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Aberdeen School District – Harbor Learning Center

Schematic Design Report

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Table of Contents

01 // INTRODUCTION

- Introduction
- Executive Building Summary
- Design Methodology
- Sustainability

02 // BASIS OF DESIGN

- Civil
- Landscape
- Architectural
- Food Service
- Structural
- Mechanical
- Electrical

03 // DRAWINGS

- Site Plan
- Floor Plan
- Renderings

04 // BUDGET CONSIDERATIONS

- Cost Estimate
- Value Engineering Options

05 // APPENDIX

- Project Schedule
- Value Engineering Report
- Owner Project Requirements
- WSSP Scorecard
- WSEC C406 Scorecard
- Project Code Summary
- Preliminary Geotechnical Report
- Educational Specifications
- Meeting Minutes



01

Introduction

I. Introduction
II. Executive Building Summary
III. Design Methodology
IV. Sustainability

Introduction

The Harbor Learning Center Schematic Design Report documents the outcomes of the schematic design phase for the Aberdeen School District's new educational facility in Aberdeen, Washington. This report serves as a comprehensive summary of design intent, guiding principles, technical strategies, and cost considerations that have shaped the project to date. It consolidates the work of the design team, Aberdeen School District leadership, and consultant partners, and establishes a clear baseline for advancing into design development.

The Harbor Learning Center is envisioned as a forward-looking, flexible, and community-oriented campus that integrates multiple programs under one roof. Anchored by Aberdeen School District's commitment to preparing students for lifelong learning and civic engagement, the facility will accommodate Harbor High School, Harbor Junior High School, Grays Harbor Academy, the Open Doors re-engagement program, and the Snug Harbor daycare.

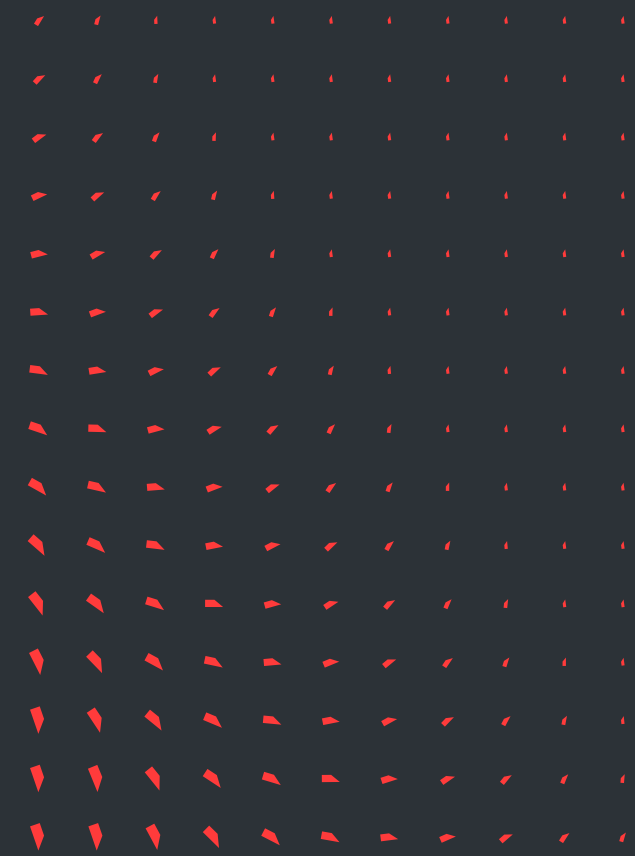
The project also holds a unique distinction as the ***first new school project in Aberdeen School District to receive funding from the Washington State Office of Superintendent of Public Instruction's (OSPI) Seismic Grant Program.*** This initiative reflects the state's commitment to improving the safety and resilience of educational facilities in seismically active regions. The Harbor Learning Center will serve as a precedent-setting example for future district projects integrating seismic readiness with 21st-century educational design.

The schematic design process was guided by the District in close collaboration with the project management team from ***ESD 112 | Construction Services Group,*** who coordinated workshops, stakeholder engagement sessions, and design advisory meetings. These efforts ensured that educational needs, operational requirements, and long-term community goals were clearly represented in the design. While this introduction provides an overview, the Design Methodology section later in this report documents the process in greater detail.

Key design priorities include diverse sensory environments, adaptability of learning spaces, daylighting, acoustical performance, sustainability in alignment with the Washington Sustainable Schools Protocol (WSSP 2023), and compliance with the 2021 Washington State Energy Code (WSEC). The project reflects the District's dedication to creating an equitable, safe, and durable facility that will serve as a cornerstone of learning and community engagement in Grays Harbor for decades to come.

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II. Executive Building Summary



Executive Building Summary II

The Harbor Learning Center is planned as a two-story, 46,007 SF educational facility located on the former Aberdeen High School site in downtown Aberdeen. Designed under Type IIB non-combustible steel and concrete construction, the building integrates multiple alternative learning programs within a single, flexible facility that emphasizes resilience, adaptability, and community accessibility.

PROGRAMS SERVED

- Harbor High School: Alternative secondary program with flexible classrooms and support spaces
- Harbor Junior High: Middle-level program with emphasis on smaller learning communities
- Grays Harbor Academy: Online/blended learning program requiring technology-rich environments
- Open Doors: Youth re-engagement program for students ages 16–21
- Snug Harbor Daycare: Childcare facility serving both students and community needs

BUILDING SYSTEMS & MATERIALS

- Structure: Steel framing with buckling-restrained brace (BRB) system, concrete slab-on-grade, and composite steel deck with concrete topping.
    - Envelope: Durable, low-maintenance cladding (metal siding and rick veneer), aluminum/fiberglass windows, and EPDM/standing seam metal roofing.
- Interiors: Resilient flooring consistent with district standards (Forbo linoleum, Nora rubber tile, Armstrong VCT, Mondo gym flooring) selected for sustainability and lifecycle cost.
- Acoustics: Complies with WAC 246-366 (NC-35 classrooms) and ICC A117.1 enhanced acoustics (≤0.6–0.7 second reverberation times), supporting speech intelligibility and student focus.

SUSTAINABILITY & PERFORMANCE

- Washington Sustainable Schools Protocol (WSSP 2023): Preliminary scorecard shows 69 points, exceeding the Class I baseline.
- Washington State Energy Code (WSEC 2021): C406 compliance achieved with required credits met in both categories — 48 credits in energy efficiency measures (lighting + HVAC) and 23 credits in load management (HVAC).
- Health & Wellness: Daylighting strategies, low-emitting materials, ducted return air systems, and acoustical design promote trauma-informed, student-centered environments.

Executive Building Summary

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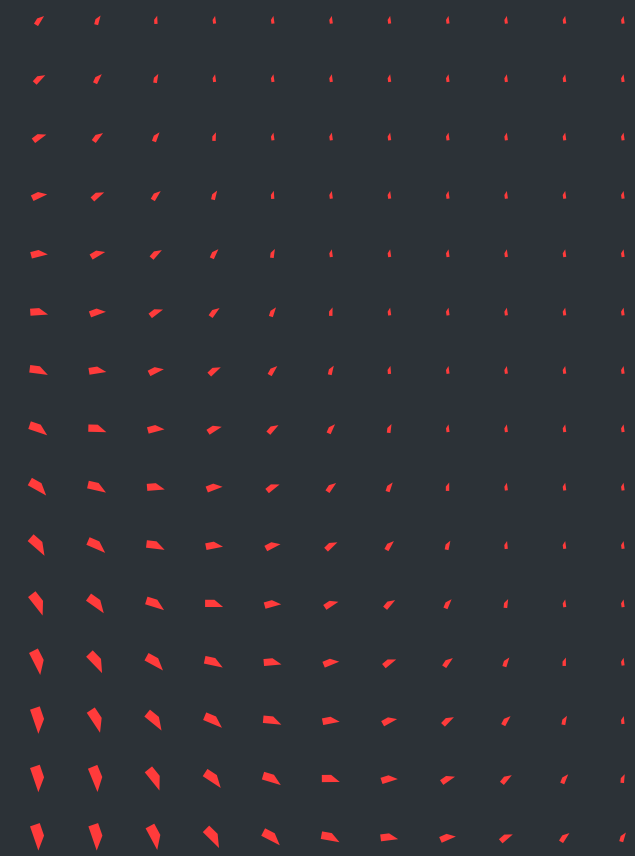
COST & SCHEDULE

- Target MACC: $36,708,061
- Schematic Design Estimate (August 2025): $38.8 million total project cost, including building, sitework, and off-site improvements.
  - Alternates under consideration: See budget consideration sections for comprehensive list of value engineering options selected to meet the budget.
  - Delivery: Design–Bid–Build, with construction start anticipated in Septemer 2027 and substantial completion projected for January 2029.

The Harbor Learning Center embodies Aberdeen School District's commitment to durability, operational efficiency, and seismic resilience, while delivering flexible, welcoming spaces that reflect the educational and social needs of its students and community.

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III. Design Methodolgy



Design Methodology

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DESIGN METHODOLOGY

The schematic design process for the Harbor Learning Center was highly collaborative, guided by the Aberdeen School District and facilitated by the project management team from ESD 112 | Construction Services Group. This process engaged administrators, educators, students, and community representatives to ensure the resulting design reflects both programmatic needs and community values.

STAKEHOLDER ENGAGEMENT

Beginning in February 2025, the design team conducted a series of educational specifications (Ed Spec) workshops with faculty, staff, district representatives, and ESD 112 project managers. These workshops focused on refining requirements for administration/reception, shared commons, child care, health care, Open Doors, Grays Harbor Academy, and flexible classroom environments. The workshops established the foundation for the program and provided clarity on space standards and adjacencies.

SITE TOURS

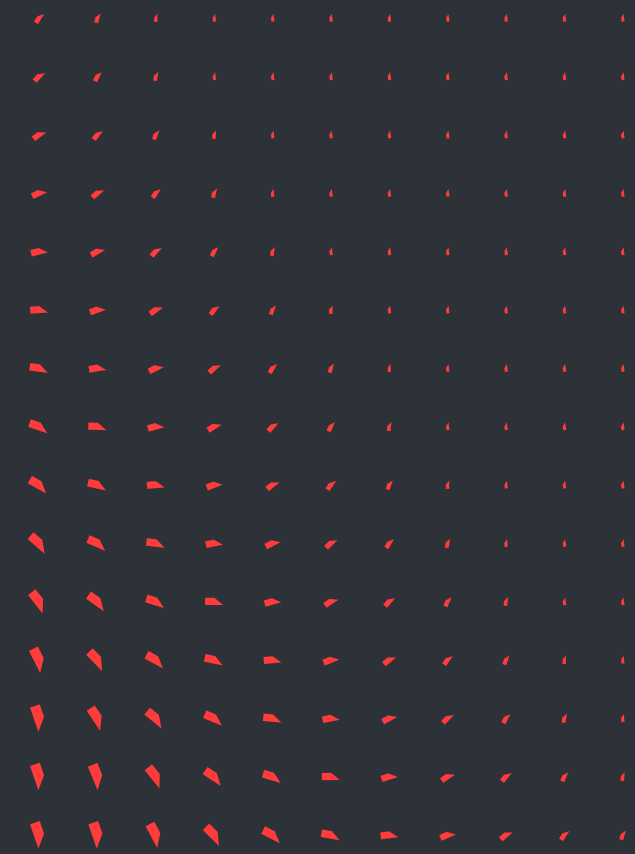
To supplement workshop discussions, the District and project team organized site visits to comparable facilities in western Washington, including the Pierce County Skills Center, Avanti High School (Olympia), and the Olympia Regional Learning Academy. These tours provided valuable insight into program structures, space utilization, and facility operations, which directly informed design strategies for the Harbor Learning Center.

DESIGN ADVISORY COMMITTEE

A Design Advisory Committee—comprised of Aberdeen School District leaders, teachers, program staff, and ESD 112 representatives—was convened to guide decision-making and review schematic design progress at key milestones. This group met regularly, holding six meetings, and a page-turn session, to ensure that educational goals, operational requirements, and community priorities were consistently integrated into the design process.

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IV. Sustainability



Sustainability IV

PROJECT SUSTAINABILITY, HEALTH, AND WELLNESS GOALS

The Harbor Learning Center reflects the Aberdeen School District's commitment to sustainability, health, and resilience in both building performance and educational experience. The design aligns with the Washington Sustainable Schools Protocol (WSSP 2023) and the 2021 Washington State Energy Code (WSEC) Section C406, ensuring the facility meets or exceeds state requirements while fostering a safe, welcoming, and adaptable environment for students and community.

ENERGY AND ENVIRONMENTAL PERFORMANCE

The project incorporates high-efficiency HVAC, enhanced lighting controls, load management strategies, and a rooftop solar photovoltaic array. Together these exceed code baselines, reduce the building's energy use intensity (EUI), and prepare the facility for future renewable expansion. Native and drought-tolerant landscaping, irrigation sub-metering, and EV/bus charging readiness further reduce environmental impacts.

HEALTH AND WELLNESS

The design emphasizes variety and choice in spaces—from large public commons and learning stairs to quiet study areas, small advising rooms, and private wellness spaces. This range supports trauma-informed design, allowing students to select environments that best fit their needs. Daylighting, biophilic elements, acoustical treatments, and thermal comfort controls are integrated across learning environments to promote focus, comfort, and wellbeing.

The building floor plan is organized to be intuitive and easy to navigate, minimizing barriers to access and providing clear way-finding throughout. Circulation paths are designed for visibility and simplicity, reducing stress for students and visitors. At the exterior, the facade and elevations express a welcoming and permanent presence, using durable materials and comfortable forms that reflect community identity and convey stability and care.

DURABILITY AND ADAPTABILITY

Materials and systems are selected for lifecycle value and resilience in Aberdeen's coastal climate, supporting a ***50–70 year service life.*** The building is planned with flexibility for future program shifts, ensuring long-term relevance and alignment with evolving District and community needs.

OPERATIONS AND ENGAGEMENT

Systems are designed for transparency and ease of management, with submetering, load tracking, and staff training to optimize performance. Green cleaning, food waste reduction, and sustainable operational practices are embedded in long-term facility use.

SUMMARY

Through these strategies, the Harbor Learning Center is positioned as a high-performance, healthy, and resilient educational facility. The design integrates sustainability with health and wellness priorities, ensuring the school is both an efficient building and an inviting, supportive environment that serves the Aberdeen community for generations.



02

Basis of Design

I. Civil
II. Landscape
III. Architectural
IV. Food Service
V. Structural
VI. Mechanical
VII. Electrical

Civil

The civil design for the Harbor Learning Center provides the framework for site development, utility connections, and compliance with local, state, and federal regulations. This section outlines the schematic-level basis of design for grading, stormwater, utilities, and access. The intent is to support the District's goals for safety, resilience, efficiency, and sustainability while addressing specific site conditions in downtown Aberdeen.

01 EXISTING SITE OVERVIEW

- The Harbor Learning Center will be located on the site of the former Aberdeen High School at 410 North I Street. The site is bounded by North I Street to the west and is surrounded by a mix of residential, institutional, and civic uses typical of downtown Aberdeen.
- The site slopes down from east to west toward North I Street, with existing elevations ranging from approximately 23 feet to 32 feet.
- Existing development includes paved surfaces, utilities, and remnants of the prior school; selective demolition and removal will be required.
- Haley & Aldrich geotechnical investigations confirm the presence of small amounts of contaminated soils in localized areas, which will require removal and disposal at a licensed facility. The report also documented the presence small amounts of groundwater across portions of the site, a condition that will be considered in excavation planning, dewatering requirements, and long-term drainage design.
- The project site is located in a tsunami hazard zone; the building and site design incorporate resiliency measures per OSPI Seismic Grant requirements. An existing swale traverses the southern portion of the site, which will be addressed in grading and stormwater planning to ensure proper drainage and long-term functionality.

02 PROPOSED GRADING & EARTHWORK

- Excavation on the northern half of the foundation will include removal of unsuitable native soils to depths recommended by the geotechnical engineer, followed by replacement with engineered structural fill to provide uniform support. This work is critical to mitigate variability in bearing capacity across the site and ensure long-term settlement control.
- The northern portion of the site generally contains higher quality soils suitable for reuse in fill operations, while the southern portion has lower quality soils, including areas of contamination requiring off-site disposal. These variations have been incorporated into the grading plan and excavation sequencing.
- Site grading is designed to balance cut and fill where feasible, while minimizing export of contaminated soils. Typical slope ratios will be 3H:1V for unretained slopes, unless otherwise engineered.
- Grading will establish level building pads and ADA-compliant circulation routes while maintaining positive drainage.
- Retaining walls are anticipated along the east property line and select playfield edges to address grade transitions. Options under review include cast-in-place concrete and modular block systems.
- Temporary erosion and sediment control (TESC) measures, such as silt fencing, construction entrances, and stabilized stockpile areas, will be implemented to protect adjacent properties and public rights-of-way during construction.
- Earthwork quantities include approximately 11,000 CY of excavation, including contaminated soil removal, with structural fill imported to support foundations and paved surfaces. Excavation phasing will separate contaminated soil removal from structural excavation, with contaminated materials hauled off-site early in the process to reduce health and safety risks and avoid cross-contamination. Structural excavation and placement of engineered fill will follow once remediation zones are cleared and certified.

03 SOIL CONDITIONS

- Native soils consist of loose to medium dense sands with silt, underlain by glacially overridden deposits, with variable bearing capacity across the site.

of the building to achieve required structural support. Shallow foundations will be supplemented with engineered fill where necessary.

- Engineered fill will be placed in over-excavated areas to ensure uniform subgrade conditions, particularly on the northern half of the site.
- The geotechnical investigation encountered groundwater at depths ranging from 6 to 12 feet below existing grade. Dewatering will be required during excavation, and long-term drainage systems will be designed to prevent hydrostatic pressure against foundations.
- Liquefaction potential under seismic loading was assessed as moderate, and structural design will incorporate mitigation measures per geotechnical recommendations.
- Foundation elevations have been coordinated with floodplain mapping to provide resilience against inundation and seismic-induced settlement.

04 STORAGE DRAINAGE

- Stormwater management follows the Department of Ecology's *Stormwater Management Manual for Western Washington (SWMMWW).*
- The site qualifies for a flow control exemption based on direct discharge to the Chehalis River estuary; however, water quality treatment is required. If flow control is ultimately determined to be non-exempt, detention vaults or other engineered flow control facilities will be incorporated into the design to mitigate peak runoff rates and comply with SWMMWW requirements.
- Treatment facilities will include bioretention planters, modular wetland treatment units, and catch basin filters, creating a treatment train approach that provides staged removal of sediments and pollutants.
- Roof drainage will be collected separately from paved surface runoff and routed to infiltration or treatment facilities as required, with roof leaders discharging directly to bioretention cells or subsurface piping.
- Storm drainage system sizing is based on a 25-year design storm for conveyance and a 100-year storm for emergency overflow routing, in accordance with local standards.
- Outfalls to the municipal storm system will be coordinated with the City of Aberdeen, including energy dissipation features to minimize erosion at discharge points.
- A stormwater pollution prevention plan (SWPPP) will be implemented during construction.
- The existing swale on the southern portion of the site will be integrated into the stormwater strategy, ensuring that natural drainage features are respected and managed as part of the long-term water management plan.

05 UTILITIES

- Water: The project will connect to the City of Aberdeen's water main in North I Street. A new fire service and domestic service will be installed, including backflow prevention. System sizing will be coordinated with fire flow testing results and plumbing demand calculations.
- Sanitary Sewer: Sanitary flows will connect to the existing City sewer main in North I Street. A grease interceptor will serve the kitchen prior to discharge. Existing laterals will be evaluated for reuse or replacement. Cleanouts and manholes will be located per City standards for maintenance access.
- Electrical & Telecommunications: Primary electrical service and communication pathways will be coordinated with local utility providers, routed underground, and sized for future capacity. Dedicated conduits for technology infrastructure will be included. Transformer and vault locations will be coordinated to maintain service reliability and clearances.
- Gas: Natural gas service is available from Cascade Natural Gas and will be coordinated with mechanical design requirements. Routing will be underground with shut-off valves located per code.
- Fire Protection: Separate fire service line with post-indicator valve (PIV) and backflow prevention will be provided. Hydrant locations will be reviewed with the City Fire Marshal to meet required coverage.
- Other Dry Utilities: Provisions for cable, fiber optic, and

other communication services will be included in the underground utility plan to ensure comprehensive service to the facility.

06 HARDSCAPE & LANDSCAPE COORDINATION

- The civil scope includes asphalt paving for parking lots and concrete paving for sidewalks and plazas.
- Pedestrian circulation routes will connect building entries to parking areas, playfields, and surrounding neighborhood sidewalks.
- Irrigation sleeves and utility coordination are provided for landscaped areas designed by the landscape architect.
- Playground surfacing and drainage systems are coordinated with site grading and stormwater collection.
- Retaining walls are anticipated along the east property line and select playfield edges to address grade transitions. Options under review include cast-in-place concrete and modular block systems.

07 ACCESS & CIRCULATION

- Primary site access will be from North I Street, with drive aisles designed to meet City of Aberdeen standards for sight distance and turning movements.
- Bus circulation, parent drop-off, and staff parking will be separated into distinct zones for safety and efficiency, with queuing capacity sized to reduce congestion on public streets.
- Service and emergency access will be provided via designated drive aisles with turning radii designed for fire truck access, consistent with the International Fire Code and Fire Marshal review.
- Pedestrian access will include new sidewalks, ADA-compliant curb ramps, and defined crosswalks connecting site entries with the surrounding neighborhood.
- Bicycle racks and pedestrian improvements will promote multimodal access, with routes coordinated to avoid conflicts with vehicular traffic.

08 STREET & OFF-SITE IMPROVEMENTS

- Improvements along North I Street will include new parallel parking, ADA curb ramps, and bulb-outs at intersections to improve pedestrian safety. Bulb-outs will be landscaped where feasible to provide both traffic calming and stormwater benefits.
- Crosswalks with striping, signage, and ADA tactile warning strips will be installed at key intersections, coordinated with City standards.
- Roadway striping and signage will be provided to clearly delineate traffic flow, parking areas, and pedestrian crossings.
- Coordination with the City of Aberdeen will ensure compliance with right-of-way and frontage improvement requirements, including storm drain tie-ins and sidewalk restoration.
- Off-site improvements may also include utility upgrades within the public right-of-way, depending on City review and capacity assessments.
- Improvements along North I Street will include new parallel parking, ADA curb ramps, and bulb-outs at intersections to improve pedestrian safety.
- Crosswalks with striping and signage will be installed at key intersections.
- Coordination with the City of Aberdeen will ensure compliance with right-of-way and frontage improvement requirements.

09 VALUE ENGINEERING CONSIDERATIONS

- The final type, height, and alignment of retaining walls will be confirmed during Design Development.
- Alternative stormwater treatment systems may be evaluated for cost efficiency and long-term maintenance considerations.
- Coordination with the City on final frontage improvements may adjust scope, depending on right-of-way agreements.

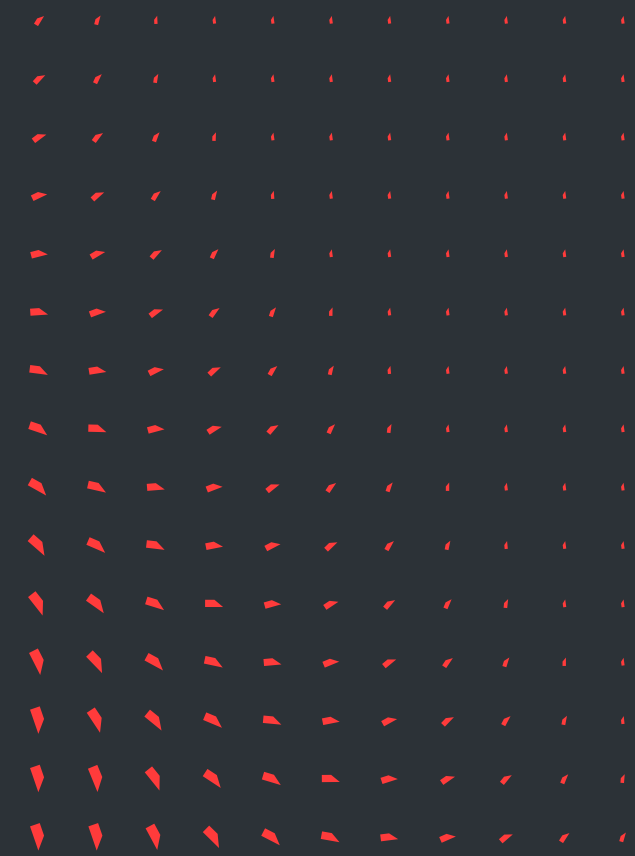
10 ENVIRONMENTAL REVIEW

- The project is subject to the State Environmental Policy Act (SEPA) review process. Documentation and analysis will be completed in coordination with the City of Aberdeen to ensure environmental impacts are properly evaluated and mitigated.

The civil basis of design for the Harbor Learning Center addresses site challenges, including soil contamination, steep grading, and stormwater management in a coastal hazard zone. By balancing earthwork volumes, separating site circulation, and integrating stormwater treatment with landscape elements, the design establishes a resilient and efficient foundation for the new facility. The approach supports Aberdeen School District's goals for a safe, sustainable, and cost-effective project with a projected 50–70 year service life.

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II. Landscape



Landscape

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The Schematic Design Phase Basis of Design (Design Criteria), as described herein, generally summarizes the design intent of materials and systems related to the landscape scope to be included in the Schematic Design cost estimate for the Aberdeen School District Harbor Learning Center.

TREE RENTENTION

All trees outside the limits of excavation are to be protected with 6-foot tall temporary chain link fencing at the dripline of each tree. When the dripline extends over hardscape to remain the fencing shall be placed at the boundary between hardscape and softscape.

PAVING & FINISHING

- Type 1 Cast-in-place (CIP) Concrete Paving:
  - Medium broom finish, sawcut joints at courtyards and plazas, tooled joints at sidewalks, no shiners. See civil for horizontal and vertical controls.
- Type 2 CIP Concrete Paving:
  - Exposed aggregate finish, sawcut joints, no shiners. See civil for horizontal and vertical controls.
- Crushed Rock Paving:
  - 1/4" minus crushed rock top course (2" depth), 5/8" minus base course (4" depth).

PLAY AREAS

- Infant and Toddler Area:
  - Mounded play lawn (see Planting and Soil Preparation section, below) Type 2 CIP Concrete Paving trike loop.
  - Perimeter Activity Fence: Fence to be 6' Height Chain Link (see below) with added interactive features. *See Detail 1 on L3.20 for character image.*
- Preschoool (SNUG) Play Area:
  - Play mound with turf and slide
    - Synthetic turf with fall attenuation pad, infill, perimeter drainage with cleanout, and perimeter nailer board. Turf safety surfacing basis of design: Playground Grass (Ultra) by ForeverLawn.
    - Slide basis of design: Slide Mound by Cre8 Play, LLC.
  - Type 2 CIP Concrete Paving trike loop:
    - Includes "Rolly Poly" cast in-place. See Detail 3 on L3.20 for character image.
    - Includes painted sidewalk games and imprints/ stamps.
  - Fence Portal: Added interactive feature into perimeter 6' Height Chain Link (see below). *See Detail 5 on L3.20 for character image.*
  - Nature Play: 6" depth Engineered Wood Fiber surfacing with natural materials (log, boulder, stump, etc.) for balancing and leaping.
- Middle / High School Play Area:
  - Pedestrian asphalt surfacing (see civil) with painted lines for basketball, four square, etc.
  - One basketball hoop. Basis of Design: Bison Ultimate HangTime Clear 6" Adjustable Systems
  - Includes Amphitheater with cast-in place concrete stage plinth for outdoor learning. *See Detail 11 on L3.20 for character image.* Assume 135 CF of concrete and reinforcing required for plinth.
  - *See Site Furnishings section* below for benches, tables, and boulders.
  - *See Paving and Finishing section* for crushed rock and asphalt paving.
  - *See Planting and Soil Preparation section* for lawn and planting.

SITE FURNISHINGS

- Benches
  - Basis of Design: TimberForm Colossus
  - Quantity: Per plan
- Picnic Tables
  - Basis of Design: TimberForm Parkway with integral

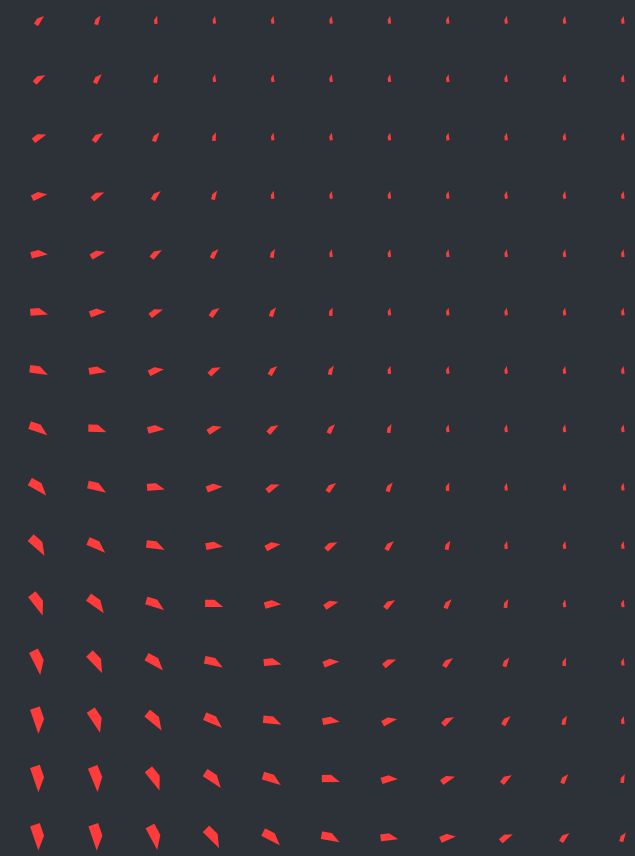
table and seats

- Quantity: Per plan

- Boulders
  - 50% 1-ton and 50% 2-ton igneous rock
  - Quantity: Per plan
- Trash Receptacles
  - Basis of Design: Urban Accessories OT Litter Receptacle with door.
  - Quantity: Assume 3 total.
- Bicycle parking
  - Basis of Design: Sportworks ADA-compliant Tofino No-scratch Bike Rack
  - Quantity: Assume 5 will be required.
- Relocate school rock, bronze sculpture, and corner stone
- 6" diameter Galvanized Steel Bollard
  - Basis of Design: Urban Accessories Classic 62C1
  - Quantity: Per plan
- Planting and Soil Preparation
  - All required planting areas including parking lot islands and perimeter landscaping shall meet the requirements of *Aberdeen Municipal Code 17.64.060*
- Planting Area (per plan)
  - 6" of bioretention soil as cap over existing soils, typical.
  - Each tree location shall be decompacted to 18" depth below finish grade, and three times the width of the root ball.
  - 5 gal. shrubs, 1 gal. groundcover, 4" pot herbaceous
  - Deciduous / broadleaf trees to be 1.5" caliper. Conifers to be 6' tall.
  - 3" depth of med-fine bark mulch
- Lawn (per plan):
  - 6" depth coarse sand
  - Proof roll
  - Sod (or hydroseed, depending on timing of installation)
  - Basis of design: Perfect Blend by Country Green Turf Farms
  - Maintenance Edge: 18" width of clean crushed rock maintenance strip with metal edging at perimeters of building where adjacent to the planting areas.
  - 1-year establishment period warranty for planting
- Irrigation:
  - Automatic permanent two-wire underground irrigation with rain sensor and flow meter. All new planting and lawn areas to receive permanent irrigation with pop-up rotary spray heads to provide head-to-head uniform coverage. All new trees are to receive dedicated irrigation zones. Assume one point of connection assembly and dedicated irrigation meter. 1-year establishment period warranty for irrigation.
  - Assumptions:
    - Site lighting per electrical
    - Paving (except at play areas), curbs, site walls, and tactile warning per civil.
    - Flag pole per architectural.

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III. Architectural



Architectural

III

The Harbor Learning Center is conceived as a durable, efficient, and flexible educational facility that will serve as a community anchor for Aberdeen and its surrounding region. Designed to Type IIB non-combustible construction standards with a projected *50–70 year life expectancy*, the building reflects the Aberdeen School District's commitment to long-term resilience, low-maintenance systems, and high-performance learning environments.

The project integrates the priorities established in the *Owner's Project Requirements (August 2025)*, ensuring alignment with the District's educational mission, sustainability goals, and operational needs. It also responds directly to the *Educational Specifications (March 2025)*, which define the programmatic and spatial requirements for Harbor High School, Harbor Junior High, Grays Harbor Academy, the Open Doors re-engagement program, and the Snug Harbor daycare.

Design strategies are guided by compliance with the *2021 Washington State Energy Code (WSEC)* and the *Washington Sustainable Schools Protocol (WSSP 2023)*, targeting Class I baseline performance. They also reflect key health and safety standards, including WAC 246-366 for school environmental health, and the Tenor Engineering Acoustical Design Plan (June 2025), which establishes criteria for speech intelligibility and noise control.

Beyond compliance, the design emphasizes diverse sensory principles and community identity, drawing on Aberdeen's coastal setting and timber heritage. Flexible spaces, daylight-filled interiors, and biophilic finishes will support diverse learners while welcoming families and community members into a facility that is adaptable for multiple uses, both during and beyond the school day.

01 GENERAL BUILDING DESCRIPTION

- Building Size: Two-story facility, 46,007 SF gross floor area. Harbor High School, Harbor Junior High, Grays Harbor Academy, Open Doors, and Snug Harbor Daycare.
- Programs Housed: Harbor High School, Harbor Junior High, Grays Harbor Academy, Open Doors, and Snug Harbor Daycare.
- Structural System: Steel framing with buckling-restrained brace (BRB) system, concrete slab-on-grade, and composite steel deck with concrete topping.
- Construction Type: IIB non-combustible per International Building Code (IBC).
- Seismic Design: Enhanced performance under the OSPI Seismic Grant Program.
- Maximum Allowable Construction Cost (MACC): $36,708,061
- Schematic Design Estimate: $38,799,843 (September, 9th, 2025): The current estimate exceeds the budgeted MACC and will require value engineering adjustments to bring the project within funding limits.

02 BUILDING ENVELOPE

- Exterior Walls:
  - Primary Cladding (First Floor): Brick veneer at the base and main entries for durability, impact resistance, and compatibility with Aberdeen's civic architecture. This is consistent with District standards for masonry cladding at ground level.
  - Primary Cladding (Second Floor and Above): Vertically oriented marine-grade metal wall panels (example: AEP Span Prestige), with high-performance fluoropolymer coating for salt-air corrosion resistance.
  - Accent Cladding: Marine-grade metal shingles (example: Millennium "Large-Cupped Tile") at administration wing accent walls to provide texture and weather protection.
  - Wall Assemblies: Non-loadbearing cold-formed steel stud framing with batt insulation, exterior-rated reinforced gypsum sheathing, continuous mineral wool insulation over a self-adhered WRB/air barrier (e.g., VaproShield WrapShield SA or equal), and rainscreen cladding attachment (Knight Wall or Cascadia system).

- Corrosion Resistance: All through-wall flashings and fasteners specified as stainless steel to meet ASD standards for coastal durability. Precast concrete lintels with embossed lettering will reinforce civic identity at key public entries.

- Specialty Walls & Wall Accessories:
  - Service Yard Wall: Structural CMU wall flashed with a sheet metal cap.
  - Lintels: Precast concrete lintels with embossed lettering will be incorporated above first-floor windows facing public access points to reinforce civic identity and provide durable detailing.
  - Below-Grade Concrete Walls: Concrete foundation walls provided with dampproofing or waterproofing at water-critical conditions. Extruded polystyrene insulation (XPS) with minimum R-10 will be installed on the exterior of below-grade walls for thermal performance and moisture resistance. Reference is made to the Civil Basis of Design for foundation drainage measures such as perimeter drains and gravel backfill.

- Roofs:
  - Secondary Low-Slope Roofing: Fully adhered single-ply EPDM membrane assemblies (Carlisle SynTec Systems, Sure-Seal® or equal) at low-slope roof areas, 60-mil thickness with mechanically fastened base layer and fully adhered cap sheet. Assemblies designed with tapered insulation for positive drainage and overflow scuppers sized for 100-year storm events.
  - Primary Sloped Roofing: Standing seam metal roofing at pitched portions of the building (AEP Span Span-Lok™ or equal), factory-applied fluoropolymer coating for marine-grade durability. Panel seams designed for wind uplift resistance per IBC and ASCE 7.
  - Performance: Assemblies designed to meet or exceed WSEC 2021 prescriptive R-values (minimum R-38, target R-49) and achieve minimum SRI values for roof areas.
  - Warranty: Roofing systems detailed for a *minimum 30-year warranty*, with design intent for a 40-year service life. Manufacturer's weatherproofing warranties will be specified for both EPDM and standing seam metal systems, with typical durations of 20–30 years for EPDM assemblies and 30–40 years for metal roofing systems.

- Roof Accessories:
  - Fall Protection: Permanent fall protection anchors post-mounted to the steel structure, integrated into the roof design for worker safety and compliance with OSHA standards. Guardian Fall Protection posts or similar systems will be specified.
  - PV Panel Attachments: Roof designed to accommodate solar PV installations using S-5 clips and horizontal rail systems, ensuring weatherproof integration without roof penetration failures.
  - Roof Access Walkways: Non-slip walk pads provided along service routes to mechanical equipment to protect membranes and improve maintenance safety. At standing seam roofing, walk pads will be aluminum grate systems mounted on S-5 clips to ensure secure attachment without compromising roof performance.
  - Roof Access Ladders: Fixed exterior and interior aluminum ladders with safety cages and lockable access points for controlled roof entry, specified in aluminum construction for enhanced corrosion resistance in the coastal environment.
  - Gutters: Prefinished sheet metal gutters from AEP Span with marine-grade finish, minimum width of 6 inches and minimum depth of 4 inches, installed with stainless steel fasteners for durability in the coastal environment.
  - Downspouts: PVC pipe downspouts, minimum 4-inch diameter, tightlined to storm drains. No downspout will daylight at grade. Stainless steel debris strainers will be provided at gutter and downspout inlets for durability and maintenance control.

- Exterior Windows & Glazing:
  - Primary Glazing: *Fiberglass windows* (Cascadia or similar) with insulated double-pane low-E glazing (Guardian or similar). Select classrooms include operable awning-style vents for natural ventilation.

Performance criteria: maximum U-factor of 0.32, SHGC of 0.40 or lower, and STC ratings of 35–40 at high-noise exposures.

- Secondary Glazing: Thermally broken painted aluminum storefront frames (Kawneer or similar), exterior-glazed with double-pane insulated glass using Guardian low-E coating or similar. Performance criteria per WSEC: maximum U-factor of 0.36 and SHGC of 0.40 or lower. Acoustic-rated glazing assemblies specified at street-facing facades to mitigate traffic noise. Laminated glazing will be provided at main entry vestibules at the Administration and SNUG Harbor areas for enhanced safety and durability.
- Window Coverings: Manually operated roller shades at exterior windows, electrically operated where roller shade elevation makes for difficult access. Draper as the basis of design.

- Exterior Doors:
  - Storefront Entrances: Aluminum storefront entries with thermally broken framing systems (similar to Kawneer Trifab® 451UT), meeting U-factor 0.45 or better, with panic hardware and automatic operators at primary entrances.
  - Hollow Metal Entrances: Curries Mercury thermally broken frames with Curries Q-Maxx insulated metal doors, coated with high-performance finishes to resist marine climate impacts.
  - Maker Space Door: Roll-up sectional glazed door (Clopay or similar) to provide transparency and flexibility, allowing indoor-outdoor connections and durable operation.
- Insulation:
  - Interior Walls: Sound batt insulation at sound-rated walls for the full depth of the stud cavity, and 5/8" minimum thickness Type 'X' drywall is typical.
  - Exterior Walls: Continuous exterior insulation, minimum R-21 effective with target R-25, using mineral wool or rigid foam sheathing.
  - Roof: Rigid polyisocyanurate insulation at roof decks, minimum R-38 with target R-49.
  - Below-Grade: Foundation walls insulated to minimum R-10.
  - Moisture Resistance: Insulation types selected for improved thermal performance and resistance to moisture intrusion.
- Exterior Stairs:
  - Construction: Cast-in-place concrete with integral drainage design.
  - Treads & Nosings: Cast-in slip-resistant nosings for durability and safety in wet conditions.
  - Railings: Hot-dip galvanized steel railings, *ground-set into concrete* rather than surface-bolted, to enhance corrosion resistance and long-term stability.
  - Fasteners: Stainless steel fasteners specified where applicable to maximize durability in the coastal environment.
  - Integration: Stairs provide direct egress from upper-level corridors, coordinated with site circulation. Assemblies designed for heavy daily use and minimal maintenance.
- Air & Vapor Control:
  - System Type: Self-adhered WRB at exterior wall assemblies and self-adhered interim roofing membrane at roof assemblies serving as the primary air barrier layers.
  - System Type: Self-adhered WRB at exterior wall assemblies and self-adhered interim roofing membrane at roof assemblies serving as the primary air barrier layers.
  - Details: Fluid-applied membranes and flashing at penetrations, window frames, and control joints.
  - Performance: Designed to comply with WSEC 2021 requirements and enhance overall building envelope tightness, reducing infiltration and improving energy efficiency.

03 INTERIOR FINISHES

- Interior Doors:
  - Typical Doors: Wood veneer doors with hollow metal

frames, stained and sealed to provide warmth and durability. Vancouver Door as design basis.

- Service Doors: Doors at high-use service areas (mechanical rooms, electrical rooms, etc.) shall be hollow metal leaf with hollow metal frames for durability and security.
- Operable Wall at Gym & Commons: Electrically operated folding panel partition (Advanced Equipment Corporation Alpha Series as design basis) to provide flexibility for large assembly and multipurpose functions.
- Acoustic Doors: Door assemblies with STC ratings of 35 will be provided at spaces requiring enhanced sound isolation.
- Fire-Rated Doors: Fire-rated interior door assemblies will be limited to specialty areas such as the elevator equipment room, as required by code for Type IIB construction.
- Access Service Panels: Access service panels with trim collar (no mud-in), factory primed to be field painted. All doors below.
- Overhead Coiling Door: Electrically operated aluminum coiling door with stainless steel trims and covers, 8' in height. Overhead Door Model 620 or similar as basis of design. Coiling doors will be available at the Kitchen and Student Store areas.

Interior Glazing:

- Window Coverings: Manually operated roller shades at interior glazing locations, electrically operated where elevation makes access difficult. Draper as basis of design.
- Vision Panels & Sidelites: Interior vision panels and sidelites using safety-rated laminated or tempered glazing in hollow metal or aluminum frames. Acoustic laminated glazing used at spaces requiring enhanced sound isolation. No fire-rated glazing assemblies will be provided on this project, as none are required for this Type IIB building.
- Interior Storefront: Painted aluminum storefront full height at the Reception, Grays Harbor Academy, and security vestibules. Kawneer or similar as design basis. Glazing to be tempered, with laminated glazing provided at designated safety locations.

Interior Stairs:

- Floors: Cast-in-place concrete base with resilient rubber treads and risers (Nora or equivalent District-approved product). Slip-resistant, integral nosings for durability and safety.
- Walls: Painted GWB or CMU, with ½" *painted MDF wainscot* at lower walls for impact resistance and durability.
- Ceilings: Painted GWB in enclosed stairwells; exposed painted structure where open to commons.
- Design Intent: Assemblies are designed for *heavy daily use* with long-term maintainability. Rubber finishes reduce impact noise and improve slip resistance. MDF wainscot protects walls in high-traffic student circulation zones. Enclosures comply with fire-rating requirements while open stairwells provide clear sightlines consistent with trauma-informed design.

Handrails:

- Material: *Stainless steel,* continuous on both sides of stairs per IBC/ADA requirements.
- Mounting: Wall-mounted or guard-mounted as required.
- Detailing: Rounded gripping surface, slip-resistant finish, mounted 34–38 inches above stair nosing per ADA.
- Design Intent: Stainless steel handrails are selected for *durability, hygiene, and low maintenance* in a coastal, high-use educational setting. Continuous runs improve accessibility, safety, and user comfort.

Guardrails

- Material: Steel with high-performance coating finish at interior locations.
- Height/Spacing: *Minimum 55 inches high* (exceeding IBC 42-inch requirement) for enhanced safety in educational environments. Vertical pickets spaced ≤ 4 inches O.C. per IBC.

- Mounting: Anchored into stair structure or mezzanine framing for long-term stability.
- Design Intent: Guardrails exceed minimum height for *student safety* and are detailed for durability. Transparent infill (tempered glass or perforated metal) may be used in high-visibility areas to support supervision and open sightlines.

- Restrooms:
  - Floors: Thinset ceramic tile with localized drain slopes.
  - Walls: Full-height ceramic tile for durability and moisture resistance. Full height framed walls forming individual toilet compartments.
  - Ceilings: Moisture-resistant gypsum board.
- Corridors:
  - Flooring: Forbo linoleum tile is preferred, though Armstrong VCT is also acceptable for durability and ease of maintenance.
  - Walls: Painted gypsum board, with 8' minimum height, 1/2" thick painted MDF wainscoting.
  - Ceilings: Acoustical lay-in ceiling tiles for noise control and access. Painted gypsum board and hardwood accent panels at selected accent locations
  - Notes: High-traffic durability prioritized. Provide selected areas for gathering that promote biophilic concepts.
- General Classrooms:
  - Resilient Flooring: Forbo linoleum tile is preferred, though Armstrong VCT is also acceptable for durability and ease of maintenance.
  - Carpet: Carpet tile may be used in classrooms, similar to administration and office areas, for acoustical comfort and warmth.
  - Walls: Painted gypsum board with tackable and writable wall surfaces integrated. Sound-rated partitions designed to achieve minimum STC ratings per the Acoustical Report (STC 50 at classroom separations).
  - Ceilings: Acoustical lay-in ceiling tiles, Armstrong basis of design, with a minimum NRC rating of 0.70 for sound absorption and accessibility to utilities.
  - Casework: Typical classrooms will receive plastic laminate casework. Science classrooms will be provided with chemically resistant epoxy counters with integral sinks, designed for laboratory durability.
- Administration & Offices:
  - Floors: Carpet tile for acoustical comfort and professional appearance.
  - Walls: Painted gypsum board with accent colors at reception and waiting areas.
  - Ceilings: Acoustical lay-in ceilings throughout, with accent hardwood ceilings.
  - Casework: Plastic laminate casework for workrooms and conference room. Main reception will receive a solid surface custom countertop with hardwood accents.
- Health / Wellness Room:
  - Floors: Sheet resilient with coved base for sanitation.
  - Walls: Painted GWB with washable finishes at bed height.
  - Ceilings: Acoustical lay-in ceilings NRC ≥ 0.70.
  - Casework/Fixtures: Plastic laminate counters with stainless steel sink; lockable storage for medical supplies.
  - Residential Fixtures: Includes a ***lockable undercounter refrigerator*** for secure storage of medications and supplies.
  - Additional Fixtures: (2) medical cots with divider curtains for student rest and isolation as needed.
  - Adjacent Health Toilet: 100 SF restroom with accessible shower, ceramic tile flooring, full-height ceramic tile walls, and moisture-resistant GWB ceiling.
  - Design Intent: Provides a *supportive, sanitary, and acoustically private environment* for student care. Divider curtains and cots allow for temporary student rest. The adjacent toilet with shower ensures hygiene and emergency use. Durable, washable finishes and

secure refrigeration provide long-term maintainability.

- Commons Area:
  - Floors: Forbo linoleum tile is preferred, though Armstrong VCT is also acceptable for durability and ease of maintenance.
  - Walls: Painted GWB with ½" MDF impact-resistant wainscot to 8' minimum height in circulation/dining zones. Tackable display panels at select locations.
  - Ceilings: Combination of exposed structure with suspended acoustical ceiling clouds NRC ≥ 0.70, plus hardwood ceiling accents for warmth and identity.
  - Casework/Fixtures:
    - Plastic laminate casework with solid surface counters at serving/storage stations.
    - Student kitchenette including base and upper cabinets, solid surface countertop, microwave shelf, counter space for a coffee maker, and an integral stainless steel sink with gooseneck faucet.
    - Built-in projection screen, A/V connections, and recessed speakers.
  - Design Intent: A flexible hub for student dining, collaboration, and community events. Durable finishes support high daily traffic while acoustical treatments control reverberation for speech intelligibility. The kitchenette provides students with access to light food preparation and casual amenities, reinforcing the Commons as a social and student-centered space.
- Food Service / Kitchen:
  - Flooring: Resilient sheet flooring with coved integral base for sanitation (District Standard approach).
  - Walls: FRP panels or stainless-steel wall protection in cooking zones for washability. Painted gypsum board in ancillary storage areas.
  - Ceilings: Moisture-resistant gypsum board with washable finish; acoustical ceilings in adjacent serving/dining areas.
  - Equipment Integration: All finishes coordinated with stainless-steel kitchen equipment for continuous washable surfaces.
- Learning Stair:
  - Function: Central gathering feature designed for informal instruction, presentations, and community interaction.
  - Finishes: Durable resilient flooring with integrated wood accents at seating tiers for warmth and identity. Wood accents at wall and ceiling to promote biophilic design concepts.
  - Flexibility: Designed to support both circulation and assembly uses, accommodating student collaboration, performances, and large group activities. Distributed electrical outlets for laptops and device charging.
- Gymnasium:
  - Flooring: Mondo sport flooring (District Standard) for durability, slip resistance, and shock absorption. Striping per program requirements.
  - Walls: Painted gypsum board with impact-resistant wall protection to 10' height. Protective wall pads at end zones and under basketball backstops.
  - Ceilings: Exposed structure with acoustic deck treatment or suspended acoustic panels to control reverberation (NRC ≥ 0.70).
  - Equipment Integration: Retractable basketball hoops, and ceiling-mounted volleyball standards with protective finishes.
- Snug Harbor (Daycare):
  - SH Vestibule:
    - Floors: Forbo linoleum resilient flooring.
    - Walls: Painted GWB with washable finishes.
    - Ceilings: Gypsum board with acoustical treatment.
    - Casework/Fixtures: Secure check-in desk with plastic laminate counter.
    - Design Intent: Controlled entry point providing visibility into the daycare, with secure access for staff and parents.
  - SH Daycare Classroom:
    - Floors: Forbo linoleum resilient flooring (preferred),

Armstrong VCT acceptable.

- Walls: Painted GWB with washable finish to 4' minimum.
- Ceilings: Acoustical lay-in ceilings NRC ≥ 0.70.
- Casework/Fixtures: Child-scaled plastic laminate casework with integral sinks; cubbies for student storage; lockable staff cabinets.
- Window Coverings: Specialty coverings compliant with DCYF choking hazard avoidance strategy (no cords or loops).
- Design Intent: Durable, child-scaled finishes supporting early learning and play.

- SH Kitchen:
  - Floors: Resilient sheet flooring with integral cove base for sanitation.
  - Walls: FRP or ceramic tile in cooking zones; painted GWB in ancillary areas.
  - Ceilings: Moisture-resistant GWB or acoustical lay-in ceilings.
  - Casework/Fixtures: Plastic laminate casework with solid surface counters, integral stainless steel sink, *residential refrigerator, microwave, and washer/dryer.*
  - Design Intent: Durable, washable, child-safe finishes for preparing snacks and meals in compliance with DCYF standards.
- SH Toilet Room(s):
  - Floors: Slip-resistant resilient sheet flooring with coved base.
  - Walls: FRP panels or full-height ceramic tile for washability.
  - Ceilings: Moisture-resistant gypsum board.
  - Fixtures: Child-scaled toilets and sinks with anti-scald mixing valves.
  - Design Intent: Hygienic and safe environment with finishes designed for child use and easy cleaning.
- SH Conference Room:
  - Floors: Carpet tile (preferred for acoustical comfort).
  - Walls: Painted GWB with tackable surfaces.
  - Ceilings: Acoustical lay-in ceilings NRC ≥ 0.70.
  - Casework/Fixtures: Plastic laminate casework with solid surface counters for staff use.
  - Design Intent: Durable staff workspace to support daily childcare operations.
- SH Work Room:
  - Floors: Carpet tile (preferred for acoustical comfort).
  - Walls: Painted GWB with washable finishes.
  - Ceilings: Acoustical lay-in ceilings.
  - Casework/Fixtures: Plastic laminate casework with solid surface counters; lockable storage for supplies.
  - Design Intent: Durable staff workspace to support daily childcare operations.
- Grays Harbor Academy:
  - Floors: Forbo linoleum resilient flooring (preferred) in classrooms and circulation; Armstrong VCT acceptable. Nora rubber or carpet tile may be used in breakout and staff areas for acoustical comfort.
  - Walls: Painted GWB with writable and tackable surfaces in classrooms; calming colors in student commons and advising areas.
  - Ceilings: Acoustical lay-in ceilings NRC ≥ 0.70 throughout.
  - Casework/Fixtures: Minimal fixed casework in classrooms; plastic laminate counters with solid surface tops in staff and advising spaces; lockable storage as required.
  - Technology: Integrated power/data, display monitors, and wireless access points to support hybrid and online learning.

- Design Intent: A flexible, technology-enabled learning environment combining classrooms, commons, and staff spaces. Designed for independent study, hybrid instruction, and small-group advising, with acoustical treatments and durable finishes to support long-term use.

- Library / Learning Resource Center:
  - Function: Multi-functional library that can also serve as a technology lab.
  - Flooring: Nora rubber or Forbo linoleum in labs; epoxy or resilient sheet flooring in prep room.
  - Walls: Painted gypsum board with tackable display surfaces.
  - Ceilings: Acoustical lay-in ceilings NRC ≥ 0.70.
  - Casework: Built-in shelving and circulation desk with plastic laminate and solid surface counters.
- Maker Space / CTE Labs:
  - Flooring: Durable resilient flooring (Forbo linoleum or Nora rubber) for ease of cleaning and resistance to wear.
  - Walls: Painted gypsum board with writable surfaces (whiteboard paint or wall-mounted markerboards). Tackable panels for display.
  - Ceilings: Acoustical lay-in ceilings NRC ≥ 0.70.
  - Casework: Plastic laminate casework with solid surface or chemical-resistant tops. Storage cabinets with lockable doors.
  - Glazing: Interior vision glazing to corridors for supervision, safety laminated.
- Life Lab:
  - Floors: Forbo linoleum resilient flooring (preferred).
  - Walls: Painted GWB with writable and tackable surfaces.
  - Ceilings: Acoustical lay-in ceilings NRC ≥ 0.70.
  - Casework/Fixtures: Plastic laminate casework with solid surface counters and sinks (one ADA).
  - Residential Fixtures: Includes (3) residential kitchen stations with ranges/hoods, microwaves, dishwashers, refrigerators, and washer/dryer.
    - ↳ Notes: Flexible for career/life-skills programs.
- Science Lab & Prep Room:
  - Flooring: Nora rubber or Forbo linoleum in labs; epoxy or resilient sheet flooring in prep room.
  - Walls: Painted GWB, washable finishes at bench height.
  - Casework: Epoxy resin countertops with sinks in labs; durable plastic laminate casework in prep room.
  - Safety: Finishes integrated with eye wash, fume hood, and chemical-resistant surfaces, goggle cabinet, and chemical storage.
- Student Store:
  - Flooring: Forbo linoleum or Armstrong VCT.
  - Walls: Painted GWB with display/tack surfaces.
  - Ceilings: Acoustical lay-in tiles.
  - Casework: Laminate counters with solid surface tops; secure storage.
  - Overhead Door: Electrically operated aluminum coiling door with stainless trims for closure and security.
  - Appliances/Fixtures: Specialty program appliances consistent with the “coffee shop” function including required sink and counter space for coffee machine and minor packaged food item sales.
- Open Doors Program:
  - Floors: Forbo linoleum resilient flooring (preferred) in classrooms and circulation; Armstrong VCT acceptable. Carpet tile may be used in informal seating and commons areas for comfort.
  - Walls: Painted GWB in calming colors, with writable and tackable wall surfaces in classrooms and advising spaces.
  - Ceilings: Acoustical lay-in ceilings NRC ≥ 0.70.
  - Casework/Fixtures: Minimal fixed casework; plastic laminate counters with solid surface tops in support

areas; lockable storage for staff and counseling.

- Technology: Power/data, display monitors, and wireless access to support flexible instructional modes.
- Design Intent: *A supportive, flexible learning environment* designed for re-engagement. Spaces include classrooms, commons, and advising areas, with durable finishes and trauma-informed design principles (warm colors, acoustical comfort, clear sightlines). Controlled access and surveillance support safety and security.

- Support Spaces (Storage, Mechanical, Electrical):
  - Floors: Clear-sealed concrete.
  - Walls: Painted GWB in general storage; moisture-resistant surfaces in food storage.
  - Ceilings: Exposed or gypsum board as required.
  - Casework/Fixtures: None beyond functional storage shelving.
  - Notes: Service clearances maintained for maintenance.

04 ACCESSIBILITY & CODE COMPLIANCE

- General Compliance: The building is designed to fully comply with the *2021 International Building Code (IBC), 2021 Washington State Building Code, 2021 Washington State Energy Code (WSEC),* and all referenced standards. Accessibility requirements are provided per the *Americans with Disabilities Act (ADA 2010 Standards)* and the Washington State Building Code accessibility provisions.
- Accessible Routes: Continuous accessible paths of travel are provided to all occupied spaces, including entries, classrooms, commons, gymnasium, daycare, health/wellness, and outdoor learning areas. Ramps, elevators, and compliant door clearances are incorporated.
- Vertical Access: An elevator is provided for access between levels, sized to meet stretcher and wheelchair requirements. Interior stairs are supplemented by accessible routes per IBC and ADA.
- Restrooms: All public and instructional restrooms include accessible toilet stalls, grab bars, clear floor spaces, and accessible lavatories with insulated piping. The Health Toilet includes an accessible shower for wellness support.
- Assembly & Gathering Spaces: The Commons, Learning Stair, and Gymnasium include accessible seating, companion seating, and assistive listening systems per ADA and IBC Chapter 11.
- Instructional Spaces: Classrooms, science labs, GHA, and Open Doors include accessible casework (sink and counter heights) and adaptable furnishings.
- Daycare (Snug Harbor): Includes child-scaled accessible toilets and sinks per DCYF licensing requirements. Circulation meets both ADA and DCYF accessibility provisions.
- Signage: All required permanent room signage includes raised characters and Braille. Directional signage designed per ADA and WAC standards for legibility and consistency.
- Acoustics & Lighting: Accessibility is extended to sensory needs, per OPR:
- Acoustics: Classrooms meet ANSI S12.60 and WAC 246-366 acoustical standards (STC 50+ partitions, NRC ≥ 0.70 ceilings).
- Lighting: Complies with ADA and WAC standards for visual comfort, glare reduction, and adequate illumination at all accessible routes.
- Diverse Sensory Design: Accessibility is not limited to compliance but incorporates equitable and diverse sensory design strategies, including clear sightlines, intuitive wayfinding, and calming finishes.

05 SUSTAINABILITY & HEALTH

The Harbor Learning Center is designed to meet the *Washington Sustainable Schools Protocol (WSSP 2023*) and the *2021 Washington State Energy Code (WSEC) C406 requirements.* These frameworks guide strategies that improve building performance, reduce operational costs, and support student wellness.

- WSSP 2023: The project achieves credits across site,

water, materials, energy, indoor environmental quality, and operations, emphasizing daylighting, acoustics, indoor air quality, and durable, low-emitting materials.

- WSEC C406: The design exceeds the required energy efficiency credits through enhanced lighting, HVAC efficiency, and load management strategies, with flexibility to add renewable readiness or envelope enhancements if needed.
- Health & Wellness: Design strategies prioritize daylighting, acoustical control, thermal comfort, and air quality, aligning with trauma-informed and equitable design principles. Natural finishes and community-focused spaces further support occupant wellbeing.

Summary: Together, WSSP and C406 strategies ensure that the Harbor Learning Center is a high-performance, resilient, and healthy school environment, balancing sustainability, operational efficiency, and student success.

06 DESIGN LIFE & FUTURE ADAPTABILITY

- Service Life: Building designed for a *50–70 year lifespan* through durable envelope assemblies, high-performance finishes, and maintainable systems.
- Flexibility: Classroom layouts and modular partitions allow spaces to be reconfigured as programs evolve, supporting long-term adaptability.
- Envelope Maintenance: Wall and roof assemblies detailed to allow for selective replacement of cladding, glazing, and roofing without major structural modifications.
- Future Expansion: Site and circulation are designed to allow for potential building additions without disrupting primary functions.
- Sustainability Integration: Strategies such as biophilic design and daylighting are intended to remain viable and adaptable across the building's service life.

SUMMARY

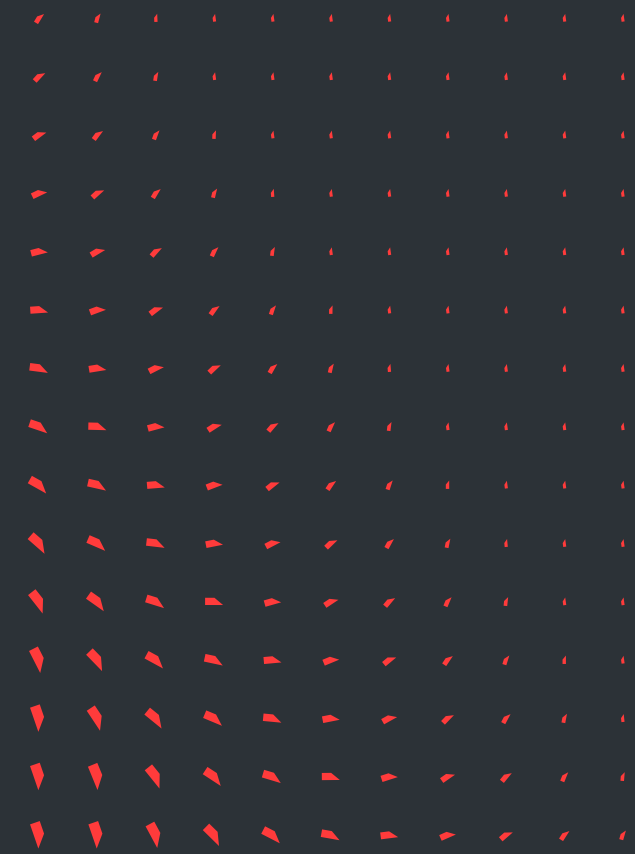
The Harbor Learning Center is designed as a durable, efficient, and adaptable educational facility that reflects community identity while supporting the District's diverse programs. The building envelope incorporates marine-grade materials and high-performance insulation to ensure long-term resilience in Aberdeen's coastal environment. Interior finishes are space-specific, balancing durability, maintainability, and comfort.

Specialty spaces—including the Commons, Snug Harbor daycare, and Open Doors—are planned for flexibility, community use, and student engagement. The design integrates sustainability and health strategies, such as daylighting, biophilic elements, and acoustical control, to enhance both performance and occupant wellbeing.

With a projected 50–70 year service life and inherent adaptability for future program changes or expansion, the Harbor Learning Center is intended to serve as a lasting community asset aligned with Aberdeen School District's long-term goals for resilience, quality, and educational excellence.

TCF

IV. Food Service



Food Service

IV

INTRODUCTION

- The Harbor Learning Center is to include an approx. 850 SF kitchen (including Employee Restroom) and serving area, serving breakfast and lunch in an open servery for approx. 100 students in a commons space. For establishing design and costs, the following requirements are assumed to be a part of the project for the serving kitchen:

EQUIPMENT:

- Equipment is to be all new. Equipment selection is to be based on kitchen staff needs and/or requests and factors such as durability and maintainability; which are important in this application. The new equipment is to be commercial grade, and Energy Star rated in categories available and as energy efficient as possible where Energy Star categories are not available.

FLOORS:

- Commercial Welded Sheet Vinyl type or Quarry Tile finish floors in kitchen.
  - Bases, integral with floor, are to have coved corners.
  - All floors to be pitched to area drains to ensure elimination of standing water and adequate drainage of floor.
  - Design kitchen for a minimum 100-lbs./sq. ft. (450 kg.cm2) live load capacity.

WALLS:

- All walls in contact with or within 6" (150 mm) of any cooking equipment shall be constructed of non-combustible heatproof materials.
  - Walls in food service areas shall be constructed using waterproof (green) gypboard or non-paper faced product covered full height, with FRP Paneling.

CEILINGS:

- Ceiling surfaces must be smooth, easily cleanable and light in color.
  - Lay-in ceiling tile must be non-porous and non-fissured.

LIGHTING:

- General lighting fixtures complete with lamps, wiring and switches.
  - All exposed lamps **MUST** be plasticized shatterproof.
  - Illumination levels shall be in accordance with local codes or recommendations of the Illuminating Engineering Society (IES) with the following minimum foot candle levels measured 36" above floor line.
  - **Dry and refrigerated storage areas:** 25
  - **Preparation areas:** 50
  - **Production areas:** 70

REGULATIONS:

- All work and materials shall be in accordance with the latest rules and/or regulations of agencies/authorities having jurisdiction. All regulations, including building codes, and other codes applying to this jurisdiction should be followed. In addition, all equipment shall comply with the following:
  - Local Health Code.
  - National Fire Protection Association, Kitchen Ventilators (NFPA-96).
  - National Electric Manufacturer's Association (N.E.M.A.).
  - Underwriters Laboratories Inc., (U.L.), must bear label. National Electric Code, (N.E.C.).
  - National Sanitation Foundation, (N.S.F.), including NSF-7, must bear label in jurisdictions requiring the

same.

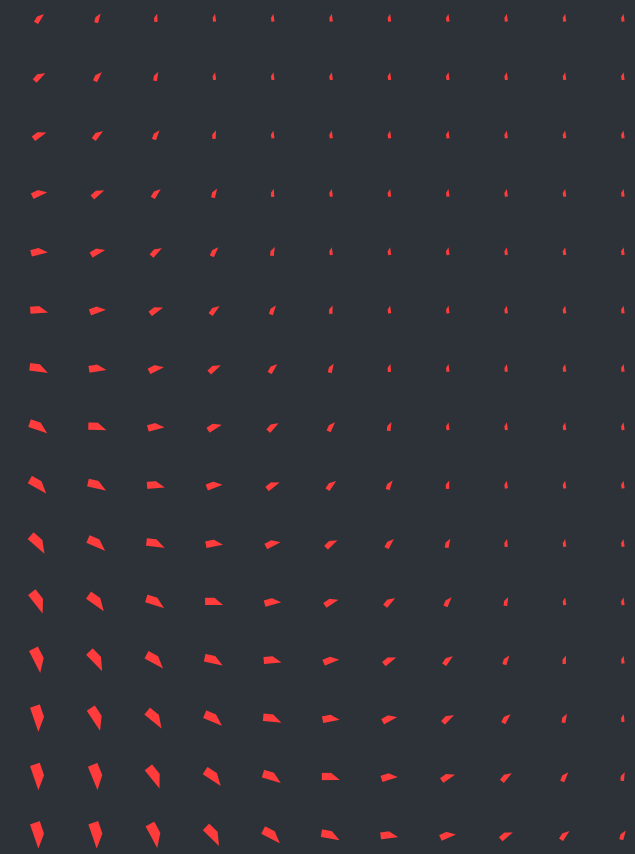
- American Society of Mechanical Engineers must carry the (A.S.M.E.) stamp.
- Occupational Safety and Health Act (O.S.H.A.) Standards.
- Hazard Analysis Critical Control Path (H.A.C.C.P.) Standards.
- American Disability Act (A.D.A.) Standards.
- Federal Energy Independence and Security Act of 2007 (HR6).
- Washington State Energy Code

WARRANTY:

- All equipment, fixtures and materials furnished and installed shall be guaranteed against defect in workmanship and material. All repairs and replacements which may have become apparent and necessary by reasons of such defects, during the first year after final completion and acceptance of equipment installation, shall be made without cost and expense to the Owner. All such repairs and replacements shall be made at a time and during hours satisfactory to the Owner.

TCF

V. Structural



Structure

V

INTRODUCTION

This narrative summarizes the schematic structural design for the Harbor Learning Center Replacement for the Aberdeen School District. We understand that the current school is inside of the tsunami inundation zone. The new school will move the students and staff outside of the hazard zone to a new site that is west of the existing Aberdeen High School, between North H and I streets and between East 3rd and 5th streets. The new HLC school building will be approximately 31,000 square feet of building area in plan and will have two primary levels as well as an elevated mechanical attic space that extends over the length of the classroom wing. The current programmatic layout includes a covered play area, play field, utility yard, gymnasium, administrative areas, commons area, support spaces, infant and toddler spaces, classrooms, lobbies, and labs.

DESIGN CODE:

The new school will be designed under the *2021 International Building Code (IBC)*, in conjunction with Washington State, Grays Harbor County, and City of Aberdeen requirements. The building would represent a substantial hazard to human life in the event of failure due to its function as a school. Therefore, the structure is classified as a Risk Category III building. This classification requires the use of a 1.25 seismic importance factor, which is in keeping with an "enhanced safety" structural performance level.

Seismic load values will be taken from the multiperiod design spectrum of ASCE 7-22 which is referenced as a voluntary design procedure in the *2021 IBC Amendments* and will be fully adopted in the 2024 IBC as the recommended design procedure. This will result in a more robust lateral force-resisting system design and will help ensure that the building pre-emptively meets the *2024 IBC seismic code* values which will have been adopted by time the building is ultimately constructed in 2027/2028.

GRAVITY FRAMING:

The building will be primarily steel-framed. The structure will consist primarily of steel wide flange columns for the vertical gravity-carrying members. Horizontal gravity-carrying members will consist of open web steel joist trusses over the gym and rolled steel wide flange beams and girders over the classroom wing. A 'dovetail' type metal deck will be used with concrete fill at all non-roof elevated levels and without concrete fill at the roof.

LATERAL FRAMING:

The seismic design of the building will be based on the spectral response accelerations provided in the Geotechnical Engineering Report by Haley & Aldrich, Inc. Based on the occupancy type and loading, the building is anticipated to be designed as Risk Category III. In the preliminary Geotechnical Report dated November 2024, the soil underneath the building structure is categorized as Site Class C, and with the spectral accelerations, the building will be assigned to Seismic Design Category D. The soil underneath the parking lot is categorized as Site Class E.

Aberdeen, Washington is designated as a special wind region (SWR) under the basic wind speed maps in the *IBC* and *ASCE 7*. The wind speed recommendations for Aberdeen are outlined in A Special Wind Regions in Washington State White Paper, published by the Structural Engineers Association of Washington on January 24, 2025. The document recommends an ultimate wind speed of 130mph for risk category III buildings within Washington's SWRs. We will use this recommendation for our design.

Structure

V

The proposed lateral system for this two-story building is buckling-restrained braced (BRB) frames. This system utilizes a re-strained steel core which prevents buckling, allowing it to reach its full axial capacity in both tension and compression. Some benefits of BRBs over traditional braced frames include reduced residual drift after a major earthquake, flexible configuration, smaller beam and column sizes, and easier post-earthquake repair of damaged units.

FOUNDATIONS:

The foundation system is planned to be shallow reinforced concrete spread footings for gravity columns and combined 'grade beam' footings for braced frames. Per the preliminary geotechnical report, the soil conditions at the site require that some form of ground improvement occur prior to use of shallow foundations. Such forms of ground improvement include over-ex-cavation and backfill with compacted engineered fill; or the use of geopiers or stone columns under each footing to locally improve bearing capacity.

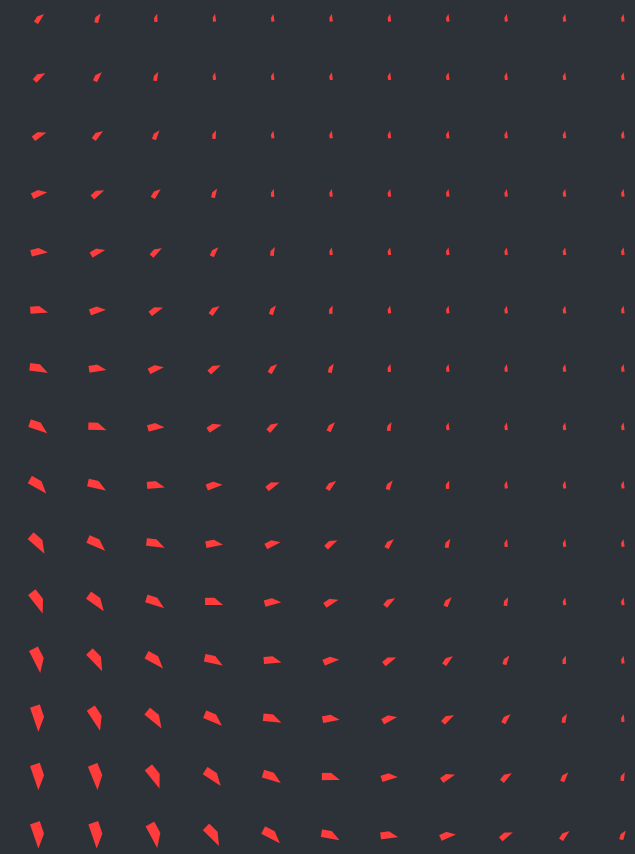
The base floor will be a concrete slab on grade. The preliminary geotechnical report indicates that some measure of ground improvement may be required underneath the building's slab on grade to mitigate settlements.

BUILDING STRUCTURAL MATERIALS

- Concrete:
  - Concrete: 4,000 psi, NW
  - Maximum aggregate size: 1" typical
  - Maximum water-to-cement ratio: 0.45
  - Base Plate Grout: 7,000 psi
- Concrete Reinforcement:
  - Concrete Reinforcement:
    - ASTM A615 (60 KSI) for #5 bars and smaller
    - ASTM A706 (60 KSI) for #6 bars and larger
  - Welded Bars: ASTM A706 Grade 60
  - Bar Splice Couplers: Type 2 per ACI-318
- Steel:
  - Wide Flange and Channels: ASTM A992 Grade 50
  - Angles and Plates: ASTM A572 Grade 50
  - Hollow Structural Steel (HSS)
    - Rectangular and Round: ASTM A500C
    - Pipe: ASTM A53 Grade B
  - High Strength Bolts: ASTM F3125 Grade A325 (Conventional), Grade F1852 (Tension-controlled)
  - Welding: E70XX electrodes
  - Anchor Rods: ASTM F1554
  - Open Web Steel Joists: Materials and grade designations and per manufacturer
- Steel Deck:
  - 2.0D Dovetail Deck

TCF

VI. Mechanical



Mechanical VI

INTRODUCTION

- The mechanical system for the Harbor Learning Center project is intended to be a balanced concept to meet project budget, published District Standards and expectations, and new 2021 WSEC requirements; while also adequately addressing and incorporating other equally important design, operational features and project goals including but not limited to programming and integration of spaces, operational and maintenance access needs and reduced system complexity, life cycle cost, occupant comfort, indoor air quality, reduction to ongoing District operational funds, acoustics, aesthetics, future system flexibility.

APPLICABLE CODES AND STANDARDS:

- The mechanical design shall meet, but not be limited to, the following codes:
  - *International Building Code (IBC)*
  - *International Mechanical Code (IMC)*
  - *International Fire Code (IFC)*
  - *Uniform Plumbing Code (UPC)*
  - *Washington State Energy Code (WSEC)*
  - *National Fire Protection Association (NFPA)*
- The mechanical design shall meet, but not be limited to, the following standards:
  - *ASHRAE Standard 52.1 – Gravimetric and Dust Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter*
  - *ASHRAE Standard 55 – Thermal Comfort*
  - *ASHRAE Standard 62.1 – Ventilation for Acceptable Indoor Air Quality*
  - *ASHRAE Standard 90.1 – Energy Standard for Buildings Except Low Rise Residential*
  - *SMACNA – Sheet Metal & Air Conditioning Contractors*
  - *WSSP – Washington State Sustainable School Protocol*

HVAC SYSTEM DESIGN CRITERIA:

- Table 1- Outdoor Design Temperatures

Design Season	Temperature
Outdoor Winter DB	25°F*
Outdoor Summer DB	83°F*

*values taken from 2021 WA State Energy Code for Aberdeen

Mechanical

VI

BUILDING ENVELOPE:

- *Building envelope* shall be in compliance with the minimum prescriptive values as defined by the 2021 Washington State Energy Code.

FIRE SPRINKLING SYSTEM:

- *The building* shall be completely sprinkled with wet system coverage in conformance with NFPA 13 and local AHJ requirements. The design shall include a wet pipe system to serve all interior occupied areas and combustible void spaces. Wet system piping shall be black steel with threaded or mechanical grooved joints. Where design coordination allows, non-combustible constructed building overhangs shall be protected with dry sidewall heads off of the wet system; and a dry system shall be provided at overhangs that are too large for dry sidewall head coverage.
- *The fire sprinkler service entrance* to the building shall be located within the building at the riser room. Fire system backflow prevention shall consist of a double detector check valve (DDCV) assembly. A fire department connection and post indicator valve shall be located on site downstream of the DDCV by Civil.

PLUMBING SYSTEMS:

- Utilities: The mechanical systems will be connected to site water, fire and sewer designed by the civil engineer. Connection will be at 5'-0" outside of the building.
- Water Service: The main building water service will be provided at the Central Plant Room. No boosters are assumed. The service riser will be located in this space and will separately serve the domestic cold water systems, domestic hot water systems, and hydronic heating/cooling systems. Backflow preventers will be located on site per utility district requirements. Water piping services throughout building shall be brazed type L copper for all mains 2-1/2" and larger in size and type L copper with soldered or press fittings for all sizes 2" and below, except where below grade at service entrance location piping shall be brazed type K copper. Piping services will be adequately isolated to provide ease of maintenance.
- Irrigation: The water service for landscape irrigation will not enter the building and is covered under the Landscape consultant's scope of work. The water service will be separately metered.
- Domestic Hot Water System: Air to water heat pumps serving storage tanks and backup electric tank-type water heaters will be located in the central plant room to serve fixtures. Hot water systems will be designed with hot water recirculation piping and pumps to keep hot water available at fixtures.
- Plumbing Fixtures: All plumbing fixtures will be selected for use in vandal resistant applications in conformance with Aberdeen SD Standards.
- Sanitary Waste & Vent System: A sanitary waste and vent system will be installed to serve all fixtures within the building. Piping shall be cast-iron with no hub fittings.
- Grease Waste & Vent System: A gravity type concrete vault style grease interceptor, located outside the building, will be provided for the Kitchen per the AHJ. Point of use grease interceptor will be provided for three-compartment sinks as required by the AHJ.
- Rain Leader Piping: No roof drains assumed on project. Gutters and downspouts assumed by others scope of work with attachment to Civil storm system.
- Acid Waste & Vent System: At science rooms, acid vent piping will be provided and acid waste will be treated with point of use dilution traps at each fixture.
- Non-Potable HW & CW System: A non-potable hot and cold water system shall be supplied to serve Science room spaces working with acids. The domestic water services will be protected from non-potable services with reduced pressure backflow preventers. A small electric pony heater shall be supplied on the non-potable HW heating system to ensure hot water is available at the non-potable use fixtures.
- Compressed Air: Compressed air piping will be roughed-in at the science classroom for connection to future air compressor located in the mechanical attic.

- Natural Gas System: No natural gas assumed on project.

HEATING, VENTILATING & AIR CONDITIONING (HVAC) SYSTEM:

- Ventilation: Ventilation systems serving each area of facility are as follows.
  - Classrooms & Offices: Dedicated outdoor air systems shall serve zones via overhead supply grilles. Central variable volume air handling units (Aaon proposed basis of design) will be supplied with air-to-air enthalpy type heat recovery wheels to temper ventilation air with building exhaust air. Air will be served to VAV boxes to modulate airflow demand and close ventilation air dampers when spaces are unoccupied.
  - Gym & Commons: High efficiency VAV air handling units (Aaon proposed basis of design) shall serve zones with overhead supply air diffusers. CO2 sensors will be provided for demand control ventilation of the Gym and Commons units and will also be supplied with airside economizer control capability to provide free air cooling to these spaces.
  - Filters: MERV 13 final filters with MERV 8 pre-filters on both outside air and MERV 8 on return.
  - Duct routing: Return-air will be fully ducted and ensure no mixing of air between spaces, not plenum type.
- Heating and Cooling: The main source for heating and cooling dedicated zones are via four-pipe hydronic loop served by air-to-water heat pumps and back-up boiler. Classrooms and offices are served by fan coil units (IEC proposed basis of design), while gym and commons are served by single zone high-efficiency VAV air handling units (Aaon proposed basis of design). Attics, mechanical rooms and entry vestibules will be served by ceiling or wall-mounted electric unit heaters providing space freeze protection.
- Air-to-Water Heat Pump: Two air-to-water heat pumps (Aermec proposed basis of design), located in the service yard, shall be provided to supply low temperature heating water and chilled water to facility. Heat pumps shall be de-coupled from main building hydronic loop and provided with their own internal in-line circulation pumps and buffer tank to ensure adequate flow and no nuisance tripping of equipment due to controlled valves.
- Boilers: An electric pony boiler (Precision proposed basis of design) shall be provided to supplement the air-to-water heat pumps at low temperature conditions.
- Building Hydronic System: Interior building hydronic system will be a four-pipe system providing heating and chilled water to facility. Each building hydronic system piping will be served by redundant vertical in-line variable speed split-coupled pumps. An air separator, expansion tank and chemical filter feeder is also provided on each system.
- Building Piping and Valves: Heating and cooling system piping shall be welded or grooved black steel for all mains 2-1/2" and larger in size and type L soldered or press copper for all sizes 2" and below. Dielectric nipples shall be used at all connection points between dissimilar metals. All control valves located at equipment shall be 3-way or 2-way modulating type.
- Exhaust Systems: Dedicated exhaust will be provided for all areas of the facility where required (toilet rooms, custodial rooms, kitchen cooking hood, kitchen dishwasher, etc). Exhaust fans will also be provided to handle heat gain from electrical closets and heat pump plant room spaces where split system air conditioning is not required. Fans will be direct drive type with speed controller.
- Ductwork: Ductwork system shall be galvanized sheet metal throughout and installed per SMACNA standards based on specified pressure classification.
- MDF & Elevator Machine Rooms: Cooling will be provided by split system air conditioning units.

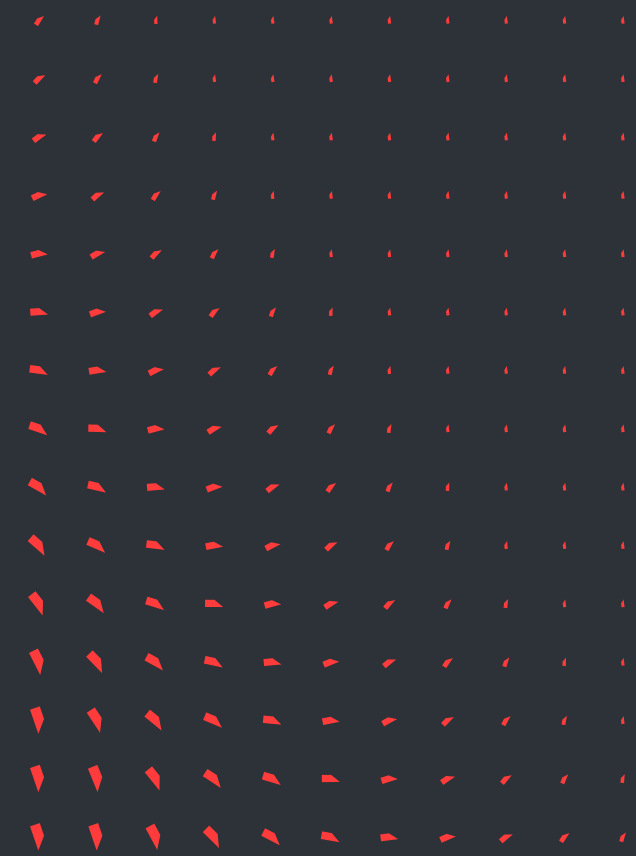
BUILDING AUTOMATION SYSTEM (BAS):

- *The mechanical systems* in the building will be controlled

and monitored by a direct digital energy management control system with BACnet interface and web-based capability. In addition to controlling the mechanical systems, the controls will be capable of monitoring and controlling other systems in the building such as energy metering and lighting and receptacle controls. Basis of design vendor is ATS Automation with Alerton Controls.

TCF

VII. Electrical



Electrical

VII

INTRODUCTION

- The electrical system for the Harbor Learning Center project is intended to be a balanced concept to meet project budget and the 2021 WSEC requirements; while also adequately addressing and incorporating other equally important design, operational features and project goals including but not limited to programming and integration of spaces, operational and maintenance access needs, reduced system complexity, and future system flexibility.

  New electrical systems shall include power, solar photovoltaics, EV chargers, emergency generator backup, lighting, fire alarm, distributed antenna, rescue assistance, data/communications, security/intrusion detection/ CCTV, access control/lock-down system, intercom clock/ speaker and classroom AV systems that meets all current codes including as noted below.

APPLICABLE CODES AND STANDARDS:

- The electrical design shall meet, but not be limited to, the following latest-adopted codes:
  - *International Building Code (IBC)*
  - *International Fire Code (IFC)*
  - *Washington State Energy Code (WSEC)*
  - *Washington State Administrative Code (WAC)*
  - *Washington Sustainable Schools Protocol (WSSP)*
  - *National Fire Protection Association (NFPA)*
  - *National Electrical Code (NEC)*

City of Aberdeen amendments to the above-listed codes

UTILITIES:

- *A new 480/277-volt, 3 phase service* will be provided by Grays Harbor Public Utility District to the building. The primary power is assumed to be extended from E 5th St to the project site. The transformer is located in the service yard near the main electrical room. The pad/ vault, conduits, and secondary conductors will be by the contractor.

ELECTRICAL DISTRIBUTION:

- *Power for the building* is distributed via distribution/ branch panels at 480Y/277V, 3Ø and transformers will step-down power to 208Y/120V, 3Ø. This equipment is located in dedicated electrical equipment spaces. There will be multiple panelboards located through-out the building to minimize long branch circuit runs. Mechanical panels will be located in the mechanical spaces to serve the mechanical equipment.
- *Feeders will be copper.* Panelboards will be door-in-door style, with copper bussing.
- *Electrical power monitoring* will be installed on all new electrical equipment as required by the WSEC for buildings over 25,000 square feet. Power monitoring shall identify mechanical, EV charging, receptacle, lighting, and solar loads. Meters shall be capable of interfacing with the DDC system for monitoring.
- To protect the increasing quantities of sensitive electronic systems from power surges, *surge protective devices* will be provided at all of the panelboards and switchboards.

ELECTRICAL DEVICES:

- *Each classroom* will have (2) - (3) standard duplex receptacles located on each wall. There will be duplex computer receptacles located adjacent to each data outlet and one for the classroom projector. GFI duplex receptacle(s) will be provided at each sink or when placed within 6' of a water source.
- All other occupied rooms will have at least one receptacle on each wall. Desk and computer workstation locations will be provided with at least one duplex receptacle.
- *Fifty percent of all receptacles* installed in classrooms, offices, conference rooms, workrooms, break rooms and at individual workstations will be automatically switched off when not occupied in accordance with the Washington State Energy Code. In general, the switched receptacles will be controlled by an auxiliary relay in ceiling-mounted occupancy sensors in each space.
- *Duplex receptacles* will be provided at a maximum of

50' spacing in hallways, just outside of each public and student restroom, on the interior side at exterior doors, and will only be provided on the exterior of the building where required to be within 25' of mechanical equipment.

- *Power* will be provided to architectural, mechanical, and Owner equipment. Exact locations will be coordinated with each discipline as the design progresses.
- *Floor boxes* will only be provided where they are code required, there is no other option available or upon Owner request.
- *Power for receptacles* located in lab spaces at workstations will be routed through a relay panel and controlled via emergency shut off switch. The emergency shut off switch will be located near the teacher station adjacent to the gas shut off switch.

SOLAR PHOTOVOLTAIC SYSTEMS:

- *A code minimum solar photovoltaic system* will be located on the roof, sized ~24kW (AC) at 480V, 3-phase. The system will be mounted to the standing seam metal room. The PV inverter shall be located in the main electrical room with the disconnect located in the service yard adjacent to the utility meter.

EV CHARGING:

- *EV charging* shall be provided in conformance with WAC 51-50-0429 for Group E Occupancies, applicable only to designated staff parking stalls. Current staff parking stall count is ~30 spaces.
- Table 429.2
- Electric Vehicle Charging Infrastructure

Occupancy	Number of EV Charging Stations	Number of EV-Ready Parking Spaces	Number of EV-Capable Parking Spaces
Group E Occupancies	10% of total parking spaces	10% of total parking spaces	10% of total parking spaces

- EV charging stations and EV-Ready parking spaces: A minimum of 40-ampere dedicated 208/240-volt branch circuit shall be installed for each EV Ready parking space and each EV Charging Station. The branch circuits shall terminate at a receptacle outlet or EV charger in close proximity to the proposed location of the EV Ready parking space or the EV Charging Station.
- EV-Capable parking spaces: A listed raceway capable of accommodating a minimum of 40-ampere dedicated 208/240-volt branch circuit shall be installed for each EV-Capable parking space. The raceway shall terminate into a cabinet, box or other enclosure in close proximity to the proposed location of the EV-Capable parking space. Raceways and related components that are planned to be installed underground, and enclosed, inaccessible or concealed areas and spaces, shall be installed at the time of original construction.
- Electric vehicle charging infrastructure for accessible parking spaces: Ten percent of the accessible parking spaces, rounded to the next whole number, shall be EV Charging Stations. Additional 10 percent of the accessible parking spaces, rounded to the next whole number, shall be EV Ready. Not fewer than one for each type of EV charging system shall be accessible.

EMERGENCY POWER:

- *A diesel skid-mount emergency generator* will be provided with (2) automatic transfer switches. One automatic transfer switch (NEC 700) will serve emergency/egress lighting. The other transfer switch (NEC 702) will serve MDF/IDF rooms, EMCS equipment, administration area, and kitchen cooler & freezer. The generator fuel supply size will be rated at 48 hours run time at 100% capacity.

LIGHTING:

- *Light fixtures will utilize LED light sources* and will be located with long term maintenance in mind. Light fixtures will be controlled by occupancy sensors with manual local override switches as much as practical. Daylight sensors will be provided and control light fixtures in all daylight zones. All other lights will be controlled by a simple lighting relay panel to meet minimum code requirements.
- *Primary interior classroom lighting* will be recessed

in the T-Bar ceiling system. Particular attention will be paid to ease of access, comfortable lighting levels and glare control. Classroom lighting will be dimmable and controlled through a daylight harvesting system for dimming the lights in response to the quantity of incoming natural light.

- *The site lighting* will utilize LED fixtures on approximately 30' steel poles. The building perimeter lighting will be wall and ceiling or soffit mounted LED fixtures. All exterior lighting will be controlled by the lighting control system with a temporary (2 hour) manual override switch in the Main Office.
- *Exit signs* will use low maintenance LED sources and will be located in corridors and exit doorways.
- *Emergency interior and exterior egress lighting* will be provided by the use of remote mounted emergency transfer devices and be connected to the emergency generator. Emergency lighting will be provided for selected light fixtures in each classroom, rooms with occupant loads of 50 or more, corridors, exit passageways, mechanical and electrical rooms, accessible attic or mezzanine spaces and public restrooms. Lighting levels will be designed to a 1.0 foot-candle average with a 0.1 foot-candle minimum.
- *The lighting control system* will be IP addressable, UL 924 rated and will interface with the building management system for scheduling and control.

DATA/TELECOMMUNICATIONS:

- *The data networking system* will be based on data wire and outlets per the Aberdeen School Districts Standards. Multiple data locations will be provided in each classroom with Category 6 cables routed from the MDF to each outlet. Each outlet will contain two jacks, with desk locations (two possible locations in typical classrooms) containing three jacks. All other occupied rooms will receive at least two data outlets. Two Category 6A cables will be provided for each Wireless Access Point. Backbone cable will consist of 12-strand single-mode fiber optic cable and (1) 25-pair copper cable routed to the MDF. 2 data outlets per classroom will be located to charge carts.
- *Equipment racks in the MDF room* will have individual rack-mounted UPSs to provide uninterruptible power until the generator starts in the event of a power failure.

CLOCK/INTERCOM SYSTEM:

- *The communication system* shall be microprocessor based, of modular design, FCC approved and shall interface transparently with the School District telephone system. It shall utilize amplifiers, speakers and call buttons for overhead paging and two-way communication.
- *Power over Ethernet digital Clocks* shall be used throughout the facility.
- *Speakers* shall be located in the hallways and other areas shall be used to augment the communication system.
- *The IP telephone system and IP telephones* shall be provided by the School District.

