.							
Function(s): Enclose Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original design has fiberglass windows, wall mount	27.03%	SF	3,097	88.90	349,743			
Alternate to move to Aluminum framed windows of higher quality	27.03%	SF				3,097	95.00	373,741
TOTAL COSTS*					**350,000**			**374,000**
							TOTAL (PROPOSED less BASELINE)	**24,000**

Note: Total Costs are rounded to nearest thousand dollars

COST

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Workbook ID: FI-50	Reduce casework by 20%.							
Function(s): Distribute Power						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original casework scope	27.03%	EA	1	643,659	817,640			
Reduce casework by 20%	27.03%	EA				1	514,927	654,112
TOTAL COSTS*					**818,000**			**654,000**
							TOTAL (PROPOSED less BASELINE)	**-164,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: FI-51	FRP wall finish ILO ceramic tiling in bathrooms.							
Function(s): Finish Interiors						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original design with ceramic wall tiling to bathrooms	27.03%	SF	3,629	24.50	112,943			
VE adjustment to wall tiling unit cost	27.03%	SF	3,629	3.00	13,830			
Use FRP paneling at bathroom walls ILO ceramic tiling	27.03%	SF				3,629	15.00	69,149
TOTAL COSTS*					**127,000**			**69,000**
							TOTAL (PROPOSED less BASELINE)	**-58,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: FI-52	Reduce the quantity of MDF paneling by 50%.							
Function(s): Finish Interiors						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original design MDF feature paneling	27.03%	SF	8,237	31.50	329,599			
Alternate is to reduce the feature MDF paneling by 50%	27.03%	SF				4,119	31.50	129,733
Add back gypsum board and paint in lieu of feature MDF paneling	27.03%	SF				4,119	6.77	35,419
TOTAL COSTS*					**330,000**			**165,000**
							TOTAL (PROPOSED less BASELINE)	**-165,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: FM-40	Use polished concrete ILO VCT/resilient in the corridors and commons on both floors.							
Function(s): Facilitate Maintenance						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original resilient flooring scope to corridors & commons, 1st & 2nd floors	27.03%	SF	8,797	9.50	106,161			
Alternate is to use polished and sealed concrete to corridors & commons, 1st & 2nd floor	27.03%	SF				8,797	3.60	40,229
TOTAL COSTS*					**106,000**			**40,000**
							TOTAL (PROPOSED less BASELINE)	**-66,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: FM-41	Use polished concrete on first floor corridors and commons.							
Function(s): Facilitate Maintenance						**Includes Idea(s):** 50		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original resilient flooring scope at corridors & commons, 1st floor	27.03%	SF	5,980	9.50	72,166			
Alternate is to use polished and sealed concrete at corridors & commons, 1st floor	27.03%	SF				5,980	3.60	27,347
TOTAL COSTS*					**72,000**			**27,000**
							TOTAL (PROPOSED less BASELINE)	**-45,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: FO-46	Reduce the kitchen equipment allowance by 20%.							
Function(s): Feed Occupants						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original kitchen equipment scope and budget, per quote by Clevenger Associates	27.03%	LS	1	356,499	452,861			
Alternate to reduce kitchen budget by 20%	27.03%	LS				1	285,199	362,289
TOTAL COSTS*					**453,000**			**362,000**
							TOTAL (PROPOSED less BASELINE)	**-91,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: GS-60	Regrade northeast slope and eliminate retaining wall.
Function(s): Grade Site	**Includes Idea(s)**:

Baseline Concept:

In the baseline concept the retaining wall is located to the north and east of the building and extends out to create a bench for landscaping.

Alternative Concept:

The alternative concept moves the retaining wall to the back of the hardscape and ties into the amphitheater seat wall reducing the square footage of needed retaining wall.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**--**	Environmental Sustainability	**--**
Aesthetics	**--**	Schedule	**+**
Durability & Reliability	**+**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 25,000	$ NA	$ NA
Alternative Concept	$ 3,000	$ NA	$ NA
Cost Difference	**$ -22,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: GS-60	Regrade northeast slope and eliminate retaining wall.
Function(s): Grade Site	**Includes Idea(s)**:

Recommendation:

Recommend acceptance of this alternative concept.

Alternative Concept

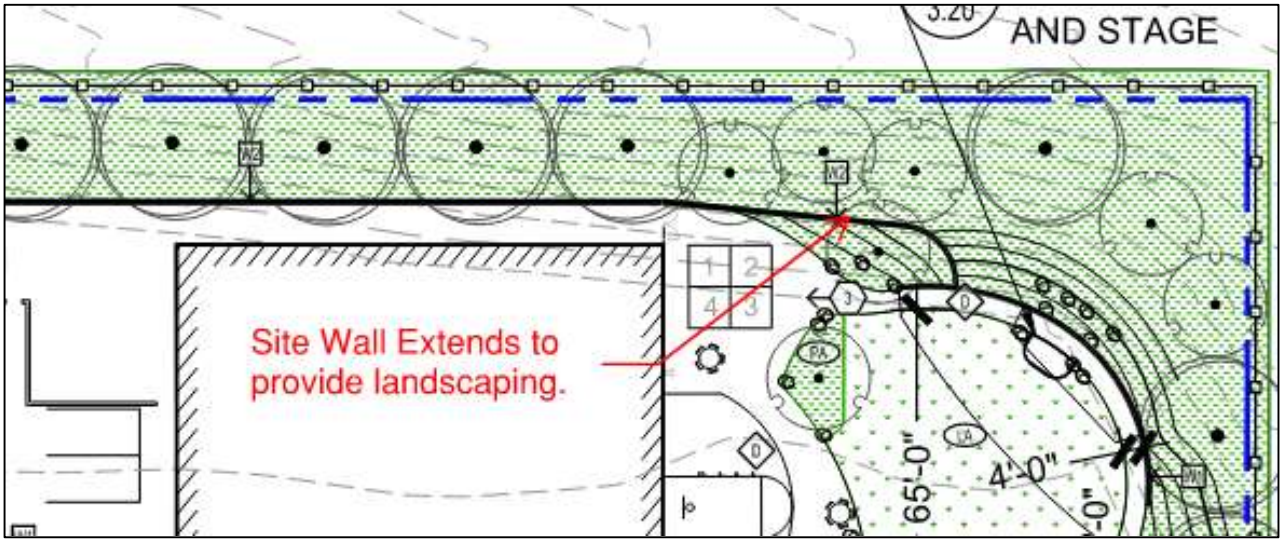
Advantages	Disadvantages
• Reduces wall construction and maintenance cost	• Less landscape area
• Function of site remains the same	•
• Easier to maintain as one small, elevated landscape area would be difficult to irrigate and maintain	•
•	•
•	•

Analysis and Justification:

Reducing the extent of the retaining wall directly translates to lower construction and long-term maintenance costs. Another compelling reason to proceed with this change is the improved ease of landscape maintenance. Smaller, isolated elevated landscape areas, especially those created by segmented retaining walls, can be difficult to irrigate, maintain, and access. Importantly, the proposed change does not compromise the overall functionality of the site. While there is a minor trade-off in terms of slightly reduced landscape area, this loss is minimal and acceptable when weighed against the gains in cost savings and practicality.

Workbook ID: GS-60	Regrade northeast slope and eliminate retaining wall.
Function(s): Grade Site	**Includes Idea(s)**:

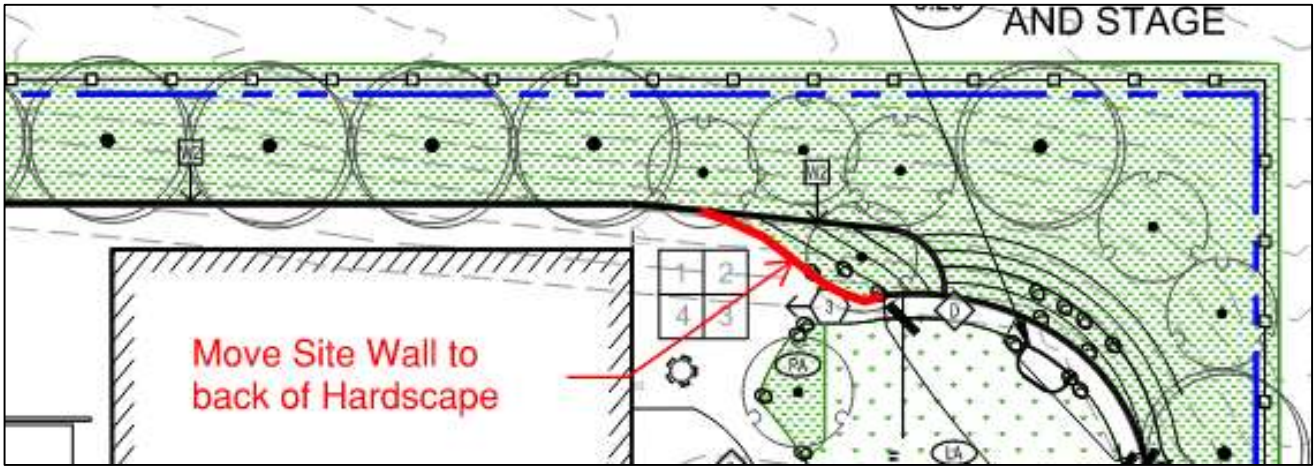
Baseline Concept Illustration



Baseline Retain Wall Location

Workbook ID: GS-60	Regrade northeast slope and eliminate retaining wall.
Function(s): Grade Site	**Includes Idea(s)**:

Alternative Concept Illustration



Alternative Retaining Wall Location

Workbook ID: GS-60	Regrade northeast slope and eliminate retaining wall.							
Function(s): Grade Site						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Regrade slope to allow retaining wall to move forward in the courtyard zone	27.03%	CY				22	35.00	988
Haul away and dispose dirt	27.03%	CY				22.22	65.00	1,835
Remove length of wall by approx. 15 to 20 feet (use 20 feet in calculation)	27.03%	SF	240	42.50	12,957			
Remove length of wall footing by approx. 15 feet	27.03%	CY	5.93	873.00	6,572			
Remove section of topsoil, landscaping, planting & irrigation	27.03%	SF	384.00	12.00	5,854			
TOTAL COSTS*					**25,000**			**3,000**
							TOTAL (PROPOSED less BASELINE)	**-22,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: IS-68	Use indirect/direct pendant lighting in classrooms.
Function(s): Illuminate Space	**Includes Idea(s)**: 69

Baseline Concept:

Typical classrooms are lit with direct type recessed 2'x4' troffers arranged on a nominal 6ft x 8ft spacing.

Alternative Concept:

Illuminate typical classrooms with three rows of high-performance pendant suspended indirect/direct lighting.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**+**	Environmental Sustainability	**=**
Aesthetics	**+**	Schedule	**=**
Durability & Reliability	**+**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**=**	Occupant Comfort, Safety, Performance	**+**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 148,000	$ NA	$ NA
Alternative Concept	$ 212,000	$ NA	$ NA
Cost Difference	**$ 64,000**	$ NA	$ NA
Cost Addition	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: IS-68	Use indirect/direct pendant lighting in classrooms.
Function(s): Illuminate Space	**Includes Idea(s)**: 69

Recommendation:

Accept this alternative for the improvements to occupant comfort and building aesthetics and because it meets the Education Specifications requested by the Aberdeen School District.

Alternative Concept

Advantages	Disadvantages
• Soft, more even illumination	• Higher cost for light fixtures (partially offset by reduced installation labor)
• Significantly less glare	• Requires higher ceiling to provide an even reflective surface
• Less installation cost	•
• Less maintenance due to fewer fixtures needed	•
•	•
•	•

Analysis and Justification:

The baseline design concept for the typical Classroom, as well as the Preschool, Toddler, and Infant Daycare rooms, shows an array of recessed 2'x4' troffers mounted on a nominal 6ft x 8ft spacing. This will result in an average total of (16) luminaires and associated power connections per each of these room types.

In terms of objective performance, the current design would meet the minimum footcandle illumination levels required for classrooms and the current spacing using relatively low wattages will minimize differences in illumination of desks directly below a fixture versus desks in between fixtures. However, there is greater cost involved in materials and labor to achieve such even coverage using completely direct lighting because there are so many per room.

While it may be acceptable to use prismatic lensed or the somewhat more aesthetically pleasing metal reflector type recessed lighting in school classrooms, the project team believes the specified fixtures would subject the occupants to distracting and/or uncomfortable glare.

Children in the Daycare spaces in particular, would be subject to staring at these bright lights when getting ready for a nap.

Workbook ID: IS-68	Use indirect/direct pendant lighting in classrooms.
Function(s): Illuminate Space	**Includes Idea(s)**: 69

Therefore, the recommendation would be to install luminaires that have an indirect component to reflect off the ceiling. In fact, the Education Specifications document created by TCF with the stakeholders calls for direct/ indirect type lighting in Classroom, lab and common spaces. The baseline design shows only the labs with direct/indirect pendants.

Benefits of indirect lighting include soft and even illumination, much less glare visible to the occupants from the light source, and an increased perception of comfort within the space. Several international studies concluded that people perform better in spaces where indirect or indirect/direct lighting is used.

Direct/indirect luminaires integrate more unobtrusively with daylight harvesting because they light ceilings, walls and surfaces in much the same way natural light does. This reduces or eliminates perceived lighting disruptions when the electric light sources are automatically dimmed or switched off to conform with energy code when sufficient daylight is present.

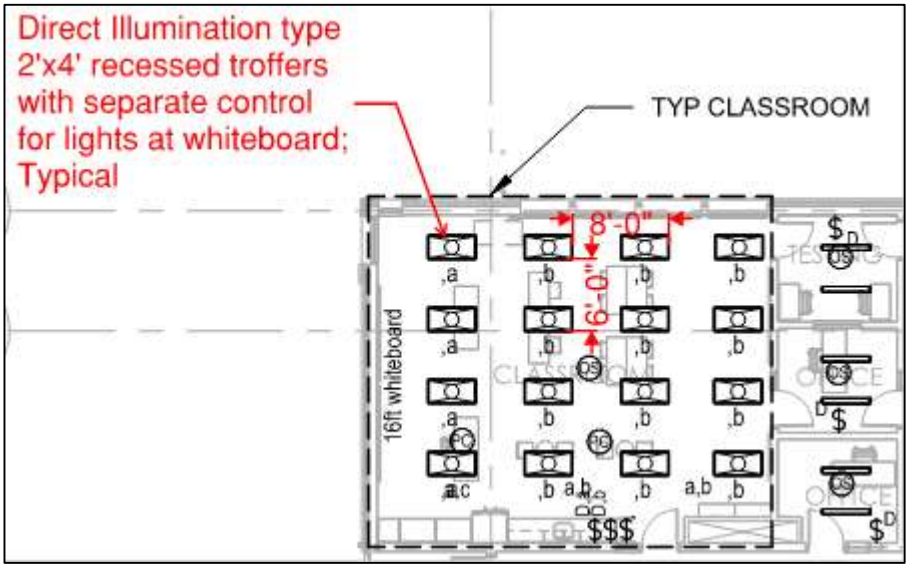
With a high-performance widespread indirect reflector, these fixtures can effectively be used as close as 12" from the ceiling. With only three runs of pendants fixtures, the power connections would be reduced from (16) per classroom to just (3) per classroom, which would allow the labor savings to offset some of the cost of the lights.

On the cons side, besides the potential for dust accumulation, a disadvantage in a setting where children are present might be that a hanging fixture with a flat top would be a target for spitballs. To address this, the design team recommends a fixture with either a sloped or rounded top. The alternative luminaire in the proposal is log shaped, which in a subtle way, can also reflect the lumber industry setting of Aberdeen.

Both options can comply with the 2021 Energy Code maximum wattage per (typical) classroom of 687W, based on 0.71 W/sf + 4.5w/lf of whiteboard. However, the alternative concept has fewer lights installed, which also means fewer to maintain over the life of the building.

Workbook ID: IS-68	Use indirect/direct pendant lighting in classrooms.
Function(s): Illuminate Space	**Includes Idea(s)**: 69

Baseline Concept Illustration



Baseline Typical Classroom Lighting Plan

LUMINAIRE SCHEDULE

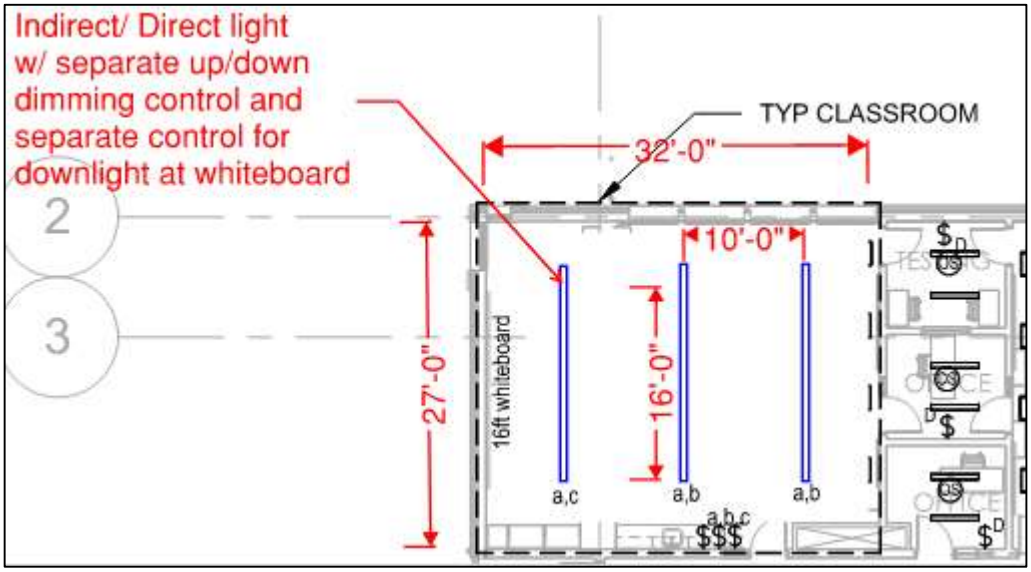
NOTES:
1. FIRST MANUFACTURER LISTED FOR EACH LUMINAIRE TYPE IS BASIS OF DESIGN.

TYPE	DESCRIPTION	MOUNTING	LAMP	LUMENS DOWN	LUMENS UP	CCT	CRI	BALLAST/DRIVER	VOLTAGE	LOAD (KVA)	WATTS
EX1	EXIT SIGN, EDGE-LIT, 1-SIDED	SURFACE	LED	0 lm	0 lm	0 K	0	--	277 V	0.00 kVA	2 W
EX2	EXIT SIGN, EDGE-LIT, 2-SIDED	SURFACE	LED	0 lm	0 lm	0 K	0	--	277 V	0.00 kVA	2 W
L1	2X4 TROFFER	RECESSED	LED	4000 lm	0 lm	3500 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.08 kVA	30 W
L2	4' LINEAR	RECESSED	LED	3600 lm	0 lm	3500 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.04 kVA	30 W
L3	2X2 TROFFER	RECESSED	LED	4000 lm	0 lm	3500 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.08 kVA	15 W
L4	8' LINEAR PENDANT	PENDANT	LED	4000 lm	0 lm	3500 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.07 kVA	30 W
L6	HIGHBAY	PENDANT	LED	17000 lm	0 lm	3500 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.19 kVA	175 W
L7	6" DOWNLIGHT	RECESSED	LED	1404 lm	0 lm	3500 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.01 kVA	12 W
L8	14" ROUND SURFACE	SURFACE	LED	2040 lm	0 lm	3500 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.03 kVA	30 W
L9	4' STRIP	SURFACE	LED	4000 lm	0 lm	4000 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.05 kVA	41 W
L10	CUSTOM COMMONS LUMINAIRE	PENDANT	LED	17600 lm	0 lm	4000 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.10 kVA	88 W
L11	4' WALL STRIP	SURFACE WALL	LED	4000 lm	0 lm	3500 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.06 kVA	50 W
L12	4' WALL DIRECT/INDIRECT	WALL	LED	549 lm	1282 lm	3500 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	0.04 kVA	38 W
R9	BOLLARD, ASYMMETRIC, WHITE	--	LED	1191 lm	0 lm	4000 K	70	LED DRIVER	277 V	0.02 kVA	22 W
S1	POLE MOUNTED ARM: 25' ROUND TAPERED ALUMINUM POLE	POLE	LED	11787 lm	0 lm	4000 K	80	LED DRIVER, 0-10V DIMMING, 1%	277 V	1.00 kVA	100 W
W1	EXTERIOR WALL PACK	WALL	LED	3215 lm	0 lm	3000 K	70	LED DRIVER	277 V	0.04 kVA	39 W

Baseline Classroom Luminaire

Workbook ID: IS-68	Use indirect/direct pendant lighting in classrooms.
Function(s): Illuminate Space	**Includes Idea(s)**: 69

Alternative Concept Illustration



Alternative Classroom Lighting with Indirect/Direct Light

The alternative concept for lighting also conforms to the Typical Standards (excerpt below):

Electrical / Communications:

1. All lighting to be LED and controlled per ASD standards and state codes
2. Classroom, lab and common space lighting to be direct / indirect type
3. Lab lighting to be sufficient to meet requirements of Washington State Department of Health requirements

From:
21 TCF Architecture // Aberdeen School District

Aberdeen School District Typical Standards

Workbook ID: IS-68	Use indirect/direct pendant lighting in classrooms.
Function(s): Illuminate Space	**Includes Idea(s)**: 69

Alternative Concept Illustration



Example Alternative Luminaire: Neoray 'Cirque' Linear Direct/ Indirect Pendant #CRQ4DIP-SR1640-50D100US835-FLLOOB-2DUDD

Workbook ID: IS-68	Use indirect/direct pendant lighting in classrooms.							
Function(s): Illuminate Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
2'x4' Recessed Troffer	27.03%	Ea	265	295.00	99,306			
Linear Pendant with Direct/Indirect Light	27.03%	Ea				50	2,800.00	177,842
Labor installing 2'x4' Recessed Troffers	27.03%	Ea	265	145.00	48,811			
Labor installing the Linear Pendant lighting, based upon support points	27.03%	Ea				100	145.00	18,419
Anchor/brackets for supporting the Linear Pendant lighting	27.03%	Ea				100	61.25	7,781
Suspension wire/cable fixed to hold Linear Pendant lighting	27.03%	Ea				100	62.85	7,984
TOTAL COSTS*					**148,000**			**212,000**
							TOTAL (PROPOSED less BASELINE)	**64,000**

Note: Total Costs are rounded to nearest thousand dollars

COST

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Workbook ID: LS-72	Reduce the landscape budget by 25%.							
Function(s): Landscape Site						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original Landscaping scope and price (Planting)	27.03%	SF	32,200	7.00	286,326			
Original Landscaping scope and price (Topsoil)	27.03%	CY	1,800	60.00	137,192			
VE estimate adjustment to add irrigation component for complete budget	27.03%	SF	32,200	3.00	122,711			
Alternate to reduce landscaping by 25% (Planting)	27.03%	SF				24,150	7.00	214,744
Original Landscaping scope and price (Topsoil)	27.03%	CY				1,350	60.00	102,894
Add the irrigation 25% saving to the landscape	27.03%	SF				24,150	3.00	92,033
Alternate to add back seed lawn in lieu of landscaping	27.03%	SF				8,050	1.00	10,226
TOTAL COSTS*					**546,000**			**420,000**
							TOTAL (PROPOSED less BASELINE)	**-126,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: MS-80	Eliminate detention for stormwater runoff.
Function(s): Manage Stormwater	**Includes Idea(s)**:

Baseline Concept:

The baseline design does not show stormwater detention, however the cost estimate has costs included for stormwater detention.