RESCUE ASSISTANCE SYSTEM

- *The Base Station* is to be located at a central control point on the first floor or as determined by local Authority having Jurisdiction. Call Boxes are to be located on all floors above and below the first floor, ideally next to a stairwell emergency exit or elevator landing on each floor.
- *The Base Station* must be capable of handling a minimum of 5 Call Boxes. Visual indicators on the Base Station allow rescue personnel to know which Call Box needs assistance. The Base Station must allow rescue personnel to speak to all Call Boxes or individual Call Boxes.
- *The emergency communication hardware* shall comply with the Americans with Disabilities Act (ADA). Call Boxes shall have the ability to be programmed with up to 5 emergency phone numbers. Upon activation of the emergency push button, a call will be automatically placed to the Base Station. If no one answers at the Base Station, the Call Box must dial a secondary location outside the building to activate two-way off-site person to person voice communications.

SECURITY SYSTEM

- *The security system* will be per district standards and will

utilize addressable technology similar to that of the fire alarm system where the location of every door position switch and motion detector can be displayed on the LCD Keypad and reported to the monitoring agency. Door position switches will be located at each exterior door. Motion Sensors will be located in each classroom, in the Administration area, hallways, and the gymnasium. Intercom at the main entry for visitor check in. Panic button at reception desk.

- *All system equipment* shall be connected to continuous (emergency) power branch panels to operate while the generator is running.
- *The system* shall be designed to have a minimum of one hour of continuous operation using power supplies with battery backup. This shall accommodate any temporary power outage (from the time that the power is lost to the time that the generator is fully up and running).

CARD ACCESS SYSTEM/EMERGENCY LOCKDOWN SYSTEM

- *The Card Access System* will be per district standard. This system will grant access to the user when a valid card is read at the reader. Access can be restricted to each user group to certain times of day and days of the week, if desired. This system will allow operation of the existing cards that are currently being used throughout the district. Locations of card readers will be as determined by the district during the design development phase of the project.
- *This system* will also control all of the functions for the Emergency Lockdown System. In the event of an emergency, local Administrative Staff can push a button in the Admin office. This button will lock all of the electronically controlled exterior doors, to secure the perimeter of the building. Locations of the Emergency Lock Down System doors will be as determined by the district during the construction document phase of the project.

CLOSED CIRCUIT CAMERAS

- *The CCTV system* will consist of Power over Ethernet (PoE) IP Color Cameras. They will be located throughout the facility. The cameras will record locally on Video Servers. The exact type of cameras and system will be per district standards. Locations of cameras will be as determined by the district during the design development phase of the project. There will be one monitor located in the front office that will show live cameras, and another monitor in reception to show visitors they are being monitored.

SOUND REINFORCEMENT SYSTEMS:

- *The new sound system* in the Gymnasium will be a high quality, multi-channel wide frequency sound reinforcement and production system with microphone pick-up and pre-recorded program capabilities. The system will use solid-state dual-channel amplification with distribution to a full-range loudspeaker system.
- *The system* will provide for microphone pick-up, playback of pre-recorded material, mixing, signal processing, amplification and distribution to a full-range reference monitor loudspeaker system.

CLASSROOM AUDIO/VISUAL SYSTEMS:

- *The classrooms* will be equipped with a teacher voice enhancement system that includes ceiling mounted speakers and teacher microphone, a wall mounted TV, and AV cable connections from the front of the classrooms. A control panel for AV functions will be present by each tv/audio set up.

FIRE ALARM:

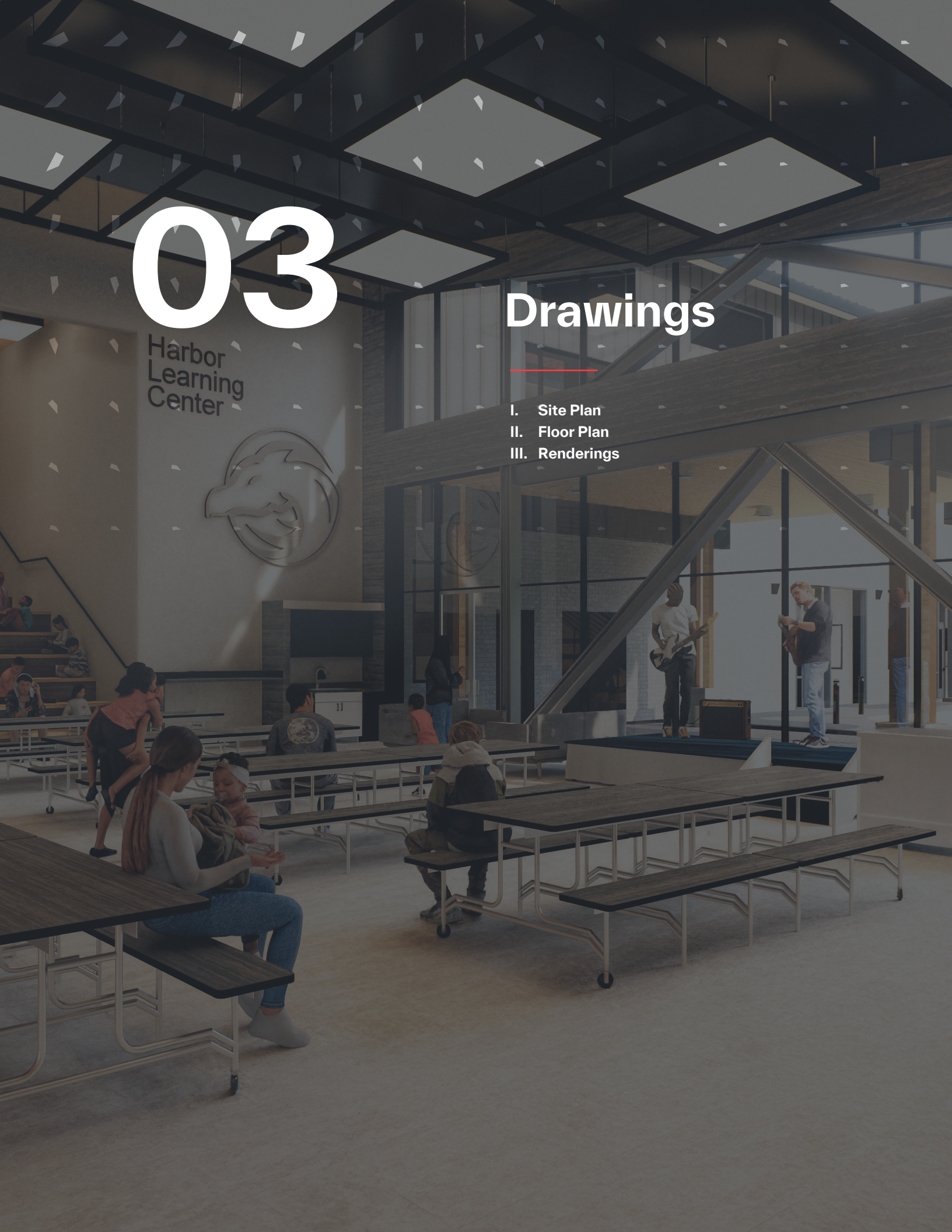
- General:
  - *A new fire alarm system* is to be provided, including fire alarm control panel, all connection points to the fire suppression system components including the sprinkler system alarm bell, dual fire pump installation flow, pressure and tamper switches, fire pump controller trouble, supervisory and alarm switches, and sprinkler riser(s) flow, pressure and tamper switches. The fire alarm system contractor is to coordinate with the sprinkler system design/build contractor for exact quantities and locations of all sprinkler system

monitoring contacts prior to bidding.

- *Connections are to be provided* to duct smoke detectors, fire/smoke dampers, and fire rated door hold opens in fire-rated walls where designated on the fire alarm floor plans. Provide connection to the EMCS for fan shutdown, to the network connection at the MDF/IDF, and primary and secondary Telco lines. The fire alarm/detection system is to meet all current codes and local jurisdictional requirements.
- *Penetration of fire rated walls, floors or ceilings* requires that the fire alarm system contractor utilize approved fire rated penetration seal methods.

Fire Alarm System:

- *The fire alarm system* will be a voice evacuation, audible addressable system. This system will be a digital microprocessor-based system that will monitor and report the alarm and operating status including individual component locations of all devices connected to the system. The system will monitor the automatic fire protection sprinkler system and report all information to the monitoring agent.
- *The Fire Alarm Control Panel* will be located in the sprinkler riser/fire alarm control room, with a remote annunciator at the main entrance, and is to be coordinated with the local fire authority having jurisdiction. A Graphical map showing fire alarm zones is required to be located adjacent to the Fire Alarm Control Panel, and the Remote Annunciator. It is to be large enough to support 1/8" text. The Fire Alarm Control Panel requires battery capacity sufficient for 24 hours standby time, and 15 minutes of voice message time.
- *Automatic smoke detectors* will be provided throughout all egress corridors, Gymnasium, Computer Room, above the fire alarm control panel, above all fire alarm system power extenders and on each side of doors with magnetic hold opens, in accordance with current national, state and local codes. Heat detectors are to be provided in locations where smoke detectors may be susceptible to false alarm. Manual pull stations will be provided at the main office and any other location not generally accessible to students.
- *The Automatic Fire Protection Sprinkler System* tamper switches are to be individually zoned. Electronic tamper switches are required on fire sprinkler system control valves, elevator sprinkler control valves, backflow preventers and post indicating valves.
- *Audio/visual devices* will be provided throughout the facility and shall conform to current ADA requirements. Refer to the contract documents for visual appliance placement, output basis, and notification circuit capacity per floor. Audible/Visual notification devices located in the attic area are to be coordinated with the installation locations of the mechanical equipment. Exterior horn-strobes are required along the path of the fire access lane and placed approximately 100'-0" apart. The fire sprinkler contractor is to verify whether any vocational/technical spaces require explosion-proof devices.
- *Provision for HVAC shutdown* via duct smoke detectors is to be per individual unit and shall be coordinated with the mechanical and electrical contractors. The fire alarm system contractor shall provide remote test switches and remote light emitting diodes (LED's) for each duct smoke detector.
- *Exposed fire alarm system* cabling is allowed in concealed spaces only. Fire Alarm conductors shall be permitted to be run open, not in conduit, in accessible ceiling voids or in attic spaces.
- *The fire alarm system contractor* shall perform audibility and intelligibility testing in each space of the building prior to acceptance testing to verify that common intelligibility scale (C.I.S.) values meet or exceed minimum requirements. In spaces that do not meet the minimum common intelligibility (C.I.S.) values, the fire alarm system contractor shall provide additional audible notification appliances (speakers) or adjust the location of audible notification appliances (speakers) until the minimum C.I.S. values are obtained.



03

Drawings

I. Site Plan
II. Floor Plan
III. Renderings

TCF

I. Site Plan



SITE PLAN LEGEND

- PROPERTY LINE
- AREA OF PAVING TO BE DEMOLISHED
- BUILDING AREA
- PROPOSED TURF / LANDSCAPE AREA, SEE LANDSCAPE DRAWINGS
- EXISTING TURF / LANDSCAPE AREA - NO WORK, SEE LANDSCAPE DRAWINGS
- PROPOSED ASPHALT PAVING AREA OR REPLACED ASPHALT PAVING, SEE CIVIL DRAWINGS
- EXISTING ASPHALT PAVING TO REMAIN, NO WORK, SEE CIVIL DRAWINGS
- PROPOSED CONCRETE PAVING AREA OR REPLACED CONCRETE PAVING, SEE CIVIL DRAWINGS
- EXISTING CONCRETRE PAVING TO REMAIN, NO WORK, SEE CIVIL DRAWINGS
- SOFT PLAY SURFACE, SEE LANDSCAPE DRAWINGS
- EXISTING BRICK PAVERS

TCF

COLORED SITE PLAN

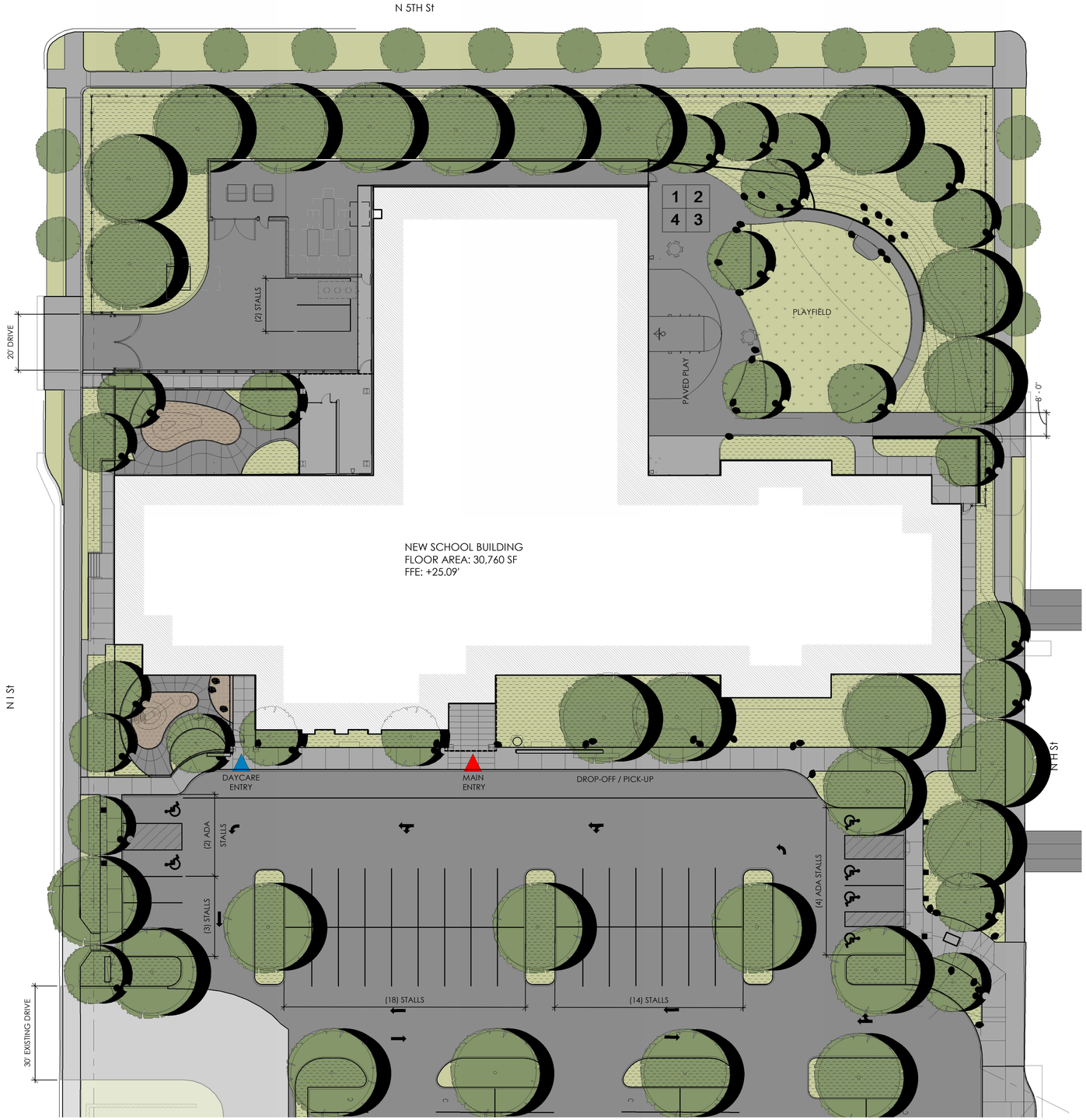
Harbor Learning Center / Aberdeen School District

NORTH

NOTE: DRAWING MAY BE REDUCED

0 20' 40' 80'

08/31/25



TCF | ENLARGED COLORED SITE PLAN

Harbor Learning Center / Aberdeen School District

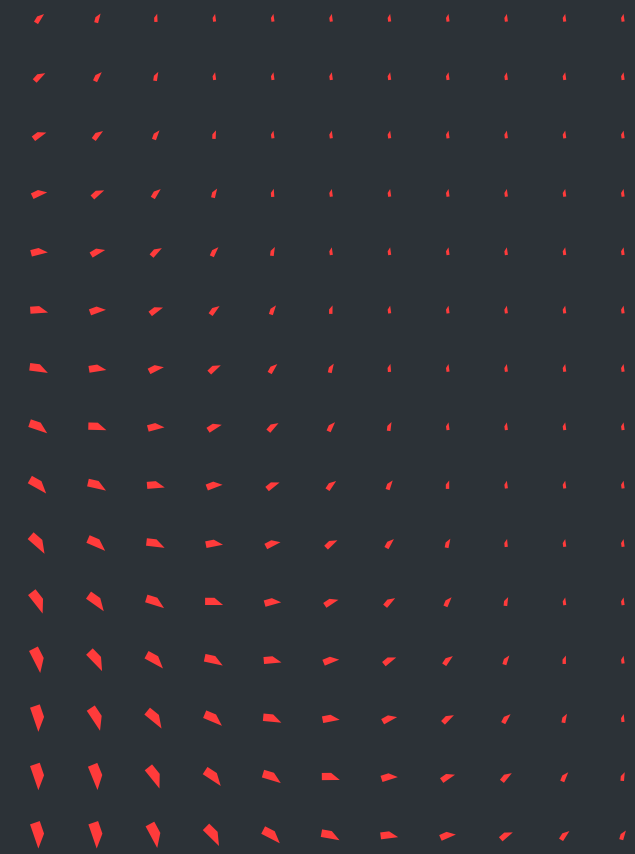
NOTE: DRAWING MAY BE REDUCED

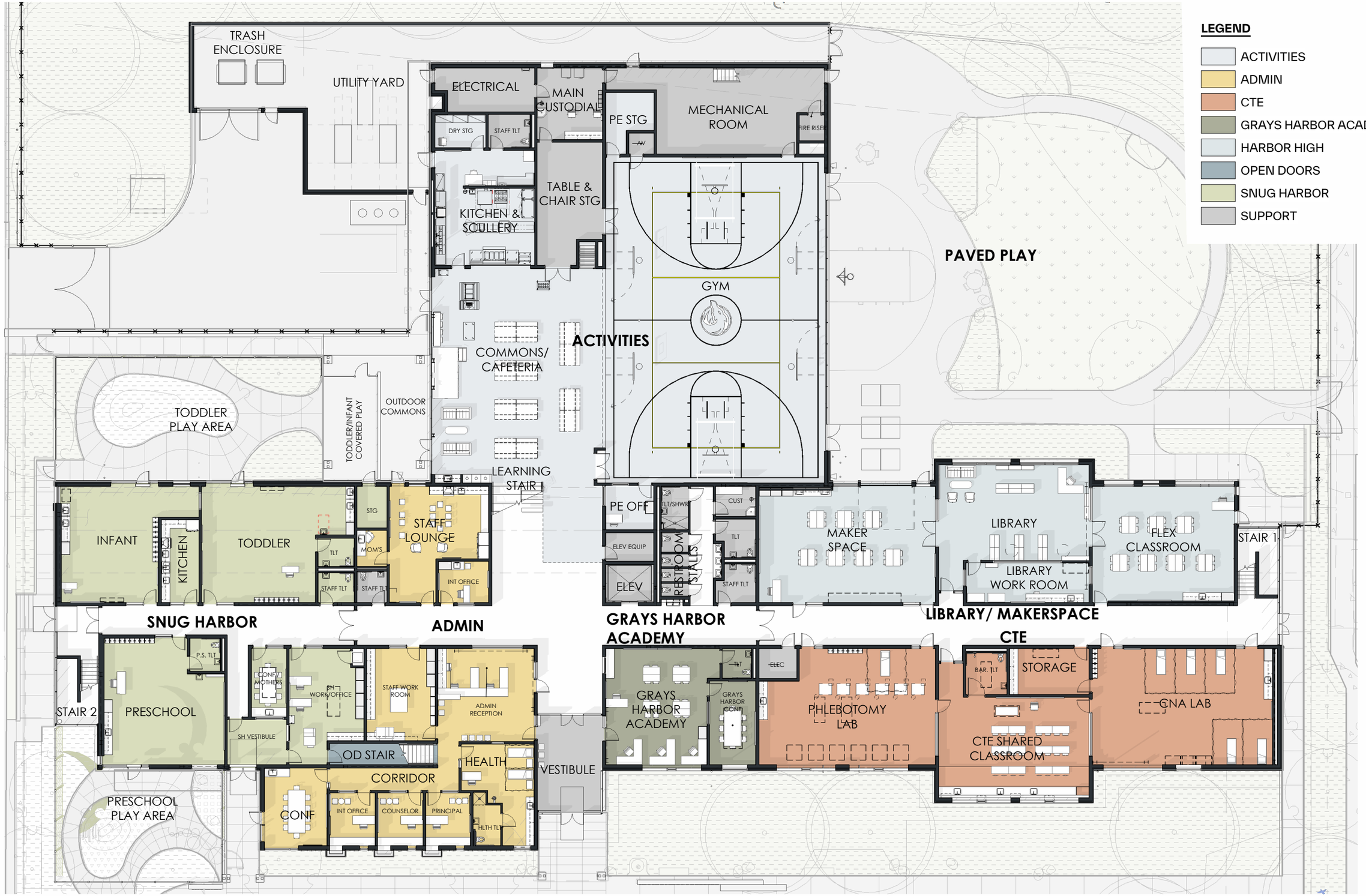
0 10' 20' 40'

09/03/25

TCF

II. Floor Plan





TCF

FIRST FLOOR PLAN

Harbor Learning Center / Aberdeen School District

NORTH

NOTE: DRAWING MAY BE REDUCED

0 8' 16' 32'

08/31/25

LEGEND

- ACTIVITIES
- ADMIN
- CTE
- HARBOR HIGH
- OPEN DOORS
- SPED
- SUPPORT

MECHANICAL ATTIC
ROOF BELOW
OPEN
ROOF BELOW
OPEN
ROOF BELOW
ROOF BELOW
ROOF BELOW
ROOF BELOW
ROOF BELOW
SPED
SPED CLASSROOM
SPED TEST
SPED OFFICE
SPED CLASSROOM
OFFICE
SAT WORK
ELEC
TLT
MDF
FOOD BANK
LEARNING STAIR
RESTROOM STALLS
ELEV
CUST
TLT
STAFF TLT
CTE STORAGE
CLASSROOM
CLASSROOM
CLASSROOM
STAIR 1
ROOF BELOW
OPEN DOORS
CTE
HARBOR HIGH
GED CR
TEST OFF
TEST
OFFICE
TLT
GED CR
OD STAIR
STAIR 2
LIFE LAB
OPEN BELOW
STUDENT STORE
MKT STG
CTE BUSINESS MARKETING
ROOF DECK
SCIENCE CR
SCIENCE PREP
CLASSROOM
ROOF BELOW
ROOF BELOW
ROOF BELOW
ROOF BELOW

SECOND FLOOR PLAN

Harbor Learning Center / Aberdeen School District

NORTH

NOTE: DRAWING MAY BE REDUCED

0 8' 16' 32'

08/31/25

TCF

III. Renderings


Snug Har bor Play


Activity Area

FRONT ELEVATION



CAFETERIA RENDER

VR Experience



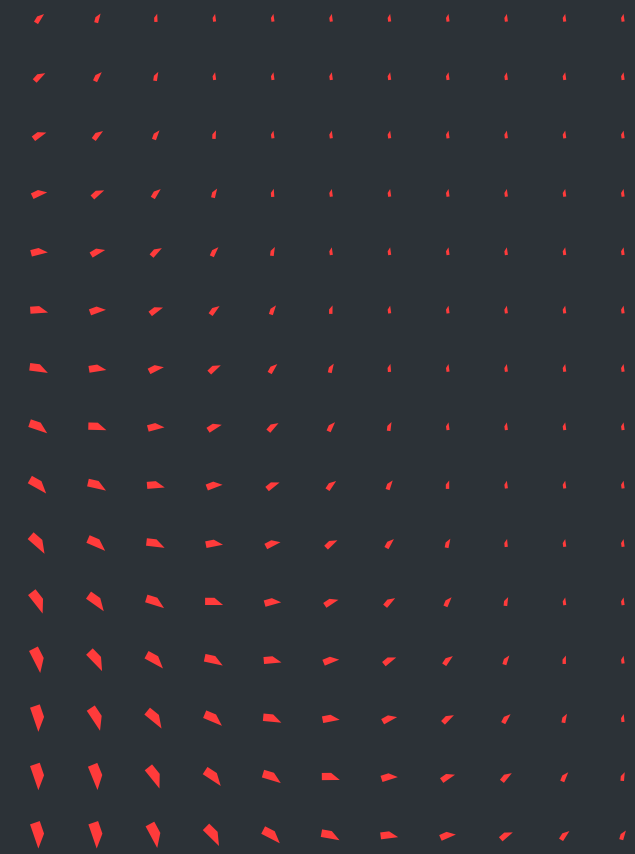
04

Budget Considerations

I. Cost Estimate
II. Value Engineering Options

TCF

I. Cost Estimate



Cost Estimate

This section introduces the Schematic Design (SD) cost estimate and the accepted value engineering (VE) items for the Harbor Learning Center. The SD estimate exceeds the MACC by $2.1M, necessitating acceptance of targeted VE items to close the gap. The following pages summarize the estimate results and the VE strategies, with the full cost estimate and cost control strategy documents attached in the appendix for reference.

- Source: RC Cost Group — Schematic Design Estimate (Rev. 2), September 8, 2025
- Lead Estimator: Mark Richardson (RC Cost Group) — participated in SD estimate development and coordination with design and engineering disciplines.
- Project: Harbor Learning Center (46,007 GSF — $699/SF based on building cost only)

PROJECT: HARBOR LEARNING CENTER (46,007)

- Total SD Estimate: $38,799,843
- Building: $32,153,818
- Sitework: $6,362,483
- Off-Site Improvements: $283,541
- Target MACC: $36,708,061
- Variance: +$2,091,782 (over MACC)
- Key Cost Characteristics:
  - Sitework share: ~16% of total; principal driver was on-site stormwater detention requirements.
  - Envelope & glazing: Modeled at SD; opportunities captured in accepted VE (curtain wall reduction, fiberglass window area reductions, interior storefront adjustments).

VALUE ENGINEERING – ACCEPTED ITEMS (SD PHASE)

- Acceptance Rule: Items shown are only those with a non-zero “Accepted Cost” value in the Cost Control Strategies log. The Item code (first column) is used as the unique identifier.

Cost Estimate

A. ACCEPTED COST REDUCTIONS

Item	V/E Function No.	Description	Accepted Cost ($)
C1b	PV-101	Parking lot reconfiguration (angled parking + reduced wall)	-65,000
C3a	MS-80	Eliminate on-site stormwater detention	-1,569,000
L1a	LS-72	Reduce landscape budget by 25%	-126,000
A1d	Alt-7	Simplify service yard finishes	-65,108
A1e	B2016	Remove wood soffits (except canopies)	-151,583
A1g	Alt-8	Remove portion of roofing over covered deck	-42,418
A3b	FI-52 / C3012	Reduce MDF paneling	-165,000
A4a	C3030	Reduce wood ceilings by 25%	-45,937
A5a.1	ES-21 / B2022	Curtain wall reduction	-192,360
A5d	B2014	Remove exterior sun shade control devices	-19,157
A5e	C1017	Reduce interior storefront glazing	-21,708
A5h	—	Reduce fiberglass window area	-44,959
A9c	E1029	Remove scoreboard/shot clocks in gym	-37,428
S1a	SL-128	SL-128 Support building pop-outs (H–I) on columns	-19,000

Cost Estimate

B. ACCEPTED VALUE-ADDED ITEMS

Item	V/E Function No.	Description	Accepted Cost ($)
A1b	SL-131	Add underslab drainage	+250,000
A1c	Alt-6	Add waterproof membrane below slab	+163,749
A7b	—	Add sliding markerboard to classroom casework	+56,644
E2a	IS-68	Add indirect/direct pendant lighting in classrooms	+64,000

C. TOTALS (ACCEPTED ITEMS ONLY)

- Total Cost Reductions: –$2,542,658
- Total Value-Added Items: +$534,727
- Net Adjustment: –$2,007,931

The Schematic Design estimate identified a total project cost of ***$38,799,843***, which exceeded the District's MACC of ***$36,708,061 by $2,091,782***. Through a package of targeted value engineering (VE) measures, including major savings from elimination of stormwater detention and selective reductions in finishes, the project realized ***$2,542,658 in cost reductions.*** After accounting for ***$534,727 in value-added items*** that the District chose to retain for long-term performance and educational value, the project achieves a ***net savings of $2,007,931.*** The remaining difference was covered through the application of project contingency, bringing the project into balance with the approved budget.

Result: The net adjustment, together with contingency use, aligns the project very closely with the District's ***MACC of $36,708,061.*** The project remains technically over budget by exactly ***$83,851,*** which is well within the 7.5% contingency allowance. Core program requirements are preserved and select features have been enhanced.

COST GROUP

ABERDEEN SCHOOL DISTRICT
HARBOR LEARNING CENTER
ABERDEEN, WA
SCHEMATIC DESIGN ESTIMATE

ESTIMATE ISSUE DATE: September 8, 2025
ESTIMATE REVISION: 2

Submitted To:

STEVE WACHTLER
TCF ARCHITECTURE
902 NORTH SECOND STREET
TACOMA, WA 98403

CLARIFICATIONS AND ASSUMPTIONS

RC Cost Group Estimating Team:

Lead Estimator: Mark Richardson
Architectural: Mark Richardson / Melia Blankenship / Jovelyn Limbag / Akil Primus
Structural: Mark Richardson
Plumbing: Metrix Engineers
HVAC: Metrix Engineers
Electrical: Metrix Engineers
Civil: LDC Corp
Landscape: Site Workshop
QA/QC: Andy Cluness

Exclusions from Construction Cost:

Design fees
Owners administration costs
Building and land acquisition fees
Legal and accounting fees
Removal of unforeseen underground obstructions
Owner's furniture, furnishings and equipment
Owners supplied materials
Moving owners equipment and furniture
Compression of schedule, premium or shift work
Assessments, finance, legal and development charges
Builder's risk, project wrap-up and other owner provided insurance program
Washington State Sales Tax
AV Equipment

Assumption used in establishing the estimate:

The project will be procured utilizing the design, bid, build delivery method
Construction Start Date: May 2026
Open and competitive bidding among all proportions of the work

Items that may affect the cost estimate:

Modifications to the scope of work included in this estimate.
Special phasing requirements other than mentioned above.
Restrictive technical specifications or excessive contract conditions.
Any non-competitive bid situations.
Bids delayed beyond the projected schedule.

OVERALL SUMMARY CONSTRUCTION COST

	GFA	$/SF	$
Building	46,007 SF	698.89	32,153,818
Sitework			6,362,483
Off-Site Improvements			283,541
TOTAL COST OF WORK			**38,799,843**

ALTERNATES

1. WSSP IEQ 4.1 Improved Acoustical Performance	214,976
2. Type V-B Wood Framing (fully sprinklered)	(1,189,803)
3. Service Yard Finishes	(65,108)
4. Replace Fiberglass Windows with Storefront Windows	(15,343)
5. Curtain Wall Reduction	(192,360)
6. Add waterproof membrane system below SOG	163,749
6. Alternate Teaching Wall Casework	56,644

MACC - $36,708,061
CHANGE FROM PD: $1,723,615

BUILDING DATA

Building Area:

Level 1	30,330 SF	
Level 2	15,677 SF	
Total Gross Floor Area		**46,007 SF**
Mechanical Level 2	783 SF	
Mechanical Penthouse	2,481 SF	
Total Unoccupied Space (Excluded from GFA)		**3,264 SF**

		Quantity	Unit	Ratio to Gross Area
Number of stories (x1,000)		2	EA	0.043
Gross Area		46,007	SF	1.000
Enclosed Area		49,271	SF	1.071
Footprint Area		30,330	SF	0.659
Suspended Slab		53,099	SF	1.154
Gross Wall Area		30,982	SF	0.673
Retaining Wall Area (Excludes Stem Walls)		-	SF	
Opaque Finished Wall Area		22,217	SF	0.483
Windows or Glazing Area	28.29%	8,765	SF	0.191
Roof Area		34,158	SF	0.742
Roof Glazing Area		-	SF	
Interior Partition Length		4,742	LF	0.103
Interior Doors Per Leaf		123	EA	0.003
Interior Glazing		1,676	SF	0.036
Finished Area		46,007	SF	1.000
Elevators (x10,000)		1	EA	0.022

ABERDEEN SCHOOL DISTRICT
HARBOR LEARNING CENTER
ABERDEEN, WA
SCHEMATIC DESIGN ESTIMATE
BUILDING

GROSS FLOOR AREA: 46,007 SF
DATE: September 8, 2025

RC COST GROUP

No.	ELEMENT DESCRIPTION		ELEMENT TOTAL	GROUP TOTAL	COST PER SF
A10	FOUNDATIONS			$ 1,633,393	$ 35.50
A1010	Standard Foundation		$ 978,771		$ 21.27
A1020	Special Foundation		$ 111,283		$ 2.42
A1030	Slab on Grade		$ 543,340		$ 11.81
A20	BASEMENT WALL CONSTRUCTION			$ -	$ -
A2010	Basement Excavation		$ -		$ -
A2020	Basement Wall Construction		$ -		$ -
B10	SUPERSTRUCTURE			$ 3,416,152	$ 74.25
B1010	Floor & Roof Construction		$ 3,416,152		$ 74.25
B20	EXTERIOR ENCLOSURE			$ 3,716,201	$ 80.77
B2010	Exterior Walls		$ 2,533,572		$ 55.07
B2020	Exterior Windows		$ 908,228		$ 19.74
B2030	Exterior Doors		$ 274,400		$ 5.96
B30	ROOFING			$ 1,518,643	$ 33.01
B3010	Roofing		$ 1,518,643		$ 33.01
C10	INTERIOR CONSTRUCTION			$ 2,179,503	$ 47.37
C1010	Partitions		$ 1,286,166		$ 27.96
C1020	Interior Doors		$ 628,771		$ 13.67
C1030	Fittings and Specialties		$ 264,566		$ 5.75
C20	STAIRS			$ 257,750	$ 5.60
C2010	Stair Construction		$ 257,750		$ 5.60
C30	INTERIOR FINISHES			$ 1,610,574	$ 35.01
C3010	Wall Finishes		$ 621,424		$ 13.51
C3020	Floor Finishes		$ 514,283		$ 11.18
C3030	Ceiling Finishes		$ 474,867		$ 10.32
D10	CONVEYING			$ 155,000	$ 3.37
D1010	Elevators & Lifts		$ 155,000		$ 3.37
D20	PLUMBING			$ 1,309,300	$ 28.46
D2010	Plumbing		$ 1,309,300		$ 28.46
D30	HVAC			$ 3,692,596	$ 80.26
D3010	HVAC		$ 3,692,596		$ 80.26
D40	FIRE PROTECTION			$ 363,293	$ 7.90
D4010	Sprinkler System		$ 363,293		$ 7.90
D50	ELECTRICAL			$ 4,106,085	$ 89.25
D5000	Electrical		$ 4,106,085		$ 89.25
E10	EQUIPMENT			$ 590,567	$ 12.84
E1010	Equipment		$ 590,567		$ 12.84
E20	FIXED FURNISHINGS			$ 762,359	$ 16.57
E2010	Fixed Furnishings		$ 762,359		$ 16.57
F10	SPECIAL CONSTRUCTION			$ -	$ -
F1010	Special Structure		$ -		
F1020	Special Construction		$ -		
F20	SELECTIVE BUILDING DEMOLITION			$ -	$ -
F2010	Building Elements Demolition		$ -		
	Sub-Total Direct Cost			**$ 25,311,415**	**$ 550.16**
	General Conditions/General Requirements	9.00%		$ 2,278,027	$ 49.51
	Sub-Total			**$ 27,589,442**	**$ 599.68**
	Estimating / Design Contingency	7.50%		$ 2,069,208	$ 44.98
	Sub-Total			**$ 29,658,651**	**$ 644.66**
	General Contractor's Overhead and Profit	5.50%		$ 1,631,226	$ 35.46
	Sub-Total			**$ 31,289,876**	**$ 680.11**
	Escalation: July 2026	2.76%		$ 863,942	$ 18.78
	TOTAL CONSTRUCTION COST			**$ 32,153,818**	**$ 698.89**

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
A10 FOUNDATIONS				
A1010 Standard Foundation				
A1011 Foundations				
Reinforced concrete continuous wall footings				
Excavate for continuous footings	302	CY	18.50	5,587
Backfill, assume imported fill	235	CY	74.00	17,390
Disposal of excavated material off-site within 8 miles, assumed a 33% swell factor	402	CY	30.88	12,403
Fine grade bottom of footing	1,737	SF	1.30	2,258
Formwork to foundations - sides	1,164	SF	13.45	15,656
Reinforcing steel in foundations	10,133	LB	1.76	17,834
Concrete, 4,000 psi	68	CY	329.60	22,413
Finish to top of footing	1,737	SF	1.40	2,432
Reinforced concrete brace frame footings				
Excavate for continuous footings	919	CY	18.50	17,002
Backfill, assume imported fill	501	CY	74.00	37,074
Disposal of excavated material off-site within 8 miles, assumed a 33% swell factor	1,222	CY	30.88	37,744
Fine grade bottom of footing	3,582	SF	1.30	4,657
Formwork to foundations - sides	3,924	SF	13.45	52,778
Reinforcing steel in foundations	91,938	LB	1.76	161,811
Concrete, 4,000 psi	418	CY	329.60	137,773
Finish to top of footing	3,582	SF	1.40	5,015
A1012 Column foundations				
Reinforced concrete spread footings				
Excavate for spread footings	475	CY	18.50	8,788
Backfill, assume imported fill	310	CY	74.00	22,940
Disposal of excavated material off-site within 8 miles, assumed a 33% swell factor	632	CY	30.88	19,508
Fine grade bottom of footing	2,124	SF	1.02	2,166
Formwork to foundations - sides	2,292	SF	11.88	27,229
Reinforcing steel in foundations	20,650	LB	1.67	34,486
Concrete, 4,000 psi	165	CY	329.60	54,384
Finish to top of footing	2,124	SF	1.05	2,230
Reinforced concrete spread footings - covered play/canopies				
Excavate for spread footings	62	CY	18.50	1,147
Backfill, assume imported fill	39	CY	74.00	2,886
Disposal of excavated material off-site within 8 miles, assumed a 33% swell factor	69	CY	30.88	2,136
Fine grade bottom of footing	288	SF	1.02	294
Formwork to foundations - sides	288	SF	11.88	3,421
Reinforcing steel in foundations	3,360	LB	1.67	5,611
Concrete, 4,000 psi	22	CY	11.88	261
Finish to top of footing	288	SF	1.05	302
A1013 Perimeter drainage and insulation				
Perimeter drain pipe and rock	984	LF		Incl in Civil
Perimeter insulation, rigid	1,558	SF	5.05	7,868

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
	Miscellaneous				
	Concrete stem wall, 8" thick	1,476	SF	88.00	129,888
	Concrete plinths	4.0	CY	1,750.00	7,000
	Dampproofing	5,392	SF	6.33	34,131
	Set anchor bolts and baseplates	1	LS	35,525.00	35,525
	Elevator pit including waterproofing	1	EA	26,744.00	26,744
	Total For Standard Foundations				**978,771**
A1020	**Special Foundation**				
	Overexcavation/haul/import, assumes 3' below footings	1,289	CY	86.37	111,283
	Total For Special Foundations				**111,283**
A1030	**Slab on Grade**				
	A1031 Standard slab on grade				
	Reinforced concrete slab on grade, 6" including base	30,330	SF	17.09	518,340
	A1034 Trenches, pits and bases				
	Pads & Thickening allowance	1	LS	25,000.00	25,000
	Total For Slab on Grade				**543,340**
A20	**BASEMENT CONSTRUCTION**				
A2010	**Basement Excavation**				
	No work anticipated				N/A
	Total For Basement Excavation				
A2010	**Basement Walls**				
	No work anticipated				N/A
	Total For Basement Walls				
B1010	**Floor & Roof Construction**				
	B1012 Upper floors construction				
	Floor Structure				
	Structural steel beams at floor	331,468	LBS	3.40	1,126,990
	Steel floor deck	18,941	SF	6.65	125,958
	Topping slab	18,941	SF	8.40	159,104
	Fireproofing at floors - none anticpated				
	Misc. structural steel/plates/connections	49,720	LB	3.40	169,048
	Brace frames				
	BRB	66	EA	4,750.00	313,500
	B1020 Roof construction				
	Roof Structure				
	Structural steel columns & beams at roof	307,422	LBS	3.40	1,045,235
	Steel roof deck	34,158	SF	6.50	222,027
	Misc. structural steel/plates/connections	46,113	LB	3.40	156,785
	Fireproofing at roof, none anticipated				
	Canopies				
	Structural steel beams & columns	18,657	LBS	3.70	69,031
	Steel roof deck	2,073	SF	6.50	13,475

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
	Misc				
	Elevator Steel	1	LS	15,000.00	15,000
	Total For Floor & Roof Construction				**3,416,152**
B20	**EXTERIOR CLOSURE**				
B2010	**Exterior Walls**				
	B2011 Exterior wall construction				
	Wall finish				
	Brick veneer including sealing	9,654	SF	46.50	448,911
	Accent panel	111	SF	54.00	5,994
	Metal panel	11,371	SF	39.50	449,155
	Metal panel, large tile	1,081	SF	42.50	45,943
	Anti-grafitti coatings, assumed 10'-0" high	1	LS	14,850.00	14,850
	Exterior wall sheathing				
	2.5" mineral wood insulation with thermally broken cladding supports, WRB, 5/8" gypsum sheathing	9,654	SF	25.00	241,350
	1" horizontal metal furring, 2.5" mineral wool insulation with thermally broken cladding support clips, WRB, 5/8" gypsum sheathing	12,563	SF	26.70	335,432
	Wall core				
	8" metal stud	22,217	SF	10.65	236,611
	Interior wall sheathing				
	5/8" gypsum board	22,217	SF	4.40	97,755
	Batt insulation	22,217	SF	3.50	77,760
	Sheet metal flashings at exterior walls	22,217	SF	2.85	63,318
	Blocking and backing at exterior walls	22,217	SF	2.45	54,432
	Framing at openings	9,395	SF	5.00	46,975
	Lintels/exterior wall steel	12,068	LBS	3.80	45,857
	B2012 Parapets				
	Parapet caps	397	LF	45.00	17,865
	Finish back of parapets	993	SF	42.50	42,181
	B2013 Exterior louvers, screens and fencing				
	Louvers	391	SF	85.00	33,235
	B2014 Exterior sun control devices				
	Sunscreens, horizontal louver shades	83	LF	185.00	15,355
	B2015 Balcony walls and handrails				
	Guardrails, roof deck	27	LF	390.00	10,530
	B2016 Exterior soffits				
	Exterior soffits, shiplap wood	2,700	SF	45.00	121,500
	Exterior soffits, shiplap wood, roof deck	784	SF	45.00	35,280
	Exterior soffits, shiplap wood, canopies	2,073	SF	45.00	93,285
	Total For Exterior Walls				**2,533,572**
B2020	**Exterior Windows**				
	B2021 Windows				
	Windows, fiberglass	3,097	SF	88.90	275,323
	Windows, hollow metal	120	SF	82.50	9,900

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
	B2022 Curtain walls				
	Curtain wall (excludes door openings)	3,365	SF	130.00	437,450
	B2023 Storefronts				
	Storefront (excludes door openings) (excludes interior storefront)	2,183	SF	85.00	185,555
	Total For Exterior Windows				**908,228**
B2030	**Exterior Doors**				
	B2031 Glazed doors and entrances				
	Aluminum glazed door, single, 3'-0" x 7'-0"	4	EA	8,250.00	33,000
	Aluminum glazed door, double, 6'-0" x 7'-0"	8	EA	16,500.00	132,000
	B2032 Solid exterior doors				
	Steel doors, single, 3'-0" x 7'-0"	10	EA	4,500.00	45,000
	B2034 Overhead doors				
	Sectional overhead door 8'x 12'	1	EA	14,400.00	14,400
	Miscellaneous				
	Miscellaneous specialty hardware	1	LS	50,000.00	50,000
	Total For Exterior Doors				**274,400**
B30	**ROOFING**				
B3010	**Roof Covering**				
	B3011 Roof finishes				
	Standing seam metal roof, Type A	31,119	SF	36.50	1,135,844
	Single ply membrane, Type B	3,039	SF	28.50	86,612
	Single ply membrane, Type C, Canopies	2,073	SF	16.50	34,205
	B3012 Traffic toppings and paving membranes				
	Pedestal pavers	756	SF	42.50	32,130
	B3014 Flashings and trim				
	Sheet metal flashings and trim at roof	36,231	SFA	3.50	126,809
	B3016 Gutters and downspouts				
	Metal guttering	542	LF	30.00	16,260
	Scuppers	5	EA	550.00	2,750
	Downspouts	10	EA	975.00	9,750
	B3022 Roof hatches				
	Roof access hatch & curb	2	EA	10,850.00	21,700
	Miscellaneous				
	Rough carpentry	1	LS	29,904.55	29,905
	Roof access ladder	1	EA	2,680.00	2,680
	Fall restraint anchors	16	EA	1,250.00	20,000
	Total For Roofing				**1,518,643**

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
C10	**INTERIOR CONSTRUCTION**				
C1010	**Partitions**				
	C1011 Fixed partitions				
	Metal stud				
	4"	6,090	SF	5.82	35,444
	6"	24,262	SF	6.12	148,483
	8"	35,004	SF	6.42	224,726
	GWB				
	5/8", type 'X', taped & finished	115,910	SF	4.57	529,709
	Allowance for soundproofing upgrades	1	ALLOW	50,000.00	50,000
	Batt Insulation	65,356	SF	1.35	88,231
	Fire rated plywood	1,000	SF	5.58	5,580
	Fire Caulking	1	LS	7,500.00	7,500
	C1016 Interior balustrades and screens				
	Steel guardrail at open to below area, 55" high	21	LF	425.00	8,925
	C1017 Interior windows and storefronts				
	Storefront glazing	1,232	SF	75.00	92,400
	HM relite	444	SF	65.00	28,860
	Pass through window	1	EA	6,500.00	6,500
	Miscellaneous				
	Blocking and backing	1	LS	23,003.50	23,004
	Caulking, sealants, and firestopping	46,007	GFA	0.80	36,806
	Total For Interior Partitions				**1,286,166**
C1020	**Interior Doors**				
	C1021 Interior doors				
	Interior doors, frames and hardware				
	Aluminum glazed door, single, 3'-0" x 7'-0"	6	EA	6,250.00	37,500
	Aluminum glazed door, double, 6'-0" x 7'-0"	4	EA	12,500.00	50,000
	Wood doors, single, 3'-0" x 7'-0"	99	EA	3,390.00	335,610
	Wood doors, double, 6'-0" x 7'-0"	5	EA	8,150.00	40,750
	Specialty hardware, rated doors, sound door premium	1	LS	25,000.00	25,000
	Access doors	1	LS	2,500.00	2,500
	Specialty doors				
	Coiling counter door, 14'-0" x 4'-2"	1	EA	7,290.50	7,291
	Folding partition, 42'-0" x 12'-0"	1	EA	78,120.00	78,120
	C1025 Interior door sidelights and transoms				
	Sidelight with safety glazing	22	EA	1,250.00	27,500
	Sidelight with safety glazing >2'	14	EA	1,750.00	24,500
	Total For Interior Doors				**628,771**
C1030	**Specialties**				
	C1033 Storage shelving and lockers				
	Janitors mop rack and shelf	3	EA	602.00	1,806
	Storage shelving	1	LS	10,000.00	10,000
	Lockers	8	EA	475.00	3,800
	C1035 Identifying devices				
	Interior signage	46,007	SF	1.25	57,509
	Exterior building signage	1	LS	25,000.00	25,000

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
C1037 General fittings and misc. metals				
Miscellaneous metals, allow 0.3#/SF	13,802	LB	3.50	48,307
Mail drop box (40 boxes)	1	EA	2,500.00	2,500
Fire extinguisher	12	EA	150.00	1,800
Fire extinguisher cabinets	12	EA	425.00	5,100
Cornerguards	1	LS	6,901.05	6,901
Restroom and shower accessories, CFIC				
Grab bars, per set @ restrooms	17	EA	340.00	5,780
Soap dispenser, classrooms (OFCI)	46	EA	52.03	2,393
Soap dispenser (OFCI)	21	EA	52.03	1,093
Toilet paper dispenser (OFCI)	24	EA	52.03	1,249
Toilet seat cover dispenser	24	EA	204.92	4,918
Sanitary napkin receptacle	24	EA	216.05	5,185
Paper towel dispenser, classrooms (OFCI)	46	EA	78.04	3,590
Paper towel dispenser (OFCI)	21	EA	78.04	1,639
Mirrors	21	EA	272.00	5,712
Baby changing station	2	EA	4,750.00	9,500
Shower rod & curtain	3	EA	450.00	1,350
Shower rod & curtain, classrooms	129	LF	20.00	2,580
Cubicle curtain and track at health room, allow	1	EA	2,000.00	2,000
Bariatric swing	1	EA	5,000.00	5,000
Bariatric hoist	1	EA	7,500.00	7,500
Elevator pit ladder	1	EA	1,374.60	1,375
Access ladders	2	EA	5,000.00	10,000
Coat hooks	24	EA	45.00	1,080
Projector ceiling mounts	1	LS	1,350.00	1,350
Tackboard/markerboard display specialties				
Tackboard, 4'-0" x 4'-0"	1	EA	375.00	375
Tackboard, 4'-0" x 5'-0"	1	EA	425.00	425
Tackboard, 4'-0" x 6'-0"	1	EA	475.00	475
Tackboard, 4'-0" x 8'-0"	1	EA	575.00	575
Markerboard, 4'-0" x 4'-0"	5	EA	400.00	2,000
Markerboard, 4'-0" x 5'-0"		EA	425.00	
Markerboard, 6'-0" x 4'-0"		EA	850.00	
Markerboard, 8'-0" x 4'-0"	38	EA	650.00	24,700
Total For Fittings and Specialty Items				**264,566**
C20 STAIRS				
C2010 Stair Construction				
C 2010 Stair Construction including railings and finish				
Learning Stairs	1	FLT	85,000.00	85,000
Egress stairs, stair 1	1	FLT	49,500.00	49,500
Egress stairs, stair 2	1	FLT	49,500.00	49,500
Egress stairs, stair OD	1	FLT	38,750.00	38,750
Mechanical platform access stair	2	FLT	17,500.00	35,000
Total For Stair Construction				**257,750**
C30 INTERIOR FINISHES				
C3010 Wall Finishes				
C3012 Wall finishes to interior walls				
Interior painting	46,007	GFA	3.88	178,507
Ceramic tile	3,629	SF	24.50	88,911
Vinyl wall covering	750	SF	12.00	9,000

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
	FRP	870	SF	15.00	13,050
	MDF Paneling	8,237	SF	31.50	259,456
	Plywood wall protection	500	SF	5.00	2,500
	Acoustical wall panels	1	ALLOW	20,000.00	20,000
	Wood window sill and chair rail	1	LS	25,000.00	25,000
	Miscellaneous finish carpentry and trim	1	LS	25,000.00	25,000
	Total For Wall Finishes				**621,424**
C3020	**Floor Finishes**				
	C3024 Flooring				
	Floor preparation	38,966	SF	0.88	34,290
	Sealed concrete	4,178	SF	2.28	9,526
	Carpet	3,715	SF	6.15	22,847
	Porcelain floor tile	839	SF	25.00	20,975
	Resilient flooring	29,151	SF	9.50	276,935
	Sheet vinyl	1,565	SF	12.00	18,780
	WOM	616	SF	17.00	10,472
	Rubber sheet flooring	3,919	SF	16.75	65,643
	Gym striping and markings	1	LS	4,898.75	4,899
	C3026 Bases, curbs and trim				
	4" Vinyl base	8,138	LF	4.14	33,691
	Ceramic Tile base	649	LF	25.00	16,225
	Total For Floor Finishes				**514,283**
C3030	**Ceiling Finishes**				
	C3031 Ceiling finishes				
	Suspended ACT and grid, 2'-0" x 4'-0"	22,419	SF	8.15	182,715
	Gypsum board over metal stud framing 5/8"	7,838	SF	10.00	78,380
	Gypsum board over metal stud framing 5/8", soffits	105	SF	19.50	2,048
	Suspended ACT and grid, 2'-0" x 4'-0", vinyl faced	1,518	SF	8.50	12,903
	Suspended acoustical hardwood ceiling system	3,233	SF	45.56	147,295
	Paint included in interior painting estimate				N/A
	Acoustical ceiling panels	565	SF	29.25	16,526
	Bulkheads & transitions	1	ALLOW	35,000.00	35,000
	Total For Ceiling Finishes				**474,867**
D10	**VERTICAL TRANSPORTATION**				
D1010	**Elevator & Lift**				
	D 1010 Elevators and Lifts				
	Hydraulic traction passenger elevator including cab finishes, 2 stops	1	EA	155,000.00	155,000
	Total For Elevator & Lifts				**155,000**
D20	**PLUMBING**				
D2010	**Plumbing**				
	220719 PLUMBING INSULATION				
	Plumbing Insulation	46,007	SF	1.84	84,538
	221116 DOMESTIC WATER PIPING				
	Domestic Water Piping	46,007	SF	7.96	366,331

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
221316 SANITARY WASTE AND VENT PIPING				
Sanitary Waste and Vent Piping	46,007	SF	6.98	321,244
Grease Interceptor, 1,500 Gallon, Below Grade Concrete Vault	1	LS	22,001.00	22,001
Grease Interceptor, Point of Use	2	EA	2,450.00	4,900
221513 GENERAL-SERVICE COMPRESSED AIR PIPING				
Compressed Air Piping	1	LS	13,475.00	13,475
222000 EARTHWORK FOR UNDERGROUND MECHANICAL SYSTEMS				
Earthwork for Underground Mechanical Systems	46,007	SF	1.04	47,905
223300 ELECTRIC HEAT PUMP WATER HEATER SYSTEM				
Electric Heat Pump Water Heater and Storage Tank	1	LS	116,375.00	116,375
80 Gallon, 36 KW, 147 GPH	3	EA	11,501.53	34,505
224200 COMMERCIAL PLUMBING FIXTURES				
Water Closets, Bowl, Flush Valve, Seat, 1.6 gpf, Wall Hung, RI	24	EA	2,588.43	62,122
Lavatory, Wall Hung, Vitreous China, 18x15, RI, Self Closing Faucet	22	EA	1,958.78	43,093
Service Sinks, Wall, 22x20, Faucet, RI	3	EA	4,109.88	12,330
Drinking Fountain, Wall Mounted, Non-Recessed, SS, Dual Level, RI	2	EA	2,715.83	5,432
Classroom Sinks, Countertop, Stainless, Faucet, Bubbler, Strainer, ADA, RI, 25x17	31	EA	2,638.65	81,798
Triple Compartment Sinks, Countertop, Stainless, Faucet, Strainer, ADA, RI	3	EA	3,960.43	11,881
Science Sink Faucet, Air Turret, RI	9	EA	1,618.23	14,564
Fiberglass Shower Stall, ADA, Grab Bar, Seat, Mixing Valve, RI	3	EA	3,392.03	10,176
Emergency Showers, Eye/Face Wash Combination, All-SS Construction	2	EA	4,928.41	9,857
Emergency Eyewash, SS, Wall Mounted	3	EA	2,666.53	8,000
Interior Hose Bibb, Hot and Cold, RI	4	EA	1,418.55	5,674
Exterior Hose Bibb, Cold, RI	5	EA	753.38	3,767
Exterior Hose Bibb, Hot and Cold, RI	1	EA	1,326.68	1,327
Misc Fixtures (CW Service Box, Instahots, Dishwasher Connections, etc.)	5	EA	1,010.63	5,053
Electronic Trap Primer Panel	4	EA	1,175.39	4,702
226600 CHEMICAL WASTE SYSTEMS FOR LABS				
Chemical Waste Systems for Science Labs (Dilution Traps)	1	LS	18,252.50	18,253
Total For Plumbing				**1,309,300**
D30 HVAC				
D3010 HVAC				
230548 VIBRATION AND SEISMIC CONTROL FOR HVAC				
Vibration and Seismic Control for HVAC	46,007	SF	0.55	25,361
230593 TESTING ADJUSTING AND BALANCING				
Testing, Adjusting and Balancing	46,007	SF	1.10	50,723
230700 MECHANICAL INSULATION				
Mechanical Insulation	46,007	SF	4.59	211,345

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
230800 COMMISSIONING SUPPORT				
Commissioning	46,007	SF	0.67	30,997
230900 INSTRUMENTATION AND CONTROL FOR HVAC				
Instrumentation and Control For HVAC	46,007	SF	12.25	563,586
232113 HYDRONIC PIPING				
Hydronic Piping	46,007	SF	14.70	676,303
232116 HYDRONIC PIPING SPECIALTIES				
Hydronic Piping Specialties	46,007	SF	3.55	163,440
232123 HYDRONIC PUMPS				
In-Line Centrifugal Hydronic Pumps				
Cast Iron, Flanged, Closed Coupled, End Suction, Bronze Impeller				
2" Size, 3 HP	2	EA	1,531.25	3,063
4" Size, 7.5 HP	4	EA	4,973.50	19,894
232500 HVAC CHEMICAL TREATMENT				
HVAC Chemical Treatment	46,007	SF	0.55	25,361
233113 METAL DUCTS				
Metal Ducts	46,007	SF	15.31	704,482
233300 AIR DUCT ACCESSORIES				
Air Duct Accessories	46,007	SF	0.67	30,997
233423 HVAC POWER VENTILATORS				
Exhaust Fans	46,007	SF	0.55	25,361
233600 AIR TERMINAL UNITS				
Air Terminal Units	1	LS	22,662.50	22,663
233713 DIFFUSERS, REGISTERS, AND GRILLES				
Diffusers, Registers, and Grilles	46,007	SF	1.35	61,994
235000 CENTRAL HEATING EQUIPMENT				
Electric Boiler	2	EA	42,262.50	84,525
236000 CENTRAL COOLING EQUIPMENT				
Air to Water Heat Pump	2	EA	187,425.00	374,850
237000 CENTRAL HVAC EQUIPMENT				
Indoor Central-Station DOAS and Air Handling Units	1	LS	318,500.00	318,500
Fan Coil Units	1	LS	259,700.00	259,700
238000 DECENTRALIZED HVAC EQUIPMENT				
Decentralized Unitary HVAC Equipment	46,007	SF	0.86	39,451
Total For HVAC				**3,692,596**

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
D40	**FIRE PROTECTION**				
D4010	**Fire Protection**				
	211300 FIRE SUPPRESSION SPRINKLER SYSTEMS				
	Fire Suppression Sprinkler Systems	50,878	GFA	6.37	324,093
	Fire Suppression Dry Sprinkler Systems	1	LS	39,200.00	39,200
	Total For Fire Sprinkler System				**363,293**
D50	**ELECTRICAL**				
D5000	**Electrical**				
	WIRE AND CABLE				
	Wire and Cable	46,007	SF	10.50	482,958
	RACEWAYS				
	Raceways	46,007	SF	9.26	426,140
	SWITCHBOARDS				
	Switchboards	2	EA	105,543.10	211,086
	PANELBOARDS				
	Panelboards	12	EA	8,027.50	96,330
	TRANFORMERS				
	Transformers	3	EA	10,003.50	30,011
	GENERATOR				
	Generator	1	EA	52,487.50	52,488
	WIRING DEVICES				
	Wiring Devices	46,007	SF	8.65	397,731
	SOLAR PHOTOVOLTAICS				
	Solar Photovoltaics	1	LS	102,505.00	102,505
	LIGHTING				
	Lighting	46,007	SF	17.29	795,461
	COMMISSIONING				
	Commissioning	46,007	SF	1.05	48,296
	VOICE AND DATA COMMUNICATIONS				
	Voice and Data Communications	46,007	SF	13.59	625,005
	AUDIO VISUAL SYSTEM				
	AV, Clock, Intercom, Public Address System	46,007	SF	7.41	340,912
	DISTRIBUTED ANTENNA SYSTEM				
	DAS System	46,007	SF	3.71	170,456
	ADDRESSABLE FIRE-ALARM SYSTEM				
	Fire Alarm System	46,007	SF	5.00	230,116

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
	SECURITY SYSTEM				
	Access Control, Intrusion Detection, Video Surveillance	46,007	SF	1.30	59,660
	RESCUE ASSISTANCE SYSTEM				
	Rescue Assistance	46,007	SF	0.80	36,932
	Total For Electrical				**4,106,085**
E10	**EQUIPMENT**				
E1010	**Equipment**				
	E1025 Audio-visual equipment				
	Projection screen at commons	1	EA	35,000.00	35,000
	85" TV, OFCI	13	EA	425.00	5,525
	E1027 Laboratory equipment				
	Fume hoods	1	EA	23,000.00	23,000
	Fume hood cabinetry	6	LF	1,180.00	7,080
	Corrosive storage cabinetry	1	EA	4,450.00	4,450
	Emergency shower station	3	EA	3,847.52	11,543
	Lab equipment and accessories				
	Lab sinks	8	EA	665.00	5,320
	Goggle sterilization units	2	EA	1,150.00	2,300
	Drying rack, epoxy	8	EA	1,010.00	8,080
	E1029 Other institutional equipment				
	Side swing basketball backstops at gymnasium	4	EA	6,000.00	24,000
	Forward folding basketball backstop at gymnasium	2	EA	11,000.00	22,000
	Volleyball standards and rack	4	EA	2,480.00	9,920
	Scoreboards, shotclocks	1	EA	30,000.00	30,000
	Wall pad @ Gym	300	SF	32.00	9,600
	Miscellaneous gym equipment (Climbing ropes, chin-up bar)	1	LS	6,800.00	6,800
	E1093 Food service equipment				
	Food service equipment - per Clevenger Associates, 8/14/25	1	LS	356,499.00	356,499
	E1094 Residential equipment				
	Main custodial				
	Washing machine	1	EA	950.00	950
	Dryers	1	EA	950.00	950
	SH Work/Office				
	Washing machine	1	EA	950.00	950
	Dryers	1	EA	950.00	950
	SPED Classroom				
	Refrigerator / Freezer	1	EA	1,850.00	1,850
	Health				
	Undercounter refrigerator	1	EA	1,250.00	1,250
	Science Prep				
	Refrigerator / Freezer	1	EA	1,850.00	1,850
	CTE Business Marketing				
	Range / Oven	2	EA	1,250.00	2,500
	Washing machine	1	EA	950.00	950
	Dryers	1	EA	950.00	950
	Student Store				
	Dishwasher	1	EA	800.00	800
	Refrigerator / Freezer	1	EA	1,850.00	1,850

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
Life Lab				
Refrigerator / Freezer	1	EA	1,850.00	1,850
Range / Oven	3	EA	1,250.00	3,750
Staff Lounge				
Refrigerator / Freezer	2	EA	1,850.00	3,700
Range / Oven	1	EA	1,250.00	1,250
Kitchen				
Refrigerator / Freezer	1	EA	1,850.00	1,850
Range / Oven	1	EA	1,250.00	1,250
Total For Equipment				**590,567**
E20 FIXED FURNISHINGS				
E2010 Fixed Furnishing				
E2012 Fixed casework				
Admin Reception				
Base Cabinet w/ P-Lam countertop	10.00	LF	555.00	5,550
Reception Desk	22.00	LF	575.00	12,650
Upper Cabinet	10.00	LF	375.00	3,750
Classrooms				
Base Cabinet w/ P-Lam countertop	95.00	LF	555.00	52,725
Cubbies	16.00	LF	350.00	5,600
Tall Cabinet	21.00	LF	585.00	12,285
Upper Cabinet	63.00	LF	375.00	23,625
Commons				
Base Cabinet w/ P-Lam countertop	6.00	LF	555.00	3,330
Trash/Recycling Enclosure	7.00	LF	525.00	3,675
Upper Cabinet	6.00	LF	375.00	2,250
Conf/Mothers				
Base Cabinet w/ P-Lam countertop	8.00	LF	555.00	4,440
Conference				
Base Cabinet w/ P-Lam countertop	6.00	LF	555.00	3,330
Corridor				
Solid Surface Countertop	10.00	LF	150.00	1,500
CTE Business Marketing				
Base Cabinet w/ P-Lam countertop	13.00	LF	555.00	7,215
Solid Surface Countertop	7.00	LF	150.00	1,050
Tall Casework	24.00	LF	585.00	14,040
Upper Cabinet	10.00	LF	375.00	3,750
CTE Storage				
Base Cabinet w/ P-Lam countertop	18.00	LF	555.00	9,990
Tall Cabinet	37.00	LF	585.00	21,645
Upper Cabinet	18.00	LF	375.00	6,750
Custodial				
FH Shelving	7.00	LF	400.00	2,800
Foodbank				
Base Cabinet w/ P-Lam countertop	18.00	LF	555.00	9,990
Upper Cabinet	18.00	LF	375.00	6,750
GED CR				
Base Cabinet w/ P-Lam countertop	19.00	LF	555.00	10,545
Tall Cabinet	6.00	LF	585.00	3,510
Upper Cabinet	18.00	LF	375.00	6,750
Grays Harbor Academy				
Tall Cabinet	3.00	LF	585.00	1,755

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
Health				
Base Cabinet w/ P-Lam countertop	11.00	LF	555.00	6,105
Upper Cabinet	11.00	LF	375.00	4,125
Infant				
Base Cabinet w/ P-Lam countertop	9.00	LF	555.00	4,995
Cubbies	10.00	LF	350.00	3,500
Tall Cabinet	3.00	LF	585.00	1,755
Upper Cabinet	9.00	LF	375.00	3,375
Int Office				
Base Cabinet w/ P-Lam countertop	3.00	LF	555.00	1,665
Tall Cabinet	3.00	LF	585.00	1,755
Kitchen				
Base Cabinet w/ P-Lam countertop	21.00	LF	555.00	11,655
Upper Cabinet	22.00	LF	375.00	8,250
Library				
3' high bookshelves	70.00	LF	425.00	29,750
FH bookshelves	6.00	LF	585.00	3,510
Library Workroom				
Base Cabinet w/ P-Lam countertop	13.00	LF	555.00	7,215
Upper Cabinet	14.00	LF	375.00	5,250
Life Lab				
Base Cabinet w/ P-Lam countertop	24.00	LF	555.00	13,320
Tall Cabinet	6.00	LF	585.00	3,510
Upper Cabinet	21.00	LF	375.00	7,875
Main Custodial				
Base Cabinet w/ P-Lam countertop	9.00	LF	555.00	4,995
Upper Cabinet	9.00	LF	375.00	3,375
Maker Space				
Base Cabinet w/ P-Lam countertop	9.00	LF	555.00	4,995
Tall Cabinet	8.00	LF	585.00	4,680
Upper Cabinet	9.00	LF	375.00	3,375
Moms				
Base Cabinet w/ P-Lam countertop	6.00	LF	555.00	3,330
PE Office				
Tall Cabinet	3.00	LF	585.00	1,755
Preschool				
Base Cabinet w/ P-Lam countertop	10.00	LF	555.00	5,550
Cubbies	11.00	LF	350.00	3,850
Tall Cabinet	3.00	LF	585.00	1,755
Upper Cabinet	9.00	LF	375.00	3,375
SAT Work				
Base Cabinet w/ P-Lam countertop	14.00	LF	555.00	7,770
Upper Cabinet	14.00	LF	375.00	5,250
Science Classroom				
Base Cabinet w/Epoxy countertop	68.00	LF	650.00	44,200
Upper Cabinet	29.00	LF	375.00	10,875
Science Prep				
Base Cabinet w/Epoxy countertop	22.00	LF	650.00	14,300
Tall Cabinet	15.00	LF	585.00	8,775
Upper Cabinet	19.00	LF	375.00	7,125
SH Work/Office				
Base Cabinet w/ P-Lam countertop	9.00	LF	555.00	4,995
Cubbies	3.00	LF	350.00	1,050
Tall Cabinet	12.00	LF	585.00	7,020
Upper Cabinet	8.00	LF	375.00	3,000

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
SPED Classroom				
Base Cabinet w/ P-Lam countertop	18.00	LF	555.00	9,990
Tall Cabinet	17.00	LF	585.00	9,945
Upper Cabinet	18.00	LF	375.00	6,750
Staff Lounge				
Base Cabinet w/ P-Lam countertop	11.00	LF	555.00	6,105
Solid Surface Countertop	9.00	LF	150.00	1,350
Upper Cabinet	11.00	LF	375.00	4,125
Staff Workroom				
Base Cabinet w/ P-Lam countertop	26.00	LF	555.00	14,430
Mailboxes	9.00	LF	450.00	4,050
Tall Cabinets	9.00	LF	585.00	5,265
Upper Cabinet	28.00	LF	375.00	10,500
Storage				
Base Cabinet w/ P-Lam countertop	11.00	LF	555.00	6,105
Upper Cabinet	11.00	LF	375.00	4,125
Student Store				
Base Cabinet w/ P-Lam countertop	12.00	LF	555.00	6,660
Upper Cabinet	9.00	LF	375.00	3,375
Toddler				
Base Cabinet w/ P-Lam countertop	9.00	LF	555.00	4,995
Cubbies	10.00	LF	350.00	3,500
Tall Cabinet	3.00	LF	585.00	1,755
Upper Cabinet	9.00	LF	375.00	3,375
Miscellaneous casework & fillers	46,007.0	GFA	0.50	23,004
E2013 Blinds and other window treatments				
Window treatments, manual	5,400	SF	15.50	83,700
Premium for motorized window treatments	1	LS	35,000.00	35,000
Total For Fixed Furnishings				**762,359**

F10 SPECIAL STRUCTURES

F1010 Special Structure

No work anticipated N/A

Total For Special Structure

F1020 Special Construction

No work anticipated N/A

Total For Special Construction

ABERDEEN SCHOOL DISTRICT
HARBOR LEARNING CENTER
ABERDEEN, WA
SCHEMATIC DESIGN ESTIMATE
SITEWORK **ELEMENTAL ESTIMATE SUMMARY** **DATE: September 8, 2025**

RC COST GROUP

No.	ELEMENT DESCRIPTION		ELEMENT TOTAL	GROUP TOTAL
G10	SITE PREPARATION			$ 574,925
G1010	Site Clearing		$ 274,000	
G1020	Site Demolition and Relocations		$ 78,905	
G1030	Site Earthwork		$ 222,020	
G1040	Hazardous Waste Remediation		$ -	
G20	SITE IMPROVEMENTS			$ 1,655,360
G2010	Roadways		$ -	
G2020	Parking Lots		$ -	
G2030	Pedestrian Paving		$ 489,255	
G2040	Site Development		$ 661,405	
G2050	Landscaping		$ 504,700	
G30	SITE MECHANICAL UTILITIES			$ 2,202,540
G3010	Water Supply		$ 286,700	
G3020	Sanitary Sewer		$ 73,500	
G3030	Storm Sewer		$ 1,842,340	
G3040	Heating Distribution		$ -	
G3050	Cooling Distribution		$ -	
G3060	Fuel Distribution		$ -	
G3090	Other Site Mechanical Utilities		$ -	
G40	SITE ELECTRICAL UTILITIES			$ 461,878
G4010	Electrical Distribution		$ 368,018	
G4020	Site Lighting		$ 49,400	
G4030	Site Communications and Security		$ 44,460	
G4090	Other Site Electrical Utilities		$ -	
	Sub-Total Direct Cost			**$ 4,894,703**
	General Conditions/General Requirements	9.00%		$ 440,523
	Sub-Total			**$ 5,335,226**
	Estimating / Design Contingency	10.00%		$ 533,523
	Sub-Total			**$ 5,868,748**
	General Contractor's Overhead and Profit	5.50%		$ 322,781
	Sub-Total			**$ 6,191,530**
	Escalation: July 2026	2.76%		$ 170,954
	TOTAL CONSTRUCTION COST			**$ 6,362,483**

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
G10	**SITE PREPARATION**				
G1010	**Site Clearing**				
	G1010 Clearing & Grubbing				
	Mobilization (8% of total cost)	1	LS	260,000.00	260,000
	G1012 Tree removal and thinning				
	Tree Removal	4	EA	3,500.00	14,000
	Total For Site Clearing				**274,000**
G1020	**Site Demolition and Relocations**				
	G1022 Demolition of Site Components				
	Sawcut	830	LF	10.00	8,300
	Asphalt Removal (incl. haul off-site)	150	SY	150.00	22,500
	Concrete Sidewalk Removal	47	SY	45.00	2,115
	Curb Removal	945	LF	10.00	9,450
	Statue Removal and Relocation	1	EA	10,000.00	10,000
	Fence Removal	938	LF	10.00	9,380
	Storm Drain Removal	479	LF	15.00	7,185
	Catch Basin Removal	4	EA	500.00	2,000
	Water Line Removal	305	LF	15.00	4,575
	Sewer Manhole Removal	1	EA	1,000.00	1,000
	Sewer Line Removal	160	LF	15.00	2,400
	Total For Site Demolition and Relocations				**78,905**
G1030	**Site Earthwork**				
	G1030 Site Earthwork				
	Site Earthwork Cut (incl. haul Off-Site)	3,200	CY	45.00	144,000
	Site Earthwork Import	1,500	CY	45.00	67,500
	G1037 Erosion Control				
	Silt Fence	1,964	LF	5.00	9,820
	Tree Protection Fence	140	LF	5.00	700
	Total For Site Earthwork				**222,020**
G1040	**Hazardous Waste Remediation**				
	No work anticipated				N/A
	Total For Hazardous Waste Remediation				
G20	**SITE IMPROVEMENTS**				
G2010	**Roadways**				
	G2012 Paving and surfacing				
	Included in G2031				N/A
	Total For Roadways				
G2020	**Parking Lots**				
	G 2020 Parking Lots				
	Included in G2031				N/A
	Total For Parking Lots				

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
G2030	**Pedestrian Paving**				
	G2031 Paving and surfacing				
	Asphalt Paving	1,085	TON	150.00	162,750
	CSBC	1,330	TON	50.00	66,500
	Concrete Sidewalk	75	CY	300.00	22,500
	CSTC	80	TON	50.00	4,000
	Concrete Curb	1,977	LF	65.00	128,505
	Cast In-place Wall	1,600	SF	50.00	80,000
	Signage	1	LS	10,000.00	10,000
	Paint Striping	1	LS	15,000.00	15,000
	Total For Pedestrian Paving				**489,255**
G2040	**Site Development**				
	G2040 Site Development				
	Engineered Wood Fiber	100	SF	5.00	500
	Synthetic Turf (pad/turf/infill)	1	EA	5,000.00	5,000
	Synthetic Turf Installation (including base prep)	300	SF	20.00	6,000
	Perf Pipe Drainage Trenches at Play Synthetic Turf	70	LF	35.00	2,450
	Cleanout at Courtyard Synthetic Turf	1	EA	250.00	250
	Synth. Turf Play field Nailer Board	70	LF	8.00	560
	Crushed Rock Surfacing, 4" base course, 2" top course	500	SF	5.50	2,750
	Concrete at Play Areas	1,500	SF	20.00	30,000
	G2041 Fences and gates				
	6' HT Black Coated Chainlink Fence	510	LF	85.00	43,350
	4' HT Black Coated Chainlink Fence	215	LF	65.00	13,975
	4' HT Black Coated Chainlink Gate, 4' wide	2	EA	1,500.00	3,000
	6' HT Black Coated Chainlink Gate, 4' wide	1	EA	2,000.00	2,000
	6' HT Black Coated Chainlink Gate, 12' wide double swing	1	EA	9,000.00	9,000
	6' HT Black Coated Chainlink Gate, 18' wide double swing	1	EA	15,000.00	15,000
	8' HT x 14'-0" Wide Custom Fabricated Metal Gate	1	EA	22,000.00	22,000
	G2042 Retaining walls / Site Walls				
	Concrete retaining wall, 12' high	1,800	SF	85.00	153,000
	Retaining wall footing	42	CY	875.00	36,750
	CMU Wall w/ Brick Veneer, 10' high	990	SF	78.00	77,220
	CMU wall footing	22	CY	875.00	19,250
	Precast cap	99	LF	115.00	11,385
	Concrete seat wall, 4' high	552	SF	85.00	46,920
	Concrete seat wall footing	11	CY	875.00	9,625
	G2044 Signage				
	Exterior site signage	1	LS	28,000.00	28,000
	Relocate School Rock, bronze sculpture, corner stone	1	EA	10,000.00	10,000
	G2045 Site furnishings				
	6" dia. Galvanized steel bollard, powder coated	9	EA	830.00	7,470
	1 Ton to 2 Ton Igneous Boulders	60	TON	200.00	12,000
	Recycling and Trash Receptacle	10	EA	1,500.00	15,000
	CIP Concrete flagpole plinth	45	CF	90.00	4,050
	CIP Concrete stage plinth at amphitheater	135	CF	90.00	12,150
	Benches	5	EA	3,000.00	15,000
	Picnic Table	2	EA	5,000.00	10,000
	Bicycle Parking	5	EA	550.00	2,750

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
	G2047 Playfields				
	Asphalt Play Area Striping	1	EA	10,000.00	10,000
	Play Structure at Preschool Play area	1	EA	15,000.00	15,000
	G2048 Flagpoles				
	Flagpole and footing	1	EA	10,000.00	10,000
	Total For Site Development				**661,405**
G2050	**Landscaping**				
	G2055 Planting				
	Imported Topsoil Type A (18" at planting areas)	1,800	CY	60.00	108,000
	Imported Topsoil Type B (12" bioretention, 6" sand)	190	CY	70.00	13,300
	Mulch (2"-3" depth)	300	CY	35.00	10,500
	Seed - Lawn	3,350	SF	1.00	3,350
	Perennial & Shrub Container Stock Planting	32,200	SF	7.00	225,400
	Trees	65	EA	500.00	32,500
	G2057 Irrigation system				
	Automatic Irrigation System - Shrubs+Perennial	32,200	SF	3.00	96,600
	Automatic Irrigation System - Lawn	3,350	SF	3.00	10,050
	Master valve, flow sensor, QCV, etc.	1	EA	2,500.00	2,500
	Controller	1	EA	2,500.00	2,500
	Total For Landscaping				**504,700**
G30	**SITE MECHANICAL UTILITIES**				
G3010	**Water Supply**				
	G3010 Water Utilities				
	8" Water Main	670	LF	260.00	174,200
	6" Fire Line	75	LF	220.00	16,500
	4" Water Service Line	75	LF	200.00	15,000
	3" Water Meter	1	EA	20,000.00	20,000
	Potable Water Backflow Device	1	EA	5,000.00	5,000
	Fire Department Connection	1	EA	3,000.00	3,000
	Post Indicator Valve	1	EA	3,000.00	3,000
	Fire Hydrant	1	EA	10,000.00	10,000
	Connect to Existing Water Main	4	EA	10,000.00	40,000
	Total For Water Supply				**286,700**
G3020	**Sanitary Sewer**				
	G3020 Sanitary Sewer				
	6" Sanitary Sewer Pipe	260	LF	200.00	52,000
	Grease Interceptor	1	EA	10,000.00	10,000
	Sewer Cleanout	2	EA	750.00	1,500
	Connect to Existing Sewer Main	2	EA	5,000.00	10,000
	Total For Sanitary Sewer				**73,500**
G3030	**Storm Sewer**				
	G3030 Storm Sewer				
	12" PVC Storm Drain	2,473	LF	80.00	197,840
	6" Storm Drain Line	850	LF	65.00	55,250
	4" Footing Drain	900	LF	55.00	49,500
	Rainvault #1	12,600	CF	30.00	378,000

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
	RainVault #2	10,500	CF	30.00	315,000
	RainVault #3	16,125	CF	30.00	483,750
	RainVault #4	1,950	CF	30.00	58,500
	Basic Treatment System	4	EA	60,000.00	240,000
	Type 1 Catch Basin	4	EA	3,000.00	12,000
	Storm Drain Cleanout	5	EA	750.00	3,750
	Total For Storm Sewer				**1,842,340**
G3040	**Heating Distribution**				
	No work anticipated				N/A
	Total For Heating Distribution				
G3050	**Cooling Distribution**				
	No work anticipated				N/A
	Total For Cooling Distribution				
G3060	**Fuel Distribution**				
	No work anticipated				N/A
	Total For Fuel Distribution				
G3090	**Other Site Mechanical Utilities**				
	No work anticipated				N/A
	Total For Other Site Mechanical Utilities				
G40	**SITE ELECTRICAL UTILITIES**				
G4010	**Electrical Distribution**				
	G 4010 Electrical Distribution				
	UTILITIES				
	Utilities, Conduits, Vaults, Trenching, Backfill	1	LS	216,125.00	216,125
	EV CHARGING				
	EV Chargers, Pathway	4	LS	10,003.50	40,014
	Trenching and Backfill	450	LF	18.53	8,336
	Underground Conduit	2,000	LF	5.03	10,053
	Ground Wire	2,000	LF	6.18	12,350
	Wire	4,000	LF	10.56	42,237
	Junction Boxes	6	EA	4,322.50	25,935
	Electrical Panel	1	EA	12,967.50	12,968
	Total For Electrical Distribution				**368,018**
G4020	**Site Lighting**				
	G 4020 Site Lighting				
	Lighting	1	LS	49,400.00	49,400
	Total For Site Lighting				**49,400**

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
G4030	**Site Communications and Security**				
	G 4030 Site Communications and Security				
	FIBER CONNECTION TO MAIN CAMPUS				
	Fiber Pathway, Trenching, Backfill	1	LS	44,460.00	44,460
	Total For Site Communications and Security				**44,460**
G4090	**Other Site Electrical Utilities**				
	G4092 Site emergency power generation				
	Emergency service and distribution				INCL IN BLDG
	Total For Other Site Electrical Utilities				

ABERDEEN SCHOOL DISTRICT
HARBOR LEARNING CENTER
ABERDEEN, WA
SCHEMATIC DESIGN ESTIMATE
OFF-SITE IMPROVEMENTS **ELEMENTAL ESTIMATE SUMMARY** **DATE: September 8, 2025**

No.	ELEMENT DESCRIPTION		ELEMENT TOTAL	GROUP TOTAL
G10	SITE PREPARATION			$ 39,860
G1010	Site Clearing		$ -	
G1020	Site Demolition and Relocations		$ 39,860	
G1030	Site Earthwork		$ -	
G1040	Hazardous Waste Remediation		$ -	
G20	SITE IMPROVEMENTS			$ 178,270
G2010	Roadways		$ 178,270	
G2020	Parking Lots		$ -	
G2030	Pedestrian Paving		$ -	
G2040	Site Development		$ -	
G2050	Landscaping		$ -	
G30	SITE MECHANICAL UTILITIES			$ -
G3010	Water Supply		$ -	
G3020	Sanitary Sewer		$ -	
G3030	Storm Sewer		$ -	
G3040	Heating Distribution		$ -	
G3050	Cooling Distribution		$ -	
G3060	Fuel Distribution		$ -	
G3090	Other Site Mechanical Utilities		$ -	
G40	SITE ELECTRICAL UTILITIES			$ -
G4010	Electrical Distribution		$ -	
G4020	Site Lighting		$ -	
G4030	Site Communications and Security		$ -	
G4090	Other Site Electrical Utilities		$ -	
	Sub-Total Direct Cost			**$ 218,130**
	General Conditions/General Requirements	9.00%		$ 19,632
	Sub-Total			**$ 237,762**
	Estimating / Design Contingency	10.00%		$ 23,776
	Sub-Total			**$ 261,538**
	General Contractor's Overhead and Profit	5.50%		$ 14,385
	Sub-Total			**$ 275,922**
	Escalation: July 2026	2.76%		$ 7,618
	TOTAL CONSTRUCTION COST			**$ 283,541**

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
G10	**SITE PREPARATION**				
G1010	**Site Clearing**				
	Included in Site Demolition				N/A
	Total For Site Clearing				
G1020	**Site Demolition and Relocations**				
	C1020 Site Demolition				
	Site Demolition				
	Sawcut	1,043	LF	10.00	10,430
	Asphalt Removal (incl. haul off-site)	92	SY	150.00	13,800
	Concrete Sidewalk Removal	110	SY	45.00	4,950
	Curb Removal	1,068	LF	10.00	10,680
	Total For Site Demolition and Relocations				**39,860**
G1030	**Site Earthwork**				
	Included in Site Demolition				N/A
	Total For Site Earthwork				
G1040	**Hazardous Waste Remediation**				
	No work anticipated				N/A
	Total For Hazardous Waste Remediation				
G20	**SITE IMPROVEMENTS**				
G2010	**Roadways**				
	G2012 Paving and surfacing				
	Asphalt Paving	170	TON	150.00	25,500
	Traffic Curb	1,658	LF	65.00	107,770
	Concrete Sidewalk	60	CY	300.00	18,000
	CSTC	80	CY	50.00	4,000
	ADA Ramp	4	EA	2,500.00	10,000
	Driveway Entrance	2	EA	3,500.00	7,000
	Striping	1	LS	6,000.00	6,000
	Total For Roadways				**178,270**
G2020	**Parking Lots**				
	No work anticipated				N/A
	Total For Parking Lots				
G2030	**Pedestrian Paving**				
	No work anticipated				N/A
	Total For Pedestrian Paving				
G2040	**Site Development**				
	No work anticipated				N/A
	Total For Site Development				

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
G2050	**Landscaping**				
	No work anticipated				N/A
	Total For Landscaping				
G30	**SITE MECHANICAL UTILITIES**				
G3010	**Water Supply**				
	No work anticipated				N/A
	Total For Water Supply				
G3020	**Sanitary Sewer**				
	No work anticipated				N/A
	Total For Sanitary Sewer				
G3030	**Storm Sewer**				
	No work anticipated				N/A
	Total For Storm Sewer				
G3040	**Heating Distribution**				
	No work anticipated				N/A
	Total For Heating Distribution				
G3050	**Cooling Distribution**				
	No work anticipated				N/A
	Total For Cooling Distribution				
G3060	**Fuel Distribution**				
	No work anticipated				N/A
	Total For Fuel Distribution				
G3090	**Other Site Mechanical Utilities**				
	No work anticipated				N/A
	Total For Other Site Mechanical Utilities				
G40	**SITE ELECTRICAL UTILITIES**				
G4010	**Electrical Distribution**				
	No work anticipated				N/A
	Total For Electrical Distribution				
G4020	**Site Lighting**				
	No work anticipated				N/A
	Total For Site Lighting				

	ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
G4030	**Site Communications and Security**				
	No work anticipated				N/A
	Total For Site Communications and Security				
G4090	**Other Site Electrical Utilities**				
	No work anticipated				N/A
	Total For Other Site Electrical Utilities				

ABERDEEN SCHOOL DISTRICT
HARBOR LEARNING CENTER
ABERDEEN, WA
SCHEMATIC DESIGN ESTIMATE
ALTERNATES

Date: **September 8, 2025**

COST GROUP

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
1. WSSP IEQ 4.1 Improved Acoustical Performance				
C3012 Wall finishes to interior walls				
Acoustical panel, 2"	1,500	SF	28.50	42,750
Acoustical panel, 1"	460	SF	22.50	10,350
C3024 Flooring				
Acoustical underlayment	10,800	SF	5.58	60,264
C3031 Ceiling finishes				
Premium for acoustically improved ACT	26,709	SF	1.53	40,865
D3041 Air distribution systems				
Provide enhanced ductwork silencers & linings	1	LS	15,000.00	15,000
Sub-Total Direct Cost				**169,229**
General Conditions/General Requirements	9.00%			15,231
Sub-Total				**184,459**
Estimating / Design Contingency	7.50%			13,834
Sub-Total				**198,294**
General Contractor's Overhead and Profit	5.50%			10,906
Sub-Total				**209,200**
Escalation: July 2026	2.76%			5,776
TOTAL CONSTRUCTION COST				**214,976**
2. Type V-B Wood Framing (fully sprinklered)				
DDT				
B1012 Upper floors construction				
Floor Structure				
Structural steel beams at floor	(331,468)	LBS	3.40	(1,126,990)
Steel floor deck	(18,941)	SF	6.65	(125,958)
Topping slab	(18,941)	SF	8.40	(159,104)
Misc. structural steel/plates/connections	(49,720)	LB	3.40	(169,048)
Brace frames				
BRB	(66)	EA	4,750.00	(313,500)
B1020 Roof construction				
Roof Structure				
Structural steel columns & beams at roof	(307,422)	LBS	3.40	(1,045,235)
Steel roof deck	(34,158)	SF	6.50	(222,027)
Misc. structural steel/plates/connections	(46,113)	LB	3.40	(156,785)
ADD				
B1012 Upper floors construction				
Floor Structure				
Wood framing	18,941	SF	34.50	653,465
Plywood sheathing, 3/4" thick	18,941	SF	4.75	89,970
Concrete topping	18,941	SF	5.58	105,691

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
B1020 Roof construction				
Roof Structure				
Wood framing	34,158	SF	33.75	1,152,833
Plywood sheathing, 3/4" thick	27,782	SF	4.75	131,965
Premium for CLT Panels	6,376	SF	24.80	158,125
Builders Risk Premium	0.24%	LS	37,495,723.11	89,990
Sub-Total Direct Cost				**(936,610)**
General Conditions/General Requirements	9.00%			(84,295)
Sub-Total				**(1,020,905)**
Estimating / Design Contingency	7.50%			(76,568)
Sub-Total				**(1,097,473)**
General Contractor's Overhead and Profit	5.50%			(60,361)
Sub-Total				**(1,157,834)**
Escalation: July 2026	2.76%			(31,969)
TOTAL CONSTRUCTION COST				**(1,189,803)**

3. Service Yard Finishes

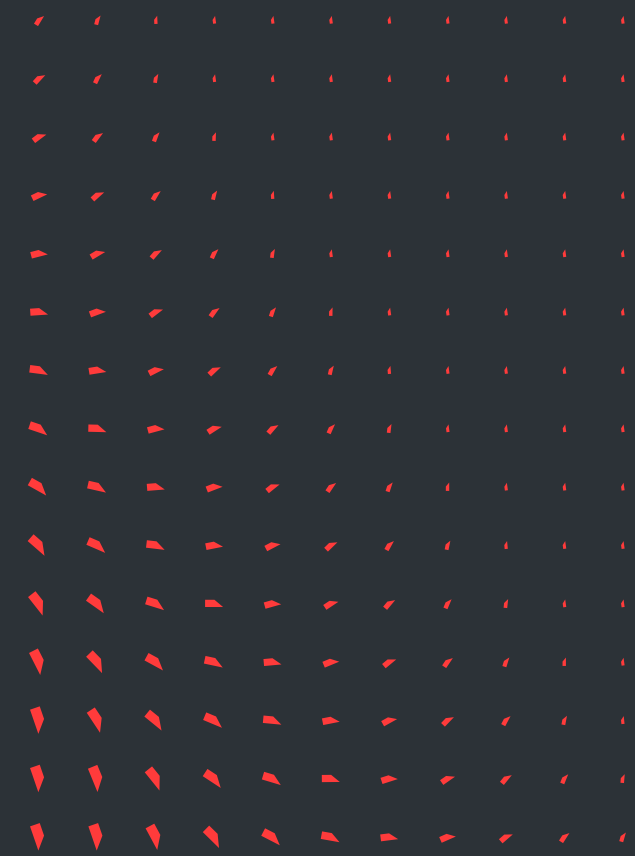
G2041 Fences and gates				
8' HT x 14'-0" Wide Custom Fabricated Metal Gate	(1)	EA	22,000.00	(22,000)
8' HT x 14'-0" Wide Pre-Engineered Metal Gate	1	EA	15,000.00	15,000
G2042 Retaining walls / Site Walls				
CMU Wall w/ Brick Veneer, 10' high	(990)	SF	42.00	(41,580)
Precast cap	(99)	LF	115.00	(11,385)
Add Smooth Finish	990	SF	5.00	4,950
Sheetmetal cap	99	LF	38.00	3,762
Sub-Total Direct Cost				**(51,253)**
General Conditions/General Requirements	9.00%			(4,613)
Sub-Total				**(55,866)**
Estimating / Design Contingency	7.50%			(4,190)
Sub-Total				**(60,056)**
General Contractor's Overhead and Profit	5.50%			(3,303)
Sub-Total				**(63,359)**
Escalation: July 2026	2.76%			(1,749)
TOTAL CONSTRUCTION COST				**(65,108)**

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
4. Replace Fiberglass Windows with Storefront Windows				
DDT				
Windows, fiberglass	(3,097)	SF	88.90	(275,323)
ADD				
Windows, storefront	3,097	SF	85.00	263,245
Sub-Total Direct Cost				**(12,078)**
General Conditions/General Requirements	9.00%			(1,087)
Sub-Total				**(13,165)**
Estimating / Design Contingency	7.50%			(987)
Sub-Total				**(14,153)**
General Contractor's Overhead and Profit	5.50%			(778)
Sub-Total				**(14,931)**
Escalation: July 2026	2.76%			(412)
TOTAL CONSTRUCTION COST				**(15,343)**
5. Curtain Wall Reduction				
DDT				
Curtain wall (excludes door openings)	(3,365)	SF	130.00	(437,450)
ADD				
Storefront (excludes door openings) (excludes interior storefront)	3,365	SF	85.00	286,025
Sub-Total Direct Cost				**(151,425)**
General Conditions/General Requirements	9.00%			(13,628)
Sub-Total				**(165,053)**
Estimating / Design Contingency	7.50%			(12,379)
Sub-Total				**(177,432)**
General Contractor's Overhead and Profit	5.50%			(9,759)
Sub-Total				**(187,191)**
Escalation: July 2026	2.76%			(5,169)
TOTAL CONSTRUCTION COST				**(192,360)**
6. Add waterproof membrane system below SOG				
Waterproof membrane	30,330	SF	4.25	128,903
Sub-Total Direct Cost				**128,903**
General Conditions/General Requirements	9.00%			11,601
Sub-Total				**140,504**
Estimating / Design Contingency	7.50%			10,538
Sub-Total				**151,042**
General Contractor's Overhead and Profit	5.50%			8,307
Sub-Total				**159,349**
Escalation: July 2026	2.76%			4,400
TOTAL CONSTRUCTION COST				**163,749**

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT COST	TOTALS
6. Alternate Teaching Wall Casework				
DDT				
Base Cabinet w/ P-Lam countertop	(63.00)	LF	555.00	(34,965)
Upper Cabinet	(63.00)	LF	375.00	(23,625)
Markerboard, 8'-0" x 4'-0"	(14)	EA	650.00	(9,100)
ADD				
Base Cabinet w/ P-Lam countertop	140.00	LF	555.00	77,700
Shelving	168.00	LF	85.00	14,280
Markerboard, 4'-0" x 4'-0"	14	EA	400.00	5,600
Markerboard, 6'-0" x 4'-0", on rails	14	EA	1,050.00	14,700
Sub-Total Direct Cost				**44,590**
General Conditions/General Requirements	9.00%			4,013
Sub-Total				**48,603**
Estimating / Design Contingency	7.50%			3,645
Sub-Total				**52,248**
General Contractor's Overhead and Profit	5.50%			2,874
Sub-Total				**55,122**
Escalation: July 2026	2.76%			1,522
TOTAL CONSTRUCTION COST				**56,644**

TCF

II. Value Engineering Options



Item	V/E Team Function Number	Accepted or Rejected	Description	Design Team Cost	Cost w/ Markup	Rejected Cost	Recommended Cost	Accepted Cost	Alt Bid / Allowance	Notes/Remarks
Note Regarding Markups: Sazan suggested V/E items include the markup cost in their proposed estimates. RC also included markup costs in specific alternate items proposed.				Markup =	1.2476					
				HIGHLIGHTED ITEMS WERE ESTIMATED BY SAZAN WITH MARKUPS ALREADY ASSOCIATED	HIGHLIGHTED ITEMS WERE ESTIMATED BY SAZAN WITH MARKUPS ALREADY ASSOCIATED			Green Highlighted Items have been accepted.		
SITE					-$1,949,000	-$189,000	-$1,760,000	-$1,760,000		
C1 Site Layout					-$254,000	-$189,000	-$65,000	-$65,000		
C1a	GS-60	**REJECTED**	Regrade northeast slope and eliminate retaining wall.	-$22,000	-$22,000	-$22,000	$0	$0	$0	Was requested specifically by the school district.
C1b	PV-101	**ACCEPTED**	Use angled parking with a landscape strip on western side of parking lot and remove/reduce site wall.	-$65,000	-$65,000	$0	-$65,000	-$65,000	$0	Angled parking will not fully remove the wall, but it will reduce it in size to just 2'-0" in height. Will need to add a single parking stall to the 4th Street Lot Addition. Need verification from district about a 2:1 slope for planting area.
C1c	OS-96	**REJECTED**	Eliminate back north retaining wall and walkway.	-$167,000	-$167,000	-$167,000	$0		$0	Removal of this wall will place more risk on the building system as it moves the waterproof membrane to the foundation wall. The seismic loads will also increase as this wall will need to resist lateral forces from the sloping grade. This will likely net as a cost increase. Owner desires a maintenance path around the perimeter of the building.
C2 Utilities					$0	$0	$0	$0	$0	
C2a					$0	$0	$0	$0	$0	
C3 Stormwater Detention Options					-$1,569,000	$0	-$1,569,000	-$1,569,000	$0	
C3a	MS-80	**ACCEPTED**	Eliminate detention for stormwater runoff.	-$1,569,000	-$1,569,000	$0	-$1,569,000	-$1,569,000	$0	Civil engineer has confirmed calculations and has forwarded to City Engineer for verifications. Note that pricing will also include additional pipe sizing. Cost item is being confirmed by the city engineer.
L1 Landscape					-$126,000	$0	-$126,000	-$126,000	$0	
L1a	LS-72	**ACCEPTED**	Reduce landscape budget by 25%.	-$126,000	-$126,000	$0	-$126,000	-$126,000	$0	Can be reduced without removal of primary scope.
BUILDING					-$8,071,713	-$7,394,703	-$247,931	-$247,931	-$427,628	
ARCHITECTURAL					-$2,821,713	-$2,498,703	-$292,931	-$292,931	-$427,628	
A1 Building Exterior					-$813,758	-$968,398	$154,639	$154,640	-$216,691	
A1a	ES-26	**REJECTED**	Reduce the extent of brick veneer at the north elevation.	-$40,000	-$40,000	-$40,000	$0	$0	$0	Replace brick veneer @ $46.50/SF with Metal siding @ $39.50/SF: Total difference @ $7/SF Assume reduction at 1,000 SF total savings at $7,000
A1b	SL-131	**ACCEPTED**	Install complete drainage under building slab t prevent heaving from expansive soils.	$250,000	$250,000	$0	$250,000	$250,000	$0	Need to be verified by Geotechnical Study Added for cost tracking
A1c	Alt-6	**ACCEPTED**	Add waterproof membrane system under the slab	$163,749	$163,749	$0	$163,749	$163,749	$0	Added for cost tracking
A1d	Alt-7	**ACCEPTED / ALTERNATE**	Reduce service yard finishes to CMU block only and "Ameristar" type pre-manufactured fencing	-$65,108	-$65,108	$0	-$65,108	-$65,108	-$65,108	Carry as a possible future alternate if budget allows
A1e	B2016	**ACCEPTED / ALTERNATE**	Exterior wood finished soffits: Remove wood soffits from the main building roof overhangs, but keep at the entry canopies	-$121,500	-$151,583	$0	-$151,583	-$151,583	-$151,583	Assume 2700 SF of overhang Possible future Alternate
A1f	B2016	**REJECTED**	Exterior wood finished soffits: Remove wood soffits from the entry canopies only	-$128,565	-$160,398	-$160,398	$0	$0	$0	Assume 2857 SF from estimate of area
A1g	ES-19	**REJECTED**	Use a low slope roof at the gym and lower the overall height.	-$236,000	-$236,000	-$236,000	$0	$0	$0	District requested to minimize low-slope roof locations.
A1h	ES-20	**REJECTED**	Reduce the overall building and roof height at the classroom wing.	-$532,000	-$532,000	-$532,000	$0	$0	$0	Reduction of 3' total - Note Metrix engineers has noted that this area will be required for duct routing in the attic area. Owner desires maxium access to the attic area for service of mechanical equipment.
A1g	Alt-8	**ACCEPTED**	Remove portion of roofing over covered deck on second floor.	-$34,000	-$42,418	$0	-$42,418	-$42,418	$0	Remove a portion of about 1/3 of the roof over the covered outdoor decking area at the second floor Assume: 340 SF of roof removal to include the following Roof Type 36.50/SF Structure: 18.45/SF Finish Soffit: 45/SF Total cost 100/SF
A2 Flooring					-$111,000	-$111,000	$0	$0	$0	
A2a	FM-41	**REJECTED**	Use polished concrete on first floor corridors and commons	-$45,000	-$45,000	-$45,000	$0	$0	$0	Owner requested no polished concrete flooring due to issues with soil settlement and cracking in other schools
A2b	FM-40	**REJECTED**	Use polished concrete ILO VCT/resilient in the corridors and commons on both floors.	-$66,000	-$66,000	-$66,000	$0	$0	$0	Owner requested no polished concrete flooring due to issues with soil settlement and cracking in other schools
A3 Walls					-$726,000	-$561,000	-$165,000	-$165,000	-$165,000	
A3a	FI-51	**REJECTED**	FRP wall finish ILO ceramic tiling in bathrooms.	-$58,000	-$58,000	-$58,000	$0	$0	$0	Owner requested ceramic tile wainscotting for maximum durability in bathroom areas.
A3b	FI-52 / C3012	**ACCEPTED / ALTERNATE**	Reduce quantity of MDF paneling by 50%.	-$165,000	-$165,000	$0	-$165,000	-$165,000	-$165,000	Can reduce MDF at corridors from 8'-0" to 3'-6" in height: 8,237 SF to 4,118 SF Savings per cost estimate is $129,728. Item saved for possible future alternate.
A3c	ES-24	**REJECTED**	Replace brick veneer with architectural CMU.	-$104,000	-$104,000	-$104,000	$0	$0	$0	Brick matches other district buildings and creates parity with the quality of materials between schools
A3d	EC-33	**REJECTED**	Apply wood exterior ILO brick at prominent elevations.	-$322,000	-$322,000	-$322,000	$0	$0	$0	District only allows exterior wood in selected weather protected areas such as soffits.
A3e	ES-18	**REJECTED**	Use brick veneer at major entrances and most visible façades and an alternative enclosure material elsewhere.	-$77,000	-$77,000	-$77,000	$0	$0	$0	Continuous brick wainscoting is important for durability and character for the school
A4 Ceilings					-$45,937	$0	-$45,937	-$45,937	-$45,937	

A4a	C3030	ACCEPTED / ALTERNATE	Reduce quantity of wood ceiling finishes by 25%	-$36,820	-$45,937	$0	-$45,937	-$45,937	-$45,937	After review a portion (800 SF) can be removed with minimal impacts to the overall design. Wood ceilings will be focused in the primary commons and entry spaces. Will be maintained as a design alternate. Assumption: 3,233 SF baseline - Subtract 25% or 808 SF
A5 Openings					-$1,195,210	-$1,073,282	-$255,850	-$255,850	$0	
A5a.1	ES-21 / B2022	ACCEPTED	Replace Aluminum Curtain wall with Storefront	-$151,425	-$188,918	-$170,026	-$170,026	-$170,026	$0	Remove curtain wall assemblies, replace with storefront that is steel supported. Assumptions: Note: Design team cost of 192,360 used in lieu of VE team number Total Curtain wall area: 3,365 SF @ 130/SF Fiberglass cost: 89/SF - 41 diff SF cost: 85/SF - 45 diff Assume additional steel and footing costs at 10%
A5a.2	ES-21 / B2022	REJECTED	Replace Aluminum Curtain wall with Fiberglass	-$137,965	-$172,125	-$154,913	$0	$0	$0	See note above: This is an alternate option and cannot be accepted with A5a.1
A5b	ES-25	REJECTED	Reduce glazing on south elevation by 20%.	-$522,000	-$522,000	-$522,000	$0	$0	$0	Large portion of glazing reduction: Note that item A5h is the preferred glazing reduction option.
A5c	ES-28	REJECTED	Use an aluminum window system ILO fiberglass.	-$24,000	-$24,000	-$24,000	$0	$0	$0	Not enough savings to justify the the lower performing aluminum window systems.
A5d	B2014	ACCEPTED	Remove all exterior sun shade control devices	-$15,355	-$19,157	$0	-$19,157	-$19,157	$0	Exterior sun shades were minimally sized and not effective enough depth to be effective
A5e	C1017	ACCEPTED	Reduce interior Storefront glazing by 20%	-$17,400	-$21,708	$0	-$21,708	-$21,708	$0	Assume some portion is replaced with hollow metal. 1232 SF total of storefront @ $75/SF Reduce to 1000 SF
A5f	ES-27		Eliminate the five clerestories on the south elevation.	-$109,000	-$109,000	-$109,000				
A5g	ES-22		Over long window spans, use metal siding ILO masonry veneer.	-$38,000	-$38,000	-$38,000				
A5h	ES-26		Reduce the extent of brick veneer at the north elevation.	-$40,000	-$40,000	-$40,000				
A5g	Design Team Alternate		Replace Fiberglass Windows with Storefront Windows	-$15,343	-$15,343	-$15,343				
A5h	Design Team Alternate		Reduce total Fiberglass window area (per diagram)	-$36,036	-$44,959		-$44,959	-$44,959		Assume 728SF of window @ 89/SF replaced with metal siding @ 39.50/SF or brick at 49.50/SF
A6 Vertical Circulation					$0	$0	$0	$0	$0	
A6a					$0					
A7 Casework					-$107,356	$0	$56,644	$56,644	$0	
A7a	FI-50	REJECTED	Reduce casework by 20%.	-$164,000	-$164,000	$0	$0	$0	$0	Will required greater detail of coordination with district staff. This item will be reserved for further development during design development
A7b	Design Team Alternate	ACCEPTED	Revise typical classroom casework to sliding marker board option	$56,644	$56,644	$0	$56,644	$56,644	$0	This was a highly desired item for the district.
A8 Signage					$0	$0	$0	$0	$0	
A8a					$0					
A9 Equipment & Misc					$177,548	$214,976	-$37,428	-$37,428	$0	
A9a	Design Team Alternate	REJECTED	WSSP IEQ 4.1 Improved Acoustical Performance	$214,976	$214,976	$214,976	$0	$0	$0	Cost does not justify the added performance charactoristics
A9c	E1029	ACCEPTED	Remove Scoreboard / Shot Clocks from Gym	-$30,000	-$37,428		-$37,428	-$37,428	$0	Shot clocks were noted in the cost estimate and are not required given the non-regulation size of the court.
STRUCTURAL					-$115,000	-$96,000	-$19,000	-$19,000	$0	
S1 Structural					-$115,000	-$96,000	-$19,000	-$19,000	$0	
S1a	SL-128	ACCEPTED	Support building pop-outs between grids H and I on columns at building edge ILO cantilevers.	-$19,000	-$19,000	$0	-$19,000	-$19,000		Is a supportive cost savings, will include new footings that will need to be coordinated.
S1b	SL-129	REJECTED	Replace roof wide-flange members with steel joist systems	-$521,000	-$521,000	-$521,000	$0	$0	$0	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.
S1c	SL-132	REJECTED	Use standard composite metal deck ILO concrete topped dovetail metal deck at second floor structure.	-$54,000	-$54,000	-$54,000	$0	$0	$0	Per input from Degenkolb 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.
S1d	SL-130	REJECTED	Support building on mat slab to resist heaving at expansive soils.	$479,000	$479,000	$479,000	$0	$0	$0	Need additional geotechnical information to determine value of this system. Assumption is that the current method of over-ex should allow for foundation system to function
MECHANICAL					-$4,671,000	-$4,671,000	$0	$0	$0	
M1 Mechanical					-$4,246,000	-$4,246,000	$0	$0	$0	
M1a	CS-4	REJECTED	Remove all cooling except at administration and preschool wing.	-$285,000	-$285,000	-$285,000	$0	$0	$0	Would not recommend accepting this item. -Metrix Owner requested: Building is used throughout the year.
M1b	RE-110	REJECTED	Use ground-source heat pumps.	$231,000	$231,000	$231,000	$0	$0	$0	Ground source heat pump will most likely have a greater cost increase. Budget most likely will not support a ground loop system. -Metrix
M1c	CS-2	REJECTED	Use VRF System for heating and cooling	-$2,322,000	-$2,322,000	-$2,322,000	$0	$0	$0	District perferers a Hydronic System - Will not persue
M1d	OB-92	REJECTED	Eliminate the mechanical mezzanine and locate fan coil units above corridor ceilings and DOAS units on gym roof.	-$383,000	-$383,000	-$383,000	$0	$0	$0	Owner has provided a requirement that rooftop mechanical equipment is to be reduced to "as-little" as possible for longevity and serviceability. Ceiling mounted units increase the difficulty in service.
M1e	CS-1	REJECTED	Use the DOAS system and displacement ventilation for cooling for entire building.	-$319,000	-$319,000	-$319,000	$0	$0	$0	Does not meet current WSEC energy code.
M1f	CS-3	REJECTED	Use all unitary rooftop equipment for heating and cooling of entire building.	-$855,000	-$855,000	-$855,000	$0	$0	$0	Would not recommend for this District. Prefers hydronic systems.
M1h	VS-142	REJECTED	Duct outside air (OA) to terminal devices and eliminate VAV boxes.	-$313,000	-$313,000	-$313,000	$0	$0	$0	Does not meet current WSEC energy code.
M2 Plumbing					-$425,000	-$425,000	$0	$0	$0	
M2a	RW-121	REJECTED	Use flush-tank ILO flush-valve water closets.	-$38,000	-$38,000	-$38,000	$0	$0	$0	Not recommended due to duribility issues to a school.
M2b	RE-114	REJECTED	Use point-of-use water heater ILO a centralized water heater.	-$387,000	-$387,000	-$387,000	$0	$0	$0	Does not meet requirements of WSEC C404.2.1.
M3 Fire Protection					$0	$0	$0	$0	$0	
M3a					$0					

ELECTRICAL					-$373,000	-$38,000	$64,000	$64,000	$0	
E1 Distribution					-$38,000	-$38,000	$0	$0		
E1a	RE-111	**REJECTED**	Increase PV array beyond code minimum.	$438,000	$438,000	$438,000	$0	$0	$0	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.
E1b	RE-113	**REJECTED**	Use split-wired controlled/non-controlled duple receptacles and reduce quantity of controlled duplex receptacles.	-$58,000	-$58,000	-$58,000	$0	$0	$0	Not recommended. 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?
E1c	PB-106	**REJECTED**	Review electrical load estimate for building to right-size service equipment rating.	-$323,000	-$323,000	-$323,000	$0	$0	$0	High risk to the project given lack of baseline measurement of systems.
E1d	DP-14	**REJECTED**	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.	-$31,000	-$31,000	-$31,000	$0	$0	$0	In study by electrical engineer for next design phase, may limit some flexibility in the system selection.
E1e	DP-15	**REJECTED**	Centralize and stack electrical room	-$64,000	-$64,000	-$64,000	$0	$0	$0	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.
E2 Lighting					$64,000	$0	$64,000	$64,000		
E2a	IS-68	**ACCEPTED**	Use indirect/direct pendant lighting in classrooms.	$64,000	$64,000	$0	$64,000	$64,000	$0	School district has pendant lighting in the high school and likes this design option, to proceed with this in the next design phase.
E3 Low Voltage					$0	$0	$0	$0		
E3a										
E4 Fire					-$399,000	$0	$0	$0		
E4a	DP-9	**ALLOWANCE**	Solicit the DAS system as a bid alternate.	-$399,000	-$399,000	$0	$0	$0	-$399,000	This number to be carried as an allowance: Cannot be confirmed until signal strength can be tested with finished walls in place.
FOOD SERVICE					-$91,000	-$91,000	$0	$0		
F1 Food Service					-$91,000	-$91,000	$0	$0		
F1a	FO-46	**REJECTED**	Reduce kitchen equipment allowance by 20%. (Remove burner and type 1 hood)	-$91,000	-$91,000	-$91,000	$0	$0	$0	Food service verified with school district that the hood and burner assembly is required
TOTALS				-$9,845,148	**-$10,020,713**	**-$7,583,703**	**-$2,007,931**	**-$2,007,931**	-$1,710,512	
Current Estimate					$38,799,843					Revision 1 issued on 9/8
MACC					**$36,708,061**					
Delta from MACC					$2,091,782					
Estimate with Recommended V/E Options							**$36,791,912**			
Estimate with Accepted V/E								**$36,791,912**		Current cost of building.
Difference							**-$83,851**	-$83,851		Project exceeds MACC but is within design contingency
Total of Allowance Items									-$1,710,512	
Total Project Contingency based on MACC					**$2,753,105**					

SD Phase Markups	
Markup Calclulation	**0.2476**
GC's	9.00%
Design Contingency	7.50%
GC Profit	5.50%
Escalation	2.76%

Assumes construction in 2026



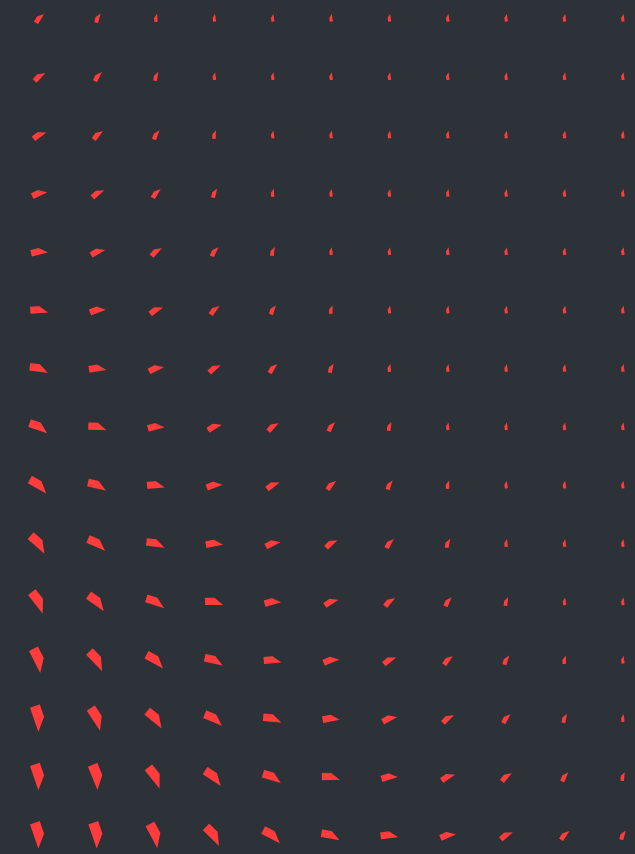
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Appendix

I. Project Schedule
II. Value Engineering Report
III. Wood vs Steel Comparison
IV. Owner Project Requirements
V. WSSP Strategy and Scorecard
VI. C406 Strategy and Scorecard
VII. Preliminary Geotechnical Report
VIII. Tsunmai Innundation Report
IX. Meeting Minutes

TCF

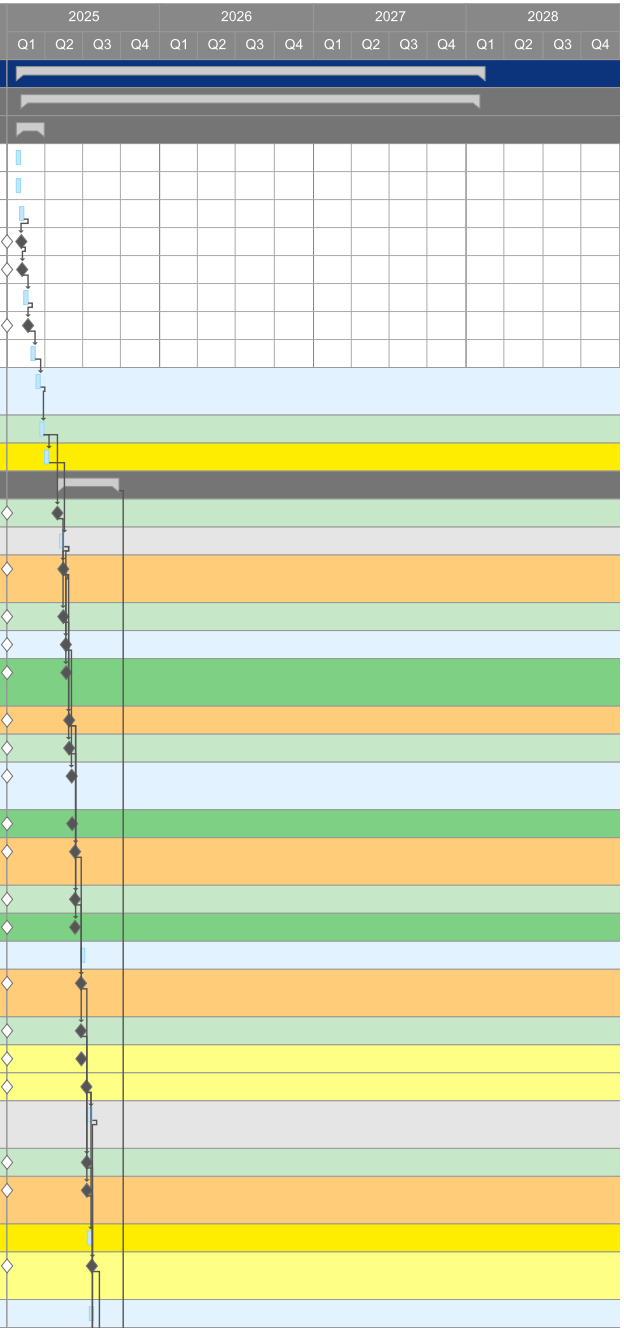
I. Project Schedule



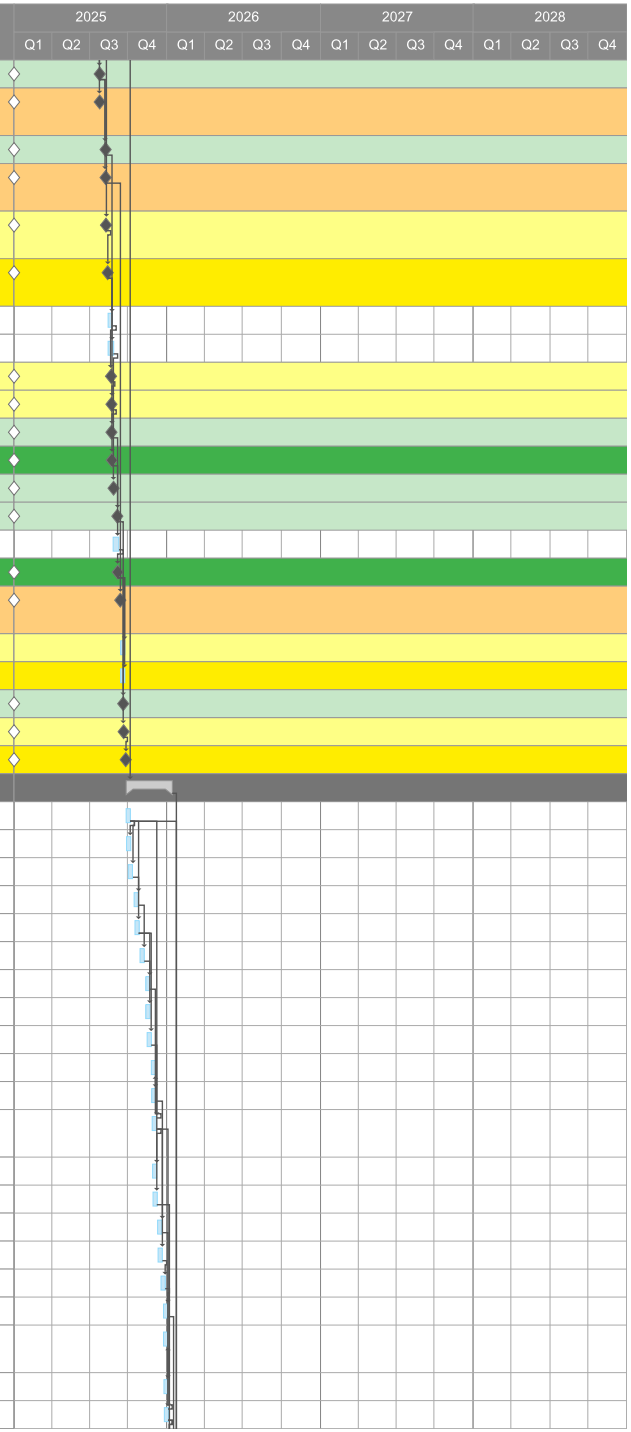
ASD-HLC SD Phase Schedule

TCF Architecture

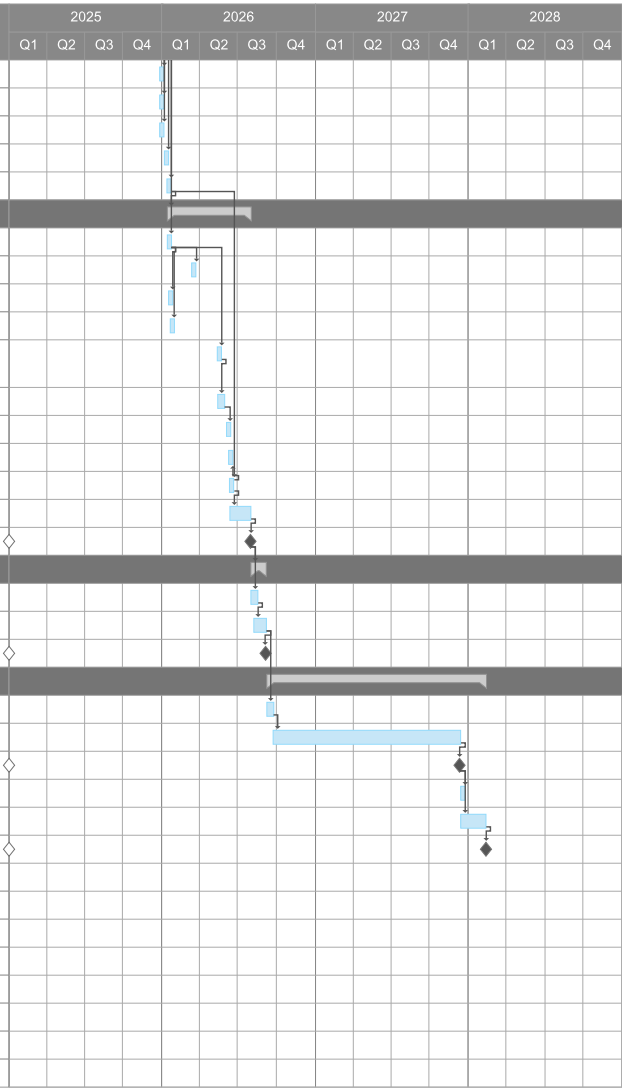
	Task Name	Duration	Predecessors	Start Date	End Date	Comments
1	Harbor Learning Center Replacement	797d		01/23/25	02/11/28	
2	Schedule Overview	781d		02/03/25	01/31/28	
12	Ed Specs / Programming	48d		01/23/25	03/31/25	
13	Finalize DAC	1d		01/23/25	01/23/25	
14	CLT Meeting	1d		01/23/25	01/23/25	
15	NTP	1d		01/31/25	01/31/25	
16	DAC Meeting #1 - Kick-off Meeting	0	15FS +2d	02/04/25	02/04/25	Virtual Zoom Meeting & 3pm
17	School Tours	0	16FS +2d	02/06/25	02/06/25	
18	Ed Spec Workshops	4d	17FS +1d	02/10/25	02/13/25	
19	CLT Meeting	0	18FS +5d	02/20/25	02/20/25	
20	Draft Ed Specs Distributed to CLT and DAC	1d	19FS +4d	02/27/25	02/27/25	
21	DAC Meeting #2 - Review Ed Spec & Programming Feedback	1d	20FS +7d	03/11/25	03/11/25	
22	CLT Meeting	1d	21FS +6d	03/20/25	03/20/25	
23	Final Ed Specs Issued to ASD	1d	22FS +6d	03/31/25	03/31/25	
24	SD	104d		05/01/25	09/24/25	
25	CLT Meeting	0	22FS +30d	05/01/25	05/01/25	Time: 8:30-10:00
26	Schematic Design Kick Off	1d	23FS +25d	05/06/25	05/06/25	
27	Design Team Kickoff Meeting #1	0	26FS +7d	05/15/25	05/15/25	Time: 10a-11:30am; All hands (Design Team)
28	CLT Meeting	0	25FS +10d	05/15/25	05/15/25	Time: 8:30-10:00
29	DAC Meeting #3 - Review Site & Floor Plan Concepts	0	26FS +11d	05/21/25	05/21/25	Time: 3pm & Harbor Learning Center
30	OPR Kick-Off Meeting w/ ASD	0	27FS +5d	05/22/25	05/22/25	Time: TBD; Attendance: Mike P, ESD 112, TCF, Metrix
31	Design Team Meeting #2 / WSSP Kick-Off	0	27FS +10d	05/29/25	05/29/25	Time: 10am-11:30a
32	CLT Meeting	0	28FS +10d	05/29/25	05/29/25	Time: 8:30-10:00
33	DAC Meeting #4 - Review Massing & Exterior Appearance Review	0	29FS +10d	06/04/25	06/04/25	Time: 3pm & Harbor Learning Center
34	Pre-Application Meeting with City of Aberdeen	0		06/05/25	06/05/25	Time: TBD
35	Design Team Meeting #3	0	31FS +10d	06/12/25	06/12/25	Time: 10am-11:30; As needed attendance
36	CLT Meeting	0	32FS +10d	06/12/25	06/12/25	Time: 8:30-10:00
37	WSSP Workshop with ASD	0	31FS +10d	06/12/25	06/12/25	Time: TBD
38	DAC Meeting #5 - Design Update Check-in	1d		06/25/25	06/25/25	Time: 3pm & Harbor Learning Center
39	Design Team Meeting #4	0	35FS +10d	06/26/25	06/26/25	Time: 10am-11:30; As needed attendance
40	CLT Meeting	0	36FS +10d	06/26/25	06/26/25	Time: 8:30-10:00
41	Issue Draft OPR	0		06/27/25	06/27/25	
42	65% SD Progress Set drawings to TCF	0		07/09/25	07/09/25	
43	QA/QC Checklist & Feedback	10d	42	07/09/25	07/22/25	QA/QC based on the 65% Set. Assume 2 weeks for QC work.
44	CLT Meeting	0	40FS +10d	07/10/25	07/10/25	Time: 8:30-10:00
45	Design Team Meeting #5	0	39FS +10d	07/10/25	07/10/25	Time: 10am-11:30; As needed attendance
46	65% SD Progress Set Drawings to ASD	1d	42FS +2d	07/11/25	07/11/25	
47	SD Backgrounds and SD QC Feedback to Consultants	0	43	07/22/25	07/22/25	All drawings, QC Comments, and Design to Consultants for final SD Documents
48	DAC Meeting #6 - Design Update Check-in	1d		07/16/25	07/16/25	Time: 1pm & Harbor Learning Center



	Task Name	Duration	Predecessors	Start Date	End Date	Comments
49	CLT Meeting	0	44FS +10d	07/24/25	07/24/25	Time: 8:30-10:00
50	Design Team Meeting #6	0	45FS +10d	07/24/25	07/24/25	Time: 10am-11:30; As needed attendance
51	CLT Meeting	0	49FS +10d	08/07/25	08/07/25	Time: 8:30-10:00
52	Design Team Meeting #7	0	49FS +10d	08/07/25	08/07/25	Time: 10am-11:30; As needed attendance
53	Consultant 95% SD Cost Estimate Drawings, Estimates, Reports to TCF	0	47FS +13d	08/08/25	08/08/25	
54	Submit 95% SD drawings & Draft Report to ASD, Cost Estimator, & VE Team	0	53FS +2d	08/12/25	08/12/25	
55	Cost Estimate	6d	54	08/13/25	08/20/25	
56	Owner SD Document Review	10d	54	08/13/25	08/26/25	
57	Draft Cost Estimate to TCF	0	55	08/20/25	08/20/25	
58	Final Cost Estime to TCF & VE Team	0	57FS +1d	08/21/25	08/21/25	
59	CLT Meeting	0	51FS +10d	08/21/25	08/21/25	Time: 8:30-10:00
60	VE Kick-Off Meeting	0	58FS +1d	08/22/25	08/22/25	Time: TBD
61	Final Owner Comments to TCF	0	56	08/26/25	08/26/25	
62	CLT Meeting	0	59FS +10d	09/04/25	09/04/25	Time: 8:30-10:00
63	VE Review	10d	60	08/25/25	09/05/25	
64	VE Results Meeting	0	63	09/05/25	09/05/25	Time: TBD
65	Design Team Meeting #8	0	52FS +25d	09/11/25	09/11/25	Time: 10am-11:30; As needed attendance
66	Submit VE Responses to TCF	1d	64FS +4d	09/12/25	09/12/25	
67	Submit VE Responses to ASD	1d	64FS +4d	09/12/25	09/12/25	
68	CLT Meeting	0	62FS +10d	09/18/25	09/18/25	Time: 8:30-10:00
69	Submit updated SD Report Docs & Drawings to TCF	0	64FS +10d	09/19/25	09/19/25	
70	100% SD Drawings, Estimate & Report to ASD	0	69FS +3d	09/24/25	09/24/25	
71	DD	78d	24	09/25/25	01/12/26	
72	Start of DD Documentation	1d	#REF	09/25/25	09/25/25	
73	Design Team DD Kickoff Meeting	1d	72	09/26/25	09/26/25	
74	CLT Meeting	1d	72FS +2d	09/30/25	09/30/25	
75	CLT Meeting	1d	74FS +9d	10/14/25	10/14/25	
76	Room Layout Workshops	4d	72FS +14d	10/16/25	10/21/25	At HLC; 3pm-6pm
77	CLT Meeting	1d	75FS +9d	10/28/25	10/28/25	
78	CLT Meeting	1d	77FS +9d	11/11/25	11/11/25	
79	Issue Room Layout Book to ASD	1d	76FS +14d	11/11/25	11/11/25	
80	DAC Meeting #6 - Interior Design Kickoff	1d	76FS +17d	11/14/25	11/14/25	Virtual Meeting
81	Consultant 50% DD VE/VA Drawings to TCF	1d	83FS -3d	11/24/25	11/24/25	
82	CLT Meeting	1d	78FS +9d	11/25/25	11/25/25	
83	Submit 50% DD VE/VA Set to Value Engineering Team	1d	72FS +43d	11/26/25	11/26/25	
84	VE Kick-Off Meeting	1d	83	11/27/25	11/27/25	
85	DAC Meeting #7 - Interior Design Update Meeting	1d	80FS +9d	11/28/25	11/28/25	Virtual Meeting
86	CLT Meeting	1d	82FS +9d	12/09/25	12/09/25	
87	VE Results Workshop	1d	83FS +9d	12/10/25	12/10/25	
88	VE Responses to TCF	1d	87FS +4d	12/17/25	12/17/25	
89	CLT Meeting	1d	86FS +9d	12/23/25	12/23/25	
90	Consultant 85% Cost Estimate Drawings & Estimates to TCF	1d	92FS -3d	12/23/25	12/23/25	
91	VE responses to VE Team and Owner	1d	88FS +4d	12/24/25	12/24/25	
92	Submit 85% DD Drawings to ASD & Cost Estimator	1d	83FS +20d	12/25/25	12/25/25	

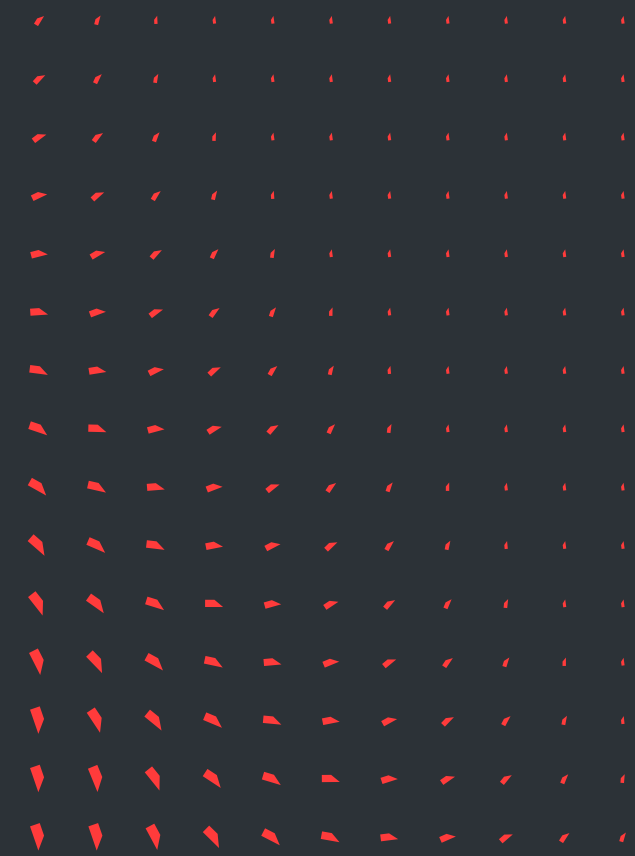


	Task Name	Duration	Predecessors	Start Date	End Date	Comments
93	DAC Meeting #8 - Color and Material Board Review	1d	85FS +19d	12/26/25	12/26/25	At HLC; 3pm - 4pm
94	Owner Review	6d	92	12/26/25	01/02/26	
95	Cost Estimate	6d	92	12/26/25	01/02/26	
96	CLT Meeting	1d	89FS +9d	01/06/26	01/06/26	
97	100% DD Drawing & Report to ASD	1d	72FS +76d	01/12/26	01/12/26	
98	**CD**	143d	71	01/13/26	07/30/26	
99	Start of CD Documentation	1d	97	01/13/26	01/13/26	
100	Permit Submittal	1d	99FS +41d	03/12/26	03/12/26	
101	Design Team CD Kickoff Meeting	1d	99FS +2d	01/16/26	01/16/26	
102	CLT Meeting	1d	99FS +4d	01/20/26	01/20/26	
103	Submit 85% Drawings to ASD, Cost Estimator and Constructability Review Team.	1d	99FS +84d	05/12/26	05/12/26	
104	CR Review	11d	103	05/13/26	05/27/26	
105	Design Team CR Response	1d	104FS +4d	06/03/26	06/03/26	
106	Consultant 100% CD Drawings to TCF	1d	107FS -3d	06/08/26	06/08/26	
107	100% CD Drawing & Report to ASD & OSPI	1d	97FS +106d	06/10/26	06/10/26	
108	OSPI Review	36d	107	06/11/26	07/30/26	
109	OSPI Phase 4/ D-7 Approval to advertise for Bid	0	108	07/30/26	07/30/26	
110	**Bidding**	26d	109	07/31/26	09/04/26	
111	Bid Advertising	11d	109	07/31/26	08/14/26	
112	Bid Period	21d	111FS -6d	08/07/26	09/04/26	
113	Bid Opening	0	112	09/04/26	09/04/26	
114	**Construction**	375d		09/07/26	02/11/28	
115	Contracts	11d	112	09/07/26	09/21/26	
116	Construction	319d	115	09/22/26	12/10/27	
117	Substaincial Completion	0	116	12/10/27	12/10/27	
118	Owner Move-in	1d	117	12/13/27	12/13/27	
119	Closeout Period	45d	117	12/13/27	02/11/28	
120	Final Completion	0	119	02/11/28	02/11/28	
121						
122	**LEGEND**					
123	Core Leadership Meeting (CLT) Meeting					
124	Design Advisory Committee (DAC) Meetings					
125	Special Meeting or Workshop					
126	Design Team Meeting					
127	TCF Document Delivery to ASD					
128	Consultant Document Delivery to TCF					



TCF

II. Value Engineering Report



Value Engineering Study Report



Harbor Learning Center

Aberdeen, WA

Prepared for

Aberdeen School District

Construction Services Group

September 2025

Prepared by

Säzän Group

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Seattle, WA 98101

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SÄZÄN
GROUP

September 16, 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 draft Value Engineering Study Report for the Harbor Learning Center project for your review. Please distribute to the project team for their review and comments. Upon receipt of any comments and the project team's final VE alternatives implementation decisions, we will incorporate what is applicable into the report and issue the VE study final report.

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.

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Content

1.0 Introduction

Introduction 1
Study Timing 1
Value Methodology 1
Workshop Scope and Objectives 2
Evaluation Factors 2
Study Team 3

2.0 Study Results

Cost Summary 3
Implementation Summary 4
Key Findings 4
Key Recommendations 5

3.0 Background

Project Description 6
Project Goals 7
Constraints and Issues 7
Key Functions 8

4.0 Project Evaluation

Cost Analysis 8
Comparison of Building Cost Per Sq. Ft 9
Constructability Comments 10
Cost Analysis Comments 10

5.0 Value Improvement Alternatives

Key Recommended Alternatives 11

Appendices

A. Owner Implementation 13
B. Value Improvement Alternatives 21
C. Function Analysis 221
D. Project Evaluation 225
E. Background Documents 245
F. Photographs 255
G. Workshop Information 259

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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	-$567,360	
Total Owner Accepted Cost Addition	$0	
Total Owner Accepted Value		**$567,360**

Total Owner Potential Acceptance Cost Avoidance *	-$2,382,000	
Total Owner Potential Acceptance Cost Addition *	$793,000	
Total Owner Potential Acceptance Value *		**$3,175,000**

NOTE *: Above costs include mutually exclusive concepts.

NOTE *: Potential Acceptance reflect the of 9 VE Proposals that remain "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 HLC will be determined following the completion of receipt of the project team's VE Alternatives Implementation decisions.

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.

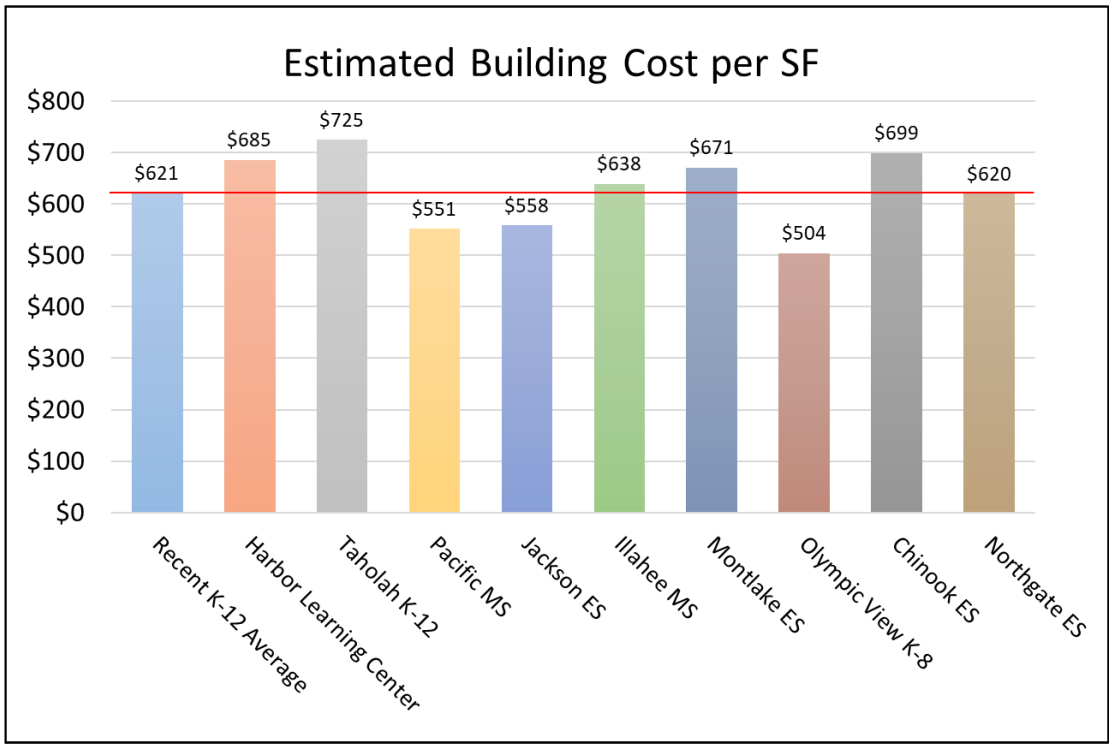
A comparative analysis of the Uniformat building system cost categories was prepared evaluating the project cost estimate relative to the comparison average. Several cost categories stand out as differing from the average. Key areas of concern are:

- 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	Decision Pending	-$31,000	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	Decision Pending	-$38,000	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	Decision Pending	-$522,000	Design team is studying some glazing reduction that may be less then 20%
ES-26	Reduce the extent of brick veneer at the north elevation.	-$40,000	Accept	Reject		Owner requested to maximize durable 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	Decision Pending	-$164,000	Will required greater detail of coordination with district staff
FI-51	FRP wall finish ILO ceramic tiling in bathrooms.	-$58,000	Reject	Reject		Durable 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 corridor 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						
IS-68	Use indirect/direct pendant lighting in classrooms.	$64,000	Accept	Decision Pending	$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.

Owner Implementation Matrix

September 2025

Function - Idea No.	Creative Idea	First-Cost Potential	VE Team Recommendation	Owner Implementation	Owner Accepted Amount	Comments
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 egress 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.
Reduce Energy						
RE-110	Use ground-source heat pumps.	$231,000	Consider	Reject		Could consider but would anticipate first cost delta to be higher.

Owner Implementation Matrix

September 2025

Function - Idea No.	Creative Idea	First-Cost Potential	VE Team Recommendation	Owner Implementation	Owner Accepted Amount	Comments
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	Decision Pending	-$58,000	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. Vandalism 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 - Transition to joists would require a wide flange 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	Decision Pending	$479,000	Need feedback from Geotech.
SL-131	Install complete drainage under building slab to prevent heaving from expansive soils.	$250,000	Consider	Decision Pending	$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.
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.

Owner Implementation Matrix

September 2025

Function - Idea No.	Creative Idea	First-Cost Potential	VE Team Recommendation	Owner Implementation	Owner Accepted Amount	Comments
Total VE Team Recommended Cost Avoidance		**-$5,737,000**			**-$567,360**	**Total Owner Accepted Cost Avoidance**
Total VE Team Recommended Cost Addition		**$64,000**			**$0**	**Total Owner Accepted Cost Addition**
Total VE Team Recommended Value		**$5,801,000**			**$567,360**	**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.
roject Suggestic	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

Function - Idea No.	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

Function - Idea No.	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

Function - Idea No.	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)	•

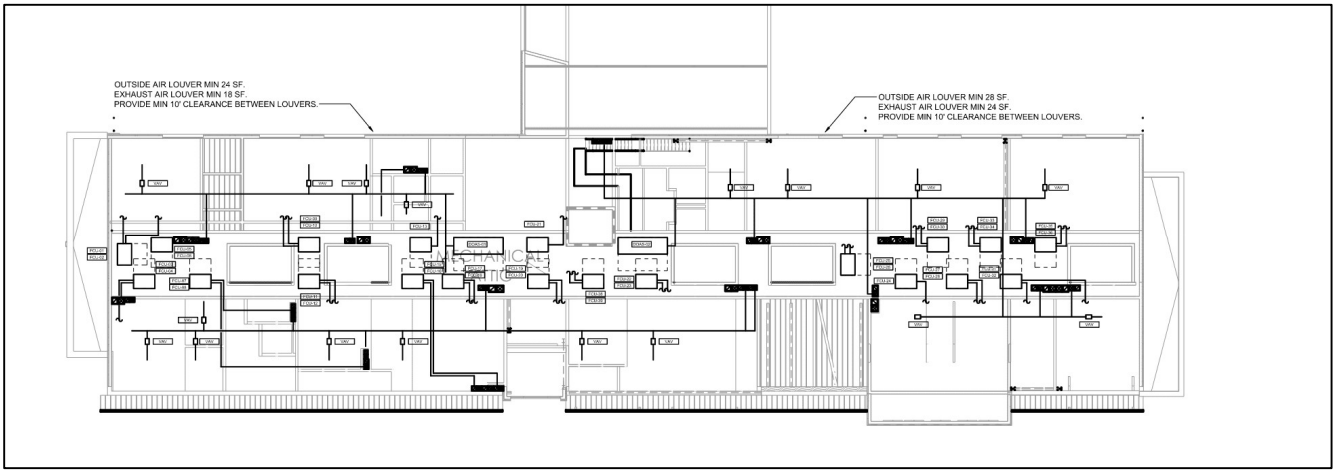
Analysis and Justification:

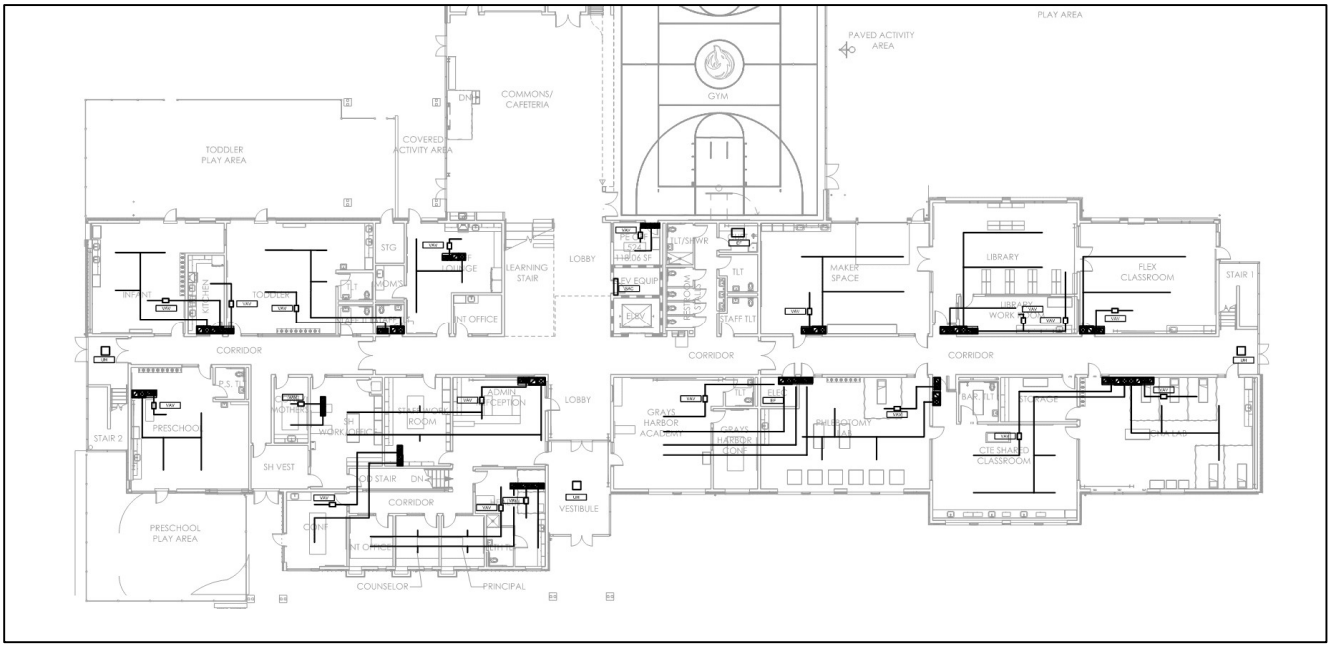
Per Washington State Code ventilation requirements, a DOAS unit or something of a similar configuration will be required. Due to the limited number of cooling hours/days in the Aberdeen marine environment, the classroom spaces can be designed to use displacement ventilation. This strategy will mean that 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

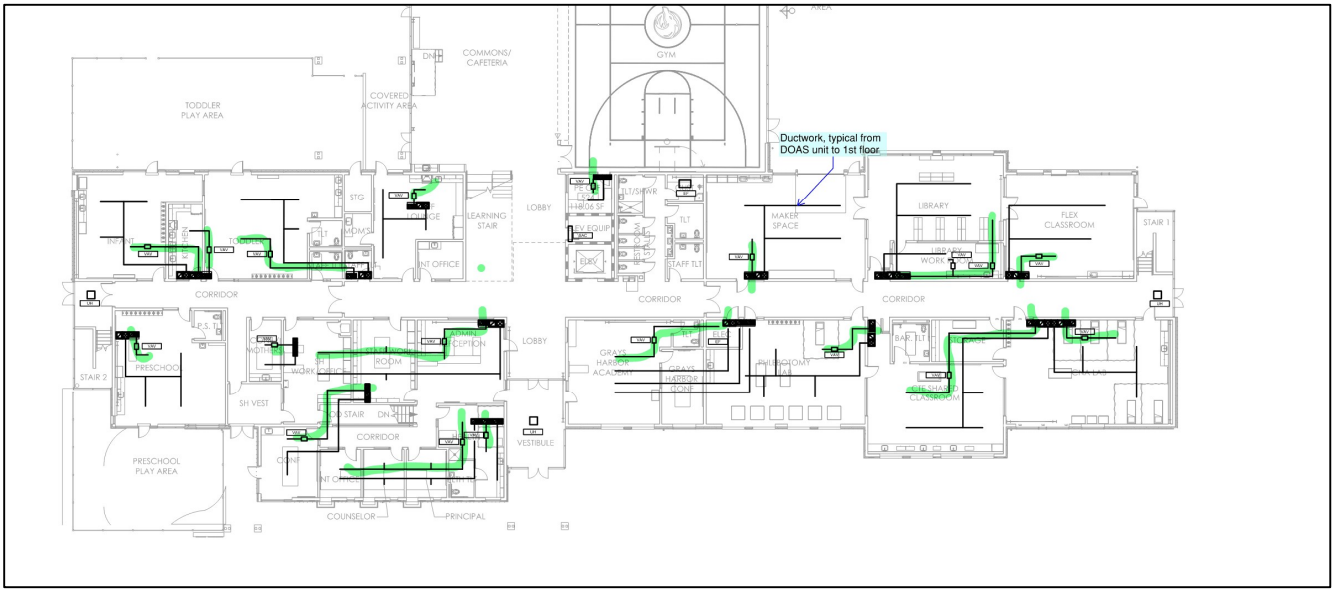


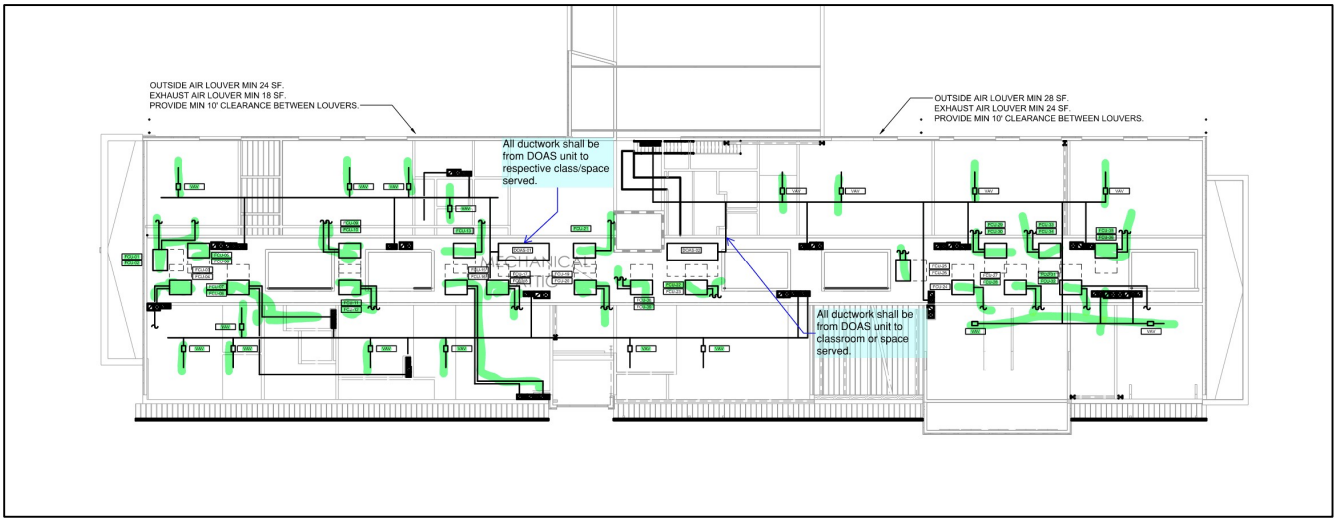


Baseline HVAC Plan

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:

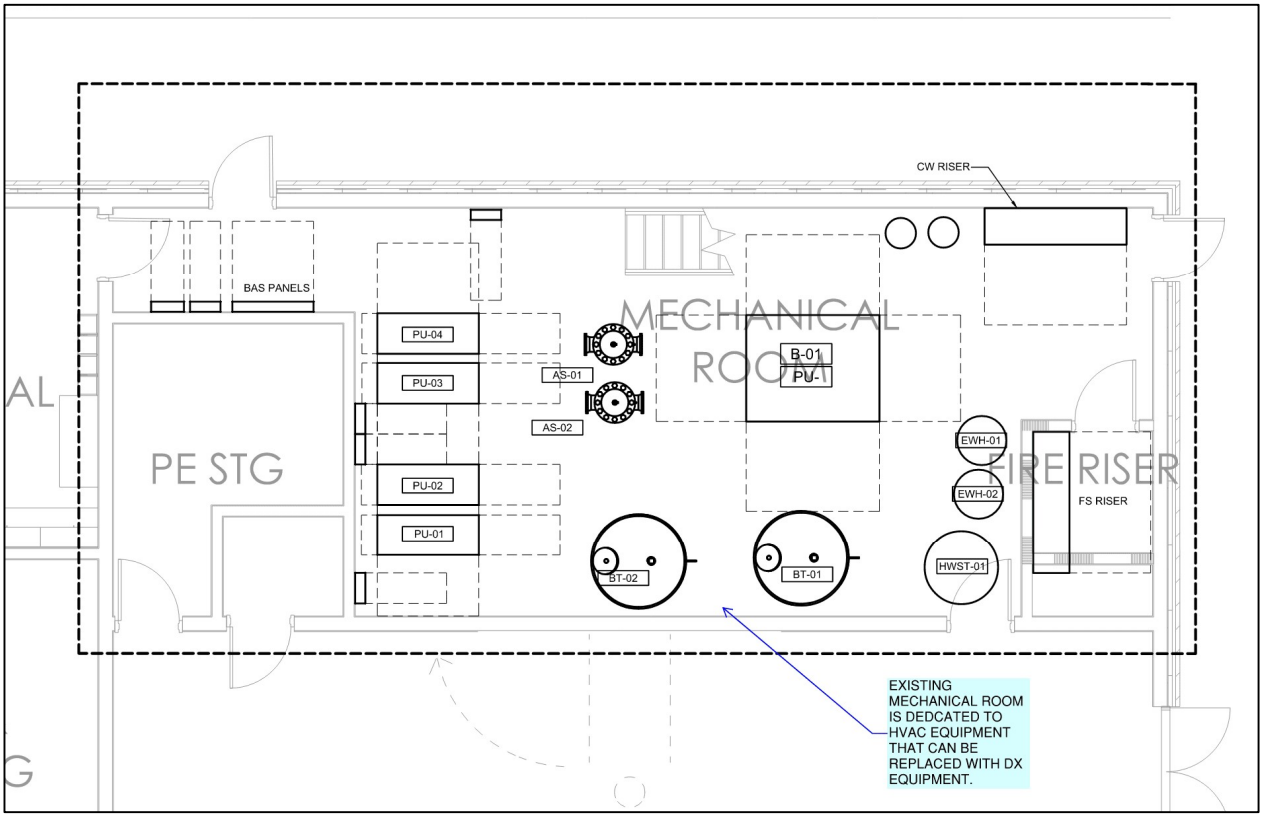
While the use of hydronic systems is preferred, DX equipment offers a closer match to the School District's expectation of reducing facility costs and easily implement future equipment replacement. VRF and DX equipment is readily available, and repairs or changes are much less costly than might be seen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

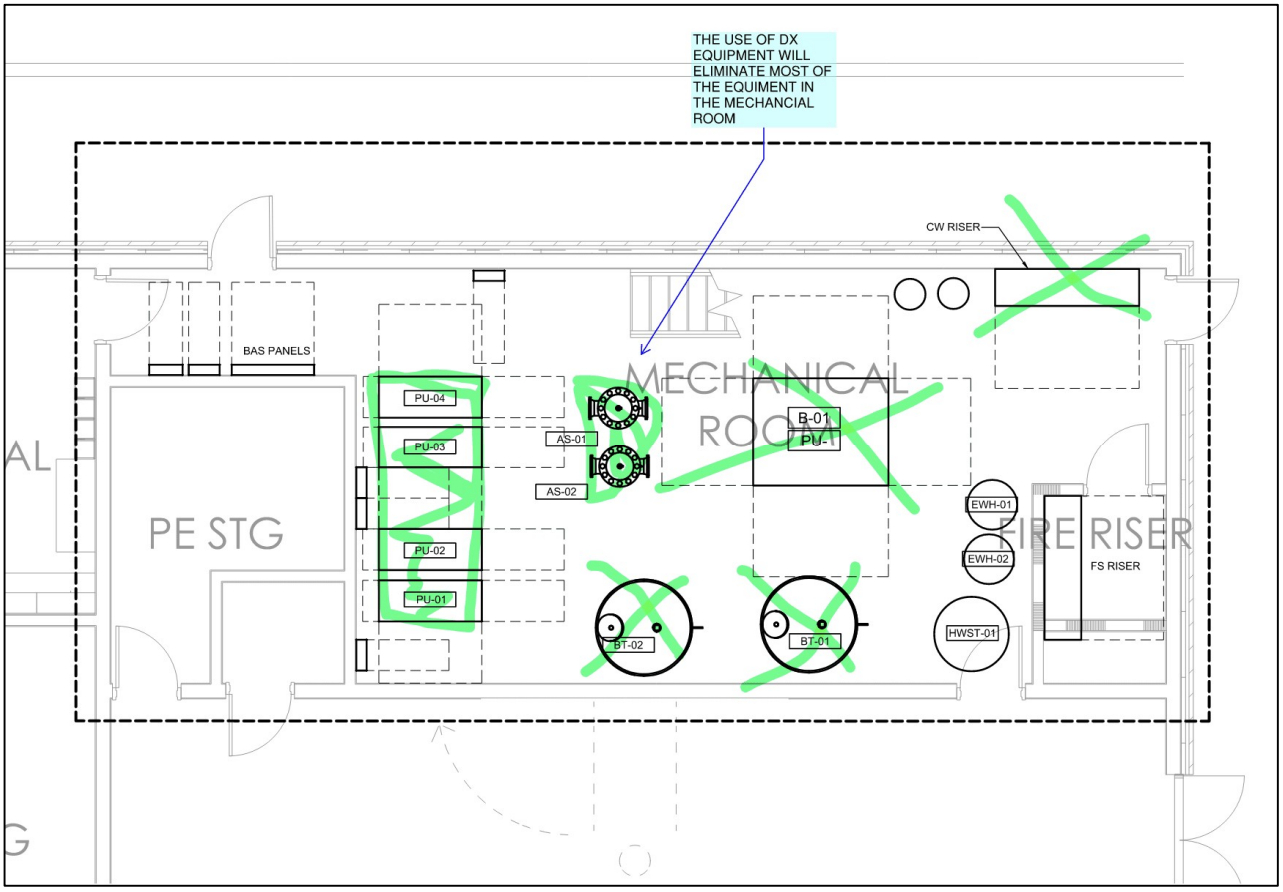
Baseline Concept Illustration



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.

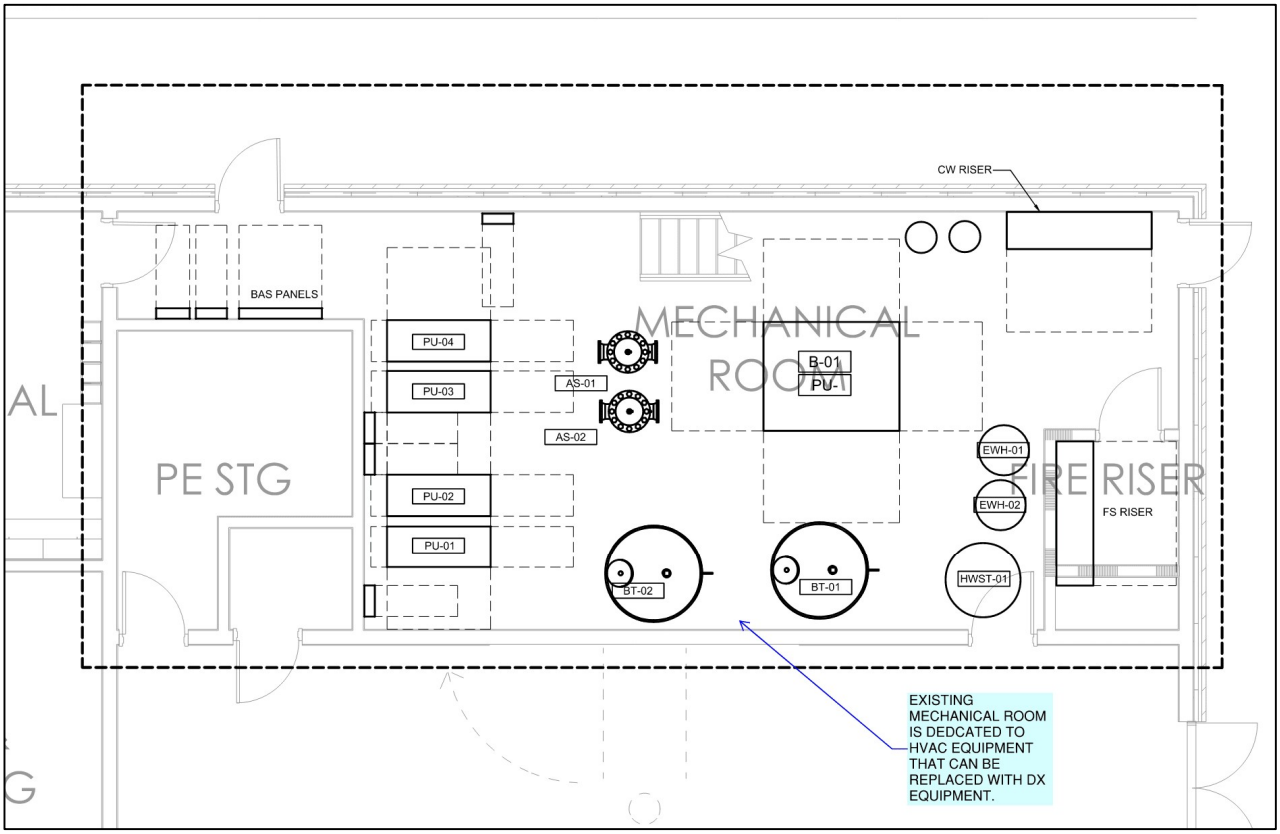
For cost estimating purposes, assume that the existing baseline system is two air-water source heat pumps each rated at 50 tons cooling (1500 MBH heating).

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)**:

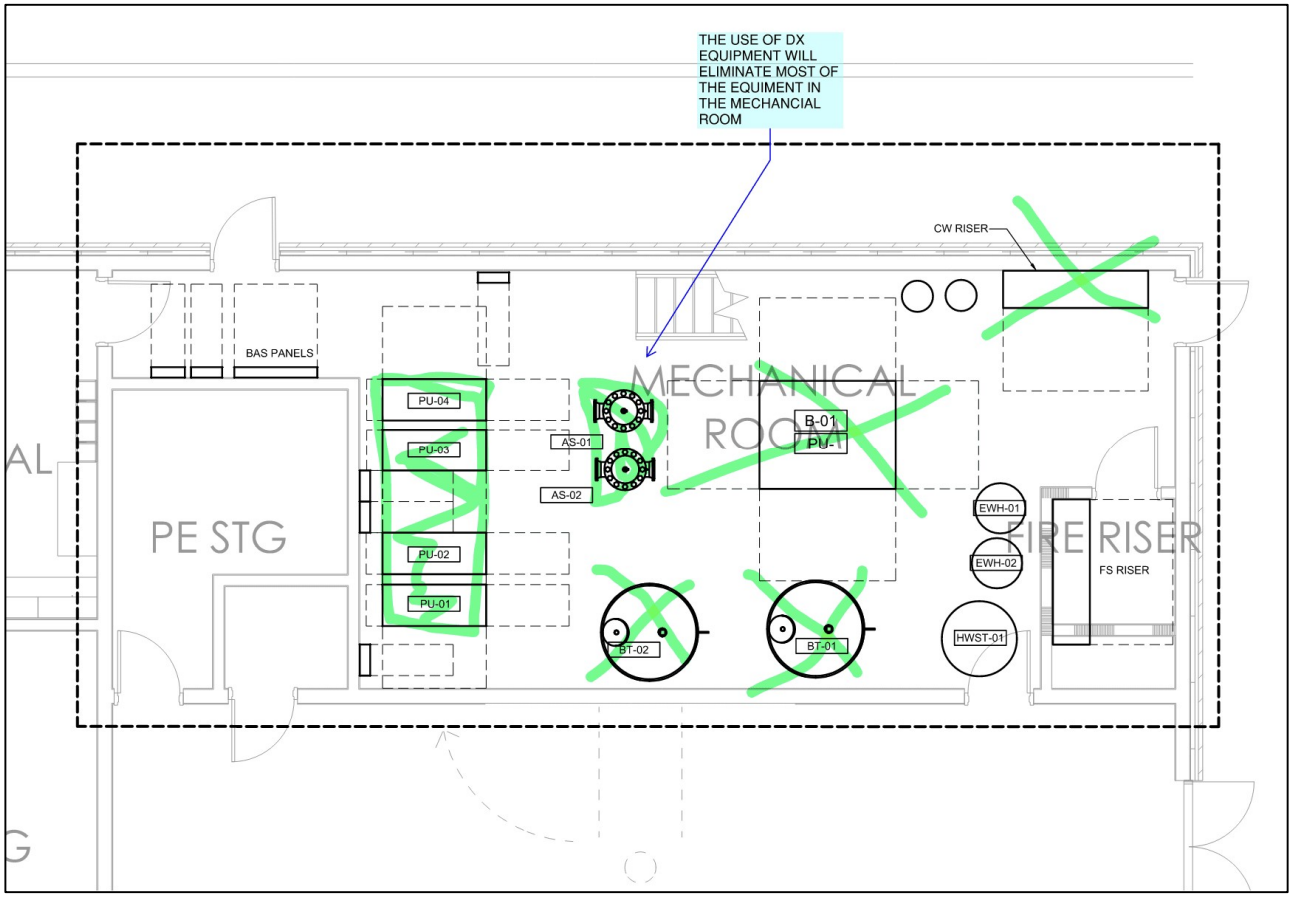
Baseline Concept Illustration



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.

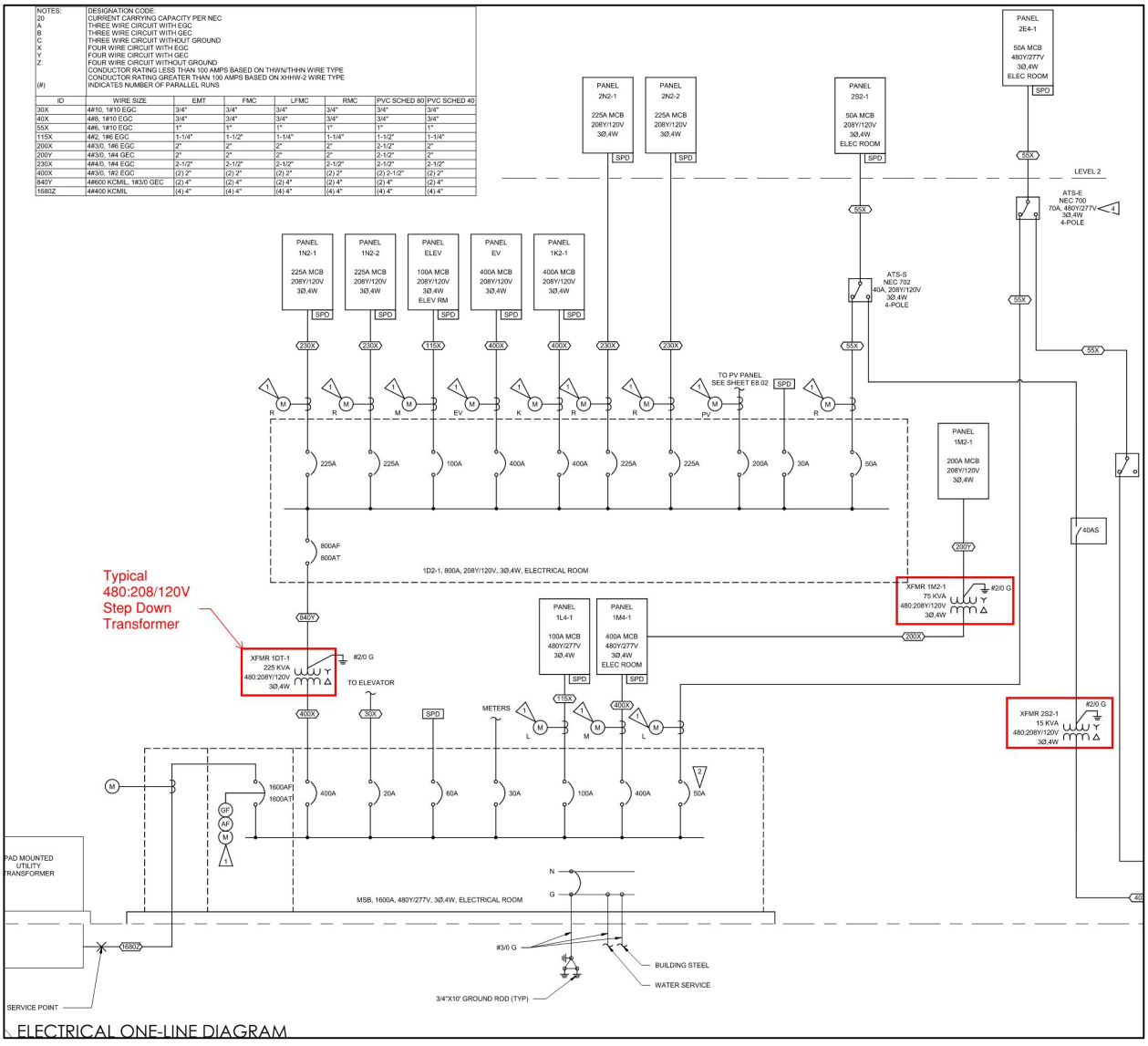
Workbook ID: DP-14	Serve building with 208/120v ILO 480/277v service and eliminate step-down transformers.
Function(s): Distribute Power	**Includes Idea(s)**: 118

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

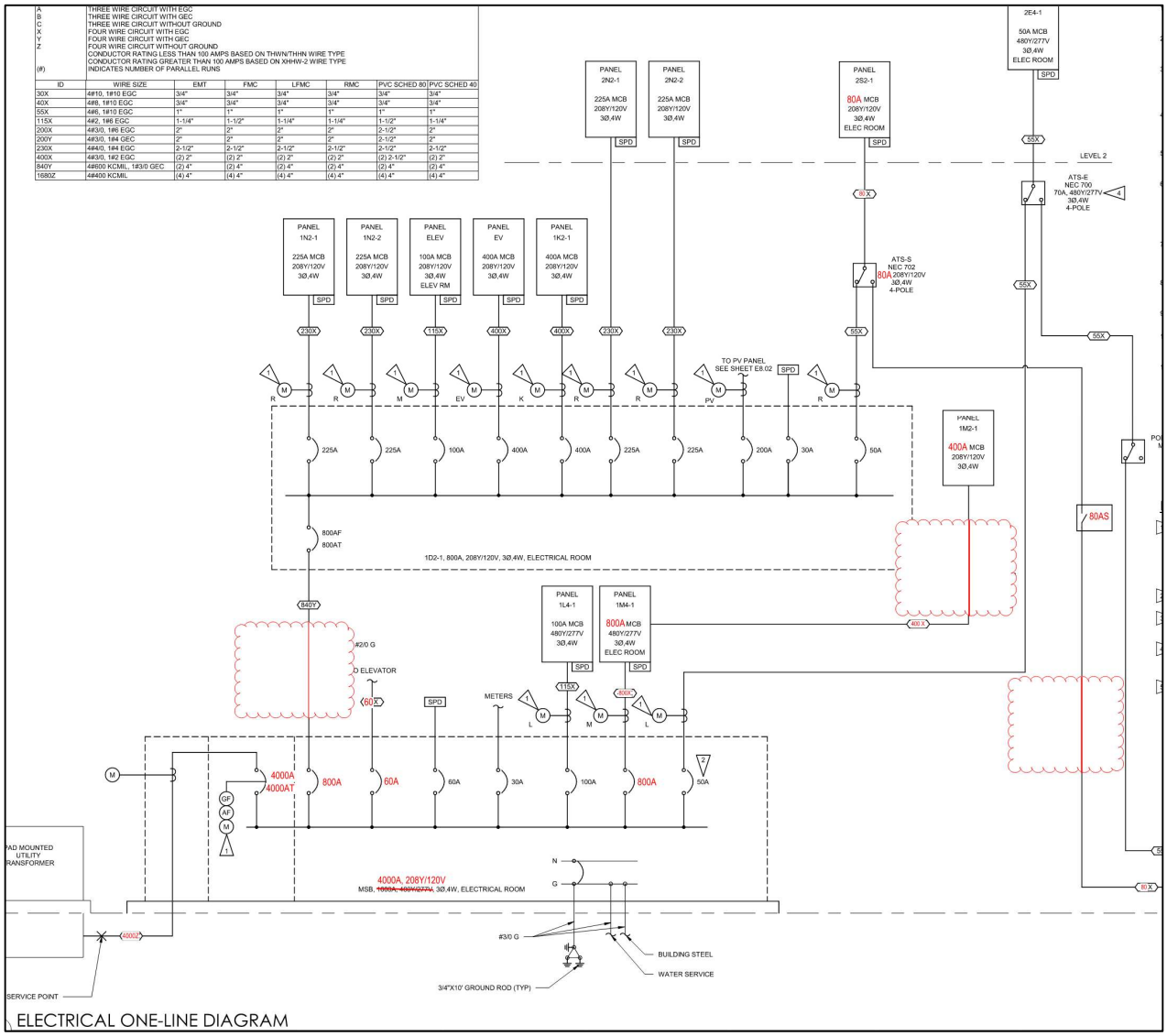
Baseline Concept Illustration



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.

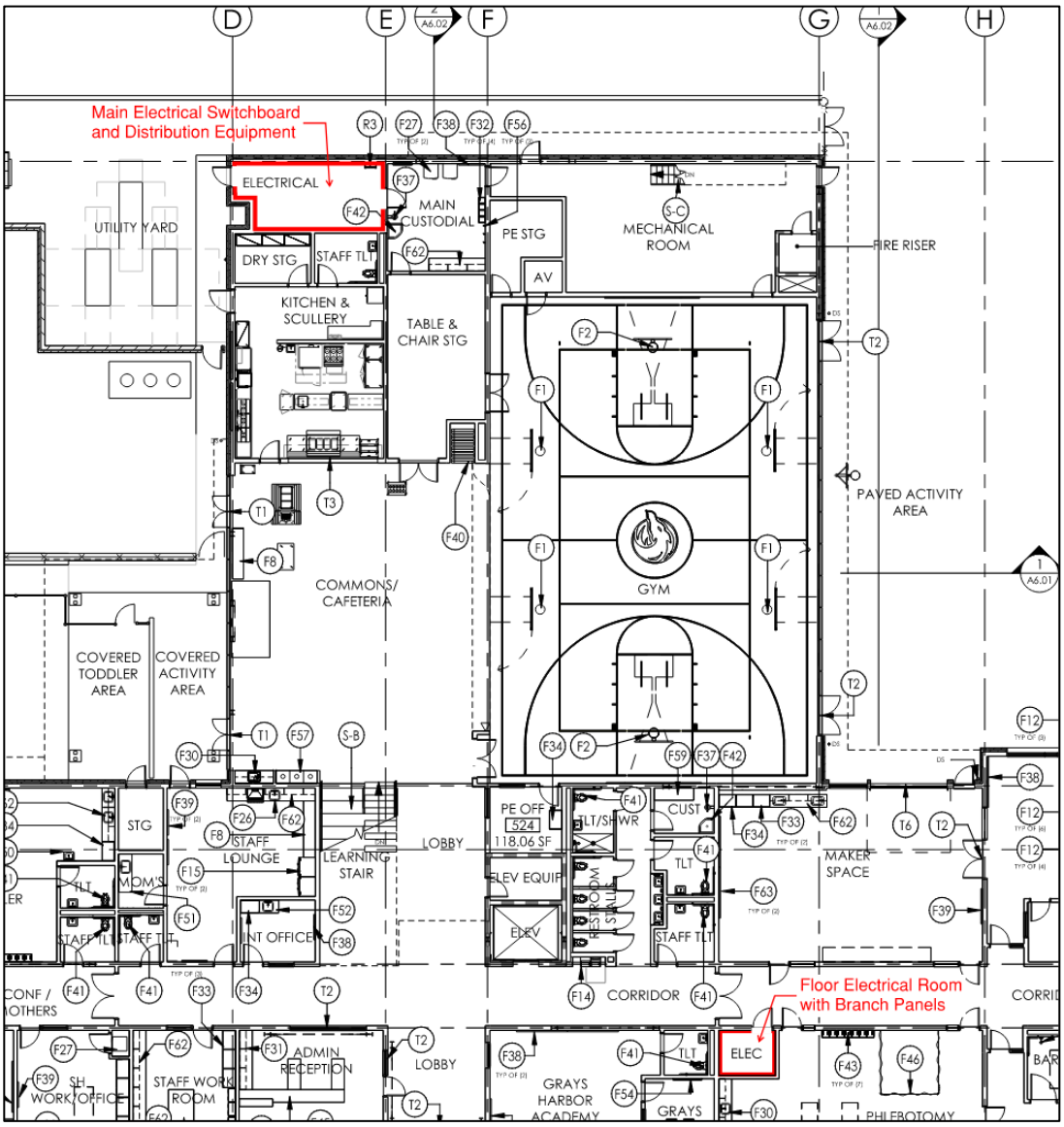
The main 480v distribution section, the step-down transformer, and the 208v distribution and branch panels would move to the central electrical room taking advantage of the smaller 480v conduit and wiring that is upstream of the transformer for this horizontal distance.