Alternative Concept:

The alternative concept removes stormwater detention from cost estimate to be in line with what is shown on the plans.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**--**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**+**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 1,569,000	$ NA	$ NA
Alternative Concept	$ 0	$ NA	$ NA
Cost Difference	**$ -1,569,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: MS-80	Eliminate detention for stormwater runoff.
Function(s): Manage Stormwater	**Includes Idea(s)**:

Recommendation:

Recommend confirmation with AHJ that detention is not required and if affirmative accept this alternative.

Alternative Concept

Advantages	Disadvantages
• Reduces stormwater vault construction cost and long-term maintenance cost	• Risk that the City or other AHJ will require stormwater detention
• Function of site remains the same	•
• Drawings and cost estimate are in alignment	•
	•

Analysis and Justification:

Eliminating the stormwater detention system provides a significant reduction in upfront construction costs. Stormwater vaults are typically high-cost infrastructure elements that also incur long-term maintenance expenses. Crucially, eliminating the stormwater detention component does not impact the function or usability of the site.

Maintaining alignment between the design drawings and the cost estimate enhances the clarity and reliability of the project documentation, and helps avoid confusion or miscommunication during bidding, review, or coordination phases.

The primary disadvantage is the potential that the City or other Authority Having Jurisdiction (AHJ) may still require stormwater detention at a later stage.

Workbook ID: MS-80	Eliminate detention for stormwater runoff.							
Function(s): Manage Stormwater						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Rain vaults 1, 2, 3, 4	27.03%	CF	41,175	30.00	1,569,138			
TOTAL COSTS*					**1,569,000**			
							TOTAL (PROPOSED less BASELINE)	**-1,569,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: OB-92	Eliminate the mechanical mezzanine and relocate fan coils to corridor ceilings and DOAS to gym roof.
Function(s): Organize Building Layout	**Includes Idea(s)**:

Baseline Concept:

The baseline design includes a partial width mechanical attic running the entire length of the 2nd floor classroom wing to house the fan coil and DOAS units.

Alternative Concept:

The alternative concept eliminates the mechanical mezzanine in its entirety and relocates the fan coil units to above the corridor ceilings and the DOAS units to the gym roof.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**=**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**--**	Constructability	**--**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 772,000	$ NA	$ NA
Alternative Concept	$ 389,000	$ NA	$ NA
Cost Difference	**$ -383,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: OB-92	Eliminate the mechanical mezzanine and relocate fan coils to corridor ceilings and DOAS to gym roof.
Function(s): Organize Building Layout	**Includes Idea(s)**:

Recommendation:

Consider eliminating the mechanical mezzanine and locating the fan coils above the corridor ceilings and DOAS units to the gym roof.

Alternative Concept

Advantages	Disadvantages
• Decreases overall project cost	• Tighter installation space during construction
•	• Less convenient for future maintenance
•	• Increases noise potential from fan coils in the corridors
•	• Exposes DOAS units to outside marine conditions
•	•
•	•

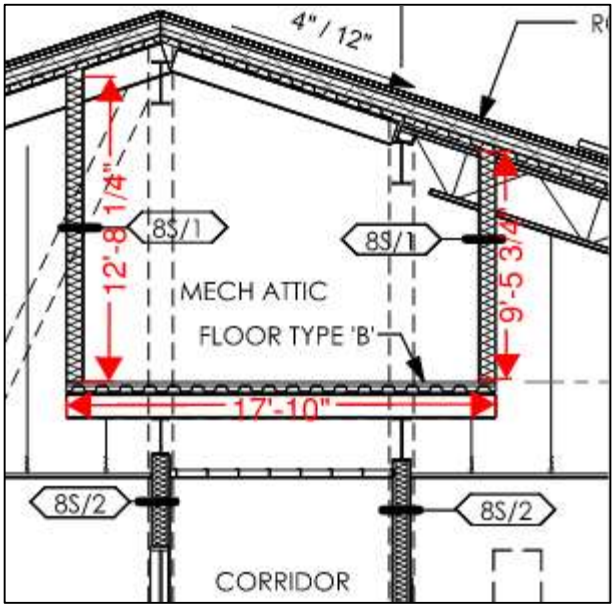
Analysis and Justification:

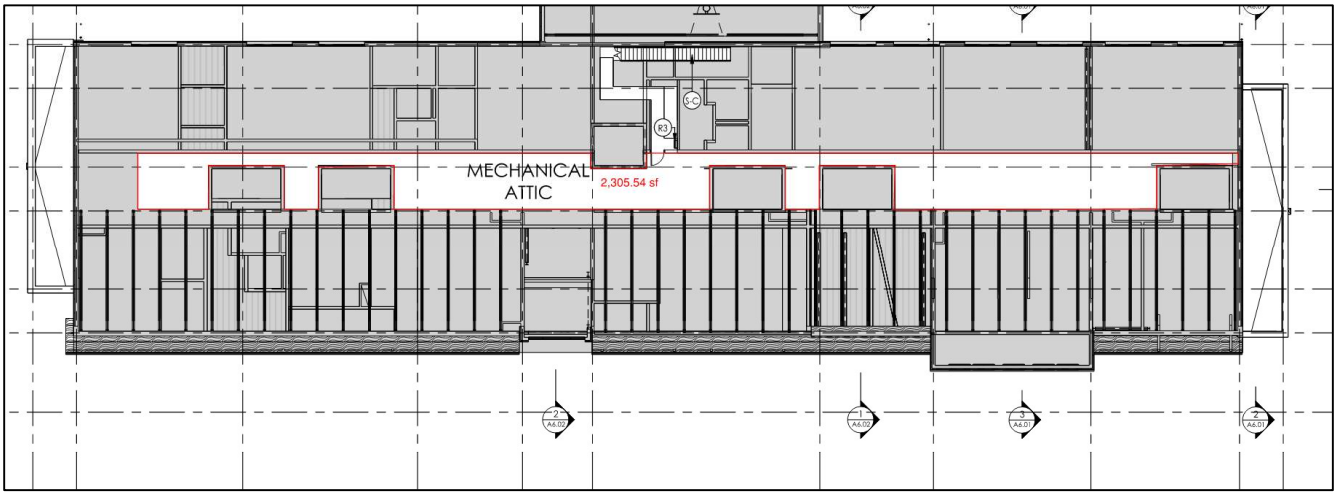
Eliminating the mechanical mezzanine is purely a cost savings consideration. This will reduce the amount of structural steel, decking, concrete, framing, fire protection, insulation, the dedicated stairs etc. Relocating the fan coils that serve the first floor will also reduce the duct runs, providing HVAC installation cost savings while also improving the performance for those units.

Suspending the fan coil units entails the suspension structure and seismic bracing. Maintenance becomes less convenient and precludes maintenance and replacement of the fan coils until after occupied hours. Placing the DOAS units on the gym roof requires changing to a flat parapeted roof from the baseline design for a 2:12 pitched roof. Placement of the DOAS units outside introduces exposure to the marine environment and the potential need to fortify the units and/or earlier replacement.

Workbook ID: OB-92	Eliminate the mechanical mezzanine and relocate fan coils to corridor ceilings and DOAS to gym roof.
Function(s): Organize Building Layout	**Includes Idea(s)**:

Baseline Concept Illustration

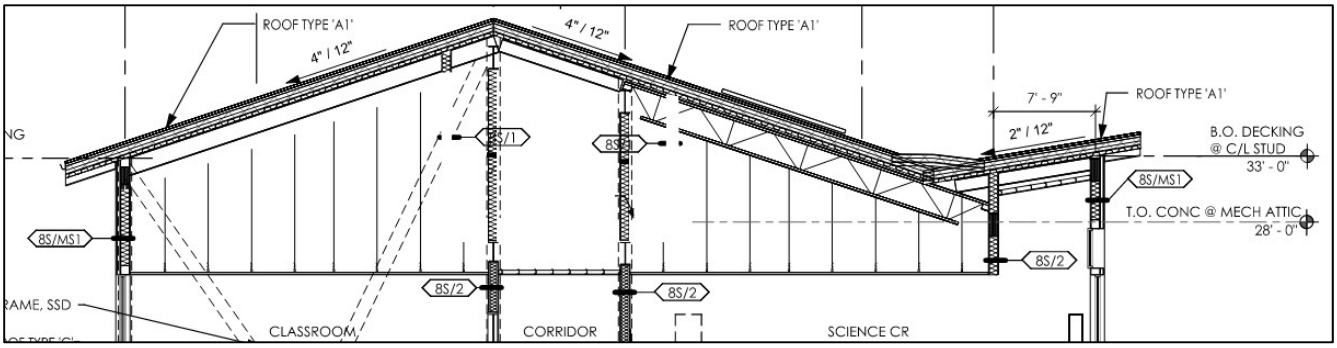




Baseline Mechanical Mezzanine Design

Workbook ID: OB-92	Eliminate the mechanical mezzanine and relocate fan coils to corridor ceilings and DOAS to gym roof.
Function(s): Organize Building Layout	**Includes Idea(s)**:

Alternate Concept Illustration



Mechanical Mezzanine Removed From Baseline Design

Workbook ID: OB-92	Eliminate the mechanical mezzanine and locate fan coil units above corridor ceilings and DOAS units on gym roof.							
Function(s): Organize Building						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Remove Mezzanine wall framing, average approx. 11' high	27.03%	SF	5,610	16.61	118,369			
Remove Mezzanine structural steel framing support	27.03%	LBS	40,338	3.40	174,218			
Remove Mezzanine metal deck and concrete fill	27.03%	SF	2,305	15.05	44,067			
VE adjustment to metal deck pricing	27.03%	SF	2,305	5.00	14,640			
Remove miscellaneous sealing and fireproofing	27.03%	SF	2,305	10.00	29,280			
Remove 25% of sound proofing upgrades	27.03%	EA	1	12,500.00	15,879			
Remove and save on ductwork due to locating fan coils more strategically	27.03%	EA	1	10,000.00	12,703			
Eliminate dedicated stairs	27.03%	EA	1	12,500.00	15,879			
Remove metal roofing system with substrate to sloped Gymnasium roof	27.03%	SF	6,664	36.50	308,983			
Remove shiplap paneling to gym soffit	27.03%	SF	656	45.00	37,499			
Add back Single ply roofing system with substrate inside new parapets	27.03%	SF				6,144	28.50	222,435
Add parapets, 44" high to outside perimeter, posts, framing, inside finish (panels on the outside shown below) (Length approx. 264lf)	27.03%	SF				924	47.00	55,167
Add parapet exterior metal panel finish to two sides as the third is the west elevation that can be coordinated with the design change	27.03%	SF				574	39.50	28,802

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Workbook ID: OB-92	Eliminate the mechanical mezzanine and locate fan coil units above corridor ceilings and DOAS units on gym roof.							
Function(s): Organize Building						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Suspend, support and brace fan coil units in the ceiling. (This is required due to eliminating the mechanical attic).	27.03%	EA				37	1,750.00	82,252
TOTAL COSTS*					**772,000**			**389,000**
							TOTAL (PROPOSED less BASELINE)	**-383,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: OS-96	Eliminate back north retaining wall and walkway.
Function(s): Organize Site	**Includes Idea(s)**:

Baseline Concept:

The retaining wall located to the north of the building retains the hill and creates a walkway between the building and the wall.

Alternative Concept:

Use the north wall at the gym as a retaining wall and remove the walkway. Reduce the length of the retaining wall and shorten the overall height.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**+**
Aesthetics	**--**	Schedule	**+**
Durability & Reliability	**--**	Constructability	**--**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 307,000	$ NA	$ NA
Alternative Concept	$ 140,000	$ NA	$ NA
Cost Difference	**$ -167,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: OS-96	Eliminate back north retaining wall and walkway.
Function(s): Organize Site	**Includes Idea(s)**:

Recommendation:

Consider accepting this alternative concept for cost reduction.

Alternative Concept

Advantages	Disadvantages
• Reduces wall construction cost and maintenance cost	• Building will now act as retaining wall
• Eliminates need for maintaining and cleaning walkway	• Eliminates access around all sides of building
• Improves site security as walkway is a hidden area of site	• Need to waterproof and/or install a trench drain around building to ensure high water table will not enter building
• Reduces amount of new impervious on site for retainage and treatment	•

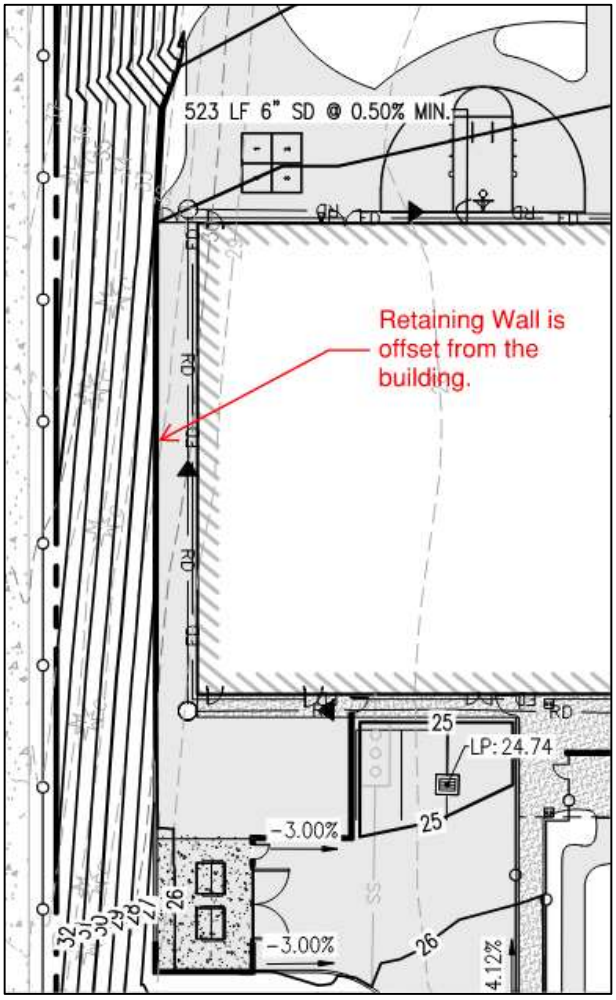
Analysis and Justification:

The most immediate benefit in this proposal is the reduction in wall construction and maintenance costs. By utilizing the building itself as a retaining structure, the length and height of a separate retaining wall is reduced, resulting in lower upfront capital expenditures. However, a significant concern is that the building will be acting as a retaining structure, which introduces minor technical challenges. Specifically, the building's exterior wall will now be in direct contact with soil under pressure. This condition requires waterproofing and drainage to relieve hydrostatic pressure and prevent moisture intrusion or water damage to the building structure. From an environmental and regulatory perspective, the change reduces the amount of new impervious surface on the site.

Eliminating the walkway reduces both maintenance and cleaning demands, depending on the type of landscaping used to replace the walkway. Another important consideration is site security. Walkways located behind buildings—especially those not actively used—can become hidden or isolated areas, potentially creating safety concerns. Eliminating this path removes a concealed zone, enhancing the overall security of the building perimeter.

Workbook ID: OS-96	Eliminate back north retaining wall and walkway.
Function(s): Organize Site	**Includes Idea(s)**:

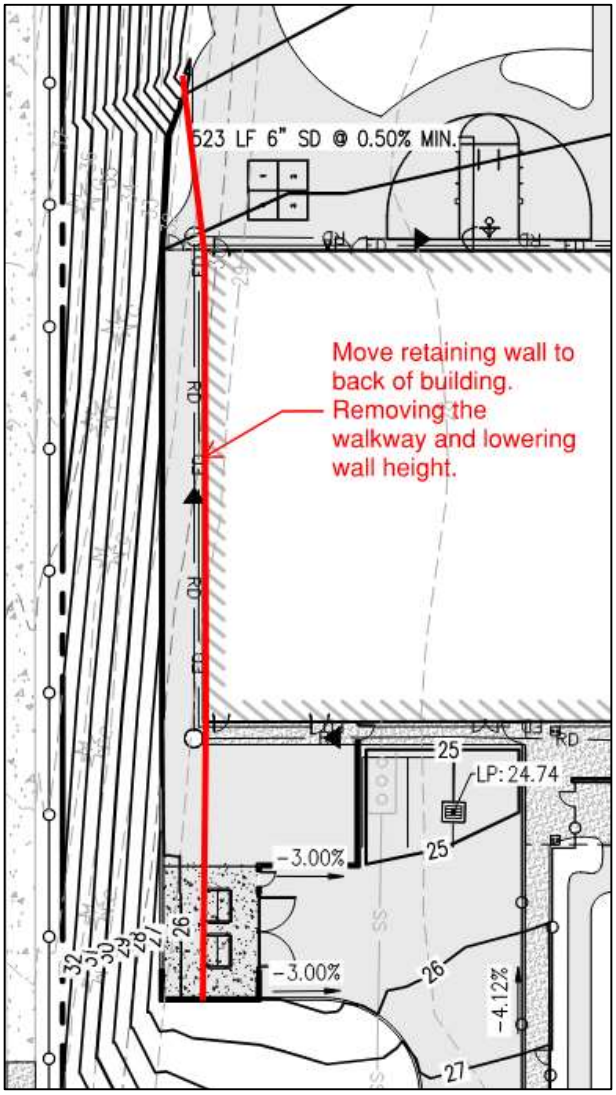
Baseline Concept Illustration



Baseline North Retaining Wall

Workbook ID: OS-96	Eliminate back north retaining wall and walkway.
Function(s): Organize Site	**Includes Idea(s)**:

Alternative Concept Illustration



Alternative Retaining Wall Location

Workbook ID: OS-96	Eliminate back north retaining wall and walkway.							
Function(s): Organize Site						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Retaining wall, 12' high	27.03%	SF	1,800	85.00	194,356			
Retaining wall footing	27.03%	CY	42	875.00	46,684			
Alternate is to move the retaining wall to the building, use the building as retaining function reducing the length and height of wall			1,980					
Remove rear sidewalk and sub base behind the building	27.03%	SF	1,300	11.11	18,347			
Remove chainlink access gate to rear of building behind gymnasium	27.03%	EA	1	2,000.00	2,541			
Remove section of retaining wall, just over 50% leaving the remaining to be built	27.03%	SF				960	85.00	103,656
Remove section of retaining wall footing, just over 50% leaving the remaining to be built	27.03%	CY				22	875.00	23,911
Reduce height of retaining wall from 12 feet down to 6 feet (being further away from higher ground)	27.03%	SF	420	85.00	45,350			
Add waterproofing membrane at building, assume 6' high	27.03%	SF				504	6.33	4,053
Add french drain and drainage rock under the building and connect to system	27.03%	LF				135	50.00	8,575
TOTAL COSTS*					**307,000**			**140,000**
							TOTAL (PROPOSED less BASELINE)	**-167,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: PB-106	Review electrical load estimate for building to right-size service equipment rating.
Function(s): Power Building	**Includes Idea(s)**:

Baseline Concept:

Building service is sized for 1400kW which is equivalent to 30W/sf of calculated load for the school.

Alternative Concept:

Develop an AHJ-approved plan to design power distribution biased toward actual power demand, which may be at least 20% lower than baseline.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**+**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**=**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 1,614,000	$ NA	$ NA
Alternative Concept	$ 1,291,000	$ NA	$ NA
Cost Difference	**$ -323,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: PB-106	Review electrical load estimate for building to right-size service equipment rating.
Function(s): Power Building	**Includes Idea(s)**:

Recommendation:

Recommend that MEP engineers work with equipment vendors and AHJ to seek options for assuring distribution equipment can supply operational needs while avoiding unnecessary oversizing beyond reasonable spare capacity.

Alternative Concept

Advantages	Disadvantages
• Reduces initial cost	• Risk that actual demand is not less than calculated
• May reduce lead times of electrical equipment	• May require pre-approval from electrical AHJ
• May reduce space requirements for equipment	•
•	•
•	•
•	•

Analysis and Justification:

Design power density on this project appears to be greater than the actual projected demand, resulting in larger and potentially unnecessary associated costs for power distribution.