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

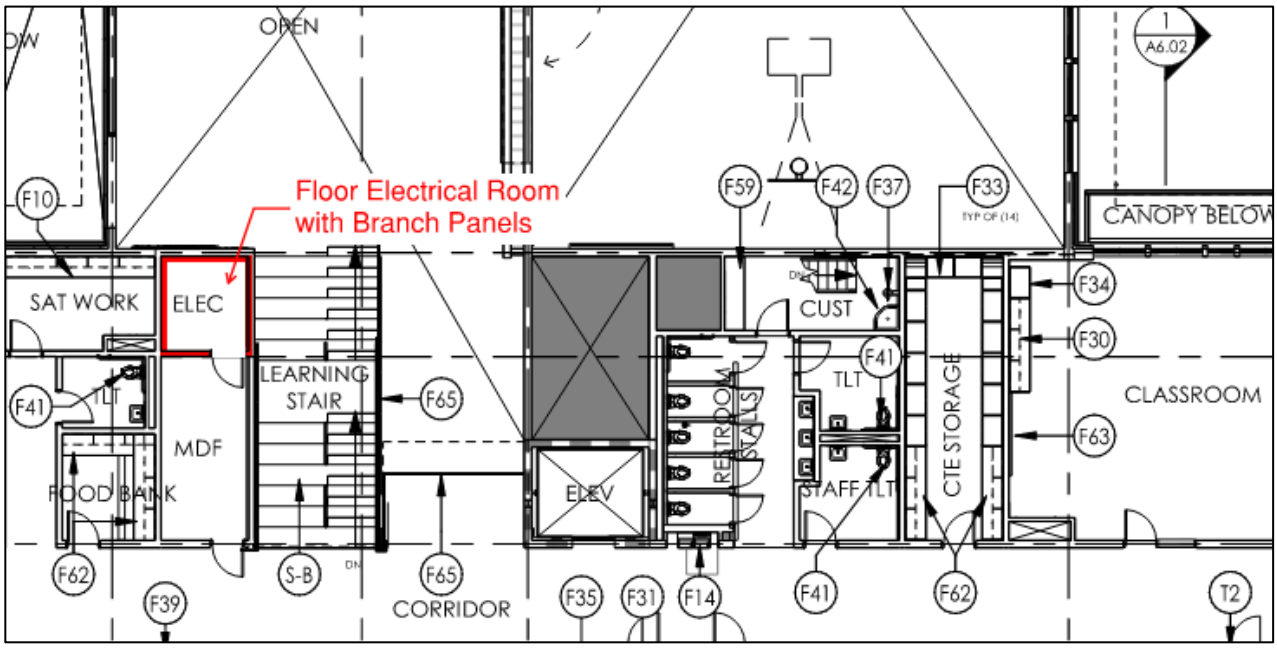
Baseline Concept Illustration



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

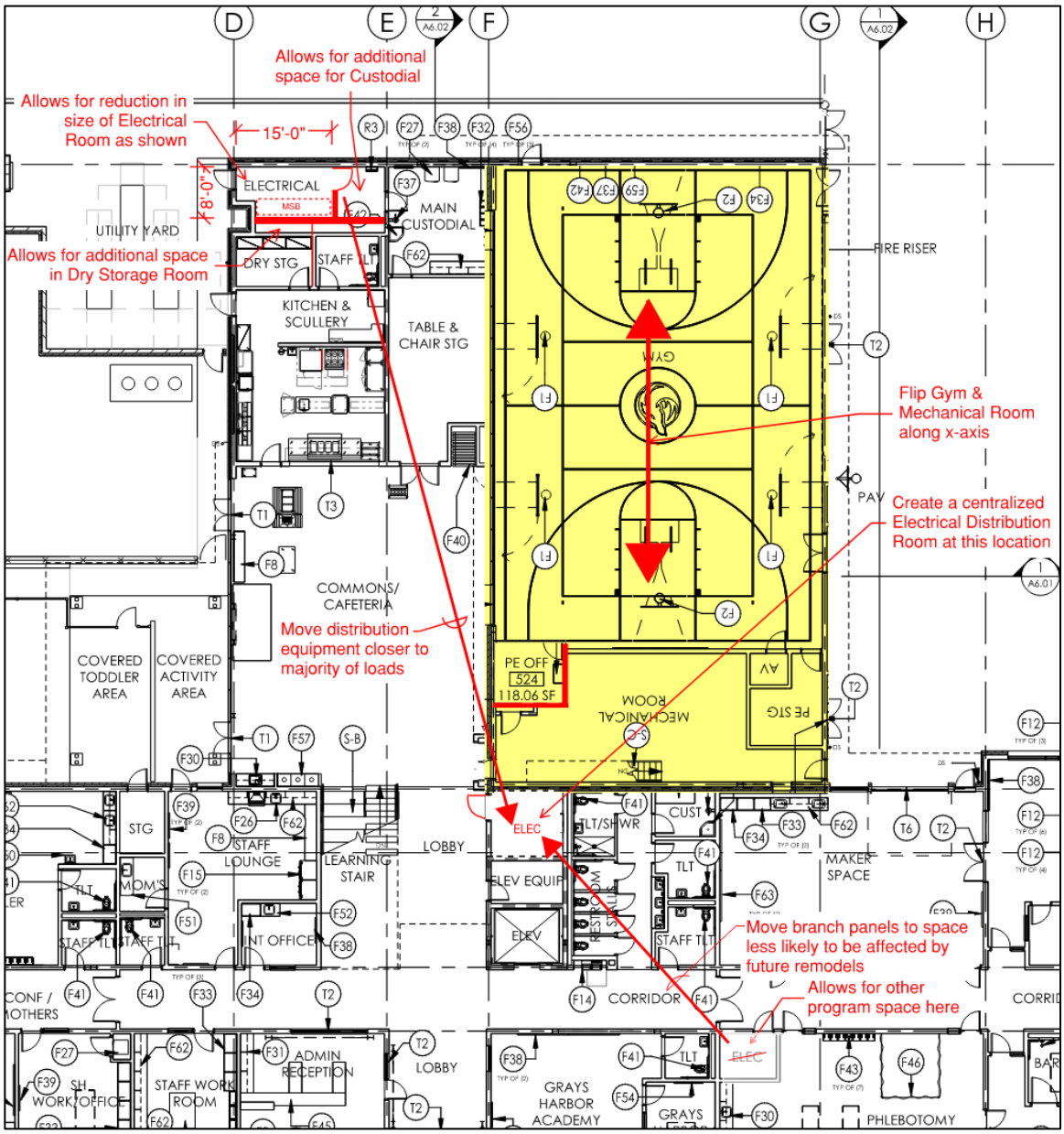
Baseline Concept Illustration



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

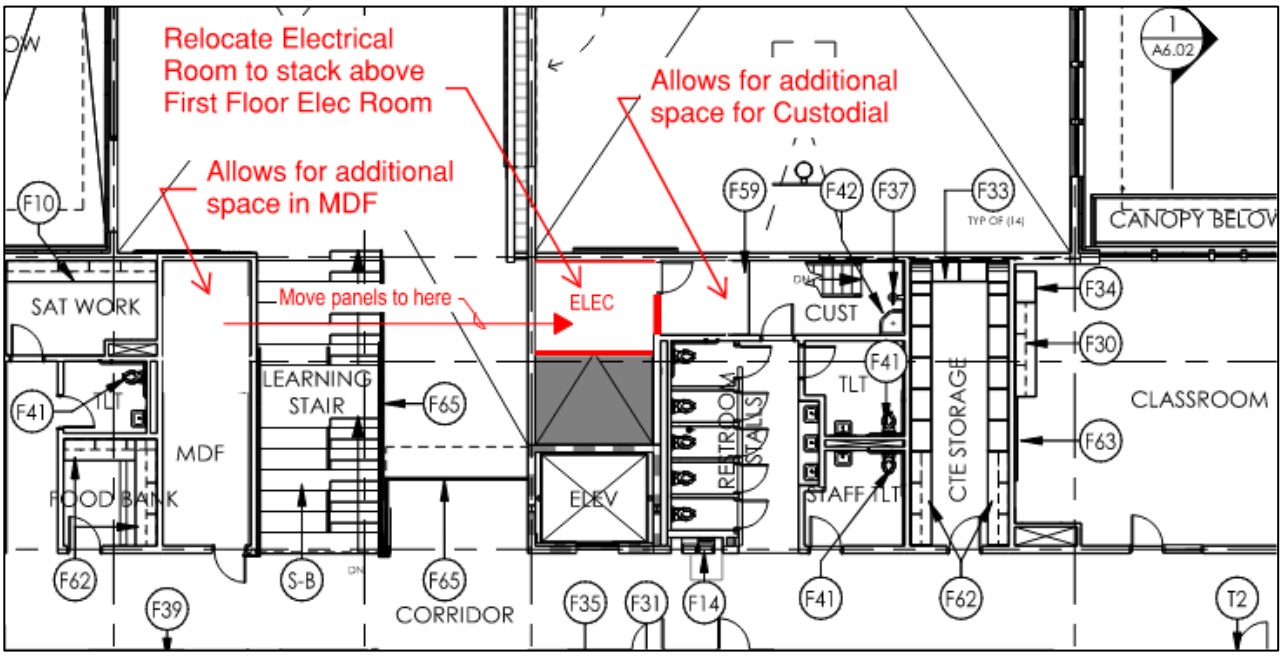
Alternative Concept Illustration



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:

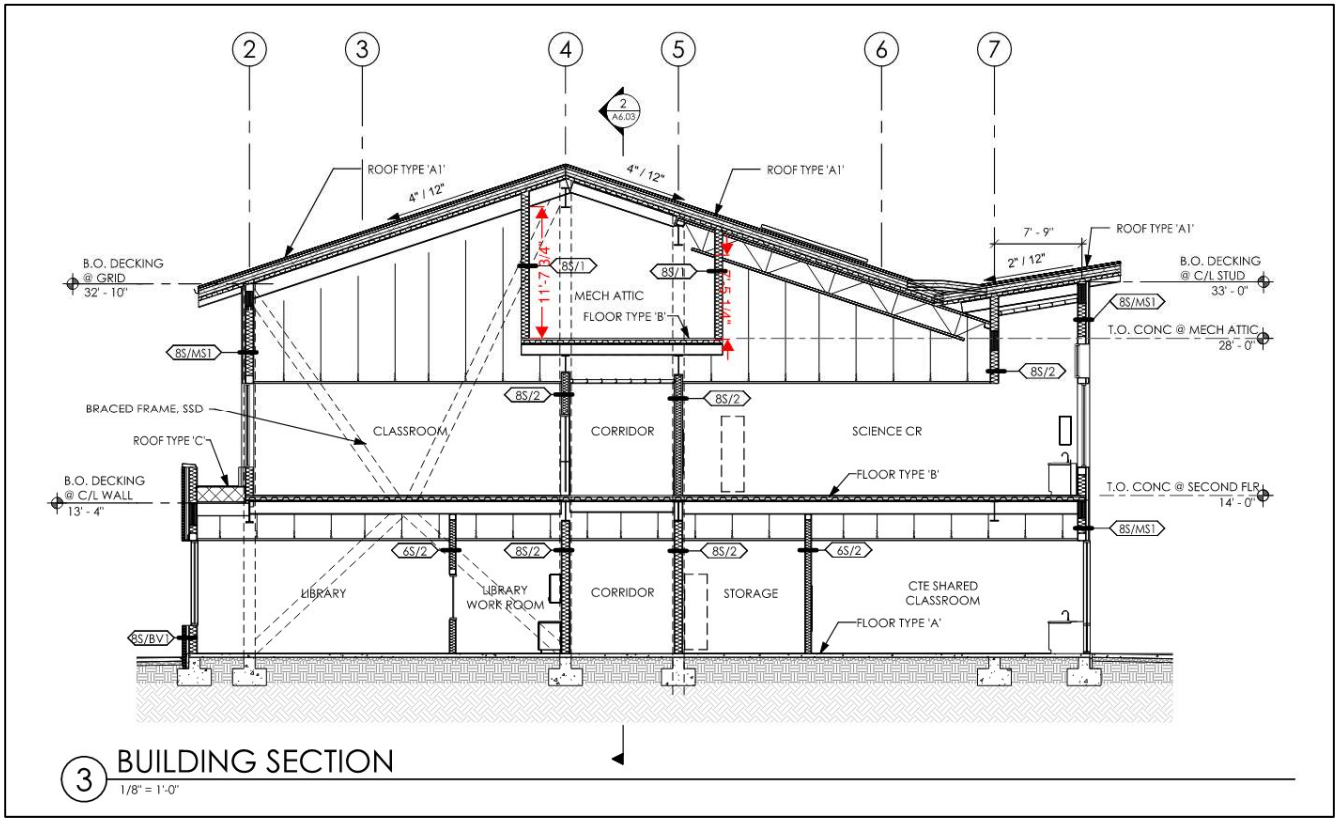
Material and Labor Savings: Lowering the overall height of the building will produce a sizeable reduction in the required amount of structural steel framing, steel stud framing, building envelope systems including metal panels, insulation, drywall etc. A reduction of these material quantities will lead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

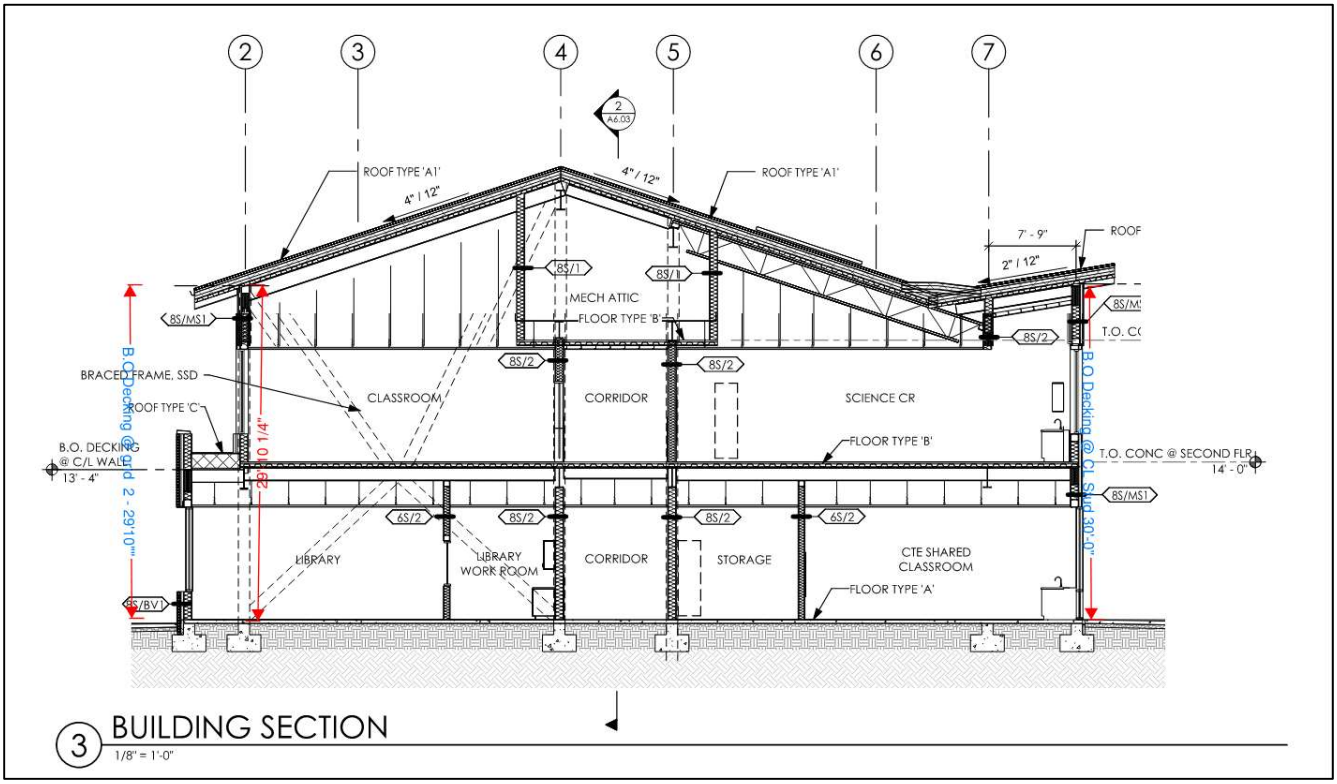
Baseline Concept Illustration



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)**:

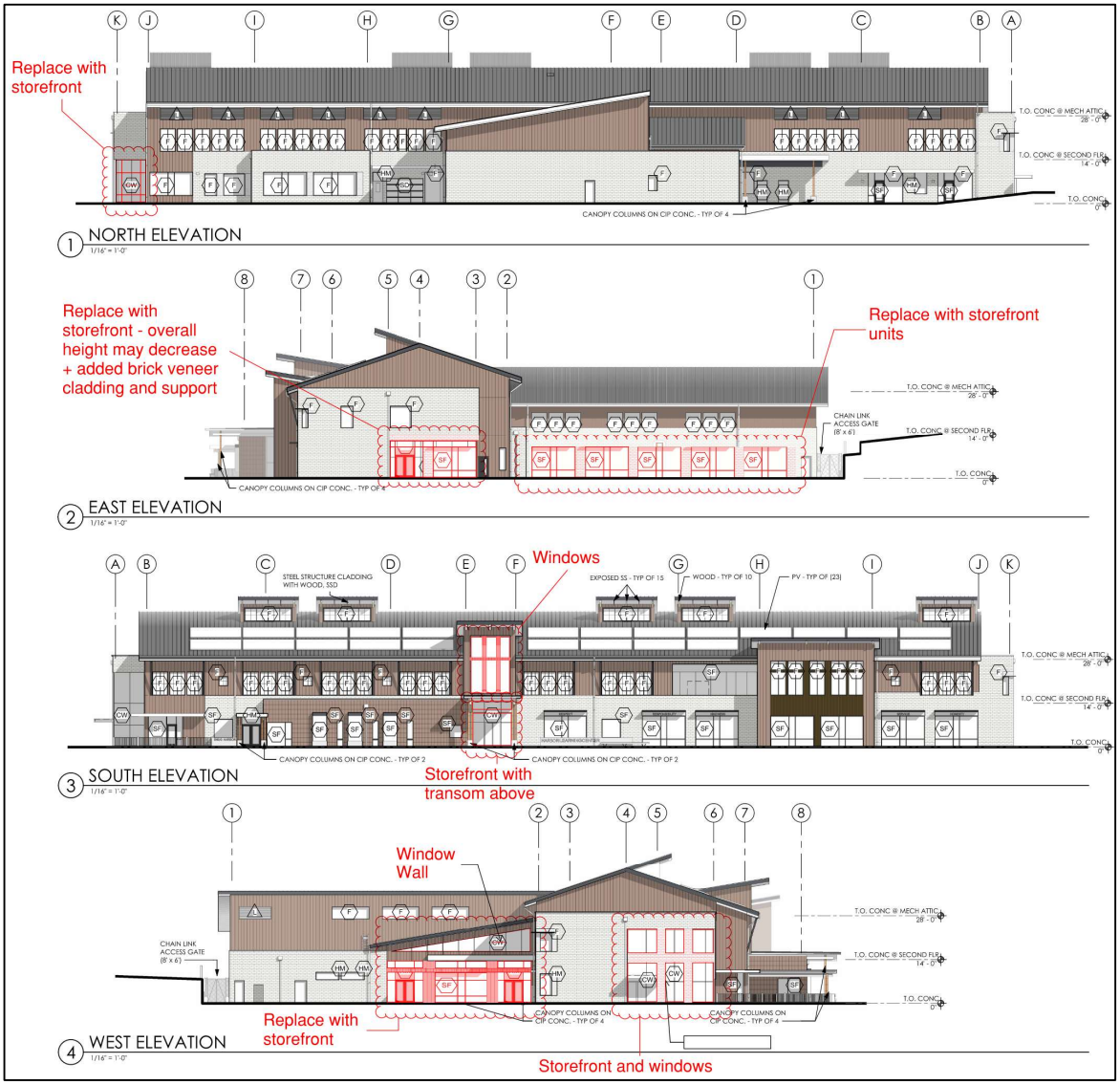
Baseline Concept Illustration



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)**:

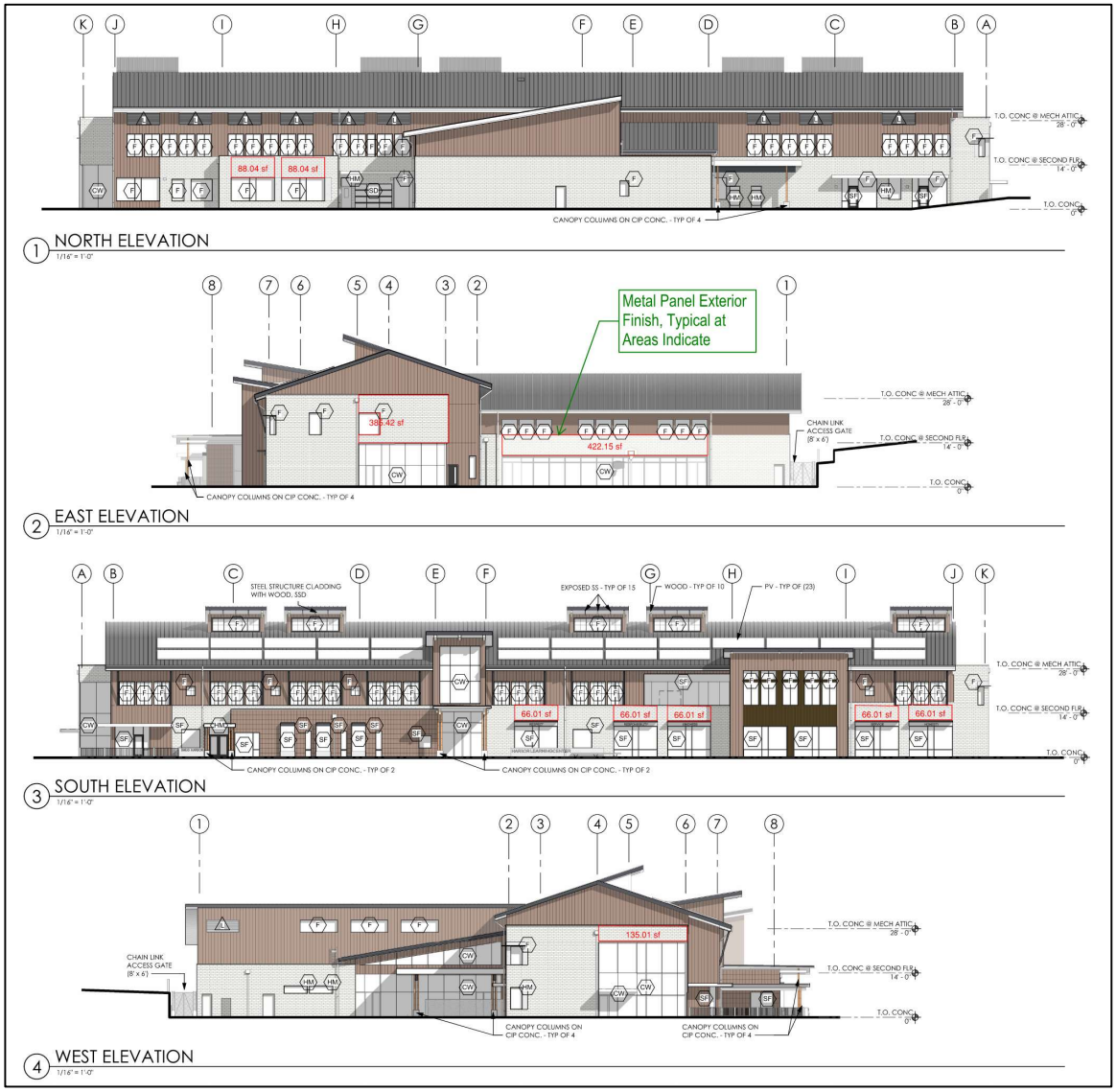
Baseline Concept Illustration



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

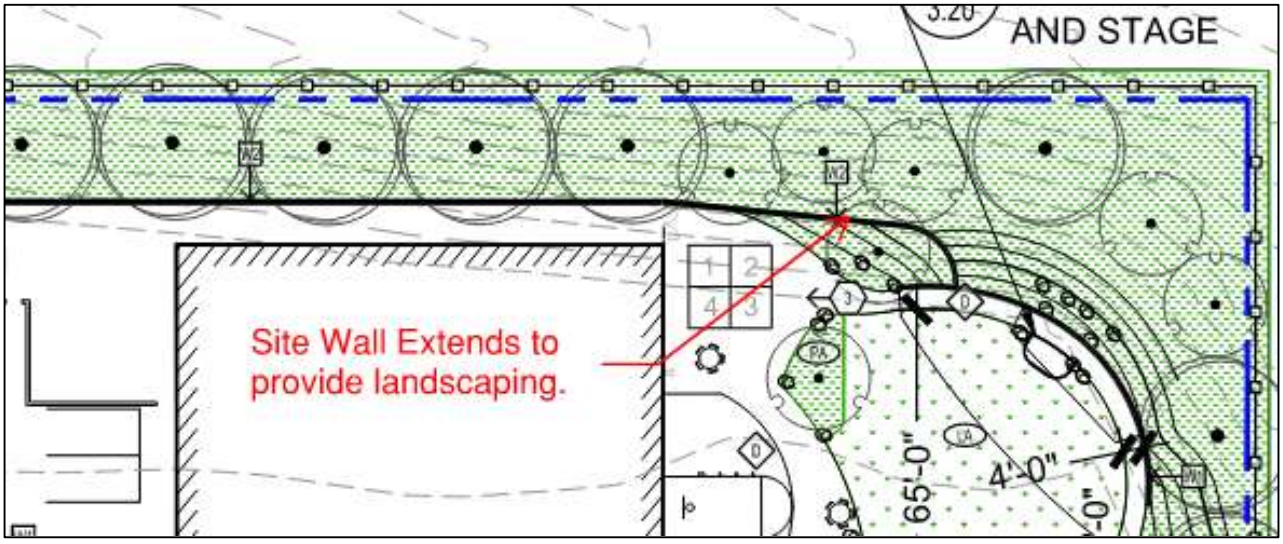
Advantages	Disadvantages
• Reduces wall construction and maintenance cost	• Less landscape area
• Function of site remains the same	•
• Easier to maintain as one small, elevated landscape area would be difficult to irrigate and maintain	•
•	•
•	•

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)**:

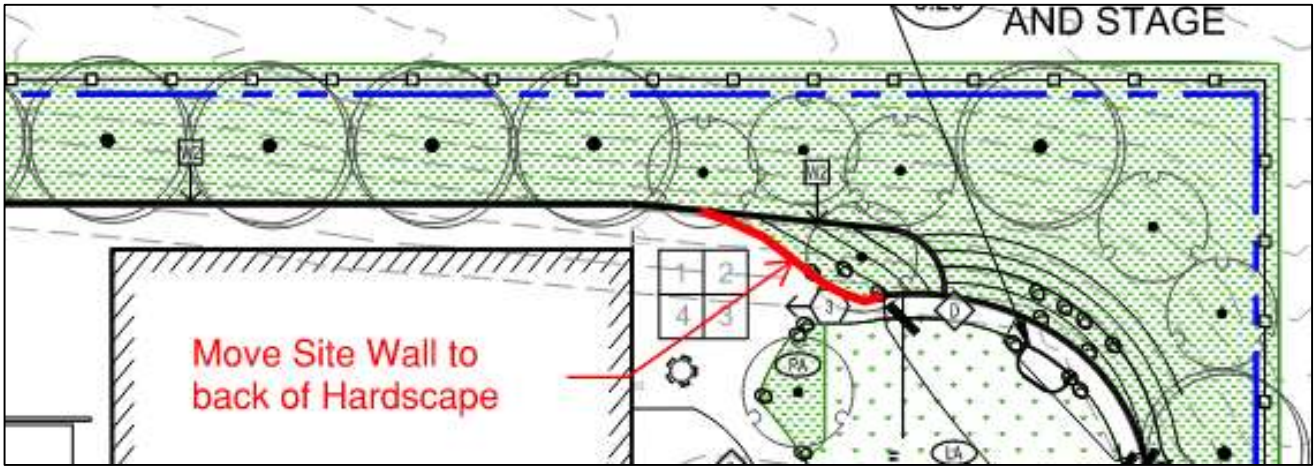
Baseline Concept Illustration



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.

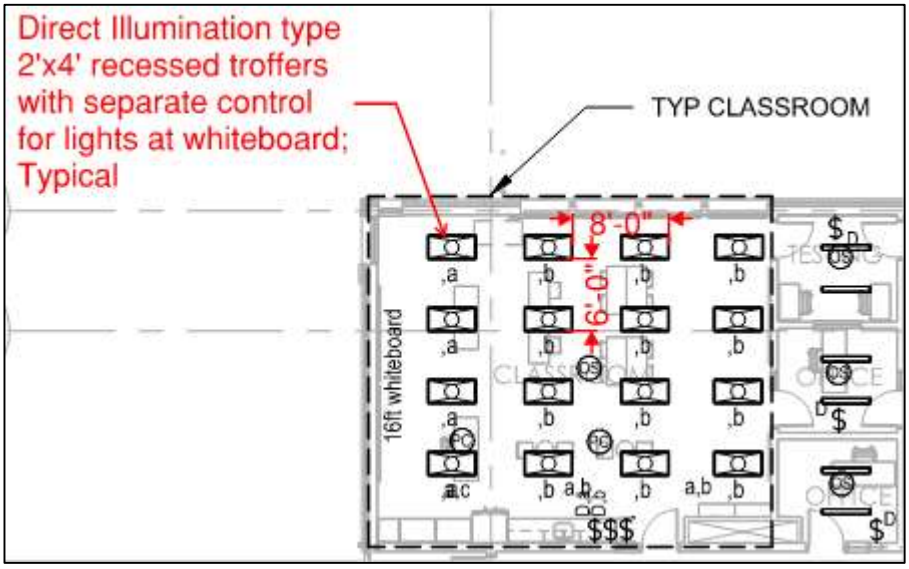
With a high-performance widespread indirect reflector, these fixtures can effectively be used as close as 12" from the ceiling. With only three runs of pendants fixtures, the power connections would be reduced from (16) per classroom to just (3) per classroom, which would allow the labor savings to offset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

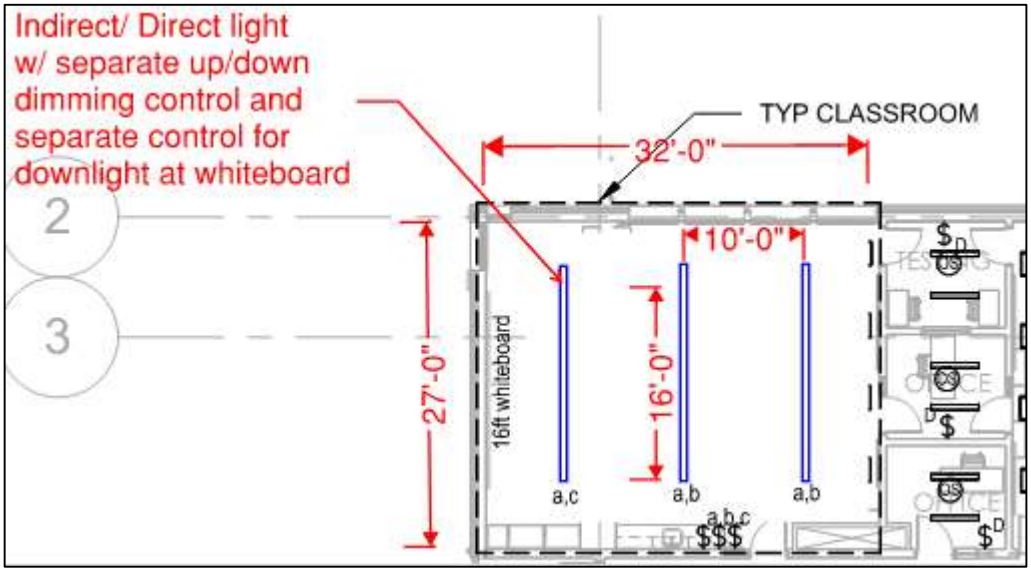
NOTES:
1. FIRST MANUFACTURER LISTED FOR EACH LUMINAIRE TYPE IS BASIS OF DESIGN.

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
•	•
•	•

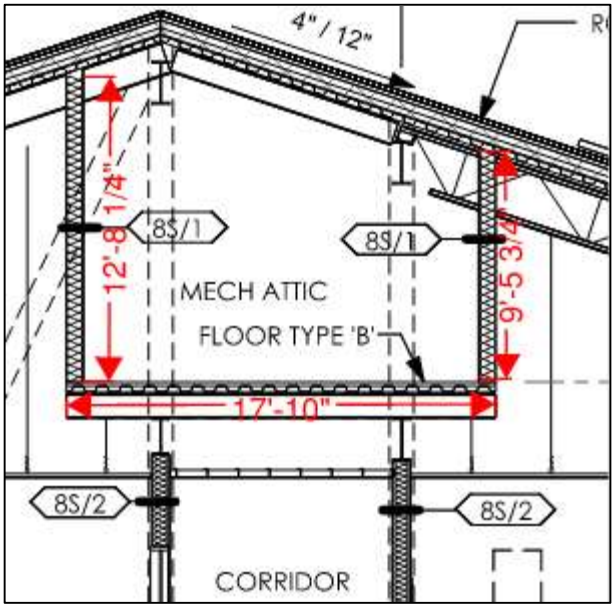
Analysis and Justification:

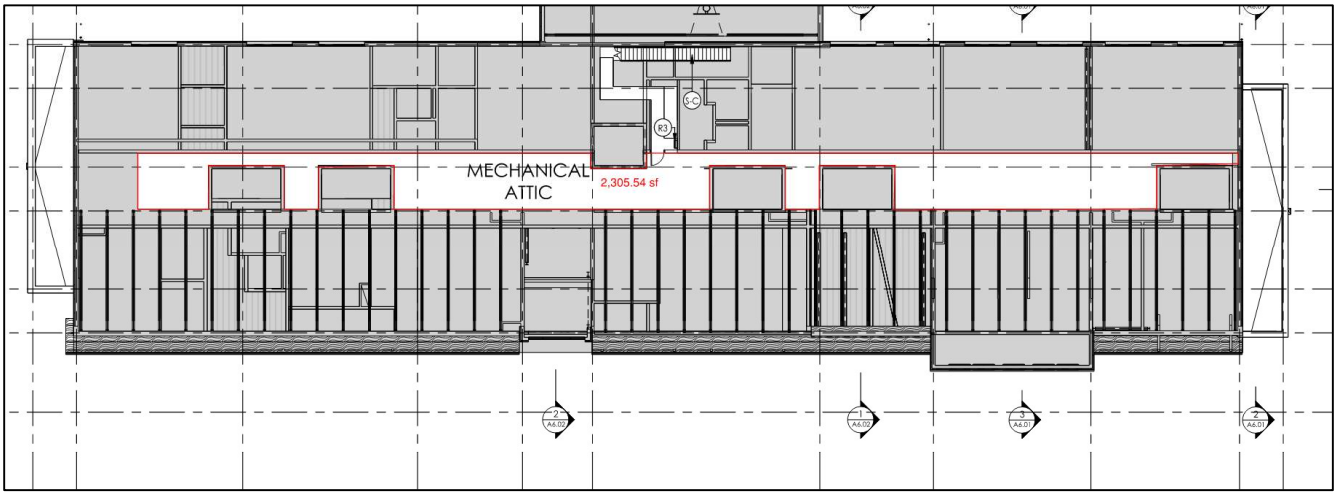
Eliminating the mechanical mezzanine is purely a cost savings consideration. This will reduce the amount of structural steel, decking, concrete, framing, fire protection, insulation, the dedicated stairs etc. Relocating the fan coils that serve the first floor will also reduce the duct runs, providing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

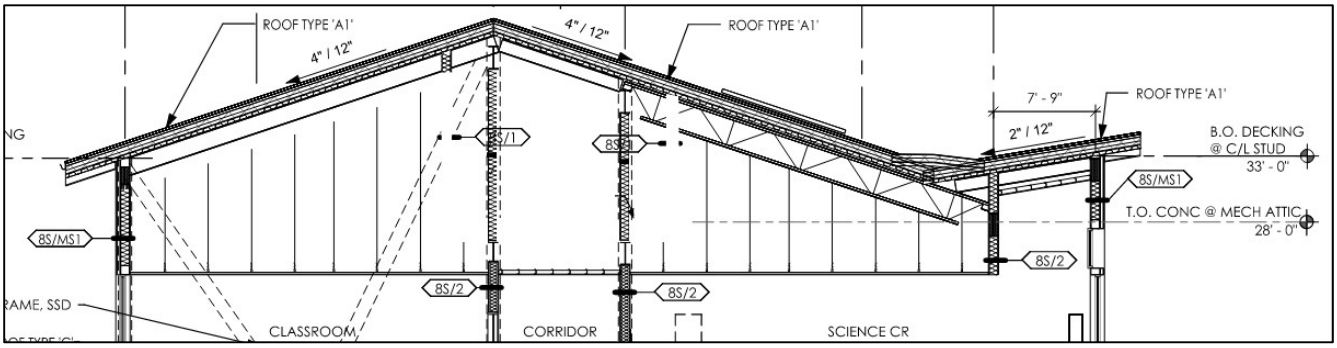




Baseline Mechanical Mezzanine Design

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	•

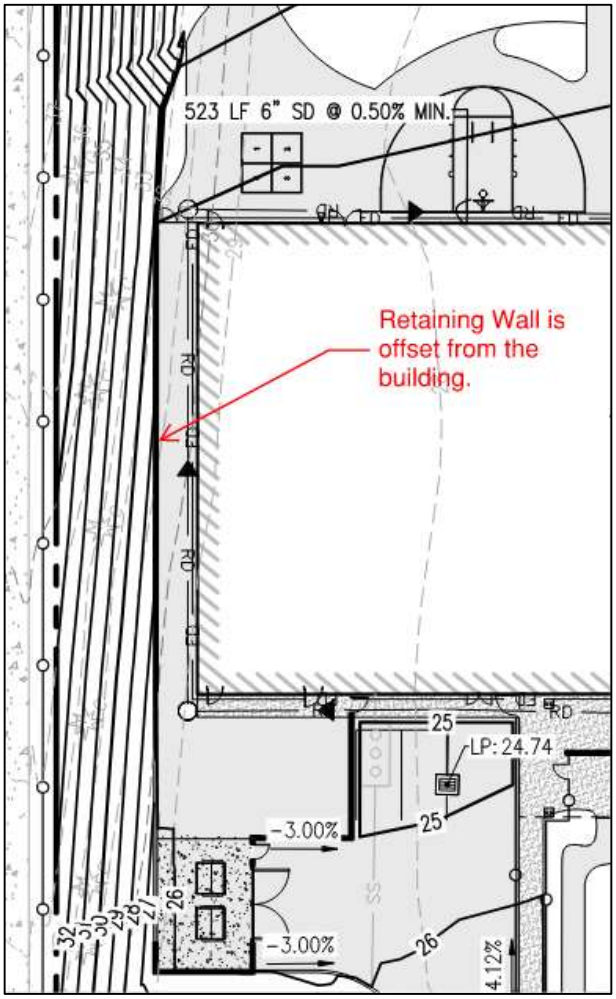
Analysis and Justification:

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)**:

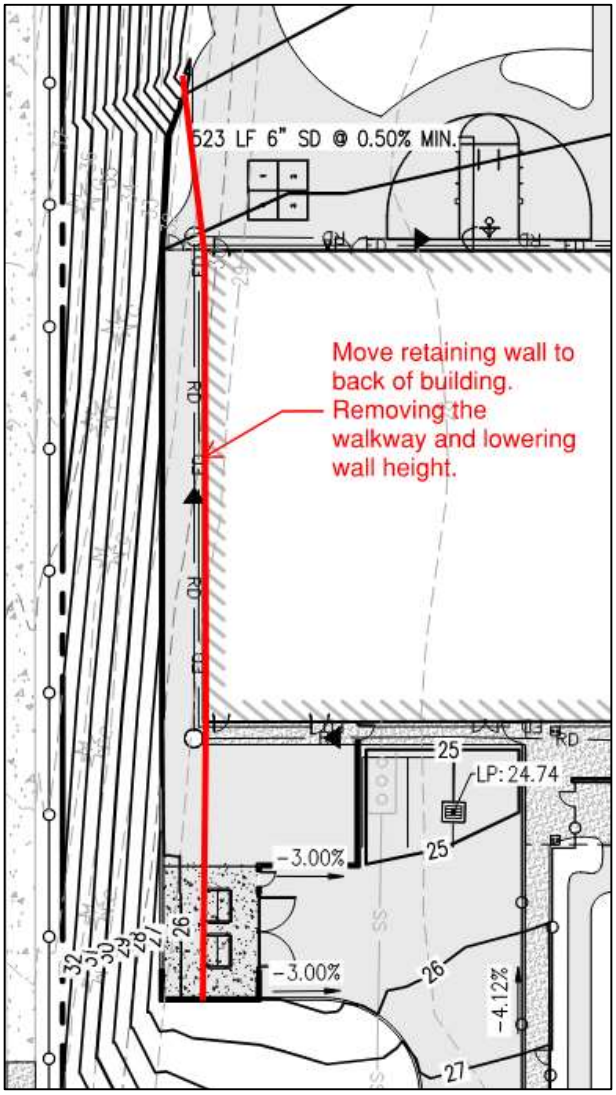
Baseline Concept Illustration



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:

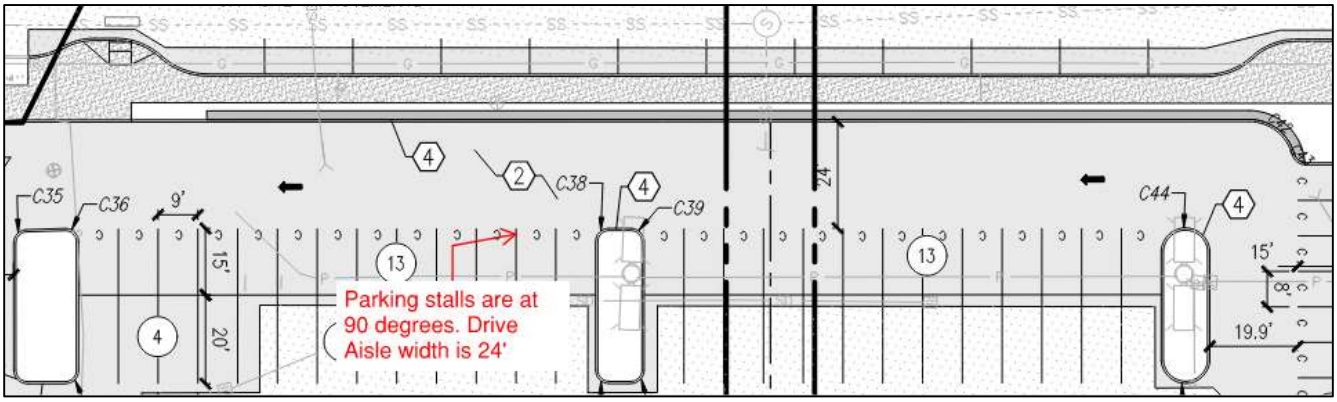
The proposed parking layout presents several notable advantages that strongly support its implementation, despite a potential minor reduction in parking capacity. One of the most significant benefits is the increase in landscape and green space on site. Easier car movements into and out of parking stalls 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)**:

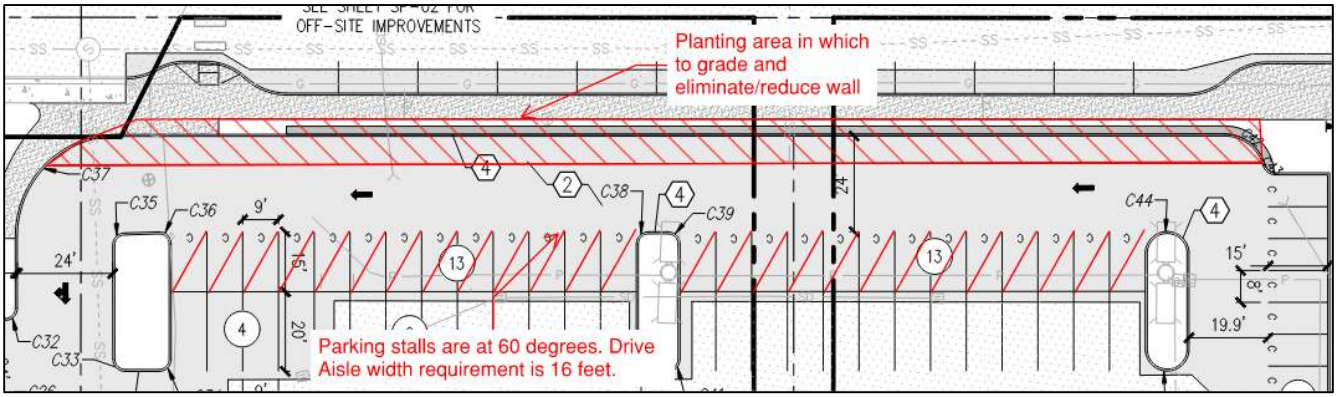
Baseline Concept Illustration



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:

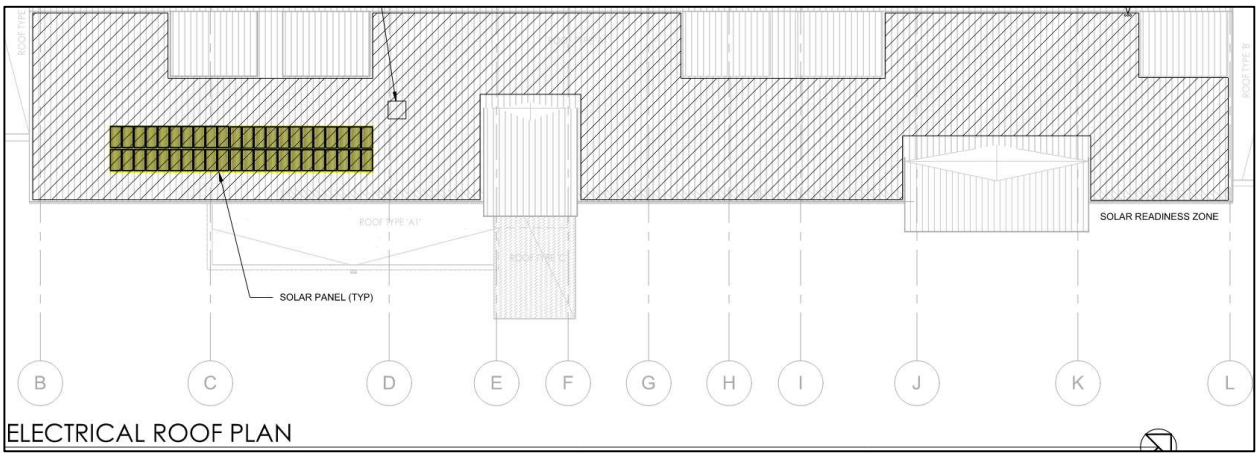
One of the requirements of the 2021 Washington State Energy Code is that a new building that has more than 10,000 sf of conditioned floor area is to be provided with 0.5 W/sf of onsite renewable energy. Typically, this has been in the form of a photovoltaic (PV) solar array unless other options such 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.

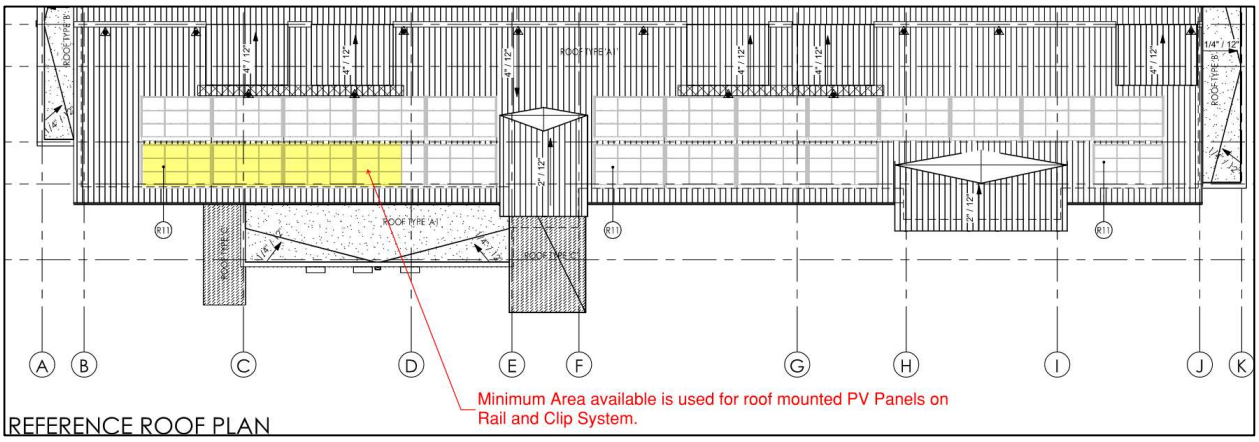
However, due to the high calculated power demand of this building, it is unlikely that this system would achieve a net-zero energy state. At this point in the design, it is unclear what the time for return-on-investment would be for a system such as this.

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

Baseline Concept Illustration



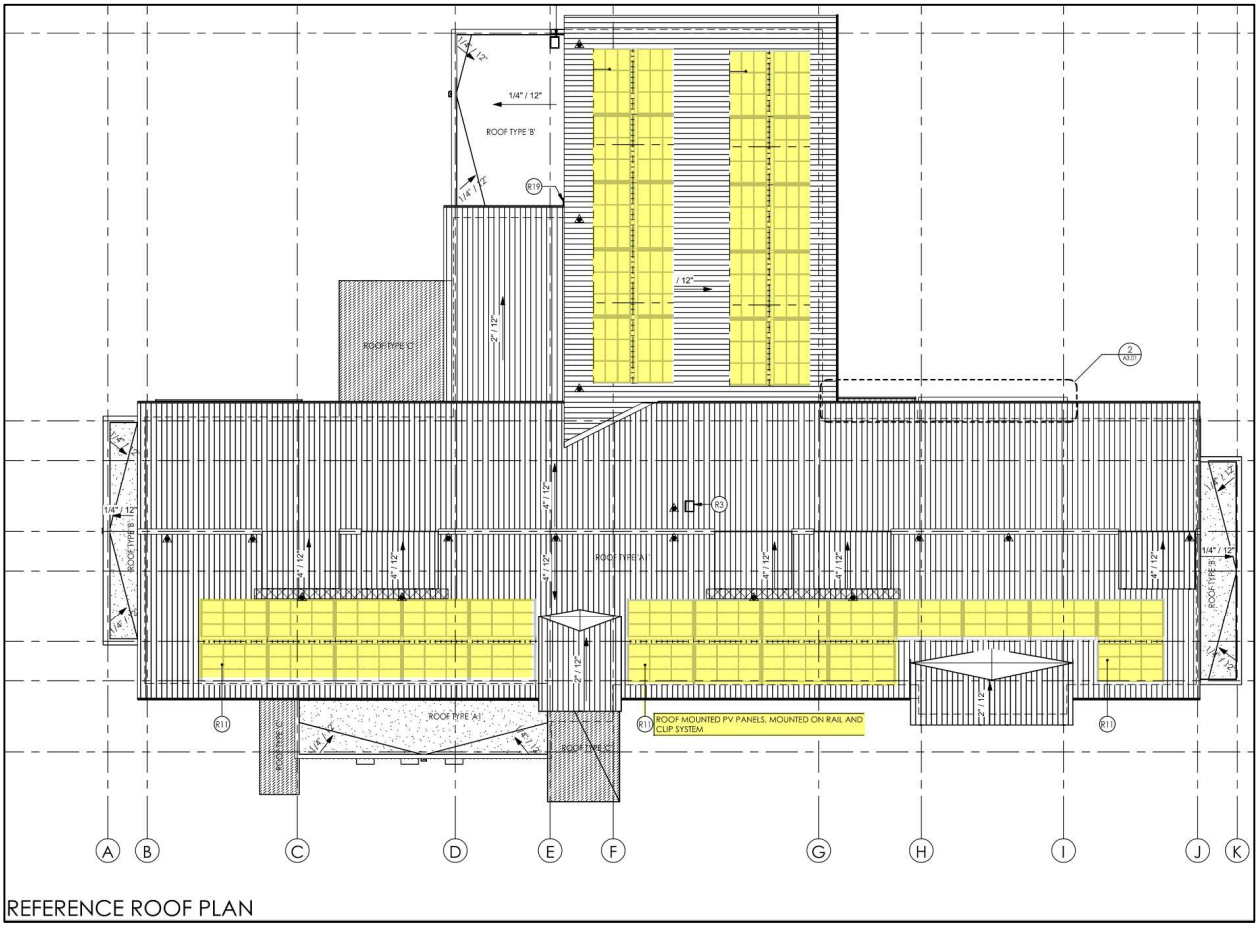
Code Minimum PV Array Installed with Solar Readiness Area for Expansion



Baseline Architectural Reference Roof Plan

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

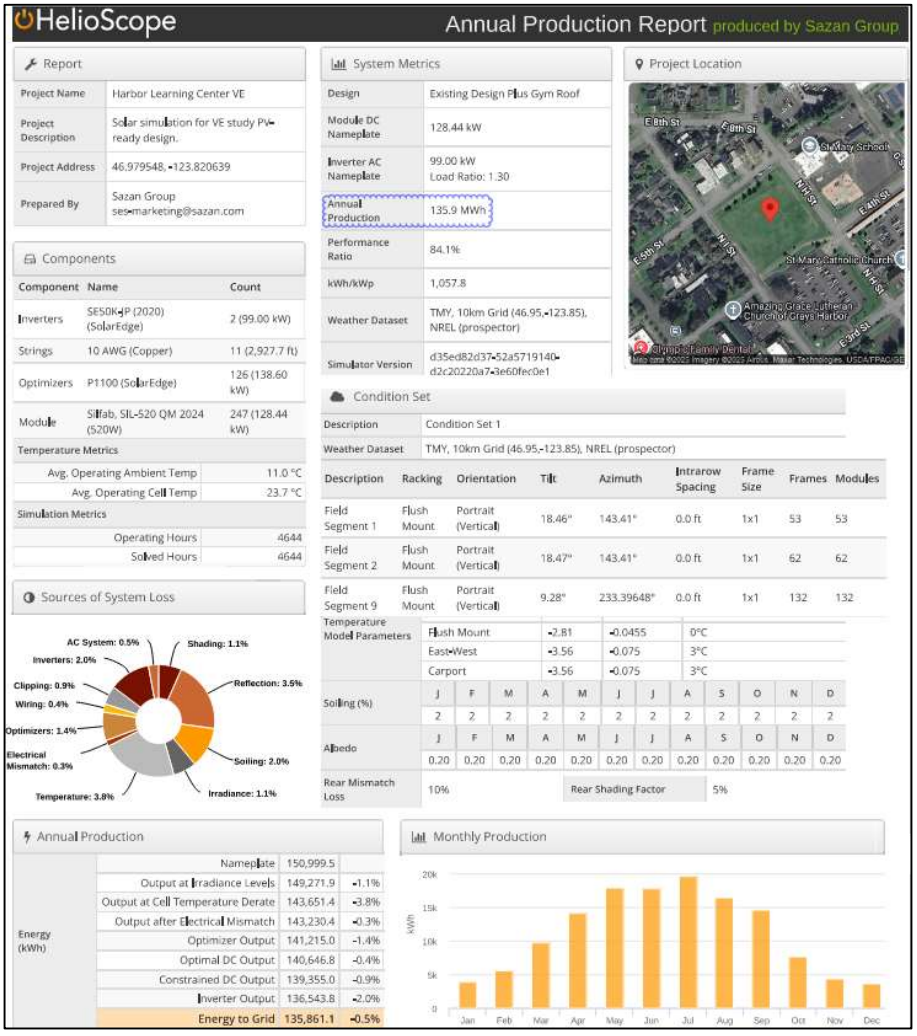
Alternative Concept Illustration



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

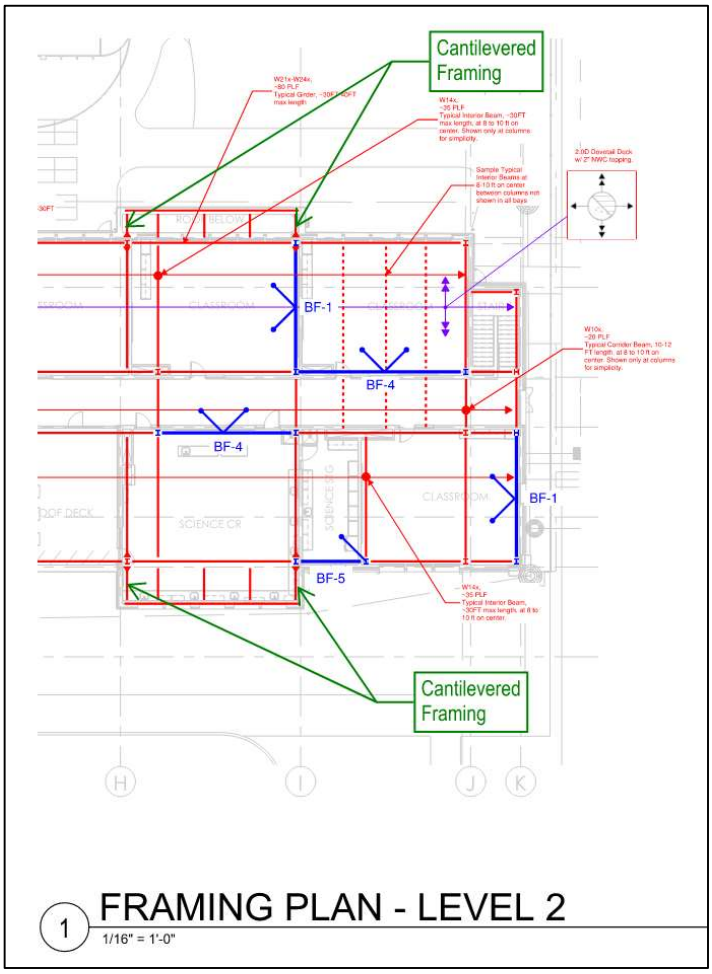
Advantages	Disadvantages
• Reduce cost	• None apparent
• Benefit schedule	•
• Improve constructability	•
• Improve environmental sustainability by reducing steel usage	•
•	•
•	•

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)**:

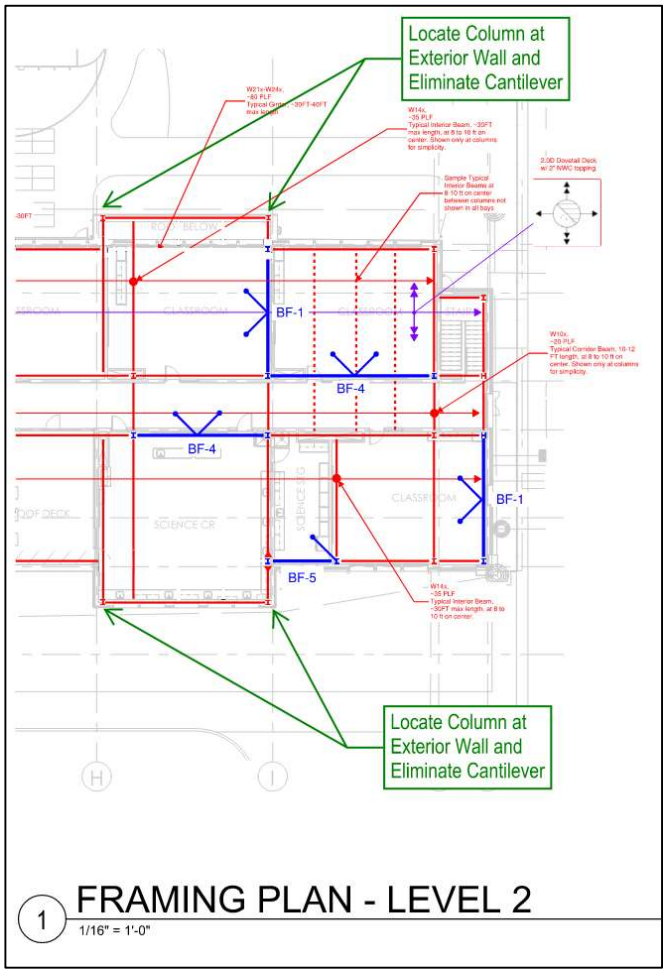
Baseline Concept Illustration



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

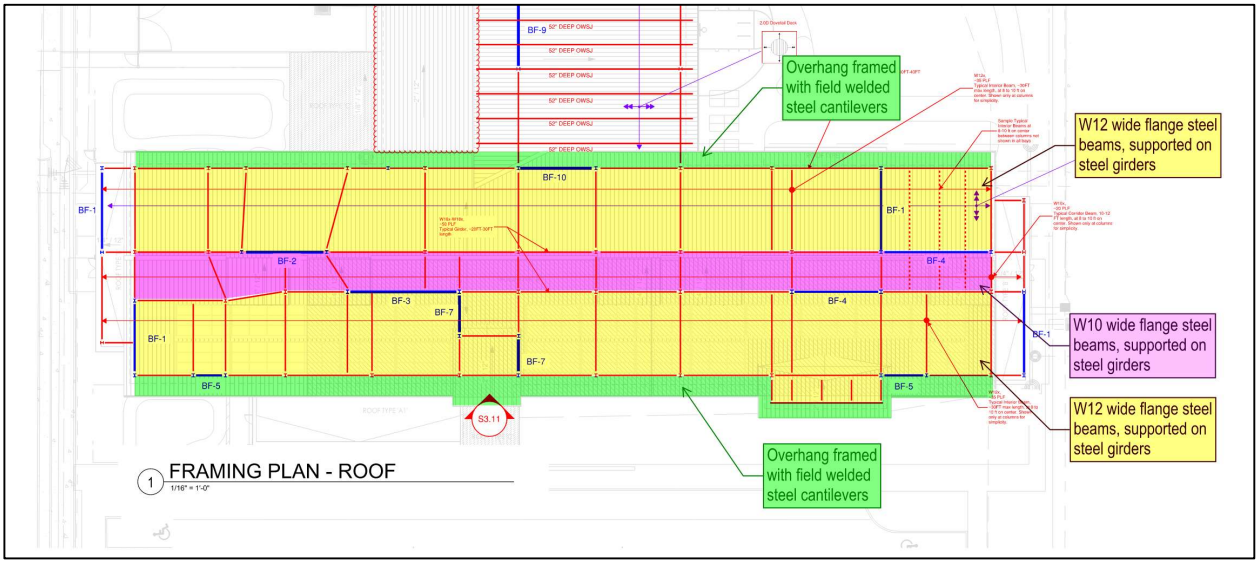
Advantages	Disadvantages
• Reduces cost	• None apparent
• Improves environmental sustainability by reducing steel weight	•
• Benefits schedule	•
•	•
•	•
•	•

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)**:

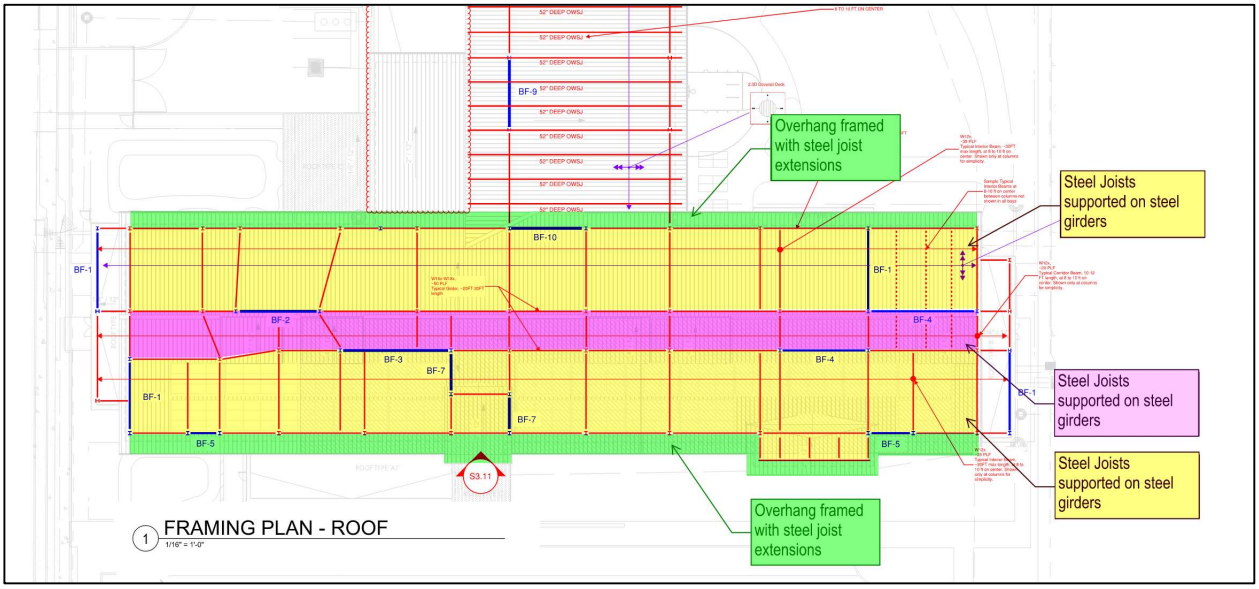
Baseline Concept Illustration



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

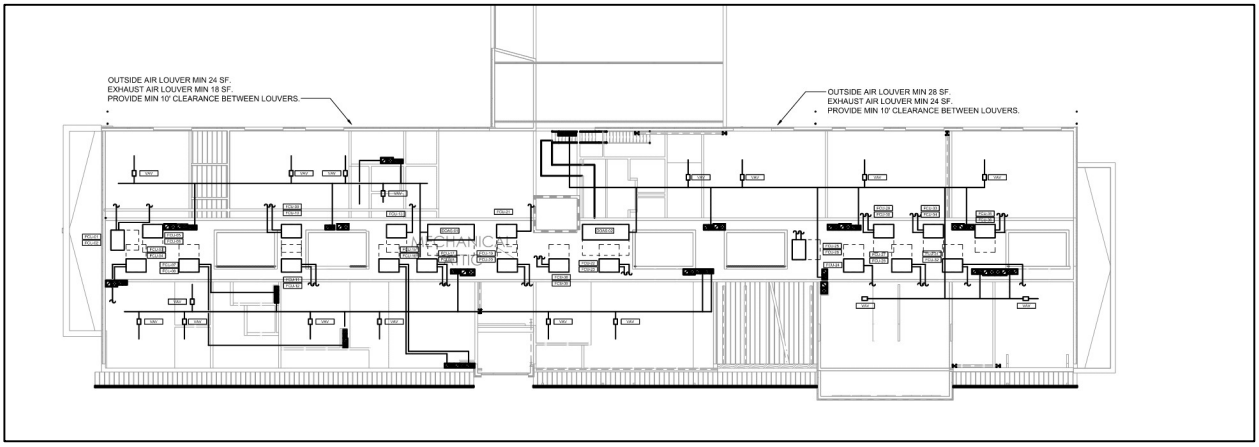
Advantages	Disadvantages
• Reduces or eliminates much of the controls and complexities of the HVAC airside system	• Less control for comfort or energy management
• Less equipment to purchase and maintain	• Increases cost for terminal devices. May also increase ductwork requirements.
•	•
•	•
•	•
•	•

Analysis and Justification:

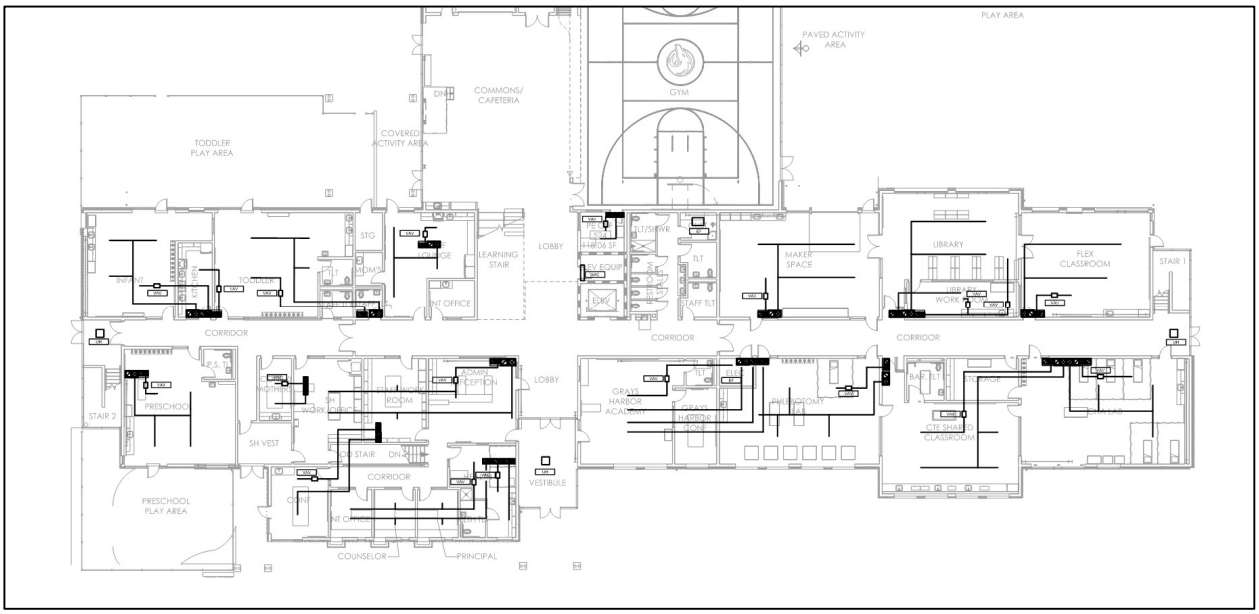
The Washington State energy and mechanical code will require ventilation air to be provided independent of the normal A/C or heating/cooling system. While there are several ways to accomplish this, new developments have included “dual input” terminal devices where both OA and supply air can be provided 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



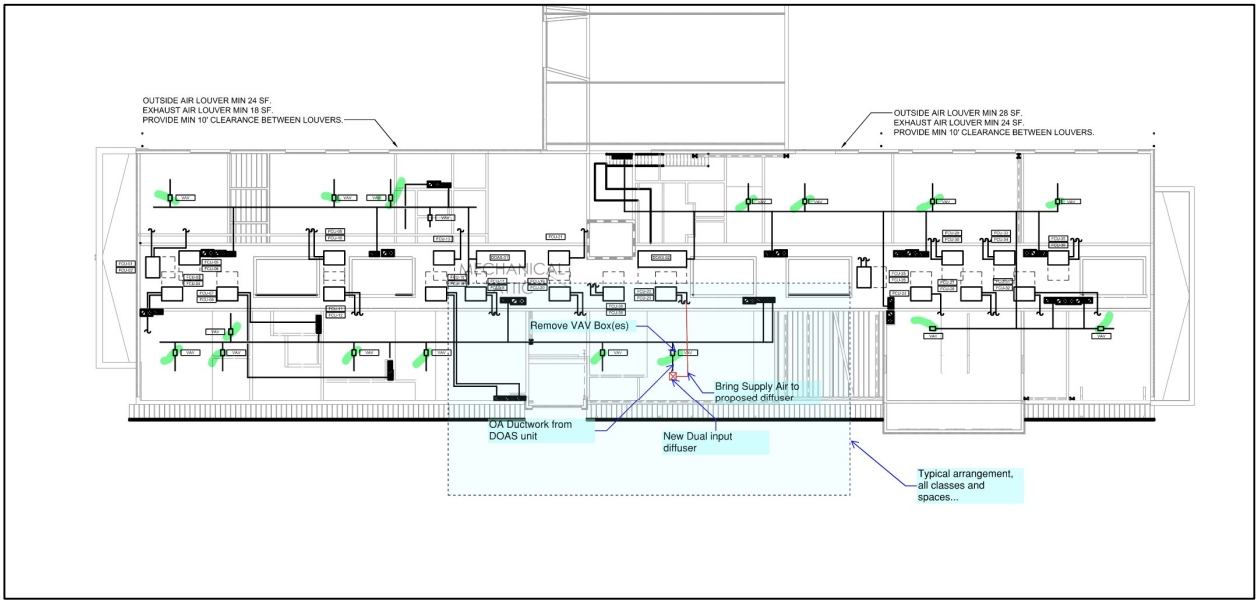
Baseline Mechanical Attic HVAC Plan



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

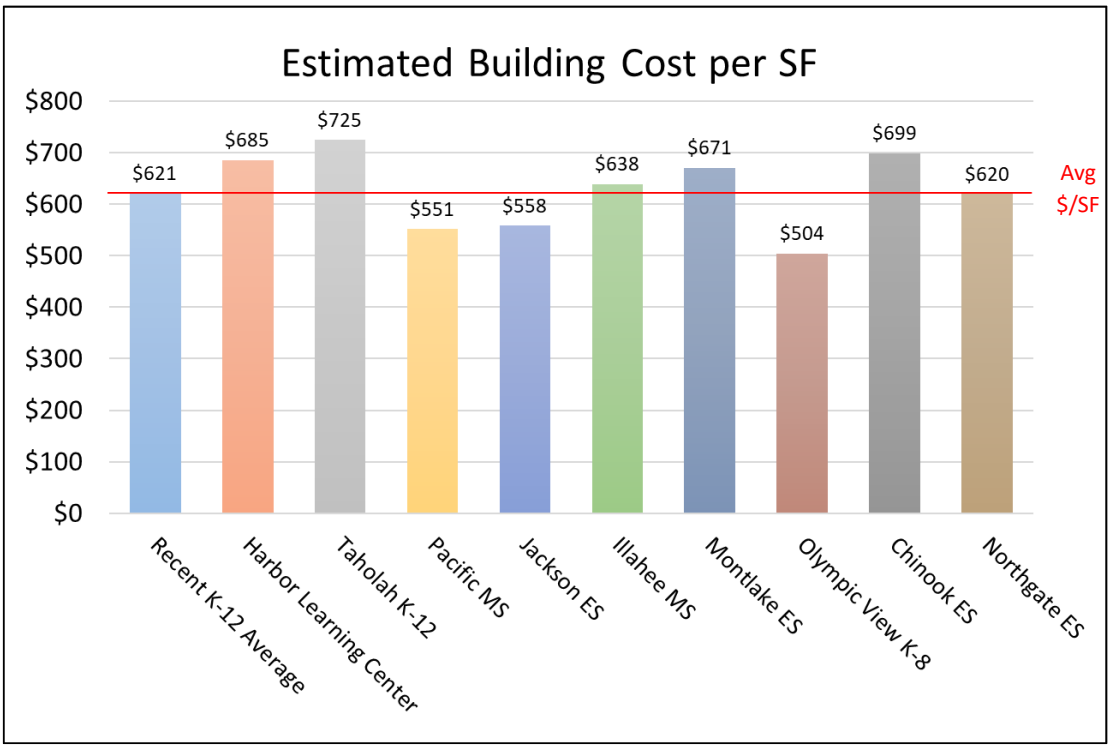
The value team completed an analysis of the estimated cost of the project in comparison to recently reviewed projects of similar type and scope. Cost information for these comparison projects was drawn from project estimates prepared by cost consultants, engineers and general contractors providing preconstruction 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.

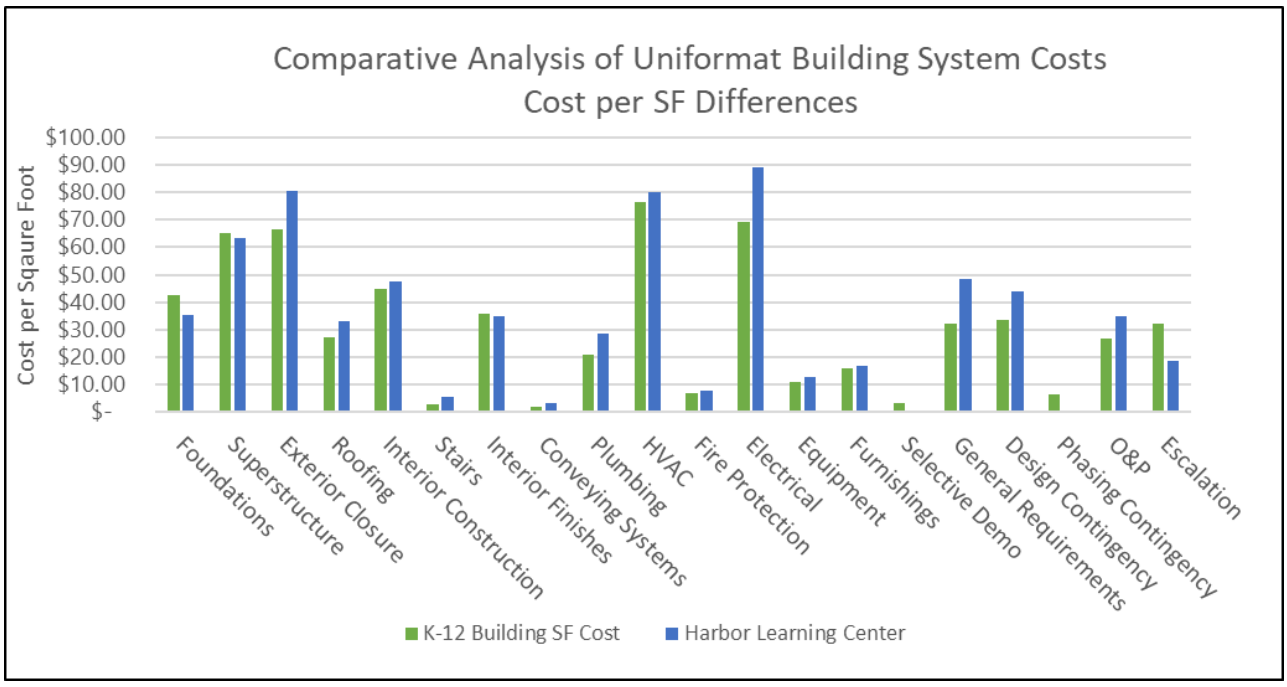
Our comparison of similar K-12 estimates for eight projects representing six school districts from the Pacific Northwest, shows an average estimated cost per sq. ft. of $621 (for the building only, not including site development cost). This average is for estimated costs escalated to the same period 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.

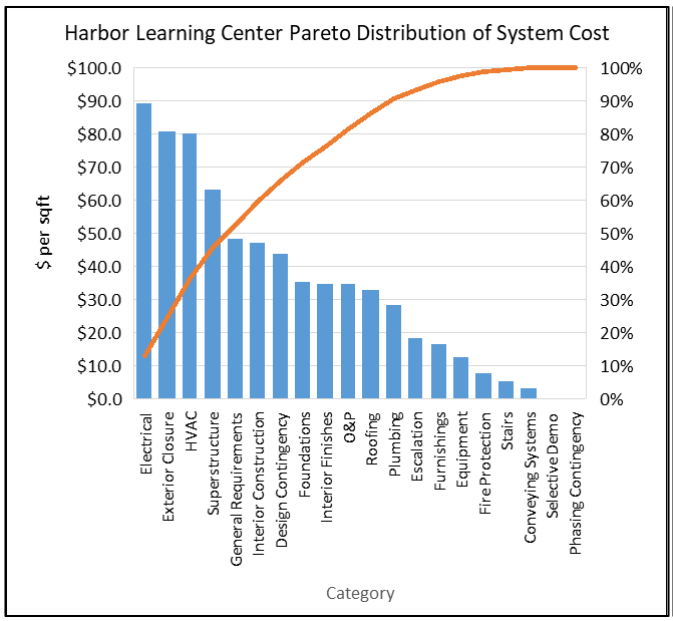
Lower than average costs include:

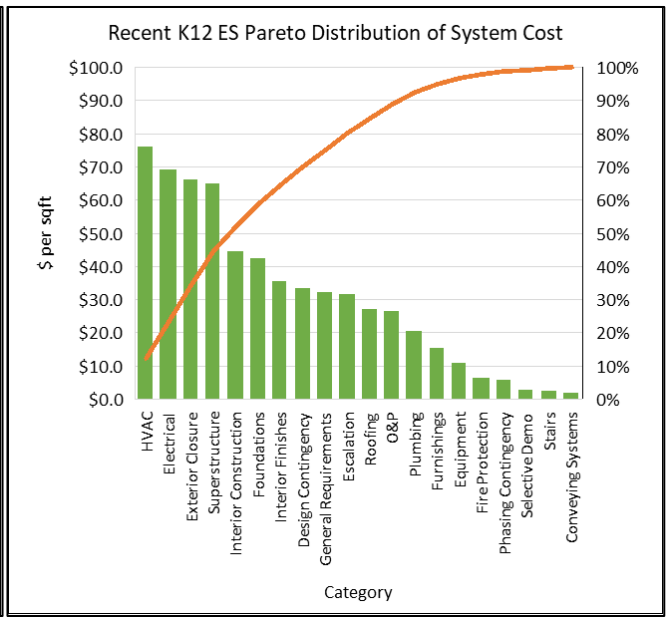
- Foundations -17% or $7 per sq. ft.
- Superstructure -3% or $2 per sq. ft.
- Escalation -42% or $14 per sq. ft.

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**

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
	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

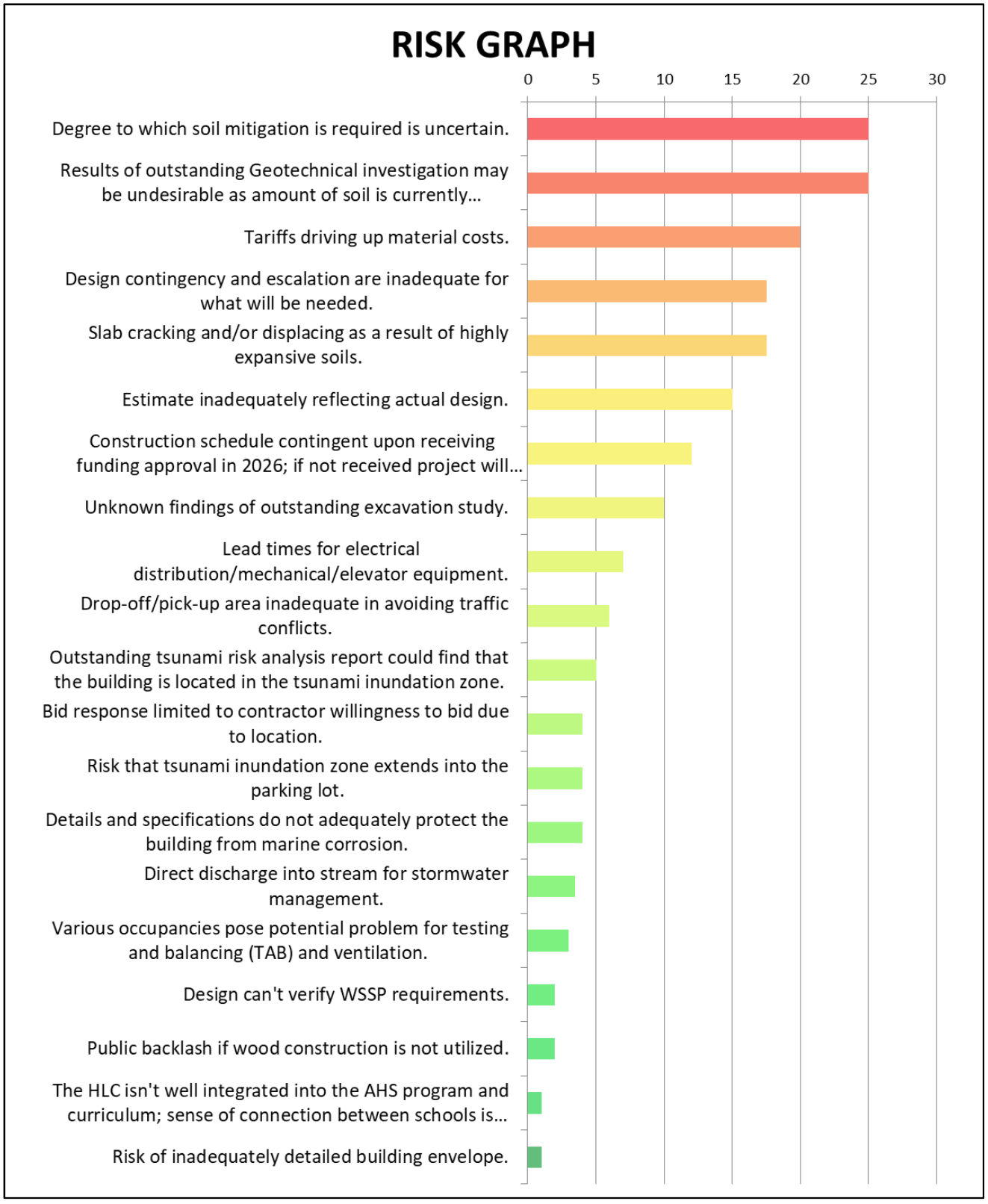


Figure 3: Risk Factors Graph Ranked by Criticality

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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

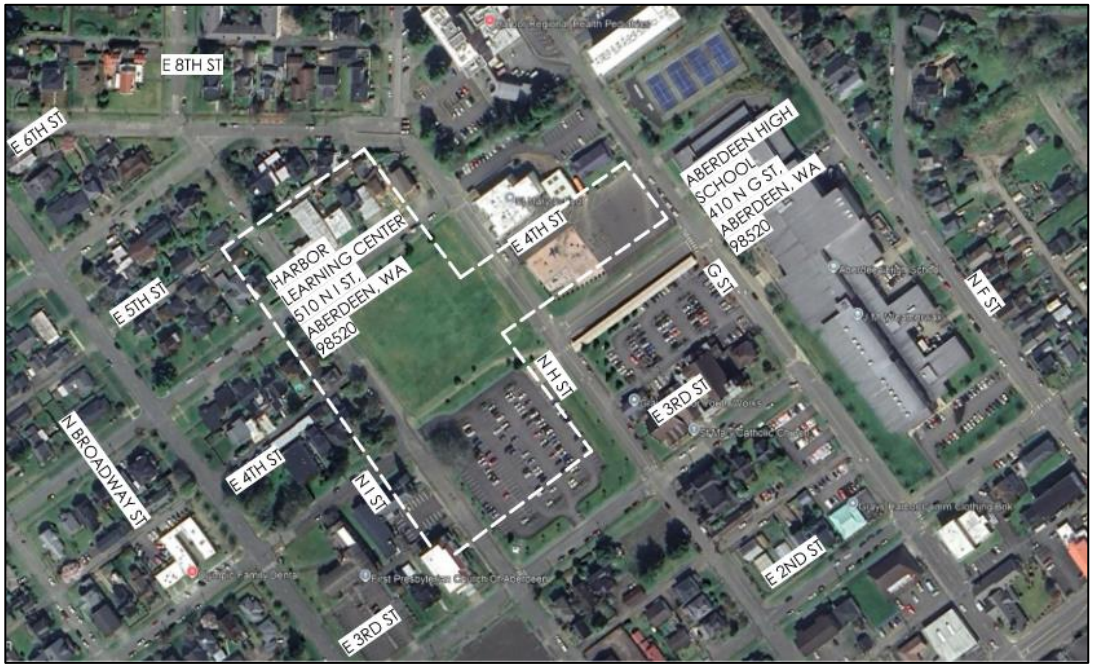
E.2 Design Drawings

Harbor Learning Center Conceptual Renderings

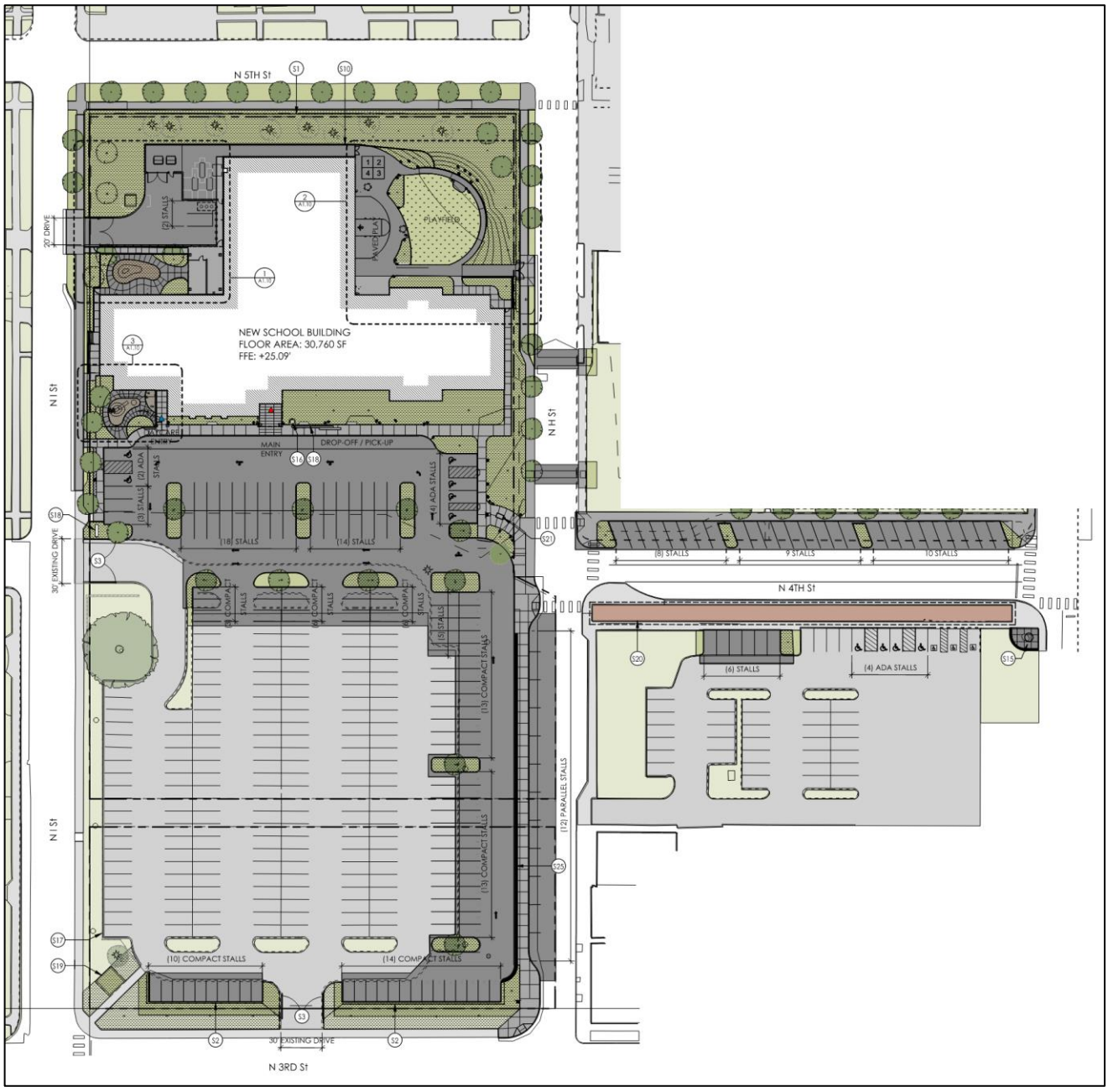
Front



Site Plan

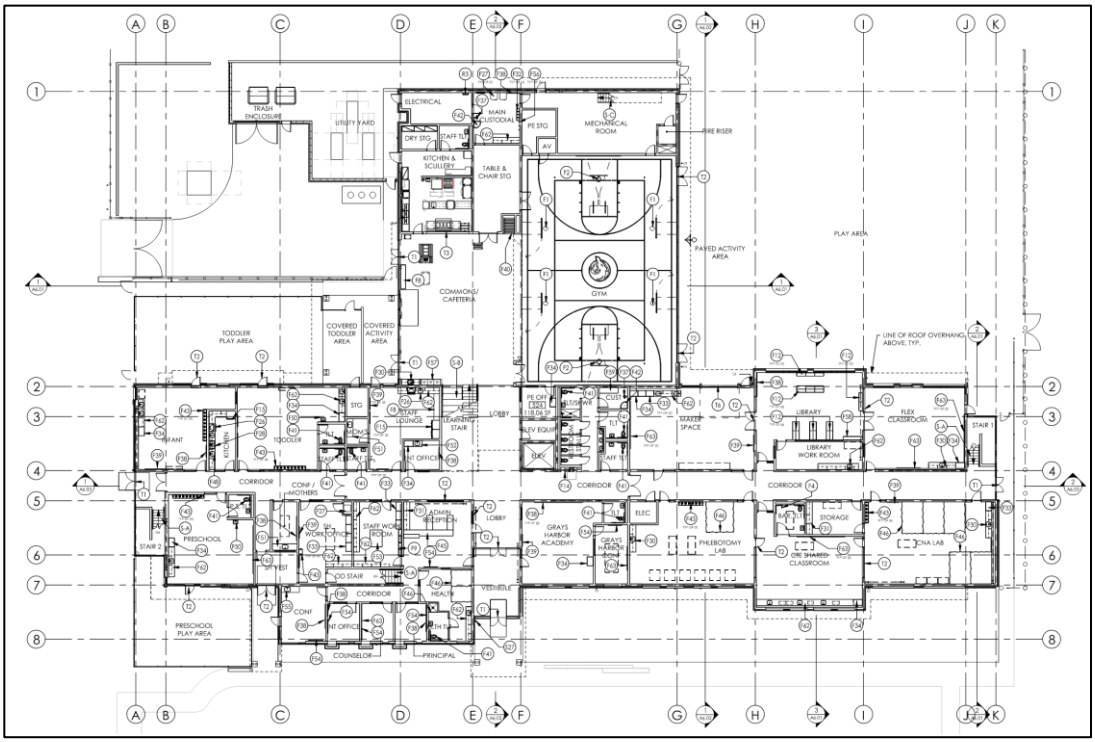


SITE PLAN

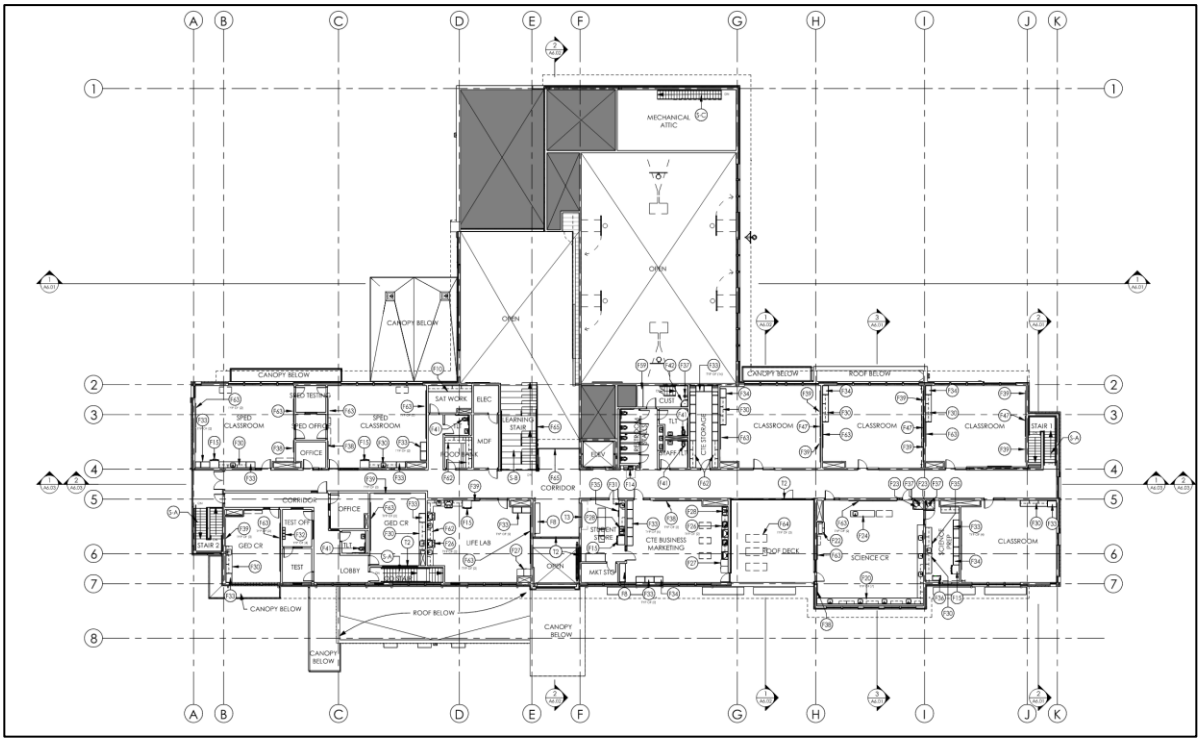

N 5TH St
N 1 St
N H St
N 4TH St
N 3RD St
NEW SCHOOL BUILDING
FLOOR AREA: 30,760 SF
FFE: +25.09'
MAIN ENTRY
DROP-OFF / PICK-UP
PLAYFIELD
PAVED PLA
20' DRIVE
30' EXISTING DRIVE
(2) STALLS
(2) ADA STALLS
(3) STALLS
(18) STALLS
(14) STALLS
(4) ADA STALLS
(9) COMPACT STALLS
(5) STALLS
(13) COMPACT STALLS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

FLOOR PLANS

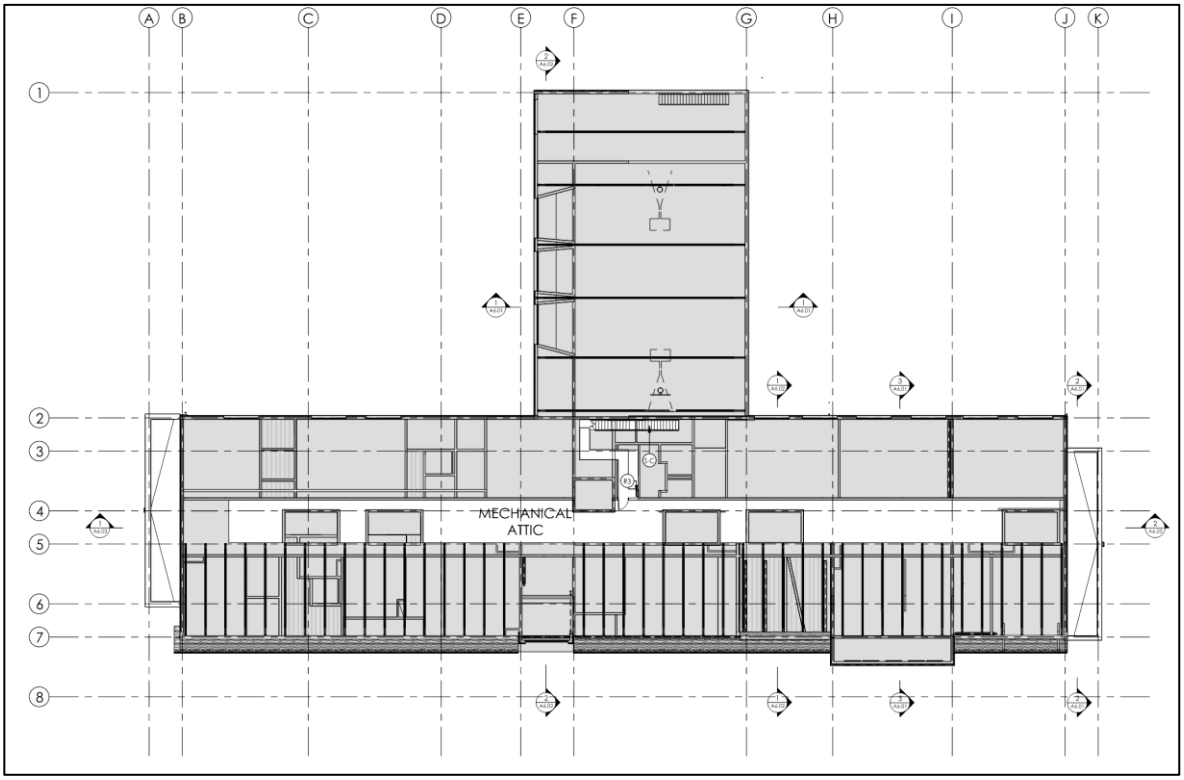
First Floor



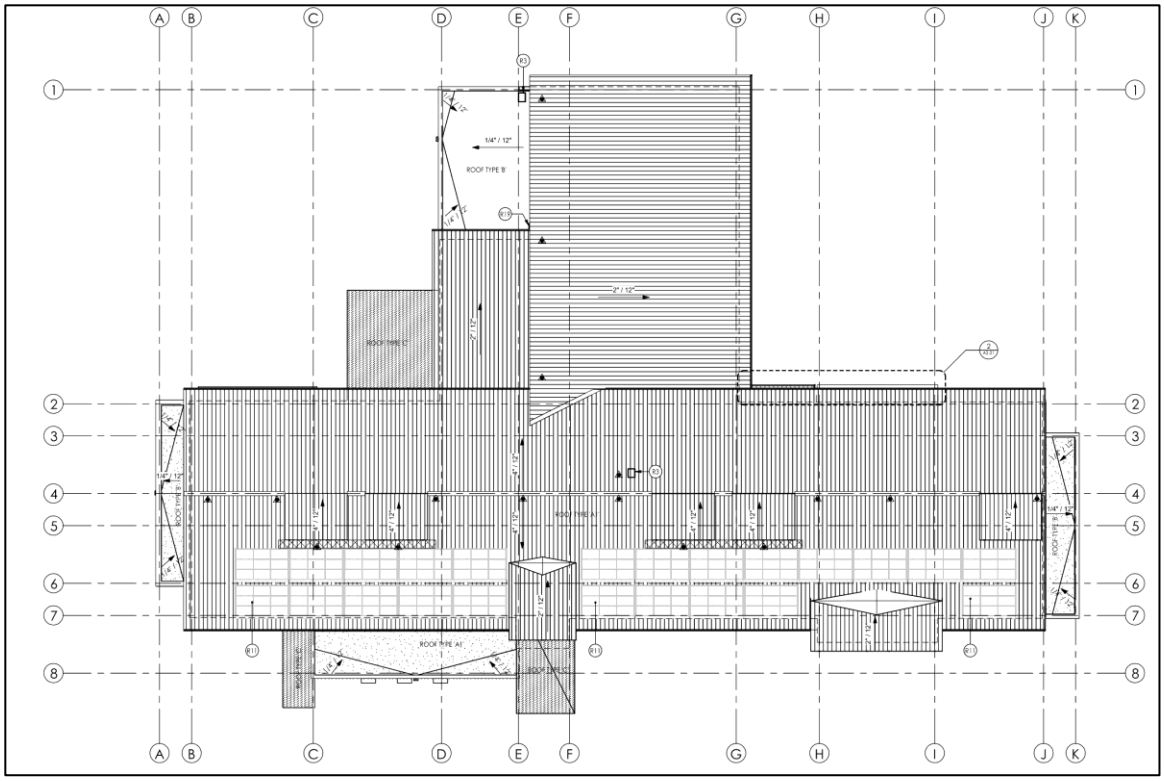
Second Floor



Mechanical Attic

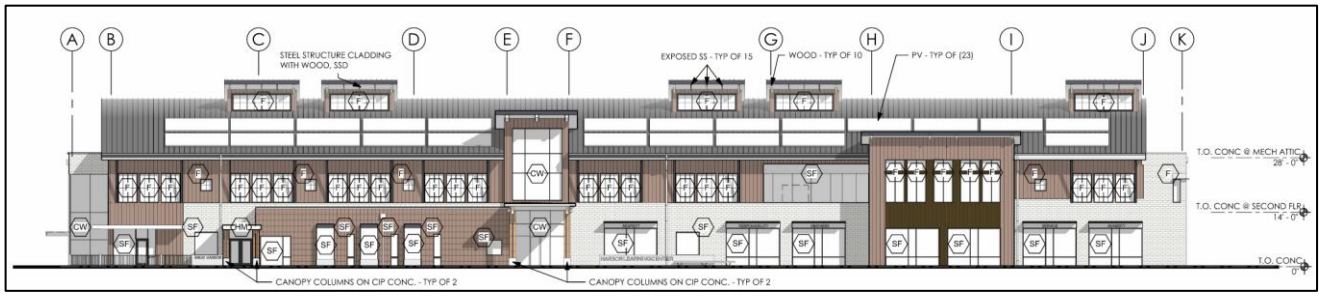


Roof Plan

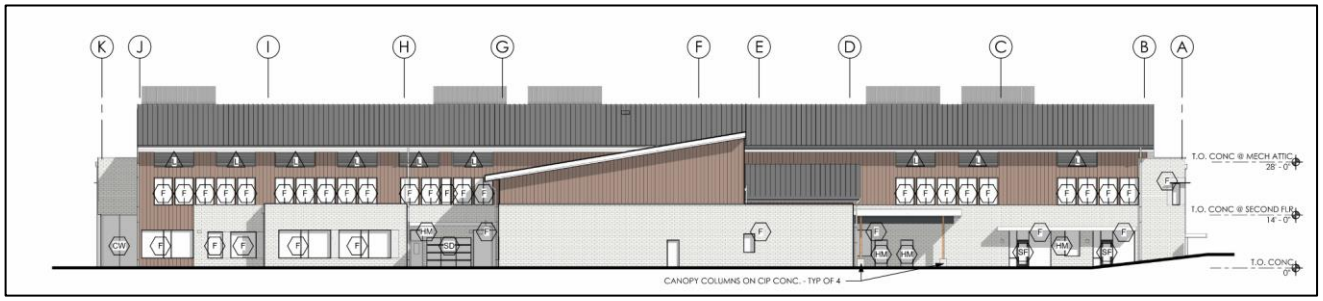


Exterior

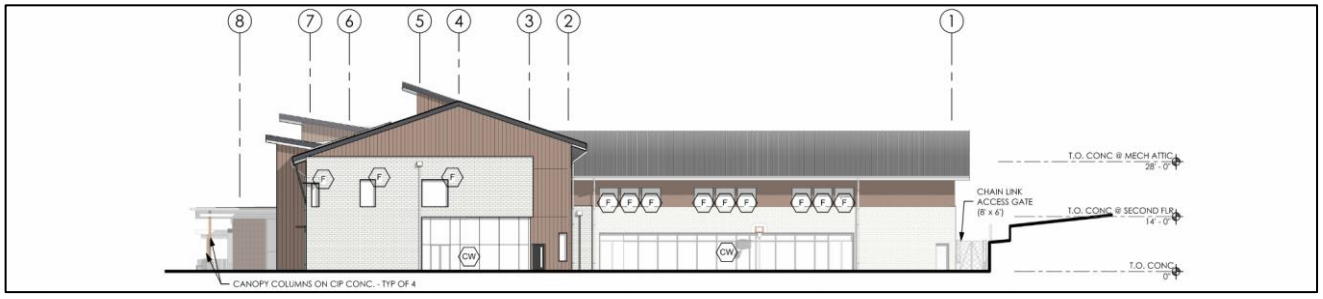
South Elevation



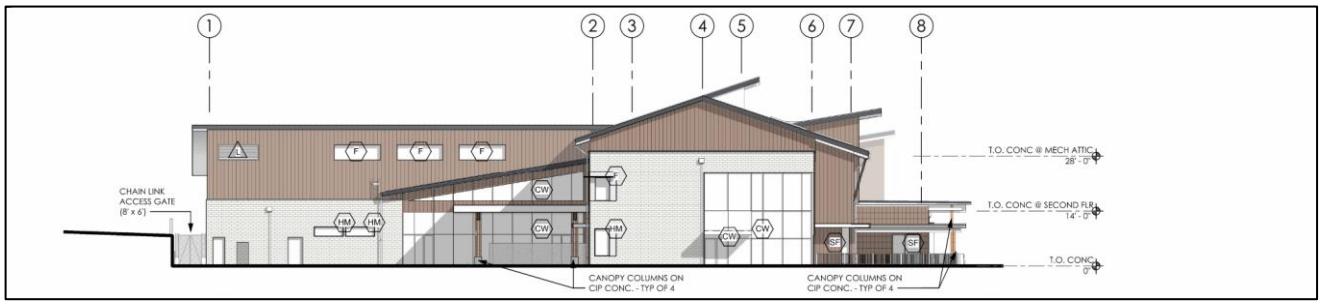
North Elevation



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

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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

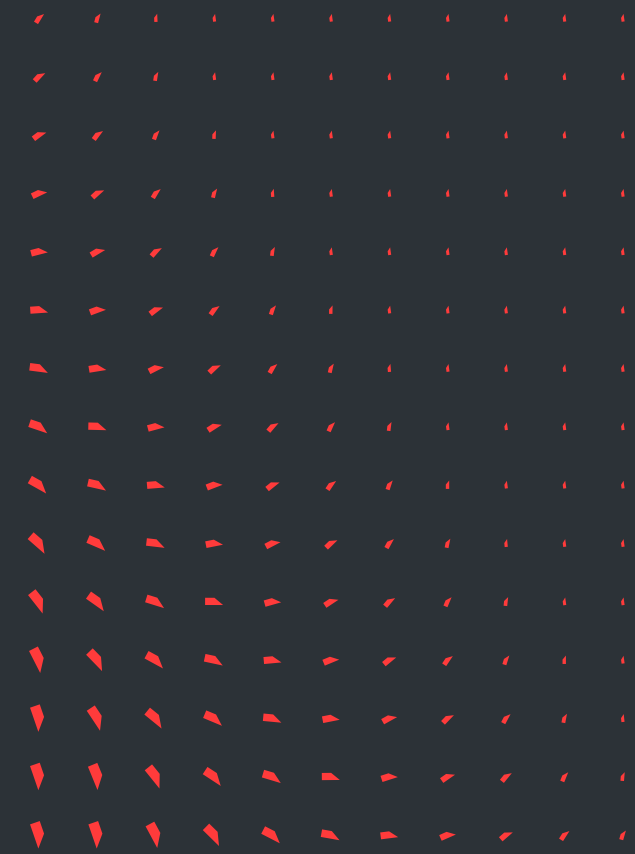


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III. Wood vs Steel Comparison



TCF

Evaluation of Building Construction type for the Harbor Learning Center for the Aberdeen school district.

Introduction:
This comparison outlines key differences between **Type II-B (non-combustible steel/concrete)** and **Type V-B (combustible wood-framed)** construction for a 2-story, 46,000 SF school facility such as the Harbor Learning Center. It evaluates how each construction type performs relative to fire code, acoustics, durability, cost, and constructability, with specific attention to the geographic and regulatory context of Aberdeen, WA. While other construction types (such as Type I or III) were considered, they were not explored in depth due to limited cost efficiency, higher construction complexity, or reduced suitability for the project's size and site constraints. The goal is to support informed early-phase design decisions by clearly presenting the trade-offs between these two viable structural systems.

Category	Type II-B (Steel/Concrete)	Type V-B (Wood-Framed)	System of Advantage
Max Allowable Area (2-story Group E w/ full increases)	123,375 SF	49,875 SF	No Advantage
Typical First Floor Max (w/o fire walls)	Up to ~61,000 SF	~33,250 SF (Fire walls would be required if this area was exceeded)	**Type II-B**
Structural Fire Resistance	None required (non-combustible)	None required (combustible framing)	No Advantage
Exterior Wall Fire Rating (if <10')	1-hr w/in 10' of lot line, easy w/ metal stud	1-hr if <10' from lot line; complex with GWB over wood	No Advantage (No adjacent lot lines)
Draft Stopping (Floors & Attics)	Not required	Required in floors/attics every 3,000 SF	**Type II-B**
Fire Blocking in Concealed Spaces	Minimal	**Extensive:** wall, ceiling, chases	**Type II-B**
Corridor Fire-Rating Likelihood	Sometimes (if >75' travel), but easier to avoid	Often required due to longer corridors and lower fire resistance	**Type II-B**
Shaft Enclosure (Stairs/Elevators)	1-hr required for 2-story stairs/elevators	1-hr required; more complex gypsum detailing	**Type II-B**
MEP Shaft Penetration Strategy	**Simpler firestop systems**; easier access	**Tight cavity access**; heavy reliance on blocking/fire sealants	**Type II-B**
Sprinkler Layout Complexity	**Straightforward**; pendent or upright heads	**Complex**; sidewall, attic, and specialty heads common	**Type II-B**
Acoustic Performance (STC/IIC)	**High baseline performance**; less treatment needed	**Weaker without upgrades**; needs resilient channels and insulation	**Type II-B**

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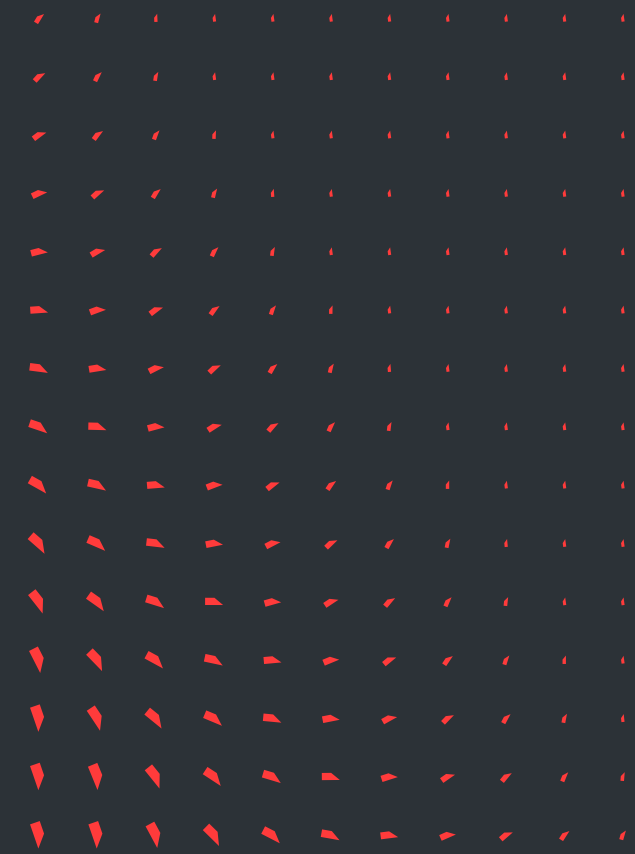
Weather & Moisture Resilience (Aberdeen)	Resilient to moisture, mold, and rot	**Higher risk** of water intrusion, warping, mold	**Type II-B**
Cladding Material Flexibility	Supports all cladding types easily	Feasible; Some cladding types will need to consider fire resistant details and cladding support for heavier cladding systems.	**Type II-B**
Construction Sequencing Flexibility	**High**; framing independent of finishes	**Tight**; trades must follow strict sequence to avoid rework	**Type II-B**
Site Utilization for Area Increases	**High** more tolerant of tighter site or setbacks	**Highly dependent on open space**; frontage increases often required	No Advantage (Full frontage available on all 4-sides)
Exit Discharge & Egress Path Layout	**Flexible**; more forgiving in layout and discharge routing	Must carefully route and terminate at exterior within fire-rated corridors	**Type II-B** (If fire rated corridors are needed)
Framing & Draft Stop Impact on HVAC/Lighting	**Minimal**; open web steel joists simplify coordination	Framing often conflicts with systems soffits and furring common	**Type II-B**
Span Capability for Large Spaces (Gym, Commons)	**Excellent**; long clear spans, good for gym/commons	**Limited;** without engineered lumber; harder to span gym/commons	**Type II-B**
Insurance & Code Oversight	**Standard**; lower scrutiny due to materials	Higher scrutiny for fire blocking, concealed spaces. Additional builders risk required for wood construction	**Type II-B**
Upfront Cost Efficiency	**Moderate** upfront cost	**Lower** upfront cost (materials/labor)	**Type V-B**
Lifecycle Durability & Maintenance	**Longer lasting**; lower maintenance	**Higher maintenance**; lower long-term durability	**Type II-B**
Local Contractor Availability (Aberdeen)	May require importing steel-qualified crews	**Good** pool of wood-framing contractors	**Type V-B**
Seismic Resilience for Risk Category III (SDC D)	**High** steel braced frames and rigid diaphragms perform well; easier detailing and deflection control	**Moderate** engineered shear walls required; more detailing, anchorage, and diaphragm stiffness challenges	**Type II-B**
Footing Sizes	**Heavier** footings to receive lateral frames.	**Lighter Weight** for wood brace frame assemblies	**Type V-B**
Window Placement	More **open** due to brace frames freeing up wall area.	May be **limited** in some locations to allow for enough shear wall area.	**Type II-B**

Sustainability	Carbon is used to create steel during fabrication and smelting	Wood **encapsulates** more carbon during its growth then is used for its fabrication and delivery.	**Type V-B**

Summary:
While **Type V-B** offers lower upfront costs and aligns with local contractor availability and community heritage, it introduces significant challenges related to area limitations, fire protection detailing, and long-term durability. In contrast, **Type II-B** provides greater flexibility in layout, fewer code-driven fire separations, and improved acoustic and moisture performance, though typically at a higher initial cost. Selection of the appropriate system will depend on how site constraints, cost targets, and program layout priorities balance with long-term performance and code compliance considerations.

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IV. Owner Project Requirements



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Harbor Learning Center – Owner's Project Requirements (OPR)

The Owner's Project Requirements (OPR) for the Harbor Learning Center establishes the District's overarching goals and technical standards, serving as a framework to guide design, construction, and long-term operations. This document ensures alignment between the educational mission, sustainability commitments, and operational needs of the Aberdeen School District while allowing for flexibility as the design develops.

Educational Mission & Program Alignment

- Supports Harbor High, Harbor Junior High, Grays Harbor Academy, Open Doors, and Snug Harbor daycare.
- Emphasizes flexible learning environments, trauma-informed design, and community accessibility.
- Provides adaptable spaces that support multiple uses, including after-hours community engagement.

Performance & Sustainability

- Must comply with the 2021 Washington State Energy Code (WSEC) and achieve Washington Sustainable Schools Protocol (WSSP 2023) Class I baseline.
- Prioritizes energy efficiency, acoustical quality, indoor air quality, and daylighting.
- Requires commissioning, energy metering, and long-term performance monitoring.

Materials & Standards

- Reinforces Aberdeen School District's material standards for durability, lifecycle value, and sustainability:
    - Forbo linoleum, Nora rubber flooring, Armstrong VCT, Mondo gym flooring.
    - Ceraclad exterior cladding, aluminum/fiberglass windows, wood/HM doors.
    - TPO/EPDM roofing membranes.
- Materials balance sustainability, cost, and maintainability.

Health, Safety & Acoustics

- Complies with WAC 246-366 Indoor Air Quality standards.
- Integrates the Acoustical Design Plan for speech intelligibility, noise control, and learning effectiveness.
- Includes daylighting and glare control to support student comfort and performance.

Building Systems & Operations

- Requires fundamental and enhanced commissioning.
- Incorporates controls, metering, and energy storage readiness.
- Prioritizes maintainability, durability, and district staff training.

Governance of Material and System Selection

The OPR establishes four levels of guidance for decision-making:

- **Required** – Must be incorporated into the design (e.g., compliance with WSEC 2021, WSSP Class I, commissioning, district-standard resilient flooring).
- **Prohibited** – Must not be used due to performance, maintenance, or health concerns.
- **Allowed Upon Approval** – May be incorporated if justified and reviewed with District approval (e.g., alternative materials or systems with proven lifecycle performance).
- **Discouraged** – Not preferred due to maintenance complexity, cost inefficiency, or past performance issues, but may be considered only with strong justification.

Community & Flexibility

- Supports joint-use agreements and after-hours access.
- Spaces are designed for adaptability to meet evolving educational and community needs.

Summary

The Harbor Learning Center OPR provides a comprehensive roadmap balancing the District's educational vision, sustainability goals, durability standards, and community use priorities. It outlines clear requirements, identifies prohibited and discouraged practices, and allows conditional flexibility through approval-based decisions. This structured framework will guide the project team through design and construction while safeguarding the long-term performance and adaptability of the facility.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
Division 2 – Existing Conditions				
General	00000	N/A		• Confirm temporary utilities and coordination of utility switchovers. • Confirm documents clearly state that contractor is to perform all tasks necessary to disconnect existing utilities and connect new utilities. • Remaining foundation at parking area. May have removed more at grass area at HLC. May have documents.
Structure & Utility Demolition	024116	N/A	REVIEWED	• When possible, review demolition scope with GC's and Subcontractor's prior to submitting bid documents. • Removal of existing utilities is ***preferred*** versus abandoning them in place. Confirm approach on a project-by-project basis. • Hazardous material removal is ***preferred*** over encapsulation.
Division 3 – Concrete				
Cast-in-Place Concrete	033000	Read-Mix	REVIEWED	• Fly Ash ***prohibited***. • Exposed concrete at stair landings and stair treads may be ***allowed upon approval***. • *Clear sealed floors are* ***preferred*** at mechanical, electrical, MDF & IDF, storage and similar interior rooms. Exact locations to be finalized. • Use of lightweight concrete or gypcrete on second floor slabs is ***discouraged***.
Ramps	033000	Read-Mix	REVIEWED	• Ramps shall be designed with a tolerance greater than ADA requirement: Minimum slope to be 1" per every 12.5" in length ***required***.
Concrete Elevator Pits	033000	Read-Mix	TO BE FURTHER REVIEWED	• All elevator pits including walls, slab, and sump shall be waterproofed with bentonite waterproofing ***required***. See DIV 07 standards. • Coordinate sump pump and discharge requirements with district and local jurisdictions. Review with state L & I sump pump is typically required and is required to outlet to a grease separator.
Stair Nosing	033000	Read-Mix	REVIEWED	• Stair nosing as ***required*** by code. Further discussion will be ***required*** on a project-by-project basis.
Skateboard Deterrents	033000	Read-Mix	REVIEWED	• Cast-in-place notches as a skateboard deterrent are ***preferred*** versus use other types of deterrents at concrete site walls.
Vapor Retarder	033000	Steggo Systems / Steggo wrap	REVIEWED	• Class A vapor retarder ***required***. • 15 Mil minimum thickness ***required***. • Tape seal at all vapor barrier edges and penetrations ***required***.
Polished Concrete Floors	033543	PROHIBITED	REVIEWED	• Polished concrete floors are ***prohibited***.
Architectural Precast Concrete	034500	Northwest Precast	REVIEWED	• Precast concrete is ***allowed upon approval***. Generally, project budget will drive approval.
Division 4 – Masonry				

General - Masonry	040000	N/A	REVIEWED	• See 071900 water repellants for masonry protection and coatings.
				• *A* masonry wainscot around building perimeter at a minimum height of the windowsill height is ***preferred*** for durability and ease of maintenance.
				  ○ Adequate vertical and horizontal control joints per code and structural engineer's review are ***required***.
				  ○ Mortar net and weep at base of wall and at window headers ***required***.
				  ○ Stainless steel flashing is ***preferred*** in lieu of flexible through-wall flashings. Hem all exposed edges.
				  ○ Through wall flashings 4"-6" above grade ***preferred***.
				  ○ The base course of veneer is ***preferred*** to be one course below finish floor minimum. Smooth face block is ***preferred*** in these locations.

Reinforced Unit Masonry (CMU)	042200	Mutual Materials / Basalite	REVIEWED	• The use of CMU is ***allowed upon approval*** at service yard walls.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
Brick Veneer	042113	Mutual Materials / Interstate Brick	REVIEWED	• Brick Veneer: o The use of brick veneer is ***allowed.*** o Also see general above.
CMU Veneer	042213	Mutual Materials / Basalite	REVIEWED	• CMU Veneer: o The use of CMU veneer at the building façade is ***allowed***. o The use split face block is generally ***discouraged*** but is ***prohibited*** at openings due to conflicts with opening flashing. o Also see general above.
Division 5 – Steel				
General – Steel	050000	As Specified	REVIEWED	• See Division 9 for Paints and Coatings. • Size floor joists and beams to minimize deflection. • Architectural exposed steel (AESS) ***allowed upon approval*** • Avoid exterior conditions or features that allow bird roosting. • For large projects steel from AISC or approved certified mill is ***preferred.***
Metal Fabrications	055000		REVIEWED	• Lintels: Lintels (and related steel supports) shall be galvanized steel. • Steel Downspouts: The use of steel downspouts is ***discouraged*** except stainless steel. PVC downspouts are ***preferred***. • Bollards: Bollards ***preferred*** to be fabricated from galvanized pipe and painted. • Access Ladders: o Full stairs to mechanical attics ***preferred***. (Also see 055113 Metal Pan Stairs below). o Ships ladders ***allowed upon approval***. o Pull-down attic access ladders ***allowed upon approval***. o Roof access ladders ***allowed***. Roof mounted access ladders ***required*** to be aluminum or stainless steel only. o Alternating tread devices ***allowed upon approval***.
Steel Decking	053100		REVIEWED	• The use of perforated metal deck where exposed in occupied spaces is ***allowed***. • Dovetail metal decking ***allowed upon approval*** for acoustical quality.
Cold Formed Metal Framing	054000		REVIEWED	• Review blocking and backing strategy with owner, e.g., wood versus steel strapping. Magnetic markerboards are heavy. Both are ***allowed*** based on price point. • Deflection track at top of non-bearing walls ***required*** where roof or floor deflection may occur. • Cold formed metal framing and treated wood ***prohibited*** to be in contact.
Structural Steel Framing	051200		REVIEWED	• All structural steel ***required*** to be primed per division 9. • Immediately after fabrication, steel ***required*** to be protected with *galvanizing or epoxy primer.*
Metal Pan Stairs	055113		REVIEWED	• Metal pan stair treads ***preferred*** for general stair construction. Perforated risers ***prohibited*** for privacy reasons. Use of precast stair treads at feature stairs ***preferred.*** • Mechanical attic and access stairs: Wood framed attic stairs ***preferred*** to be wood framed to economize on cost if building type allows .
Pipe and Tube Railings	055213		REVIEWED	• Interior & Exterior Handrails: Stainless steel handrails ***preferred***. Handrails to mechanical attics can be primed steel. Galvanized steel ***allowed upon approval*** at exterior where budget doesn't permit for stainless steel. Painted rails are ***discouraged.*** • Guardrails*:* Steel guardrails with high performance coating ***preferred***. Galvanized steel handrails ***allowed upon approval***. Horizontal rod or cable infills that can be used for climbing ***prohibited***. Guardrails ***required*** to be **55"** high minimum, aesthetically pleasing, discourage climbing.
Division 6 – Wood, Plastics, & Composites				

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
General – Wood, Plastics, & Composites	060000		REVIEWED	• Use of salvaged wood ***allowed*** on project-by-project basis. Verify salvaged items with owner.
Rough Carpentry	061000		REVIEWED	• Provide continuous backing for whiteboards, projection screens, dispensers, custodial shelves, etc. 12" steel strapping 18 gauge minimum is acceptable centered at +3'-0" & +7'-0". Also see 055400 Section regarding backing. • Either 18 ga metal strapping or wood backing is ***allowed.***
Wood Roof Decking	061516		REVIEWED	• Conventional wood decking ***allowed upon approval***. Exposed exterior wood should be finished with a semi-translucent stain ***allowed upon approval***. • Use of CLT ***allowed upon approval.***
Sheathing	061600		REVIEWED	• Orientated Strand Board (OSB) ***prohibited*** at roof, floors, exterior walls, and sills. Interior use shall be weather protected during construction.
Glued-Laminated Construction	061800		REVIEWED	• Architectural grade ***preferred*** where exposed to view. ***Allowed upon approval*** at exterior locations. Architectural concealed brackets at attachment points where glu-lam is exposed.
Exterior Finish Carpentry	062013	PROHIBITED FOR SIDING	REVIEWED	• *The use of exterior wood stripping for wall cladding is* ***prohibited.***
Interior Finish Carpentry	062023	Compact Plastic Laminate Wainscot: Wilsonart, Compact Laminate, Classic Grade	REVIEWED	Wainscots: mechanical attachment only. Need corner guards. Apple ply veneer is an ***allowed upon approval***. • Corner Guards: ***Required*** at outside corner locations at corridors, classrooms, and common areas. Stainless steel corner guards ***required*** at kitchen areas. • Wainscot Fasteners: Architect to provide fastener types to Owner for review during design. • Height: Minimum 8'-0" high wainscot ***preferred*** at all hallways, corridors, and stairs. • Compact plastic laminate (CPL): Compact plastic laminate wainscot is ***preferred.*** Panels to be minimum 1/8" thick. • Stainless Steel: SS wainscot ***preferred*** at mop sinks. Verify if required at combustible areas (range top, cook top, oven etc.). • Fiberglass Reinforced Wainscot (FRP): Smooth FRP wainscot ***preferred*** at kitchens. School store, eyewash, and shower. • MDF: MDF wainscot ***allowed upon approval***. Clear sealed is ***discouraged***, painted is ***preferred***. • Fiber Reinforced Laminate (FRL): ***Allowed upon approval.*** Example: Specialty CTE areas. • Hardwood Veneer Paneling: ***Allowed upon approval*** for select areas.
Division 7 – Thermal & Moisture Protection				
General – Thermal & Moisture Protection	070000		REVIEWED	• All products in this section shall be reviewed with the Design Team's envelope consultant. • The use of sloped roofs is ***preferred.*** The use of low slope roofs are ***allowed upon approval***. • Designs that permit easy access to roof from fences and walls ***discouraged.*** • Use of internal roof drains ***discouraged.*** • 20-Year minimum warranty ***required*** on Low Slope Roofs and 50-Year minimum warranty ***required*** material warranty on Sloped Roofs. 5-year installer warranty ***required***. • Roof and envelope specific system warranties to be discussed with and approved by owner. • Provide snow guards above entries at metal roofs. • Fall protection supported by the roof structure ***required.*** • 3'-11" Overhangs ***preferred.*** • Roof types – Slopes greater then 3:12 are ***preferred***. • Full coverage of self-adhered "ice and water shield" is ***required*** at sloped roofs. • Interim roof/vapor retarder ***required*** at all low-slope roofs. • Walkway pads ***required*** at all low-slope roofs at equipment requiring maintenance. • Roof top equipment ***preferred*** to have all maintenance access to be 10' or greater from roof edge. Provide guard rails where distance is less than 10'.

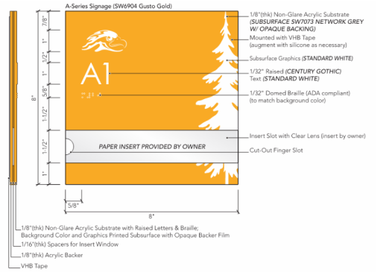
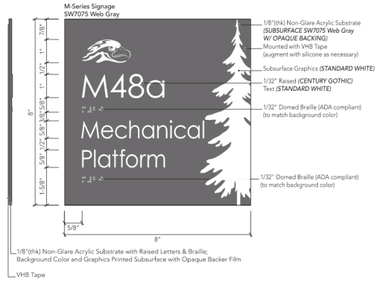
Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				• ½" cover board is ***preferred*** under roofing membrane and above insulation at low-slope roofs.
Bituminous Dampproofing	071113	BASF; MasterSeal	REVIEWED	• Use on exterior face of footings and stem walls and as directed by envelope consultant. • Damp-proofing ***required*** at the back concealed side of retaining walls.
Bentonite Waterproofing	071700	Carlisle; MiraCLAY	REVIEWED	• All elevator pits including walls, slab, and sump ***preferred*** to be *waterproofed with bentonite waterproofing*. Consult with envelope consultant involving use under slab and other locations when driven by high water table. • Waterproofing ***required*** at below grade walls to occupied spaces.
Water Repellents	071900	Prosoco / Evonik	REVIEWED	• Masonry veneer ***preferred*** to be water repellent. • Provide Anti-graffiti coating to approximate 10 feet above grade and at other locations subject to graffiti. Review product options with Owner. Non-water-based coating ***preferred***. Confirm existing coatings at wall for compatibility at remodel or renovations.
Thermal Insulation	072100	Atlas / Carlisle	REVIEWED	• Rigid insulation over deck is ***preferred*** over batt insulation between joists at roofs. Premanufactured sandwich panels for plywood and rigid insulation assembly are ***preferred.*** • Continuous insulation: Semi-rigid mineral wool. • Cavity insulation: fiberglass or mineral wool insulation unfaced. • Below grade insulation: Polystyrene (XPS).
Foamed-In-Place insulation	072119		REVIEWED	• Use of closed-cell spray foam at wall to roof transitions in air barrier is ***allowed.*** • Use of closed-cell spray foam wall cavities is ***allowed upon approval.***
Weather Barriers	072500	VaproShield Inc., WrapShield SA (self-adhered) VaproShield Inc., Liqui-Flash	REVIEWED	• Weather-Resistive / Air Barrier: A self-adhered WRB is ***preferred***. All envelope details should reflect manufacturers recommendations for installation of WRB membrane and components. • Liquid Applied Weather Barrier as WRB ***allowed upon approval*** *f*rom Owner and Envelope consultant. Typically, it is only used as field WRB at CMU applications. • Fluid Applied Waterproofing (FAWP) over the WRB pre-strip at openings is ***preferred.***
Asphalt Shingle Roofing	073113	Malarkey Roofing; Laminated Shingle	REVIEWED	• Laminated asphalt shingle roofing is ***allowed.*** • (add minimum warrantee (see Alaskan product from Malarkey 30-50 year laminate).
Standing Seam Metal Panels	074113	AEP Span and Metal Sales	REVIEWED	• Metal roofs are ***preferred.*** • Metal roof finishes and fastening shall be rated for marine environment. (aluminum or 3-coat steel).
Metal siding	074213	AEP Span and Metal Sales	REVIEWED	• The use of metal panel siding is ***preferred***. • 22 gauge minimum thickness. • Exposed fasteners are discouraged • Metal wall finishes and fastening shall be rated for marine environment. (aluminum or 3-coat steel) • Provide neoprene closure gasket formed to sliding profile. • Provide insect screens and pest resistant strategies at corners and edges.
Polyvinyl-Chloride (PVC) Roofing	074419	Carlisle / Sika	REVIEWED	• PVC roofing ***allowed****;* 60 mil thickness minimum. • Fully adhered membrane.
Fiber-Cement Siding	074646	James Hardie / Others with approval	REVIEWED	• Fiber Cement Siding: James Hardie Fiber Cement panel and lap siding is ***allowed.*** 5/16" panels are ***allowed***. The use of 7/16" panels is ***preferred*** if budget allows or areas exposed to high traffic or abuse. Fasteners marine-grade ***preferred***. • High Density Fiber Cement Siding: If budget allows high density fiber cement siding products like Nichiha and Cereclad are ***allowed upon approval.*** • Backer plates ***preferred*** at butt joints.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
Styrene-Butadiene-Styrene (SBS) modified bituminous roofing	075216		REVIEWED	• 3-ply min SBS modified bituminous roofing ***preferred*** for low slope roofing system. • SBS Modified bitumen systems ***preferred*** with torch or cold applied adhesive system. • Fluid applied flashing ***preferred*** at select roof penetrations.
Thermoplastic-Polyolefin (TPO) Roofing	075419		REVIEWED	• Thermoplastic-Polyolefin (TPO) roofing is ***discouraged.***
EPDM Roofing	075323		REVIEWED	• EPDM roofing ***allowed****;* 80 mil thickness minimum. • Fully adhered membrane.
Roof Accessories	077200		REVIEWED	• Fall Protection: Single point system over cable system is ***preferred.*** • D-ring fall restraints are ***allowed*** at asphalt shingle roofs. • See metal fabrications for access ladders. • Roof access hatch ***preferred*** to be thermally sealing and have safety post and integral guardrail with gate. • Pedestals/pavers system for occupiable roofs is ***allowed upon approval.***
Division 8 – Openings				
General - Openings	080000		REVIEWED	• Standard door leaf size to be 3’-0” x 7’-0”; Provide greater size at special use spaces or where more access is needed. • Provide double leaf doors where movement of equipment, furniture and other large items ***required***. • Allow for 180 degree door swing ***encouraged.*** • Encroachment of door swings into major circulation areas through recessed doors ***discouraged.*** • Louvers away from sources of fumes and smell ***preferred.*** • Removable keyed mullions at double leaf doors ***preferred.*** • Hold-open cush arm ***preferred***. • Also see 122113 Horizontal Louver Blinds and 122413 Roller Window shades.
Hollow Metal Door Frames	081113	Curries, Republic and Steelcraft	REVIEWED	• Knock down frames ***prohibited.*** • Frames ***required*** to be fully welded. • Exterior frames ***required*** to meet energy code. • Exterior frames ***required*** to be galvanized and painted. • Insulation for exterior frames and acoustically sensitive interior frames with mineral wool ***preferred***. • Interior frames ***preferred*** to be 16 gauge, exterior 14 gauge. • If horizontal mullion is provided, size to allow for roller shades to continue to sill or provide translucent glazing in lower pane.
Hollow Metal Doors	081113	Curries, Republic and Steelcraft	REVIEWED	• Provide HM doors at exterior secondary access locations. • HM doors in the interior are ***allowed upon approval***, except as noted below. • Provide at mechanical rooms, kitchen, electrical rooms, etc. • Insulate per energy code. • Face metal to be 16 gauge. • Preferred manufacturers are the same as Metal Door Frames.
Aluminum Doors	084113	EFCO and Kawneer	REVIEWED	• ***Allowed upon approval*** at main entry and other entries where integrated with storefront frame.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
Wood Doors	081416	VT Industries / Vancouver Door	REVIEWED	• Stained wood veneer solid core doors are ***preferred*** at all interior locations except for mechanical rooms, electrical rooms, etc. where HM doors are ***preferred***. • Painted wood doors are ***discouraged.***
Access Doors & Frames	083113	KARP	REVIEWED	• All access doors mounted 8’ or lower shall have keyed entry. • Doors shall be factory primed to be field painted, except stainless steel when located in wainscot ***preferred.***
Coiling Doors	083323	Overhead Door Company	REVIEWED	• Provide coiling doors at kitchen, open grille ***allowed upon approval*** if required for ventilation. • Stainless steel finish or Powder coated steel finishes are ***allowed***. • Power operated coiling doors are ***preferred.*** Review with Owner.
Overhead Sectional Doors	083613	Clopay	REVIEWED	• Sectional doors to connect program spaces ***allowed upon approval.*** • Insulated and weatherproofed at exterior to comply with energy code.
Entrance & Storefronts	084113	EFCO and Kawneer	REVIEWED	• Aluminum storefront is ***allowed upon approval.*** • System thermally broken and internally draining ***required.*** • Factory applied fluoropolymer finish or anodized are ***allowed.***
Curtain Wall Systems	084413		REVIEWED	• Curtain wall is ***allowed upon approval.*** Limit use of curtain wall systems to where storefront height limits are exceeded.
Windows	085113 085413 085313	EFCO, Kawneer, Cascadia, Kolbe, Anderson	REVIEWED	• Fiberglass Windows*:* ***Preferred.*** • Aluminum Windows: ***Allowed.*** • Vinyl Windows: ***Allowed.*** • Operable windows: The use of operable windows is ***preferred*** in classrooms and other occupied spaces. Awning operable windows are ***preferred.***
Skylights	086200	Kingspan	REVIEWED	• Skylights are ***discouraged*** and only allowed upon approval or where required by code.
Louvers	089119	Ruskin	REVIEWED	• Louvers with drainable blades and be resistant to wind-driven rain ***required.***
Glazing	088000		REVIEWED	• Front office visibility to main entry is ***preferred.*** • Individual panes of glass shall not exceed 4 feet x 8 feet. • Exterior glazing shall be insulated. • Provide Low-E coating where ***required*** to comply with code. • Provide translucent ¼ lite glazing at all classroom doors. • Provide ½ lite clear glass at offices with roller shades. • Wire glass ***prohibited.*** • Fire-rated ceramic glazing ***allowed*** where required by code for fire rating. • Glass at entry vestibule ***required*** to be laminated. Glazing for any windows adjacent to main entry ***preferred*** to be laminated. • Tempered or laminated glass ***required*** for glazing at gymnasium, cafeteria, and where high impact likely to occur.
Hardware	087100			• Review of specific requirements on this section with hardware consultant and District Locksmith is ***required***. • A door hardware consultant shall be engaged to coordinate selection of operational features of hardware. • Exit devices where required by code. • Continuous hinges **required** at main entry doors. • Corridor and building zoning doors ***required*** to be on hold opens and able to be placed in lock-down mode. • Provide ADA push buttons and automatic door operators at major building entries where required by code but a minimum at:

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				○ Main entry ○ Access from parent drop-off (if different location than main entry) ○ *Access from bus drop-off* ○ *Access from playground* • Temporary construction cores/cylinders ***required*** to be keyed to the district's standard construction keying. • Final cores/cylinders ***required*** to be provided by supplier directly to Owner. • Final keying requirements by hardware consultant. • Final installation by contractor.
Division 9 – Finishes				
Gypsum Wallboard	092900		REVIEWED	• Provide abuse resistant gypsum wallboard in areas subject to abuse e.g., gyms. • Provide gypsum wallboard behind all wainscot locations. • Provide moisture resistant gypsum wallboard in areas subject to moisture. • Wall board on exterior walls shall be resistant to moisture. • Provide cementitious or special gypsum backer board behind wall tile. • Gypsum wallboard finish: ○ Level 5 ***prohibited***, unless approved in high light areas. ○ Level 4 ***preferred*** unless noted otherwise. ○ Level 3 Not used. ○ Level 2 Fire resistive construction above ceiling, Finish behind cabinets and other items ***required*** to match adjacent finish. Fire Tape at Mechanical and Electrical room ***required***.
Perforated Gypsum Ceiling & Walls System	092900		REVIEWED	• Perforated gypsum board is ***allowed upon approval*** on ceilings. • Perforated gypsum board is ***prohibited*** on walls.
Suspended Ceiling Systems	095113		REVIEWED	• 2 x 4 suspended ceilings is ***preferred.*** • 2 x 2 suspended ceiling ***allowed upon approval.*** • A Tegular ceiling tile profile is ***preferred***. • Scrubbable tile ***required*** at kitchen • Raised ceiling height in MDF and IDF rooms for ease of cable routing ***preferred.***
Wood Ceiling Systems	095426		REVIEWED	• Wood ceiling systems are ***allowed upon approval*** at key focal areas.
Flooring		Preferred Carpet Manufacturers? Tandus, Shaw, Millikan, others	REVIEWED	• Locate floor types as follows: ○ Classroom, library, administration: Carpet or resilient per Ed Specs. ○ Classroom "Wet Areas": resilient ***required.*** ○ Commons: Linoleum or Rubber ***preferred.*** ○ Corridors (at Ground Floor): Linoleum or Rubber ***preferred.*** ○ Corridors (at 2nd Floor): Linoleum or Rubber ***preferred.*** ○ Entry Vestibules: Walk-off Mats ***required,*** three-component walk-off system ***allowed upon approval*** to comply with enhanced WSSP. ○ Gym: Wood at Middle and High Schools. Resilient athletic flooring at Elementary and Specialty School ***required.***

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				○ Stairs: Pre-cast concrete ***preferred*** at main stair & cast-in-place concrete ***preferred*** at secondary stairs. Rubber stair treads & risers. ○ Kitchen: Quarry tile ***preferred.*** Fluid-applied ***allowed upon approval.*** ○ Student restrooms: Ceramic Tile ○ Staff restrooms: Ceramic Tile ○ Health room: Sheet Vinyl ○ OTPT Room: Rubber Tile ○ Storage rooms: sealed concrete ***preferred.*** ○ Boiler & Electrical Rooms: Sealed Concrete • Carpet tile ***preferred*** over sheet products. • Coved base is ***required*** in restrooms, health room, and kitchen. • 4" Rubber floor base ***preferred.***
Ceramic Tile	090130		REVIEWED	• Large format ceramic floor tiles is ***preferred.*** • Large format ceramic wall tiles is ***preferred.*** • Epoxy grout ***required*** at all tile. • *Waterproof membrane below tile* ***required.*** • Floor slope at restrooms: At restrooms provide a localized 3'x3' +/- sump to floor drain at -3/4" ***preferred.*** • Thin set tile over waterproofing/uncoupling membrane ***preferred.***
Paint	099000		REVIEWED	Paint Sheen: • Walls – Satin Finish ***required.*** • Ceilings – Satin Finish ***required.*** • Corridors (Walls and Ceilings) – Satin Finish ***required.*** • HM Doors and Frames – Semi Gloss ***required.*** • Exposed steel – Semi Gloss ***required.*** • Exposed ductwork and equipment to match adjacent walls/ceilings. • Fire rated paint for MDF & IDF.
Division 10 – Specialties				
Door and Wall Protection	102600	InPro Corporation (IPC); Model G2-160R	REVIEWED	Corner Guards: • 7' High +/- corner guards are ***required*** at all outside corners in hallways, corridors and other select locations. • Surface-Mounted, Plastic-Cover Corner Guards ***preferred.*** • Stainless Steel Corner guards ***required*** at kitchen and ***allowed*** in special locations.
Classroom Marker Boards	101100		REVIEWED	• Dray Eraser Type, low sheen. • (2) 8 linear feet by 4 feet tall (At typical classrooms). • (2) 8 linear feet by 5 feet tall (At KG & 1st Grade Classrooms). • Aluminum trim, cork tack strip and clips along top, and eraser trays. • Magnetic boards ***allowed.***
Other Markerboards	101100			• Reviewed on a project-by-project basis.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				• Eraser trays shall be omitted from MB's in gyms.
Tackboards / Tack Strips	101100		REVIEWED	• (2) 8 linear feet by 4 feet tall (At typical classrooms). • 16 linear feet tack strip as alternative.
Signage	101400		REVIEWED	• Building Address Signage: Address numbers highly visible for fire department ***required.*** • Classroom signage: Classroom Signage shall have raised characters for the room number with matching Braille underneath. A ***required*** slot shall be provided for a removable paper insert for the grade and teacher's name. Thumb recess for removal of the paper insert ***required***. See example at right from Tumwater Hill Elementary School.  • Support spaces, where no insert for a teacher's name is required should have raised characters with the room number, name (where appropriate) and matching Braille.  • All door frames shall have the architectural room number at the top of the door frame.
Toilet Compartments	102113.17	Scranton Products; Hiny Hiders	REVIEWED	• Solid-Plastic (HDPE) Toilet Compartments are ***preferred.*** • Floor support and headrail braced with tamper-proof fasteners. • Hardware and support devices shall be stainless steel. • Pivot hinges and continuous wall brackets ***required***.
Toilet Accessories	102800	Bobrick		The following toilet Accessories are ***preferred*** to be OFCI: • Toilet Paper Dispensers. • Hand Soap Dispensers. • Toilet Seat Cover Dispensers. • Paper Towel Dispensers . • Sanitary Napkin Disposal Unit (SND). • Sanitary Napkin/Tampon Dispenser. The following toilet Accessories are ***preferred*** to be CFCI: • Grab Bars. • Purse Shelfs. • Mirrors. • Robe Hooks. • Diaper Changing Stations.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				In Elementary Schools: Sanitary napkin dispensers, receptacles, and toilet seat cover dispensers in adult and health restrooms only.
Cubical Curtains	102123	C/S, InPro	REVIEWED	• Track 6062. • Washable.
Defibrillators	104313		REVIEWED	• Confirm if OFOI at both Main Office and Gym.
Fire Extinguishers & Cabinets	104416		REVIEWED	• Semi-recessed ***preferred.*** • Fully recessed ***allowed.*** • Stainless steel. • Fire Extinguishers CFCI in new projects. • Type K in Kitchen ***required***. • Certify for use with tags. • Use plexiglass in lieu of glass on doors. • Mount on brackets in mechanical & back-of-house spaces.
Flag Poles	107516		REVIEWED	• One flagpole is ***preferred*** over multiple flag poles. USA flag &WA flag. • Review lighting approach to flag poles with owner. Solar down light ***allowed.*** • Tilting flagpole base ***preferred***.
Storage Cabinets	109900		REVIEWED	• 1 flammable storage cabinet in custodial area and/or Service Yard ***required.*** • 1 flammable and 1 corrosive cabinet in Science Prep room at secondary school (unvented) ***required.***
Operable Walls	102239	Advanced Equipment	REVIEWED	• Motorized operation at Gymnasium/Commons and stage ***preferred.*** • STC 54 or greater. • Durable laminate finish ***required.***
Accordion Walls	102233		REVIEWED	• Use of accordion walls is ***prohibited.***
Electric Hand Dryers			REVIEWED	• Use of Electric Hand Dryers is ***allowed upon approval*** .
Safe	109900		REVIEWED	• Safe ***required*** to be in Main Office area inside of base cabinet.
Knox Box	10 99 00			• OFCI flush mount at wall locations is ***preferred.***
Division 11– Equipment				
Residential Appliances	113013		REVIEWED	Staff Lounge: (Also see Ed Specs for requirements at each school). • 2 microwaves minimum (CFCI). • 2 refrigerators (CFCI). • 1 dishwasher (CFCI). • 1 Range (CFCI) – with venting to exterior. • 1 Vending Machine (OFOI). Health Room: • 1 Ice Maker (CFCI). • Lockable Undercounter Refrigerator (CFCI).

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				Life skill: • Per Ed Specs. Student Store/Business & Marketing: • Per Ed Specs. Custodial Room: • 1 washer and 1 dryer (side by side ***preferred***).
Gymnasium Equipment	116623	Porter	REVIEWED	(6) basketball hoops: • (2) at main court and (2) at each side court. • Main court hoops motorized forward fold or side fold where in front of proscenium. Maintain 23'-9" clear above volleyball court. • Side court hoops to be side-fold or up-fold. Blocking spectator view in up position ***prohibited.*** Glass ***allowed upon approval.*** • Electric height adjusters of main court hoops are ***preferred.*** • Manual height adjusters on side hoops ***preferred.*** Wall Pads: • Entire Assembly ASTM E-84 tested for Class "A" Fire Rating. • Wall pads glued and screwed into place ***preferred.*** • 'Z' Clip (French Cleat) Approach ***prohibited.*** • Minimum 16' behind each basketball goal ***required***. Volleyball: • Recess volleyball inserts/sleeves are preferred. Quantity to be determined project-by-project. Gym Striping: • Gym striping to be on a project-by-project basis.
Scoreboard			REVIEWED	• Provide at Middle School and above. No scoreboards at Elementary Schools or HLC.
Emergency Evacuation Chairs			REVIEWED	• Locate one on each floor. OFCI
Food Service Equipment	114000		REVIEWED	• Review with District Food Service Supervisor for ASD standard installations. Tailored for each school.
Division 12 – Furnishings				
Window Treatments	122413		REVIEWED	• Roller shades at all interior relites ***required.*** • Mini Blinds allowed at exterior openings, but roller shades ***preferred.*** • Provide motorized rollers hades at high windows.
Platform Curtain			REVIEWED	• No Preferences.
Walk-Off Mats	124813		REVIEWED	• 7' minimum length in direction of travel. • Three-component walk-off system ***allowed upon approval*** to comply with enhanced WSSP.
Manufactured Plastic-Laminate Faced Casework	123216		REVIEWED	• All casework shall comply with the latest version of the AWI Standards or WI's North American Woodwork Standards. • Plastic laminate countertops ***preferred.*** Use of other countertop material ***allowed upon approval*** by Owner. • Post Formed or PVC Edging ***allowed***. PLAM Edging ***prohibited***.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				• Backsplash at location with sinks should extend to casework above otherwise 4" high backsplash shall ***required***. • Standard base cabinets to top of countertop to be 33-1/2" tall, except at under cabinet refrigerators. • Recessed stainless steel Drawer and Door Pulls ***preferred.*** • Lock teacher wardrobe cabinet and base cabinet below sink. Verify other locking locations with Owner. All front office cabinets and Health Room cabinets to be locked. Coordinate Special Ed cabinet locking at each school. • Cabinet manufacturers ***required*** to provide standard locks and keyed the same, except Health Room key separately. • Vents in the wardrobe cabinet ***required***. • The use of mobile book storage in central area of Library is ***preferred.*** Verify if they are furniture or custom casework on a project basis upon approval.
Quartz Countertops or other Solid Surfacing Countertops	12366.19		REVIEWED	• Quartz and solid surface countertops are ***allowed upon approval*** at main entry and library reception desks. They are also ***allowed upon approval*** at gang restroom counters.
Division 14 – Conveying Equipment				
Elevator	142400		REVIEWED	• Holeless Hydraulic Elevators are ***preferred.*** • Size elevator per local jurisdictional requirements. 3000-pound capacity ***preferred*** to accommodate gurney. • Card Access control is ***required***.
Division 21 – Fire Protection – See separate Mechanical OPR document				
Division 22 – Plumbing – See separate Mechanical OPR document				
Division 23 – HVAC – See separate Mechanical OPR document				
Division 26 – Electrical, Lighting, and Fire Alarm Systems – See separate Electrical OPR document				
Division 27 – Performance Audio Visual, Sound, Intercom Clock, Telephone & I. S. System Guidelines — See separate Electrical OPR document				
Division 31 – Earthwork				
Site Clearing	311000		REVIEWED	• Bid documents shall clearly state which sub-contractor shall perform landscaping demolition and soil removal.
Selective Tree Removal	311313		REVIEWED	• Remove stumps to a minimum of 3-feet blow rough grade. • Backfill material to be specified.
Soil Stripping and Stockpiling	311400		REVIEWED	• Specifications shall state that track out is ***prohibited***. If track out occurs, the contractor shall clean immediately. • Specification shall state that the contractor will be the NPDES permitting and shall cover costs associated with reporting.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				• Provide geotechnical engineering report and Stormwater Pollution Prevention Plan as a supplemental document. Contractor's acknowledgment understanding of the report ***required***.
Earth Moving	312000		REVIEWED	• Specifications shall include dewatering plan. Language shall indicate that de-watering shall be provided at the contractor's expense. A project specific de-watering plan shall be provided by the contractor, reviewed and approved by the owner prior to mobilization. • Recycled glass is ***prohibited*** to be specified in fill under any circumstances.
Grading	312200		REVIEWED	• Finish grades are ***prohibited*** to expose the foundation. If exposed, adjust grades accordingly or provide curbing or retaining wall(s). • Grades are ***prohibited*** to exceed maximum ADA allow slopes. • Grade ***preferred*** to slope away from perimeter of building.
Excavation & Fill	312300		REVIEWED	• Excavated materials for use as fill: Onsite soils may be acceptable for reuse as structural fill in landscaped areas and if approved by the geotechnical engineer. Native soils shall not be used for backfill in structural areas such as under the building, in paved areas and under sidewalks. The suitability of excavated site soils for compacted backfill will depend on gradation and moisture content of soil when placed. • Coordinate fill requirements at crawl spaces or basements that need to be filled following demolition.
Division 32 – Exterior Improvements				
Concrete Paving	321313		REVIEWED	• 1'-0" wide concrete mow strip or sidewalk next to building to keep landscape and pests away unless prohibited by City requirements ***required***. • Concrete sidewalks of 6' minimum wide ***preferred*** at primary pathways. Secondary pathways less than 6' width are ***allowed upon approval***. • At select plaza and main entry areas a higher level of finish such as top cast concrete is ***preferred***.
Aggregate Surfacing	321500		REVIEWED	• Pervious paving is ***discouraged***. Pervious concrete or asphalt may be allowed on a case-by-case basis depending on location and use.
Curbs and Gutters	321600		REVIEWED	• Cast-in-place concrete curbs are ***preferred*** compared to extruded curbs. • 6" curb face ***preferred.***
Athletic & Recreational Surfacing	321800		REVIEWED	• At turf play fields grass seeded fields are ***preferred***, also see Topsoil Placement & Grading. • At "Natural" or "Low-Intensity" play areas, wood fiber chips are ***preferred***. • At "High-Intensity" play areas, field turf at accessible areas, and wood fiber chips are ***preferred***. • At play areas provide a cast-in-place concrete curb or enclosure wall at all sides of play area. • At general paved play areas asphalt paving is ***preferred***. • At competition level exterior paved play surfaces concrete is ***preferred***.
Chain Link Fences and Gates	323100		REVIEWED	• A low fence along the curb side of the sidewalks, along bus driveways and parent pick-up & drop-off areas ***preferred***. 4' wide gaps ***preferred.*** • Passage gates with a 48" minimum clear width ***required***. Nothing narrower is allowed. • Galvanized 6- high standard fences unless approved otherwise by owner. Black vinyl coated fencing is ***preferred***. • 3" O.D. corner and end posts with a specified weight of 5.790 lbs. per lineal foot ***required***. Provide 4" O.D. Gate Posts with a specified weight of 9.11 lbs. Per lineal foot. • Folded top ***required*** if lower than 6'. • Concrete mow strips under fencing are ***preferred*** if budget allows. • Decorative fencing and gates ***preferred*** versus chain link at locations requiring access control.
Decorative Metal Fences and Gates	323119	Ameristar Fence Products	REVIEWED	• Ameristar, Montage II, Majestic fencing is ***preferred*** BOD. • Decorative gates designed with panic hardware and closures shall be a minimum of 7' high. • Provide 1/8" steel plate for mounting panic hardware. Gate plate kits ***prohibited.*** • Gates shall have perforated metal panels installed above and below panic hardware full height on fencing adjacent to gate. • Kickplates to be provided on all gates with panic hardware.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				• Gate hinges to be reviewed by hardware consultant, gate hinges shall be self closing at access controled areas.
Retaining Walls	323200		REVIEWED	• Rockeries (2 to 3 man rock) are ***discouraged.*** • If exposed, trowel finished concrete ***preferred.***
Site Furnishings	323300	Per project.	REVIEWED	• Site furnishings to be selected on a project by project basis. Consider the following options with site furnishings: Bench seating, picnic table seating, group seating areas, exterior classroom areas, and accessible access and options at all conditions. • Skateboard deterrent shall be provided where appropriate. Deterrents type to be approved by owner.
Irrigation	328400		REVIEWED	• Irrigation is ***required*** at play fields and code required areas. The contractor shall maintain it for the first year and document the start/end date. 2-wire irrigation with weather sensing capabilities and spray heads for uniform and efficient coverage is ***preferred***. • Drip irrigation is ***discouraged***. Irrigation at other locations ***allowed upon approval.*** • Bioretention soil is ***preferred*** for all planting areas. • Coarse sand ***preferred*** at lawn areas. • Trees to be on separate irrigation zones. • ASD to provide guidance on irrigation standards and preferences.
Topsoil Placement & Grading	329119		REVIEWED	• Topsoil from approved list of suppliers ***required.*** • Some minimal sloping at playfields to allow for longevity is ***preferred***. • Avoid loam soils for maintenance and weed propagation. 6” cap is ***preferred***. • Existing soils ***required*** to be decompacted to 18” below finish grade. • A sand based infield at elementary schools is ***preferred.***
Turf and Grasses	329200		REVIEWED	• ASD to provide seed mix to include in these standards. • Playfields shall use sand base (where applicable). • The use of playfield underdrainage systems is ***discouraged.***
Exterior Plants	329300		REVIEWED	• Landscaping ***allowed upon approval.*** • Keep trees away from the building. • ASD to provide guidance of landscaping standards.
Misc.			REVIEWED	• Monument & Reader Board Signs: Buildings shall have both a reader board and monument sign. They can be combined pending permitting jurisdiction. Reader boards preferred on street, but allowed on building on case by case basis. • Baseball Backstops: backstop and basic benches at baseball fields ***preferred.*** • Drainage Galleries: Drainage galleries under play fields ***discouraged***. If done, rock ***discouraged***. • Mailboxes: Designer to coordination location and mailbox type with District and postmaster on project-by-project basis. • Vehicle Gates: Vehicle gates shall be constructed from 2” diameter steel tubing or smallest dia. required for gate span similar to a cattle gate for ease of user operation. All gate foundations need to be designed by a structural engineer. Gates shall be designed with a vertical return at end to prevent a dangerous hazard. Gates shall be HPC painted black to match fencing with applicable reflective safety reflectors. • Play Equipment (Big Toy): CFCI ***preferred***. Playground surfacing on case-by-case basis. Review required depth with current health department requirements. • Walking Path Around Play Fields: Walking paths shall be designed around playfields. Where accessibility is required paved walking paths are ***preferred***, ¼” minus crushed rock contained with concrete curbs is ***allowed upon approval***. • Future Bldg. Expansion: All schools shall be designed with a layout and configuration that is conducive to adding a future building addition off a classroom wing or other planned out location. • Future Portables: New school design shall plan for locations for (4) double portables at elementary schools and (3) double portables and Middle Schools. Utilities shall be roughed into future portable location.

Product / System	Spec Section	Preferred Product / Mfr	Owner Reviewed	System Notes
				• Outdoor Covered Areas: Design Teams to study on a project-by-project basis, covered outdoor areas adjacent to cafeteria / MP Rooms for outdoor dining. • Site Circulation: Parent and bus pick-up and drop-off shall have separate access points to the site.
Division 33 – Utilities				
General			REVIEWED	• Review with the Owner the need for sleeving (power, low voltage, and irrigation) for future use underneath paved surfaces. • Coordinate isolation valve locations with Owner. • Ladder up assembly on all vaults (water meter, irrigation, power, etc.) ***required.***
Water Utility Distribution	331100		REVIEWED	• Coordinate isolation valve quantity and location with owner. • Drains at all vaults, tight-lined to the storm sewer system ***required***.
Water Supply Backflow Preventer	332313		REVIEWED	• At new schools, should a backflow prevention device be above the finish grade and exposed to the elements inside a Hot Box. Electrical power is required for heat trace or other electrical heating devices to keep the backflow device from freezing. Located inside building ***preferred.*** • Stainless steel enclosures are ***preferred***. • Contractor shall coordinate water shutdown with the school district three days prior to shutdown.
Sanitary Utility Sewerage Piping	333100		REVIEWED	• 6” minimum size of all lines and fittings ***preferred.*** • Verify that lengthy sewer lines are equipped with access covers every 100’ minimum. • Cleanouts at all bends greater than 45 degrees ***required***. • All cleanouts to be equipped with concrete collars.
Sanitary Utility Sewerage Structures	333900		REVIEWED	• Locate grease interceptors outside building (no grease traps inside building). • Plastic or fiberglass grease interceptors are ***preferred***. • Gravity drain or sump pump to eliminate water within all vaults ***allowed upon approval.***
Utility Septic Tank	333600		REVIEWED	• Connect to generator to operate sewage pumps in times of power outage. Coordinate with Section 26 30 00 Emergency Generator.
Sanitary Utility Sewerage Manholes, Frames and Covers	333900		REVIEWED	• Locking lids on all utility lids ***required***. • Manhole and clean-out covers ***required*** to be labeled “Sanitary Sewer”. • Verify the top of vaults are above the surrounding finish grade.
Storm Drainage Structures	334900		REVIEWED	• Installation of storm drainage structure under playfields is ***discouraged.***
Gas Metering	335133		REVIEWED	• Seismic valve on gas meters ***required***. Locate gas meters inside service yards. Meter each building individually (after PSE gas meter) to isolate the building.

Owner's Project Requirements
Mechanical & Electrical

Harbor Learning Center

Aberdeen, WA



Aberdeen School District 5

Harbor Learning Center

Aberdeen, WA

Table of Contents

1. Overview and Scope 1
2. General Requirements 4
3. Space Plan and Functional Uses ..... Error! Bookmark not defined.
4. Design Process 5
5. Heating, Ventilating and Air Conditioning ..... Error! Bookmark not defined.
6. Electrical Systems 10
7. Commissioning ..... Error! Bookmark not defined.
8. Sustainability 13
9. Building Envelope ..... Error! Bookmark not defined.
10. Plumbing Systems 14
11. Fire Protection and Alarm 15
12. Data and Communications Systems 15
13. Security and Access 16

1. Overview and Scope

Overview and Definition

The Owner's Project Requirements (OPR) provide an explanation of the ideas, concepts and criteria that are considered to be very important to the owner, coming out of the programming and conceptual design phases and which are desired to be tracked throughout design and construction. The OPR is developed by the owner, not the design team. The OPR provides the direction for the design team. The OPR document sets the functional goals that the design is judged against and establishes the basis of the criteria used during construction to verify actual performance. The OPR does not list items that are already required by code. The OPR is generally not a description of what specifically will be included in the project design, but is the more general feature and categorical performance criteria to be met by the design. Where practical and known, the OPR includes measurable indicators used to verify that the performance requirements were met.

The OPR will be followed by the basis of design or design narrative written by the design team and included with design package submissions. The basis of design documents the primary thought processes and assumptions behind the design decisions and describes the design elements being incorporated to meet the OPR.

1.1 Scope

This document includes requirements for the systems that are more likely to be included under the formal commissioning umbrella or be impacted by their interactions. For reference, systems not included in this project and OPR that are typically commissioned and should have an OPR developed for them include: process mechanical and plumbing, paging, automatic doors and gates, presentation screens, and other moving mechanical devices.

This document is not a comprehensive project OPR, and does not include all project requirements and directives to the design team which could include: other disciplines such as fire protection, structural, landscaping, civil, geotechnical and other earth work, utilities, specification division 1 requirements, demolition, all the materials, furnishings and special construction disciplines, drawing, specification and calculation requirements, codes and references, etc.

This document focuses on the mechanical, energy and comfort related systems and on the sustainability requirements of the project. Other areas impacted by commissioning or commissioned systems are covered more broadly. The design areas included in this document are:

Covered More Thoroughly

- Heating, ventilating & air conditioning (HVAC)
- Electrical
- Sustainability
- Commissioning

Covered Peripherally

- General requirements
- Design process
- Fire alarm
- Plumbing
- Data and communications
- Security and access

1.2 Format

Under each area or building system is a list of pertinent questions and data needed to be answered. Blue, indented italicized text indicates the answers to the questions and specific information about the project requirements for this project.

2. General Requirements

Describe this project, including the general overall objectives?

2.1.1 In general, what type of activities/functions will occur in this facility? (Provide a general overview. The space planning and detailed functional uses of the building are listed or referred to later in this document).

Programs include Harbor High, Harbor Junior High, Grays Harbor Academy (Alternative Learning K-12), Open Doors youth reengagement, and Snug Harbor daycare.

2.1.2 What is the proposed facility's life expectancy?

50 year target.

2.1.3 What future flexibility in function/activities must this facility accommodate?

Trying to design in a modular format so spaces can be moved around as needed.

2.1.4 Are spaces anticipated to be converted from one use or occupancy type to another?

Possible.

2.1.5 Will the Owner operate and maintain the building?

Yes.

2.1.6 What are the overall energy efficiency goals and objectives? (ASHRAE 90.1, State Code, Energy Star, other indices, this building's past performance, etc.)

Would like to be better than code minimum.

2.1.7 What other environmental goals and requirements are there?

Not at this time.

2.1.8 What are the objectives relative to the local neighborhood?

Future location was a school previously.

2.1.9 What are the challenges relative to the local neighborhood and adjacent buildings?

No challenges at this time. Private school across the street and are curious about the project. Would like to stay informed.

3. Design Process

3.1 Design Reviews

3.1.1 Describe the expected design reviews and the expectations of the design team regarding responding to comments.

There will be owner review page turns at each major milestone (SD, DD, CD), as well as third party commissioning review for commissioned systems for each design submission.

3.2 Occupancy, Climatic, Temperature and Sizing Requirements

3.2.1 **Time of day schedules.** List tenant types with their time of day and days of week they occupy.

Summer use? Current school is. Have a summer school program and is done by 4th of July.

3.2.2 List and describe any spaces that will require night time operation. Indicate how often and how long this after hours occupancy is likely to be.

Will have some evening usage, especially with the new building.

3.2.3 **Temperature and humidity.** List the interior temperature and relative humidity conditions that must be maintained for each tenant or occupancy type. List any special conditions or spaces.

Will use Washington State Energy Code setpoints. 68F heating, 75F cooling

3.2.4 **Tolerances.** List the space temperature and humidity tolerances that each space type must stay within during occupied hours.

+/- 3F per WSEC.

3.2.5 **Air Drafts.** How tolerant are the occupants expected to be of noticeable HVAC air movement—none, little, some, moderate.

None at this time.

3.2.6 **Diversity.** Is it OK to plan for reasonable diversity—typically around 85%—that is, the assumption and likelihood that not all spaces will experience worst case load conditions at the same time?

Ok to assume some diversity, especially with Gym.

Will this be an emergency evacuation point? If so, building could be fully loaded.

3.2.7 **Redundancy.** What redundancies are desired for specific HVAC services (chilled water, hot water, space air temperature, humidity, air quality) and why?

Will discuss once a system is decided.

3.3 Air Quality and Ventilation

3.3.1 What are the goals and requirements for indoor air quality--standard, above average, exceptional? List any special requirements.

Have been meeting requirements. Used MERV 13 during COVID, but back to MERV 8 now. Can design around 2" MERV 13 and that gives the District flexibility to use MERV 13 or 8.

3.3.2 Will there be rooms that store bulk quantities of flammable, combustible, radioactive, or biological materials?

Will evaluate based on science rooms layouts.

3.3.3 Where are operable windows acceptable? Where are operable windows desired?

Operable windows are desired. Will have limited openings.

No fire egress windows.

3.4 General HVAC Systems Data

3.4.1 Is full air conditioning/comfort cooling a requirement?

Cooling is not a must but would like it if it fits in the budget.

May make sense to follow approach at the high school (cooling at activities/admin but not at classrooms). HS, some rooms can get real cool and some rooms can get real hot.

Changeover system may not be a good system for this climate.

3.4.2 What system types and brands are not desired or are not acceptable? (2 or 4-pipe fan coil unit, central high-efficiency VAV, water source heat pump)

No rooftop units. No unit ventilators. Not familiar with VRF or water-to-air heat pumps.

3.4.3 What system types or brands are mandatory?

No specific manufacture preferences.

3.4.4 Is larger central equipment desired over smaller more numerous distributed equipment? (Central equipment typically is easier to maintain, but requires vendor support, lasts longer, is more energy efficient, but may cost more.)

Depends on system type. Prefer central hydronic plant systems. Fan coil units are acceptable. No preference between larger central or smaller individual DOAS units. Convectors can be considered on a heating only system.

Liked the idea of central air-to-water heat pump serving a four-pipe fan coil unit system with DOAS.

3.4.5 Can central air-to-water heat pumps be considered?

Yes.

3.4.6 Is it acceptable to locate any equipment above ceilings of zones served or corridors? And if so, what types of equipment? (VAV boxes, Fan Coil Units, Exhaust Fans)

Yes, but they need to be accessible and maintainable.

3.5 Energy Efficiency and Demand Reduction

3.5.1 The goals and targets of *overall building* energy efficiency are given in the Sustainability section under Energy Efficiency.

Meet the Clean Building Standards. Keep refrigeration units under 50 lbs of gas.

3.5.2 List any specific HVAC energy efficiency features or equipment desired or required for this project.

None specifically.

3.5.3 What level of HVAC *equipment* energy efficiency are desired (standard, above standard, exceptional)?

Code minimum is acceptable.

3.5.4 Are power demand reduction features important? These include, listed from moderate to rigorous: staggering of equipment startup, active automatic load limiting, thermal energy storage, etc. List those required or of interest.

Would like to implement demand response on Day 1. Will have several stages.

Ok implementing mechanical demand response for WSEC C406.

3.6 Renewable Energy

3.6.1 Describe any renewable energy goals.

Will have a small PV array to meet code. No plans for a larger system.

3.7 New Concepts and Systems

3.7.1 Would incorporating new or relatively untried systems and equipment be seriously considered (no, possibly, likely)?

No.

3.8 HVAC Flexibility

3.8.1 What are the requirements for flexibility in the HVAC systems to accommodate changing floor layouts and occupancy needs (normal, above average flexibility, very flexible. List the areas that apply or any special needs)?

There should be some flexibility for the system to adapt to potential floor plan changes.

3.9 Maintainability

3.9.1 What are the maintainability objectives for the HVAC equipment (standard level, above standard, exceptionally easy to maintain)?

Standard for a school.

Workability with a 10' step ladder.

Don't route piping in front of access panels.

3.9.2 Is it expected that there will be normal, above normal or exceptional accommodation for replacement of chillers, cooling towers, boilers and air handlers?

Normal.

3.9.3 How much desire is there for top of the line equipment features that simplify and make maintenance easier? (e.g., hinged access doors, filter pressure monitoring, direct expansion equipment with refrigerant hose access plugs and taps, hose bibs on roof, lights in cabinets, service outlets in units or nearby, etc.). Little, some, significant.

Starting with standard equipment, good handles and hinges. Accessible filters.

3.10 Reliability and Durability

3.10.1 What are the reliability and durability objectives for the HVAC equipment (standard level, above standard, exceptionally reliable)? Would this include smaller components like dampers, actuators, valves, sensors, etc. and not just the larger equipment?

Provide equipment with at least 1 year warranty. Heat pumps- 7 year compressor.

Standard reliability and durability of major and smaller components are desired.

No preference between EC fan/motors and motors with VFDs.

3.11 Operations and Maintenance Documentation

3.11.1 Are electronic O&M manuals desired?

Yes.

3.12 Training

3.12.1 Who will be operating the building HVAC and electrical systems? (in-house staff, outsourced staff)

In-house staff.

3.12.2 How much equipment will be maintained by equipment vendors vs. in-house staff?

All in-house staff.

3.12.3 What level of training is desired for the in-house staff for operating and maintaining the systems and assemblies of the building?

All staff will be new to this building. A comprehensive level of training is desired.

3.12.4 How much of the training is desired to be video recorded? (All, most, some.)

All mechanical systems will have their trainings recorded.

3.13 Building Automation System (BAS) and Controls

3.13.1 Are there special owner control system standards that need to be followed?

Look at a recent project for templates, naming conventions.

3.13.2 What sophistication is desired in the control system (standard, above standard, exceptional)?

Above standard

3.13.3 What control systems are not acceptable?

None at this time.

3.13.4 What control systems are mandatory or highly desirable?

Currently use ATS in all buildings. Recently replaced a JCI system with ATS.

3.13.5 List any control element type or brand that is not to be used.

None at this time.

3.13.6 Is a web-based accessible system desired?

Yes.

3.13.7 Will the control system need to tie into another existing building automation control system from another building? Explain.

ATS has a district central server.

3.13.8 Describe interlocks to the HVAC system from the Fire Alarm System.

Fire alarm system is separate, except general alarms are passed to the BAS.

3.13.9 Describe interlocks to the HVAC system from the Lighting Control System.

Have control of exterior lighting through BAS at HS. BAS doesn't control interior lights at the HS. Start off matching this approach for HLC.

3.13.10 For the chiller, boiler and pumps are there any of these that will not require automatic changeover to the backup / lag piece without operator action should one piece of equipment fail?

No.

3.13.11 How fast should the refresh rate be on the operator's work station? (standard, above average, exceptional)

Standard.

3.13.12 What fraction of the BAS set points should be able to be adjusted from the OWS graphics screens? (none, few, some, most, all)

Most.

3.13.13 For non-measurement and verification (M&V) purposes, like energy optimization and troubleshooting, how many system monitoring points are desired, above that required to execute the sequences of control (none, some, many)?

None.

3.13.14 Is there going to be a measurement and verification (M&V)--rigorous energy tracking, or significant ongoing commissioning program after occupancy, requiring numerous additional power and HVAC monitoring points? Mention it's part of LEED, if applicable.

Probably not. Will revisit when Cx agent is onboard.

3.13.15 How much expansion capacity is desired for adding control point inputs and outputs in each field control panel and primary controller? (none, 5%, 10%, 20%, etc.)

~10%

3.13.16 Are there areas of the building that require essentially uninterrupted delivery of the HVAC (which would affect how the controls were designed)? List.

None.

3.13.17 Are there any critical areas that need their controllers to have redundancy in their power supplies?

No.

3.13.18 Upon a control system network failure should all equipment not being controlled by local controllers control to the last known value?

Yes.

3.13.19 Upon restoration of power after an outage, which equipment is allowed to require an operator to go to the equipment and reset it before it will start? Or require operator action at the workstation?

None to either.

3.13.20 Upon a general alarm that shuts down the equipment, upon the condition correcting itself, what equipment is allowed to or should require an operator to reset the unit at the equipment? Or require action at the workstation?

None to either.

3.13.21 What other desires for the control system are there?

Text notifications for certain critical alarms.

System shutdown button at Admin.

3.14 Occupant HVAC Control

3.14.1 What level of control is desired for the occupants to have over the temperature and ventilation in their space—list for each occupancy type (temperature adjustable by occupants at a zone thermostat, ventilation control adjustable by occupants for their specific area, temperature control adjustable only by facility staff, ventilation control adjustable only by facility staff)? Describe what areas will have after-hours override capabilities accessible to the tenants or occupants.

Occupants can have limited controllability of thermostats (+/- 2F).

3.15 HVAC Acoustics --See Acoustics in the Sustainability section.

4. Electrical Systems

4.1 General

4.1.1 List general requirements for the electrical system.

All electrical equipment will bear the UL label and no rebuilt, refurbished or remanufactured or used equipment or material shall be specified or installed. Complete raceway routing from panels to the field devices shall be indicated on the drawings for power, fire alarm, security, PA, intercom and CCTV.

Complete 1-line power diagram(s) are required.

4.1.2 List any requirements for coordination studies (short circuit study, protective relays/breakers, voltage drop / transient study for large motors, etc.).

Short circuit study is required.

Arc flash study is required.

Selective coordination study is required for emergency systems.

Protective device setting/Ground fault protection study is required.

4.1.3 List requirements for connected and operating electrical load estimate, including future project loads, if applicable, lighting level calculations.

Both load calcs and lighting level calcs are required. *Grays Harbor County Health Department- refer to them for light level standards.*

4.1.4 List any specific equipment brand or components that are to be included or not included in this project.

Main switchgear- no preference. HS is GE, no issues.

4.2 Power Capacity and Redundancy

4.2.1 Are there any requirements for redundant transformers or power feeds from the utility?

None.

4.3 Power Quality

4.3.1 What level of power quality are desired (standard, above standard, exceptional)?

Standard.

4.3.2 Are there any spaces that require special power quality requirements?

None identified.

4.3.3 What level of safeguard is required to monitor and maintain the integrity (such as voltage or phase imbalance) of the incoming power (e.g. - protection of sensitive lab equipment)? What equipment or devices are included in the design to meet this requirement?

Have some surge protectors on main equipment. Can provide on main switchgear, not needed at every panel.

4.3.4 Are there special grounding and EMF mitigation requirements for these lab environments and equipment? What measures will be taken to mitigate?

None.

4.4 Lighting and Visual Quality

4.4.1 What is the general level and description of the visual quality desired and for each use or occupancy type in the facility?

4.5 Lighting Levels

4.5.1 Required average maintained light levels for this project are listed below. For spaces not listed, the current IESNA light level recommendations shall be followed.

Offices: 45 FC with occupancy sensor daylight sensors where applicable.

Lobbies: 20 FC

Corridors and means of egress: 15 FC.

Conference rooms: 30 FC to 50 FC with dimming controls as required.

Restrooms: 20 FC

Equipment rooms: 30 FC

Laboratories (general): 50-70FC.

General Classrooms: 30FC.

Gymnasiums/Common Spaces: minimum 20FC.

Kitchens: 50-70FC.

Exterior lighting at building entrances, walkways, streets, and parking lots: Not more than 2 FC.

4.5.2 Would task lighting be an acceptable design feature required to achieve desired light levels in office areas?

Task lighting at workstations will be plug-in at discretion of the end-user. Where casework allows for integrated approach, undercounter lighting will be added.

4.6 Light Fixtures and Lamps

4.6.1 What level of energy efficiency is desired in the lighting equipment for each occupancy type (standard, above standard, exceptional)?

Exceptional - LED.

4.7 Lighting Control

4.7.1 What control of lighting is required in the various types of spaces (open office, closed offices, common areas, conference rooms, retail spaces, condominiums, exterior, parking garage, etc.)? Examples are manual switches to on, occupancy sensors to turn on or off, scheduled lighting controls and lighting sweeps and daylight dimming.

Don’t have a specific lighting control system- current systems obsolete. Could look into ATS lighting control system. Current system is outdated and no longer supported.

Open office: manual switch on, occupancy sensor off.

Closed office, storage and copy rooms: manual switch on, occupancy sensor off.

Corridors and other service spaces: time clock schedule.

Perimeter office (open and closed), lobbies and corridors: same as above, but also include daylight dimming.

Classrooms: manual switch on, occupancy sensor off.

Conference rooms: manual switch on, occupancy sensor off.

Exterior: photocell and time clock.

4.7.2 Do any spaces have special glare requirements?

None.

4.8 Emergency Generator and UPS

4.8.1 In general, what equipment is desired to be on generator power?

Life/safety equipment (emergency lighting, fire alarm, smoke detectors, datacenter).

Kitchen equipment, freezer/cooler.

Heat trace for heat pump, no other mechanical.

4.8.2 How much extra capacity is desired in the generator (for potential special needs by tenants, etc.)?

Provide additional capacity to allow enlarging and powering the MDF load by 50%.

4.8.3 How many hours of full load operation are desired in sizing the fuel tank?

Meet minimum code requirement.

4.8.4 What equipment will require uninterruptible power supplied?

UPS, including the MDF.

4.9 Power Monitoring

4.9.1 Is submetering of utility power desired? (list for gas, steam, electricity, water) What is the purpose of the monitoring of each? (resource efficiency tracking, measurement and verification (M&V), occupant billing, demand reduction, etc.)

Submetering of electricity is required per code.

4.9.2 What is the intended level of metering and sub-metering? (Main switchgear only, or including metering of energy consuming sub-systems, such as HVAC central plant, AHUs, lighting panels, etc.)

Code minimum.

4.9.3 How will the metered information be presented and reported for the occupants and staff? (Integrated with BAS, separate monitoring station, touch screen displays in lobby/common areas, etc.)

Integrated with BAS. Can look into energy dashboard.

4.9.4 Are peak demand reduction strategies desired?

Possibly, can be at BAS.

5. Sustainability

What are the general sustainability goals for this project?

The project is required to comply with the Washington Sustainable Schools Protocol.

The specific sustainability goals for the project are listed in the categories below.

5.1.1 State where any sustainability certifications or achievements will make the project eligible for Federal, state or local tax credits or incentives.

5.2 Certifications

5.2.1 Describe any LEED or other certification goals and objectives.

5.3 Water Efficiency and Conservation

5.3.1 Describe the water efficiency goals of the project.

Standard water savings features.

5.3.2 Is grey water recovery a consideration for this project?

No.

5.3.3 Is rainwater harvesting and use a consideration for this project?

No.

5.3.4 What level of low-water use landscaping is desired or would be considered?

Yes, is desired.

5.3.5 To what level of sophistication will the irrigation controls be, beyond simple typical time clock functions and above ground sprinklers, to reduce water consumption?

Normal system controller.

Provide additional BAS water meter to measure irrigation usage.

5.4 Energy Efficiency

5.4.1 What level of *overall building* energy efficiency is required above code? (none, 10%, 20%, 30%, etc.).

Note stated energy savings goals. Want the building to be as efficient as possible while staying within project budget and constraints.

5.4.2 Specifics of HVAC energy efficiency are found in the HVAC section, lighting efficiency under Electrical and water heating under Plumbing.

5.5 Indoor Environmental Quality

5.5.1 HVAC related IEQ goals and requirements are listed in the HVAC section.

5.5.2 Interaction with building operations personnel. Describe the interface that occupants will have with operations and maintenance personnel to voice concerns over IEQ and related issues (e.g., direct to facility manager's office, front receptionist, internal company supervisor, etc).

Occupant complaints come via work order system.

5.5.3 Lighting and visual quality requirements.

These are listed under the Electrical section.

6. Plumbing Systems

Water Efficiency

6.1.1 Refer to the Water Efficiency section under Sustainability for details of the water efficiency objectives of this project.

6.2 Fixture Controls

6.2.1 Are auto-flushing and on/off controls desired on urinals, lavatories, toilets?

Prefer manual flush valves. Auto flush are expensive and have seen some failures.

6.2.2 Are waterless urinals a consideration? Where?

No.

6.3 Energy Efficiency

6.3.1 The water heating system energy design is desired to be: standard code, somewhat more efficient that code, much more efficient than code? Note standard code now requires heat pump water heaters.

Standard code.

6.3.2 Are there specific system types that shall be incorporated or that are not to be considered (e.g., point of use heaters, electric heaters, etc.)?

No.

7. Fire Protection and Alarm

List the specific brand and/or model of fire alarm system required, if any.

No specific type required.

7.1.1 List any special features desired or required of the fire alarm system.

Fully addressable system required. Code compliant minimum system with additional features mentioned below. Full detection coverage along with fully sprinklered. Integration into AV systems, intercom systems. Supervisory on duct detectors. One pull station at admin area, and one pull station at fire alarm panel/elevator room.

7.1.2 Describe where the fire alarm signal is to be sent to off site.

Alerts or troubles will remain in the fire alarm panel. Alarms will be sent to the BAS as a general alarm and to the municipal fire department. Alarms will be sent to a monitoring company – Guardian Security.

7.1.3 Is the FA system to have addressable and monitored fire smoke dampers (ones that can be commanded open or closed from the fire alarm panel)?

Yes.

7.1.4 Are the fire smoke dampers to have end switches that positively confirm closed and open positions or is the commanded position notification acceptable?

Commanded position notification is acceptable.

8. Data and Communications Systems

Describe the data requirements in the building.

Single mode- no multimode, minimum of 10 gigs. Plan is to bring fiber from ISP, land at MDF on rack. Spread fiber out to IDF as required. Provide CAT6A cabling to data drops, wireless access points located for full coverage. Specialty systems intregrated w/ AV systems.

Phone provider for elevator recall or fire alarm dial out?

Confirm w/ Mike Pauley. Probably cellular. Need network drops for phones. Drops for camera systems and expansions.

ISP- Primary is K20, sometimes Comcast, sometimes noahnet (?). Dark fiber from Greys harbor PUD. May need to get dark fiber from HS to this facility. Could be direct run to facility or from the street.

Walkie Talkie repeater? Ask Mike Pauley.

8.1.1 Describe the needs for future expansions.

Will have space built into patch panels. ~20% spare. Will try to have adequate space in racks for future equipment.

8.1.2 Will special backbone, conduit and cabling be required for future flexibility?

Conduit and pathway sizing for future flexibility. ~20% spare capacity.

8.1.3 Describe the wireless internet systems desired for the building.

Complete wireless coverage throughout. Any access point at exterior of building?

8.1.4 Describe the communication systems desired for the building.

IP Phone Systems (OFOI).

District Radio (OFOI). Infrastructure for radio system to be CFCI.

- Silke Communications

Fire and security panels are cellular dialers. Separate from AES Radios.

Rescue Assistance to be IP system. (Metrix to coordinate this with the state)

POTS requirements to be coordinated with local fire marshal.

8.1.5 Is CATV desired?

Could be brought into a demark location. HS is using coax for morning announcements, etc.

Have secondary connection from Comcast to MDF (possibly coax) for backup.

8.1.6 Describe any tie-in between the data and communication systems and the security system or building automation system.

Sometimes, see security tie-in. Will provide drops for BAS. Nothing else required.

9. Security and Access

What are the securities concerns for this facility?

Had access through intercom system. That system is cumbersome to work on. Looking for something less complex and easier to maintain. Security is Bosch (used to be Radionics). 3 card readers at HS, other schools have one at main entrance. Would be nice to do more so staff can use other entrances. Has remote access to all systems. There's a computer that acts as a server at the HS and can be access remotely. Have Exactvision cameras at the HS, and server is at the HS.

Want additional security measures with cameras (like license plate readers)? Unsure, will explore.

If cellular connections are desired, then DAS system would be added.

Lockdown trigger can be over the phone or hardwired.

Duress buttons? Messages can be sent via Navigate app.

9.1.1 List the specific brand and/or model of security system required, if any.

Security- familiar with Bosch, open to others.

Cameras- prefer to stay with Exactvision, would be open to similar.

9.1.2 What access control must this facility accommodate?

Want 15 sec delay on door openings. Will discuss further. Not common but sometimes provided in special ed programs.

Not sure about every door, but maybe childcare, special needs areas.

9.1.3 What areas of the facility will require controlled access?

TCF marking up floor plan to confirm.

9.1.4 Describe the desired security system features (e.g., card reader, fingerprint, retina scanner types, length of image storage capacity, remote access capabilities and backup features, user programmability, reporting functions, battery backup duration, etc.).

Security system, card readers, cameras.

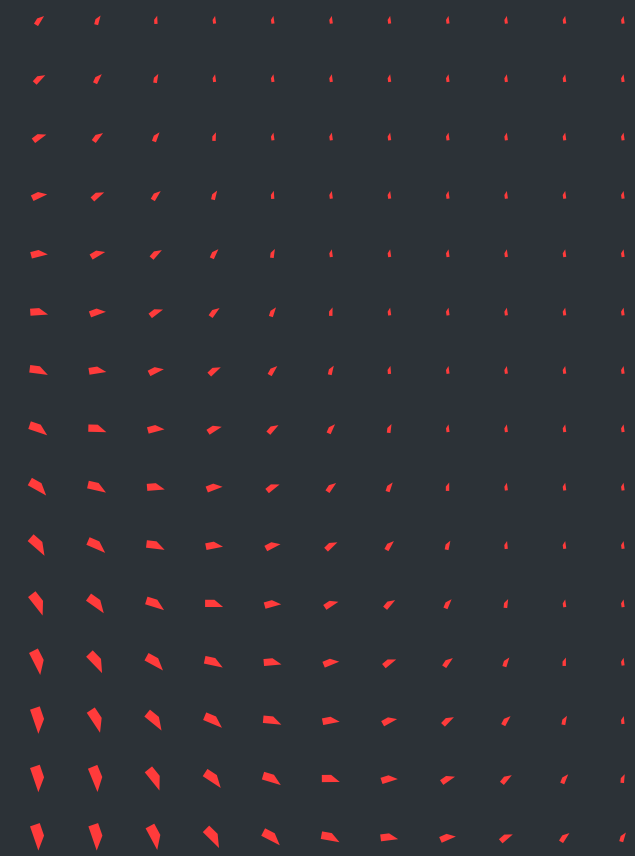
9.1.5 Describe any required interlocks between the security system and the building automation system and HVAC.

Standard connections from BAS to fire alarm panel.

---END of OPR---

TCF

V. WSSP Strategy and Scorecard



TCF

Harbor Learning Center Washington State Sustainability Protocol Strategy

Draft Narrative Summary – Harbor Learning Center WSSP 2023 Scorecard
The Harbor Learning Center has completed its preliminary Washington Sustainable Schools Protocol (WSSP) 2023 scorecard, achieving **69 points** to date. This result demonstrates strong progress toward high-performance design while also recognizing that the process is ongoing. As the project is still in the **early design phase**, additional credits in the *"Maybe"* column remain available and may be pursued if needed to ensure all sustainability targets are met.

Site and Transportation — 16 Points
The project earned 16 points through thoughtful site planning and multimodal integration. Credits include avoidance of sensitive areas, development on a previously disturbed site, community joint-use opportunities, protection of open space, tree canopy improvements, transit and walking access, initial steps toward electrified bus readiness, and mitigation of heat island and light pollution impacts. These measures strengthen connections between the school, neighborhood, and environment.

Water Efficiency — 2 Points
Two points are credited for water-conscious landscape design and irrigation metering. Drought-tolerant landscaping and sub-metering strategies support reduced potable water use, lowering long-term operational demand.

Materials and Waste — 8 Points
Sustainable procurement and waste reduction strategies yield 8 points. These include diversion of construction waste, reuse of building elements, recycling infrastructure, certified wood procurement, and use of local/regional materials. This approach balances life-cycle durability with District standards for resilient, low-maintenance finishes.

Energy and Atmosphere — 16 Points
The project achieves 16 points through superior energy performance strategies, both prescriptive (C406 compliance) and whole-building, as well as on-site renewable readiness, enhanced commissioning, energy metering, and building enclosure commissioning. These strategies exceed WSEC 2021 baselines and prioritize long-term operational efficiency.

Indoor Environmental Quality — 14 Points
A total of 14 points are credited for measures that enhance student and staff health, including daylighting in classrooms, controllable electric lighting, low-emitting materials, source control, ducted return systems, and acoustical improvements. Points are also achieved for occupant control of windows and thermal comfort, aligning with trauma-informed and acoustically supportive learning environments.