It is difficult to envision that the school, situated in Aberdeen's relatively mild climate, will require the same power per square foot as a comparison project from the experience of the VE electrical SME, for a fully-equipped, fully-occupied modern hospital designed 10 years ago. The comparison project is subjected to the significantly more extreme temperatures of eastern Oregon.

It is understood that the design needs to meet the current Energy Code, which has a dual mandate of reducing energy needed for operations and reducing reliance on natural gas, making mechanical systems' power ratings greater than they have been in the past. Historical measurements of the actual power demand for almost every building supplied by a utility show a significant reduction compared to the calculated power demand prepared by an engineer prior to construction. As a result, buildings are typically served by a transformer that supplies only a fraction (often approximately 66%) of the calculated load.

The typical procedure for an electrical engineer is to sum the mechanical cut sheet power requirements and choose distribution equipment amperage based on the resulting total. According to mechanical review, the following major equipment may eventually be specified:

Workbook ID: PB-106	Review electrical load estimate for building to right-size service equipment rating.
Function(s): Power Building	**Includes Idea(s)**:

- Air-water heat pumps (chillers) - Qty 2 - 550kW each (where both can run simultaneously)
- Boiler (HVAC backup) - Qty 1 - 300kW each (where this can run with chillers)
- Electric hybrid water heater (Dom. HW production) - Qty 2 - 300kW each (Assume N+1 redundancy)
- Pumps (hydronic HVAC) - Qty 4 - 5 HP each

This equipment alone exceeds the electrical baseline anticipated load of 1400kW.

The power utility is not constrained by the same electrical code the building designers need to follow. The project MEP engineers should review how systems will operate and explore every opportunity with the AHJ to limit power requirements to operational needs plus reasonable spare capacity instead of simply summing up the nameplate values of equipment. While there are specific demand and diversity factors listed in the Code, it has been found beneficial for clients to meet with the electrical AHJ to present a case to obtain preapproval for any demand/diversity factors planned to be used. It is possible to successfully request permit approval contingent on the verification of future, actual maximum power demand recorded over one year of occupancy. This is typically much lower than any calculated demand. The AHJ will require the Owner to assume the risk for upgrading equipment if needed, but the risk can be low with a well-prepared load analysis employing the accepted diversity factors.

For this project, there is no real risk to safety or operations if the baseline design is followed, just a higher cost for the Owner. For example, if the actual demand of a new school in Washington State is only 25% of the load that was initially calculated, then the owner with have paid four times more for the electrical distribution than necessary. In this project, the electrical distribution is one of the highest single line-item costs.

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Workbook ID: PB-106	Review electrical load estimate for building to right-size service equipment rating.							
Function(s): Power Building						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Baseline Power Distribution	27.03%	Ea	1	1,270,664	1,614,124			
Reduce baseline power distribution by 20%, using all available Code approved demand factors and approval by AHJ	27.03%	Ea				1	1,016,531	1,291,300
TOTAL COSTS*					**1,614,000**			**1,291,000**
							TOTAL (PROPOSED less BASELINE)	**-323,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: PV-101	Use angled parking on west side of parking lot to create a landscape strip and remove/reduce site wall.
Function(s): Park Vehicles	**Includes Idea(s)**:

Baseline Concept:

In the baseline, the parking lot on the western side is one way traffic, uses 90-degree parking stalls, and has a 24’ wide drive aisle.

Alternative Concept:

Since travel is already one way, the alternative concept provides angled parking on the western side which will reduce the required drive aisle width to 16’, creating 8-10’ for a landscape strip. Utilize the landscape strip for grading the elevation difference and then remove/reduce the site wall.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**=**
Aesthetics	**+**	Schedule	**+**
Durability & Reliability	**=**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**+**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 118,000	$ NA	$ NA
Alternative Concept	$ 53,000	$ NA	$ NA
Cost Difference	**$ -65,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: PV-101	Use angled parking on west side of parking lot to create a landscape strip and remove/reduce site wall.
Function(s): Park Vehicles	**Includes Idea(s)**:

Recommendation:

Recommend acceptance of the alternative concept.

Alternative Concept

Advantages	Disadvantages
• Increases landscape and green space on site	• Potential loss of 1 or 2 parking spots
• Increases efficiency of car circulation into and out of parking	•
• Decreases cost of wall construction and maintenance	•
• Increases site safety by not having potential for drop-off/pick-up along drive aisle	•
• Reduces amount of new impervious on site for retainage and treatment	•
•	•

Analysis and Justification:

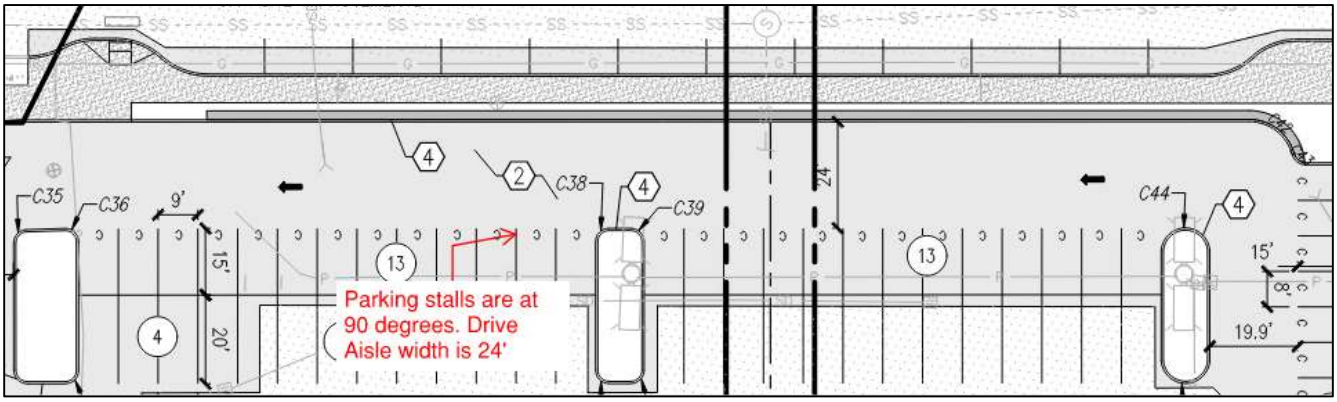
The proposed parking layout presents several notable advantages that strongly support its implementation, despite a potential minor reduction in parking capacity. One of the most significant benefits is the increase in landscape and green space on site. Easier car movements into and out of parking stalls represent another key advantage, promoting better traffic flow and reducing the likelihood of minor collisions or driver frustration. This is particularly beneficial in high-turnover areas or locations with mixed-use circulation.

From a construction and maintenance perspective, the reduction in wall construction and pavement maintenance costs offers long-term financial savings. Furthermore, the design results in a reduced amount of new impervious surface, which supports better stormwater management practices. This lessens the impact on municipal systems and can reduce or eliminate the need for costly detention infrastructure.

In summary, the proposed changes are justified by a combination of environmental, operational, and financial benefits. The modest decrease in parking capacity is a reasonable compromise in exchange for increased green space, improved vehicle circulation, cost savings, and enhanced site safety.

Workbook ID: PV-101	Use angled parking on west side of parking lot to create a landscape strip and remove/reduce site wall.
Function(s): Park Vehicles	**Includes Idea(s)**:

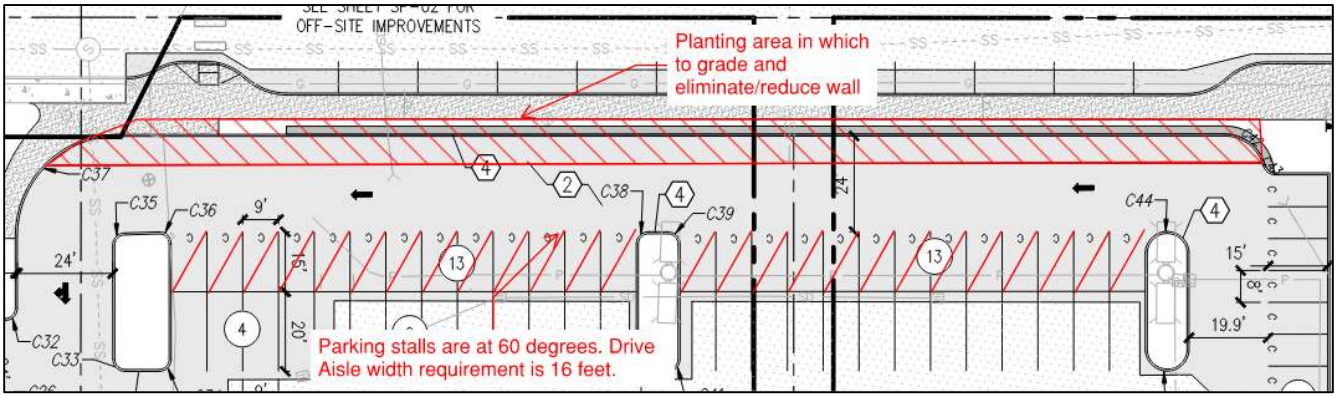
Baseline Concept Illustration



Baseline Parking Layout at Drop Off Zone

Workbook ID: PV-101	Use angled parking on west side of parking lot to create a landscape strip and remove/reduce site wall.
Function(s): Park Vehicles	**Includes Idea(s)**:

Alternative Concept Illustration



Alternative Parking Layout Concept at Drop Off Zone with Additional Landscaping

Workbook ID: PV-101	Use angled parking on west side of parking lot to create a landscape strip and remove/reduce site wall.							
Function(s): Park Vehicles						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Asphalt parking lot pavement	27.03%	SF	3,500	12.00	53,353			
Site wall	27.03%	LF	253	200.00	64,277			
Landscaping	27.03%	SF				3,500	12.00	53,353
TOTAL COSTS*					**118,000**			**53,000**
							TOTAL (PROPOSED less BASELINE)	**-65,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: RE-111	Increase PV Array beyond Code minimum.
Function(s): Power Building	**Includes Idea(s)**: 109

Baseline Concept:

PV array is sized for code-minimum power output with space reserved on roof for solar readiness.

Alternative Concept:

Increase PV array size beyond code-minimum to utilize more of the available roof space.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**+**	Environmental Sustainability	**+**
Aesthetics	**+**	Schedule	**--**
Durability & Reliability	**+**	Constructability	**--**
Total Cost of Ownership / Lifecycle Cost	**--**	Occupant Comfort, Safety, Performance	**+**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 156,000	$ NA	$ NA
Alternative Concept	$ 594,000	$ NA	$ NA
Cost Difference	**$ 438,000**	$ NA	$ NA
Cost Addition	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: RE-111	Increase PV Array beyond Code minimum.
Function(s): Power Building	**Includes Idea(s)**: 109

Recommendation:

Consider this alternative if grant funding can be secured as it reduces power demand over the life of the building.

Alternative Concept

Advantages	Disadvantages
• Reduces grid power demand	• Increases initial cost
• Completes the architectural aesthetic	• Increases array maintenance and cost of replacement PV components
• Enhances environmental stewardship to the community	•
•	•
•	•
•	•

Analysis and Justification:

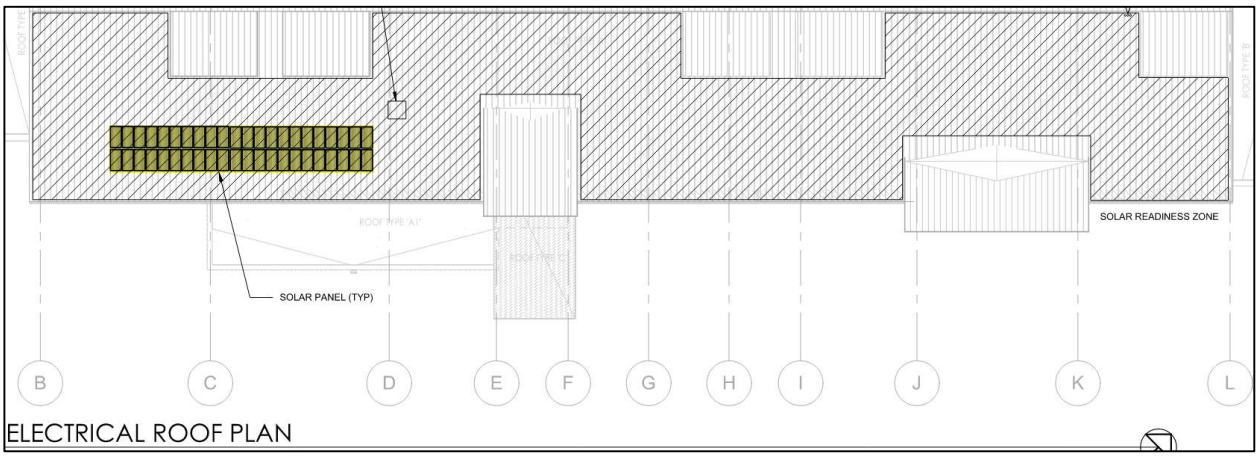
One of the requirements of the 2021 Washington State Energy Code is that a new building that has more than 10,000 sf of conditioned floor area is to be provided with 0.5 W/sf of onsite renewable energy. Typically, this has been in the form of a photovoltaic (PV) solar array unless other options such as wind-power or exceptions to the code are granted. The baseline electrical design shows about 25kW of solar power generating capacity which is slightly more than the code-minimum while the architectural roof plan shows a PV array that covers much of the south roof elevation.

The alternate proposal attempts to utilize all the available solar readiness space on the roof while keeping access corridors between and around groups of panels clear for maintenance purposes. The proposed PV system could provide up to 99kW peak power output and generate approximately 136MWh of energy per year.

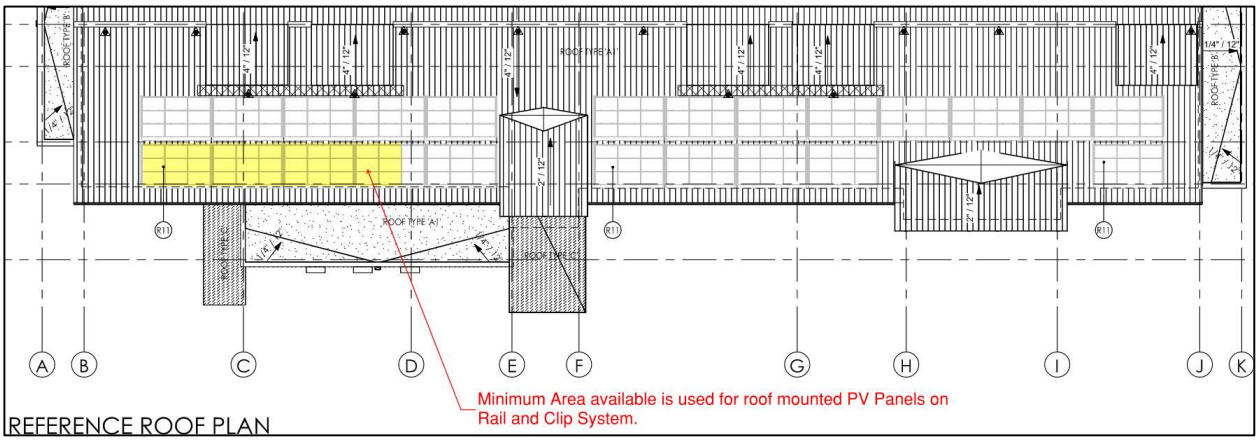
However, due to the high calculated power demand of this building, it is unlikely that this system would achieve a net-zero energy state. At this point in the design, it is unclear what the time for return-on-investment would be for a system such as this.

Workbook ID: RE-111	Increase PV Array beyond Code minimum.
Function(s): Power Building	**Includes Idea(s)**: 109

Baseline Concept Illustration



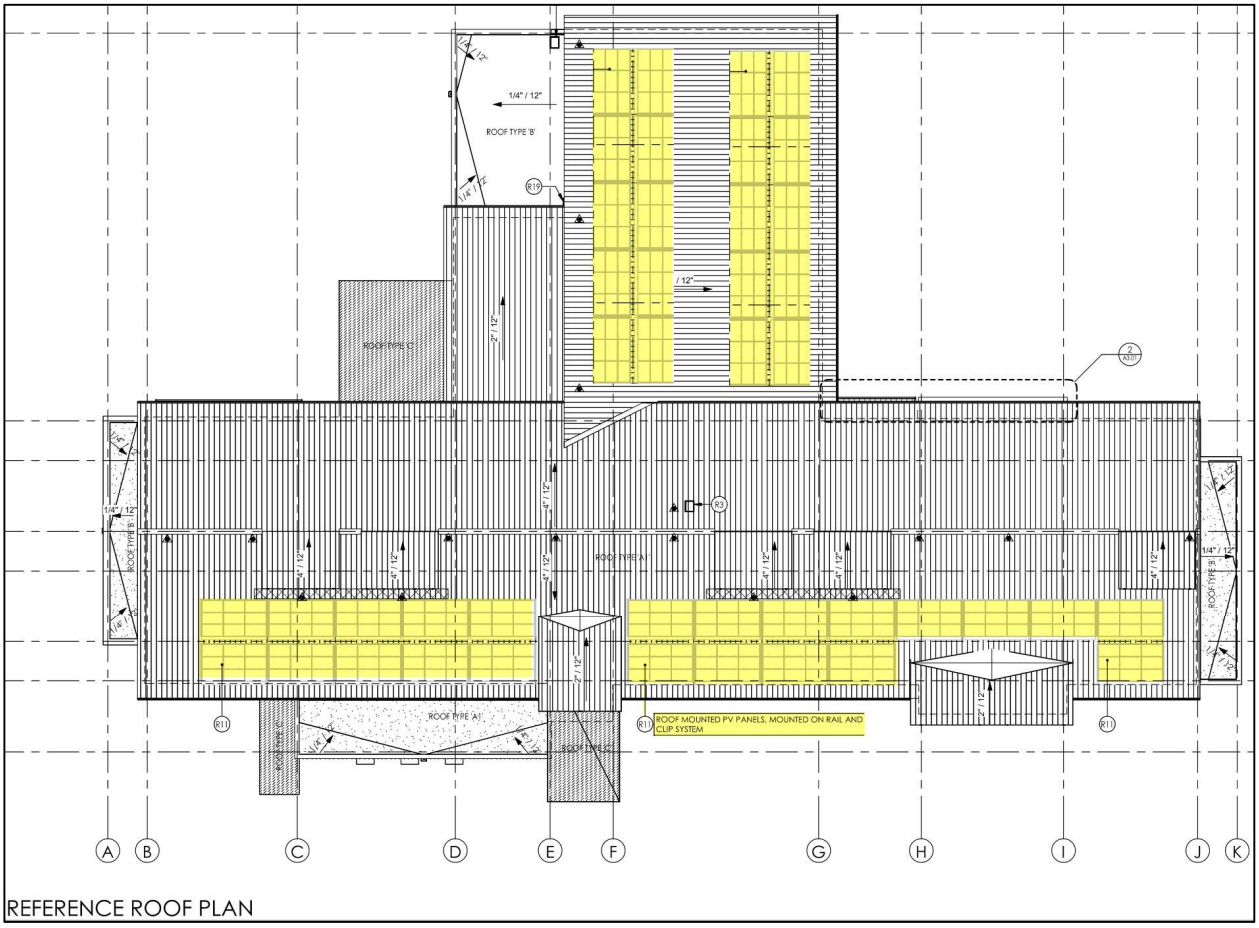
Code Minimum PV Array Installed with Solar Readiness Area for Expansion



Baseline Architectural Reference Roof Plan

Workbook ID: RE-111	Increase PV Array beyond Code minimum.
Function(s): Power Building	**Includes Idea(s)**: 109

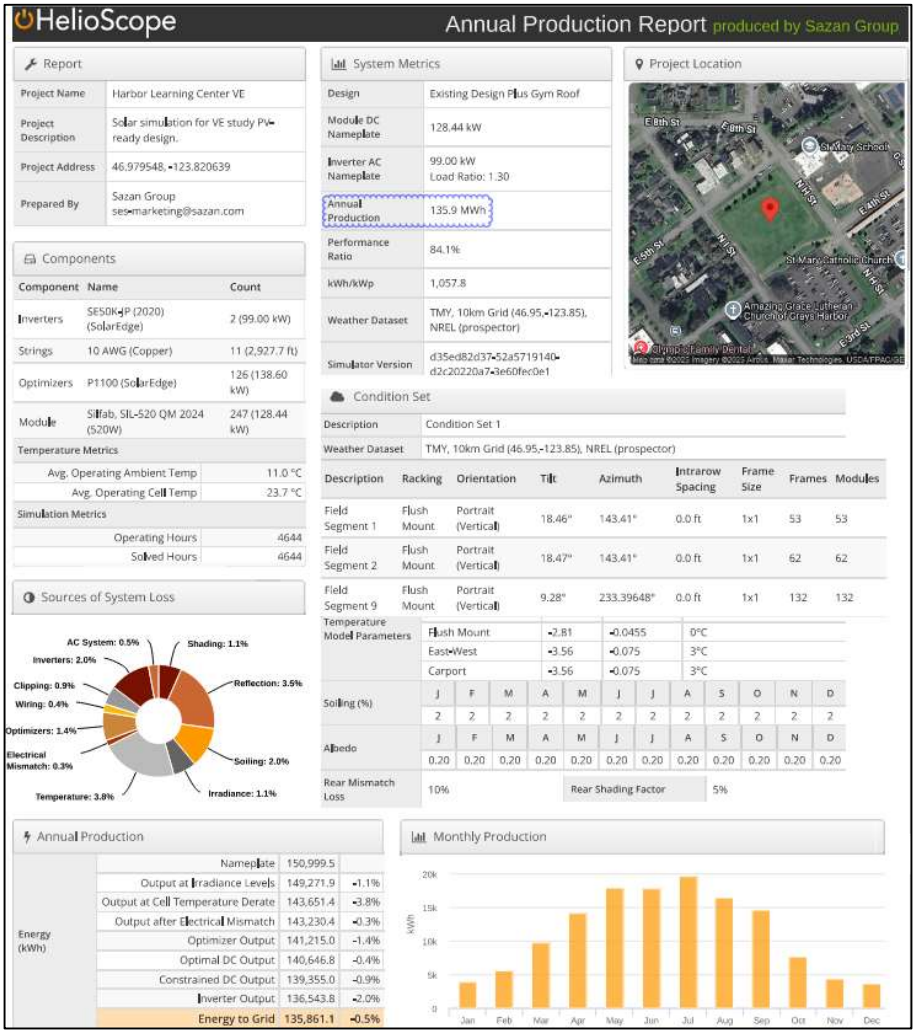
Alternative Concept Illustration



Alternative Design Optimized Roof Array to Make Full Use of Available Space

Workbook ID: RE-111	Increase PV Array beyond Code minimum.
Function(s): Power Building	**Includes Idea(s)**: 109

Alternative Concept Illustration



Alternative Design Helioscope Solar Model with Production Output

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Workbook ID: RE-111	Increase PV Array beyond Code minimum.							
Function(s): Power Building						**Includes Idea(s):**	109	
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Photovoltaic System that can generate 26kW		Ea	1	156,000.00	156,000			
Photovoltaic System that can generate 99kW		Ea				1	594,000.00	594,000
TOTAL COSTS*					**156,000**			**594,000**
							TOTAL (PROPOSED less BASELINE)	**438,000**

Note: Total Costs are rounded to nearest thousand dollars

COST

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Workbook ID: RE-113	Reduce the quantity of controlled duplex receptacles needed to meet energy code by sharing split wired controlled/non-controlled duplex receptacles.