Integration, Education & Operations — 13 Points
Thirteen points are earned through integrated design workshops, innovation credits, durability strategies, transportation demand management, operations staff training, food waste reduction, and adoption of green cleaning practices. These efforts extend sustainability benefits into the educational program and day-to-day operations.

TCF

Summary

The Harbor Learning Center's preliminary WSSP score of **69 points** demonstrates a comprehensive commitment to high-performance design. Importantly, this process is **not yet complete**: the project is still advancing through schematic design, with additional credits in the *"Maybe"* category that can be targeted if needed. As the design evolves, the project team will continue to refine strategies that support energy efficiency, indoor health, and sustainable operations. This approach ensures flexibility and resilience in meeting both WSSP compliance and the Aberdeen School District's long-term sustainability goals.

Attached:

WSSP Scorecard

WSSP Scorecard for Harbor Learning Center

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
Site Credits 26 Points Possible											
1) Site Selection											
	S1.0	Code Compliance	**R**	**0**	**REQUIRED**			Comply with all siting and environmental impact study requirements of the most current edition of the School Facilities Manual, issued by the Washington State Office of the Superintendent of Public Instruction.	ALL	No submittals or action required of the Contractor for this credit.	
	S1.1	Sensitive Areas	**1**	**1**	**1**			Avoid environmentally sensitive or important areas. See criteria in 2023 WSSP - Credit attached for team review	CIVIL	No submittals or action required of the Contractor for this credit.	A portion of the site parcel is in the inundation zone. We are going to inquire about subdividing the parcel as this also has impacts on structure.
	S1.2	Greenfields	**1**	**1**	**1**			Do not build on greenfield	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	This site was previously the site of the old high school that burned down in 2005 it is not a greenfield area
	S1.3	Central Location	**1**	**1**		**1**		Locate sites where at least 50% of students live within the following distances from the school: ES - 1 mile MS/JrH - 2 miles HS - 4 miles To earn this point, calculations must be based on the planned number of students indicated on the D5 submittal.	OWNER	No submittals or action required of the Contractor for this credit.	This may be difficult - HLC is an alternative program that pulls kids from around the district. IT is a small community but a geographically large area.
	S1.4	Joint Use of On-Site Facilities	**1-2**	**2**	**1**	**1**		Joint Use On-Site: Make portion(s) of the school building or grounds available for either shared or dedicated use by community and other appropriate organizations. One point if the space is "shared" use. An additional point (total of two points) if the space is dedicated for use by the community and other appropriate organizations	OWNER	No submittals or action required of the Contractor for this credit.	confirm with owner whether there is any dedicated space.
	S1.5	Joint Use of Off Site Facilities	**1**	**1**	**1**			Share park or recreation space with local park boards or other organizations (off-site).	OWNER	No submittals or action required of the Contractor for this credit.	District will need to provide a written agreement
	S1.6	Protect Open Space	**2**	**2**		**2**		Design a building footprint that does not exceed 60% of the total building square footage, a Floor Area Ratio (FAR) equal to or greater than 1:4.	ARCHITECT	No submittals or action required of the Contractor for this credit.	TCF Need to review the FAR - Assume that this is a YES
	S1.7	Tree Canopy	**1**	**1**	**1**			Increase tree canopy by 10% over existing tree cover.	LANDSCAPE	No submittal or action required of the Contractor for this credit.	NEW Credit Site Workshop (SW) believes this credit can be met by trees required as part of Type C landscape 7/9 - Need to review with Site Workshop City ROW requirement will probably achieve this. 8/18 - TCF Based on 95% SD drawings vastly more tree canopy then the existing. Exceeds 10% will count this point
	S1.8	School Carbon Sequestration Data	**1**	**1**	**1**			Use the I-Tree Planting Calculator to assess the amount of CO_2 sequestered (in lbs/sq.ft. or kg/sq.m.) by vegetation such as all trees and shrubs on the baseline site compared to the proposed site.	LANDSCAPE	No submittal or action required of the Contractor for this credit.	NEW Credit SW believes this credit can be met 7/9 - Need to review with site crafting. 8/18 - TCF Moving to Yes column based on the additional tree canopy cover. Will need the follow up calculations from Siteworkshop.
2) Transportation											
	S2.1	Public Transportation	**1**	**1**	**1**			In urban areas, locate the school within ½ mile of a commuter rail or light rail station or within ¼ mile of one or more bus lines. In rural and suburban areas, with limited or non-existent rail/bus service, provide busing to the school.	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	4 Greys harbor transit stops within 1 block of the school

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	S2.2	Bike & Walk to School	1	1		1		Provide bike lanes or sidewalks that extend to the end of the property. And provide suitable means for securing bicycles for at least 5% of students above grade 3 and staff (at peak periods) in an elementary or middle school, and 3% of building staff and students (at peak periods) in a high school. And either Integrate the Engineering and infrastructure component of the Washington Safe Routes to School in the planning and design process. The education and enforcement components can be implemented for credit under PEO3.3 Transportation Options OR complete a School Walk Route Map or Plan in accordance with WAC 392-151-025 and/or WAC 392-141-340.	ARCHITECT	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	Bike parking for 3% and safe routes can be difficult to achieve
	S2.3	Electric Buses or District Vehicles	1-2	2	1	1	0	1 point - Develop and implement a plan for acquiring at least 1 electric bus. 2 points - Develop and implement a plan for 50% of all other (non-bus) vehicles owned or leased to serve the school to be electric vehicles.	OWNER	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	Verify - Need to verify with the district - District has a plan on file for 1 electric bus - CS
	S2.4	Minimize Parking	1	1	1			Provide preferred parking totaling 5% of staff and student spaces for carpools or vanpools and alternative fuel vehicles, AND Size parking capacity not to exceed 2.25 spaces per classroom plus parking for 20% of students at High Schools, or three spaces per classroom for Elementary and Junior/Middle Schools. OR Provide preferred parking totaling 5% of staff and student spaces for carpools, vanpools, and alternative fuel vehicles, and size parking capacity not to exceed local codes. OR Add no new parking for modernization projects and provide preferred parking totaling 5% of staff and student spaces for carpools, vanpools, and alternative fuel vehicles.	ARCHITECT	No submittals or action required of the Contractor for this credit.	Verify - City parking requirements for the high school may torpedo this point. 7/9 - Need to review against the WSEC will probably obtain - Coordinate with LDC 8/18 - TCF Assume 30 Staff stalls. Preferred parking is required for a total of (2) stalls. (2) charging stations are provided on E1.01
3) Stormwater Management											
	S3.0	Construction Stormwater Pollution Prevention	R		REQUIRED			Implement a site stormwater pollution prevention plan (SWPPP) that follows the best management practices outlined by the Washington State Department of Ecology's Stormwater Management Manuals (for Western Washington: Volume II, Construction Stormwater Pollution Prevention, and for Eastern Washington, Chapter 7: Construction Stormwater Pollution Prevention), and the local ordinance requirements.	CIVIL	implement and maintain site sediment and erosion control plan, and provide photographic documentation of the implememntation of the plan.	
	S3.1	On-site Stormwater Management and Flow Control	R-1	1	R		1	Required: Meet state and local requirements for on-site management and flow control of stormwater on the developed site. Projects exempted by state or local jurisdictions are exempt from this requirement. 1 point - Apply Low Impact Development (LID) performance standards for either Eastern or Western Washington to enhance stormwater management and flow control.	CIVIL	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	VERIFY - Most typical SWPP's cover the extra point
	S3.2	Stormwater Treatment	R-1	1	R		1	Install treatment systems designed to meet site-specific requirements outlined in Washington State Department of Ecology's Stormwater Management Manual for either Western or Eastern Washington and the local jurisdiction requirements. Projects exempted by state or local jurisdictions are exempt from this requirement. Apply Low Impact Development (LID) performance standards for either Eastern or Western Washington to enhance stormwater treatment.	CIVIL	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	**VERIFY - Most typical SWPP's cover the extra point**
	S3.3	Soil Management	1	1	1			Implement the Department of Ecology's BMP T5.13 "Post-Construction Soil Quality and Depth" that provides guidelines for amending soils with compost post-construction, or local government guidelines and procedures similar to those recommended in Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13.	LANDSCAPE	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	**VERIFY - Most typical agency requirements cover this point SW-DOE requires minimum organic matter (OM) content of 10% in planting beds and total topsoil layer of 8" and subgrade scarified to 4". Generally the more OM, the more weeds. We will look to ways to achieve OM while minimizing maintenance challenges. Seems achievable.**

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
4) Outdoor Surfaces											
	S4.1	Outdoor Learning Spaces	**2**	**2**	**2**			Provide an outdoor classroom or lab for students to experience their learning beyond the walls of a school building.	ARCHITECT - TCF	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	VERIFY - Outdoor balconies may comply with this requirement Preschool could hit targets here
	S4.2	School Gardens	**1-2**	**2**	**1**	**1**		1 point - Provide dedicated space and infrastructure for a future school garden 2 points - Provide a complete installation of a school garden	LANDSCAPE	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	VERIFY - Teachers were interested in garden outside. Infrastructure could be cheap to add.
	S4.3	Reduce Heat Island - Site	**1-2**	**2**	**1**	**1**		1 POINT: Provide shade (at plant maturity) on at least 30% of non-roof, impervious surfaces on the site, including parking lots, walkways, plazas, etc., OR Use light-colored materials with a solar reflectance of at least 0.30 for 50% of the site's non-roof, impervious surfaces, OR Use an open-grid pavement system (net impervious area of less than 50%) for a minimum of 30% of the parking lot area. A combination of shading and high solar reflectance may be used to meet the credit. 2 POINTS: Use an open-grid pavement system (net impervious area of less than 50%) for a minimum of 50% of the parking lot area.	LANDSCAPE	No submittals or action required of the Contractor for this credit.	VERIFY - going to assume no for the following reasons: Excessive paving to cover for tree planting. Metal roof is difficult to achieve a high SRI Open paving may also be difficult 1 point - Need to study shade of parking does this include the existing parking areas 7/9 - Need to revisit with LDC 8/18 - TCF - AEP Span offers many roof colors in the neutral grey category that meets the 0.30 category. Moving into 1 Point for SRI 0.30 for 50% of the roof.
	S4.4	Reduce Heat Island - Roof Design	**1**	**1**	**1**			Install an ENERGY STAR® labeled Cool Roof for a minimum of 75% of the roof surface, with a minimum initial solar reflectance of 0.65, and after 3 years 0.50 on low-sloped roofs 2:12 or lower and an initial 0.25, and >= 0.15 after 3 years, on steep-sloped roof > 2:12, OR install a vegetated roof for at least 50% of roof area, OR install high-albedo & vegetated roof surface that in combination, meet the following criteria: Area Roof Meeting Minimum SRI + Area of Vegetated Roof ≥ Total Roof Area	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	VERIFY - going to assume no for the following reasons: Excessive paving to cover for tree planting. Metal roof is difficult to achieve a high SRI Open paving may also be difficult 7/9 - Kristin to study metal roofing options can comply with Cool roof requirements 8/18 - TCF - Per uploaded AEP span standards "Cool Sage Green" meets the steep slope requirements and the CRCC council requirements moving this point to the "YES" Coumn
5) Outdoor Lighting											
	S5.1	Light Pollution Reduction	**1**	**1**	**1**			Do not exceed Illuminating Engineering Society of North America (IESNA) foot-candle level requirements as stated in the IESNA RP-33 Recommended Practice for Exterior Environmental Lighting or applicable sections of the IESNA Lighting Handbook, Current Edition; AND Design interior and exterior lighting (excluding sports fields) such that zero direct-beam illumination leaves the building site.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	Usually this is an easy one to achieve. 8/18 - TCF confirm that Metrix will achieve this point
Site Credits		Total possible		**26**	**16**	**8**	**2**				
Water 6 Points Possible											
1) Outdoor Systems											
	W1.0	Landscape Water Use Budget	**R**		**REQUIRED**			Develop a landscape water budget that conforms to the requirements set forth in the Irrigation Association Best Management Practices, Appendix B. Develop a landscape plan and Estimated Water Use for the site specific landscaping.	LANDSCAPE	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	W1.1	Irrigation Water Reduction (50%, 100%)	1-2	2	1	1		1 point - Reduce consumption of water supplied for irrigation by a water district or utility, after plant establishment period, by 50% of Maximum Applied Water Allowance as determined in credit W1.0. 2 points - For an additional point, eliminate water consumption for irrigation use of water supplied by water district or utility, after plant establishment period.	LANDSCAPE	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	VERIFY - Most districts like the idea of limiting irrigation after establishment
	W1.2	Control Irrigation Water Use	R-1	1			1	REQUIRED: Develop an irrigation schedule, by zone, based on historic rates of evapotranspiration, plant water requirements, soil type, and system efficiency. AND input into controller after plant establishment, OR Any irrigation systems used for playfields must have weather-based irrigation controllers (WBIC) that meet or exceed Smart Water Application Technology (SWAT) protocols to manage operation of irrigation systems when there is adequate ambient moisture. 1 POINT: Irrigation systems used for campus landscape, gardens, and recreational areas must have weather-based irrigation controllers (WBIC) that meet or exceed SWAT protocols.	Landscape	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	VERIFY - Most districts have not "bit" on the weather controlled stations. Is there a web interface that could satisfy this? SW-Yes, this is fairly standard technology on irrigation controllers theses days. For example, the Hunter HPC uses Hydrawise software, so no additional hardware needed and software is guided by local weather data.
	W1.3	Irrigation System Testing and Training	1-2	2			2	1 POINT: Create an irrigation commissioning plan to verify the irrigation system and controls are operating as intended and that effective training for system upkeep and maintenance has been provided. 1 POINT: The Landscape Architect will provide a baseline irrigation run time schedule for post establishment irrigation for all zones, including sports fields, that shall be input by the contractor into the irrigation controller prior to final hand-off of the irrigation system to the owner. The irrigation audit shall include coverage test and confirmation that the entire system has been installed per design.	LANDSCAPE	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	VERIFY - Have not yet dealt with a district that wanted to do irrigation Cx yet.
	W1.4	Flow Switches & Irrigation Water Meters	R-1	1	1			REQUIRED: Install a flow switch or flow sensor to monitor the flow rate and pressure of water. 1 POINT: Install an irrigation water meter, deduct meter, or submeter for measuring irrigation used in outdoor activities. District-owned meters must be connected to the building automation system.	MEP & Landscape & Civil		
2) Indoor Systems											
	W2.0	Lead-Free Potable Water System NOTE: W2.1 & W2.2 FROM THE 2018 MANUAL ARE NO LONGER AVAILABLE IN THIS 2023 MANUAI	R		R			All products that are part of the potable water system (pipes, pipe fittings, plumbing fittings and plumbing fixtures) are certified as meeting the lead free requirement of the 2014 Safe Drinking Water Act (SDWA).	**Mechanical during design / Contractor during CA**	**Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents**	**NEWLY REQUIRED CREDIT**
Water		Total possible		**6**	**2**	**1**	**3**				

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
Materials and Waste 29 Points Possible											
1) Efficient Material Use & Waste Management											
	MW1.0	Storage and Collection of Recyclables and Compostables	**R-2**	**2**	**REQUIRED**	**2**	0	REQUIRED: Space shall be provided for the storage of recycled materials, compost and solid waste for all new buildings. AND Provide dedicated, easily accessible areas, within the building/facility, for the separation, collection, and storage of materials for recycling and composting. Also provide at least one centralized collection point for all materials to be staged for removal from the site (e.g. loading dock), or for transport to composting location. The staging area shall be designed to meet the needs of the occupancy, efficiency for pickup, and shall be available to haulers. AND Regularly inform all building occupants about what materials can and cannot be recycled and composted, and educate building occupants about the environmental and economic benefits. AND Provide means for recycling in each teaching and learning space. Administration areas must have one central recycling station set up per 20 employees, if not one at each desk. AND When local waste service providers have ability to divert food waste, provide means for collection of organic waste in food preparation and dining areas. 1 POINT: Provide means for recycling and composting at sports fields. 1 POINT: Provide means for collection of compostable paper products in dining areas and restrooms.	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	Locate recycling throughout building and provide space for collection in/near service yard Need to confirm the composting program at the school.
	MW1.1	Construction Site Waste Management (50%, 75%)	**R-3**	**3**	**3**			REQUIRED: Develop and implement a construction site waste management plan and provide documentation of waste disposal at the conclusion of the project. 1-3 POINTS: Document the percent (by weight) of construction and demolition waste diverted from the landfill, excluding hazardous or dangerous materials and land clearing debris. 50%=1 POINT 75%=2 POINTS 90%=3 POINTS	CONTRACTOR	Comply with all requirements of Waste Management Specification. Submit monthly waste management reports and final report for inclusion in WSSP final documentation.	NEWLY REQUIRED CREDIT. Have achieved 90% on previous projects. Note need to coordinate with specifications for waste tracking. 7/9 - Need 90% to take the innovation point below
	MW1.2	Building Reuse - Structure/Shell (50%, 75%, 95%)	**1-3**	**3**		**3**		Maintain a minimum of 50%, (or 75% or 95%) of existing building structure and shell (exterior skin and framing, excluding window assemblies). Hazardous and unsound materials or systems that are remediated as part of the project scope are to be excluded from the calculation of the percent maintained (ex. asbestos removal).	ARCHITECT - TCF	Maintain and Re-use materials as directed in the contract documents	
	MW1.3	Building Reuse - Interior Non-Structural Elements (50%)	**1**	**1**		**1**		Maintain and reuse at least 50% of interior non-structural (walls, interior partitions, doors, relites, floor coverings, and ceiling systems) materials.	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	
	MW1.4	Materials Reuse (5%, 10%)	**1-2**	**2**		**2**		1 POINT: Install salvaged or refurbished materials using either a percentage approach or prescriptive approach for one or two points. Calculate using material costs. (PERFORMANCE OR PRESCRIPTIVE AS NOTED BELOW) Performance Approach (#1): Install salvaged or refurbished materials for 5%, based on cost, of the total value of building materials. OR Prescriptive Approach (#1): Specify salvaged or refurbished materials for 25% of one of the following major interior finish materials: [Flooring;; Casework; Acoustical Ceiling Tile; Wall Coverings; Tile.] 2 POINTS: Above requirements doubled.		No submittals or action required of the Contractor for this credit.	

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	MW1.5	PCB/T12 Lighting Removal	R-1	1		1		REQUIRED: Remove and replace all T-12 lighting fixtures and ballasts manufactured in or before 1979. 1 POINT: Replace removed fixtures with Energy Star certified LED lighting.			NEW CREDIT 7/9 - If the old school is demolished is the lighting replacement a point?
2) Sustainable Materials											
	MW2.1	Recycled Content (10%/4 mtls, 20%/8 mtls)	1-2	2		2		Performance Approach: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer recycled content constitutes at least 10% (or 20%) of the total cost of the materials in the project. See manual for Prescriptive approach	Architect during Design / Contractor during CA	No submittals or action required of the Contractor for this credit.	TCF to confirm - Either 4 products or 8 products. 7/9 - Will need to do the performance approach to incorporate the recycled content of the steel and concrete in construction.
	MW2.2	Rapidly Renewable Materials	1	1		1		Install rapidly renewable building materials for 2.5% of the total value of all building materials, excluding mechanical and electrical. OR Prescriptive Approach: Specify rapidly renewable materials for 50% of one of the following major interior finish or structural materials: Flooring, casework, acoustical ceiling tile, wall covering, tile, exterior walls, and roof. A product must contain 25% rapidly renewable raw materials based on weight to qualify under the prescriptive approach.	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	Difficult to achieve 5% of building materials.
	MW2.3	Certified Wood (50%, Chain of Custody)	1-2	2	1		1	At least 50% of the cost of wood and wood-based materials and products are from a sustainable forest certified by a third party. This includes, but is not limited to, framing, flooring, finishes, and built-in cabinetry. One additional point is available if all of the certified wood also has chain-of-custody tracking.	Architect during Design / Contractor during CA	No submittals or action required of the Contractor for this credit.	Verify wood products will be smaller cabinets will need chain of custody will be cost premium
	MW2.4	Regional/Local Materials	1-2	2			2	For one point: 20% of the building materials are manufactured, extracted, harvested, or recovered from within a 500-mile radius of the site. 2 points - 20% of the building materials are manufactured, extracted, harvested, or recovered from within Washington State	ARCHITECT	Architect has specified regional materials. Contractor shall submit completed WSSP submittal cover sheet with submittals for each product containing regional materials. WSSP Product Matrix shall include all Project products and their costs (except MEP,	BRB's are not local and could make this more difficult. 7/9 - Need to review
	MW2.5	Environmentally Preferrable Products - Multiple Attribute	1-2	2	2			Earn one point for each major building product that meets the Environmentally Preferable Products (EPP) established criteria, and is certified for at least 2 of the attributes under a nationally recognized certification program. If claiming points under this credit you may not claim points for the same materials under M1.4, M2.1 or M2.2.	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	Review with Kristin and backcheck the M2.1 7/9 - Carpet can an easy conforming products - Hard surface flooring can oals conform. EPDM roofing maybe?
	MW2.6	Environmental Product Declaration	2-7	7	2		5	2 POINTS: Select 10 products or materials (that are each at least 2% of the total value of all building materials and products based on costs) that contain a third-party certified Environmental Product Declaration (EPD) (cradle to cradle) conforming to the requirements of ISO 14025 on Type III environmental declarations and/or ISO 21930 on environmental declarations of building products. 1-5 POINTS: An additional 1 point for each product declaration that demonstrates a 10% or higher reduction (in comparison to the industry baseline) in one half of the impact categories (global warming potential category is required).	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	7/9 - Two points is low effort.
	MW2.7	Building Materials Health Product Disclosure		1		1		Provide a published Health Product Declaration (HPD) with a disclosure level of 1000ppm for at least 20 permanently installed products from at least five different manufacturers in accordance with the Health Product Declaration Standard Version 1.0, 2.0, or 2.1.	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	7/9 - This point would be difficult to achieve
Material and Waste		Total possible		**29**	**8**	**11**	**8**				

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
Energy 108 Points Possible											
1) Efficiency											
	E1.0	Minimum Energy Performance								Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	E1.0.1	Energy Code Minimum	**R**		**REQUIRED**			The school design and construction must be Washington State Energy Code (WSEC) Commercial Provisions compliant.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	E1.0.2	Energy Star Certified Equipment	**R**		**REQUIRED**			All major appliances, commercial food service equipment, electronics and office equipment must be ENERGY STAR Certified if certification is available for the product type, and required features and functionality are not sacrificed.	MEP & ARCHITECT	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	E1.1	Superior Energy Performance - Prescriptive Component Design	**1-14**	**14**	**4**	**10**		Comply with more than the minimum required credits in WSEC Section C406 to achieve points.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	Review with Metrix on C406 - Review with the proposal. To revisit after the OPR. Discuss about options for improvement portions
	E1.2	Superior Energy Performance - Whole Buidling Design	**1-20**	**20**	**4**	**10**	**6**	Reduce the predicted energy use intensity (pEUI) of the proposed design to be better than the energy use intensity target (EUIt) as defined by the Clean Buildings Performance Standard (CBPS). The EUIt shall be adjusted by both the operating shift normalization and new construction factors as defined in the tables below. Select either Table 1 or 2 based on the average weekly operating hours that the majority of the building is open to serve the public. The pEUI shall be gross EUI before the application of any onsite or offsite renewables.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	Review with Metrix
	E1.3	Zero Net Energy	**35**	**35**		**35**		Design and construct the building to be zero net energy	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
3) Alternative Energy											
	E3.1	On-Site Renewable Energy						SEE ATTACHED 3.1.1 THROUGH 3.1.3			
	E3.1.1	On-Site Renewable Energy	**2-12**	**12**	**2**	**7**	**3**	Use on-site renewable energy for a portion of a school's energy use. Point levels correspond to the percentage of energy use supplied by this method. See WSSP manual for point breakdown	MEP	No submittals or action required of the Contractor for this credit.	Review for PV roof areas and proper orientation 7/9 - Need to confirm 40% of roof area will produce at lease 5% of the building's energy needs.
	E3.1.2	Solar Ready	**3**	**3**	**3**			Design a structurally-sound building to allow for a solar array that maximizes the available roof area.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	E3.1.3	Service Water Heating	2-8	8		8		Use site-solar or site-recovered energy for at least 25% of the annual service water-heating energy used. Energy production used to earn this credit may not be used to earn points for percentage of energy supplied by renewables (E3.1.1).	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
4) Commissioning											
	E4.0	Fundamental Commissioning	R		R			Comply with requirements outlined in WSEC and WAC 392-343-080 regarding: • Cx Plan • Commissioned Systems • Supporting Documents (system documentation, record documents, and training) • Cx Report • Systems Balancing (TAB) • Functional Testing (FT) • Systems Operation Training WAC 392-343-080 requires on-site physical inspection remote monitoring-based Cx is not sufficient. The CxP must be an independent third party regardless of project delivery method (design-build or GC/CM). AND The Owner will develop the Owner's Project Requirements (OPR) and the Design Team will develop the Basis of Design (BOD) documents. AND Conduct a controls summit to clarify sequences of operation for networked control systems, when applicable (see Building Automation System). The controls summit must occur prior to final shop drawing. AND Review test, adjust, and balance (TAB) report, including duct pressure testing when applicable. AND Verify functional and maintenance training of O&M Staff, and document training is completed in the Final Commissioning Report. AND Assure, through contractual arrangements, involvement by the CxP in reviewing building operation after one academic year of building use with O&M staff and occupants. AND Verify warranty documentation from equipment suppliers and sub-contractors; including extended warranty requirements, if any.	CxA	no submittals or action required of the Contractor for this credit.	
	E4.1	**Enhanced Commissioning**									
		Commissioning Review; Verification and Assurances	3	3	3			Independent CxA required by E4.0 and State regulations as referenced in E4.0 will: • Conduct a commissioning design review of the Owner's Project Requirements (OPR), Basis of Design (BOD), and design documents prior to mid-construction documents phase. • Review contractor submittals applicable to systems being commissioned for compliance with OPR and BOD. • Ensure commissioning milestones are included in the project schedule. CxA will: * participate in OPR development * Witness air barrier leakage testing * Review building IAQ flushout if applicable * Verify training for optimal operation of commissioned systems they interface with has been completed. * Conduct O&M staff training to optimize building performance over time, such as through trend-log analysis. * Conduct seasonal testing and review performance quarterly during the first year of operation	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	Need to review with the owner if a Cx is onboard yet?
	E4.1.1	Energy Measurement & Verification	1	1			1	commissioning provider will assist the building owner in setting up first-year Energy Star Portfolio Manager reporting and compare actual energy use with modeled energy use and resolve differences.	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	Need Cx involvement to review actual use. Need to verify with the owner as it is additional cost 7/9 - Need to confirm Cx contract with ESD112

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
5) Metering & Management											
	E5.0	Minimum Energy Metering	**R**		**R**			Install an energy use metering system to measure, monitor, record and display each energy source and end-use per WSEC. Required for new buildings and additions with more than 50,000 sq. ft. gross conditioned floor area, for all energy sources (with exceptions), and sub-metered for HVAC and domestic hot water. Additionally, a data acquisition and display system is required. See WSEC for provisions that apply to existing building upgrades (modernizations and additions).	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	E5.1	Energy Metering - Other									
	E5.1.1	Energy Metering System - Not Code Required	**4**	**4**		**4**		Install an energy use metering system that meets the code required (above) on a project that does not meet the square foot threshold.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	E5.1.2	Energy Use Metering Display	**4**	**4**			**4**	For each building subject to Section C409.2 and C409.3, either a single visible display in a location with ready access, or a single web page or other electronic document available for access to building operation and management personnel or to a third-party energy data analysis service shall be provided in the building; for metering data acquisition systems and energy displays monitored by a third-party energy data analysis service, building operation and management personnel shall retain access to the metering data acquisition system and energy dis-play. See WSSP 2023 for added information.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	Review with owner if energy dashboard or webpage is desired
	E5.2	Energy Storage	**2**	**2**		**2**		Implement a new technology, strategy, or technique that produces actual and measurable results for on-site electric power storage that: * Reduces peak demand from grid * Provides a reliable source of electric power * Provides storage for renewable energy generated (beyond what is used on the site)	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	E6.0	Building Enclosure Commissioning	**2**	**2**	**2**			Employ the services of a professional consultant to commission the Building Enclosure including: * Weather barrier *Air barrier *Thermal * Roof Assembly and its vapor retarder/barrier * BECx activities must include and be overseen by a qualified BEX envelope consultant * Define enclosure performance requirements in the OPR. * Review design details for constructability and performance * Prepare building enclosure details, specifications, and test plans * Review product test data. * Observe construction beginning with mock-ups and testing of mock-ups * Witness testing of enclosure barriers and envelope * Prepare BECx review, site-visit, field reports * Review enclosure O&M Manual * Ensure Owner O&M staff are trained on enclosure maintenance. See 2023 WSSP manual for added requirements	BECx		NEWLY REQUIRED CREDIT. Need to add review of the OPR and follow up after OPR.
Energy		Total possible		**108**	**16**	**76**	**14**				
Indoor Environmental Quality 24 Points Possible											
1) Daylighting											
	IEQ1.0	Permanent Shading	**R-1**	**1**	**R**		**1**	Comply with the minimum exterior sun control requirements in WAC 246-366-050 (9), if applicable. OR FOR 1 POINT, Eliminate direct sun from day lit spaces (other than instructional areas, assembly rooms and meeting rooms covered by the WAC) from March 21st until September 21st through the use of permanent or automated shading devices.	ARCHITECT - TCF	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	IEQ1.1	Outdoor View Windows	R-1	1	R		1	Comply with the minimum outdoor view window requirements in WAC 246-366-050 (8). For 1 point, Provide a direct line of sight to vision glazing from 90% of critical task areas and office spaces, not including copy rooms, storage areas, mechanical, laundry and other low occupancy support areas. To qualify, a space will have view glazing equal to or greater than 7% of the floor area. View glazing will be transparent, but not translucent, and only include window area above 2.5 ft. or below 7.5 ft. from the floor.	ARCHITECT - TCF		
	IEQ1.2	Daylighting Classrooms	1-4	4	3		1	1 Point 25% all classroom area day lit 2 Point 50% all classroom area day lit 3 Point 75% all classroom area day lit 4 Point 90% all classroom area day lit	ARCHITECT - TCF		Confirm if a daylight study will be done on the building. 7/9 - Dayllight study will be required for the points need to reach out to Jeremy S. for the study
2) Electric Lighting Quality											
	IEQ2.0	**Electric Lighting Quality**									
	IEQ2.0.1	Electric Lighting Quality	R		R			Comply with all requirements in WAC 246-366-120. School spaces will be designed so end of lamp life conditions meet the minimum average illumination levels as identified in WAC 246-366-120. See WSSP Manual for additional info	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	IEQ2.0.2	Electric Lighting Dimming	1	1	1			After meeting all requirements for IEQ2.0.1 above, dim all luminaires in the classrooms, excluding whiteboard luminaires. Provide switches that allow for manual dimming below the levels set by the photocells based on natural lighting entering the space.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	IEQ2.0.3	Electric Lighting Luminaire Color	1	1		1		After meeting all requirements above, provide a lighting system designed to change the color of the luminaires (approximately 3,000 K – 5,000 K) based on the respective color of sunlight throughout the day. System may have the ability to have a temporary override (up to 60 minutes) for "calm" (3,000 K) and/ or "test" (5,000 K) settings.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	Need to review with owner
3) Indoor Air Quality											
	IEQ3.0	Min Requirements Ventilation, Filtration, & Moisture Control									
	IEQ3.0.1	Permanent Ventilation	R		R			Comply with ventilation requirements for primary and secondary schools in WAC 246-366-080. Meet International Mech Code with WA amendments for performance reqs. AND: * Filtration during construction: Temporary filters: If permanent air handlers must be used during construction, install filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 at each return air grille as determined by ASHRAE 52.2. Replace all filtration media immediately prior to occupancy. AND: *Moisture Control: All surface grades, drainage systems, and HVAC condensate must be designed to prevent the accumulation of water under, in, or near buildings, including portables. Irrigation systems must not spray on buildings. Building materials, especially wood, porous insulation, paper, fabric, and other porous materials must be kept dry before, during, and after installation to prevent the growth of mold and bacteria. Before installation, store all materials in a manner that assures they stay dry. If stored outside, cover building materials with plastic to protect from the rain and other sources of moisture, and keep off of the ground. Immediately discard all water-damaged materials and replace with new, undamaged materials. If building envelope components (foundation, framing and/or sheathing) are significantly impacted by moisture during the framing process, mitigation measures to reduce the moisture content to acceptable levels must be implemented prior to installation of insulation, wall cover, and other interior finishes.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	IEQ3.0.2	Increased Ventilation	**1**	**1**				In all general classrooms set the ventilation to be 21 cfm/person or greater. Ventilation rate must be maintained during all occupied hours. Increase HVAC heat recovery system efficiency beyond code to assure this approach is energy natural. Do not take additional energy efficiency credit for this modification.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	IEQ3.1	Outdoor Moisture Management	**R**		**R**			Design surface grades to slope away from the building and the building foundation to drain away rainwater, snowmelt, and HVAC condensate to prevent ponding, pooling, or otherwise saturating the building envelope or foundation. Rain leaders, or downspouts, must be directed to infiltration structures, on site storage, rain gardens or daylight provided that surface drainage moves water well away from the building and does not result in unintended ponding or pooling. Lawn irrigation systems are also required to be designed to prevent spray on building walls. And HVAC systems that use evaporation drip pans for condensate removal are prohibited.	**ARCHITECT - TCF**		**NEWLY REVISED & REQUIRED CREDIT.**
	IEQ3.2	Low-Emitting Interior Finishes	**R-1**	**1**	**1**			Use products that have been independently tested and certified for VOC emissions by a qualified third party. Testing for VOC emissions will be in accordance with the following: * Interior carpet, hard surface flooring, building insulation, acoustical ceilings, wall panels, adhesives and sealants shall be tested and determined complaint for emissions of VOCs in accordance with California Department of Public Health (CDPH) Standard Method v1.2, using the applicable exposure scenario (school classroom). * For wet-applied products, the VOC material content must be disclosed in the third-party certificate or in the manufacturer's product documentation, and must meet the applicable VOC content standard rule listed below; • Interior adhesives and sealants must meet South Coast Air Quality Management District Rule 1168; • Interior Paints and Coatings must meet South Coast Air Quality Management District Rule 1113 or CARB 2019 Suggested Control Measure for Architectural Coatings; • Concrete sealers must meet South Coast Air Quality Management District Rule 1113. For 1 Point: All interior composite wood products must contain no added urea formaldehyde. Formaldehyde content must be disclosed in a third-party certification or the manufacturer's product documentation.	**Architect during Design / Contractor during CA**	**Contractor shall maintain a list of all products in the 6 chosen options. Submit documentation under WSSP cover sheet showing that each product within each option is compliant with the requirements as noted to the left and further expanded in the WSSP manual.**	**NEWLY REVISED & REQUIRED CREDIT.** **Need to confirm with Dean to "bake in" to the specifications regarding the composite wood requirements to conform.** **Armin Jahr did the same**
	IEQ3.3	Low-Emitting Furniture	**1**	**1**		**1**		100% of the new or newly refurbished/remanufactured student and administrative workstations (desk/table and chair or a desk/chair combination, and individual pieces) are low-VOC-emitting.	OWNER		NEWLY REVISED CREDIT. Review with the owner Review or confirm with the owner if this point is needed
	IEQ3.4	Source Control	**3**	**3**	**3**			Design to minimize and control sources of indoor air pollutants per WSSP Manual 2023	**Architect during Design / Contractor during CA**	**Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents**	**See attached EPA IEQ document for entry mat system -** **7/9 - Confirm specifics that if we include the 2 entry points only for the Matt and if there are any more requirements?**
	IEQ3.5	Ducted HVAC Returns	**1**	**1**	**1**			Install all ducted HVAC returns.	**Mechanical during design / Contractor during CA**	**Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents**	**NEWLY REVISED CREDIT.**
	IEQ3.6	Construction IAQ Management									

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	IEQ3.6.1	During Construction	1	1	1		0	Temporary construction ventilation: Continuously ventilate with temporary equipment (not the permanent HVAC system) affected spaces during installation of materials that emit volatile organic compounds (VOC) and for at least 72 hours after installation. Ventilate longer than 72 hours if necessary to remove odors. Exhaust the air directly to the outside; do not re-circulate to other enclosed spaces. AND Duct protection: Turn the permanent mechanical system off and protect HVAC supply and return openings from debris generated during dust-producing activities such as drywall installation and finishing. Provide temporary ventilation as needed. Additionally, specify that ductwork be sealed when transported to the construction site and store ductwork in clean, dry conditions and keep sealed during storage. Wipe down internal surfaces of ductwork immediately prior to installation to remove dust. AND Preconditioning: Allow products with odors and significant VOC content to off-gas, off-site in a dry, well-ventilated area for at least two weeks prior to delivery to the construction site. Remove products from their containers and packaging to maximize off-gassing of VOCs. AND Sequencing: Install any necessary odorous and/or VOC-emitting products and allow to off-gas prior to installation of porous and fibrous materials. AND HEPA vacuuming (carpets and upholstery): After installation, vacuum carpeted and soft surfaces with a high-efficiency particulate arrestor (HEPA) vacuum as needed and just prior to occupancy. AND HEPA duct cleaning: Prior to installation, inspect ducts for dust and debris. Remove any dust, dirt, and residual oil. Prior to substantial completion and prior to using the permanent mechanical system, inspect the ducts again for dust and other debris that may have collected during construction. Immediately remove any dust using a HEPA vacuum. Bid specifications must require that new ducts be pre-cleaned and sealed prior to shipping to the job site.	CONTRACTOR	**See WSSP manual "Construction IAQ Management" credit and comply with all requirements therein.**	
	IEQ3.6.2	After Construction	1	1	1			After construction either use Option 1 Building Flush out before Occupancy or Option 2 Building Flush out after occupancy. All interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and furniture must be installed, and major VOC punch list items must be finished prior to either flushout. NOTE THE TESTING REQUIREMENTS THAT MUST BE ACCOMPLISHED PRIOR TO OPTION #2 - SEE PAGE 2 OF ATTACHED	CONTRACTOR	**Perform flush-out per WSSP 2023 manual.**	
4) Acoustics											
	IEQ4.0	Acoustic Performance	R		R			Comply with sound control requirements in WAC 246-366-110.	ACOUSTICS	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents. Compliance with this prerequisite must be determined with the classroom ventilation system and noise generating components, such as compressors and fans, in normal operation during conditions representing reasonable worst-case equipment loads. Contractor shall coordinate with Acoustical Testing Agency to schedule these tests.	
(note that previous credits 4.1.1 through 4.1.4 are now included in this one-point credit)	IEQ4.1	Improved Acoustical Performance	1	1			1	See the tables in IEQ4.0 attached above. The requirements in Credit IEQ 4.1 column of each of the following tables must be achieved to attain this one credit: *NC/dBA - Table 1 - Background Noise *STC - Table 2 - Sound Transmission & Impact Insulation Criteria *IIC [included in Table 2] *RT Table 3 - Room Reverberation Criteria	ACOUSTICS	Contractor shall coordinate testing/inspections	7/9 - Ask for cost option from the estimator.

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	IEQ4.2	Sound Amplification	1	1			1	Provide accommodations for a sound amplification system and an assistive listening system in all classroom spaces. * A sound amplification system to amplify the teacher's voice, via wired or wireless microphones, and to amplify audio visual presentations. * A dedicated or portable assistive listening device (system) to amplify the teacher's voice, via wired or wireless microphones, and to amplify audio visual presentations.	OWNER	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	NEWLY REVISED CREDIT. Follow up with owner on the requirements
	IEQ4.3	Acoustical Consultant	1	1	1			Retain the services of an experienced acoustical consultant (with a minimum of ten years experience in Educational Facilities). Prior to the conclusion of Schematic Design, the consultant must be involved in the design process and provide integrated team review, outline specifications and acoustic performance requirements, code sheet requirements, and general acoustic performance input. By Design Development, provide review and recommendations of architectural and mechanical systems, specifications, and basic system details or edits. By the Bid Period, have provided Contract document coordination, review, and input. During construction and prior to occupancy, provide submittal review for acoustic related items, and site observations of installed acoustic components and systems.	ACOUSTICS		
5) Thermal Comfort											
	IEQ5.0	Thermal Code Compliance	R		R			Comply with ASHRAE Standard 55 - Thermal Comfort Conditions for Human Occupancy, for thermal comfort standards within established ranges per climate zone. For buildings designed with occupant-controlled naturally conditioned spaces ensure an adaptive comfort standard has been established.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
	IEQ5.1	Radiant Heated Floors - K–5	2	2		2		Provide radiant heated floors in all general classrooms that serve elementary students grade K through 5	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
6) User Controls											
	IEQ6.1	User Control - Windows	1	1	1			Provide a minimum of two operable window in each standard classroom.	ARCHITECT - TCF	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	Review with Andrew
	IEQ6.2	User Control - Temperature	1	1	1			Provide a temperature control, adjustable by the occupants during occupied hours, in each classroom.	MEP	Contractor shall provide all product and material submittals as required and install all systems as required in the Contract Documents	
Indoor Environmental Quality		Total possible		**24**	**14**	**4**	**5**				

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
Integration, Education and Operations 45 Points Possible											
1) Integration											
	IEO1.1	Integrated Design Workshop	**1**	**1**	**1**			Conduct a workshop no later than mid-schematic design phase. Include project stakeholders to collaboratively develop a range of sustainable building strategies for all five categories of the WSSP, document the project's sustainable building goals, and incorporate them as an ongoing part of programming and design decision-making.	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	
	IEO1.2	Enhanced Integrated Design	**1-2**	**2**	**1**		**1**	1 POINT: Advanced Design Modeling - Utilize an advanced BIM decision-making tool for integrated sustainable design; whole building life cycle assessment (WBLCA); or environmental impact modeling tool such as Tally, Athena, One Click, or Skanska's Embodied Carbon in Construction Calculator (EC3); or others that facilitate calculation of embodied and/or operating carbon emissions. 1 POINT: Cross-Category Workshops - During the integrated design workshop, set aside time to specifically discuss design opportunities to improve multiple high performance outcomes by identifying criteria across categories (Site, Water, Materials and Waste, Energy, Indoor Environmental Quality) that contribute to the achievement of other category credits and/or design strategies that also promote human health, nutrition, or wellness.	ARCHITECT - TCF		NEWLY REVISED CREDIT. 7/9 - Kristin to review the effort to do a Tally or other program.
	IEO 1.3	Durability	**1**	**1**	**1**			Implementation of Durability, Efficiency and Maintainability Features Provide Architect's certification that major components of the facility are designed to exceed the 50 year useful service life envisioned by the state of Washington. A criterion for this certification is the design professional's evaluation of the building systems design life. The architect's certification should outline the specific features and indicate how they will improve service life, given reasonable use and maintenance.	ARCHITECT - TCF	No submittals or action required of the Contractor for this credit.	NEWLY REVISED CREDIT.
	IEO1.4	Faculty and Staff Changing and Shower Facilities	**1**	**1**	**1**			Provide a minimum of one onsite changing room and shower facility for faculty and staff, separate from any facility designated for students (toilet rooms, locker rooms). If only one is provided design for unisex use. If 2, then one for each gender, or as determined best suitable to serve the non-student population.	ARCHITECT - TCF		NEWLY REVISED CREDIT.
Note that strategies or technologies not tried in school buildings and/or masterplans that incorporate high-performance elements may also be considered for innovation points.	**IEO1.5**	Innovation	**1-2**	**2**			**2**	Implement a new technology, strategy, or technique that produces actual and measurable results, is not used to comply with a point in another WSSP credit, and that strives for at least one of the following goals: * Improves the health and performance of students and staff. * Improves the performance and efficiency of the school facility, or operation of the facility. * Restores the natural environment. * Achieves Living Building status as defined by the Living Future Institute. * Demonstrate exceptional performance in an existing criterion area through submission of a narrative explaining how the intent was exceeded by a significant amount.	ARCHITECT - TCF		NEWLY REVISED CREDIT. 7/9 - Need to review for possible options.

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	IEO1.6	Biophilic Design	**1-3**	**3**	**2**		**1**	1 POINT: BIOPHILIC DESIGN - Document and implement a holistic Biophilic Plan to strengthen connections between building users and natural ecosystems. The plan must incorporate a minimum of six biophilic features, with at least two elements in each of the three categories: Nature in the Space (physically experiencing nature), Nature of the Space (spatial configurations), and Natural Analogues (nature-inspired elements). Biophilic Plan will likely include multiple strategies working together to create an overall experience for all users that is grounded in place and nature. 1 POINT: RESPONSIVE DESIGN - Provide a minimum of two interior or exterior features that create safe and calming spaces, provide sensory input, or contribute to a sense of community. Features may include the sites' cultural, spiritual, archeological, or architectural history. 1 POINT: EDUCATIONAL MATERIALS - Provide educational materials for students and teachers that document the successful biophilic design strategies.	ARCHITECT - TCF		NEWLY REVISED CREDIT. 7/9 - Yes credits for Responsive design and Yes for Educational Materials Maybe is for the Planning.
	IEO1.7	Pursue Additional Funding Sources	**2**	**2**	**2**			Pursue private and public funding in support of initiatives/features that provide long-term environmental benefits to the building and site.	ARCHITECT - TCF		NEWLY REVISED CREDIT.
note that the 2nd paragraph in the credit summary adds a new requirement to attain these two points. The requirement for a CPTED professional may make this difficult to achieve. Teh 2-points for this credit do not appear to be separable - both portions of the credit must be achieved.	**IEO1.8**	Safer Schools by Design	**2**	**2**		**2**		Design safer schools by including at least 4 of the elements of safe school design in new building, addition and modernization projects. Conduct a Crime Prevention Through Environmental Design (CPTED) workshop with key project stakeholders and a CPTED professional at the outset of, or before, schematic design to identify site, building, and interior issues, and define strategies aligned with CPTED principles. The design team must incorporate these strategies in the project design. To earn the NICP's CPTED Professional Designation credential, a participant must successfully complete sixty-four hours of instruction offered through the NICP within two consecutive years. Course curriculum includes forty-hours of training in Basic CPTED and twenty-four hours of training in Advanced CPTED training. CPTED training from another training provider cannot be used as credit for the NICP's CPTED Professional Designation.	ARCHITECT - TCF		Review with Andy regarding outside study. Review for possible coordination with owner
2) Education											
	IEO2.1	Green Building Learning	**1-2**	**2**		**2**		1 point - Develop student-learning opportunities by using the building structure and site, through demonstration areas, exposed systems, lesson plans, teaching aids, interpretive graphics and signage. 1 point - Provide students, teachers, and staff with knowledge of each aspect of the high-performance design and their responsibility for use and preservation.	ARCHITECT - TCF & Owner if the 2nd point is attempted. Contractor during CA	Provide signage as required in the Contract Documents	
3) Operations											
	IEO 3.0	Operational Performance Monitoring	**R**		**R**			The project energy and water use will be tracked in EPA's ENERGY STAR Portfolio Manager for a period of 5 years following either building occupancy or board acceptance.	OWNER		
	IEO 3.1	Post Occupancy Evaluation (POE)									
	IEO3.1.1	POE Occupant Survey	**R**		**R**			Conduct a Post Occupancy Evaluation (POE) at least one year after the building is occupied, but no longer than two years after. A written plan for a POE must be in place at the time of the final (D11) high-performance submittal. The POE evaluation will include at a minimum: Surveys of occupants regarding comfort, including thermal comfort, air quality, lighting, building furnishings, spatial layout and acoustical comfort. *	OWNER		A written plan for a POE must be in place at the time of the final (D11) high-performance submittal. The POE evaluation will include at a minimum: • Surveys of occupants regarding comfort, including thermal comfort, air quality, lighting, building furnishings, spatial layout and acoustical comfort. • ARCHITECT'S STANDARD 1-YEAR WARRANTY REVIEW DOES NOT COVER REQUIREMENTS OF THIS PREREQUISITE

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	IEO3.1.2	Comprehensive POE	2	2				In addition to the required elements listed above the PEO includes additional topics such as security, accessibility, transportation, and green building features, as well as an analysis of the actual resource use (energy and water). & The POE investigates connections between the facility and health, user satisfaction, academic achievement, and other fundamental goals of facility construction.		No submittals or action required of the Contractor for this credit.	
	IEO3.2	ELCCA/LCCA									
	IEO3.2.1	ELCCA Required Facilities	R		R			As part of the early design process, perform an Energy Life Cycle Cost Analysis (ELCCA) to meet chapter 39.35 RCW – Energy Conservation in Design of Public Facilities requirements. For major facilities that are (1) new buildings having twenty-five thousand gross square feet or more of usable floor space, (2) renovation, modernization, addition, alteration or repair of a facility having greater than twenty-five thousand square feet, work completed within a 12-month period, the project cost is more than 50 percent of the assessed value of the existing facility and the project affects energy-using systems.	MEP	No submittals or action required of the Contractor for this credit.	
	IEO3.2.2	ELCCA Other Facilities	1	1				Perform an ELCCA for all other facilities (1) new building projects larger than five thousand gross square feet, but less than twenty-five thousand gross square feet of usable floor space, (2) renovation, modernization, addition, alteration, or repair of a facility where the cost is less than 50 percent of the assessed value of the existing facility.		No submittals or action required of the Contractor for this credit.	
	IEO3.2.3	ELCCA Update	1	1				Update the ELCCA energy model based on final construction drawings. This is a valuable tool that can be used to compare designed performance with actual performance.		No submittals or action required of the Contractor for this credit.	
	IEO3.2.4	LCCA	1	1				Perform a Life Cycle Cost Analysis (LCCA) showing 50-year net present value.		No submittals or action required of the Contractor for this credit.	
	IEO3.3	Monitoring-Based Commissioning	4	4			4	Develop an ongoing commissioning program.			
	IEO3.4	Project or District Long Term Operations						Choose all of the operations activities below that apply to this school. Plans and programs may be developed for the individual school or for the entire district. This section includes 21 possible points for operations and maintenance activities that often generate strong returns on the investment.	OWNER		
	IEO3.4.0	Asset Preservation Program (APP)-New Buildings	R		R			Newly constructed state-assisted school buildings, board accepted after December 31, 1993, must participate in the Asset Preservation Program (APP) in order to be eligible for future state assistance. A district Asset Preservation System (maintenance plan) is required as part of the APP. The building maintenance plan must include maintenance and operational issues related to high-performance features.	OWNER		
	IEO3.4.1	Operations and Maintenance Staff Involvement	R		R			Involve at least 3 key Operations & Maintenance staff, including resource conservation managers, custodians, electricians, mechanical and control system staff, grounds and building services staff in every phase of the project, from pre-planning through close-out. Staff selection to participate is at the discretion of the school district or project team.	OWNER		
	IEO3.4.2	Asset Preservation System (APS) on Modernizations	1	1		1		A state-assisted school building modernization project is not required to participate in the Asset Preservation Program (APP), therefore no asset preservation system (maintenance plan) for OSPI purposes is required. To earn the point, the district will provide an asset preservation plan that meets the requirements in the APP program, and include maintenance and operational issues related to high-performance features.	OWNER		
	IEO3.4.3	Green Power and Carbon Offsets	1-2	2		2		Enter into a contract for a minimum of five years to provide at least 50% (1 point) or 100% (2 points) of the project's energy from green power, carbon offsets or renewable energy certificates (RECs). Any combination of the three.	OWNER		

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	IEO3.4.4	Resouce Conservation and GHG Reduction Plan	1	1	1			Develop and implement a Resource Conservation Plan including energy, water, and materials conservation. & Develop a Greenhouse Gas Reduction plan. Include plans for reduction of water, energy, and vehicle miles traveled. Include goals with target dates.	OWNER		
	IEO3.4.5	IAQ Management Plan	2	2			2	Use EPA's Design Tools for Schools as a design reference and resource. Implement the EPA's Tools for Schools Program or an alternative, equivalent in scope and effectiveness. A school-specific IAQ management plan must be implemented.	OWNER		7/9 - Need to confirm with Michael about an EPA portfolio tool and management plan.
	IEO3.4.6	Integrated Pest Management Program	1-2	2	1	1		1 POINT: Develop and implement a formal IPM Program that follows the model IPM program for schools in Washington State developed by Urban Pesticide Education Strategy Team (UPEST). To get this point, an IPM plan must be developed and implemented at the school. A district-wide IPM that includes the new school can be used to satisfy this credit. 1 POINT: DESIGN FOR IPM - ncorporate pest prevention through design principles that will prevent pest entry or harborage. This includes: * Using ¼" hardware cloth on all ventilation openings * Caulk all cracks * Keep landscape plantings at least two feet from all buildings * Facades should be designed to discourage birds from roosting or excavating * Select pest-proof dumpsters that seal tightly and are easy for people to open and close. Garbage areas need to be easily cleanable and not located where fresh air intakes will entrain odors * Use door sweeps on all exterior doors * Make all kitchen surfaces easy to degrease	OWNER		
	IEO3.4.7	Transportation Options Program	1	1			1	Develop and implement a Transportation Options Program, with input from the local community and other stakeholders. The goal of the plan is to improve the school's connection to the community by offering students and staff more transportation choices such as public buses, rail, biking, and walking. Implement the education and enforcement components of the Safe Routes to School program.	OWNER		7/9 - Need to review with the district and review. 8/17 - TCF - sent confirming email to city for the participation of the "safe-routes" program that is a requirement.
	IEO3.4.8	Opeations and Maintenance Personnel Training	1-2	2		2		Facilities and maintenance staff will receive operations and maintenance training on all systems included in the commissioning scope of work, as well as systems related to high-performance – lighting, shading controls, all floor and wall finishes, audio systems, etc. depending on the scope of the project. Training will be a combination of Operations & Maintenance document review and field observations. For 1 point: BOC Level 1, maintained for 2 years, for at least 2 staff that have responsibility to maintain the new building systems included in the commissioning. For 2 points: BOC Level 2, maintained for 2 years, for at least 2 staff that have responsibility to maintain the new building systems included in the commissioning or BOC Level 1 for all O & M staff that have primary responsibility for maintaining the new facility, including electrical, mechanical, custodial, building services, grounds, controls, resource conservation managers.	OWNER		
	IEO3.4.9	Food Related Waste Management	1-2	2			2	1 point - Develop and implement a plan for food waste management at this school 1 point - Food Services at this school uses only re-usable trays	OWNER		7/9 - Confirm with the owner 8/18 - Confirmed that Owner uses reusable trays
	IEO3.4.10	Wasted Food Reduction Program	1, 2-3	3	1		2	1 POINT: Initiate a reducing wasted food awareness campaign 2 POINTS: 15% LESSS EDIBLE FOOD WASTE GOES TO COMPOST OR LANDFILL. Implement a Wasted Food Reduction Program to reduce the amount of food fit for consumption that is being wasted 3 POINTS: 25% LESS EDIBLE FOOD WASTE GOES TO COMPOST OR LANDFILL. Reference the EPA's Food Recovery Hierarchy for preferred reduction strategies.	OWNER		7/9 - Need to confirm with owner. 8/17 - TCF - Sent email to LeMay confirming if food waste composting is an option for the ASD | Also moved 1 point over in the expectation that there will be a student awareness program for reducing food waste

Category	Credit Number	Credit Name	Available Points	Possible Points	Yes	No	Maybe	General Description	Responsible Discipline	Required Submittals During Construction	Remarks
	IEO3.4.11	Fuel Efficient Buses and Maintenance Vehicles		1	1			At least 20% of the district-owned buses and 20% of the district-owned maintenance vehicles that are diesel (only those that travel on the roads and highways) serving this school are built in or after 2007 when the latest standards we updated. If district bus service is provided under contract from a third party, then 20% of the buses used to service this school must meet the requirement. The same is true if the school is served by public bus service.	OWNER		
	IEO3.4.12	Environmentally Preferrable Supplies Purchasing		1		1		Develop and implement an environmentally preferable purchasing policy at the school or district level. The plan must include the environmental performance indicators that are to be used to judge purchasing decisions. The plan should include typical products and materials and weighting of the indicators. Typical products and materials generally include office supplies and classroom supplies. The plan should ensure the protection of the students, staff, and workers.	OWNER		
	IEO3.4.13	Green Cleaning Policy and Program		1	1			Develop and implement a Green Cleaning Policy and Program at the school or district level. See WSSP 2023 manual for requirements	OWNER		Administrative or board approved policy? 7/9 - Need to confirm with owner 8/18 - TCF - Moved to "Yes" column
	IEO3.4.14	Green School Program		1			1	Register and participate in one or more Green School Programs that meet the requirements include Washington Green Schools, King County Green Schools, EPA's Cool Schools Challenges, plus others.	OWNER		
Integration, Education and Operations		Total Possible		**45**	**13**	**11**	**16**				
GRAND TOTAL Possible Points				**238**	**69**	**111**	**48**				

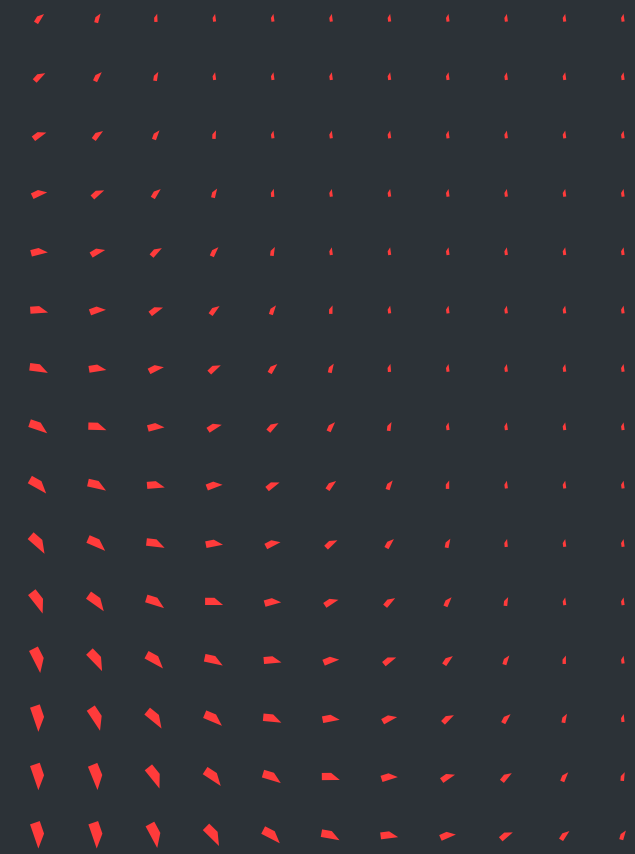
Minimum required for Washington Sustainable School Two-tier system:

New Facility and new Building on Existing Facility

For Class I Districts: **Minimum 66 points**

TCF

VI. C406 Strategy and Scorecard



TCF

Harbor Learning Center Washington State Energy Code Chapter C406 Compliance Strategy

Early Design Phase Narrative – 2023 Scorecard

The Harbor Learning Center project has completed its initial evaluation under the Washington State Energy Code (WSEC) Section C406, which requires a minimum of 48 credits from efficiency measures (Table C406.2) and 15 credits from load management measures (Table C406.3). Based on current design strategies, the project team has identified a total of 71 accepted credits, exceeding the minimum compliance threshold.

Summary of Accepted Credits

HVAC

C406.2 – Energy Efficiency Measures — 48 credits minimum, 48 accepted

- Improved Cooling & Fan Efficiency — 4 credits
- Fault Detection & Diagnostics (FDD) — 6 credits
- 20% Reduced Lighting Power — 32 credits
- Enhanced Lighting Control — 6 credits

Electrical

C406.3 – Load Management & Measurement — 15 credits minimum, 23 accepted

- HVAC Load Management — 23 credits

Strategy and Next Steps

The design approach demonstrates a strong alignment with WSEC performance goals. The majority of credits are secured through efficient lighting strategies, enhanced controls, and mechanical system monitoring and optimization. HVAC load management provides an additional credit buffer, ensuring the project meets compliance comfortably.

It is important to emphasize that this scorecard represents an early design-phase strategy and is therefore still a work in progress. These accepted credits outline the current pathway toward compliance but will continue to be evaluated and refined as design development advances.
Several additional measures remain in the *"maybe"* column—such as renewable energy (24 credits possible), envelope enhancements, and service hot water improvements—which can be pursued if currently accepted credits are not fully realized. In addition, the project team has identified contingency credits that can be explored as backup strategies.

Together, this layered approach provides flexibility and assurance that the Harbor Learning Center will achieve—and likely exceed—WSEC C406 energy credit requirements, while maintaining alignment with cost, feasibility, and district standards.

Attached: WSEC C406 Scorecard

Harbor Learning Center C406 Credit Strategy

Legend:

Credit is Accepted in Design

Credit is Currently Possible in Design

Table C406.2

Credit Section	TITLE	AVAIL. CREDITS	POSSIBLE CREDITS	ACCEPTED CREDITS	Maybe	Yes	No	Responsibility	Added Cost of Credit	CREDIT DESCRIPTION	NOTES
~~C406.2.2~~	~~1. Dwelling unit HVAC control~~	~~NA~~	~~0~~	~~0~~			~~TRUE~~			~~HVAC systems serving dwelling units or sleeping units shall be controlled with a programmable thermostat that is configured to automatically activate a setback condition of at least 5°F (3°C) for both heating and cooling. The programmable thermostat shall be configured to provide setback during occupied sleep periods. The unoccupied setback mode shall be configured to operate in conjunction with one of the following:~~	~~7/2 - Metrix - Doesn't apply.~~
~~C406.2.2.1~~	~~2. Improved HVAC TSPR~~	~~17~~	~~0~~	~~0~~			~~TRUE~~			~~For systems required to comply with Section C403.1.1, the HVAC TSPR shall exceed the minimum requirement by five percent. If improvement is greater, the credits in Table C406.2(1) are permitted to be prorated up to a 20 percent improvement.~~ ~~TSPR = Total System Performance Ratio~~	~~7/2 - Metrix - TSPR not required for systems with heat pumps.~~
C406.2.2.2	**3. Improve cooling and fan efficency**	**4**	**0**	**4**		**TRUE**		**Mechanical**		**No less than 90 percent of the total HVAC capacity serving the total conditioned floor area of the entire building, building addition or tenant space in accordance with Section C406.1.1 shall comply with Sections C406.2.2.2.1 through C406.2.2.2.3. Where individual equipment efficiencies vary, weigh them based on capacity.**	**7/27 - Confirm if efficiencies can be met** **1. Elec resistance heating limited - OK - Moving into yes category**
C406.2.2.3	**4. Improve heating efficienty**	**10**	**10**	**0**	**TRUE**			**Mechanical**		**No less than 90 percent of the total HVAC capacity serving the total conditioned floor area of the entire building, building addition or tenant space in accordance with Section C406.1.1 shall comply with Sections C406.2.2.3.1 through C406.2.2.3.2.**	**7/27 - Efficiency equations need to be completed in order to confirm**
~~C406.2.2.4~~	~~5. Improved Low-carbon district energy system (10% better)~~	~~11~~	~~0~~	~~0~~			~~TRUE~~			~~Not less than 90 percent of the annual service hot water and space heating load, or not less than 90 percent of the annual service hot water, space heating, and space cooling load shall meet the criteria of Section C406.2.2.4.1 or C406.2.2.4.2.~~	~~6/26 - TCF (Dan)don't have a district energy system~~
~~C406.2.2.5~~	~~6. Improved low-carbon district energy system (20% better)~~	~~33~~	~~0~~	~~0~~			~~TRUE~~			~~Not less than 90 percent of the annual service hot water and space heating load, or not less than 90 percent of the annual service hot water, space heating, and space cooling load shall meet the criteria of Section C406.2.2.5.1 or C406.2.2.5.2.~~	~~6/26 - TCF (Dan)Projects using C406.2.2.5 shall not use C406.2.2.4.~~ ~~Doesn't apply.~~
C406.2.2.6	**7. High performance DOAS**	**39**	**39**	**0**	**TRUE**			**Mechanical**	**$200,000.00**	**No less than 90 percent of the total conditioned floor area of the whole project, excluding floor area of unoccupied spaces that do not require ventilation as specified by the International Mechanical Code, shall be served by DOAS installed in accordance with Section C403.3.5 with the following adjustments:** **1. Minimum heat recovery sensible effectiveness of 80 percent, calculated in accordance with Section C403.3.5.1** **2. Where design outdoor airflow is greater than 500 cfm (250 L/s), the DOAS shall be equipped with an economizer bypass, damper control, or wheel speed control that is active between 55°F (13°C) and 75°F (24°C) outdoor air temperature and minimizes energy recovery or maintains an appropriate DOAS leaving air temperature when the building is generally in cooling, based either on outdoor air temperature or a DDC zone-based cooling system reset.** **3. DOAS total combined fan power shall be less than either:** **3.1. 0.769 W/cfm (1.55 W/L/s) when calculated in accordance with Section C403.3.5.2.** **3.2 Eighty percent of fan power allowance for a constant volume system when calculated in accordance with Section C406.8.1.** **This option is not available to areas served by systems utilizing Section C403.2.2.1 exception 5.**	**7/2 - Metrix (Eric) Would require much larger DOAS equipment and ductwork. And would need to add DOAS to big box spaces (currently planned to be high-eff VAV).** **Can get this but the mechanical attic sizes will need to get larger. taller and wider DOAS unites (by feet). Would need to start space planning for this now.** **7/27 - TCF (JR) This seems like a lot of cost and complexity. Added space and structure will add to the 200K cost. Lets assign this as a low-priority point item and see about getting points elsewhere**
C406.2.2.7	**8. Fault detection & diagnostics (FDD)**	**6**	**0**	**6**		**TRUE**		**Mechanical**	**$20,000.00**	**A project not required to comply with Section C403.2.3 or C403.6.10(16) shall achieve energy credits for installing a fault detection and diagnostics system to monitor the HVAC system's performance and automatically identify faults. The installed system shall comply with items 1 through 6 in Section C403.2.3.**	**7/2 - TCF (Dan) Could pay for these points by adding software to the DDC** **7/27 - TCF (JR) - This seems like a low cost item and a possible good cost/benefit. Moving into the yes column to establish a point basis.**

Table C406.2 C406.3

Credit Section	TITLE	AVAIL. CREDITS	POSSIBLE CREDITS	ACCEPTED CREDITS	Maybe	Yes	No	Responsibility	Added Cost of Credit	CREDIT DESCRIPTION	NOTES
~~C406.2.3.1~~	~~9. 10% reduced lighting power~~	~~16~~	0	0			~~TRUE~~	~~Electrical~~	~~$0.00~~	~~The total connected interior lighting power calculated in accordance with Section C405.4.1 shall be 90 percent or less of the lighting power values specified in Table C405.4.2(1) times the floor area for the building types, or 90 percent or less of the total interior lighting power allowance calculated in accordance with Section C405.4.2.~~	~~we'll know closer to 60% design if we can hit 20%.~~ ~~7/27 - TCF (JR) Seems likely we can hit this target. Am moving into the Yes column for scoring. Ben can you confirm the logic on the likelyhood of hitting this target?~~
C406.2.3.2	10. 20% reduced lighting power	32	32	32	TRUE	TRUE		Electrical	$0.00	The total connected interior lighting power calculated in accordance with Section C405.4.1 shall be 80 percent or less of the lighting power values specified in Table C405.4.2(1) times the floor area of the building types, or 80 percent or less of the total interior lighting power allowance calculated in accordance with Section C405.4.2.	6/26 - TCF (Dan) Projects using C406.2.3.2 shall not use C406.2.3.1. This will likely be attainable on an elementary school but should be carried as a maybe. 7/27 - TCF (JR) Ben, has there been any progress on the feasibility of this credit? If we take this credit then we will exceed our 48 point target.
~~C406.2.3.3~~	~~11. Lamp efficacy improvement~~	~~NA~~	0	0			~~TRUE~~			~~No less than 95 percent of the permanently installed light fixtures in dwelling units and sleeping units shall be provided by lamps with a minimum efficacy of 90 lumens per watt.~~	
~~C406.2.4.1~~	~~12. Residential lighting control~~	~~NA~~	0	0			~~TRUE~~			~~In buildings with nontransient dwelling units and sleeping units, lighting controls shall be configured to meet the following: 1. Each dwelling unit or sleeping unit shall have a main control by the main entrance that turns off all the lights and switched receptacles in the unit. The main control shall be permitted to have two controls, one for permanently wired lighting and one for switched receptacles. The main controls shall be clearly identified as "lights master off" and "switched outlets master off." 2. Switched receptacles shall be clearly identified and all switched receptacles shall be located within 12 inches of an unswitched receptacle. Each room shall have a minimum of two switched receptacles except bathrooms, kitchens, and closets.~~	
C406.2.4.2	13. Enhanced lighting control	6	0	6		TRUE		Electrical		Measure credits shall be achieved where no less than 50 percent of the gross floor area within the project has luminaires and lighting controls that include high end trim in compliance with Section C405.2.8.3 and either luminaire-level lighting controls in compliance with Section C405.2.8.1 or networked lighting controls in accordance with Section C405.2.8.2. Where general lighting in more than 50 percent of the gross floor area complies, the base credits from Table C406.2(1) shall be prorated as follows: [Floor area with high end trim, %] x [Base energy credits for C406.2.4.2] / 50%	7/2 - Metrix - Given district's inexperience with digital controls this may not be recommended. Metrix: Most lighting control systems are digital/low voltage now. It isn't a big leap to go from stand-alone systems to a networked system with luminaire-level lighting control. It may be worth visiting other districts with different control systems (for example Bethel SD uses wireless nLight Air with sensors in each fixture and they are happy with it. Wireless also cuts down on labor/material cost). 7/27 - TCF (JR) With the new controls systems being chosen this week can this credit be "firmed up". Can this feature be demoed by the lighting rep this week?
C406.2.5	14. Renewable energy	24	24	0	TRUE			Electrical	$36,000.00	Projects installing on-site or off-site renewable energy systems with a capacity of at least 0.1 watts per gross square foot (1.08 W/m2) of building area in addition to the renewable energy capacity required elsewhere in this code shall achieve energy credits for this measure. Renewable energy systems achieving energy credits shall not be used to satisfy other requirements of this code. Off-site renewable energy systems shall comply with Sections C411.2.2 and C411.2.3. Credits shall be prorated from the table value in accordance with Equation 4-17.	7/27 - TCF (JR) - Lets keep this credit in reserve if another falls through. I assume adding additional PV panels doesn't effect backbone/switchgear type infrastructure much? If not then adding additional PV panels at the last minute if we need credits may be a viable low-cost option. 8/1 Metrix - We can size the inverter to have additional capacity built in in case we need to go this route. Does not affect backbone/switchgear sizes, just inverter and PV panel size. 8/8 - Metrix - Additional 12 kW beyond energy code. Metrix: Further discussion is needed on this one, as the current scope is only going for code minimum.

Table C406.2 C406.3

Credit Section	TITLE	AVAIL. CREDITS	POSSIBLE CREDITS	ACCEPTED CREDITS	Maybe	Yes	No	Responsibility	Added Cost of Credit	CREDIT DESCRIPTION	NOTES
~~C406.2.6.1~~	~~15. Shower drain heat recovery~~	~~3~~	~~0~~	~~0~~			~~TRUE~~			~~Shower drain heat recovery units shall comply with Section C404.10 and preheat cold water supply to the showers. Potable waterside pressure loss shall be less than 10 psi (69 kPa) at maximum design flow. The efficiency of drain water heat recovery units shall be 54 percent in accordance with CSA B55.1. Full credits are applicable to the following building use types: Multi-family, hotel, motel, dormitory, and schools with locker room showers. Where not all showers in the project have drain heat recovery, the credit is adjusted based on the following:~~ ~~{Section C406.2.6.1 table credits} x {Showers with drain recovery} / {Total number of showers}~~	~~7/2 - Metrix - Not applicable.~~
~~C406.2.6.2~~	~~16. Service water heat revovery~~	~~14~~	~~0~~	~~0~~			~~TRUE~~			~~Not less than 30 percent of the annual service hot water heating energy use, or not less than 70 percent of the annual service hot water heating energy use in buildings with condenser water systems subject to the requirements of Section C403.9.2.1 or qualifying for one of its exceptions, shall be provided by one or more of the following:~~ ~~1. Waste heat recovery from service hot water, heat recovery chillers, building equipment, process equipment, or other approved system. Qualifying heat recovery must be above and beyond heat recovery required by other sections of this code.~~ ~~2. On-site renewable energy water-heating systems where not used to meet other requirements or to obtain other energy credits.~~	~~6/26 - TCF(Dan) Would be expensive for little return.~~
~~C406.2.6.3~~	~~17. Heat pump water heating~~	~~13~~	~~0~~	~~0~~			~~TRUE~~			~~Credit shall be achieved where the primary heat pump service water heating system is sized to deliver no less than 100 percent of the net calculated demand for service water production during the peak demand period with entering dry-bulb or wet bulb outdoor air temperature at 40°F (4°C) for air source heat pumps, or 44°F (7°C) ground temperature for ground-source heat pumps, as calculated using the equipment manufacturer's selection criteria or another approved methodology. For this credit, the net calculated demand shall be the gross building demand less any portion of the demand complying with the exceptions to Section C404.2.1. Supplemental heating is permitted in accordance with Section C404.2.1, but cannot use fossil fuels. Heat pump water heaters shall comply with one of the following:~~ ~~1. The COP rating shall be a minimum COP of 3.0 reported at the design leaving heat pump water temperature with an entering air temperature of 60°F (16°C) or lower. For water source equipment, the COP rating will be reported at the design leaving load water temperature with an entering load water temperature of 74°F (23°C) or lower.~~ ~~2.The uniform energy factor (UEF) shall be a minimum of 3.40 rated based on U.S. Department of Energy requirements.~~	~~6/26 - TCF(Dan) These points may be expensive because this is increasing the domestic hot water heat pump capacity by ~2x code baseline, however there are only a limited number of heat pump sizes on the market so we'll have to analyze the actual cost.~~ ~~This is low on the list to consider doing.~~ ~~7/2 - Metrix - putting down as a no as there are better options listed as maybe above~~
~~C406.2.6.4~~	~~18. High efficiency service water heating, gas-fired~~	~~NA~~	~~0~~	~~0~~			~~TRUE~~			~~The credit achieved shall be from Table C406.2(2) where hot water is supplied by gas-fired equipment with minimum efficiency of 0.91 UEF.~~	
~~C406.2.7.1~~	~~19. Heat trace system~~	~~1~~	~~0~~	~~0~~			~~TRUE~~			~~The credit achieved shall be from Table C406.2(1). This system shall include self-regulating electric heat cables, connection kits and electronic controls. The cable shall be installed directly on the hot water supply pipes underneath the insulation to replace standby losses.~~	~~7/2 - Metrix - Would not recommend this point~~
~~C406.2.7.2~~	~~20. Point of use water heater~~	~~5~~	~~0~~	~~0~~			~~TRUE~~			~~The credit achieved shall be from Table C406.2(1) where any fixtures requiring hot water shall be supplied from a localized electric source of hot water with no recirculation or heat trace and limited to 2 kW and 6 gallons of storage. The supply pipe length from the point of use water heater to the termination of the fixture supply pipe shall be no more than 20 feet.~~	~~7/2 - Metrix - Not practical for a school~~
~~C406.2.8~~	~~21. Service hot water distribution right sizing~~	~~NA~~	~~0~~	~~0~~			~~TRUE~~			~~To achieve this credit, where Group R-1 and R-2 occupancies are served by a central service hot water system, the distribution system serving dwelling units, sleeping units and guestrooms shall be sized using Appendix M of the Uniform Plumbing Code.~~	
C406.2.9	**22. High performance service hot water temperature maintenance system**	**1**	**1**	**0**	**TRUE**			**Mechanical**		**Systems with multiple riser service hot water circulation systems shall use only heat pump technology for temperature maintenance. The heat pump technology shall have a minimum COP of 3.0 or UEF of 3.4. For air-source equipment, the COP rating will be reported at the design leaving heat pump water temperature with an entering dry bulb air temperature of 60°F (16°C) or lower and a relative humidity of 50 percent or lower. For water-source equipment, the COP rating will be reported at the design leaving load side water temperature with an entering source side water temperature of 74°F (23°C) or lower. The system shall comply with the requirements of Section C404.7.1.**	**7/27 - TCF(JR) With only 1 point available: lets make this a low priority item. With one of the lighting controls items above we could make this point obsolete.**

Table C406.2 C406.3

Credit Section	TITLE	AVAIL. CREDITS	POSSIBLE CREDITS	ACCEPTED CREDITS	Maybe	Yes	No	Responsibility	Added Cost of Credit	CREDIT DESCRIPTION	NOTES
C406.2.10	**23. High efficiency service hot water circulation system**	**1**	**1**	**0**	**TRUE**			**Mechanical**		**Multiple riser service hot water circulation systems shall use a variable volume circulation pump controlled to vary the pump speed based on system demand and shall include self-actuated thermostatic balancing valves to control the system flow at each riser.**	**7/27 - TCF(JR) With only 1 point available: lets make this a low priority item. With one of the lighting controls items above we could make this point obsolete.**
~~C406.2.11~~	~~24. Low flow residential showerheads~~	~~NA~~	~~0~~	~~0~~			~~TRUE~~			~~All showerheads installed in Group R-1 and R-2 dwelling units or sleeping units shall have a maximum listed flowrate of 1.25 gallons per minute or less at 80 psi operating pressure for fixed showerheads and a maximum listed flowrate of 1.50 gallons per minute or less at 80 psi operating pressure for handheld showerheads. When a shower is served by more than one showerhead, including handheld showerheads, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 1.25 gallons per minute or less for fixed or 1.5 gallons per minute or less for handheld, or the shower shall be designed to allow only one shower outlet to be in operation at a time.~~	
C406.2.12	**25. Enhanced envelope performance**	**5**	**5**	**0**	**TRUE**			**Architecture**		**The Proposed Total UA of the thermal envelope of the project shall be 15 percent lower than the Allowable Total UA determined in accordance with Section C402.1.5 and Equation 4-2.**	**6/26 - TCF(Dan) Buildings or building areas that are exempt from the thermal envelope requirements in accordance with Sections C402.1.1 and C402.1.2, do not qualify for this package.** **7/27 - TCF(JR) Our gameplan was to use prescriptive method for thermal envelope insulation. However if we "need" points then we can shift to a whole UA value. We can increase 15% by adding 1/2" of Poly iso (7" in lieu of 6.5") and adding batt cavity insulation at walls.**
~~C406.2.13.2~~	~~26. Base reduced air leakage~~	~~3~~	~~0~~	~~0~~			~~TRUE~~			~~Measured air leakage shall not exceed 68 percent of the maximum leakage allowed by Section C402.5.1.2.~~	~~6/26 - TCF - Buildings or building areas that are exempt from the thermal envelope requirements in accordance with Sections C402.1.1 and C402.1.2, do not qualify for this package.~~
~~C406.2.13.3~~	~~27. Enhanced reduced air leakage~~	~~5~~	~~0~~	~~0~~			~~TRUE~~			~~Measured air leakage shall not exceed 33 percent of the maximum leakage allowed by Section C402.5.1.2.~~	~~6/26 - TCF - Buildings or building areas that are exempt from the thermal envelope requirements in accordance with Sections C402.1.1 and C402.1.2, do not qualify for this package.~~
~~C406.2.14~~	~~28. Enhanced commerical kitchen equipment~~	~~30~~	~~0~~	~~0~~			~~TRUE~~			~~For buildings or areas designated as Group A-2, or facilities whose primary business type involves the use of a commercial kitchen with at least one gas or electric fryer, all fryers, dishwashers, steam cookers and ovens shall comply with all of the following: 1. Achieve the ENERGY STAR label in accordance with the specifications current as of January 1, 2022. 2. Be installed prior to the issuance of the certificate of occupancy. 3. Have the ENERGY STAR qualified model number listed on the construction documents submitted for permitting. Energy efficiency credits for efficient commercial kitchen equipment shall be determined based on Equation 4-19, rounded to the nearest whole number.~~	~~6/26 - TCF - Additional energy efficiency credits, up to the maximum shown in Table C406.2(2), shall be calculated according to Section C406.2.14.~~

Table C406.2 C406.3

Credit Section	TITLE	AVAIL. CREDITS	POSSIBLE CREDITS	ACCEPTED CREDITS	Maybe	Yes	No	Responsibility	Added Cost of Credit	CREDIT DESCRIPTION	NOTES
~~C406.2.15~~	~~29. Enhanced residnetial kitchen equipment~~	~~NA~~	~~0~~	~~0~~			~~TRUE~~			~~For projects with Group R-1 and R-2 occupancies, energy credits shall be achieved where not less than 90 percent of dishwashers, refrigerators, and freezers comply with all of the following: 1. Achieve the ENERGY STAR Most Efficient label in accordance with the 2021 specifications. 2. Be installed prior to the issuance of the certificate of occupancy. For Group R-1 where only some guestrooms are equipped with both refrigerators and dishwashers, the table credits shall be prorated as follows: [Section C406.2.15 table credits] x [Floor area of guestrooms with kitchens] / [Total guestroom floor area]~~	
~~C406.2.16~~	~~30. Enhanced residential laundry equipment~~	~~NA~~	~~0~~	~~0~~			~~TRUE~~			~~For projects with Group R-2 occupancies, energy credits shall be achieved where not less than 90 percent of clothes washers and dryers in the project meet the following requirements: 1. Each dwelling unit contains in-unit washing washer and dryer equipment that meets the following requirements: 1.1 Achieve the ENERGY STAR Most Efficient label in accordance with the 2021 specifications. 1.2 Be installed prior to the issuance of the certificate of occupancy. 2. Where only some dwelling units are equipped with both washers and dryers, the table credits shall be prorated as follows: [Section C406.2.16 table credits] x [Floor area of dwelling units with laundry] / [Total dwelling unit floor area]~~	
~~C406.2.17~~	~~31. Heat pump clothes dryers~~	~~NA~~	~~0~~	~~0~~			~~TRUE~~			~~Not less than 90 percent of domestic clothes dryers located in Group R-1 and R-2 of the whole project are ENERGY STAR rated heat pump dryers. Credit applies only to buildings where laundry facilities are provided either within each residential dwelling or sleeping units or grouped together in central multifamily use laundry rooms, or a mix of the two. To claim this credit, the building permit drawings shall specify the appliance type and provide documentation of ENERGY STAR compliance. At the time of inspection, all appliances shall be installed and connected to utilities.~~	
~~C406.2.18~~	~~32. Efficient elevator equipment~~	~~5~~	~~0~~	~~0~~			~~TRUE~~			~~Qualifying elevators in the building shall be Energy Efficient Class A in accordance with ISO 25745-2, Table 7. Only buildings three or more floors above grade shall be permitted to use this credit. Credits shall be prorated based on Equation 4-18, rounded to the nearest whole credit. Projects with a compliance ratio (CRe in Equation 4-18) below 0.5 do not qualify for this credit.~~	
	TOTAL CREDITS & COST C406.2		**112**	**48**					**$256,000.00**		

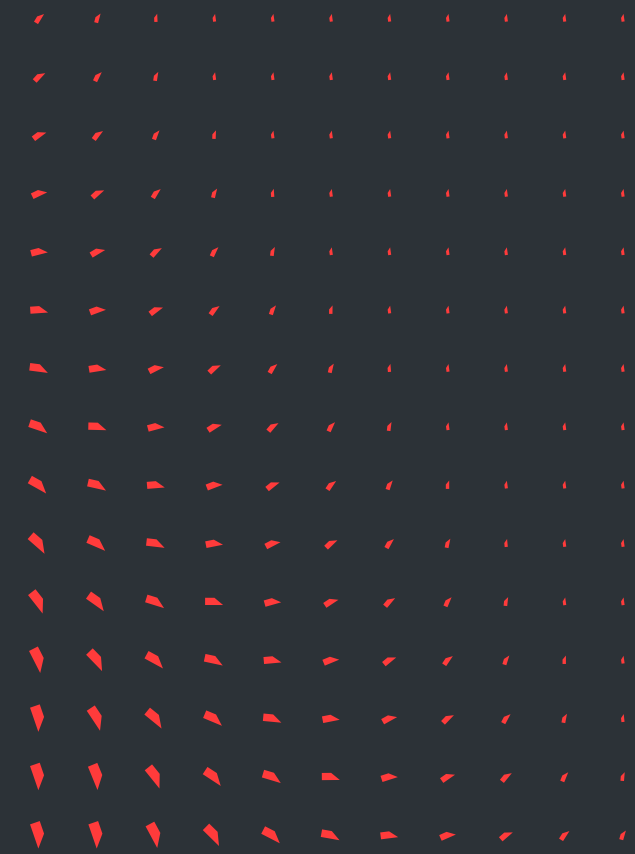
Credit Section	TITLE	AVAIL. CREDITS	POSSIBLE CREDITS	ACCEPTED CREDITS	Maybe	Yes	No	Responsibility	Added Cost of Credit	CREDIT DESCRIPTION	NOTES
Table C406.3											
C406.3.1	**1. Lighting load management**	**15**	**15**	**0**	**TRUE**					**Automatic controls shall be capable of gradually reducing general lighting power with continuous dimming in 75 percent of the building area by at least 20 percent during peak demand periods. Where less than 75 percent, but at least 50 percent, of the building area lighting is controlled, the credits from Table C406.3 shall be prorated as follows:** **[Area of building with lighting load management, %] × [Table credits for C406.3.1] 75%** **EXCEPTION: Warehouse or retail storage building areas shall be permitted to achieve this credit by switching off at least 25 percent of lighting power in 75 percent of the building area without dimming.**	**7/2 - Metrix: Electrical has not implemented this yet, but possible and should be discussed if load management is a desire of the Owner.** **7/27 - TCF(JR) Lets keep this as our secondary option if the HVAC load management option falls through. If this is just pure management of software options perhaps we consider this option as well.**
C406.3.2	**2. HVAC load management**	**23**	**0**	**23**		**TRUE**				**Automatic controls shall:** **1. Where electric cooling is used, be configured to gradually increase, over a minimum of three hours, the cooling setpoint by at least 3°F during the summer peak periods.** **2. Where electric heating is used, be configured to gradually reduce, over a minimum of three hours, the heating setpoint by at least 3°F during winter peak periods.**	**7/2 - Metrix (Eric) Would be fairly simple to implement mechanically.** **7/27 - TCF(JR) - If this is a simple one then lets use this as our primary strategy. Meeting this single item will meet the requirements for load management.** **Note- am moving to yes column**
~~**C406.3.3**~~	~~3. Automated shading~~	~~16~~	~~**0**~~	~~**0**~~			~~TRUE~~			~~Where fenestration on south and west exposures exceeds 20 percent of the wall area, automatic controls shall be configured to operate movable exterior shading devices or dynamic glazing to reduce solar gain through sunlit fenestration on southern and western exposures by at least 50 percent during summer peak periods.~~ ~~Informative Note:~~ ~~This credit can be met by exterior roller, movable blind or movable shutter shading devices; however, fixed overhang, screen or shutter shading will not meet the requirement. Roller shades that reject solar gain but still allow a view are allowed as long as they provide an effective 50 percent reduction in net solar gain (e.g., have a shading coefficient of less than 0.5 for the shading material itself). Interior shading devices will not meet the requirement. Electrochromic windows that achieve 50 percent of SHGC would qualify.~~	
~~**C406.3.4**~~	~~4. Electric energy storage~~	~~72~~	~~**0**~~	~~**0**~~			~~TRUE~~			~~Automatic controls shall store electricity in electric storage devices during nonpeak periods and use stored energy during peak periods. Electric storage devices shall have a minimum capacity of 5 Wh/ft2 (58 Wh/m2) of gross building area. For greater storage capacity up to 15 Wh/ft2 (160 Wh/m2), credits shall be prorated as follows:~~ ~~[Installed electric storage capacity, Wh/ft2] × [C406.3.4 credits from Table C406.3]~~	~~7/2 - Metrix - Metrix: These are very expensive and would most likely be cost prohibitive to the project. Lead times are also an issue.~~
~~**C406.3.5**~~	~~5. Cooling energy storage~~	~~19~~	~~**0**~~	~~**0**~~			~~TRUE~~			~~Automatic controls shall be capable of activating ice or chilled water storage to reduce peak period electric demand. Credits shown in Table C406.3 are based on storage capacity of 2 ton-hours per design day ton of cooling load (2 kWh per design day kW) with a 1.15 sizing factor. Credits shall be prorated for installed storage systems sized between 0.5 and 3.5 ton-hours per design day ton (kWh per design day kW) of cooling load rounded to the nearest whole credit. The storage tank shall have no more than 1.5 percent of storage capacity standby loss per day.~~	
~~**C406.3.6**~~	~~6. Service hot water energy storage~~	~~8~~	~~**0**~~	~~**0**~~			~~TRUE~~			~~To achieve this credit, where service hot water is heated by electricity, automatic controls shall preheat stored service hot water before the peak period and suspend electric water heating during the peak period. Storage capacity shall be provided by either:~~ ~~1. Preheating water above 140°F (60°C) delivery temperature with at least 1.34 kWh of energy storage per kW of water heating capacity. Tempering valves shall be provided at the water heater delivery location.~~ ~~2. Providing additional heated water tank storage capacity above peak service hot water demand with equivalent peak storage capacity to item 1.~~	

Table C406.2 C406.3

Credit Section	TITLE	AVAIL. CREDITS	POSSIBLE CREDITS	ACCEPTED CREDITS	Maybe	Yes	No	Responsibility	Added Cost of Credit	CREDIT DESCRIPTION	NOTES
~~C406.3.6~~	~~7. Building thermal mass~~	~~95~~	~~0~~	~~0~~			~~TRUE~~			~~To achieve this credit, the building shall have both additional passive interior mass and a night-flush control of the HVAC system.~~ ~~1. Interior to the building thermal envelope insulation, provide 15 pounds of passive thermal mass per square foot of building floor area. Mass construction shall be in the building interior and the indoor facing portion of the exterior wall, and interior floor construction. Mass construction shall have mass surfaces in direct contact with the air in conditioned spaces with directly attached wall board or hard surface flooring allowed. Mass with carpet or furred wallboard shall not be counted toward the building mass required. For integral insulated concrete block walls complying with ASTM C90, only the mass of the interior face shall be counted toward the building mass required.~~ ~~2. When summer mode is active and indoor average temperature is 5°F (3°C) or more above outdoor temperature and between 10:00 p.m. and 6:00 a.m., automatic night flush controls shall operate outdoor air economizers at low fan speed less than 66 percent during the unoccupied period until the average indoor air temperature falls to the occupied heating setpoint. Summer mode shall be activated when outdoor air exceeds 70°F (21°C) and continues until deactivated when outdoor air falls below 45°F (7°C). Another night flush strategy shall be permitted where demonstrated to be effective, avoids added morning heating and is approved by the code official.~~ ~~Informative Note:~~ ~~The simplified night flush sequence described will operate in "summer mode" below the 70°F outdoor air trigger temperature down until outdoor air of 45°F is hit when the "summer mode" is deactivated until the outdoor air temperature rises above 70°F again. Other strategies may be implemented that cool the space below the heating setpoint and adjust the morning heating setpoint to avoid morning reheating.~~	
	TOTAL CREDITS & COST C406.3	**248**	**15**	**23**					**$0.00**		
	Total Credits for C406										
			Possible Credits	**Accepted Credits**					**Total Cost Implications**	**Credit Requirements**	
	Total Credits for Table 406.2 Efficiency		**112**	**48**					$256,000.00	48 Credits Minimum Required	
	Total Credits for Table 406.3 Management Measurement		**15**	**23**					$0.00	15 Credits Minimum Required	

TCF

VII. Preliminary Geotechnical



HALEY ALDRICH

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REPORT OF PRELIMINARY GEOTECHNICAL ENGINEERING FINDINGS
NEW ABERDEEN SCHOOL DISTRICT CAMPUS - SITE 1
EAST 3RD STREET & NORTH I STREET
ABERDEEN, WASHINGTON



by
Haley & Aldrich, Inc.
Vancouver, Washington

for
TCF Architecture PLLC
Tacoma, Washington

File No. 0211414-000
Revised 20 December 2024
November 2024

HALEY & ALDRICH, INC.
300 W 15th S
Vancouver, WA 98660
360.448.4189

Revised 20 December 2024
4 November 2024
File No. 0211414-000

TCF Architecture PLLC
902 N 2nd Street
Tacoma, Washington 98403

Attention: Steve Wachtler, AIA, Principal

Subject: Report of Preliminary Geotechnical Engineering Findings
New Aberdeen School District Campus - Site 1
East 3rd Street & North I Street
Aberdeen, Washington

Dear Steve Wachtler:

Haley & Aldrich, Inc. (Haley & Aldrich) is pleased to submit this report to TCF Architecture PLLC and Aberdeen School District No. 5 (District) summarizing our preliminary geotechnical engineering services for the seismic retrofit of Miller Junior High School in Aberdeen, Washington. Our work was completed in general accordance with our agreement executed 12 August 2024.