Function(s): Reduce Energy						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Two gang box with cover plate	27.03%	EA	129	127.50	20,893			
Normal receptacle x2 receptacles	27.03%	EA	129	152.50	24,990			
Controlled receptacle x2 receptacles	27.03%	EA	129	162.50	26,629			
Conduit & wire from controlled outlets x2 to switch / control location, and back to power supply	27.03%	EA	129	690.00	113,069			
Conduit & wire from regular outlets x2 back to power supply	27.03%	EA	129	575.00	94,225			
Install single gang box with cover plate	27.03%	EA				129	100.00	16,387
Install split controlled and non-controlled receptacle	27.03%	EA				129	152.50	24,990
Conduit & wire from controlled outlets x2 to switch / control location, and back to power supply	27.03%	EA				129	600.00	98,321
Conduit & wire from regular outlets x2 back to power supply	27.03%	EA				129	500.00	81,934
TOTAL COSTS*					**280,000**			**222,000**
							TOTAL (PROPOSED less BASELINE)	**-58,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: RE-114	Use point-of-use water heater ILO a centralized water heater.							
Function(s): Reduce Energy						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Electric heat pump water heater & storage tank, 36KW, 147GPH	27.03%	LS	1	116,375	147,831			
80 gallon storage tank	27.03%	EA	3	11,501	43,829			
Domestic water piping, with hot & cold water piping	27.03%	SF	46,007	7.96	465,204			
Plumbing insulation	27.03%	SF	46,007	1.84	107,535			
Remove electric heat pump water heater & storage tank, 36KW, 147GPH	27.03%	LS				1		
Remove 80 gallon storage tank	27.03%	EA				3		
Remove 50% domestic water piping, removing the hot water piping	27.03%	SF				46,007	3.98	232,602
Remove 50% plumbing insulation	27.03%	SF				46,007	0.92	53,767
Alternate: 50 hallon hot water heater located in kitchen	27.03%	EA				1	11,550	14,672
Alternate: miscellaneous piping for HWU in kitchen	27.03%	LS				1	7,500.00	9,527
Alternate: 5kw point-of-use at following - 31 classroom sinks, 3 service, 9 Science, 5 miscellaneous	27.03%	EA				48	650.00	39,633
Alternate: power run to point-of-use units	27.03%	EA				48	440.00	26,829
TOTAL COSTS*					**764,000**			**377,000**
							TOTAL (PROPOSED less BASELINE)	**-387,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: RW-121	Use flush-tank ILO flush-valve water closets.							
Function(s): Remove Waste						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original design utilizes flush-valve WC's	27.03%	EA	24	2,588.00	78,901			
Alternate uses flush-tank WC's in lieu of flush-valve type WC's	27.03%	EA				24	1,725.00	41,400
TOTAL COSTS*					**79,000**			**41,000**
							TOTAL (PROPOSED less BASELINE)	**-38,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: SL-128	Support building pop-outs between grids H and I on columns at building edge ILO cantilevers.
Function(s): Support Load	**Includes Idea(s)**:

Baseline Concept:

At floor framing, between grids H and I, the steel framing is cantilevered past grid 7 and grid 2. The building footprint at the first floor extends under the area of the cantilevers.

Alternative Concept:

At floor framing, between grids H and I, the steel framing is supported on columns located at the exterior wall.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**+**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**=**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 19,000	$ NA	$ NA
Alternative Concept	$ 0	$ NA	$ NA
Cost Difference	**$ -19,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: SL-128	Support building pop-outs between grids H and I on columns at building edge ILO cantilevers.

Function(s): Support Load	**Includes Idea(s)**:

Recommendation:

At floor framing, between grids H and I, support the steel framing on columns located at the exterior wall.

Alternative Concept

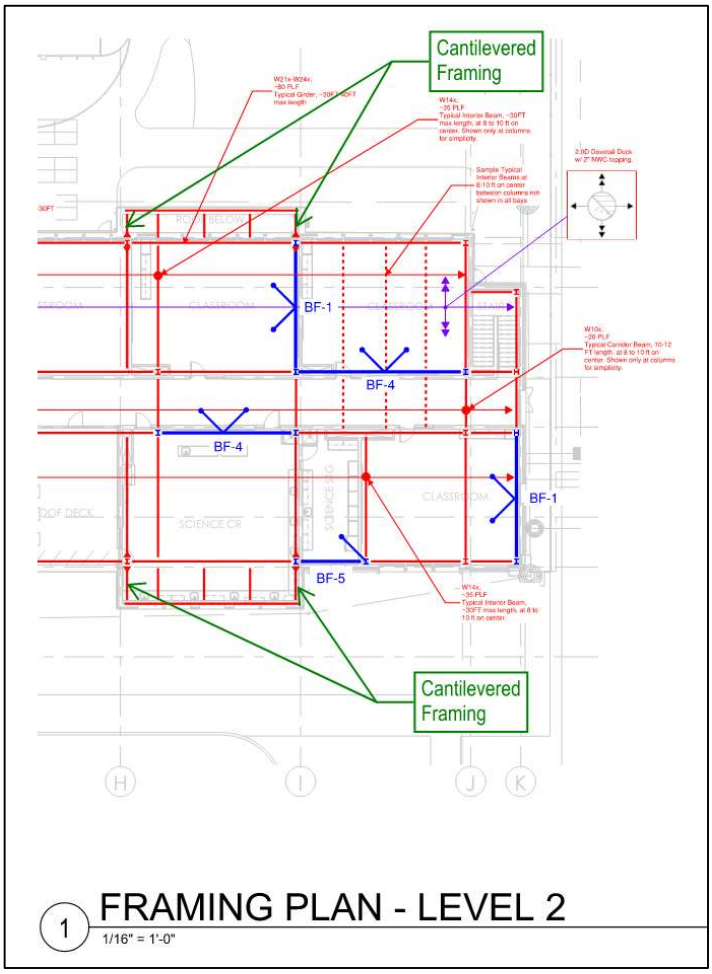
Advantages	Disadvantages
• Reduce cost	• None apparent
• Benefit schedule	•
• Improve constructability	•
• Improve environmental sustainability by reducing steel usage	•
•	•
•	•

Analysis and Justification:

At floor framing, between grids H and I, the exterior wall is cantilevered past grid 7 and grid 2. The building footprint at the first floor extends under the area of the cantilevers. In lieu of cantilevering, it is possible to add columns at the exterior end of current cantilevers and provide traditional steel framing. This would reduce costs, benefit schedule, and improve constructability.

Workbook ID: SL-128	Support building pop-outs between grids H and I on columns at building edge ILO cantilevers.
Function(s): Support Load	**Includes Idea(s)**:

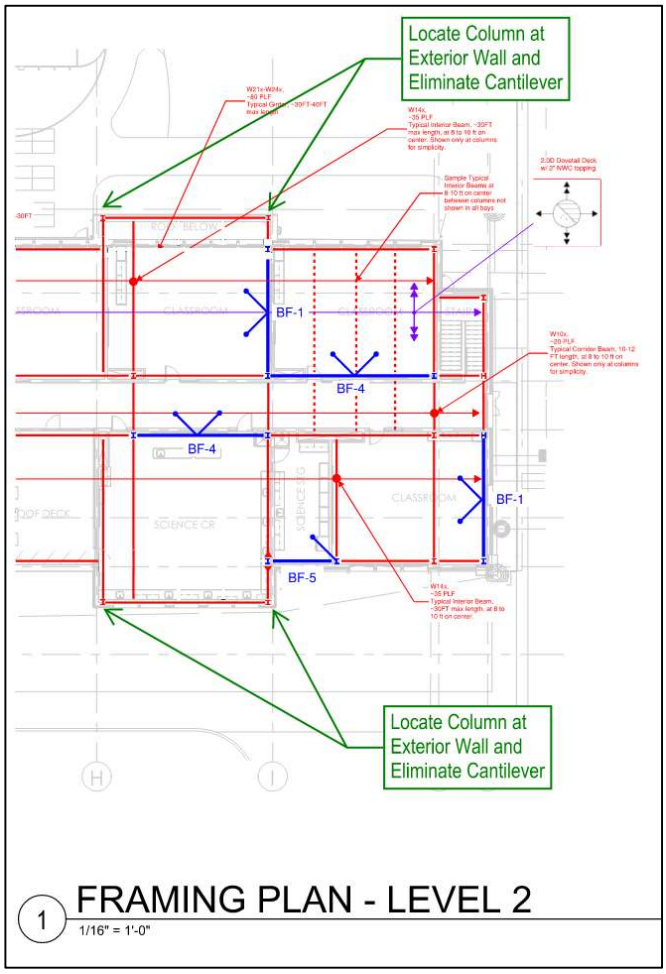
Baseline Concept Illustration



Baseline Framing Plan

Workbook ID: SL-128	Support building pop-outs between grids H and I on columns at building edge ILO cantilevers.
Function(s): Support Load	**Includes Idea(s)**:

Alternative Concept Illustration



Alternative Framing Plan with Eliminated Cantilever

Workbook ID: SL-128	Support building pop-outs between grids H and I on columns at building edge ILO cantilevers.							
Function(s): Support Load						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Structural Steel. Savings due to adding column supports	27.03%	LBS	4,500	3.40	19,436			
TOTAL COSTS*					**19,000**			
							TOTAL (PROPOSED less BASELINE)	**-19,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: SL-129	Frame with steel joists ILO wide-flange subframing at roof over classroom wing.
Function(s): Support Load	**Includes Idea(s)**:

Baseline Concept:

Roof framing over classroom wing is wide flange steel beams, supported on steel girders. Roof overhangs are framed with steel cantilevers.

Alternative Concept:

Roof framing over classroom wing is steel joists, supported on steel girders. Roof overhangs are formed with steel joist extensions.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**+**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**=**	Constructability	**=**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**=**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 1,231,000	$ NA	$ NA
Alternative Concept	$ 710,000	$ NA	$ NA
Cost Difference	**$ -521,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: SL-129	Frame with steel joists ILO wide-flange subframing at roof over classroom wing.
Function(s): Support Load	**Includes Idea(s)**:

Recommendation:

Frame roof over classroom wing with steel joist, supported on steel girders. Form overhangs with steel joist extensions.

Alternative Concept

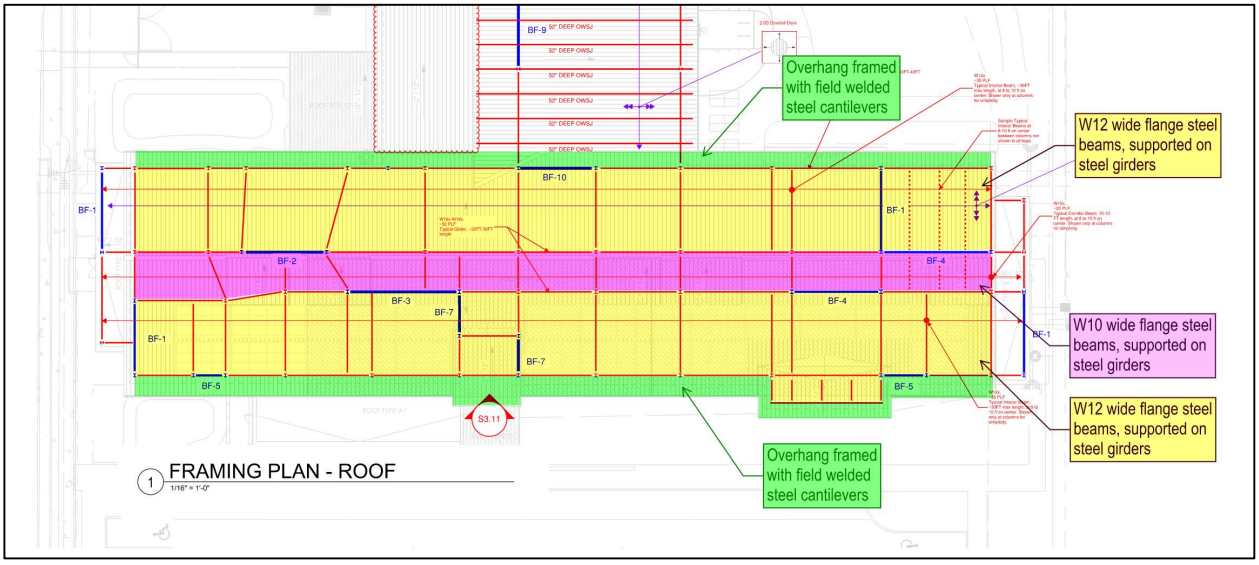
Advantages	Disadvantages
• Reduces cost	• None apparent
• Improves environmental sustainability by reducing steel weight	•
• Benefits schedule	•
•	•
•	•
•	•

Analysis and Justification:

Framing roof over classroom wing with steel joists supported on steel girders will reduce steel weight and reduce cost. Forming the roof overhangs with steel joist extensions will reduce the cost and time of forming overhang cantilevers with structural steel.

Workbook ID: SL-129	Frame with steel joists ILO wide-flange subframing at roof over classroom wing.
Function(s): Support Load	**Includes Idea(s)**:

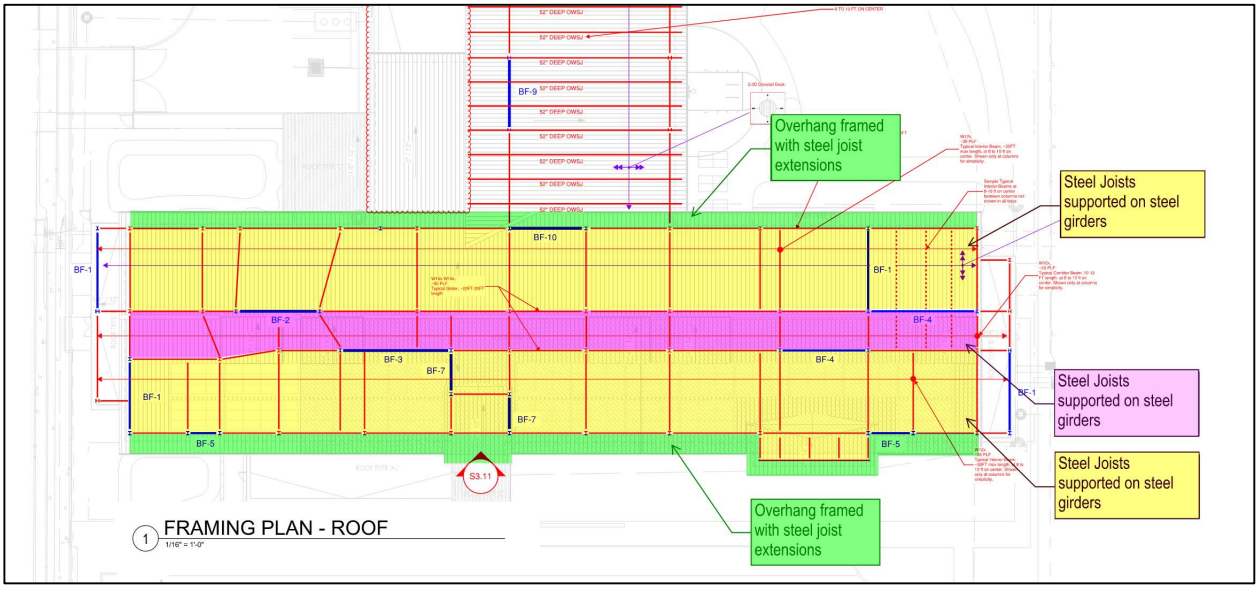
Baseline Concept Illustration



Baseline Wide Flange Steel Framing

Workbook ID: SL-129	Frame with steel joists ILO wide-flange subframing at roof over classroom wing.
Function(s): Support Load	**Includes Idea(s)**:

Alternative Concept Illustration



Alternative Steel Joist Framing System

Workbook ID: SL-129	Frame with steel joists ILO wide-flange subframing at roof over classroom wing.							
Function(s): Support Load						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Original Design: Structural steel framing, classroom wing roof	27.03%	LBS	250,800	3.40	1,083,210			
V.E correction of steel to 12.5lbs/sf (Current ratio is 11lbs/sf)	27.03%	LBS	34,200	3.40	147,710			
Alternate Design: Steel Joist framing system with bracing	27.03%	SF				22,800	24.50	709,590
TOTAL COSTS*					**1,231,000**			**710,000**
							TOTAL (PROPOSED less BASELINE)	**-521,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: SL-130	Support building on mat slab to resist heaving at expansive soils.							
Function(s): Support Load						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Reinforced concrete slab on grade, 6" including base	27.03%	SF	30,330	17.09	658,447			
Wall Footing - Fine grade bottom of footing	27.03%	SF	1,737	1.30	2,868			
Wall Footing - Formwork to foundations - sides	27.03%	SF	1,164	13.45	19,888			
Wall Footing - Reinforcing steel in foundations	27.03%	LB	10,133	1.76	22,655			
Wall Footing - Concrete	27.03%	CY	68	329.60	28,471			
Wall Footing - Finish to top of footing	27.03%	SF	1,737	1.40	3,089			
Column foundations - Fine grade bottom of footing	27.03%	SF	2,124	1.02	2,752			
Column foundations - Formwork to foundations	27.03%	SF	2,292	11.88	34,589			
Column foundations - Reinforcing steel in foundations	27.03%	LB	20,650	1.67	43,807			
Column foundations - Concrete	27.03%	CY	165	329.60	69,084			
Column foundations - Finish to top of footing	27.03%	SF	2,124	1.05	2,833			
Reinforced concrete mat slab, reinforcing steel	27.03%	LB				181,926	1.67	385,938
Reinforced concrete mat slab, concrete	27.03%	CY				2,246	329.60	940,380
Reinforced concrete mat slab, finish	27.03%	SF				30,330	1.05	40,455
TOTAL COSTS*					**888,000**			**1,367,000**
							TOTAL (PROPOSED less BASELINE)	**479,000**

Note: Total Costs are rounded to nearest thousand dollars

COST

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Workbook ID: 131	Install complete drainage under building slab to prevent heaving from expansive soils.							
Function(s): Support Load						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Under building drain system	27.03%	SF				30,330	6.49	250,048
TOTAL COSTS*								**250,000**
							TOTAL (PROPOSED less BASELINE)	**250,000**

Note: Total Costs are rounded to nearest thousand dollars

COST

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Workbook ID: SL-132	Use standard composite metal deck ILO concrete topped dovetail metal deck at second floor structure.							
Function(s): Support Load						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Dovetail steel floor deck	27.03%	SF	18,942	7.75	186,481			
V.E correction to Dovetail cost	27.03%	SF	18,942	5.00	120,310			
Steel floor deck	27.03%	SF				18,942	6.50	156,403
V.E correction to Regular floor deck	27.03%	SF				18,942	4.00	96,248
Note: *The Idea was generated with the assumption the estimate included the entire 2nd floor, however the estimate included only the Gym roof with 6,376 sf. The actual savings with the scope over the Gym is a savings of $38,000.*								
TOTAL COSTS*					**307,000**			**253,000**
							TOTAL (PROPOSED less BASELINE)	**-54,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Workbook ID: VS-142	Duct outside air (OA) to terminal devices and eliminate VAV boxes.
Function(s): Condition Space	**Includes Idea(s)**:

Baseline Concept:

The existing HVAC systems is based on using chilled water fan coils to provide cooling/heating to the classroom areas. Makeup or outside air (OA) is provided to the classrooms with a Dedicated Outdoor Air System (DOAS) with VAV boxes and demand occupancy control. The gym and common area are served with air handlers that provide OA to the respective spaces.

Alternative Concept:

Eliminate the VAV boxes from the classroom area. Duct OA from the DOAS system directly to a specially configured terminal device with dual-duct connection.

Performance Summary (relative to Baseline Concept: **+** improvement; **--** detriment; **=** equal)

Program	**=**	Environmental Sustainability	**+**
Aesthetics	**=**	Schedule	**+**
Durability & Reliability	**+**	Constructability	**+**
Total Cost of Ownership / Lifecycle Cost	**+**	Occupant Comfort, Safety, Performance	**--**

Cost Summary	Initial Cost	Future Cost	Life Cycle Cost
Baseline Concept	$ 1,604,000	$ NA	$ NA
Alternative Concept	$ 1,291,000	$ NA	$ NA
Cost Difference	**$ -313,000**	$ NA	$ NA
Cost Avoidance	Life cycle cost analysis uses a NA% discount rate and NA-year economic life.		

Workbook ID: VS-142	Duct outside air (OA) to terminal devices and eliminate VAV boxes.
Function(s): Condition Space	**Includes Idea(s)**:

Recommendation:

Not recommended, the additional ductwork and specialized terminal device will provide a moderate cost reduction at the expense of comfort and control. In addition, other proposed alternatives provide greater savings while improving the system performance in other ways.

Alternative Concept

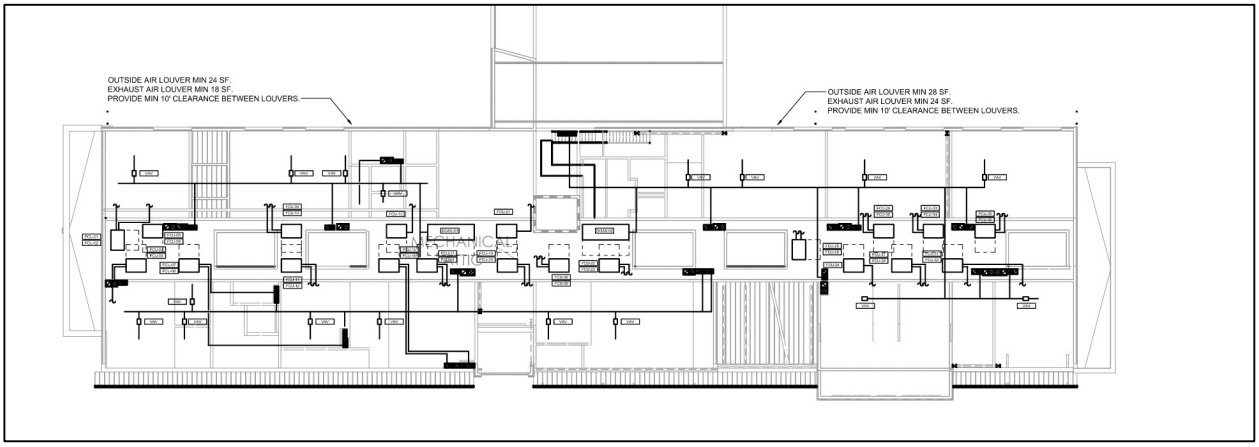
Advantages	Disadvantages
• Reduces or eliminates much of the controls and complexities of the HVAC airside system	• Less control for comfort or energy management
• Less equipment to purchase and maintain	• Increases cost for terminal devices. May also increase ductwork requirements.
•	•
•	•
•	•
•	•

Analysis and Justification:

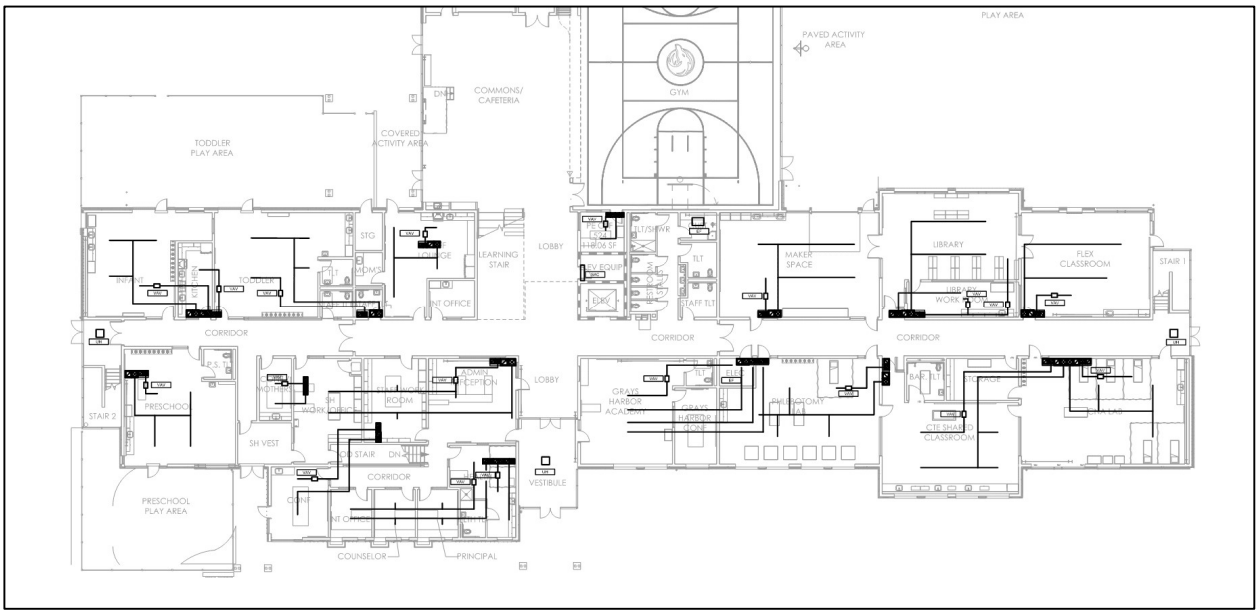
The Washington State energy and mechanical code will require ventilation air to be provided independent of the normal A/C or heating/cooling system. While there are several ways to accomplish this, new developments have included “dual input” terminal devices where both OA and supply air can be provided to the same space. Unfortunately, these devices are expensive and would possibly increase the amount of ductwork required for each space.

Workbook ID: VS-142	Duct outside air (OA) to terminal devices and eliminate VAV boxes.
Function(s): Condition Space	**Includes Idea(s)**:

Baseline Concept Illustration



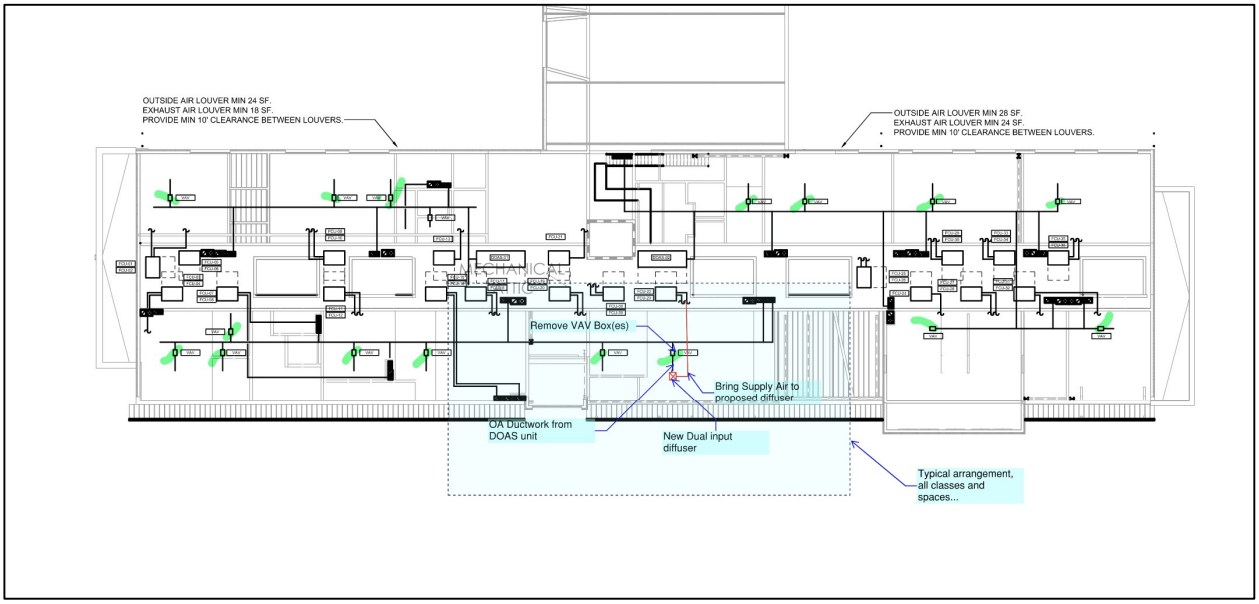
Baseline Mechanical Attic HVAC Plan



Baseline First Floor HVAC Plan

Workbook ID: VS-142	Duct outside air (OA) to terminal devices and eliminate VAV boxes.
Function(s): Condition Space	**Includes Idea(s)**:

Alternative Concept Illustration



Alternative Mechanical Attic HVAC Plan

Workbook ID: VS-142	Duct outside air (OA) to terminal devices and eliminate VAV boxes.							
Function(s): Ventilate Space						**Includes Idea(s):**		
CONSTRUCTION ELEMENT	**Markup**	**BASELINE DESIGN ASSUMPTION**				**PROPOSED ALTERNATIVE**		
Description	%	Unit	Qty	Unit Cost $	TOTAL $	Qty	Unit Cost $	TOTAL $
Eliminate the Air Terminal Units (VAV boxes)	27.03%	LS	1	22,663	28,788	1		
Eliminate 25% of the hydronic piping	27.03%	SF	46,007	14.70	859,108	34,505	14.70	644,331
Remove 25% of Instrumentation	27.03%	SF	46,007	12.25	715,923	34,505	12.25	536,942
Supplemental ductwork to allow the alternate to be feasible (16 ea rooms/spaces)	27.03%	LBS				3,328	22.50	95,120
New dual input diffuser (16 ea rooms/spaces)	27.03%	EA				16	695.00	14,126
TOTAL COSTS*					**1,604,000**			**1,291,000**
							TOTAL (PROPOSED less BASELINE)	**-313,000**

Note: Total Costs are rounded to nearest thousand dollars

SAVINGS

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Appendix C
Function Analysis

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C.1 Functions

Random Function Determination

The VE team identified project functions required for the project to deliver the services required and accomplish the project goals. Identification and analysis of the underlying functions helped the VE team form a deeper understanding of the project alternatives and consider alternatives to improve the design. The function or functions categorized as Basic are defined as the principal reasons for the project. Higher Order functions are why the Basic functions are being implemented. Required Secondary and Secondary functions are the means by which the Basic function is carried out and supported. Additionally, several functions fall into the category of All-the-Time functions or define performance criteria for the project.

Function	Function Type
Accommodate Diverse Programs	Project Objectives
Avoid Tsunamis	Project Objectives
Control Access	Project Objectives
Enhance Safety	Project Objectives
Maintain Flexibility	Project Objectives
Enhance Collaboration	Project Objectives
Express Culture	Project Objectives
Educate Students	Higher Order
House Program	**Basic**
Allow Access	Required Secondary
Facilitate Maintenance	Required Secondary
Feed Occupants	Required Secondary
Improve Reliability	Required Secondary
Increase Durability	Required Secondary
Prevent Fire	Required Secondary
Resist Deterioration	Required Secondary
Resist Earthquakes	Required Secondary
Resist Lateral Forces	Required Secondary
Secure Access	Required Secondary
Treat Storm Water	Required Secondary
Access Site	Secondary
Charge Vehicles	Secondary
Circulate Pedestrians	Secondary

Function	Function Type
Condition Space	Secondary
Control Illumination	Secondary
Cover Space	Secondary
Decrease Material	Secondary
Deliver Project	Secondary
Distribute Power	Secondary
Drain Site	Secondary
Enclosure Space	Secondary
Facilitate Wayfinding	Secondary
Finish Interiors	Secondary
Generate Power	Secondary
Grade Site	Secondary
Illuminate Site	Secondary
Illuminate Space	Secondary
Landscape Site	Secondary
Maintain Water Quality	Secondary
Manage Stormwater	Secondary
Mitigate Corrosion	Secondary
Mitigate Soil	Secondary
Organize Building Layout	Secondary
Organize Site	Secondary
Park Vehicles	Secondary
Power Building	Secondary
Reduce Energy	Secondary
Remove Waste	Secondary
Repel Water	Secondary
Retain Soil	Secondary
Supply Stability	Secondary
Supply Water	Secondary
Support Load	Secondary
Ventilate Space	Secondary

Appendix D
Project Evaluation

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D.1 Cost Analysis

Cost Analysis

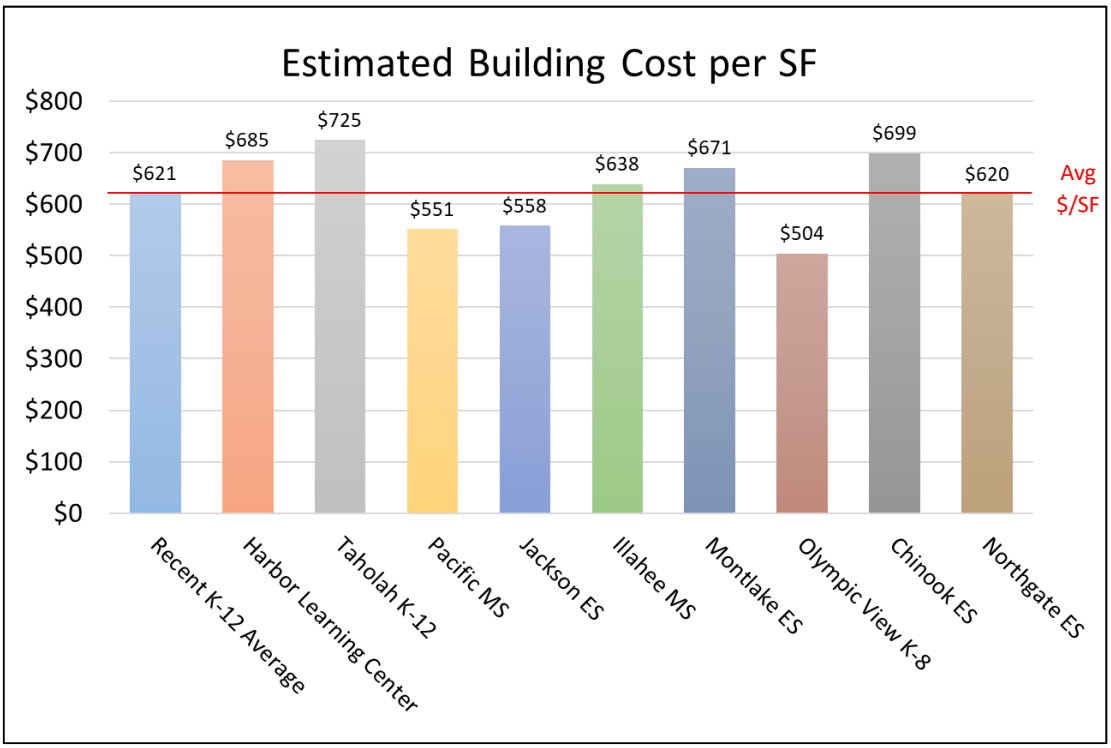
The value team completed an analysis of the estimated cost of the project in comparison to recently reviewed projects of similar type and scope. Cost information for these comparison projects was drawn from project estimates prepared by cost consultants, engineers and general contractors providing preconstruction estimating services. It is important to note that the cost information is not actual bid prices. While consultant estimates generally reflect market bid prices, they will vary depending on how closely each tracks the market place. These comparable projects are relatively similar in purpose, population served, size, building type, new or renovation/modernization, and overall scope. The estimate summaries from the comparison projects are escalated to the time period of the current project. The historical escalation is based on the Turner Building Cost Index and the escalation looking forward is based on that used in the project estimate. A geographic location adjustment based on RS Means' location factors has also been applied. The comparison projects provide a general benchmark when reviewed in aggregate to help identify differences of the subject project in overall cost, building cost per sq. ft., Uniformat cost divisions, and individual unit cost pricing, from the average. With this information, the value and project teams can access the differences and either validate the difference or identify the need for any changes.

Comparison of Building Cost Per Sq. Ft.

The value team compared the overall cost per sq. ft. of the project relative to recently reviewed comparables and the average of these projects. This comparative data is useful for relative benchmarking of costs and helps focus the team's efforts on opportunities to improve value. When comparing project costs, it is important to recognize that each project is developed according to the unique programming and design requirements of each client. Some owners place a higher priority on minimizing the initial cost of construction while others are more interested in minimizing their total cost of ownership, i.e., paying higher first costs to lower the overall life cycle costs of operations and maintenance. The latter paradigm is typically reflected in the selection of higher quality and durability of materials and building systems with longer expected lifecycle performance. Additionally, each project site and context are highly variable, impacting the cost of the building. Therefore, in evaluating cost comparisons, it is important to recognize that cost estimates inherently reflect unique project constraints and client requirements.

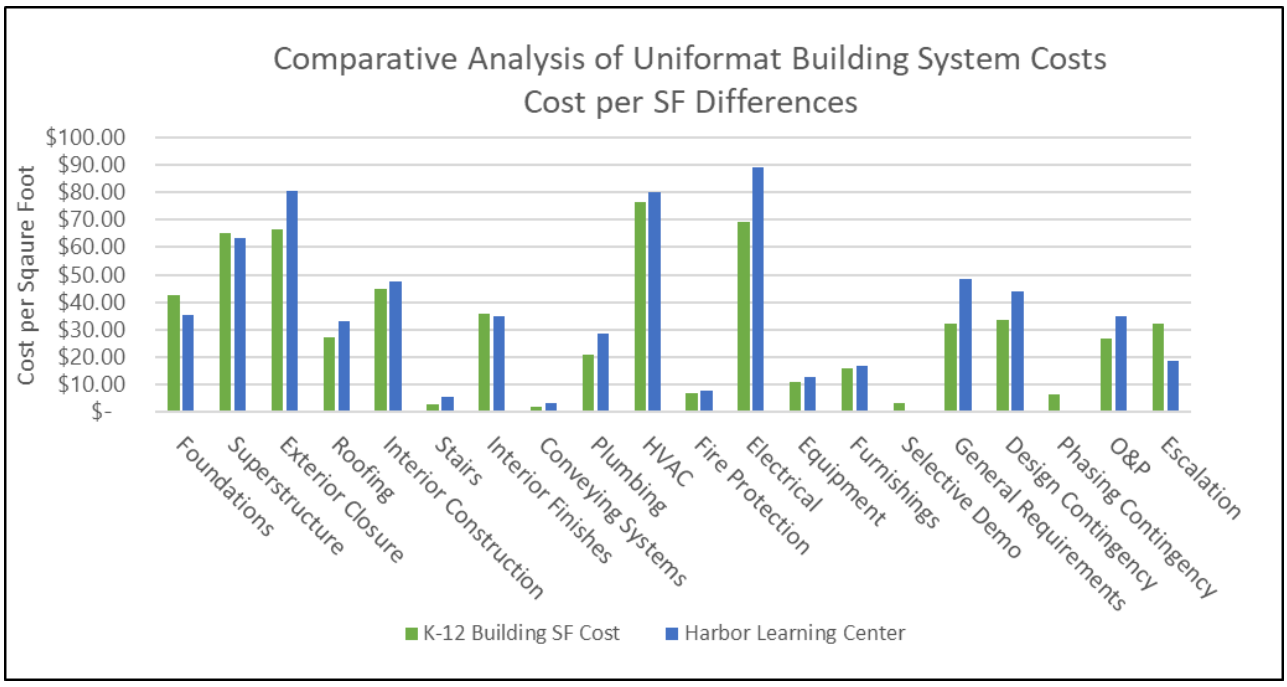
Our comparison of similar K-12 estimates for eight projects representing six school districts from the Pacific Northwest, shows an average estimated cost per sq. ft. of $621 (for the building only, not including site development cost). This average is for estimated costs escalated to the same period of time as the subject project. The $621 per sq. ft. average is representative of the range of cost for a larger pool of school project estimates reviewed over the last 24 months.

The Harbor Learning Center project estimate is based on a 46,007 SF new construction with related site work. The project's estimated cost at $685 per sq. ft. is 10.4% above the comparison average.



Comparative Analysis of Uniformat System Costs

A comparative analysis of the Uniformat building system cost categories was prepared evaluating the project cost estimate relative to the comparison average. The cost differences between the project and the comparison average were analyzed on a cost per sq. ft. basis and as a percentage of the overall building costs. The building cost per sq. ft. comparison is represented below.



The patterns reflected in the comparison of Uniformat costs for the project reveal variations from the averages of recently reviewed projects. The more significant cost variances per sq. ft. are outlined below.

Higher than average cost variances include:

- Exterior Closure +22% or $14 per sq. ft.
- Roofing +21% or $6 per sq. ft.
- Plumbing +37% or $8 per sq. ft.
- Electrical +29% or $20 per sq. ft.
- Equipment +17% or $2 per sq. ft.
- General Requirements +50% or $16 per sq. ft.
- O&P +30% or $8 per sq. ft.