We understand the District intends to relocate one or more of its school campuses to a new site located one block west of Aberdeen High School, north of the intersection of East 3rd Street and North I Street. The proposed school Site is occupied by an asphalt-paved parking lot in its southern half and playfields in its northern half.

This study was funded by the Office of Superintendent of Public Instruction's (OPSI's) School Seismic Grant Program. The findings from this preliminary evaluation will inform the District's and OPSI's decision-making to either advance design efforts for seismic retrofit improvements at the existing campus or to explore re-siting the school to a new location.

This preliminary report provides a discussion of the site setting, surface and subsurface conditions, the seismic basis of design, a preliminary geotechnical analysis of seismicity and seismic hazards that may impact plans for retrofit of the subject school, as well as a discussion of conceptual foundation support alternatives. Design-level recommendations for foundations and earthwork may be provided using currently available or supplemental subsurface data under a supplemental authorization.

Scope of Services

The purpose of our services was to preliminarily characterize subsurface conditions at the site and to provide geotechnical engineering guidance and recommendations that conform in a preliminary sense to the geotechnical requirements of ASCE 7-16. These services included conducting geologic research, subsurface explorations, laboratory testing, preliminary seismic ground motion assessments, seismic hazard evaluation, and preliminary engineering analyses.

We completed the following tasks in general accordance with our proposal for Preliminary Geotechnical Engineering Services dated 3 July 2024 and executed 12 August 2024.

- Reviewed readily available geologic and geologic hazard maps, water well logs, and other geotechnical reports and plans provided by others for general information regarding subsurface soil and groundwater conditions and geologic hazards.
- Drilled two borings to depths of approximately 30 to 50 feet below ground surface (bgs) and advanced four cone penetration test (CPT) soundings to depths of approximately 30 feet bgs to characterize subsurface conditions.
- Observed the explorations, logged the subsurface conditions, collected representative soil samples, and transported the samples to our laboratory for further visual review and testing.
- Completed laboratory tests on select soil samples to evaluate soil engineering properties. Our specific tests included moisture content, Atterberg Limits, and grain size distribution determinations.
- Developed code-based seismic design values in conformance with ASCE 7 Section 11.4, not including site-specific seismic or ground response analyses per ASCE 7 Chapter 21.
- Conducted limited seismic hazard analysis including:
  - Assessing liquefaction potential analysis per the method presented by Idriss & Boulanger (2008); and
  - Assessing lateral spreading at the site, including an evaluation of local and regional topography.
- Prepared this report summarizing our preliminary findings and presenting conceptual foundation alternatives for support of a new school.

Site Conditions

SURFACE CONDITIONS

The site encompasses an approximately 4.7-acre area located one block west of Aberdeen High School in Aberdeen, Washington. The site is currently occupied by an asphalt-paved parking lot in its southern half and features a playing field in its northern half. The site is bounded by E 5th Street to the north, N H Street to the east, E 3rd Street to the south, and N I Street to the west.

Topography in the southern half of the site is generally flat with an average surface elevation at approximately Elevation 20 feet (World Geodetic System 84). The playfields in the northern half of the site slope gently to the south. The northern and northeastern portions of the site adjacent to E 5th Street and N H Street feature slopes up to 10 feet tall inclined at approximately 2H:1V, which descend from the roadways towards the playfields to the south.

The Chehalis River is located about 0.6 miles southeast of the site. The bay of Grays Harbor begins approximately 2.5 miles southwest of the site at the mouth of the Chehalis River. The Pacific Ocean is about 17 miles to the west of the school, beyond the northern peninsula of Grays Harbor.

SITE HISTORY

The site is the former location of Weatherwax High School, which was originally constructed in the southern portion of the site in 1909. Historical aerial photographs dating back to 1953 depict the original high school structure in the southern portion of the site, as well as several multi-story structures in the northern portion of the site. By 1981, several changes to improvements at the site had occurred. Historical photos show that the multi-story structures in the northern portion of the site had been altered, with the westernmost structure appearing to have been demolished, and a new structure appearing to have been erected in the northeastern corner of the site. Historical aerial photos from 1981 also show an addition to the high school, south of the original structure. A 1962 geotechnical report by Dames & Moore (see Appendix C) describes plans for this high school addition, suggesting that the addition was constructed in the early to mid-1960s. The original high school structure is present in photos from 1990 but is absent from 2006 imagery, as the original structure reportedly burned down in 2002. Between 2006 and 2009, all structures at the site had been demolished as the new Aberdeen High School was completed and opened in 2007. The site conditions appear to have remained relatively unchanged between 2009 and present.

The 1962 Dames & Moore report recommended that the high school addition be supported on steel H-piles driven to refusal on bedrock. The foundation types used for the other previous structures at the site are unknown, though based on our knowledge of development in the area, it is likely that other structures in the southern portion of the site had been founded on driven timber pile foundations. Structures in the northern portion were most likely supported on shallow foundations, given the relatively shallow depth to bedrock in this region.

GEOLOGIC AND SOIL MAPPING

The majority of the site is mapped in Logan (1987) as Quaternary alluvium (Qal) described as “silt, sand, and gravel deposited in streambeds and fans,” the surface of which is “relatively undissected” while Rau (1986) maps the site as Quaternary deposits (Qd) that is described as undifferentiated “alluvium and glacial drift,” the latter of which is described as “outwash and gravel deposits” (Rau, 1986). In mapping that starts approximately 4,500 feet north of the site, Logan (2003) describes Quaternary alluvium (Qa) at the floor of river valleys as locally containing peat and lacustrine deposits. The mapping shows the furthest north portion of the site is mapped as marine sedimentary rocks assigned to the Miocene Montesano Formation, sandstone member (Tmns [Logan, 1987]; Mm_2 [Logan, 2003]). This formation is

described as predominantly “coarse- to fine-grained, silty, friable” sandstone with “local to widespread conglomerate, siltstone, and mudstone” that is generally blue-gray where fresh and orange-brown where weathered (Logan, 1987; Logan, 2003). Mapping indicates that this formation likely continues to the south below the alluvial deposits. Our explorations encountered dense materials typically beginning at approximately 26 to 29.5 feet bgs in the southern half of the site, and as shallow as 5 to 10 feet bgs in the northern portion, which are likely part of this sedimentary rock formation. Thicker deposits of alluvium in the southern portion of the site are likely associated with ancient streams or channels.

The near surface soils at the site are mapped by the U.S. Department of Agriculture (USDA) in the *Soil Survey of Grays Harbor County Area, Pacific County, and Wahkiakum County* (Pringle, 1986), as compiled in the Web Soil Survey (USDA, 2024), as Elochoman silt loam, 1 to 8 percent slopes, and Udorthents, level. The site is split nearly evenly between the two soil types with Elochoman soils found in the north and Udorthents soils to the south (see Figure 2). A summary of the physical properties of each soil type is presented below.

- Elochoman soils are described as very deep, well drained soils derived from sandstone along shoulders of uplands (Pringle, 1986). The typical soil profile generally comprises 60 inches of medial loam (United Soil Classification System [USCS] ML, MH). Depth to water in this soil type is typically greater than 80 inches and the soil is assigned to hydrologic soil group B, which are soils that generally have moderate infiltration and water transmission rates. The risk of corrosion is rated as “high” for both uncoated steel and concrete with typical effective cation-exchange capacity ranging of 45 to 70 milliequivalents per 100 grams of soil (meq/100g).
- Udorthents soils are very deep, moderately to excessively drained soils found on former tidelands and/or sandy and loamy river dredgings that have been protected from flooding by dikes (Pringle, 1986). Pringle (1986) notes that “no single profile is representative of these soils” but a common profile generally comprises 6 inches of sandy loam (USCS SC-SM, SM) overlying loamy sand, loam, and sandy loam (USCS CL-ML, SM, ML, SC-SM) to 60 inches. Depth to water in this soil type is typically 24 to 79 inches and the soil is assigned to hydrologic soil group A, which are soils that generally have high infiltration and water transmission rates. The risk of corrosion is rated as “moderate” for uncoated steel and “high” for concrete with typical effective cation-exchange capacity ranging from 5 to 20 meq/100g in the upper 6 inches and from 5 to 15 below 6 inches depth.

Based on our explorations, the native soils and bedrock materials identified in our explorations are generally similar to those described in the geologic and soil mapping. Locally these materials are overlain by fill soils.

SUBSURFACE CONDITIONS

Subsurface conditions interpreted from the explorations advanced at the site as part of our current study and the historical Dames & Moore report, in conjunction with soil properties inferred from field and laboratory tests, formed the basis for the conclusions and recommendations in this report. The locations and depths of our explorations were selected considering the site features, under the constraints of surface access, time, and budget.

We explored subsurface soil and groundwater conditions at the site on 22 and 23 of August 2024 by drilling two borings, B-1 and B-2, to respective depths of approximately 50 and 30 feet bgs, using the mud-rotary drilling method and advancing four CPT soundings (CPT-1 through CPT-4) to depths of approximately 10 to 30 feet bgs. Historical explorations performed at the site by Dames & Moore consisted of six borings advanced to depths of approximately 30 to 48 feet bgs. The current and historical exploration locations are shown on Figure 2.

Our field exploration procedures and exploration logs are in Appendix A. Laboratory soil testing procedures and results are in Appendix B. Excerpts from the historical report are presented in Appendix C.

The explorations indicate that subsurface stratigraphy varies significantly between the northern and southern halves of the site, with unique conditions in each area described as follows:

- **Northern Area:** The boring and CPT data from the northern half of the site shows several feet of fill or subsoil blanketing this area, which appears to be underlain in places by alluvium and residual soil composed of medium dense sandy silt and fat clay. Very dense, weathered sandstone begins at a depth of about 8 to 10 feet bgs and persists with depth in this area of the site.

  Atterberg limits testing performed on a sample of fat clay in the upper 4 feet showed a plasticity index of 75 and a liquid limit of 111, indicating a very high expansion potential. CPT data in this area of the site indicates that the fill, alluvium, and residual soil overlying bedrock is very soft and may be compressible under new loading.

  As discussed previously in this report, the northern portion of the site was previously developed with several structures which were presumably constructed on shallow foundations. We did not observe evidence of remnant foundations or building slabs remaining in place in this portion of the site.

- **Southern Area:** In the southern half of the site, and most notably towards the far southern end, data indicates the presence of about 25 to 30 feet of very soft to medium stiff alluvial deposits composed of silty clay, sandy clay, and silty sand (described as “silty loam” in historical logs). Historical exploration logs suggest the presence of buried tree logs at variable depths within this material, apparently evidenced by wood fragments retrieved from Standard Penetration Test (SPT) samples. At historical exploration Boring 5 and current exploration B-1, the thickness of this alluvial layer extends to depths of approximately 44 to 47 feet bgs, suggesting the presence of an ancient stream channel in this portion of the site. The 1962 Dames & Moore report postulates that the stream channel crosses the site in a roughly east-west orientation. The alluvial deposits are underlain by very dense weathered sandstone.

  Several structures associated with the former Weatherwax High School occupied this portion of the site historically. The 1962 Dames & Moore report prepared to support design and construction of an expansion to the high school recommended that the addition be supported on steel H-piles driven into the sandstone bedrock that underlies this area at depth. The recommended pile sizes were 8-inch 8BP36 piles and 12-inch 12BP74 piles. The original high

school structure was presumably supported on piles as well, likely timber. During our field exploration, we observed undulations in a grid-like pattern across the surface of the asphalt-paved parking lot. We assume that the high point of each undulation represents the presence of a remnant pile foundation, and that the space between each pile represents an area where the surrounding soil has experienced settlement over time.

Groundwater

Groundwater was identified in all recent and historical explorations except for B-2, which was located in the northern portion of the site (drilling method at this location was transitioned to mud-rotary before a groundwater depth could be identified). The depth and elevation of groundwater at each exploration is presented in Table 1.

Table 1. Groundwater Data

Exploration ID	Date	Depth to GW (feet, bgs)	GW Elevation (feet)[1]
B-1	8/22/2024	4.5	16
CPT-1	8/22/2024	5.0	21
CPT-2	8/22/2024	11.5	10
CPT-3	8/22/2024	6.5	10.5
CPT-4	8/22/2024	6.4	11
Boring 1	3/28/1962	3.5	16
Boring 2	3/30/1962	9	15
Boring 3	3/30/1962	9	16
Boring 4	3/30/1962	8.5	16
Boring 5	3/31/1962	9.5	13.5
Boring 6	3/31/1962	7	15

Note:
1) *Elevation is NAVD88 for borings and CPTs included in current exploration program; vertical datum for historical borings is unknown*

Seismic Basis of Design

SEISMIC SETTING

The site is in a seismically active area. In this section, we describe the seismic setting, identify the seismic basis of design, provide code-based design values, and discuss the seismic hazards at the site. Geologic hazards mapped near the project site are all related to seismicity and include tsunami inundation, very strong earthquake shaking, and a moderate to high liquefaction hazard (Washington Department of Natural Resources [WADNR], 2023).

Regional Seismicity

Western Washington sits at the contact between two large crustal tectonic plates. The Juan de Fuca Plate forms the floor of the Pacific Ocean off the coast of the northwestern United States and moves northeastward from its spreading ridge boundary with the Pacific Plate at an average rate of

approximately 1.5 inches per year. As it converges with the continental North American Plate, the Juan de Fuca Plate dips below (or "subducts") beneath the North American Plate forming a shallow, eastward-dipping contact interface. This boundary is known as the Cascadia Subduction Zone (CSZ) and is responsible for the seismicity in the western Washington regions, producing earthquakes associated with three types of source zones: subduction interface, subduction intraslab, and crustal. The CSZ is located offshore approximately 101 miles west of the site.

Subduction Interface Sources. The displacement caused by the subduction of the Juan de Fuca Plate below the North American Plate does not generally manifest as slip between the two plates; rather, it is absorbed by compression of the North American Plate at the interface at relatively shallow depths. This compression, based on geologic and historical evidence, is released every 300 to 600 years, on average, in the form of magnitude 8 to 9 or larger earthquakes, the last such event occurring in 1700. Characteristics of this type of earthquake may include very large ground accelerations, shaking durations in excess of 2 minutes, and particularly strong long-period ground motions that may affect tall or long-period structures.

Subduction Intraslab Sources. A deeper zone of seismicity is associated with a steeper bending of the Juan de Fuca Plate and the breaking of the plate under its own weight below the Pacific Northwest region. This region, termed the Benioff Zone, produces intraslab earthquakes at depths of 40 to 70 kilometers. Such past events in western Washington include the 1949 Puget Sound, 1965 Olympia, and 2001 Nisqually earthquakes. Deep, intraslab earthquakes tend to be felt over larger areas than shallower crustal events, and generally lack significant aftershocks.

Crustal Sources. Shallow crustal faults are caused by cracking of the continental crust, resulting from the stress that builds as the subduction zone plates remain locked together. Many small crustal faults are mapped near the site that are a part of the greater Cascadia Fold and Thrust Belt (U.S. Geologic Survey [USGS], 2024a). However, due to the size of these faults, their contribution to the site seismic hazard is relatively small.

Seismic Shaking and Site Class

We evaluated potential seismic shaking at the Site in accordance with the 2021 International Building Code (IBC; International Code Council, 2021) and the ASCE 7-16 Minimum Design Loads for Buildings and Other Structures (ASCE/Structural Engineering Institute, 2017), which considers the maximum considered earthquake to be seismic shaking having a 2 percent probability of exceedance in 50 years (approximately 2,475-year return period).

Thick sequences of unconsolidated, soft sediments typically amplify the shaking of long-period ground motions, such as those associated with subduction zone earthquakes, whereas areas underlain by shallow soil profiles are not likely to amplify seismic waves. The "Site Class" is a designation used by ASCE 7-16 to quantify ground motion amplification. The classification is based on the stiffness in the upper 100 feet (roughly 30 meters) of soil and bedrock materials at a site. We used site-specific data collected during our investigation to estimate the stiffness profile at this site.

Subsurface conditions are variable between the northern and southern halves of the site, and the two halves will have different responses to seismic shaking as a result. Further, we understand that proposed plans for the site may be limited to development of structures only in the northern half. Therefore, our analysis of site seismicity and seismic design values was performed by dividing the site into two areas.

We evaluated potential seismic shaking at the Site using data obtained from the U.S. Seismic Design Maps (USGS, 2024b):

- **Northern Area:** The northern half of the site is underlain by shallow weathered sandstone, contributing to a very dense overall soil profile within the upper 100 feet bgs. Based on the N-value approach for determination of site class, conditions in this area are consistent with Site Class C, as defined in ASCE 7-16. The design peak ground acceleration (PGA_M) with a 2 percent probability of exceedance in 50 years (2,475-year return period) is 0.96 g in this area of the site. For IBC-specified motions, the "mean source" should be used for determining design shaking at the Site at all potential periods of interest (0.0 to 2.0). This is a magnitude 8.59 earthquake with an epicenter approximately 34 kilometers from the Site.
- **Southern Area:** The southern half of the site features a softer soil profile compared to the northern half, consisting of dozens of feet of very soft to medium stiff fine-grained soils overlying weathered bedrock at depth. Based on the N-value approach for determination of site class, conditions in this area are consisted with Site Class E, as defined in ASCE 7-16. However, the fine-grained soils in this area may experience liquefaction or cyclic softening under design-level seismic shaking, which requires a designation of Site Class F. Per ASCE 41-17, a Site Class F designation requires a site-specific analysis including a seismic hazard analysis and a site response analysis; however, buildings in the southern area with structural periods of less than 0.5 seconds may be designed using seismic parameters developed considering Site Class E conditions.

  The design seismic values for the southern portion of the site include a PGA_M of 1.16 g, and a design earthquake magnitude of 8.76 earthquake coupled with an epicenter approximately 33 kilometers from the Site.

Preliminary Spectral Design Parameters

Acceleration response spectra for use in preliminary design have been developed following the procedures in ASCE 7-16 with associated design values provided in Table 2.

Table 2. Seismic Design Parameters		
Parameter	**Value**	
Site Area	Northern	Southern
Site Class	C	E (Note 1, 2)
Spectral Response Acceleration at Short Periods (S_s)	1.519	
Spectral Response Acceleration at 1-Second Period (S_1)	0.693	
Peak Ground Acceleration (PGA)	0.717	
Site Coefficient for Short Periods (F_a)	1.2	1.2 (Note 2)
Site Coefficient for 1-Second Period (F_v)	1.4	3.0 (Note 2)
Site Coefficient for PGA (F_{PGA})	1.2	1.1
Spectral Response Acceleration for Short Period, S_{DS}	1.215	1.215 (Note 1, 2)
Spectral Response Acceleration for 1-second period, S_{D1}	0.646	1.386 (Note 1, 2)
PGA Adjusted for Site Amplification, PGA_M	0.86	0.79

Note:

1) *Buildings with structural periods exceeding 0.5 seconds bearing on liquefiable soil conditions may not use the SD_s and SD_1 presented for Site Class E and a seismic site response analysis must be performed.*
2) *Use of values in this table for Site Class E requires adherence to ASCE 7-16 Supplement 3, Section 11.4.8, Exception to Note 2, which states that design must be performed as follows:*
   a) *Use the equivalent lateral force procedure with a value of Cs determined by Eq. (12.8-2) for all values of Ts, **or***
   b) *Determine the value of Sai by Eq. (15.7-7) for all values of Ti using values in the table above. **NOTE:** We have increased the value of Fv provided in the table above by a factor of 1.5. No additional factoring of 1.5 to S_{D1} is necessary to comply with this approach.*

Seismic Hazards

LIQUEFACTION

General

When cyclic loading occurs during an earthquake, the shaking can increase the pore pressure in loose to medium dense saturated sand and cause liquefaction. The rapid increase in pore water pressure reduces the effective normal stress between soil particles, resulting in the sudden loss of shear strength in the soil. Granular soils, which rely on interparticle friction for strength, are susceptible to liquefaction until the excess pore pressures can dissipate. Sand boils and flows observed at the ground surface after an earthquake are the result of excess pore pressures dissipating upward, carrying soil particles with the draining water. In general, loose, saturated sand soils with low silt and clay contents are the most susceptible to liquefaction. Silty soils with low plasticity are moderately susceptible to liquefaction under relatively higher levels of ground shaking. For any soil type, the soil must be saturated for liquefaction to occur.

We performed liquefaction potential analysis on soils logged at the site using the procedures outlined in Idriss and Boulanger (2008) and updated Magnitude Scaling Factor as outlined in Boulanger and Idriss (2014).

We note the term liquefaction is defined very specifically by the simplified method that we used to evaluate the liquefaction hazard. Liquefaction is defined as when a soil under repeated cyclic loading exhibits the generation of increasing excess pore pressures until the pore pressure equals the total overburden stress. When this condition is reached, the normal stress acting between adjacent soil particles is effectively lost, and the soil, which derives its shear strength from interparticle friction, can lose much of its available shear strength. However, it is well documented that not all soils exhibit the same behavior after the initiation of liquefaction.

Loose sandy soils that achieve the condition of liquefaction during earthquake shaking can subsequently collapse and exhibit large shear strains under continued cyclic or static loading. This type of behavior is a well-documented result of numerous earthquakes, where structures underlain by shallow, liquefiable hydraulically placed fills have been observed to experience bearing capacity failures and collapse. Conversely, medium dense to dense sandy soils that achieve the condition of liquefaction will typically not collapse and can exhibit strain hardening behavior due to dilation effects. Therefore, despite the soil achieving the condition of liquefaction, there is little to no shear strength loss and only moderate shear strains under continued cyclic and static loading. This condition is termed “cyclic mobility.”

Analysis

For analyses in the southern half of the site, we used the site class adjusted acceleration coefficient PGA_M of 1.16 g for Site Class E, in combination with a design magnitude of 8.76. Saturated soils overlying the bedrock in this area include very loose to loose silty sands and very soft to medium stiff silts and clays. The probability and expected severity of liquefaction is expected to increase with proximity to the southern site boundary, with relatively low liquefaction hazard in more northern areas and very high hazard of liquefaction or cyclic softening to the south.

Our analyses indicate that seismic-induced vertical settlements of up to 3 feet are possible in the most vulnerable areas, assuming that the low plasticity silt layers encountered in this area are susceptible to liquefaction and sand-like settlement. Disregarding liquefaction-induced settlements from silt layers and considering contributions only from sand layers, settlements of up to 8 inches are still predicted where soil conditions are especially poor in this half of the site. Liquefaction is generally expected to occur beginning near the ground surface where soils first become saturated, with the liquefiable condition extending downward throughout all soils above the bedrock. Based on these findings, our analyses conclude that potential for liquefaction (and secondary effects including seismic-induced settlement and surface effects) to occur in the southern portion of the site is high. However, due to the presence of relatively flat terrain in the southern portion of the site, the likelihood of lateral spreading occurring in this area is considered low.

For the northern portion of the site, liquefaction hazard is very low, due to the presence of shallow, non-liquefiable fine-grained soils and relatively shallow bedrock in this area.

Surface Effects

We evaluated the potential for liquefaction-related surface manifestations (such as sand boils) to occur using the procedures presented by Ishihara (1985). The Ishihara procedure compares the thickness of a given liquefiable soil layer to the thickness of the overlying non-liquefiable soil mantle to determine if surface manifestations are possible at a given peak ground acceleration. This approach has several limitations and may overestimate potential for surface manifestations to occur in silty sands and sandy silts, as the relatively low permeability of these materials has potential to prevent pore water from flowing quickly enough to produce sand boils (Kramer, 1996). Also, the Ishihara procedure was designed for analysis of liquefiable soils with SPT N-values of 10 or less, and application to liquefiable layers with higher N-values may produce conservative results.

We conclude the potential for surface manifestations of liquefaction in the southern portion of the site is high, due to the presence of several tens of feet of liquefiable soils overlain by a relatively thin crust of non-liquefiable soil. Due to the low potential for liquefaction hazard in the northern portion of the site, the potential for surface effects in this region is similarly low.

Seismic Strength Loss

Some strength loss due to cyclic shear stresses are expected to occur in the silty soils present in the southern half of the site, in instances where these soils do not experience outright liquefaction. Full cyclic softening and development of lowered residual strengths within these materials are likely to occur. Supplemental exploration including performance of cyclic direct simple shear testing would be required to accurately estimate residual strength ratios for these soils.

Based on currently available information, we conclude that the potential for cyclic softening to occur in both the northern and southern portions of the site is high.

FAULT SURFACE RUPTURE

We used the USGS U.S. Quaternary faults web application (USGS, 2024a) to identify earthquake-producing faults near the project site. No mapped earthquake-producing crustal faults are present at the site. The closest mapped fault is a strand of the Cascadia Fold and Fault Belt located more than 12 miles to the west of the site. The USGS has mapped the “Cascadia Megathrust” portion of the Cascadia Subduction Zone approximately 101 miles west of the site.

Based on known fault locations, we consider the potential for fault rupture to occur at the site to be low unless occurring on an unmapped or otherwise unknown fault.

TSUNAMI HAZARD

The tsunami hazard at the site is mapped in the *Tsunami Hazard Maps of Southwest Washington - Model Results from a ~2,500-Year Cascadia Subduction Zone Earthquake Scenario* by the WADNR (Eungard et al., 2018). Based on this reference, the southern half of the site is located within an area

expected to be inundated from a CSZ-induced tsunami, with an expected inundation depth in excess of 6 feet. Similarly, tsunami wave simulation for Grays Harbor, Washington, performed by WADNR shows that the site will be inundated by 5 to 10 feet in the event of a hypothetical magnitude 9.0 earthquake on the CSZ (WADNR, 2020).

The ASCE Tsunami Hazard Tool (https://asce7tsunami.online/) maps probabilistic inundation hazards for all potential tsunami sources, not just a CSZ-related event. The proposed school relocation site is not within a tsunami-inundation zone according to this source (ASCE, 2022).

Based on the findings presented by Washington DNR, we consider the potential for tsunami inundation to occur in the southern half of the site to be high, whereas inundation in the northern half is expected to be low to moderate.

Conclusions

Based on our explorations, testing, and analyses, we have formulated preliminary conclusions in this report for use in assessment of the school relocation project's viability. We offer the following general summary.

DEVELOPMENT OF NORTHERN HALF OF SITE

The northern half of the site generally possesses geologically favorable conditions and development of this portion of the site is geotechnically feasible. Conditions in this portion of the site are summarized as follows:

- Subsurface conditions in the northern portion of the site include about 2 feet of subsoil overlying about 6 feet of very soft alluvium and residual soil, with bedrock found at 8 to 10 feet bgs.
- The alluvium and residual soil include fat clay with very high expansion potential; the potential for expansive soils to affect proposed site improvements in the northern area is high and should be accounted for in foundation design.
- The CPT data in this area of the site indicates that the soils overlying the bedrock may be compressible.
- Groundwater in the northern portion of the site was encountered at relatively shallow depths and appears to be perched above bedrock. New structures in the northern portion of the site may require use of underdrains to facilitate conveyance of water away from the building subgrade. Additionally, the building slab will require use of a robust vapor barrier system to reduce moisture transmission through the floor slab.
- Weathered sandstone bedrock is present at shallow depths below the residual soil.
- Potential for liquefaction in this portion of the site is generally low.
- The fine-grained soils overlying bedrock may be subject to cyclic softening under severe seismic shaking.

- Due to the conflicting mapping and nearby inundation predictions, we recommend the tsunami hazard be evaluated by a tsunami specialist.

Structures in the northern portion of the site may feasibly be supported by shallow foundations, such as spread footings or mat foundations, where competent residual soil and weathered bedrock conditions are present within the upper 5 to 10 feet bgs. However, the existing subgrade soils within the typical bearing zone for spread footings (the upper 1 to 2 feet bgs) appear to be very soft and compressible based on our subsurface data. Foundations supported directly on this material will have a very low bearing capacity. Spread footings will require subgrade mitigation, achieved by one of the following two means:

1. Overexcavating 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 geopiers or stone columns under each footing to locally improve bearing capacity.

Additionally, some measure of overexcavation and recompaction or ground improvement may be required underneath the building's slabs-on-grade to mitigate potential settlement under seismic and potentially static conditions.

Final design of geotechnical elements may require additional site characterization to better delineate subsurface conditions around proposed structures. This may include performing additional shallow borings throughout the proposed school footprint to better define depth to suitable bearing soils throughout this area, to better assess the potential of expansion and compression of near-surface soils, and to collect additional data for design of potential ground improvements.

DEVELOPMENT OF SOUTHERN HALF OF SITE

The southern half of the site is defined by relatively poor geotechnical conditions, though development of this area of the site is geotechnically feasible. Conditions in this portion of the site are summarized as follows:

- Subsurface conditions in the southern portion of the site include soft, compressible soils overlying bedrock typically at depths in excess of 25 feet bgs, though locally up to nearly 50 feet bgs.
- Shallow groundwater conditions are present throughout the entirety of this portion of the site.
- This area of the site has high potential for seismic hazards, including the potential for strong seismic shaking, liquefaction-induced settlements potentially on the order of several feet, and loss of soil strength and bearing capacity.
- New structures in this area of the site would require support by deep foundations to carry building loads through the relatively thick deposits of compressible soils down to bedrock.

- The presence of abandoned pile foundations throughout much of this portion of the site could make design and construction of new pile-supported buildings challenging.
- This portion of the site is located within a tsunami inundation zone.

Structures in the southern half of the site would require support by deep foundations (e.g., driven or augercast piles) to transmit building loads through the thick deposits of compressible and liquefiable soils and into bedrock. Pile foundations would likely need to extend 10 to 20 feet into bedrock materials.

Conceptually, structures could be supported on shallow foundations bearing over a zone of ground improvement (e.g., soil mixing). However, this approach is typically more expensive than the deep foundation elements mention above; and would be complicated by the presence of existing abandoned remnant pile foundations in this portion of the site, as installation of most ground improvement methods would likely require extraction of remnant piles prior to initiation of ground improvement work. While remnant piles could feasibly remain in place and accommodate construction of new pile-supported buildings in this area, there would remain a very high potential for encountering unidentified subsurface obstructions and incurring construction change orders and delays.

Final design of geotechnical elements in this area may require additional site characterization to verify subsurface conditions around the school building. The additional site characterization should include a geophysical survey to attempt to locate remnant pile foundations throughout the site; however, while geophysical methods may be successful at identifying remnant steel pile foundations, the ability to locate timber foundations (if present) may be limited. Test pit explorations in areas where remnant pile foundations are thought to be present may be recommended to improve design of new deep foundations and reduce potential for challenges and delays during construction.

Closing

Thank you for the opportunity to perform these services for you. Please do not hesitate to contact us if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH, INC.



Daniel J. Trisler, P.E.
Principal Geotechnical Engineer

Micah D. Hintz, P.E.
Geotechnical Engineer

HALEY ALDRICH

Attachments:

References
Figure 1 - Project Locus
Figure 2 - Site and Exploration Plan
Appendix A - Exploration Logs
Appendix B - Laboratory Test Results
Appendix C - Historical Plans and Geotechnical Logs

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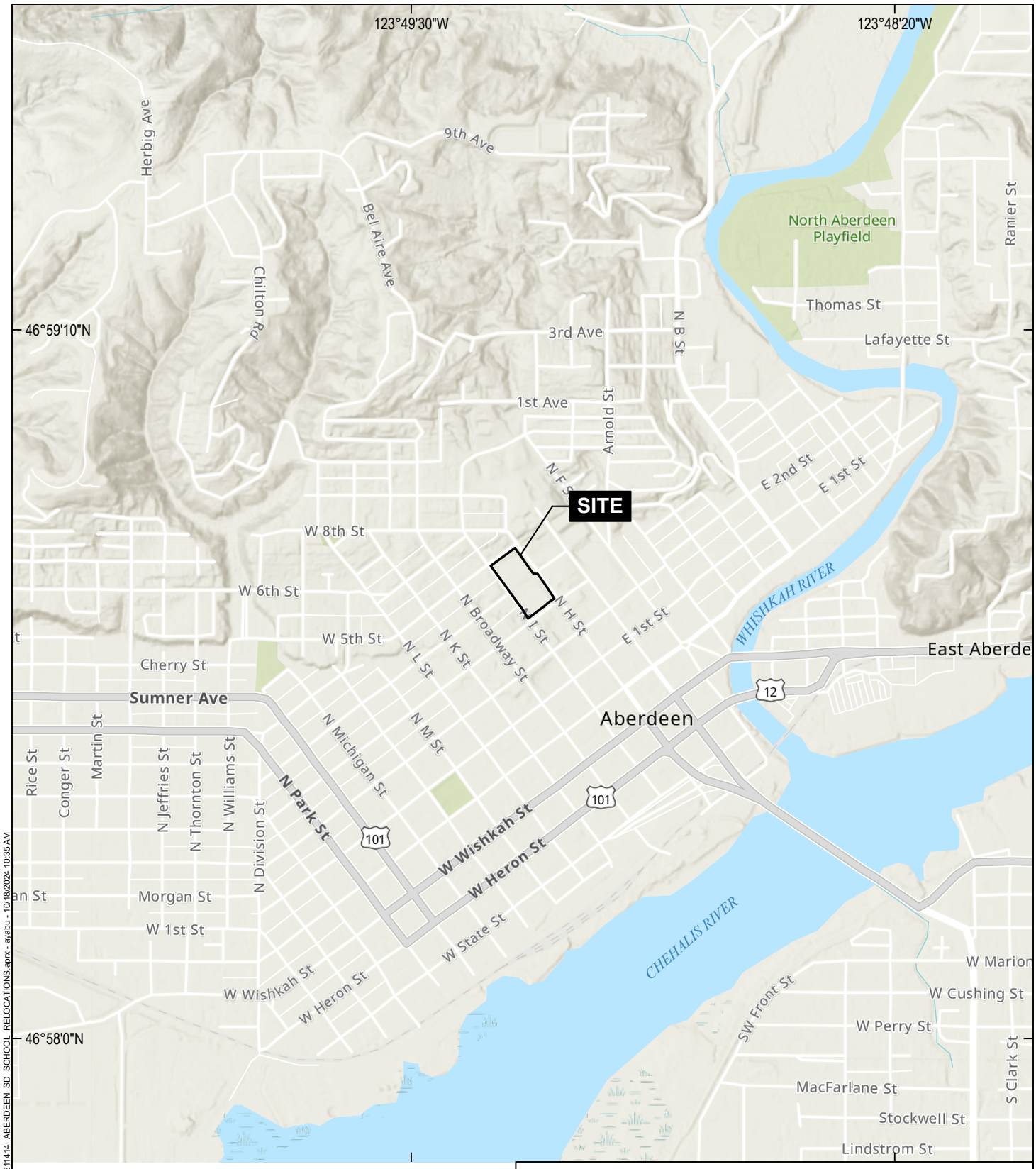
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FIGURES



MAP SOURCE: ESRI
SITE COORDINATES: 46°58'45"N, 123°49'14"W

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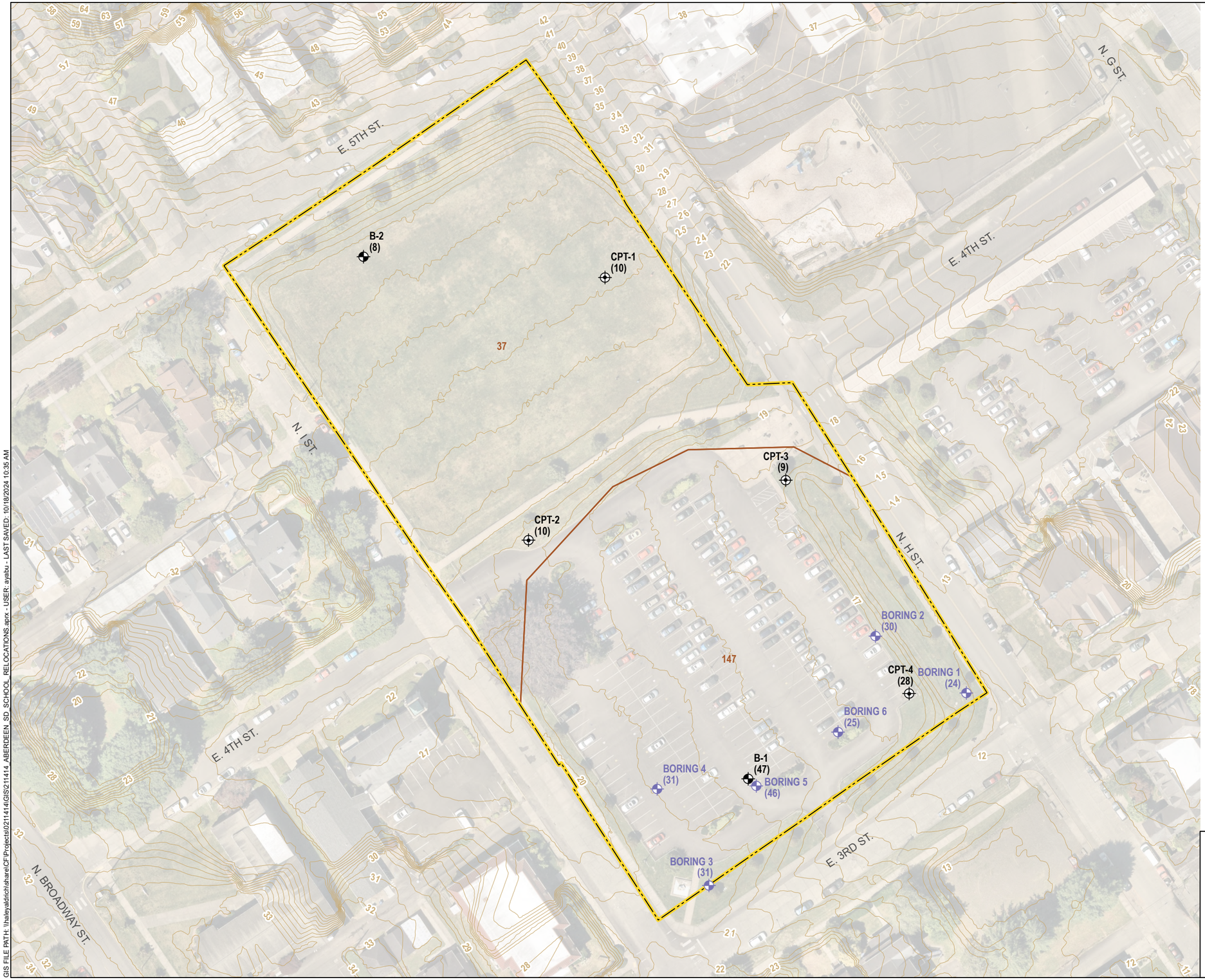
ABERDEEN SCHOOL DISTRICT
SCHOOL RELOCATION SITE 1
ABERDEEN, WASHINGTON

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
OCTOBER 2024

FIGURE 1

GIS: \\haleyaldrich\share\CF\Projects\0211414\GIS\211414_ABERDEEN_SD_SCHOOL_RELOCATIONS.aprx - ayabu - 10/18/2024 10:35 AM



LEGEND

- MUD ROTARY BORING (ESTIMATED DEPTH TO FOUNDATION BEARING LAYER, IN FEET)
- CONE PENETRATION TEST (CPT) (ESTIMATED DEPTH TO FOUNDATION BEARING LAYER, IN FEET)
- HISTORICAL BORING (DAMES & MOORE 1962) (ESTIMATED DEPTH TO FOUNDATION BEARING LAYER, IN FEET)
- TOPOGRAPHIC ELEVATION CONTOUR, 1-FT INTERVAL (NAVD 88)
- 37 SOIL MAP UNIT BOUNDARY
- SITE BOUNDARY

MAP UNIT	DESCRIPTION
37	ELOCHOMAN SILT LOAM, 8 TO 30 PERCENT SLOPES
147	UDORTHENTS, LEVEL

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. NAVD 88 = NORTH AMERICAN VERTICAL DATUM OF 1988
3. TOPOGRAPHIC ELEVATION CONTOUR SOURCE: WASHINGTON STATE DEPARMENT OF NATURAL RESOURCES (WADNR), WASHINGTON LIDAR PORTAL, 2019.
4. SOIL MAP UNIT SOURCE: UNITED STATES DEPARTMENT OF AGRICULTURE (USDA) NATURAL RESOURCES CONSERVATION SERVICE (NRCS) WEB SOIL SURVEY
5. AERIAL IMAGERY SOURCE: NEARMAP, 10 JUNE 2024

N

0 80 160
SCALE IN FEET

HALEY ALDRICH

ABERDEEN SCHOOL DISTRICT
SCHOOL RELOCATION SITE 1
ABERDEEN, WASHINGTON

SITE AND EXPLORATION PLAN

OCTOBER 2024

FIGURE 2

GIS FILE PATH: \\haleyaldrich\share\CF\Projects\0211414\GIS\211414_ABERDEEN_SD_SCHOOL_RELOCATIONS.aprx - USER: ayabu - LAST SAVED: 10/18/2024 10:35 AM

APPENDIX A
Exploration Logs

APPENDIX A

Exploration Logs

We evaluated subsurface conditions at the site by completing two drilled borings and four cone penetration tests (CPTs) on 22 and 23 August 2024. The field explorations were coordinated and overseen by geotechnical staff from Haley & Aldrich, Inc., who classified the various soil units encountered, obtained representative soil samples for geotechnical testing, and maintained a detailed log of the borings. Exploration logs are included in this appendix. Figure 2 of the report shows the approximate locations of the explorations. Explorations were located in the field using landmarks on site. Results of the laboratory testing are indicated on the exploration logs and are included in Appendix B. Explorations were performed via the following methods:

- **Borings:** Borings were advanced using mud rotary methods using an ATV-mounted CME-550X drill rig operated by Western States Soil Conservation, Inc., of Hubbard, Oregon. The boring created a hole approximately 5 inches in diameter.
- **CPTs:** CPT soundings were advanced using a truck-mounted CPT rig operated by ConeTec.

Materials encountered in the explorations were classified in the field in general accordance with ASTM International (ASTM) Standard Practice D 2488 "Standard Practice for the Classification of Soils (Visual-Manual Procedure)." The exploration logs in this appendix show our interpretation of the exploration, sampling, and testing data. The logs indicate the depth where the soils change. Note that the change may be gradual. In the field, we classified the samples taken from the explorations according to the methods presented on the *Figure A-1, Key to Exploration Logs*. This figure also provides a legend explaining the symbols and abbreviations used in the logs.

Sampling of soils was completed at regular intervals throughout the depth of each boring. The samples were collected with a Standard Penetration Test sampler used in general conformance with ASTM Test Method D 1586 "Standard Method for Penetration Test and Split-Barrel Sampling of Soils." The sampler was driven by a 140-pound auto-trip hammer falling 30 inches. The *N* value, or number of blows required to drive the sampler 1 foot, or as otherwise indicated into the soils, is shown adjacent to the sample symbols on the boring logs. Disturbed samples were obtained from the SPT sampler. A piston sampler was used to collect relatively undisturbed Shelby tube samples. Samples were used for classification and laboratory testing purposes.

In general, the CPT soundings were completed in general accordance with ASTM D5778 using a seismic electronic cone penetrometer. The CPT soundings are an *in situ* test that provides assistance in characterizing subsurface stratigraphy. The test includes advancing a 38.1-millimeter-diameter cone equipped with a load cell, friction sleeve, strain gauge, porous plastic filter, and geophone through the soil profile. The cone is advanced at a rate of approximately 2 centimeters per second. Tip resistance, sleeve friction, and pore pressure are typically recorded at 2.5-centimeter intervals.

A detailed description of the CPT sounding procedure is included in ConeTec's report which is presented in this appendix.

Sample Description

Identification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. ASTM D 2488 visual-manual identification methods were used as a guide. Where laboratory testing confirmed visual-manual identifications, then ASTM D 2487 was used to classify the soils.

Relative Density/Consistency

Soil density/consistency in borings is related primarily to the standard penetration resistance (N). Soil density/consistency in test pits and probes is estimated based on visual observation and is presented parenthetically on the logs.

SAND or GRAVEL Relative Density	N (Blows/Foot)	SILT or CLAY Consistency	N (Blows/Foot)
Very loose	0 to 4	Very soft	0 to 1
Loose	5 to 10	Soft	2 to 4
Medium dense	11 to 30	Medium stiff	5 to 8
Dense	31 to 50	Stiff	9 to 15
Very dense	>50	Very stiff	16 to 30
		Hard	>30

Moisture

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

USCS Soil Classification Chart (ASTM D 2487)

Major Divisions			Symbols: Graph	Symbols: USCS	Typical Descriptions
Coarse Grained Soils — More than 50% of Material Retained on No. 200 Sieve	Gravel and Gravelly Soils — More than 50% of Coarse Fraction Retained on No. 4 Sieve	Clean Gravels (<5% fines)		GW	Well-Graded Gravel; Well-Graded Gravel with Sand
				GP	Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Gravels (5-12% fines)		GW-GM	Well-Graded Gravel with Silt; Well-Graded Gravel with Silt and Sand
				GW-GC	Well-Graded Gravel with Clay; Well-Graded Gravel with Clay and Sand
				GP-GM	Poorly Graded Gravel with Silt; Poorly Graded Gravel with Silt and Sand
				GP-GC	Poorly Graded Gravel with Clay; Poorly Graded Gravel with Clay and Sand
		Gravels with Fines (>12% fines)		GM	Silty Gravel; Silty Gravel with Sand
				GC	Clayey Gravel; Clayey Gravel with Sand
	Sand and Sandy Soils — More than 50% of Coarse Fraction Passing No. 4 Sieve	Sands with few Fines (<5% fines)		SW	Well-Graded Sand; Well-Graded Sand with Gravel
				SP	Poorly Graded Sand; Poorly Graded Sand with Gravel
		Sands (5-12% fines)		SW-SM	Well-Graded Sand with Silt Well-Graded Sand with Silt and Gravel
				SW-SC	Well-Graded Sand with Clay; Well-Graded Sand with Clay and Gravel
				SP-SM	Poorly Graded Sand with Silt; Poorly Graded Sand with Silt and Gravel
				SP-SC	Poorly Graded Sand with Clay; Poorly Graded Sand with Clay and Gravel
		Sands with Fines (>12% fines)		SM	Silty Sand; Silty Sand with Gravel
				SC	Clayey Sand; Clayey Sand with Gravel
Fine Grained Soils — More than 50% of Material Passing No. 200 Sieve	Silts			ML	Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
				MH	Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
	Silty Clay (based on Atterberg Limits)			CL-ML	Silty Clay; Silty Clay with Sand or Gravel; Gravelly or Sandy Silty Clay
	Clays			CL	Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
				CH	Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
	Organics			OL/OH	Organic Soil; Organic Soil with Sand or Gravel; Sandy or Gravelly Organic Soil
Highly Organic (>50% organic material)				PT	Peat - Decomposing Vegetation - Fibrous to Amorphous Texture

Minor Constituents

	Estimated Percentage
Sand, Gravel	
Trace	<5
Few	5 - 15
Cobbles, Boulders	
Trace	<5
Few	5 - 10
Little	15 - 25
Some	30 - 45

Soil Test Symbols

%F	Percent Passing No. 200 Sieve
AL	Atterberg Limits (%)
	Liquid Limit (LL)
	Water Content (WC)
	Plastic Limit (PL)
CA	Chemical Analysis
CAUC	Consolidated Anisotropic Undrained Compression
CAUE	Consolidated Anisotropic Undrained Extension
CBR	California Bearing Ratio
CIDC	Consolidated Drained Isotropic Triaxial Compression
CIUC	Consolidated Isotropic Undrained Compression
CK0DC	Consolidated Drained k0 Triaxial Compression
CK0DSS	Consolidated k0 Undrained Direct Simple Shear
CK0UC	Consolidated k0 Undrained Compression
CK0UE	Consolidated k0 Undrained Extension
CRSCN	Constant Rate of Strain Consolidation
DS	Direct Shear
DSS	Direct Simple Shear
DT	In Situ Density
GS	Grain Size Classification
HYD	Hydrometer
ILCN	Incremental Load Consolidation
K0CN	k0 Consolidation
kc	Constant Head Permeability
kf	Falling Head Permeability
MD	Moisture Density Relationship
OC	Organic Content
OT	Tests by Others
P	Pressuremeter
PID	Photoionization Detector Reading
PP	Pocket Penetrometer
SG	Specific Gravity
TRS	Torsional Ring Shear
TV	Torvane
UC	Unconfined Compression
UUC	Unconsolidated Undrained Triaxial Compression
VS	Vane Shear
WC	Water Content (%)

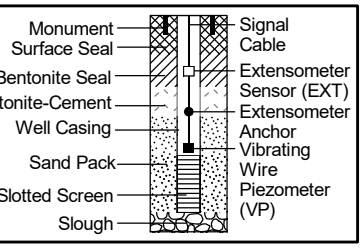
Groundwater Indicators

- Groundwater Level on Date or At Time of Drilling (ATD)
- Groundwater Level on Date Measured in Piezometer
- Groundwater Seepage (Test Pits)

Sample Symbols

- 1.5" I.D. Split Spoon
- 3.0" I.D. Split Spoon
- Modified California Sampler
- Rock Core Run
- Sonic Core
- Thin-walled Sampler
- Grab
- Cuttings
- Push Probe

Well Symbols



HALEY ALDRICH

Project: Aberdeen School District - Relocation Site 1
Location: Aberdeen, Washington
Project No.: 0211414-000

Key to Exploration Logs

Figure **A-1**
Sheet **1 of 1**

HA KEY TO EXP LOGS SOIL ONLY - \\HALEYALDRICH.COM\SHARES\EA_DATA\GINT\HC_LIBRARY\GLB - 10/31/24 08:23 - \\HALEYALDRICH.COM\SHARES\CFPROJECTS\0211414\PERMANENT\GINT FILES\0211414-000_ABERDEEN SD RELOCATION SITE 1_GINT.GPJ - khuttel

Date Started: 08/22/2024	Date Completed: 08/22/2024	Drilling Contractor/Crew: Western States Soil Conservation, Inc. / Shane	
Logged by: D. Knapp	Checked by: M. Hintz	Drilling Method: Mud Rotary	
Location: Lat: 46.978527 Long: -123.820013 (WGS 84)		Rig Model/Type: CME-550X Rubber Tire / ATV-mounted Drill	
Ground Surface Elevation: 19.66 feet (NAVD 88)		Hammer Type: Auto-hammer	
Comments: Hand augered to 5 ft.		Hammer Weight (pounds): 140	Hammer Drop Height (inches): 30
		Measured Hammer Efficiency (%): 86.8	
		Hole Diameter: 5 inches	Well Casing Diameter: NA
		Total Depth: 50.2 feet	Depth to Groundwater: 4.5 feet

Elevation (feet)	Depth (feet)	Sample Data: Blow Count	Type	Recovery	Length (inches)	Number / Tests	Graphic Log	Material Description	Water Level	PL WC (%) LL; Fines Content (%); SPT N Value	Depth (feet)
15	0					G-1 AL		Asphalt concrete (3-inches thick). Base aggregate (4-inches thick). POORLY GRADED SAND WITH SILT (SP-SM), loose, wet, gray, fine to coarse sand and fine gravel. [FILL] layer of filter fabric at 3 ft, concrete debris from 3 to 5 ft			0
10	5	4 3 2		1in.	18	S-2 GS, WC		abandoned pipe at 4.5 ft SILTY SAND (SM), loose, wet, red-brown, fine to medium sand. (loss of drilling mud circulation at 6 ft)	ATD	8 5	5
5	10	1 0 1		12in.	18	S-3 PP, TV		SANDY SILT WITH GRAVEL (ML), very soft, wet, brown, fine to coarse subrounded to subangular sand and gravel, low to medium plasticity, chaotic texture, no layering. (PP = 0.5 tsf, TV = 0.1 tsf) gravel and wood debris in cuttings		1	10
0	15	1 1 1		1in.	18	S-4 WC		SANDY SILT WITH GRAVEL (ML), very soft, wet, brown, low to medium plasticity, layer of silty wood debris (1-inch thick), low recovery. [ALLUVIUM] wood debris in cuttings		2 61.3	15
-5	20	0 0 1		0in.	18	S-5		no recovery less wood debris in cuttings		1	20
-10	25	0 0 0		18in.	18	S-6 PP, TV		SILT (ML), trace fine sand, very soft, wet, gray, micaceous, scattered to numerous organics (black wood debris, rootlets). (PP = 0.25 tsf, TV = 0.15 tsf)		0	25
-15	30	0 0 0		2in.	18	S-7 WC				0 97.3	30
-20	35	1 1 2		15in.	18	S-8b PP, TV S-8a GS, WC		(PP = 0.75 tsf, TV = 0.15 tsf) SILTY SAND (SM), very loose, wet, gray to brown, fine to medium sand, stratified with frequent alternating layers of sandy silt/silty sand/wood debris, micaceous.		3 47 106.1	35

General Notes:
1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
5. Location and ground surface elevations are approximate.

HALEY ALDRICH

Project: Aberdeen School District - Relocation Site 1
Location: Aberdeen, Washington
Project No.: 0211414-000

Boring Log
B-1

Figure **A-2**
Sheet **1 of 2**

HA BORING LOG - \\HALEYALDRICH.COM\SHARE\SEA_DATA\GINT\HC_LIBRARY.GLB - 10/31/24 08:24 - \\HALEYALDRICH.COM\SHARE\SEA_PROJECTS\0211414\PERMANENT\GINT FILES\0211414-000_ABERDEEN SD RELOCATION SITE 1_GINT.GPJ - kbubel

Date Started: 08/22/2024	Date Completed: 08/22/2024	Drilling Contractor/Crew: Western States Soil Conservation, Inc. / Shane	
Logged by: D. Knapp	Checked by: M. Hintz	Drilling Method: Mud Rotary	
Location: Lat: 46.978527 Long: -123.820013 (WGS 84)		Rig Model/Type: CME-550X Rubber Tire / ATV-mounted Drill	
Ground Surface Elevation: 19.66 feet (NAVD 88)		Hammer Type: Auto-hammer	
Comments: Hand augered to 5 ft.		Hammer Weight (pounds): 140	Hammer Drop Height (inches): 30
		Measured Hammer Efficiency (%): 86.8	
		Hole Diameter: 5 inches	Well Casing Diameter: NA
		Total Depth: 50.2 feet	Depth to Groundwater: 4.5 feet

Elevation (feet)	Depth (feet)	Sample Data: Blow Count	Type	Recovery	Length (inches)	Number / Tests	Graphic Log	Material Description	Water Level	PL WC (%) LL; Fines Content (%); SPT N Value	Depth (feet)
40	40	1 1 1		18in.	18	S-9 WC		SILTY SAND (SM), very loose, wet, gray to brown, fine to medium sand, stratified with frequent alternating layers of sandy silt/silty sand/wood debris, micaceous. *(continued)*		2; 102.4	40
-25	45	3 1 18		0in.	18	S-10		no recovery, piece of wood in sampler tip		19	45
-30	50	50		2.5in.	3	S-11 WC		SILTY SAND (SM), very dense, moist, light gray, fine to medium subrounded to rounded sand, moderate cementation. [WEATHERED SANDSTONE]		50/2.5"	50
-35	55							Bottom of Borehole at 50.2 feet.			55
-40	60										60
-45	65										65
-50	70										70
-55	75										75
-60											

General Notes:
1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
5. Location and ground surface elevations are approximate.

HALEY ALDRICH

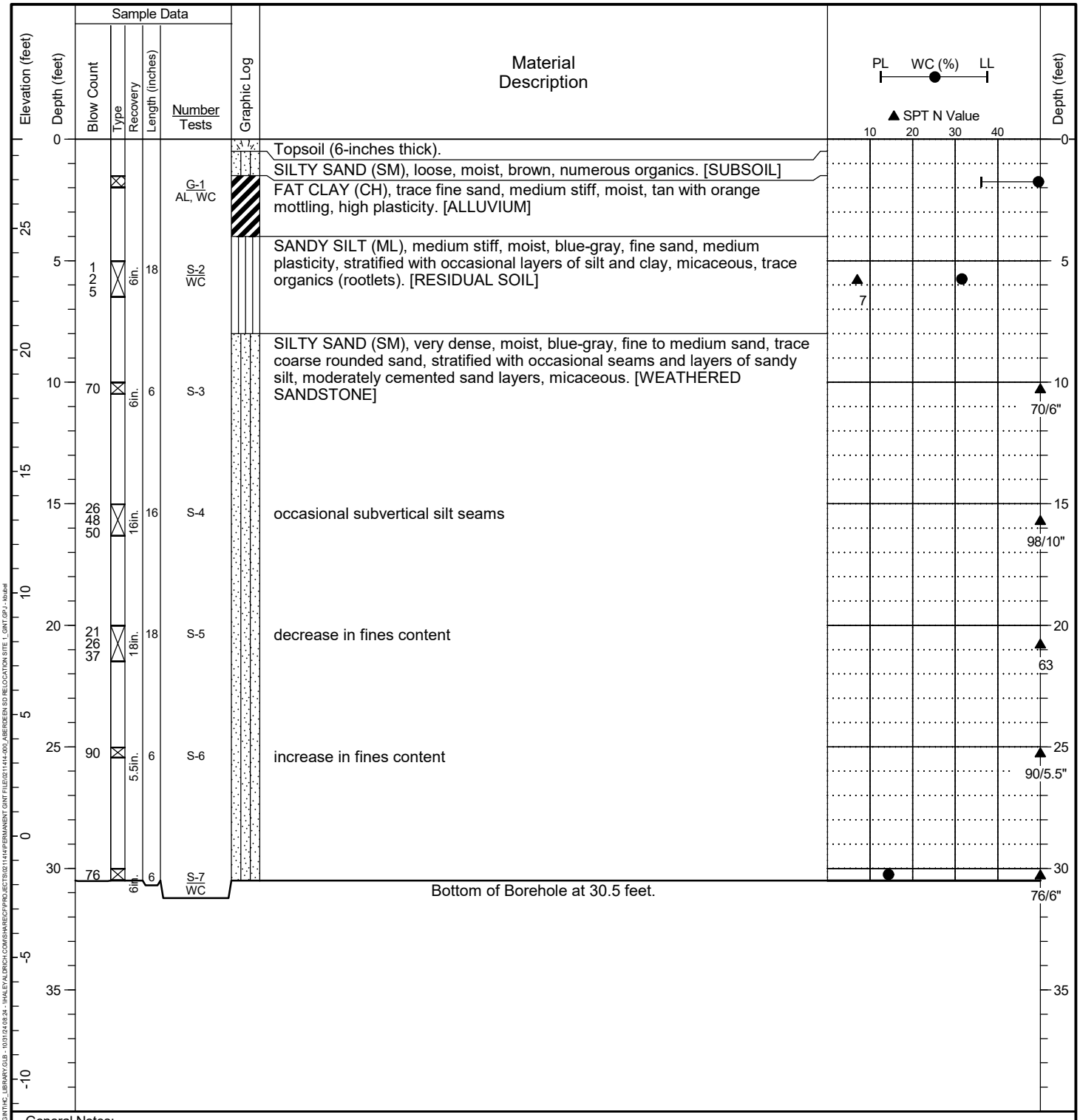
Project: Aberdeen School District - Relocation Site 1
Location: Aberdeen, Washington
Project No.: 0211414-000

Boring Log
B-1

Figure **A-2**
Sheet **2 of 2**

HA BORING LOG - \\HALEYALDRICH.COM\SHARES\EA_DATA\GINTHC_LIBRARY.GLB - 10/31/24 08:24 - \\HALEYALDRICH.COM\SHARES\CP\PROJECTS\0211414\PERMANENT.GINT FILES\0211414-000_ABERDEEN SD RELOCATION SITE 1..GINT (GP) - kbutler

Date Started: 08/23/2024	Date Completed: 08/23/2024	Drilling Contractor/Crew: Western States Soil Conservation, Inc. / Shane/Dave/Kyle	
Logged by: D. Knapp	Checked by: M. Hintz	Drilling Method: Mud Rotary	
Location: Lat: 46.979664 Long: -123.821349 (WGS 84)		Rig Model/Type: CME-550X Rubber Tire / ATV-mounted Drill	
Ground Surface Elevation: 28.67 feet (NAVD 88)		Hammer Type: Auto-hammer	
Comments: Hand augered to 1.5 ft.		Hammer Weight (pounds): 140	Hammer Drop Height (inches): 30
		Measured Hammer Efficiency (%): 86.8	
		Hole Diameter: 5 inches	Well Casing Diameter: NA
		Total Depth: 30.5 feet	Depth to Groundwater: Not Identified



General Notes:
1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Material stratum lines are interpretive and actual changes may be gradual. Solid lines indicate distinct contacts and dashed lines indicate gradual or approximate contacts.
3. USCS designations are based on visual-manual identification (ASTM D 2488), unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling/excavation (ATD) or for date specified. Level may vary with time.
5. Location and ground surface elevations are approximate.

HALEY ALDRICH	Project: Aberdeen School District - Relocation Site 1 Location: Aberdeen, Washington Project No.: 0211414-000	Boring Log **B-2**	Figure **A-3** Sheet **1 of 1**

HA BORING LOG - \\HALEYALDRICH.COM\SHARESEA_DATA\GINTHC_LIBRARY.GLB - 10/31/24 08:24 - \\HALEYALDRICH.COM\SHARESEA_DATA\PROJECTS\0211414\PERMANENT\GINT FILES\0211414-000_ABERDEEN SD RELOCATION SITE 1_GINT.GPJ - kbutler

PRESENTATION OF SITE INVESTIGATION RESULTS

Aberdeen SD Relocation Site 1

Prepared for:

Haley & Aldrich, Inc.

ConeTec Job No: **24-59-28189**

Project Start Date: 2024-08-22
Project End Date: 2024-08-22
Release Date: 2024-08-30

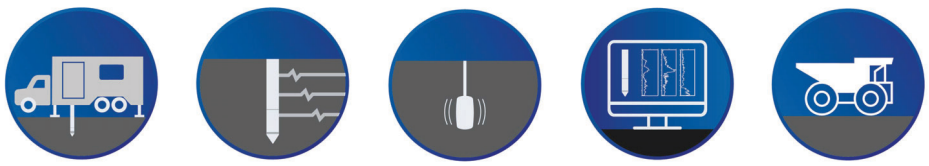
Report Prepared by:

ConeTec, Inc.

1237 S Director Street, Seattle, WA 98108

Tel: (253) 397-4861

ConeTecWA@conetec.com
www.conetec.com
www.conetecdataservices.com



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CONETEC

ABOUT THIS REPORT

The enclosed report presents the results of the site investigation program conducted by ConeTec, Inc. for Haley & Aldrich, Inc..

Please note that this report, which also includes all accompanying data, are subject to the 3rd Party Disclaimer and Client Disclaimer that follow in the 'Limitations' section of this report. Please refer to the list of attached documents following the text of this report. A site map, test summaries, and test plots are all included in the body of the report.

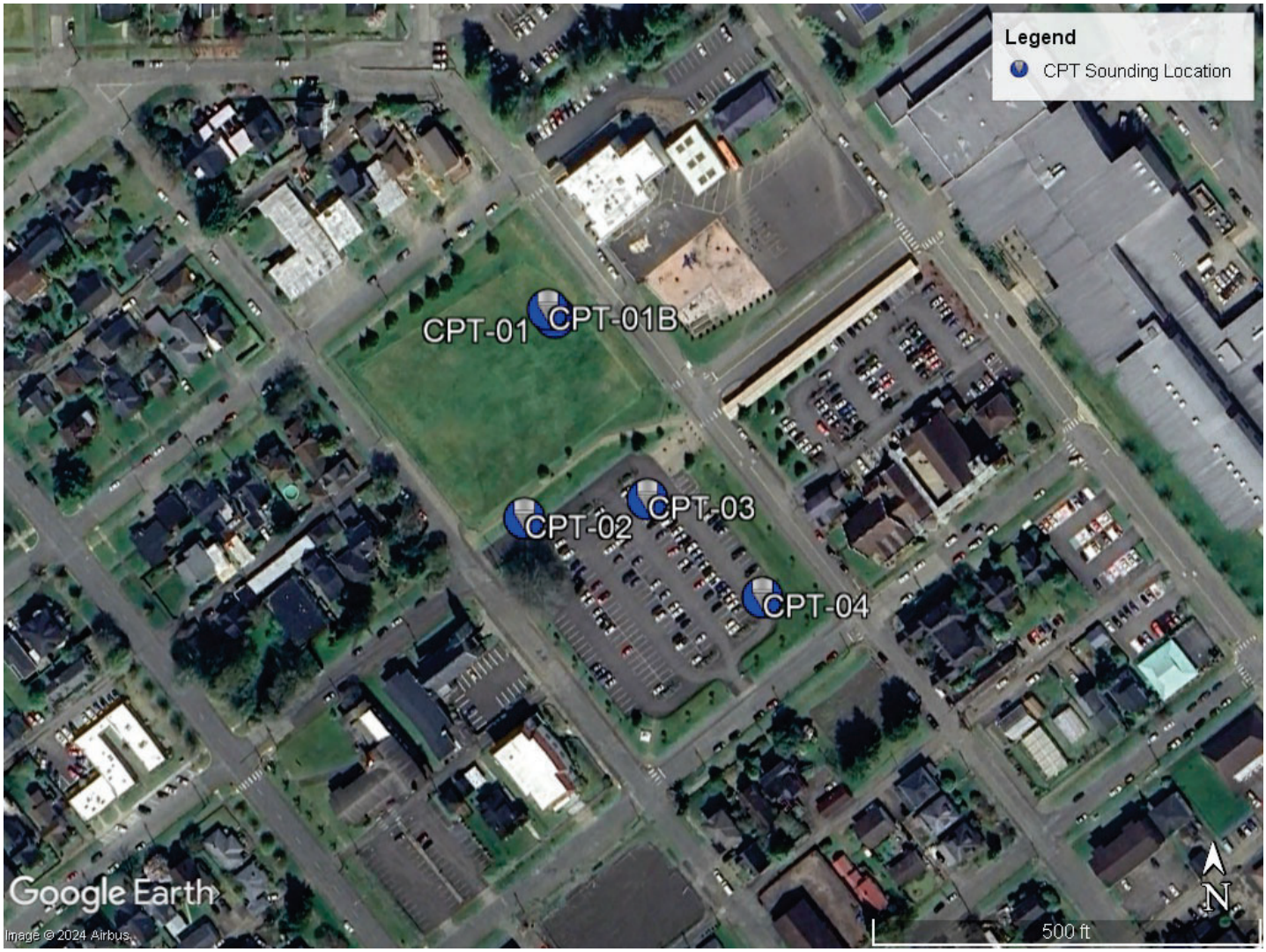
Project	
Client	Haley & Aldrich, Inc.
Project	Aberdeen SD Relocation Site 1
ConeTec Project Number	24-59-28189
Test Types	CPTu/SCPTu
Additional Comments	None

Contents

The following listed below are included in the body of this report:

- **Site Map**
- **Limitations and Closure**
- **Project Information**
- **Report Appendices**
- **Supporting Documents and Materials**

SITE MAP



All locations are approximate unless otherwise stated in the body of the report.

ConeTec Job Number: 24-59-28189

Client: Haley & Aldrich, Inc.

Project: Aberdeen SD Relocation Site 1

Date: 2024-08-30

ConeTec

LIMITATIONS

3rd Party Disclaimer

The "Report" refers to this report titled: Aberdeen SD Relocation Site 1

The Report was prepared by ConeTec for: Haley & Aldrich, Inc.

The Report is confidential and may not be distributed to or relied upon by any third parties without the express written consent of ConeTec. Any third parties gaining access to the Report do not acquire any rights as a result of such access. Any use which a third party makes of the Report, or any reliance on or decisions made based on it, are the responsibility of such third parties. ConeTec accepts no responsibility for loss, damage and/or expense, if any, suffered by any third parties as a result of decisions made, or actions taken or not taken, which are in any way based on, or related to, the Report or any portion(s) thereof.

Client Disclaimer

ConeTec was retained by: Haley & Aldrich, Inc.

The "Report" refers to this report titled: Aberdeen SD Relocation Site 1

ConeTec was retained to collect and provide the raw data ("Data") which is included in the Report.

ConeTec has collected and reported the Data in accordance with current industry standards. No other warranty, express or implied, with respect to the Data is made by ConeTec. In order to properly understand the Data included in the Report, reference must be made to the documents accompanying and other sources referenced in the Report in their entirety. Other than the Data, the contents of the Report (including any Interpretations) should not be relied upon in any fashion without independent verification and ConeTec is in no way responsible for any loss, damage or expense resulting from the use of, and/or reliance on, such material by any party.

Closure

Thank you for the opportunity to work on this project. The equipment used as well the field procedures followed, all complied with current accepted best practice standards.

Report prepared by: Michael Hammons
Jesse Martinez

PROJECT INFORMATION

Rig		
Description	**Deployment System**	**Test Type**
C02-023 CPT Truck Rig	Twin mounted cylinders	CPTu/SCPTu

Coordinates		
Test Type	**Collection Method**	**EPSG Number**
CPTu/SCPTu	Consumer Grade GPS	4326 (WGS84 / LatLong)

Piezocones Used for this Project						
Cone Description	**Cone Number**	**Cross Sectional Area** (cm^2)	**Sleeve Area** (cm^2)	**Tip Capacity** (bar)	**Sleeve Capacity** (bar)	**Pore Pressure Capacity** (bar)
EC855:T1500F15U35	855	15	225	1500	15	35

Cone Penetration Test (CPTu)	
Depth reference	Depths are referenced to the existing ground surface at the time of each test.
Tip and sleeve data offset	0.1 Meters. This has been accounted for in the CPT data files.

Calculated Geotechnical Parameters	
Additional information	The Normalized Soil Behaviour Type Chart based on Q_{tn} (SBT Q_{tn}) (Robertson, 2009) was used to classify the soil for this project. A detailed set of calculated CPTu parameters have been generated and are provided in Excel format files in the release folder. The CPTu parameter calculations are based on values of corrected tip resistance (q_t) sleeve friction (f_s) and pore pressure (u_2). Effective stresses are calculated based on unit weights that have been assigned to the individual soil behaviour type zones and the assumed equilibrium pore pressure profile. Soils were classified as either drained or undrained based on the Q_{tn} Normalized Soil Behaviour Type Chart (Robertson, 2009). Calculations for both drained and undrained parameters were included for materials that classified as silt mixtures (zone 4).

REPORT APPENDICES

The appendices listed below are included in the report:

- **Cone Penetration Test (CPTu) Summary and Standard CPTu Plots**
- **Advanced Cone Penetration Test Plots**
- **Soil Behavior Type (SBT) Scatter Plots**
- **Pore Pressure Dissipation Test (PPDT) Summary and PPDT Plots**
- **Seismic Cone Penetration Test (SCPTu) Tabular Results**
- **SCPTu Plots**
- **SCPTu Velocity Wave Traces**

Cone Penetration Test (CPTu) Summary and Standard CPTu Plots

CONETEC

Job No: 24-59-28189
Client: Haley & Aldrich, Inc.
Project: Aberdeen SD Relocation Site 1
Start Date: 2024-08-22
End Date: 2024-08-22

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Cone Area (cm^2)	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Seismic Intervals	Latitude[2]	Longitude[2]	Refer to Notation Number
CPT-01	24-59-28189_CP01	2024-08-22	855:T1500F15U35	15	5.0	9.92		46.97974	-123.82062	3
CPT-01B	24-59-28189_CP01B	2024-08-22	855:T1500F15U35	15	5.0	11.48		46.97977	-123.82065	3
CPT-02	24-59-28189_CP02	2024-08-22	855:T1500F15U35	15	11.1	30.35		46.97905	-123.82080	
CPT-03	24-59-28189_CP03	2024-08-22	855:T1500F15U35	15	6.5	29.69		46.97910	-123.82017	
CPT-04	24-59-28189_SP04	2024-08-22	855:T1500F15U35	15	6.4	29.69	8	46.97875	-123.81959	
Totals	5 Soundings					111.14	8			

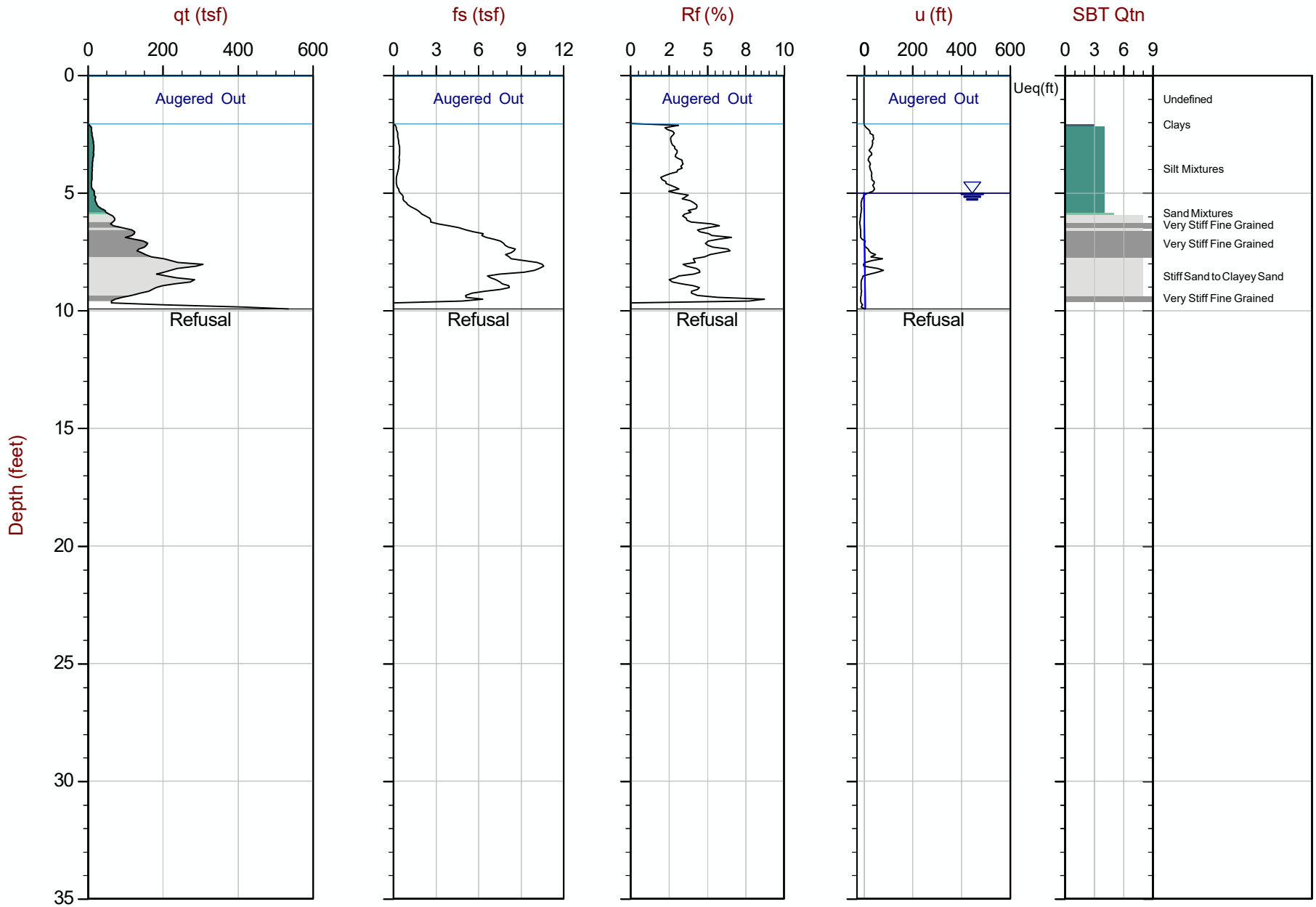
1. The assumed phreatic surface was based off the shallowest pore pressure dissipation tests performed within or nearest the sounding. Hydrostatic conditions were assumed for the calculated parameters.
2. The coordinates were collected using consumer grade GPS. EPSG number: 4326 (WGS84 / LatLong).
3. The assumed phreatic surface was based on the dynamic pore pressure profile.

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 08:40
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-01
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 3.025 m / 9.92 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_CP01.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97974 Long: -123.82062

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

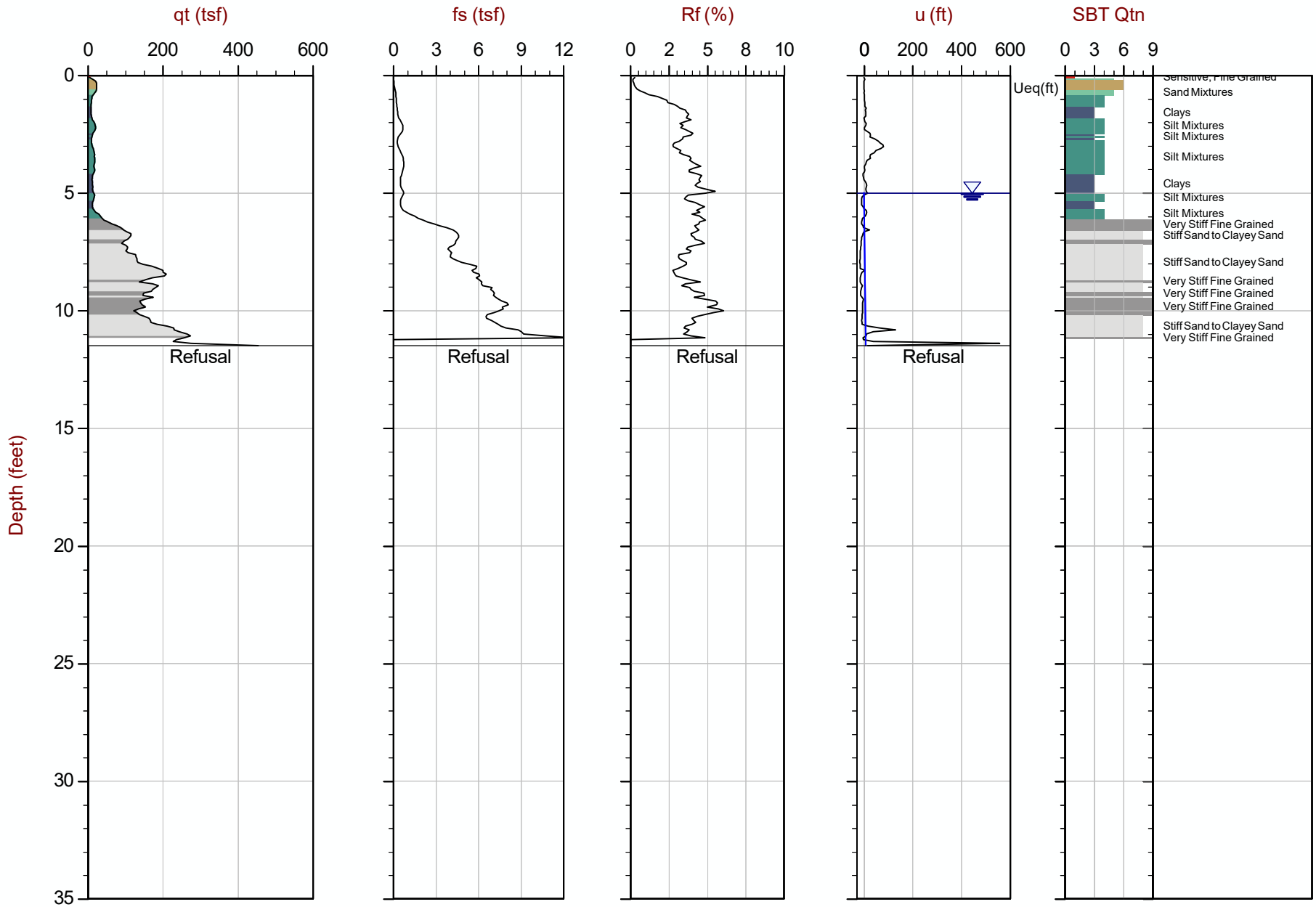
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 09:03
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-01B
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 3.500 m / 11.48 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_CP01B.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97977 Long: -123.82065

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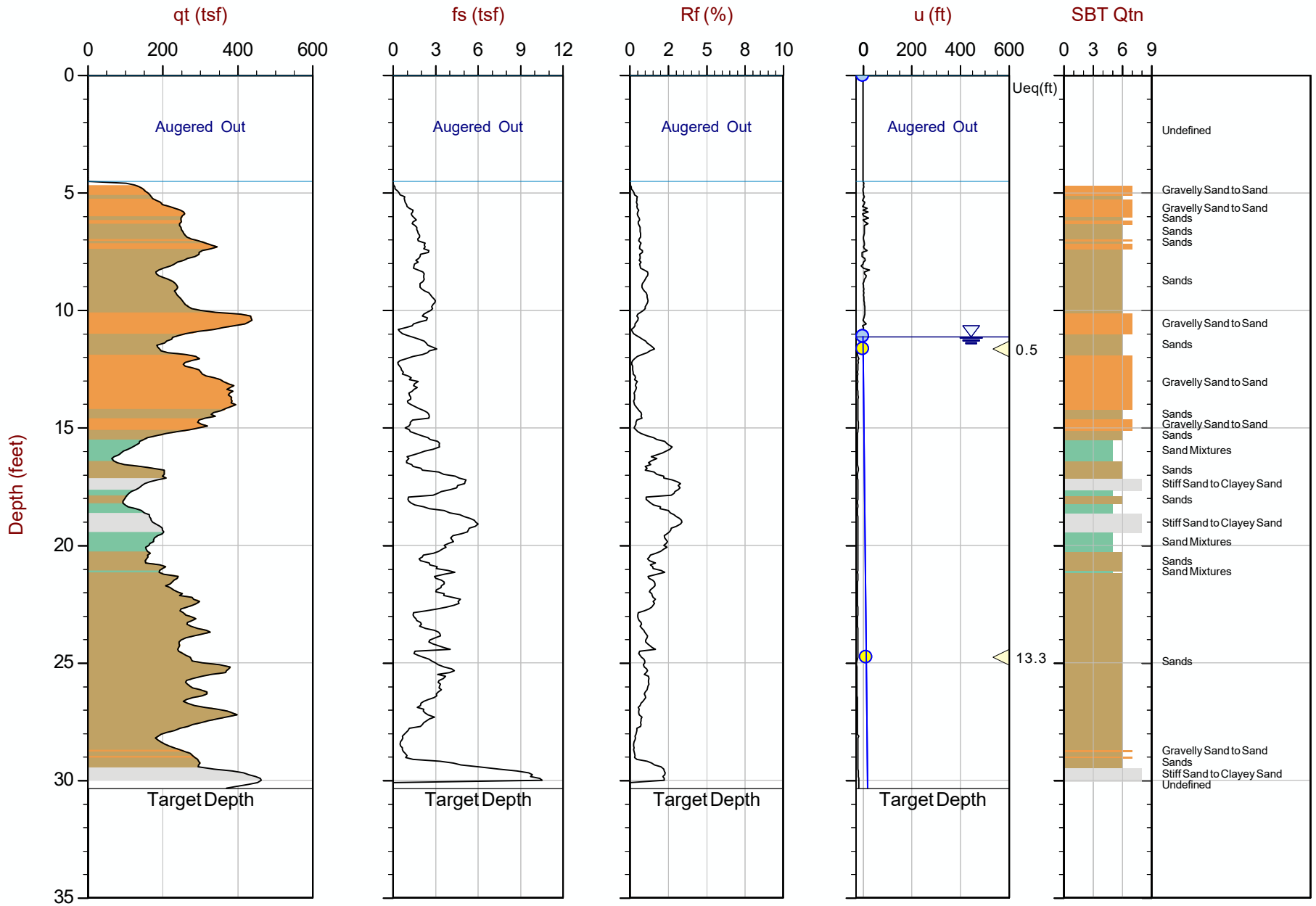
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CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 09:50
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-02
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 9.250 m / 30.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_CP02.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97905 Long: -123.82080

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

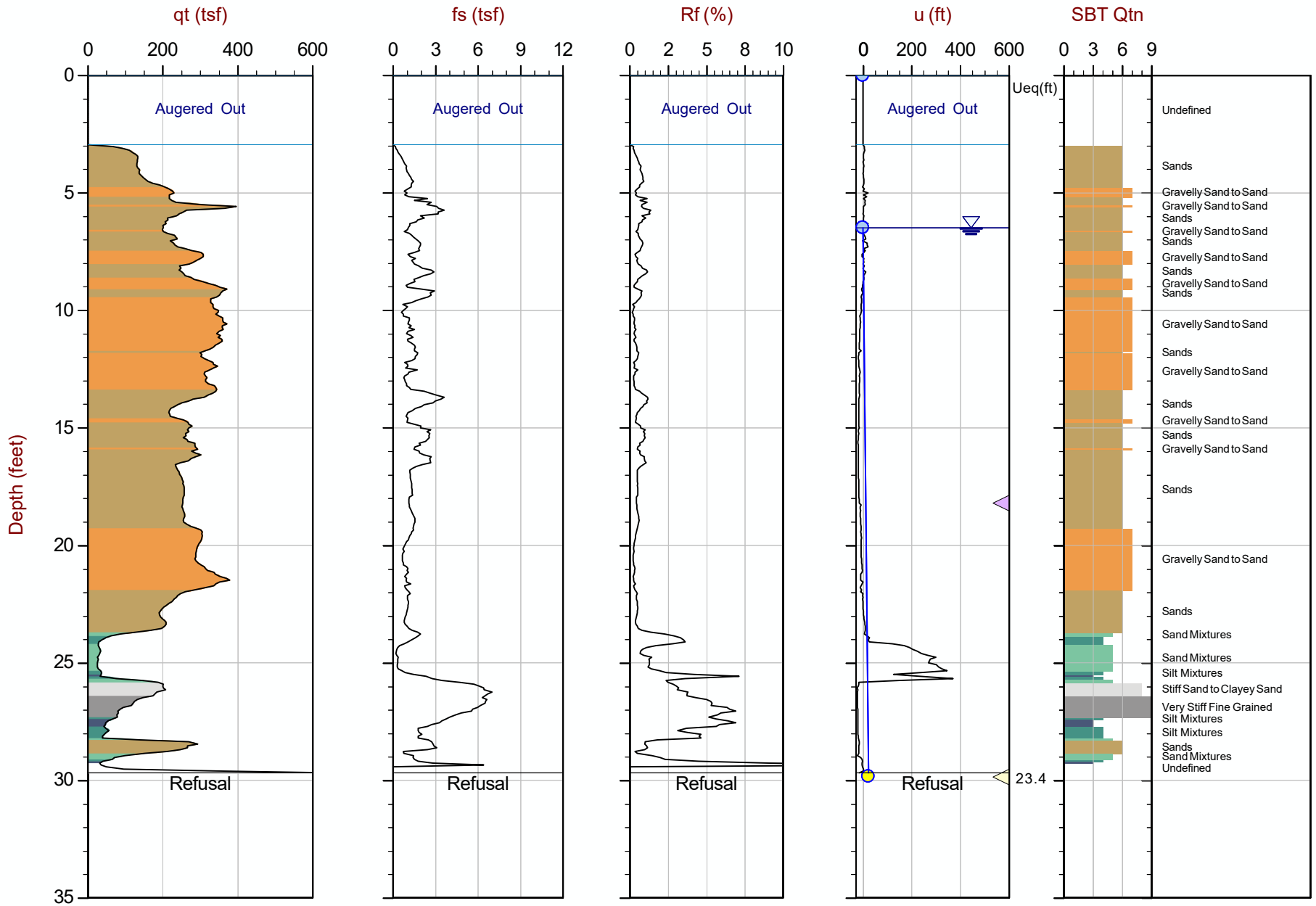
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 11:32
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-03
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 9.050 m / 29.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_CP03.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97910 Long: -123.82017

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

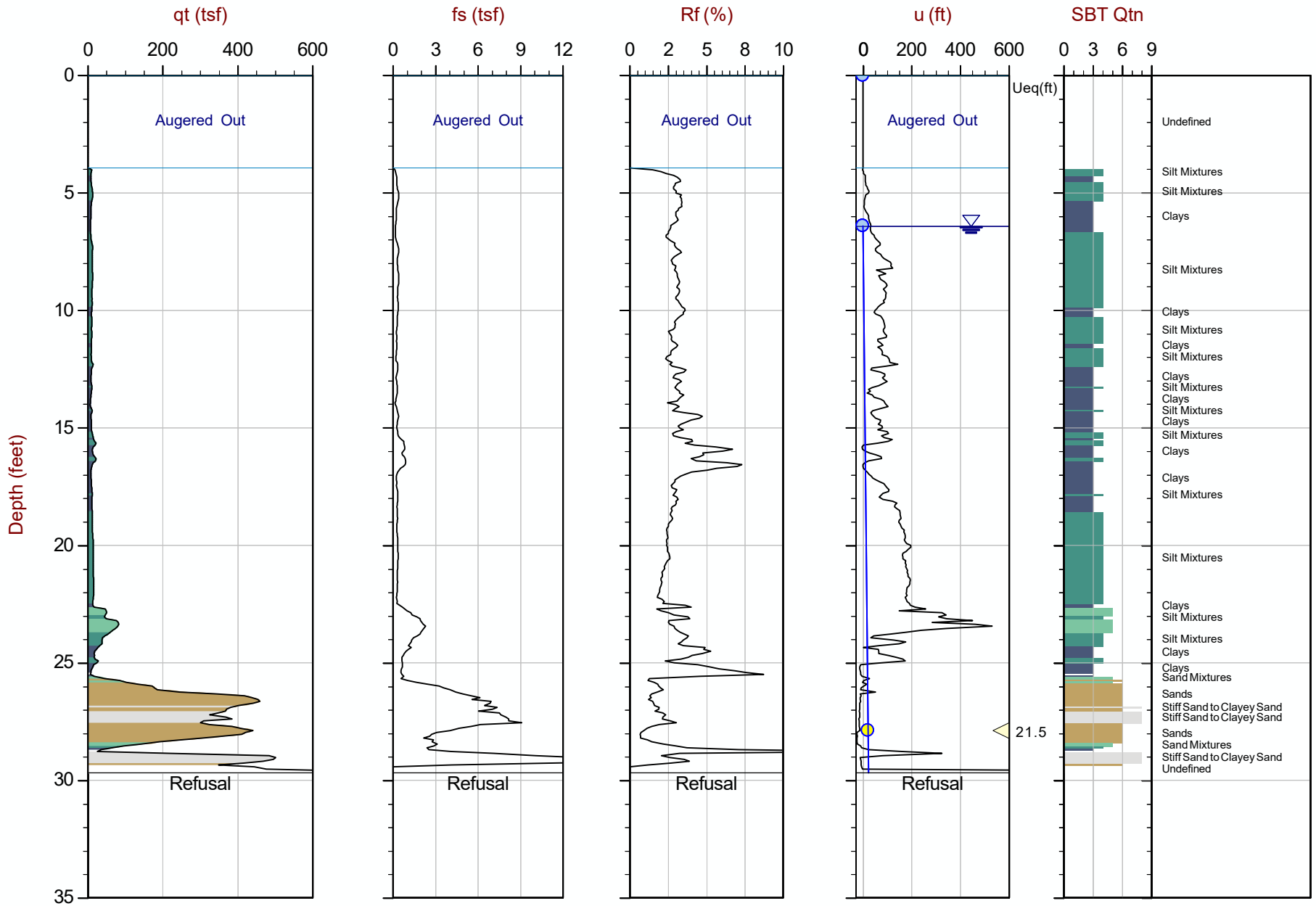
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 12:57
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-04
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 9.050 m / 29.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_SP04.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97875 Long: -123.81959

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

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Advanced Cone Penetration Test Plots with Ic, Su(Nkt), Phi, and N1(60)Ic