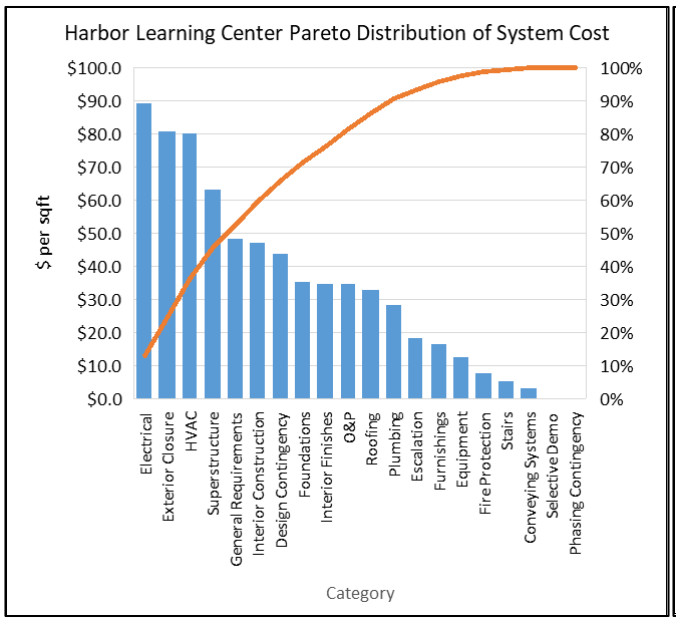
Lower than average costs include:

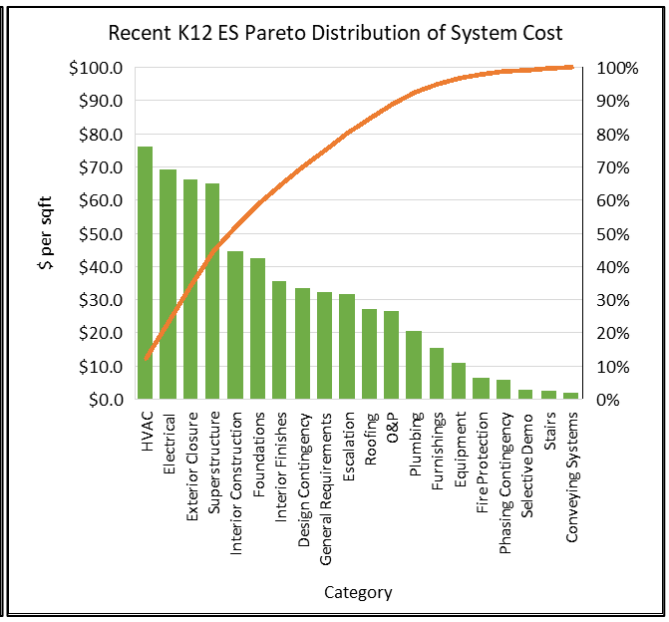
- Foundations -17% or $7 per sq. ft.
- Superstructure -3% or $2 per sq. ft.
- Escalation -42% or $14 per sq. ft.

The degree of variation for these cost categories may reflect program differences, special conditions and design features, or possibly misunderstanding of the scope by the estimator. The degree of differences and potential impacts to the project cost warrant validation of the scope and estimated cost by the design team and estimator. Detailed comments about the Uniformat costs are provided in the D.2 Estimate Review.

Pareto Cost Distribution

The value team prepared a Pareto, or 80/20 ratio analysis comparing Uniformat construction cost categories, i.e., the superstructure, exterior enclosure, interior finishes, etc., of the project relative to the Pareto distribution average of the comparison projects. The Pareto distribution of Uniformat cost categories represents 80% of cost below and 20% of cost above the distribution curve. The Pareto analysis is founded on the Pareto Principal (or observation) that roughly 80% of the effects of a system are generated by about 20% of the system variables. The analysis is useful for quickly understanding which building systems are driving project cost and risk, and potentially offer the greatest opportunities for managing these two factors.





The project Pareto 80/20 distribution curve reveals the project does not vary from the average as the typical categories of Superstructure, Mechanical and Electrical systems, and Exterior Closure are falling within the top cost categories. The K-12 Average Pareto Distribution is composed of the comparison projects.

The cost categories which fall above the curve offer the greatest opportunity for design alternatives to influence the overall building cost.

D.2 Estimate Review

Estimate
The value team reviewed cost estimates developed for the Harbor Learning Center project which form the basis of the following comments. Estimates were prepared by the following consultants:
- Schematic Design Summary Estimate prepared by RC Cost Group dated August 21, 2025.

The estimate was based upon the following design documents:
- Design drawing set for 95% design as developed by TCF Architecture PLLC, dated August 12, 2025.
- Included in the design set were: 10 Civil sheets, 2 Landscape sheets, 23 Architectural sheets, 8 Structural sheets, 21 Mechanical sheets, 25 Electrical sheets.

This review is formatted in the same sequence as the cost estimate. Discrete quantities were spot checked with the focus of the review on the unit prices. In developing recommended costs for unit prices in question, the VE team compared them with cost estimates on file from previous similar projects within the Pacific Northwest region prepared by a variety of cost consultants, engineers, and general contractors.

The Harbor Learning Center project estimate is based on 46,007 SF construction of a new facility that relocates the existing facility out of the Tsunami inundation zone. The new facility is designed as a two story, steel brace framed structure with steel joists over the Gymnasium space. The building has shallow footings, and a full investigation of the soil and substructure has not been undertaken yet. It is anticipated that design will need to be upgraded to deal with the underlaying soils. The new building is located between East 3rd and East 5th Streets, North H Street and North I Street. An existing parking lot sits on the East side, and the project extends this existing parking lot over to the west and the building is built further west on the site bordering East 5th Street.

The Estimate completed by RC Cost Group dated August 21, 2025, has an overall total cost of work at $38,164,581. The building alone is $31,518,557 equating to $ 685.08/sf; Sitework alone is $6,362,483; Off-Site Improvements are $283,541.

Observations:
Overall Estimate – The cost estimate appears to be inclusive of the anticipated scope for the project. However, some of the unit pricing is not in line with other project estimates of similar scope. Specific observations are outlined below. Quantities were spot checked, and any significant exceptions found are noted below.

Estimate Exclusions – Qualifications and exclusions are consistent with a project at this level of design.

Schedule Duration – We could not locate a construction schedule in the VE documents, however, that has not impacted the estimate at this point due to the percentage methodology used for the Markup items. This is typical when a traditional Cost Consultant is involved.

General Conditions – 9% has been used for General Conditions/ General Requirements. This is acceptable for a public bid project in the K-12 school sector.

Design and Estimating Contingency – 7.5% has been used in the estimate. This is seen as being on the low side at the Schematic Design Phase, where the procurement method is design-bid-build and public bid. The typical range for the Cost Consultant being they measure and price the work to exact quantities where possible, is 7.5% to 15% range.

Escalation Adjustment – The escalation used in the estimate totals 2.76% taking the mid-point as July 2026. This allows for an escalation of under 3% over the next year. There was discussion about whether the project may be pushed out a year, and if that's the case we would recommend adjusting the escalation out to match.

We are tracking the tariffs situation, and they will add in some instances a one-time bump, or adjustments over a quarter if the manufacturers and suppliers space the impacts out over a few months. We recommend this project add a line in the summary for tariff adjustments as it will be impacted due to its timing. Until we can assess things further a 5% to 7.5% bump could be in order.

Market Conditions – Escalation is defined as rising costs of materials, rentals, wages, etc. and does not account for more immediate market conditions. Market conditions are defined as contractor, subcontractor, and worker availability at time of bid and how desirable a project is based on constructability, location, and risk factors. Factors affecting these perceived conditions are location, client, worker availability, simplicity of the project, competition for this project, and timing of the project.

This project is isolated and remote. We are hearing the bid coverage has not been great in this area. Due to this it will be important to advertise this project well, and to provide a good amount of time for the bid. We recommend the Owner, and the Owners Representative/CM and Architect do some outreach to ensure there is a satisfactory level of interest in the project. This strategy will help mitigate poor bid coverage.

Fee – The General Contractors overhead and profit at 5.5% is a reasonable number to hold at this point. If the project were not as remote as it is and had good bid coverage it's likely the low bidder could submit with a lower percentage on the Overhead & profit if they needed to pick up more work.

Alternate for Wood Framing – If a wood framed option was to be entertained, based upon the size and massing of the design currently utilizing a Steelwork structure with brace frames it's our opinion a mass timber building would be required. The Wood framed option as priced in alternate number two does not reflect the genuine cost of mass timber construction. This would need to be revisited if the option were to be entertained.

Observations in Detailed Section of Estimate:

- **Footing Excavation**: The excavation of footings at $18.50/cy appears to be on the lower side. This work could range up to $45.00/cy.
- **Haul and Disposal of Dirt**: Disposal of excavated material at $30.88/cy is on the low side since there is a trucking haul off cost and a disposal fee at most locations. The actual costs could be in the $45/cy to $55/cy range.
- **Structural Steelwork**: We have assessed it could be low with 13Lbs/sf on the second floor, and 9Lbs/sf for the roof structure. The amount of steel for pricing may need to be in the 20Lbs/sf range. This means the cost may need adjusting up by $1.2 Million. In addition, there is an error with the brace frame pricing. The current pricing is in the $4,750 range for each when the cost could be in the vicinity of $34,000, giving the project a further shortfall of $600 thousand to $1.2 Million depending upon how the brace frames were measured and counted. We recommend the steelwork assumptions be checked and the brace frames be repriced.
- **Structural Metal Deck**: The metal deck is priced at $6.50/sf and $6.65/sf, which appears on the low side. The actual price could be in the $10.00/sf range installed.
- **Metal Panel**: If it's a higher end finish and a proprietary system, the price of $39.50/sf in the estimate would need a bump up to the $55.00/sf range. We note the estimate prices of the backing system in the exterior sheathing line item.
- **Curtain wall**: The curtain wall is priced at $130/sf. We would expect this to be closer to $175/sf.
- **Suspended ACT Ceiling**: The suspended ACT ceiling in exposed grid priced at $8.15/sf is on the low side and we expect this would price in the $10.00 to $12.00/sf range.

Uniformat Cost Review

A10 Substructure:
HLC cost at $35.50/sf is lower than the historical average for the comparison projects at $42.52/sf.

B10 Superstructure:
HLC cost at $63.38/sf is comparable to the historical average of the comparison projects at $65.16/sf.

B20 Exterior Closure:
HLC cost at $80.77/sf is higher than the historical average of the comparison projects at $66.42/sf.

B30 Roofing:
HLC cost at $33.01/sf is higher than the historical average of the comparison projects at $27.32/sf.

C10 Interior Construction:
HLC cost at $47.37/sf is higher than the historical average of the comparison projects at $ 44.88/sf.

C20 Stairways:
HLC cost at $5.60/sf is higher than the historical average of the comparison projects at $2.86/sf.

C30 Interior Finishes:

HLC cost at $35.01/sf is comparable to the historical average of the comparison projects at $35.71/sf.

D10 Conveying:
HLC cost at $3.37/sf is comparable to the historical average of the comparison projects at $1.97/sf.

D20 Plumbing:
HLC cost at $28.46/sf is higher than the historical average of the comparison projects at $20.73/sf.

D30 HVAC:
HLC cost at $80.26/sf is higher than the historical average of the comparison projects at $76.39/sf.

D40 Fire Protection:
HLC cost at $7.90/sf is comparable to the historical average of the comparison projects at $6.74/sf.

D50 Electrical:
HLC cost at $89.25/sf is higher than the historical average of the comparison projects at $69.38/sf.

E10 Equipment:
HLC cost at $12.84/sf is comparable to the historical average of the comparison projects at $10.99/sf.

E20 Furnishings:
HLC cost at $16.57/sf is comparable to the historical average of the comparison projects at $15.68/sf.

Constructability and Project Delivery:
Use of design-bid-build project delivery is advantageous for the project in current market conditions, as it will ensure the District receives competitive pricing in an already competitive market. The project design does have some complexity to it, and the sub surface conditions will provide some challenges to the early phases of the project. The access to the site is good as it is situated in the center of four streets.

Comments and observations contained within this report represent the value team's observations and are intended for verification by the project team.

Aberdeen School District
Harbor Learning Center
Recalibrating the SD Estimate by RC Cost Group
Date: 8-26-2025

No.	Section/Item Descriptions	Qty	Unit	RC Cost Unit Cost	V.E Unit Cost	RC Cost Total	Total (V.E Study)	Adjustment
A1010	**Foundations**							
	Excavate continuous footings	1,221	CY	$18.50	$45.00	$22,589	$54,945	
A1012	**Excavate column footings**							
	Excavate column footings	372	CY	$18.50	$45.00	$6,882	$16,740	
	Backfill, imported fill	1,085	CY	$74.00		$80,290		
	Haul dirt	2,325	CY		$55.00		$127,875	
	Disposal of excavated material within 8 miles, swell factor 33%	2,325	CY	$30.88	$15.00	$71,796	$34,875	
	Concrete at footing to covered play canopies	22	CY	$11.88		$261		
	Set anchor bolts	1	LS	$35,525.00		$35,525	$35,000	
	Elevator pit including waterproofing	1	EA	$26,744.00		$26,744	$25,000	
	SubTotal - Adjustment to Foundations:					**$244,087**	**$294,435**	**$50,348.14**

		Qty	Unit	RC Cost Unit Cost	V.E Unit Cost	RC Cost Total	Total (V.E Study)	Adjustment
A1020	**Special Foundations**							
	Overexcavation/haul/import, assumes 3' below footings (Slab 30,330sf)	1,289	CY	$86.39	$155.00	$111,357	$199,795	
	Area of footings:	11,601						
	SubTotal - Adjustment to Special Foundations:					**$111,357**	**$199,795**	**$88,438.29**

		Qty	Unit	RC Cost Unit Cost	V.E Unit Cost	RC Cost Total	Total (V.E Study)	Adjustment
B1010	**Floor & Roof Construction**							
B1012	Structural steel beams at floor	236,763	LBS	$3.40	$3.40	$804,994	$804,994	
	Steel floor deck	18,941	SF	$6.65	$11.00	$125,958	$208,351	
		13	Lbs/sf					
	V.E Study supplement to adjust steelwork to 20lbs/sf	142,058	LBS		$3.40		$482,996	
	Misc. steel plates, connections etc.15%	35,514	LBS	$3.40	$3.40	$120,748	$120,748	
	Brace Frames	37	EA	$4,750.00	$34,000.00	$175,750	$1,258,000	
B1020	**Roof structure**							
	Structural steel columns & beams	307,422	LBS	$3.40	$3.40	$1,045,235	$1,045,235	
	Steel roof deck	27,782	SF	$6.50	$11.00	$180,583	$305,602	
	Acoustical roof deck	6,376	SF	$7.75	$13.50	$49,414	$86,076	
		9	Lbs/sf					
	V.E Study supplement to adjust steelwork to 20lbs/sf	70,136	LBS		$3.40		$238,462	
	Misc. steel plates, connections etc.15%	46,113	LBS	$3.40	$3.40	$156,784	$156,784	
	SubTotal - Adjustment to Floor & Roof:					**$2,659,465**	**$4,707,248**	**$2,047,782.25**

		Qty	Unit	RC Cost Unit Cost	V.E Unit Cost	RC Cost Total	Total (V.E Study)	Adjustment
B20	Exterior Closure							
B2011	Exterior wall							
	Metal panel	11,371	SF	$39.50	$55.00	$449,155	$625,405	
	Metal panel, large tile	1,081	SF	$42.50	$57.50	$45,943	$62,158	
	Batt insulation	22,217	SF	$3.50	$2.50	$77,760	$55,543	
	Exterior sun control devices - Sunscreens, horizontal lou	83	LF	$185.00	$250.00	$15,355	$20,750	
	SubTotal - Adjustment to Exterior Wall:					**$588,212**	**$763,855**	**$175,643.50**

		Qty	Unit	RC Cost Unit Cost	V.E Unit Cost	RC Cost Total	Total (V.E Study)	Adjustment
B2020	**Exterior Windows**							
	Curtain wall	3,365	SF	$130.00	$175.00	$437,450	$588,875	
	SubTotal - Adjustment to Windows:					$437,450	$588,875	$151,425.00

B30 **Roofing**

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No.	Section/Item Descriptions	Qty	Unit	RC Cost Unit Cost	V.E Unit Cost	RC Cost Total	Total (V.E Study)	Adjustment
	Standing seam metal roof, type A	31,119	SF	$36.50	$24.00	$1,135,844	$746,856	
	SubTotal - Adjustment to Roof:					$1,135,844	$746,856	($388,987.50)
C3030	**Ceiling Finishes**							
	Suspended ACT and grid 2x4	22,419	SF	$8.15	$12.00	$182,715	$269,028	
	Gypsumboard over metal stud	7,838	SF	$10.00	$12.30	$78,380	$96,407	
	Gypsumboard over metal stud, soffits	105	SF	$10.00	$24.60	$1,050	$2,583	
	Suspended ACT and grid 2x4, vinyl faced	1,518	SF	$8.50	$14.00	$12,903	$21,252	
	Acoustic ceiling panels	565	SF	$29.25	$40.00	$16,526	$22,600	
	SubTotal - Adjustment to Ceiling Finishes:					$291,574	$411,870	$120,296.30
	SubTotal - Adjustment to Building Cost:							**$2,244,945.98**
		Qty	**Unit**	**RC Cost Unit Cost**	**V.E Unit Cost**	**RC Cost Total**	**Total (V.E Study)**	**Adjustment**
	SITEWORK:							
G1010	**Site Clearing & Grubbing**							
	Mobilization (8% of total costs)	1	LS	$260,000.00		$260,000		
G1030	**Site Earthwork**							
	Site earthwork/ cut, include haul	3,200	CY	$45.00		$144,000		
	V.E Team - Site cut	3,200	CY		$15.00		$48,000	
	V.E Team - Haul & dispose	3,200	CY		$65.00		$208,000	
	SubTotal - Adjustment to earthwork Cut:					**$144,000**	**$256,000**	**$112,000.00**
	Site earthwork/ fill	1,500	CY	$45.00		$67,500		
	V.E Team - Import Engineered fill	1,500	CY		$55.00		$82,500	
	V.E Team - Compaction of placed fill	1,500	CY		$10.00		$15,000	
	SubTotal - Adjustment to Site Fill:					**$67,500**	**$97,500**	**$30,000.00**
						$211,500	$353,500	
G2030	**Pedestrian Paving**			$33.33				
	Concrete sidewalk	75	CY	$300.00	$340.00	$22,500	$25,500	
	Cast in place wall (VE assume 8" reinforced #5 @12"o.c EW	1,600	SF	$50.00	$68.78	$80,000	$110,041	
	Note: Assume site wall that doesn't require a footing							
	SubTotal - Adjustment to Pedestrian Paving:					**$102,500**	**$135,541**	**$33,041.48**
	SubTotal - Adjustment to Sitework Cost:							**$175,041.48**

NOTE: Excluded from Adjustment

* MEP @ Building is yet to be assessed due to the conceptual nature of the pricing.

G30 Site Mechanical - Considered but on second look decided no action
G3010 Water Supply - Considered but on second look decided no action
G3020 Sanitary sewer - Considered but on second look decided no action
G3030 Storm sewer - Considered but on second look decided no action

Value of Items Assessed:	**$5,781,988**	**$8,201,976**	
Total Adjustment - Construction Cost:			**$2,419,987**

D.4 VE Team Observations and Comments

The following initial observations and comments were noted by the VE team following the design presentation and site visit.

Civil

- Existing parking lot may get damaged during construction/staging. Consider new top asphalt layer.
- Verify all required ADA ramps are on plans.

Architectural

- SF's need to stay the same to maintain school funding.
- Rockeries are not preferred per ASD standards.
- Trees are required in design to support passive site cooling (including permanent irrigation).

Structural

- There are long spans of masonry veneer supported over strip glazing and large curtainwall panels.
- There are many canopies around the building not yet reflected in structural plans.
- Spread footings at the norther portion of the site will require subgrade mitigation, achieved by one of the following two means: 1. over-excavating existing subgrade soils to a depth of several feet below each footing bottom (or to bedrock) and backfilling with compacted engineered fill, or 2. performing shallow ground improvement such as geo-piers or stone columns under each footing to locally improve bearing capacity.
- The building slab will require use of a robust vapor barrier system to reduce moisture transmission through the floor slab.
- Potential for liquefaction in northern portion of the site is generally low.
- Due to the conflicting mapping and nearby inundation predictions, Geotech recommends the tsunami hazard be evaluated by a tsunami specialist.
- Final design of geotechnical elements may require additional site characterization to better delineate subsurface conditions around proposed structures, to better assess the potential of expansion and compression of near-surface soils.
- The southern half of the site would require piles. The presence of abandoned pile foundations throughout much of this portion of the site could make design and construction of new pile-supported structures challenging.
- The southern portion of the site is located within a tsunami inundation zone.
- The southern portion of the site has potential for strong seismic shaking with liquefaction-induced settlements potentially on the order of several feet, and loss of soil strength and bearing capacity.
- The northern half of the site has fine-grained soils overlying bedrock which may be subject to cyclic softening under severe seismic shaking.
- BRBF frames are configured to accommodate programs, not for efficiency.
- Frame 5 (there are two) do not extend from second floor to the foundation level.
- Mechanical Attic is centered over the second-floor corridor, cantilevering in both directions over corridor walls.

- Mechanical attic is not centered under roof peak, resulting in lower head height clearances.
- There are retaining walls along the south edge of site, in very poor soils.
- North retaining wall is site wall (ILO building wall) to help manage the high ground water table.
- Outdoor roof deck at second floor between Science and CTE Business Marketing classrooms, not yet reflected in structural plans.
- There is a large learning stair adjacent to Commons/Cafeteria, not yet reflected in structural plans.
- Shallow foundations throughout with BF foundations on grade beams.
- BRBF lateral load resisting system. Chosen because: 1. Standard steel construction, 2. Cost effective: smaller foundations (lower upfront costs), 3. Higher resilience in post-earthquake occupancy.
- There is not currently a plan for soil mitigation in the structural plans. Assumed soil bearing capacity is assumed to be 4000psf. (Also not finding in cost estimate)
- In addition to addressing soil improvement, Geopiers can be effective in managing high the high ground water table.
- Dovetail metal deck on the second floor is for acoustics (not reflected in the cost estimate).
- Existing trees conflict with planned north retaining wall.
- Current soil mitigation is thought to over excavate and import structural fill. Geopiers are not currently considered.
- There are second floor level cantilevers, but they do not appear required by building footprint below.
- All column shapes are wide flange, both frame and gravity columns.
- The northern half of the site has geologically favorable conditions over southern half of site.
- The northern half of the site has bedrock found at 8 to 10 feet bgs. Soils overlying the bedrock may be compressible.
- The northern half of the site has very high expansion potential. This will affect proposed site. Improvements should be accounted for in foundation design (not reflected in the cost estimate).
- New structures in the northern portion of the site may require use of underdrains to facilitate conveyance of water away from the building subgrade (not reflected in the cost estimate).

Electrical

- Suspended ceiling heights of 9ft to 9'-8".
- Interior Lighting: mostly 2x4 troffers.
- To meet energy code for controlled receptacles, they are using a separate duplex adjacent to the standard non- controlled duplex.
- Separate secure areas separating School from GED/ Admin and from Daycare.
- Daycare and School for ages 1-21.
- Nursing Labs placed closer to existing HS.
- Estimated the load at 1.4MW, 1600A at 480V 3ph.
- 50-75Yr Service Life.
- Outdoor equipment must withstand Marine Environment.
- Open 6AM until 9PM.
- Large step-down transformer in main electrical room meant to reduce size of transformers in

satellite/floor electrical rooms.
- Main electrical room in NW corner by utility yard.
- M2.01 Currently has a lot of plumbing routed through the ceiling of the main electrical room (to be revised later in design).

Mechanical
- The cooling load study has not been completed yet.
- The commercial kitchen hood is Type I.
- The HVAC airside system is Fan Coils with dedicated OA via VAV boxes.
- Using Bottle Traps instead of an AWN system.
- State Energy Code will tend to force the use of Heat Pumps (instead of a chiller/boiler).
- Current District wide BMS supplier is ATS.
- Building is fully sprinkled.
- The facility staff is familiar with hydronic HVAC systems and prefers them.
- Most of the classroom OA is being provided from DOAS units mount in the mechanical attic.

Construction Management
- Vertical height seems excessive.
- Subsurface anomalies from previous site which burned down unknown.

Cost Estimation
- Earthwork cut and fill in Site Earthwork are the same price and do not reflect actual costs.
- Building site cut and fill do not reflect the real costs of the work and do not reflect the Geotech Report.
- The cost for the over-excavation in the Special Foundations is on the light side.
- The steelwork costs are light and do not fully cover the extent of the steel design.
- The backfill priced into the footings is a cost location error, which is overinflating the footings cost.
- The price used for excavating footings is lower than the sitework cut.
- The building has good height and volume. Could be opportunity for savings across Structural & Architectural systems.
- With the extent of sub grade preparation and soil mitigation, there is the opportunity to investigate different pier systems.
- Design contingency is on the low side for a building with the site conditions and challenges.
- Cost Escalation is on the low side for the current climate and introduction of tariffs.
- The 9% for GC's, GR's and 5.5% for O/H & profit are okay if it's a public bid. If the project will be procured differently, these percentages will need to be reviewed.

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D.5 Risk Analysis

	PROBABILITY	COST IMPACT	SCHEDULE IMPACT
HIGH (5)	90-100%	>1m	>2 mos
MEDIUM-HIGH (4)	66-89%	500k-1m	1.5-2 mos
MEDIUM (3)	45-65%	2-500k	1-1.5mos
MEDIUM-LOW (2)	30-44%	1-200k	.5-1mo
LOW (1)	<29%	<100k	<.5mo

Figure 1: Risk Scoring Legend

RISK FACTORS	PROB	COST IMPACT	SCHEDULE IMPACT	SCORE
Degree to which soil mitigation is required is uncertain.	H	H	H	25
Results of outstanding Geotechnical investigation may be undesirable as amount of soil is currently underestimated.	H	H	H	25
Tariffs driving up material costs.	H	MH	MH	20
Design contingency and escalation are inadequate for what will be needed.	H	H	ML	17.5
Slab cracking and/or displacing as a result of highly expansive soils.	H	MH	M	17.5
Estimate inadequately reflecting actual design.	H	H	L	15
Construction schedule contingent upon receiving funding approval in 2026; if not received project will be delayed and project cost increases due to escalation.	M	M	H	12
Unknown findings of outstanding excavation study.	MH	ML	M	10
Lead times for electrical distribution/mechanical/elevator equipment.	ML	ML	H	7
Drop-off/pick-up area inadequate in avoiding traffic conflicts.	MH	L	ML	6
Outstanding tsunami risk analysis report could find that the building is located in the tsunami inundation zone.	L	H	H	5
Bid response limited to contractor willingness to bid due to location.	ML	ML	ML	4

Risk that tsunami inundation zone extends into the parking lot.	MH	L	L	4
Details and specifications do not adequately protect the building from marine corrosion.	ML	ML	ML	4
Direct discharge into stream for stormwater management.	L	H	ML	3.5
Various occupancies pose potential problem for testing and balancing (TAB) and ventilation.	M	L	L	3
Design can't verify WSSP requirements.	ML	L	L	2
Public backlash if wood construction is not utilized.	ML	L	L	2
The HLC isn't well integrated into the AHS program and curriculum; sense of connection between schools is not well-established.	L	L	L	1
Risk of inadequately detailed building envelope.	L	L	L	1

Figure 2: Risk Factors Graph and Scoring

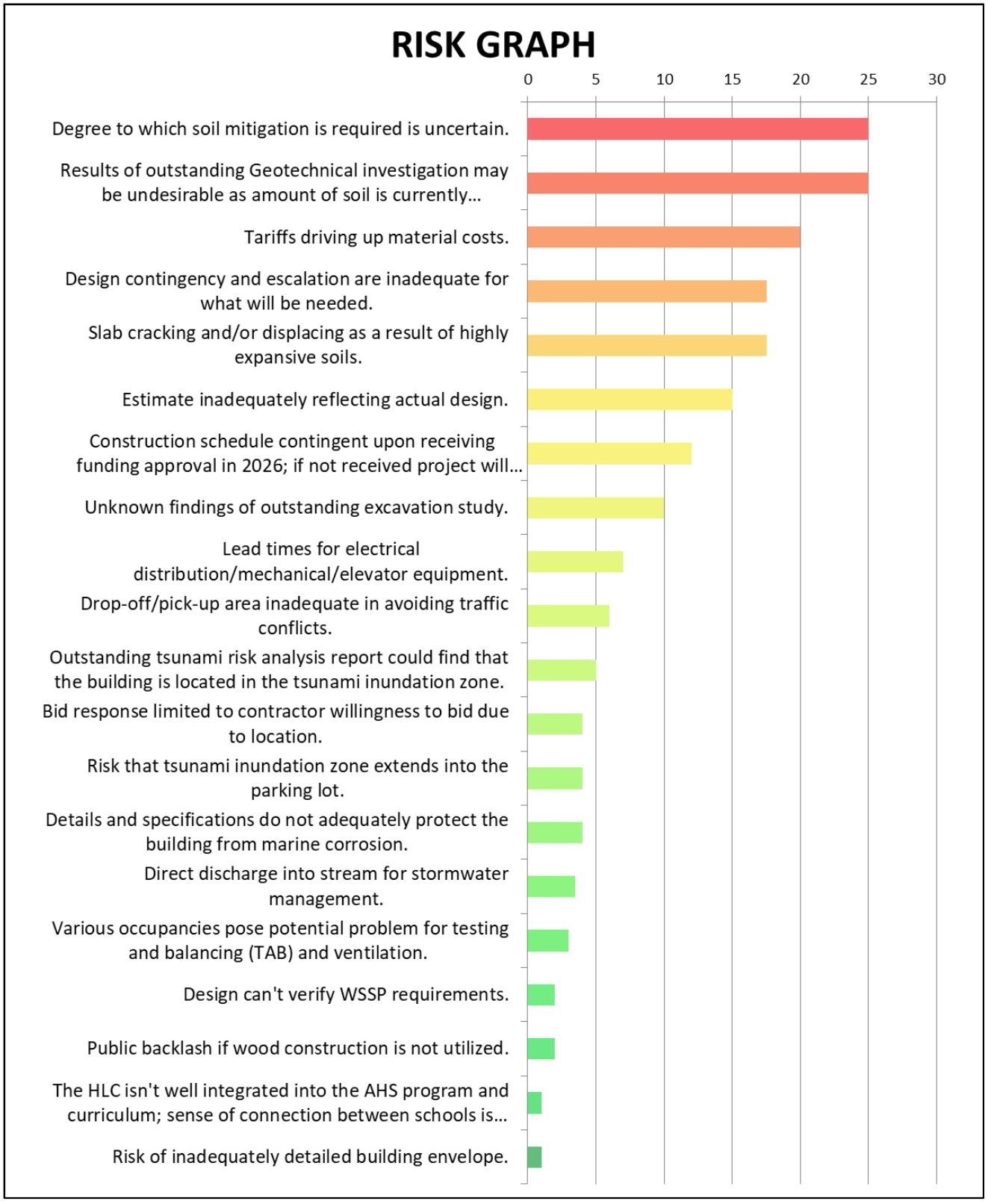


Figure 3: Risk Factors Graph Ranked by Criticality

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Appendix E
Background Documents

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E.1 Background Documents

The documents listed below were provided to the VET for reference in reviewing and analyzing the project design.

- Aberdeen School District Harbor Learning Center – C406 Strategy by TCF Architecture, August 22, 2025
- Aberdeen School District Harbor Learning Center – Ed Specs and Program by TCF Architecture, August 22, 2025
- Aberdeen School District Harbor Learning Center – Owners Project Requirements by TCF Architecture, August 22, 2025
- Aberdeen School District Harbor Learning Center – Schematic Geotech Report by Haley Aldrich, December 20, 2024
- Aberdeen School District Harbor Learning Center – SD Acoustical Report by Tenor Engineering Group, June 20, 2025
- Aberdeen School District Harbor Learning Center – SD Estimate by RC Cost Group, August 21, 2025
- Aberdeen School District Harbor Learning Center – Topographic Site Survey by MTN 2 Coast, May 30, 2025
- Aberdeen School District Harbor Learning Center – VE Review Suggestions by TCF Architecture, August 22, 2025
- Aberdeen School District Harbor Learning Center – Wood vs Steel Comparison by TCF Architecture, August 22, 2025
- Aberdeen School District Harbor Learning Center – WSSP Strategy by TCF Architecture, August 22, 2025
- Aberdeen School District Harbor Learning Center –95% SD by TCF Architecture, August 12, 2025
- Aberdeen School District Harbor Learning Center – Schematic Design Phase Schedule by TCF Architecture, May 2, 2025
- Aberdeen School District Harbor Learning Center – Schematic Design Phase Schedule by TCF Architecture, August 25, 2025
- Aberdeen School District Harbor Learning Center – SD Estimate Recalibration by RC Cost Group, August 26, 2025
- Aberdeen School District Harbor Learning Center –Tsunami Inundation Report by HyperNumbers, December 1, 2024
- Aberdeen School District Harbor Learning Center –VE Presentation by TCF Architecture, August 25, 2025
- Aberdeen School District Harbor Learning Center –District Standards Material Options by TCF Architecture, August 22, 2025
- Aberdeen School District Harbor Learning Center –95% Food Cost Estimate by Clevenger Associates, August 14, 2025
- Aberdeen School District Harbor Learning Center –95% Landscape Cost Estimate by TCF Architecture, August 22, 2025
- Aberdeen School District Harbor Learning Center –95% Mechanical Cost Estimate by Metrix Engineers, August 8, 2025
- Aberdeen School District Harbor Learning Center –95% Civil Cost Estimate by LDC, August 8, 2025

- Aberdeen School District Harbor Learning Center –95% Electrical Cost Estimate by Metrix Engineers, August 8, 2025

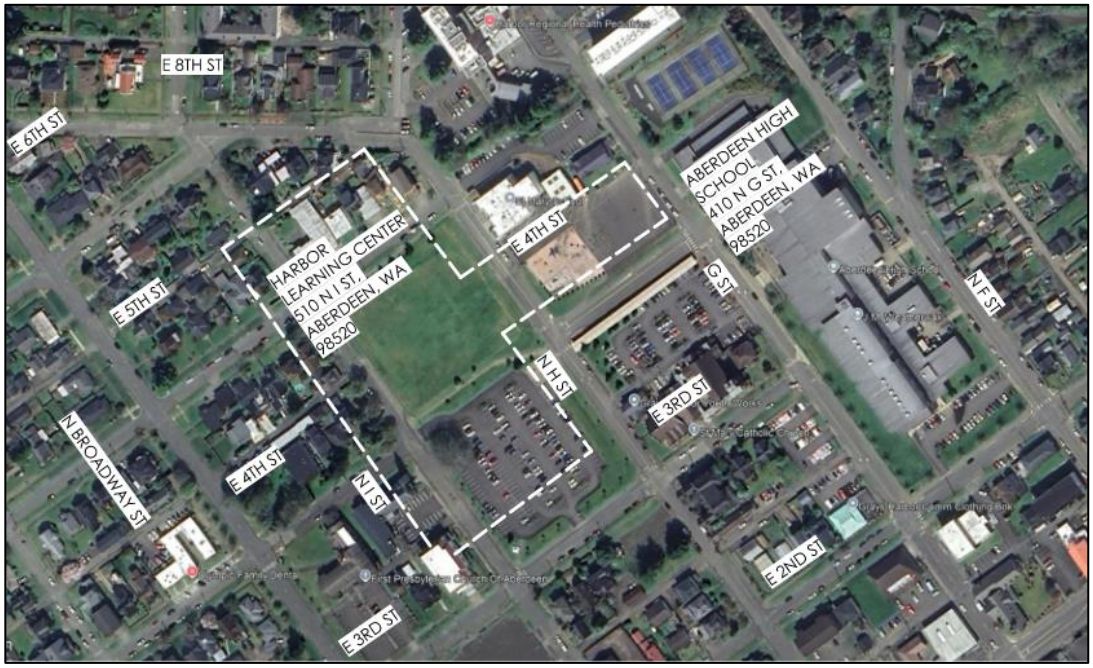
E.2 Design Drawings

Harbor Learning Center Conceptual Renderings

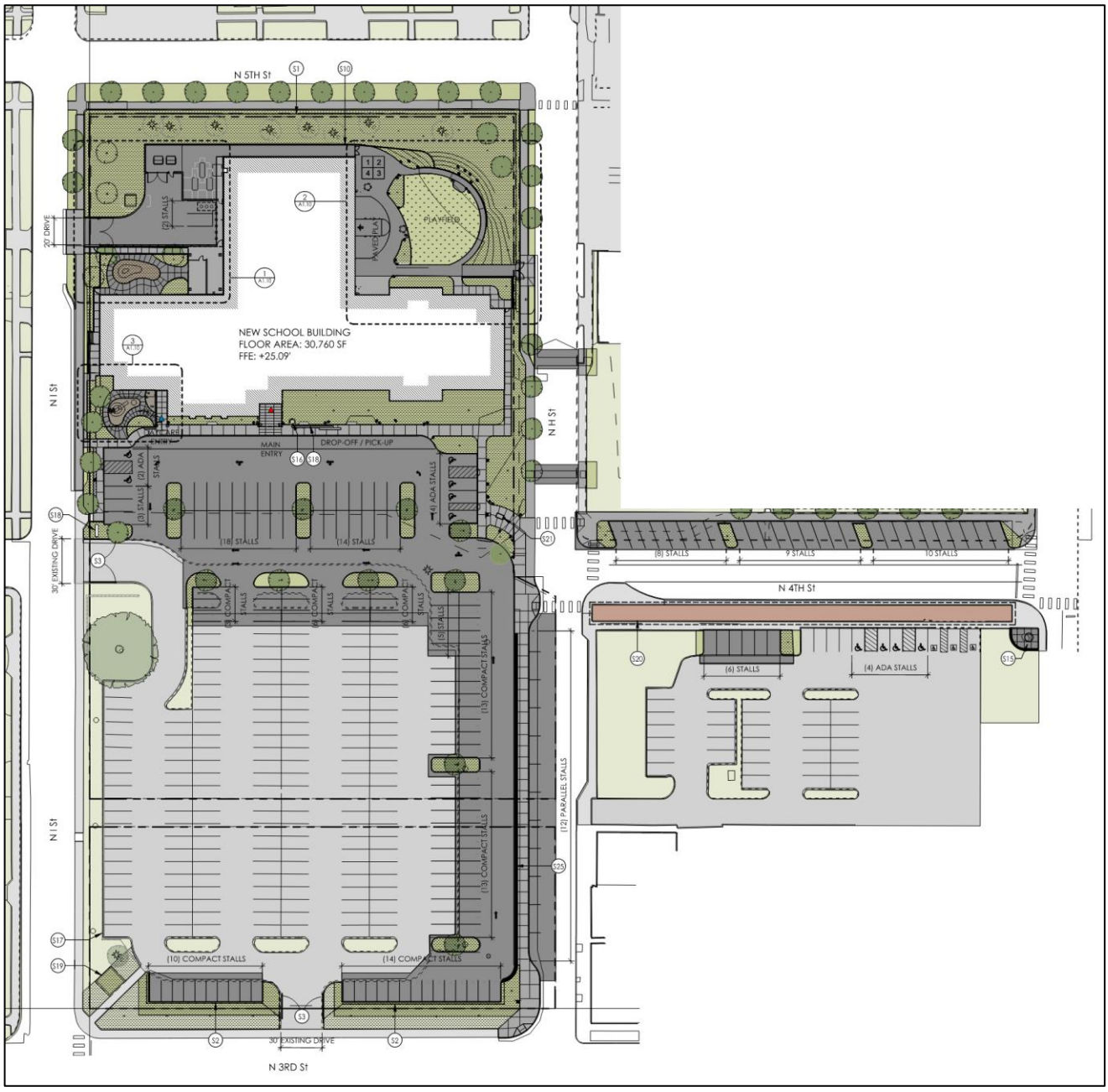
Front



Site Plan

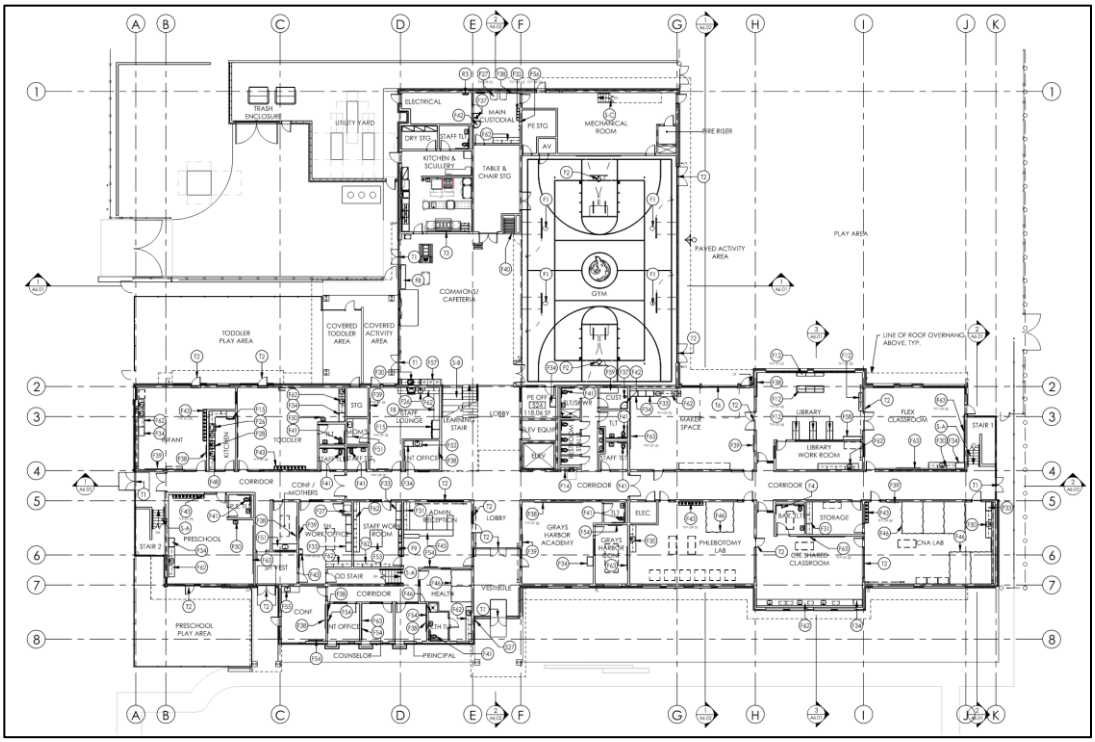


SITE PLAN

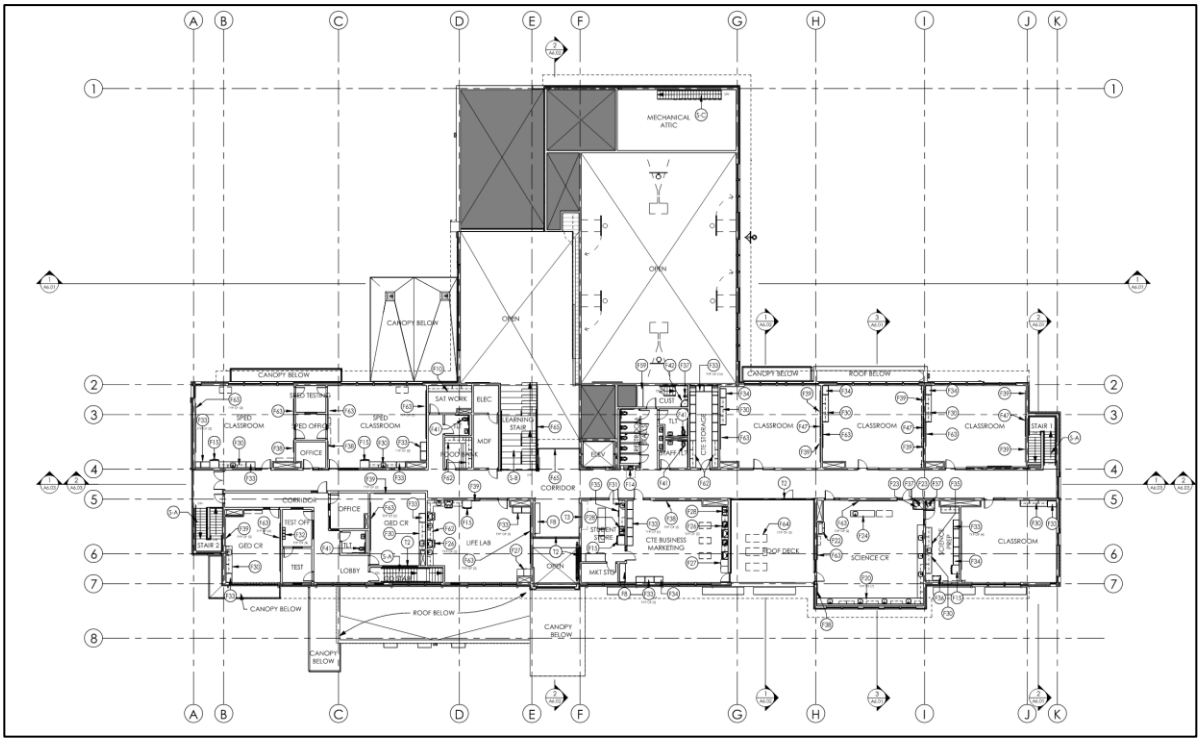

N 5TH St
N 1 St
N H St
N 4TH St
N 3RD St
NEW SCHOOL BUILDING
FLOOR AREA: 30,760 SF
FFE: +25.09'
MAIN ENTRY
DROP-OFF / PICK-UP
PLAYFIELD
PAVED PLAY
20' DRIVE
30' EXISTING DRIVE
(2) STALLS
(2) ADA STALLS
(3) STALLS
(18) STALLS
(14) STALLS
(4) ADA STALLS
(9) COMPACT STALLS
(5) STALLS
(13) COMPACT STALLS
(12) PARALLEL STALLS
(10) COMPACT STALLS
(8) STALLS
9 STALLS
10 STALLS
(6) STALLS
(4) ADA STALLS

FLOOR PLANS

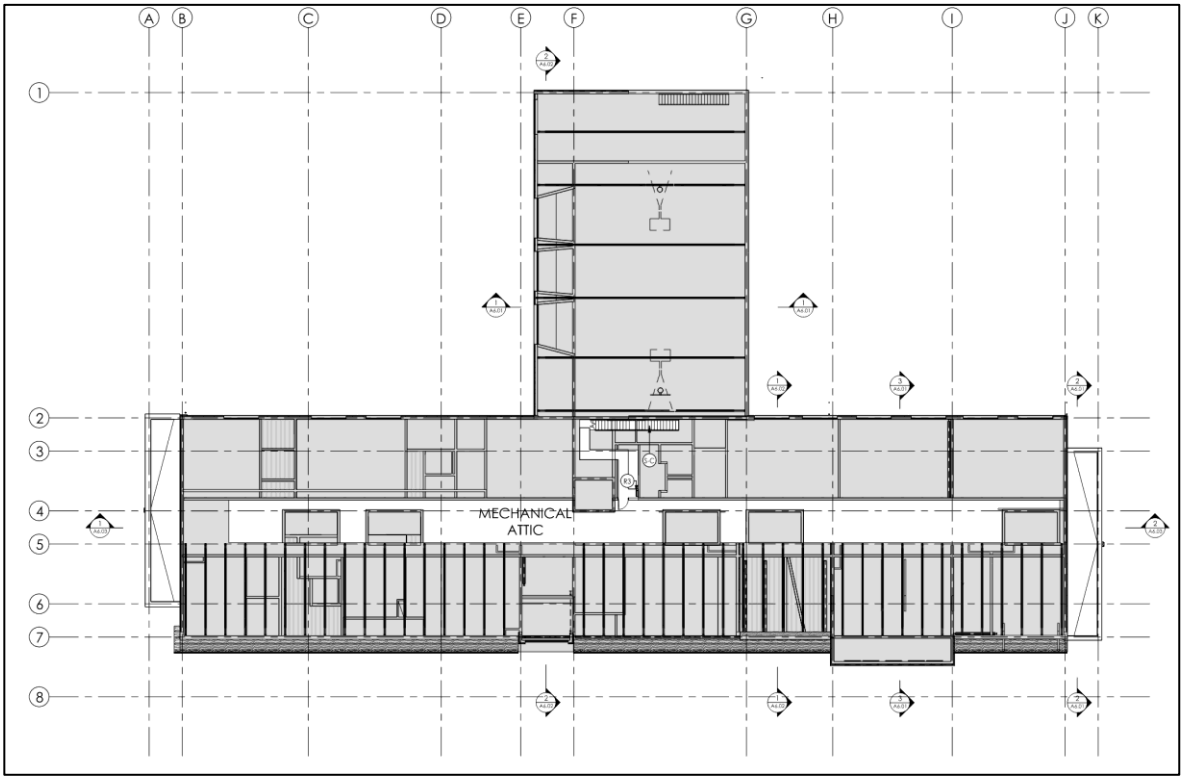
First Floor



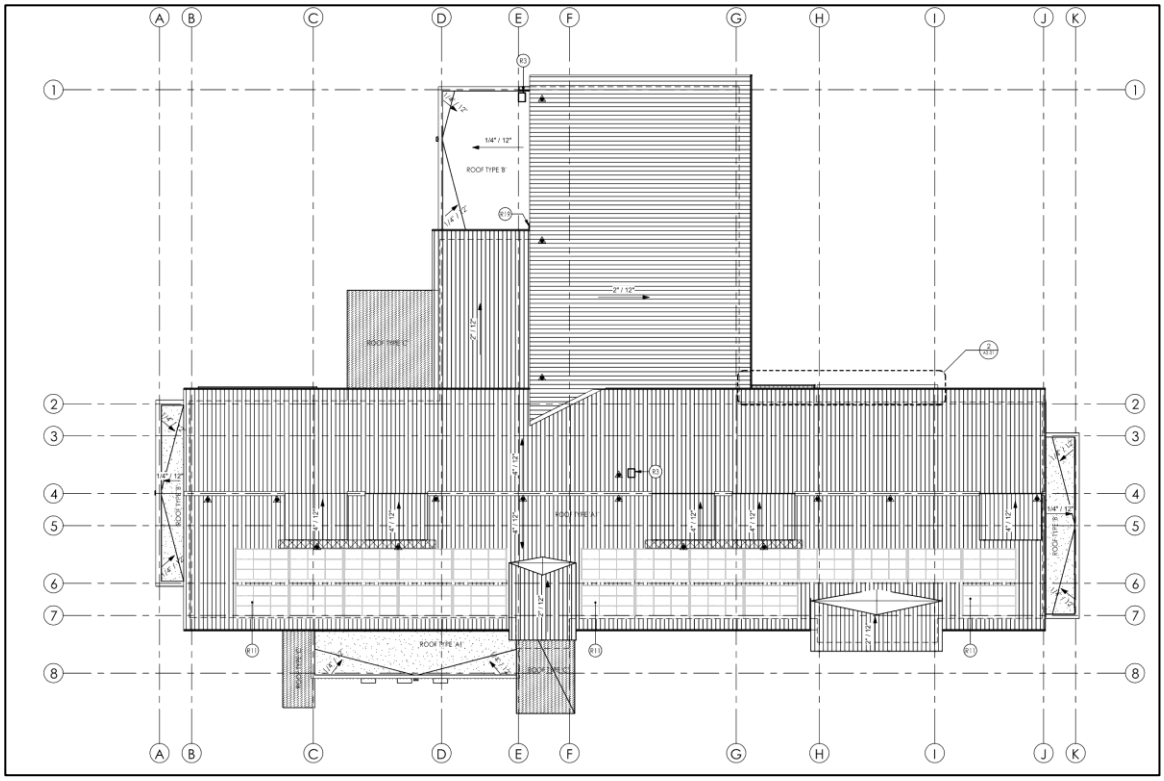
Second Floor



Mechanical Attic

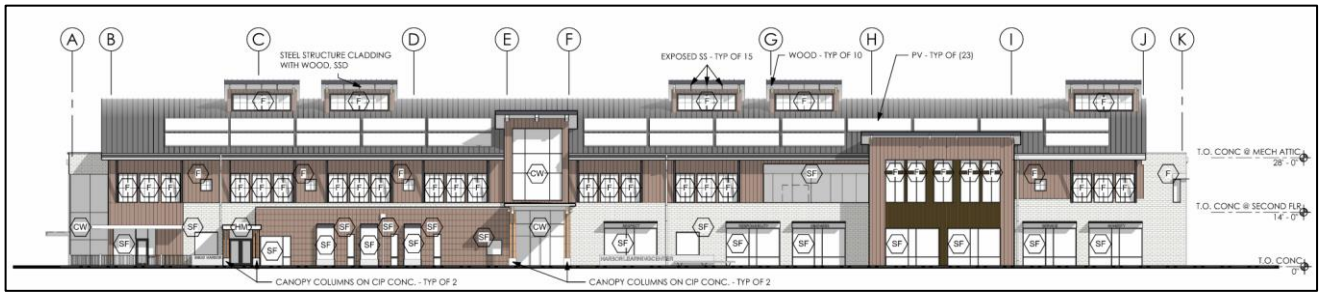


Roof Plan

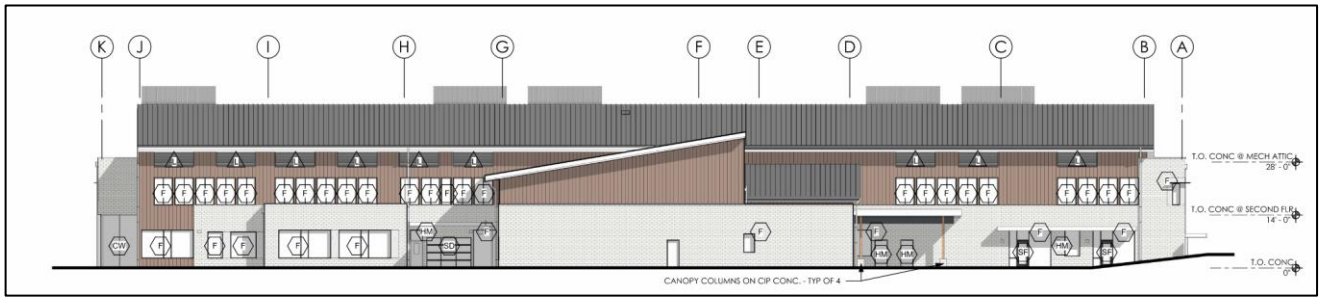


Exterior

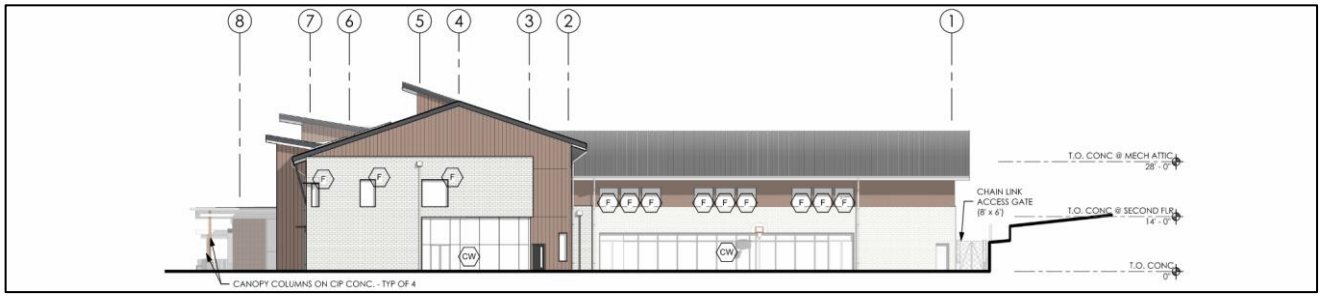
South Elevation



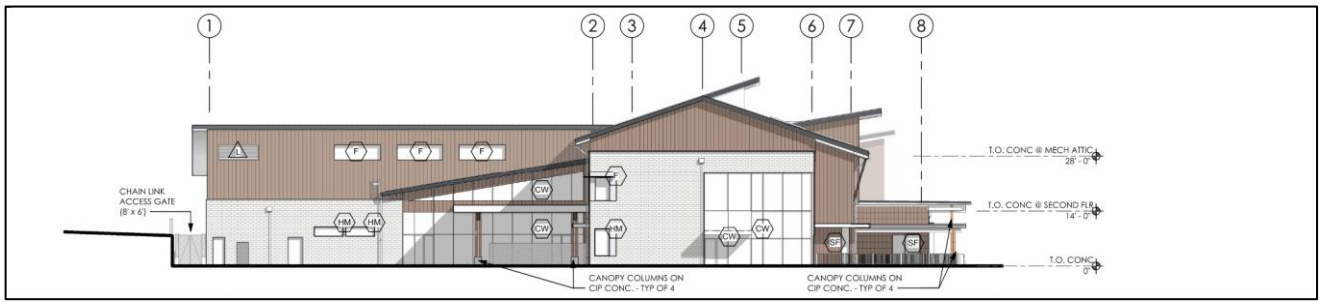
North Elevation



East Elevation



West Elevation



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Appendix F
Photographs

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F.1 Site Photos



Existing Parking Lot



Existing Covered Walkway



Existing Trees along N 5th St



Site from corner of N 5th St and N I St



Site from E 4th St



Site from N H St

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Appendix G
Workshop Information

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VE Study Agenda

Monday, August 18th, 2025 – Pre-Study Kickoff Meeting hosted via Teams by Sazan

		Participants
1:30-2:00	**VES Pre-Study Kickoff Meeting** Introductions Review overall schedule and logistics Review scope, agenda, methodology, and expectations Coordinate documents requirements Identify goals, concerns, opportunities, and focus areas Identify alternatives evaluation criteria	ASD Reps CSG Team TCF Rep VE Facilitator

Monday, August 25th, 2025 – Kickoff Presentation hosted via Teams and in-person at Säzän, 600 Stewart St. Suite 1600, Seattle, 98101, 16th floor, Large Conference Rm.

		Participants
	Set Up	
7:45	Join the teleconference and troubleshoot any technology or connection issues to enable a prompt meeting kickoff at 8:00	ASD Reps CSG Team TCF Team VE Team
	Introduction and Background	
8:00	Introductions Review VE agenda and methodology - Säzän	
	Information	
	Project overview, program and goals – ASD, CSG, TCF	
8:15	Design presentation – TCF Review of project issues and constraints – TCF Overview of project budget and current working estimate – TCF	
	Study Goals and Objectives	
10:15	Review workshop goals and objectives – Sazan Review alternatives evaluation criteria – Sazan	
10:45	**Break**	

Workshop begins via Teams and in-person at Säzän, 600 Stewart St. Suite 1600, Seattle, 98101, 16th floor, Large Conference Rm.

11:00	**Observations** Document observations on concerns, issues and how and how well baseline design achieves program and project goals	VE Team
12:00	**Break**	
1:00	**Risk Review** Develop risk register and rate project risks	
2:00	**Function Analysis** Examine major systems, elements and functions Identify unique or specialized functions required to meet project objectives and performance requirements	
3:45	**Break**	

4:00 **Creative Speculation**
Identify functions for consideration
Speculate on alternative solutions

5:00 **Adjourn**
Review agenda for next day

Tuesday, August 26th, 2025 – hosted via Teams and in-person at Säzän, 600 Stewart St. Suite 1600, Seattle, 98101, 16th floor, Large Conference Rm.

8:00 **Creative Speculation Continued** VE Team

10:00 **Break**

10:15 **Evaluation**
Review alternatives evaluation criteria
Score ideas and select alternatives for development
Assign person responsible for follow-up; distribute workbooks

12:30 **Lunch break**

1:30 **Development**
Follow up on issues and questions
Prepare analysis of alternatives
Document technical, risk and cost analysis with supporting calculations, sketches, research and estimates

3:30 **Break** (as needed)

5:00 **Adjourn**
Review agenda for next day

Wednesday, August 27th, 2025 – hosted via Teams and in-person at Säzän, 600 Stewart St. Suite 1600, Seattle, 98101, 16th floor, Large Conference Rm.

8:00 **Development Continued** VE Team

12:00 **Lunch break**

1:00 **Presentation Prep**
Identify key findings and recommendations
Prep for presentation

10:00 **Development**
Continue development

5:00 **Adjourn**
Review agenda for next day

Thursday, August 28th, 2025 – hosted via Teams and in-person at Säzän, 600 Stewart St. Suite 1600, Seattle, 98101, 16th floor, Large Conference Rm.

8:00 **Development** VE Team
Continue development

12:00 **Lunch break**

1:00 **Development**
Complete draft workbooks by 12pm*
Complete estimate workbooks by 4pm*
Review draft workbooks / facilitator
Quality review/edits of workbooks
Revise and complete documentation as needed

5:00 **Adjourn**

Friday, August 29th, 2025 – hosted via Teams and in-person at Säzän, 600 Stewart St. Suite 1600, Seattle, 98101, 16th floor, Large Conference Rm.

8:00 **Presentation Prep**
Review team member participation
Review workbooks

12:00 **Lunch break**

1:00 **Presentation Prep**
Continue presentation prep

5:00 **Adjourn**

POST WORKSHOP

Wednesday, September 3rd – via Teams video conference

1:00-	**Results Presentation**	ASD Reps
3:00	Presentation of study key findings and recommendations	CSG Team
	Presentation of study results	TCF Team
	Next step actions	VE Team

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G.2 Attendance Sheet

August/September							NAME	DISCIPLINE/ REPRESENTING	PHONE	EMAIL
Pre-Study Kickoff: Aug. 18th	Kickoff: Aug. 25th	Workshop: Aug. 25th	Workshop: Aug. 25th	Workshop: Aug. 25th	Workshop: Aug. 25th	Results Pres: Sep. 3rd				
X	X	X	X	X	X	X	Steven Paget	Säzän, VE Facilitator	206-267-1700	spaget@sazan.com
X	X	X	X	X	X	X	Natalia Winfield	Säzän, Study Assistant	760-707-8336	nwinfield@sazan.com
X	X	X	X	X	X	X	Gigi Lam	Säzän, Study Assistant	206-576-3926	glam@sazan.com
	X	X	X	X	X	X	Steve Sanders	Säzän, Mechanical	480-370-8204	ssanders@sazan.com
	X	X	X	X	X	X	Robert Grzan	Säzän, Electrical	234-802-4265	rgrzan@sazan.com
	X	X	X	X	X	X	Sam Wong	Säzän, Architectural	206-605-7328	swong@sazan.com
	X	X	X	X	X	X	Theresa Daniel	Integrus, Structural	206-628-3137	tdaniel@integrusarch.com
	X	X	X	X	X	X	Robert Muir	Muir Construction Cost Index, Cost Estimation	510-880-7158	robmuir72@hotmail.com
	X	X	X	X	X	X	Chad Oxford	Oxford Consulting Services, Civil	425-208-2897	chad@oxford consultingservices.com
X	X	X	X	X	X		Dan Purefoy	CSG, Construction Management	509-368-0853	dan.purefoy@esd112.org
X							Dax Logsdon	CSG, Director	509-528-8160	dax.logsdon@esd112.org
X	X					X	Caren Johnson	CSG	509-554-1329	caren.johnson@esd112.org
X	X					X	Manny Saldivar-Aguirre	CSG	817-371-5531	manuel.saldivar-aguirre@esd112.org

August/September							NAME	DISCIPLINE/ REPRESENTING	PHONE	EMAIL
Pre-Study Kickoff: Aug. 18th	Kickoff: Aug. 25th	Workshop: Aug. 25th	Workshop: Aug. 25th	Workshop: Aug. 25th	Workshop: Aug. 25th	Results Pres: Sep. 3rd				
	X					X	Andrew Twyman	CSG	360-921-8294	andrew.twyman@esd112.org
	X						Drew Pearson	CSG	360-589-4595	drew.pearson@esd112.org
X	X					X	JR Mill	TCF	253-683-0326	jr@tcfarchitecture.com
	X					X	Steve Wachtler	TCF	253-552-2006	stevew@tcfarchitecture.com
	X					X	Eric Nordlund	Metrix Engineering		ericn@metrixeng.com
	X					X	Ben Prehoda	Metrix Engineering		benp@metrixeng.com
	X					X	Maggie Howdsen	LDC Corp		mhowsden@ldccorp.com
	X						Ross Jarvis	LDC Corp		rjarvis@ldccorp.com
	X						Dan Sloat	Degenkolb Engineers		dsloat@degenkolb.com
						X	David Sommer	Degenkolb Engineers		dsommer@degenkolb.com
	X					X	Brent Hall	Clevenger Associates		claytonb@siteworkshop.net
	X					X	Luke Vannice	Site Workshop		lukev@siteworkshop.net
	X					X	Clayton Beaudoin	Site Workshop		claytonb@siteworkshop.net
						X	Lisa Griebel	Aberdeen School District, HLC Principal		lgriebel@asd5.org

August/September							NAME	DISCIPLINE/ REPRESENTING	PHONE	EMAIL
Pre-Study Kickoff: Aug. 18th	Kickoff: Aug. 25th	Workshop: Aug. 25th	Workshop: Aug. 25th	Workshop: Aug. 25th	Workshop: Aug. 25th	Results Pres: Sep. 3rd				
						X	Amber Diel	Aberdeen School District		adiel@asd5.org
						X	Countney Sandstorm	Aberdeen School District		csandstorm@asd5.org
						X	Lynn Green	Aberdeen School District		lgreen@asd5.org



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