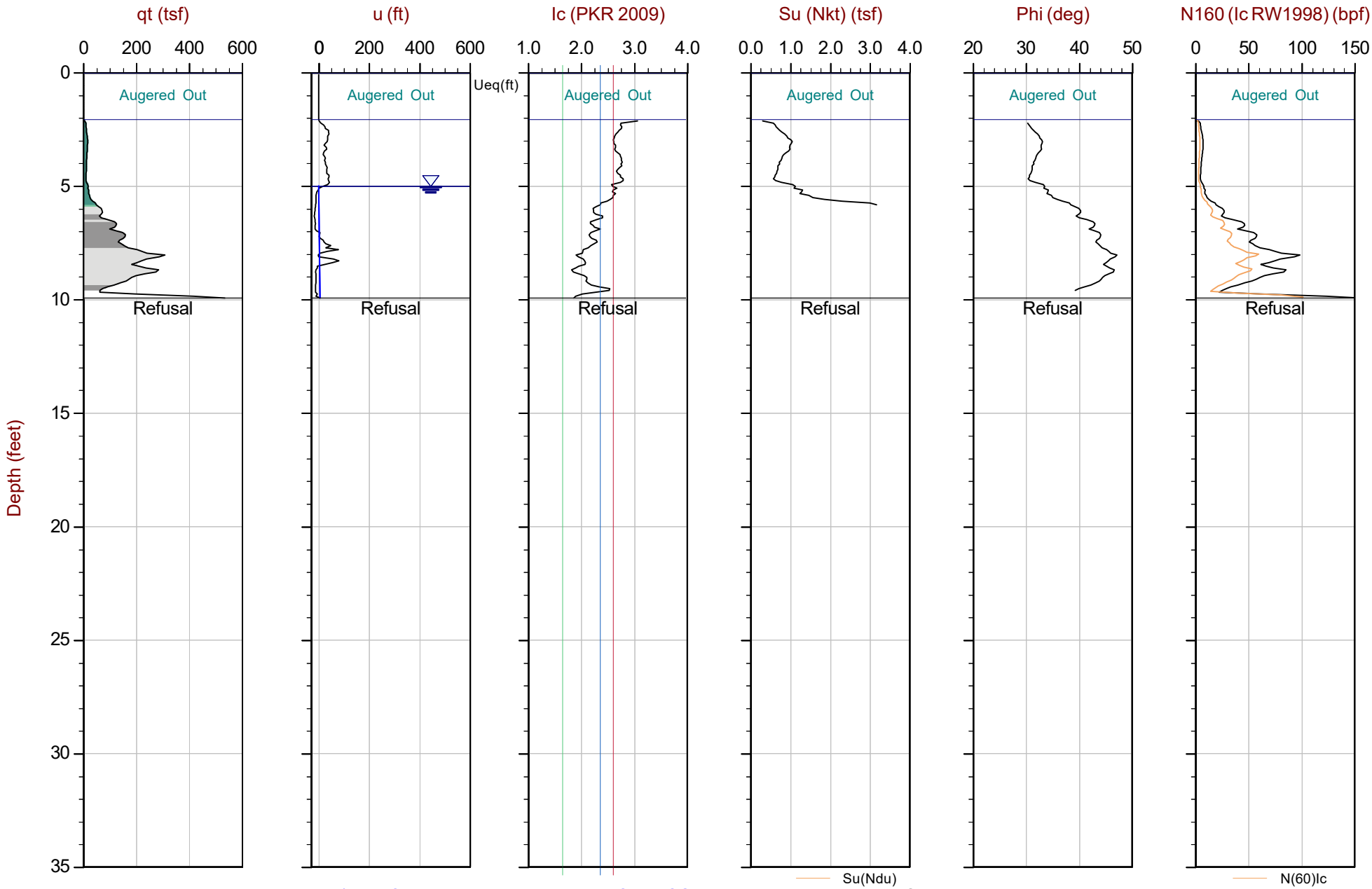
CONETEC

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 08:40
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-01
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 3.025 m / 9.92 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_CP01.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97974 Long: -123.82062

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

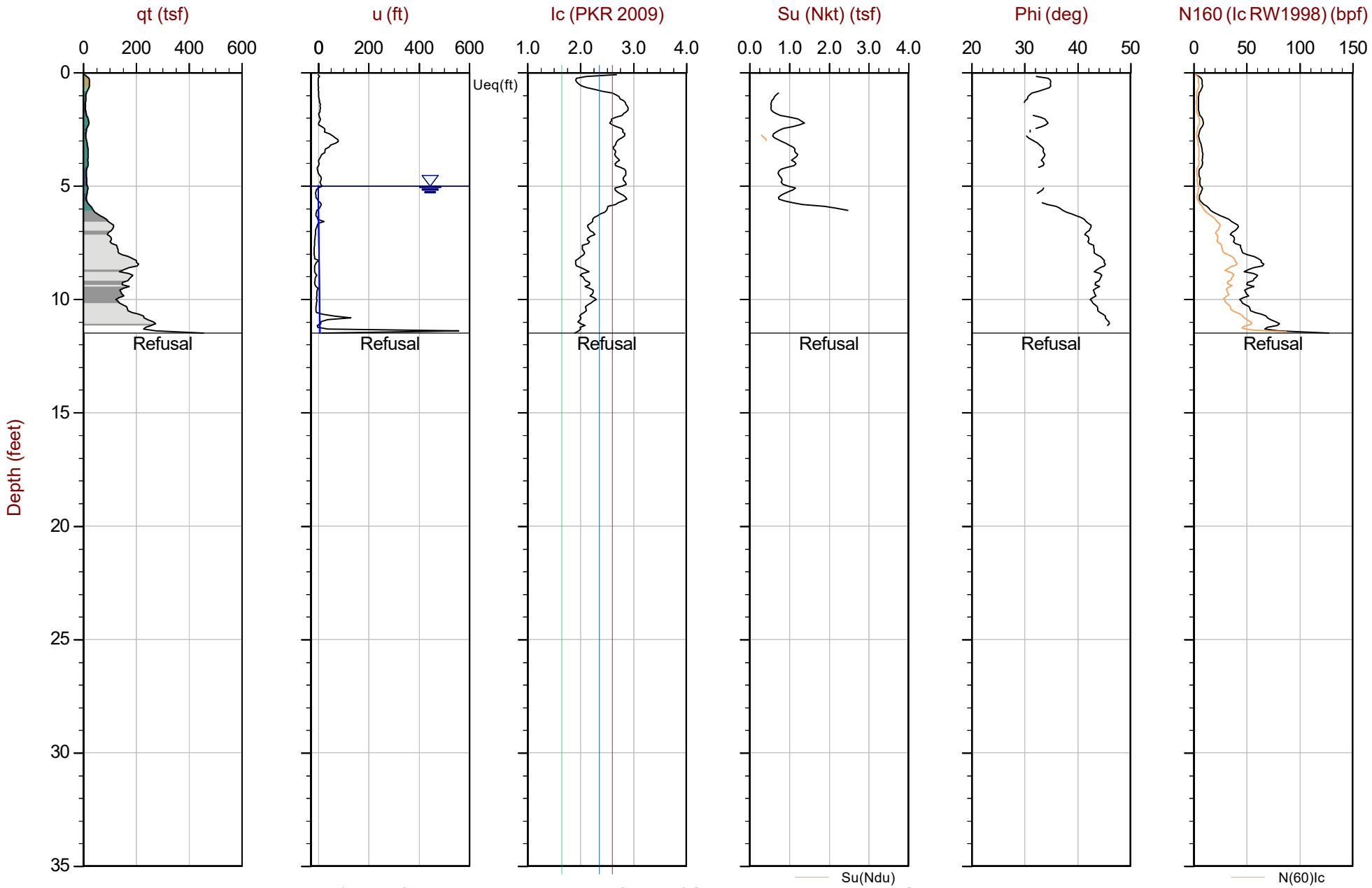
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 09:03
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-01B
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 3.500 m / 11.48 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_CP01B.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97977 Long: -123.82065

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

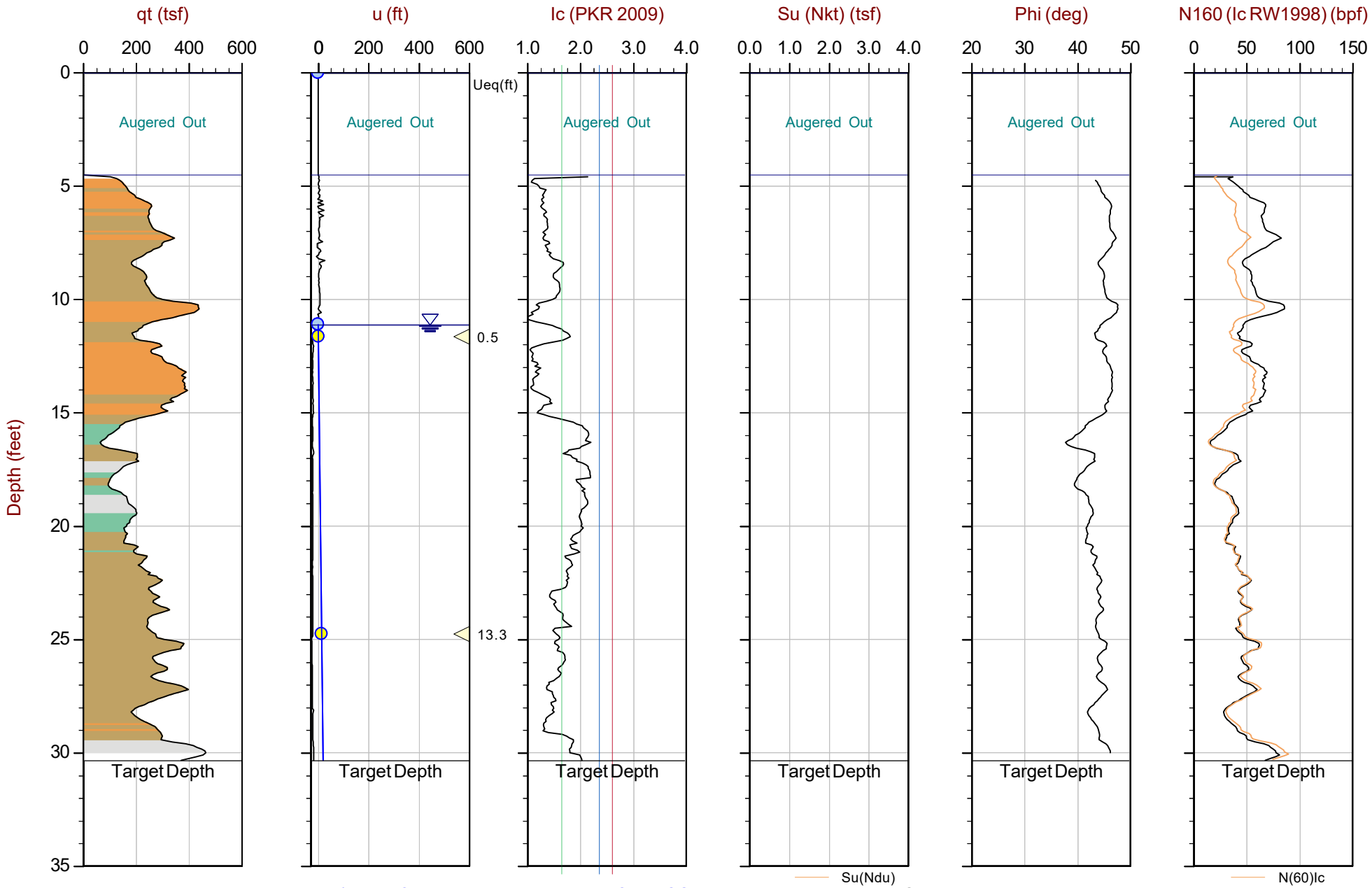
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 09:50
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-02
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 9.250 m / 30.35 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_CP02.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97905 Long: -123.82080

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

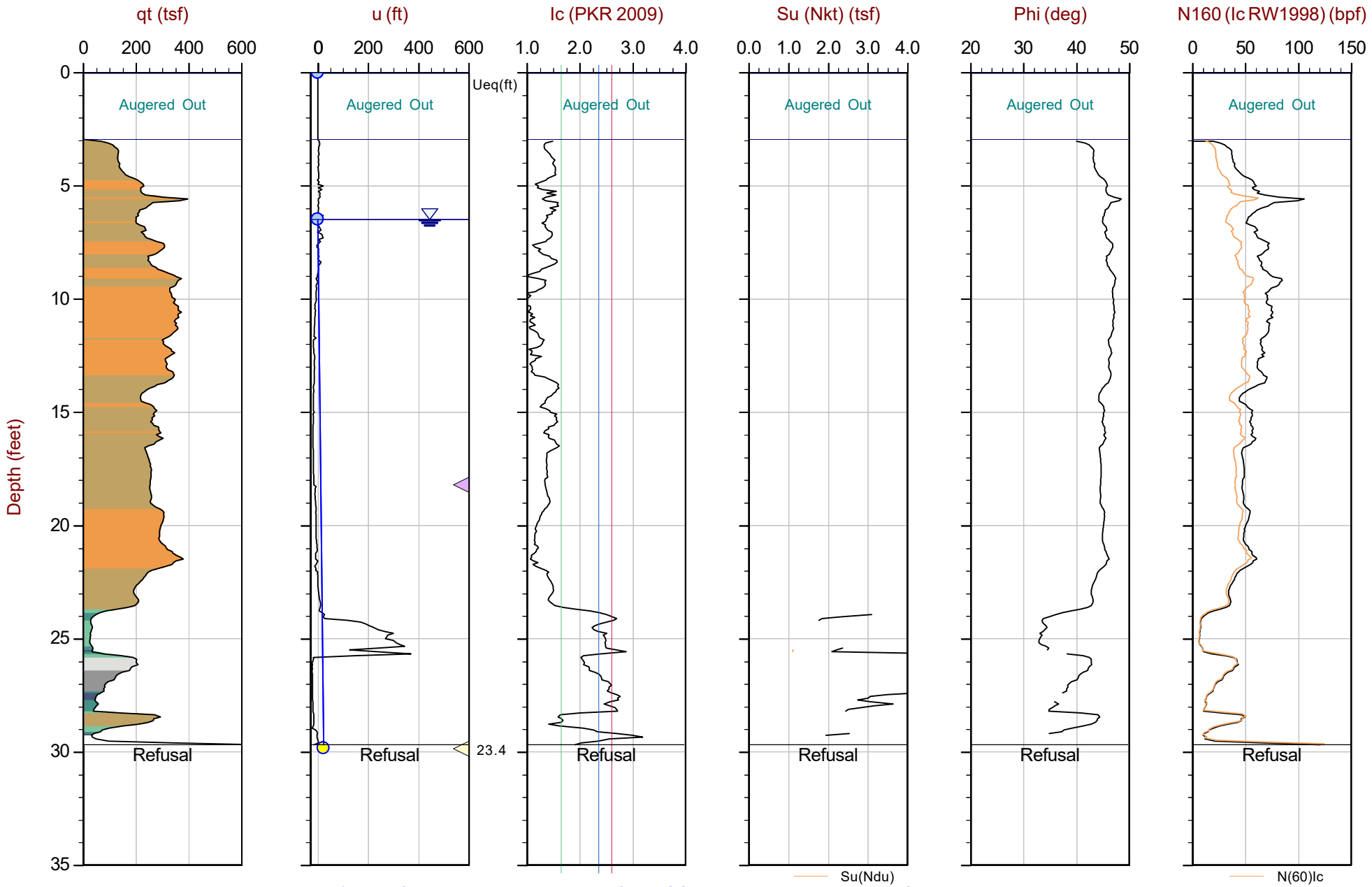
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 11:32
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-03
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 9.050 m / 29.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_CP03.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97910 Long: -123.82017

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

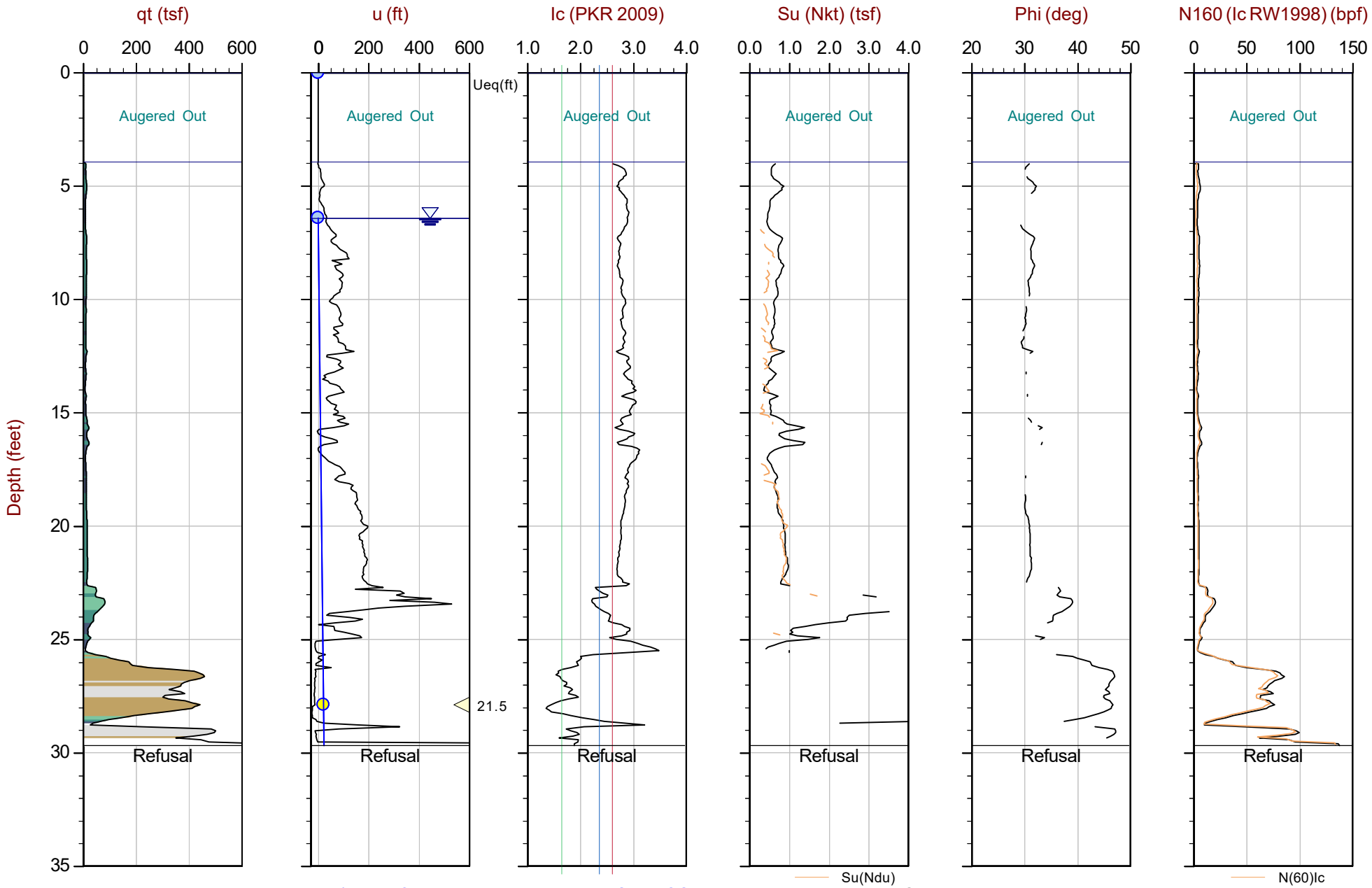
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 12:57
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-04
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 9.050 m / 29.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_SP04.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97875 Long: -123.81959

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Soil Behavior Type (SBT) Scatter Plots

CONETEC

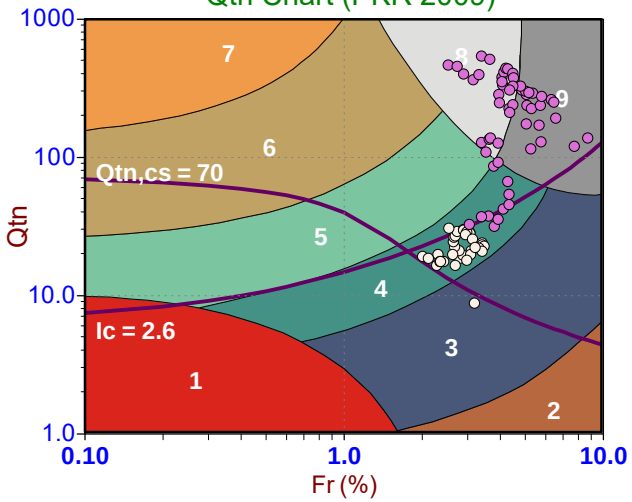
CONETEC

Haley & Aldrich

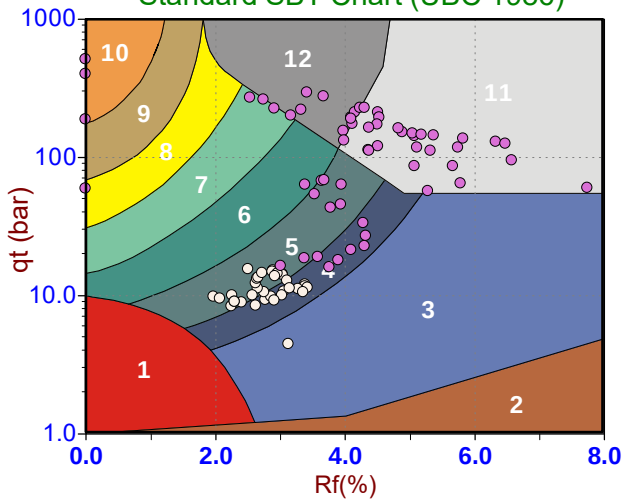
Job No: 24-59-28189
Date: 2024-08-22 08:40
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-01
Cone: 855:T1500F15U35 Area=15 cm²

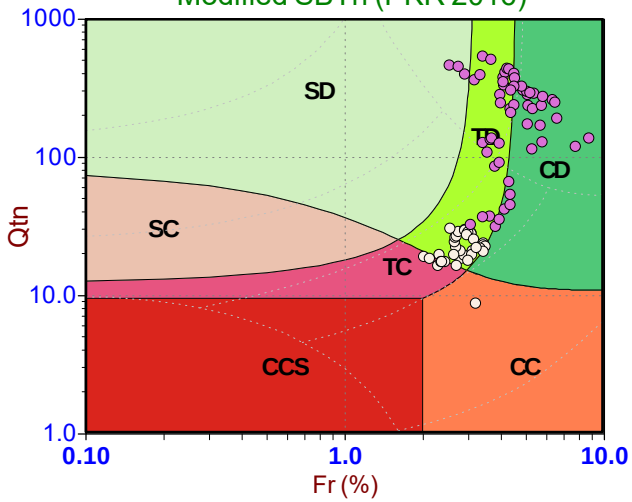
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

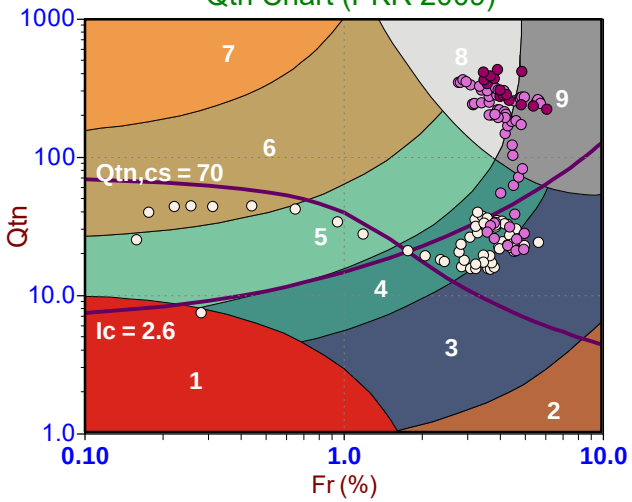
CONETEC

Haley & Aldrich

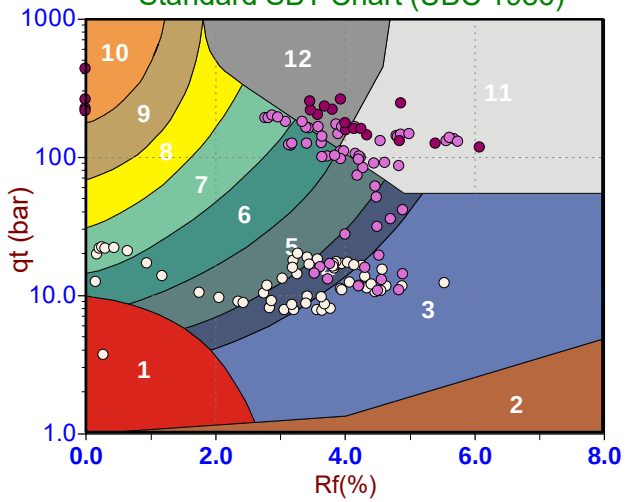
Job No: 24-59-28189
Date: 2024-08-22 09:03
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-01B
Cone: 855:T1500F15U35 Area=15 cm²

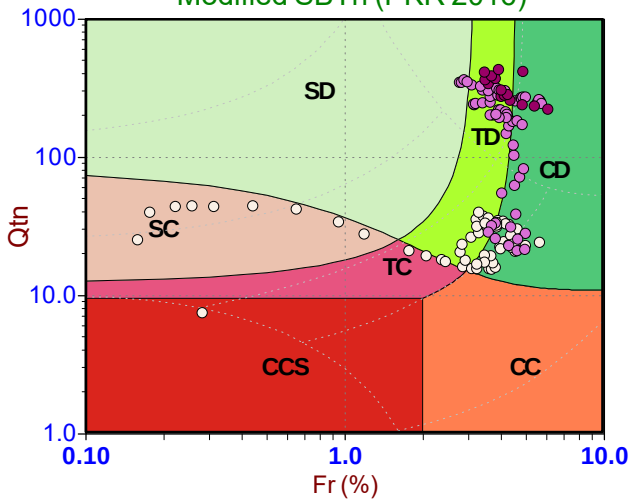
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

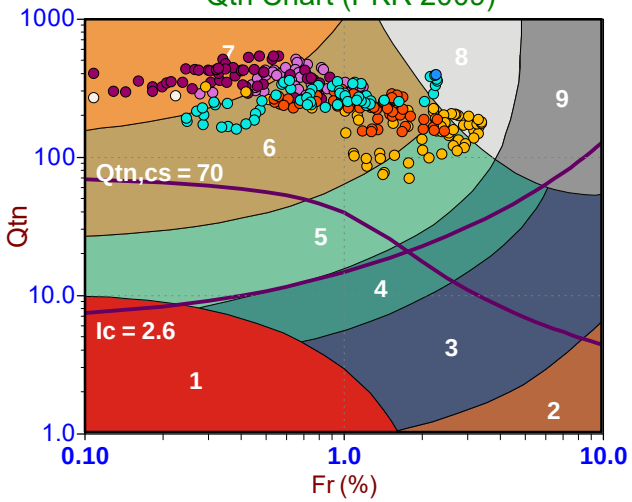
CONETEC

Haley & Aldrich

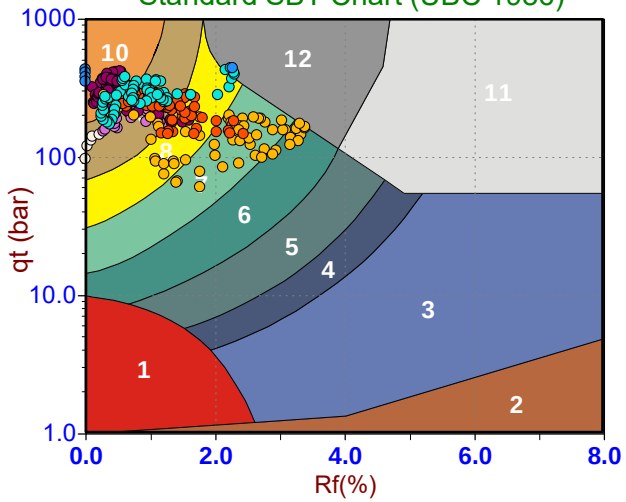
Job No: 24-59-28189
Date: 2024-08-22 09:50
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-02
Cone: 855:T1500F15U35 Area=15 cm²

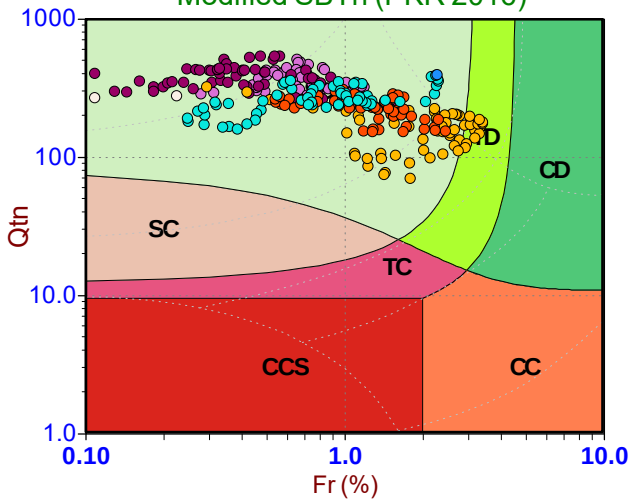
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
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- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

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- Organic Soil
- Clay
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- Silty Sand/Sand
- Sand
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- Stiff Fine Grained
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- TC (Cont. transitional)
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- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

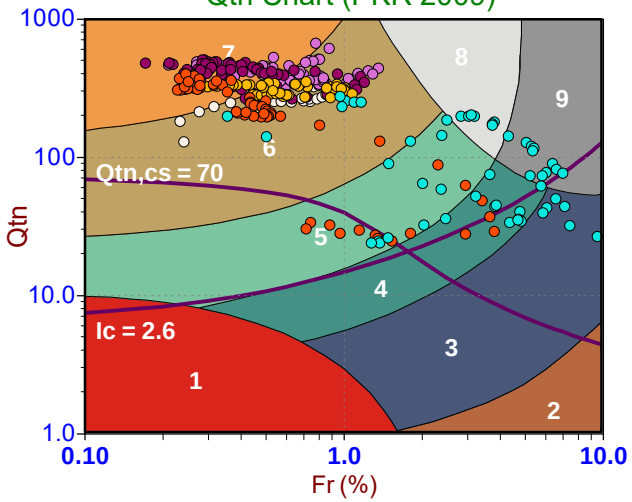
CONETEC

Haley & Aldrich

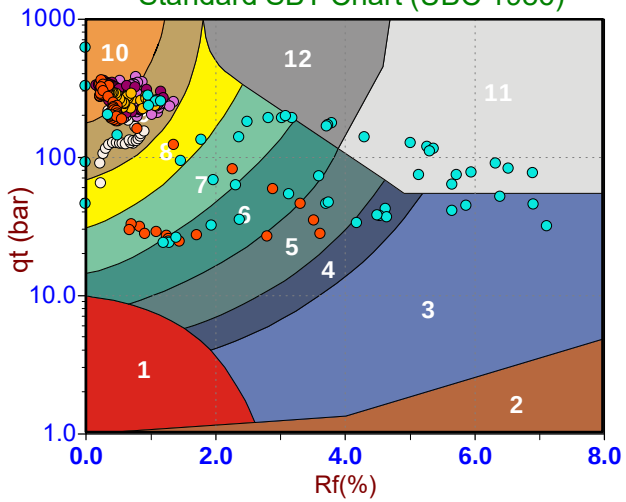
Job No: 24-59-28189
Date: 2024-08-22 11:32
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-03
Cone: 855:T1500F15U35 Area=15 cm²

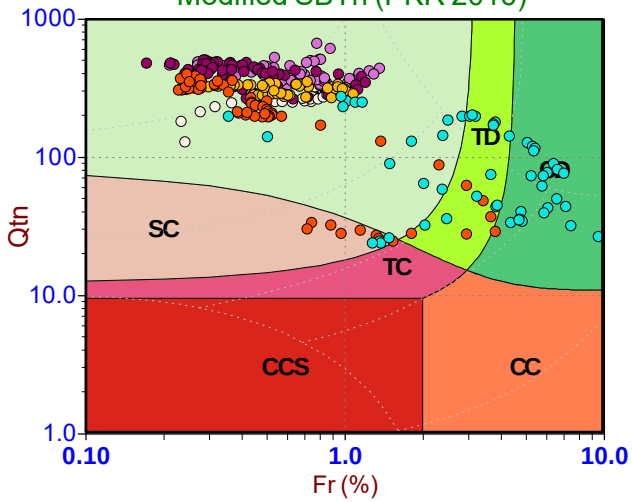
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
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- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

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- CD (Dil. clay like)
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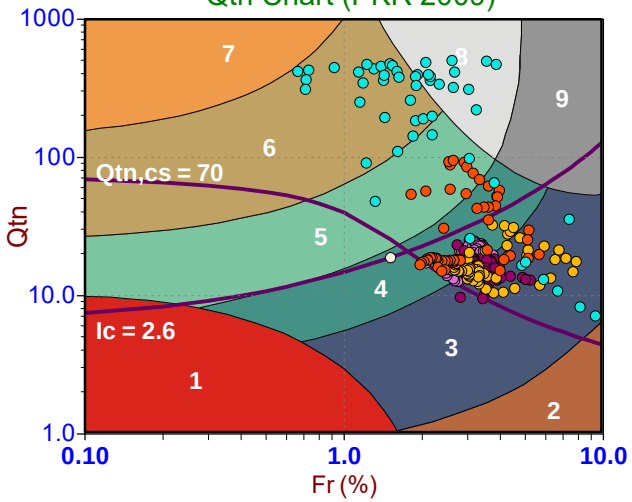
CONETEC

Haley & Aldrich

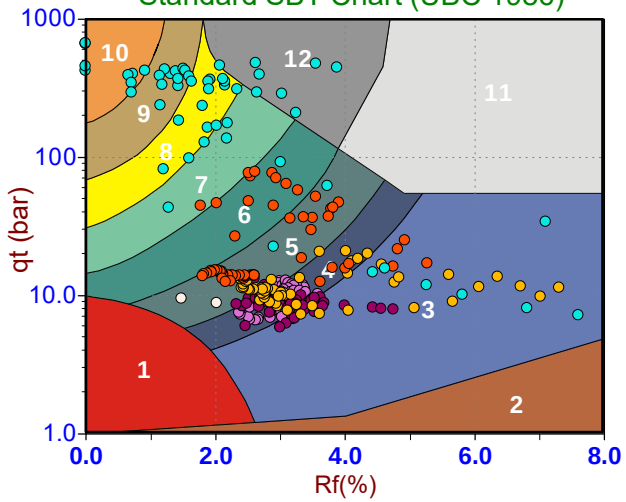
Job No: 24-59-28189
Date: 2024-08-22 12:57
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-04
Cone: 855:T1500F15U35 Area=15 cm²

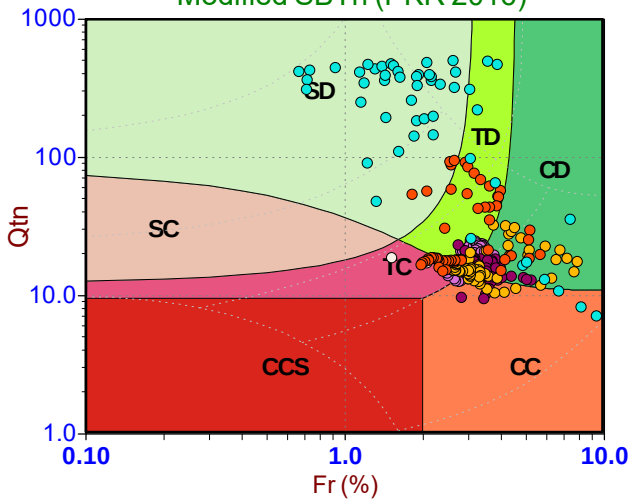
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
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- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Pore Pressure Dissipation Test (PPDT) Summary and PPDT Plots

CONETEC

Job No:	24-59-28189
Client:	Haley & Aldrich, Inc.
Project:	Aberdeen SD Relocation Site 1
Start Date:	2024-08-22
End Date:	2024-08-22

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Refer to Notation Number
CPT-02	24-59-28189_CP02	15	690	11.65	0.5	11.1	
CPT-02	24-59-28189_CP02	15	670	24.77	13.3	11.5	
CPT-03	24-59-28189_CP03	15	990	18.21			1
CPT-03	24-59-28189_CP03	15	105	29.86	23.4	6.5	
CPT-04	24-59-28189_SP04	15	360	27.89	21.5	6.4	
Totals			47 min				

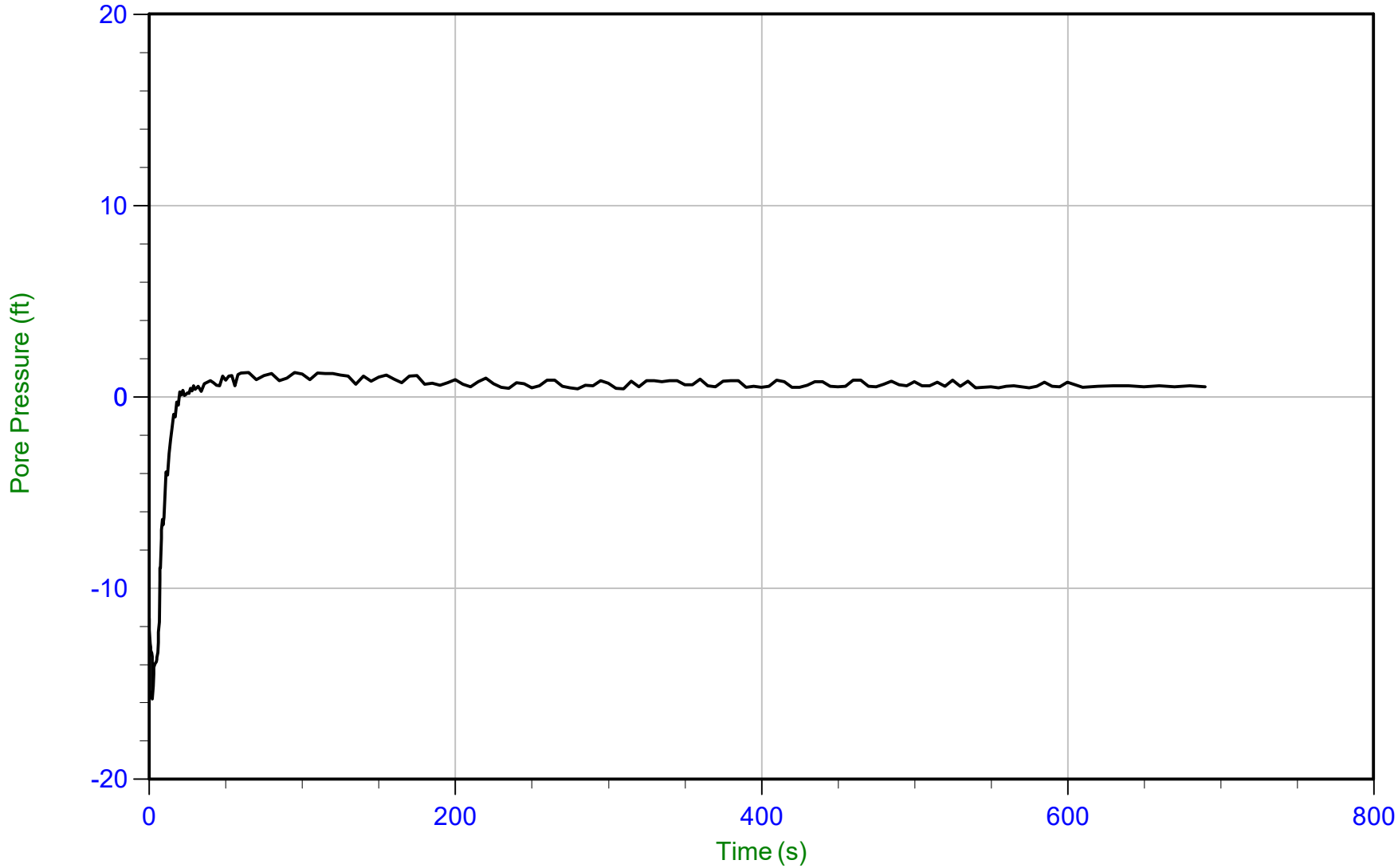
1. The equilibrium pore pressure was not achieved.

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 09:50
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-02
Cone: 855:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 24-59-28189_CP02.ppd2
Depth: 3.550 m / 11.647 ft
Duration: 690.0 s

u Min: -15.8 ft
u Max: 1.3 ft
u Final: 0.5 ft

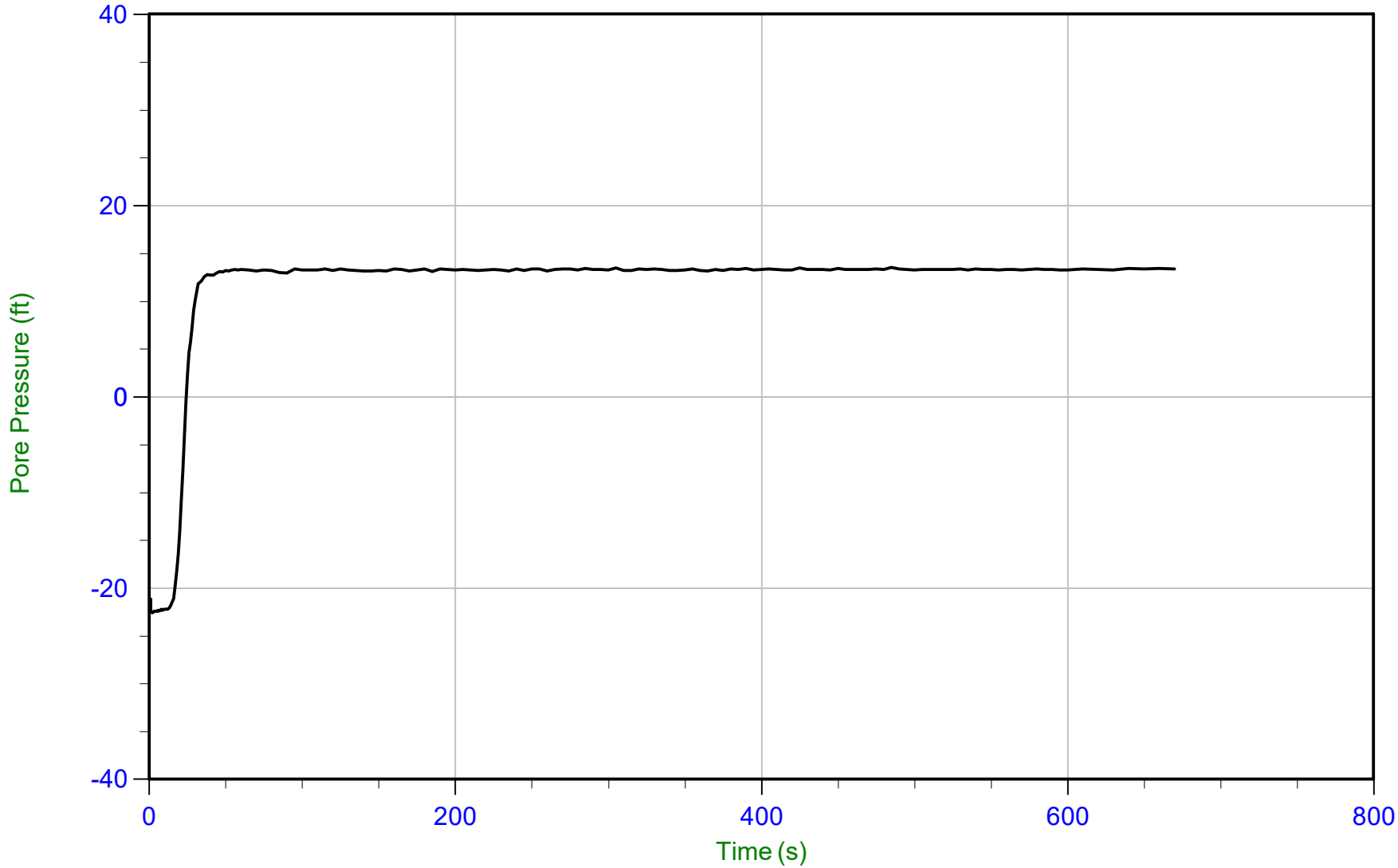
WT: 3.4 m / 11.1 ft
Ueq: 0.5 ft

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 09:50
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-02
Cone: 855:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 24-59-28189_CP02.ppd2
Depth: 7.550 m / 24.770 ft
Duration: 670.0 s

u Min: -22.6 ft
u Max: 13.5 ft
u Final: 13.4 ft

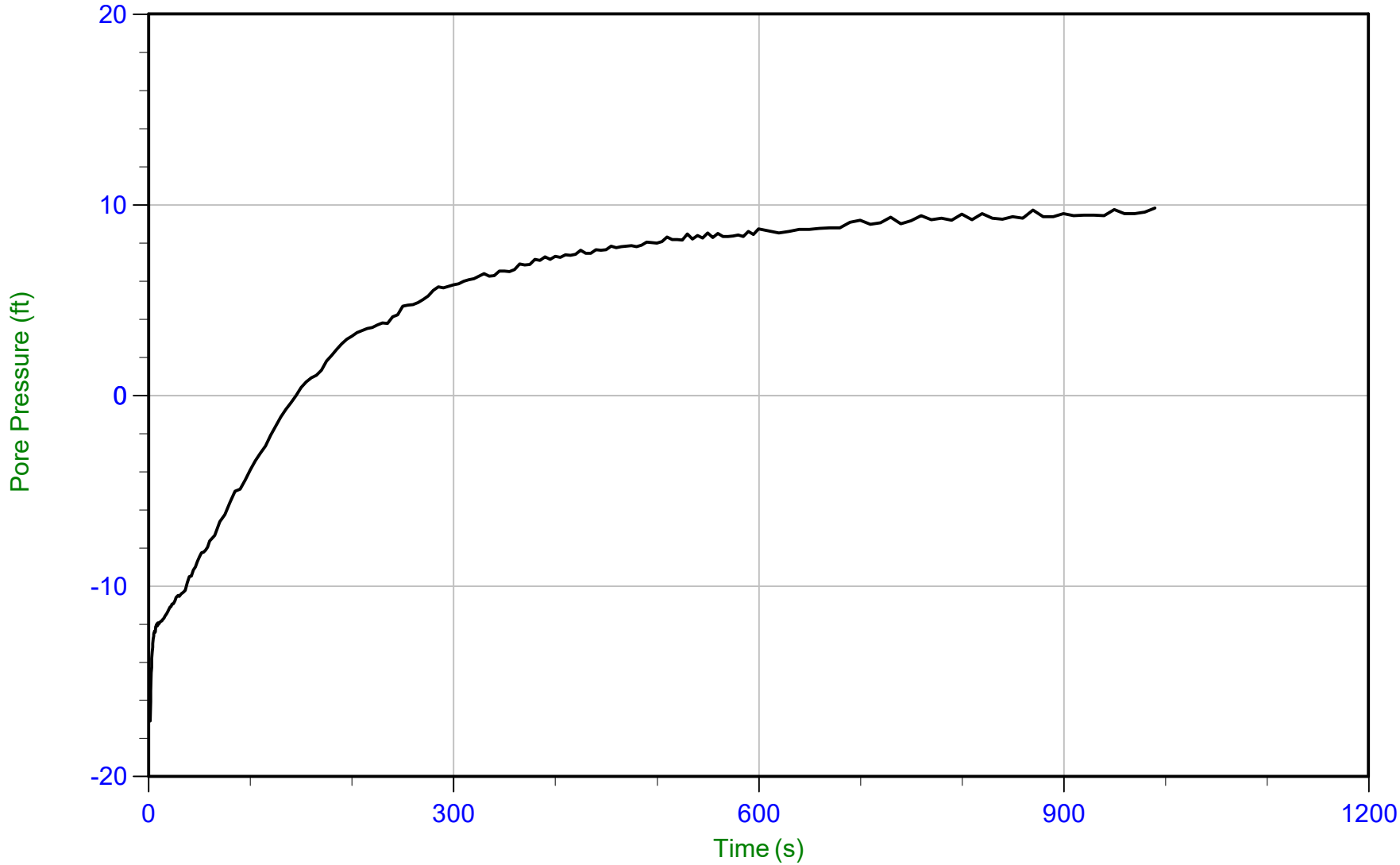
WT: 3.5 m / 11.5 ft
Ueq: 13.3 ft

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 11:32
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-03
Cone: 855:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 24-59-28189_CP03.ppd2
Depth: 5.550 m / 18.208 ft
Duration: 990.0 s

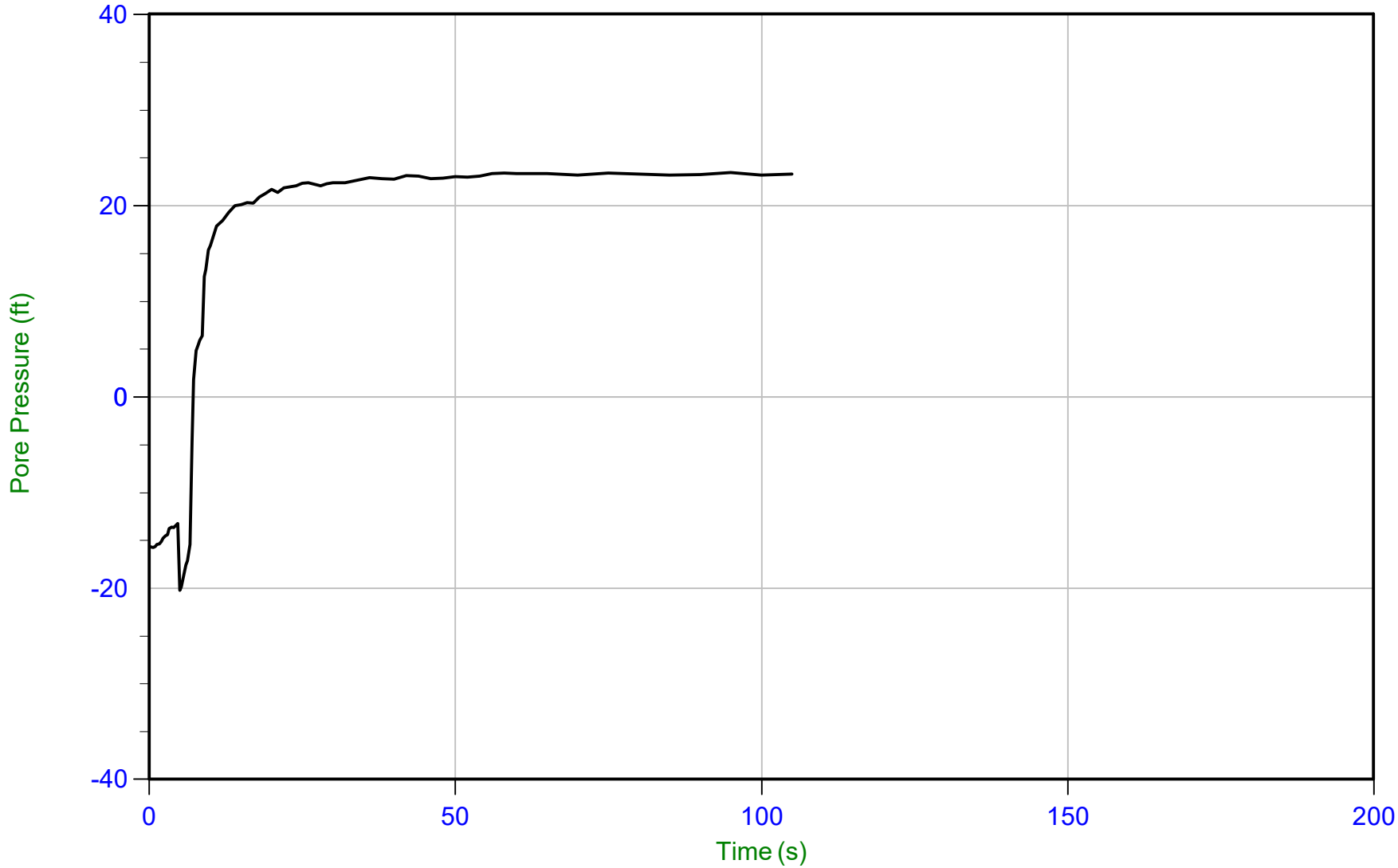
u Min: -17.1 ft
u Max: 9.8 ft
u Final: 9.8 ft

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 11:32
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-03
Cone: 855:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 24-59-28189_CP03.ppd2
Depth: 9.100 m / 29.855 ft
Duration: 105.0 s

u Min: -20.3 ft
u Max: 23.4 ft
u Final: 23.3 ft

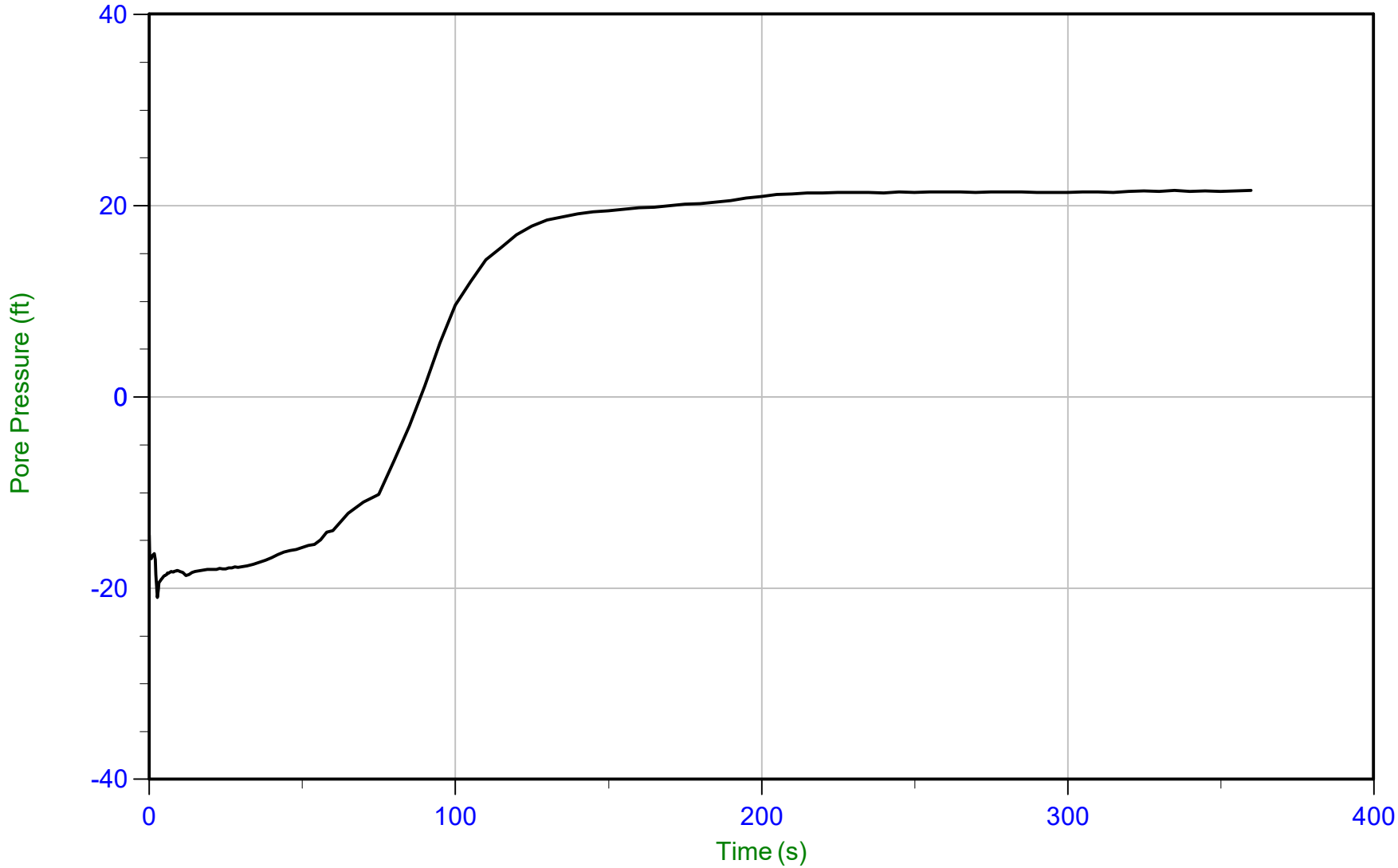
WT: 2.0 m / 6.5 ft
Ueq: 23.4 ft

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 12:57
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-04
Cone: 855:T1500F15U35 Area=15 cm²



Trace Summary:

Filename: 24-59-28189_SP04.ppd2
Depth: 8.500 m / 27.887 ft
Duration: 360.0 s

u Min: -21.0 ft
u Max: 21.6 ft
u Final: 21.6 ft

WT: 2.0 m / 6.4 ft
Ueq: 21.5 ft

Seismic Cone Penetration Test (SCPTu) Tabular Results

CONETEC

Job No:	24-59-28189
Client:	Haley & Aldrich, Inc.
Project:	Aberdeen SD Relocation Site 1
Sounding ID:	CPT-04
Date:	2024-08-22
Seismic Source:	Beam
Seismic Offset (ft):	1.74
Source Depth (ft):	0.00
Geophone Offset (ft):	0.66

SCPTu SHEAR WAVE VELOCITY TEST RESULTS - Vs

Tip Depth (ft)	Geophone Depth (ft)	Ray Path (ft)	Ray Path Difference (ft)	Travel Time Interval (ms)	Interval Velocity (ft/s)
8.20	7.55	7.74			
11.48	10.83	10.97	3.22	6.35	508
14.76	14.11	14.22	3.25	6.37	510
18.04	17.39	17.48	3.26	7.17	455
21.33	20.67	20.74	3.27	5.13	638
24.61	23.95	24.01	3.27	5.10	641
27.89	27.23	27.29	3.27	3.28	997

SCPTu Test Plots

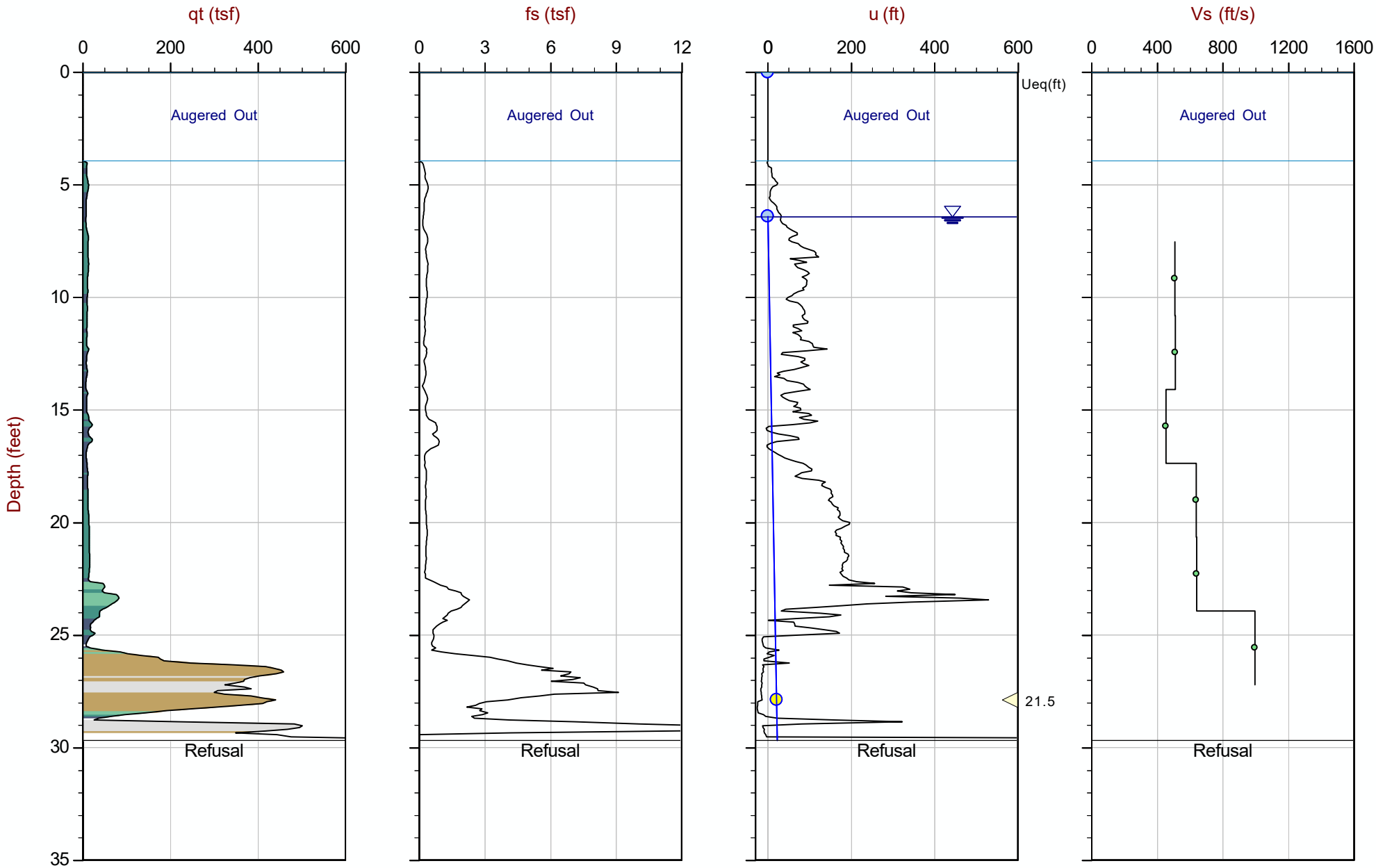
CONETEC

CONETEC

Haley & Aldrich

Job No: 24-59-28189
Date: 2024-08-22 12:57
Site: Aberdeen SD Relocation Site 1

Sounding: CPT-04
Cone: 855:T1500F15U35 Area=15 cm²



Max Depth: 9.050 m / 29.69 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 24-59-28189_SP04.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: Lat: 46.97875 Long: -123.81959

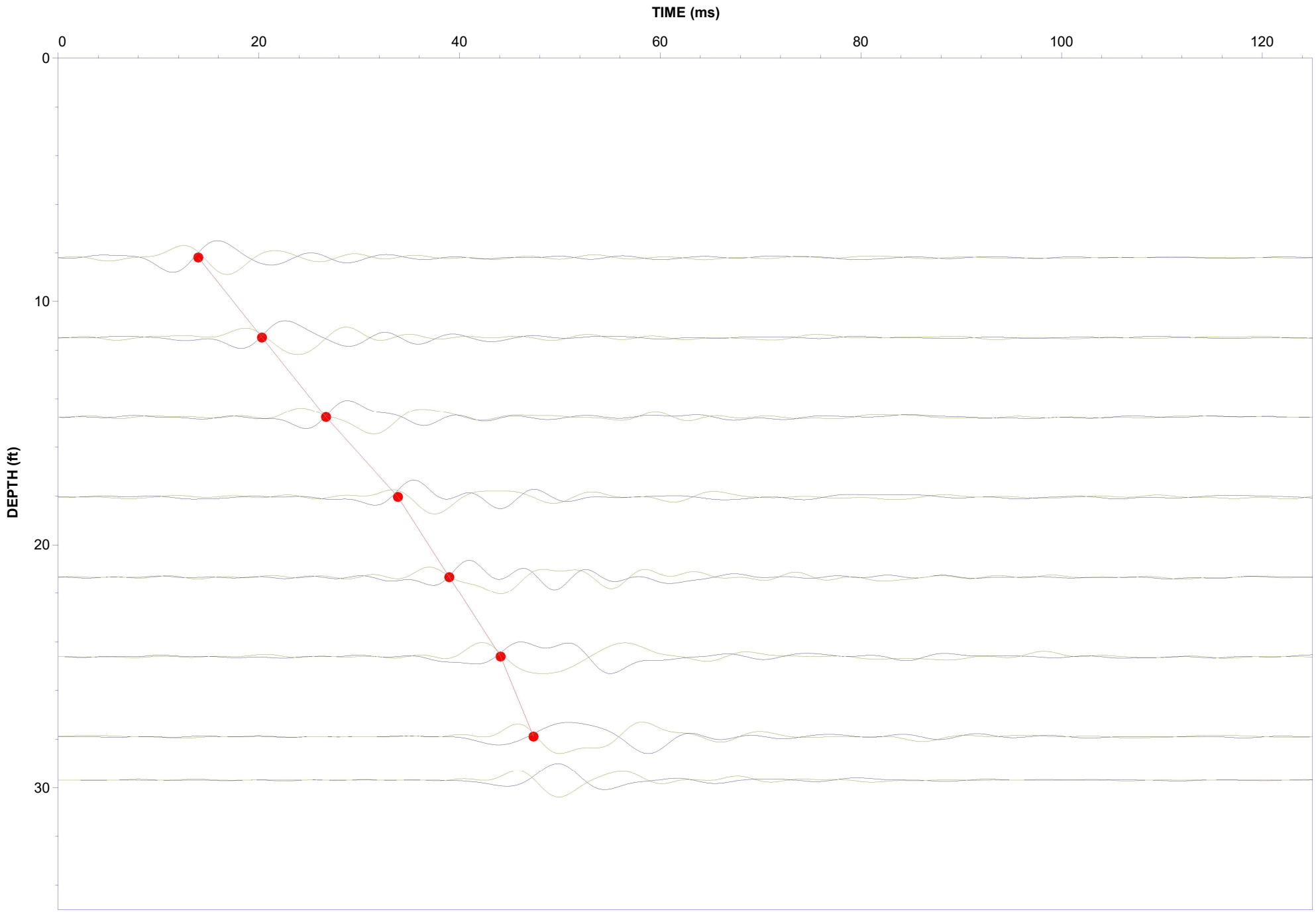
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

SCPTu Velocity Wave Traces

CONETEC

Job No: 24-59-28189	Client: Haley & Aldrich, Inc.	Project: Aberdeen SD Relocation Site 1	Analysis: Shear Wave	Sounding: CPT-04
Filter: BP 0 - 200 Hz	Date: 2024-08-22	Cone: 855:T1500F15U35		



SUPPORTING DOCUMENTS AND MATERIALS

The documents and materials listed below are included in the report:

- **Methodology Statements**
- **Cone Penetration Digital File Formats**
- **Description of Methods for Calculated CPTu Geotechnical Parameters**
- **Calibration Records**

Methodology Statements

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METHODOLOGY STATEMENTS



CONE PENETRATION TEST (CPTu) - eSeries

Cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd., a subsidiary of ConeTec.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and two geophone sensors for recording seismic signals. All signals are amplified and measured with minimum sixteen-bit resolution down hole within the cone body, and the signals are sent to the surface using a high bandwidth, error corrected digital interface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The specific piezocone used for each test is described in the CPT summary table. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 millimeters diameter over a length of 32 millimeters with tapered leading and trailing edges) located at a distance of 585 millimeters above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is six millimeters thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. ConeTec's calibration criteria also meets or exceeds those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

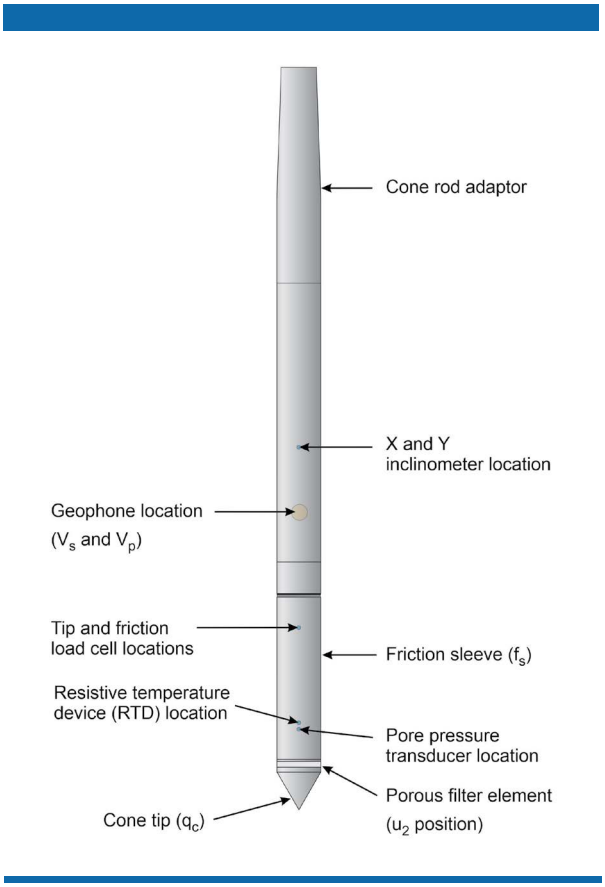


Figure CPTu. Piezocone Penetrometer (15 cm²)

The ConeTec data acquisition system consists of a Windows based computer, signal interface box, and power supply. The signal interface combines depth increment signals, seismic trigger signals and the downhole digital data. This combined data is then sent to the Windows based computer for collection and presentation. The data is recorded at fixed depth increments using a depth encoder that is either portable or integrated into the rig. The typical recording interval is 2.5 centimeters; custom recording intervals are possible.

The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPTu operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of two centimeters per second, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil under vacuum pressure prior to use
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of piezocone data for this report is based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson, P.K., 2010. The Soil Behavior Type (SBT) classification chart developed by Robertson, P.K., 2010 is presented in Figure SBT. It should be noted that it is not always possible to accurately identify a soil behavior type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

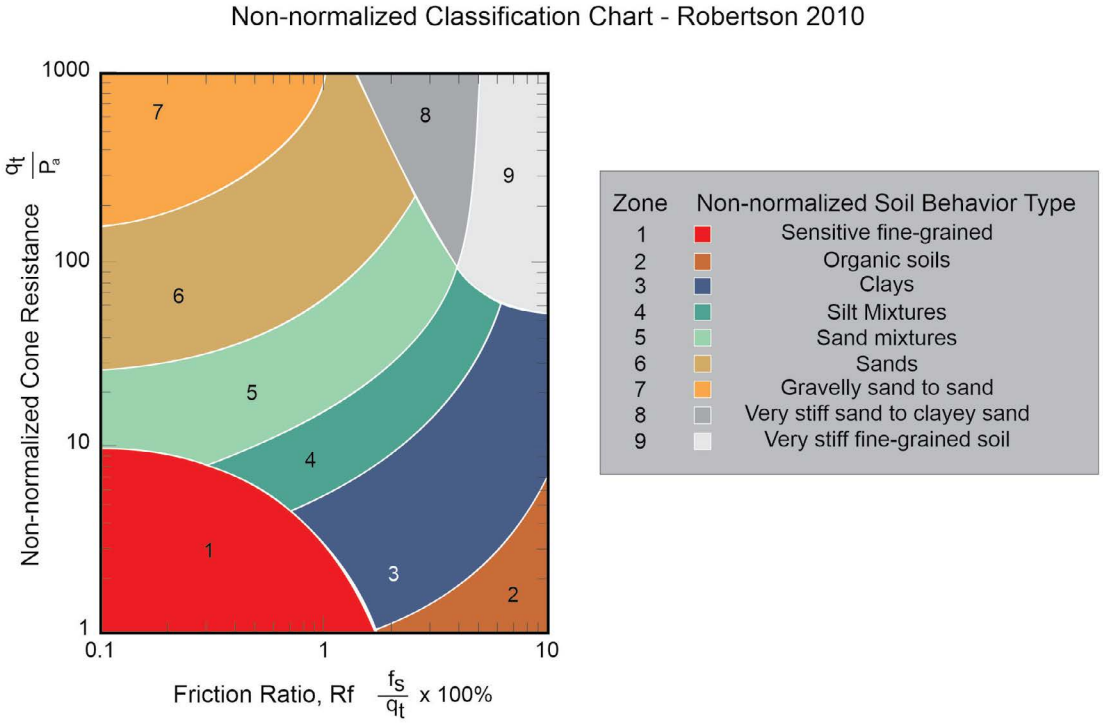


Figure SBT. Non-Normalized Soil Behavior Type Classification Chart (SBT)

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al. (1986):

$$q_t = q_c + (1-a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (Rf) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

For additional information on CPTu interpretations and calculated geotechnical parameters, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

REFERENCES

ASTM D5778-20, 2020, “Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils”, ASTM International, West Conshohocken, PA. DOI: 10.1520/D5778-20.

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Robertson, P.K., 2010. Soil behavior type from the CPT: an update. 2nd International Symposium on Cone Penetration Testing, CPT’10, Huntington Beach, CA, USA

PORE PRESSURE DISSIPATION TEST

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

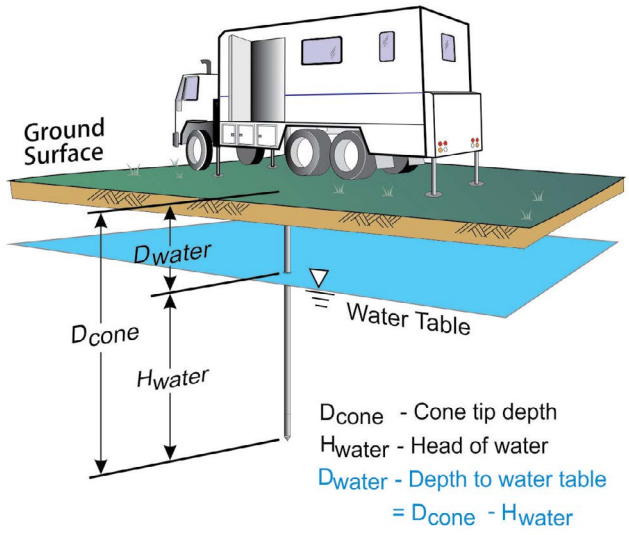


Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behavior.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

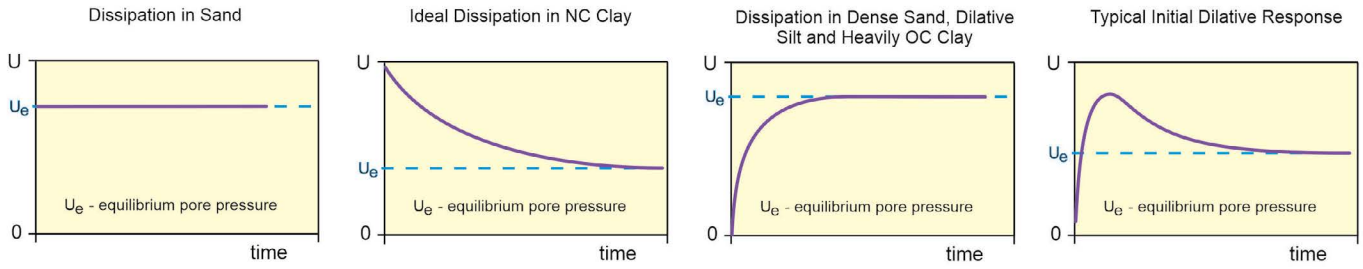


Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve in Figure PPD-2.



SEISMIC CONE PENETRATION TEST (SCPTu) - eSeries

Shear wave velocity (Vs) testing is performed in conjunction with the piezocone penetration test (SCPTu) in order to collect interval velocities. For some projects seismic compression wave velocity (Vp) testing is also performed.

ConeTec's piezocone penetrometers are manufactured with one horizontally active geophone (28 hertz) and one vertically active geophone (28 hertz). Both geophones are rigidly mounted in the body of the cone penetrometer, 0.2 meters behind the cone tip. The vertically mounted geophone is more sensitive to compression waves.

Shear waves are typically generated by using an impact hammer horizontally striking a beam that is held in place by a normal load. In some instances, an auger source or an imbedded impulsive source may be used for both shear waves and compression waves. The hammer and beam act as a contact trigger that initiates the recording of the seismic wave traces. For impulsive devices an accelerometer trigger may be used. The traces are recorded in the memory of the cone using a fast analog to digital converter. The seismic trace is then transmitted digitally uphole to a Windows based computer through a signal interface box for recording and analysis. An illustration of the shear wave testing configuration is presented in Figure SCPTu-1.

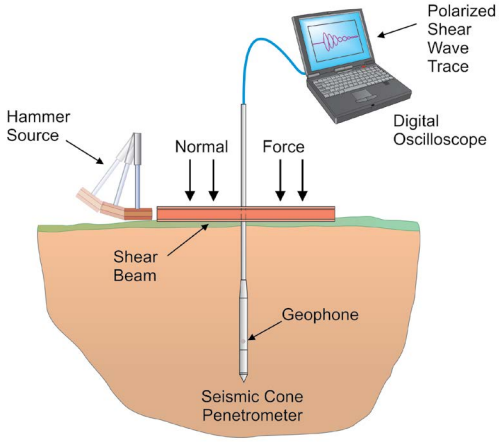


Figure SCPTu-1. Illustration of the SCPTu system

All testing is performed in accordance to ConeTec's SCPTu operating procedures which are in general accordance with the current ASTM D5778 and ASTM D7400 standards.

Prior to the start of a SCPTu sounding, the procedures described in the Cone Penetration Test section are followed. In addition, the active axis of the geophone is aligned parallel to the beam (or source) and the horizontal offset between the cone and the source is measured and recorded.

Prior to recording seismic waves at each test depth, cone penetration is stopped and the rods are decoupled from the rig to avoid transmission of rig energy down the rods. Typically, five wave traces for each orientation are recorded for quality control and uncertainty analysis purposes. After reviewing wave traces for consistency the cone is pushed to the next test depth (typically one meter intervals or as requested by the client). Figure SCPTu-2 presents an illustration of a SCPTu test.

For additional information on seismic cone penetration testing refer to Robertson et al. (1986).

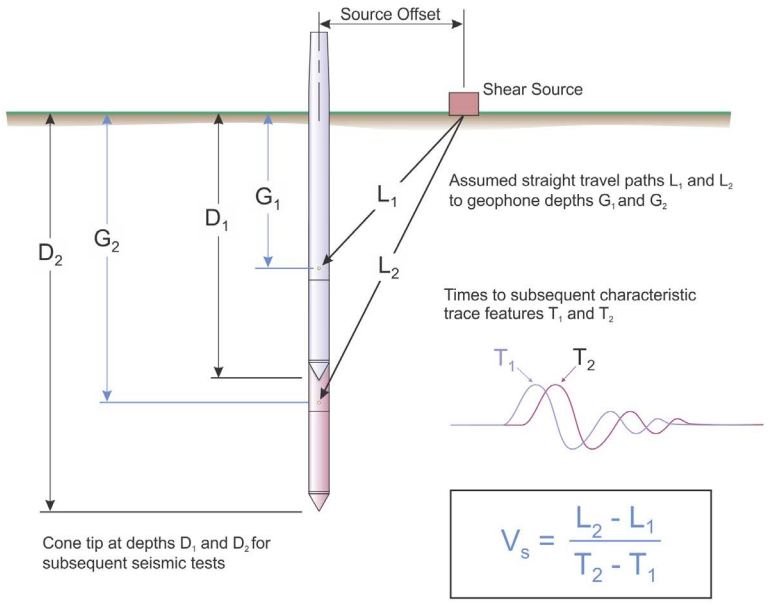


Figure SCPTu-2. Illustration of a seismic cone penetration test

For the determination of interval travel times the wave traces from all depths are displayed in analysis software. The results of the interval picks are supplied in the relevant appendix of this report. Standard practice for ConeTec is to record five wave traces for each source direction at each test depth. Outlier impacts are identified in the field and the impacts are repeated. For the final wave trace profile, the traces are stacked in the time domain to display a single average trace.

Calculation of the interval velocities are performed by visually picking a common feature (e.g. the first characteristic peak, trough, or crossover) on all of the recorded wave sets and taking the difference in ray path divided by the time difference between subsequent features. Ray path is defined as the straight line distance from the seismic source to the geophone, accounting for beam offset, source depth and geophone offset from the cone tip.

In some cases, usually for shear wave velocity testing, more than one characteristic marker may be used. If there is an overlap between different sets of characteristic markers, then the average time value for those sets of interval times is applied to the determination of velocity.

Ideally, all depths are used for the determination of the velocity profile. However, an interval may be skipped if there is some ambiguity or quality concern with a particular depth, resulting in a larger interval.

Tabular velocity results and SCPTu plots are presented in the relevant appendix.

For all SCPTu soundings that have achieved a depth of at least 100 feet (30 meters), the average shear wave velocity to a depth of 100 feet ($\overline{v}_S$) has been calculated and provided for all applicable soundings using the following equation presented in ASCE (2010).

$$\bar{v}_s = \frac{\sum_{i=1} d_i}{\sum_{i=1}^{n} \frac{d_i}{v_{si}}}$$

where: $\bar{v}_s$ = average shear wave velocity ft/s (m/s)
d_i = the thickness of any layer between 0 and 100 ft (30 m)
v_{si} = the shear wave velocity in ft/s (m/s)
$\sum_{i=1}^{n} d_i$ = the total thickness of all layers between 0 and 100 ft (30 m)

Average shear wave velocity, $\bar{v}_s$ is also referenced to V_{s100} or V_{s30}.

The layer travel times refers to the travel times propagating in the vertical direction, not the measured travel times from an offset source.

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ASTM D7400/D7400M-19, 2019, "Standard Test Methods for Downhole Seismic Testing", ASTM International, West Conshohocken, PA. DOI: 10.1520/D7400_D7400M-19.

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Cone Penetration Digital File Formats

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CONE PENETRATION DIGITAL FILE FORMATS - eSeries

CPT Data Files (COR Extension)

ConeTec CPT data files are stored in ASCII text files that are readable by almost any text editor. ConeTec file names start with the job number (which includes the two digit year number) an underscore as a separating character, followed by two letters based on the type of test and the sounding ID. The last character position is reserved for an identifier letter (such as b, c, d etc) used to uniquely distinguish multiple soundings at the same location. The CPT sounding file has the extension COR. As an example, for job number 21-02-00001 the first CPT sounding will have file name 21-02-00001_CP01.COR

The sounding (COR) file consists of the following components:

1. Two lines of header information
2. Data records
3. End of data marker
4. Units information

Header Lines

Line 1: Columns 1-6 may be blank or may indicate the version number of the recording software
Columns 7-21 contain the sounding Date and Time (Date is MM:DD:YY)
Columns 23-38 contain the sounding Operator
Columns 51-100 contain extended Job Location information

Line 2: Columns 1-16 contain the Job Location
Columns 17-32 contain the Cone ID
Columns 33-47 contain the sounding number
Columns 51-100 may contain extended sounding ID information

Data Records

The data records contain 4 or more columns of data in floating point format. A comma and spaces separate each data item:

Column 1: Sounding Depth (meters)
Column 2: Tip (q_c), recorded in units selected by the operator
Column 3: Sleeve (f_s), recorded in units selected by the operator
Column 4: Dynamic pore pressure (u), recorded in units selected by the operator
Column 5: Empty or may contain other requested data such as Gamma, Resistivity or UVIF data

End of Data Marker

After the last line of data there is a line containing an ASCII 26 (CTL-Z) character (small rectangular shaped character) followed by a newline (carriage return / line feed). This is used to mark the end of data.

Units Information

The last section of the file contains information about the units that were selected for the sounding. A separator bar makes up the first line. The second line contains the type of units used for depth, q_c, f_s and u. The third line contains the conversion values required for ConeTec's software to convert the recorded data to an internal set of base units (bar for q_c, bar for f_s and meters for u). Additional lines intended for internal ConeTec use may appear following the conversion values.

CPT Data Files (XLS Extension)

Excel format files of ConeTec CPT data are also generated from corresponding COR files. The XLS files have the same base file name as the COR file with a -BSC suffix. The information in the file is presented in table format and contains additional information about the sounding such as coordinate information, and tip net area ratio.

The BSCI suffix is given to XLS files which are enhanced versions of the BSC files and include the same data records in addition to inclination data collected for each sounding.

CPT Dissipation Files (XLS Extension)

Pore pressure dissipation files are provided in Excel format and contain each dissipation trace that exceeds a minimum duration (selected during post-processing) formatted column wise within the spreadsheet. The first column (Column A) contains the time in seconds and the second column (Column B) contains the time in minutes. Subsequent columns contain the dissipation trace data. The columns extend to the longest trace of the data set.

Detailed header information is provided at the top of the worksheet. The test depth in meters and feet, the number of points in the trace and the particular units are all presented at the top of each trace column.

CPT Dissipation files have the same naming convention as the CPT sounding files with a "–PPD" suffix.

Data Records

Each file will contain dissipation traces that exceed a minimum duration (selected during post-processing) in a particular column. The dissipation pore pressure values are typically recorded at varying time intervals throughout the trace; rapidly to start and increasing as the duration of the test lengthens. The test depth in meters and feet, the number of points in the trace and the trace number are identified at the top of each trace column.

Cone Type Designations

Cone ID	Cone Description	Tip Cross Sect. Area (cm^2)	Tip Capacity (bar)	Sleeve Area (cm^2)**	Sleeve Capacity (bar)	Pore Pressure Capacity (bar)
EC###	A15T1500F15U35	15	1500	225	15	35
EC###	A15T375F10U35	15	375	225	10	35
EC###	A10T1000F10U35	10	1000	150	10	35

refers to the Cone ID number
**Outer Cylindrical Area

Description of Methods for Calculated CPT Geotechnical Parameters

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CALCULATED CPT GEOTECHNICAL PARAMETERS

A Detailed Description of the Methods Used in ConeTec's CPT Geotechnical Parameter Calculation and Plotting Software



Revision SZW-Rev 18

Revised February 10, 2023
Prepared by Jim Greig, M.A.Sc, P.Eng (BC, AB, ON)

Limitations

The geotechnical parameter output was prepared specifically for the site and project named in the accompanying report subject to objectives, site conditions and criteria provided to ConeTec by the client. The output may not be relied upon by any other party or for any other site without the express written permission of ConeTec Group (ConeTec) or any of its affiliates. For this project, ConeTec has provided site investigation services, prepared factual data reporting and produced geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

To understand the calculations that have been performed and to be able to reproduce the calculated parameters the user is directed to the basic descriptions for the methods in this document and the detailed descriptions and their associated limitations and appropriateness in the technical references cited for each parameter.

ConeTec's Calculated CPT Geotechnical Parameters as of February 10, 2023.

ConeTec's CPT parameter calculation and plotting routine provides a tabular output of geotechnical parameters based on current published CPT correlations and is subject to change to reflect the current state of practice. Due to drainage conditions and the basic assumptions and limitations of the correlations, not all geotechnical parameters provided are considered applicable for all soil types. The results are presented only as a guide for geotechnical use and should be carefully examined for consideration in any geotechnical design. Reference to current literature is strongly recommended. ConeTec does not warranty the correctness or the applicability of any of the geotechnical parameters calculated by the program and does not assume liability for any use of the results in any design or review. For verification purposes we recommend that representative hand calculations be done for any parameter that is critical for design purposes. The end user of the parameter output should also be fully aware of the techniques and the limitations of any method used by the program. The purpose of this document is to inform the user as to which methods were used and to direct the end user to the appropriate technical papers and/or publications for further reference.

The geotechnical parameter output was prepared specifically for the site and project named in the accompanying report subject to objectives, site conditions and criteria provided to ConeTec by the client. The output may not be relied upon by any other party or for any other site without the express written permission of ConeTec Group (ConeTec) or any of its affiliates.

The CPT calculations are based on values of tip resistance, sleeve friction and pore pressures considered at each data point or averaged over a user specified layer thickness (e.g., 0.20 m). Note that q_t is the tip resistance corrected for pore pressure effects and q_c is the recorded tip resistance. The corrected tip resistance (corrected using u_2 pore pressure values) is used for all calculations. Since all ConeTec cones have equal end area friction sleeves pore pressure corrections to sleeve friction, f_s, are not performed.

Corrected tip resistance: $q_t = q_c + (1-a) \cdot u_2$ (consistent units are required)

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure from behind the tip (u_2 position)
a is the Net Area Ratio for the cone (typically 0.80 for ConeTec cones)

The total stress calculations are based on soil unit weight values that have been assigned to the Soil Behavior Type (SBT) zones, from a user defined unit weight profile, by using a single uniform value throughout the profile, through unit weight estimation techniques described in various technical papers or from a combination of these methods. The parameter output files indicate the method(s) used.

Effective vertical overburden stresses are calculated using the total stress and equilibrium pore pressure (u_{eq} or u_o) values derived from an assumed hydrostatic distribution of pore pressures below the water table or from a user defined equilibrium pore pressure profile (typically obtained from CPT dissipation tests) or a combination of the two. For over water projects the stress effects of the column of water above the mudline are taken into account as is the appropriate unit weight of water. How this is done depends on where the instruments are zeroed (i.e. on deck or at the mudline). The parameter output files indicate the method(s) used.

A majority of parameter calculations are derived from or driven by results based on material types as determined by the various soil behavior type charts depicted in Figures 1 through 6. The parameter output files indicate the method(s) used.

The Soil Behavior Type classification chart shown in Figure 1 is the classic non-normalized SBT Chart developed at the University of British Columbia and reported in Robertson, Campanella, Gillespie and Greig (1986). Figure 2 shows the original normalized (linear method) SBTn chart developed by Robertson (1990). The Bq classification charts

shown in Figures 3a and 3b incorporate pore pressures into the SBT classification and are based on the methods described in Robertson (1990). Many of these charts have been summarized in Lunne, Robertson and Powell (1997). The Jefferies and Davies SBT chart shown in Figure 3c is based on the techniques discussed in Jefferies and Davies (1993) which introduced the concept of the Soil Behavior Type Index parameter, I_c. Take note that the I_c parameter developed by Robertson and Fear (1995) and Robertson and Wride (1998) is similar in concept but uses a slightly different calculation method than that defined by Jefferies and Davies (1993) as the latter incorporates pore pressure in their technique through the use of the Bq parameter. The normalized Qtn SBT chart shown in Figure 4 is based on the work by Robertson (2009) utilizing a variable stress ratio exponent, n, for normalization based on a slightly modified redefinition and iterative approach for I_c. The boundary curves drawn on the chart are based on the work described in Robertson (2010).

Figure 5 shows a revised 1986 SBT Chart presented to CPT'10 by Robertson (2010b). It is known as the Updated non-normalized Soil Behavior Chart (also referred to as the Rev SBT Chart (PKR2010) in our output files). This chart was produced to be more in line with all post-1986 Robertson charts having the same 9 soil type zones, a $\log_{10}$ axis for friction ratio, R_f in this case, and a unitless tip resistance axis.

Figure 6 shows a revised behavior based chart by Robertson (2016) depicting contractive-dilative zones. As the zones represent material behavior rather than soil gradation ConeTec has chosen a set of zone colors that are less likely to be confused with material type colors from previous SBT charts. These colors differ from those used by Dr. Robertson. A green palette was selected for the dilative (desirable) side of the chart and a red palette for the contractive side of the chart.

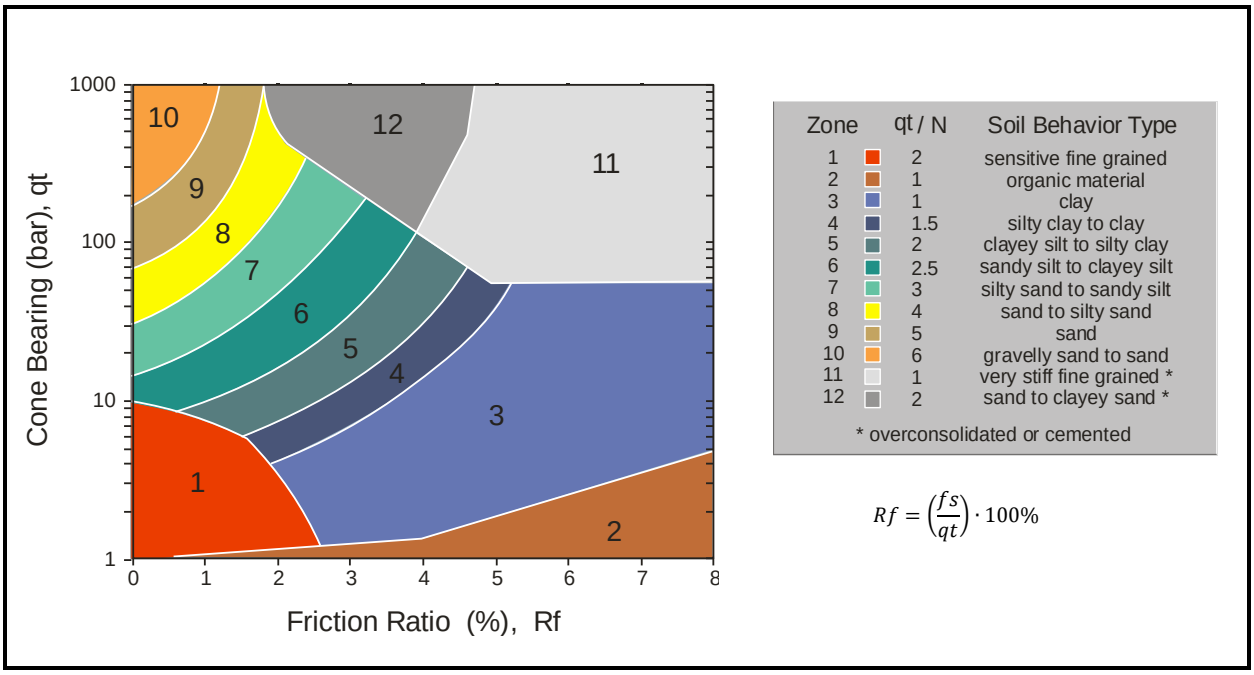


Figure 1. Non-normalized Soil Behavior Type Classification Chart (SBT)

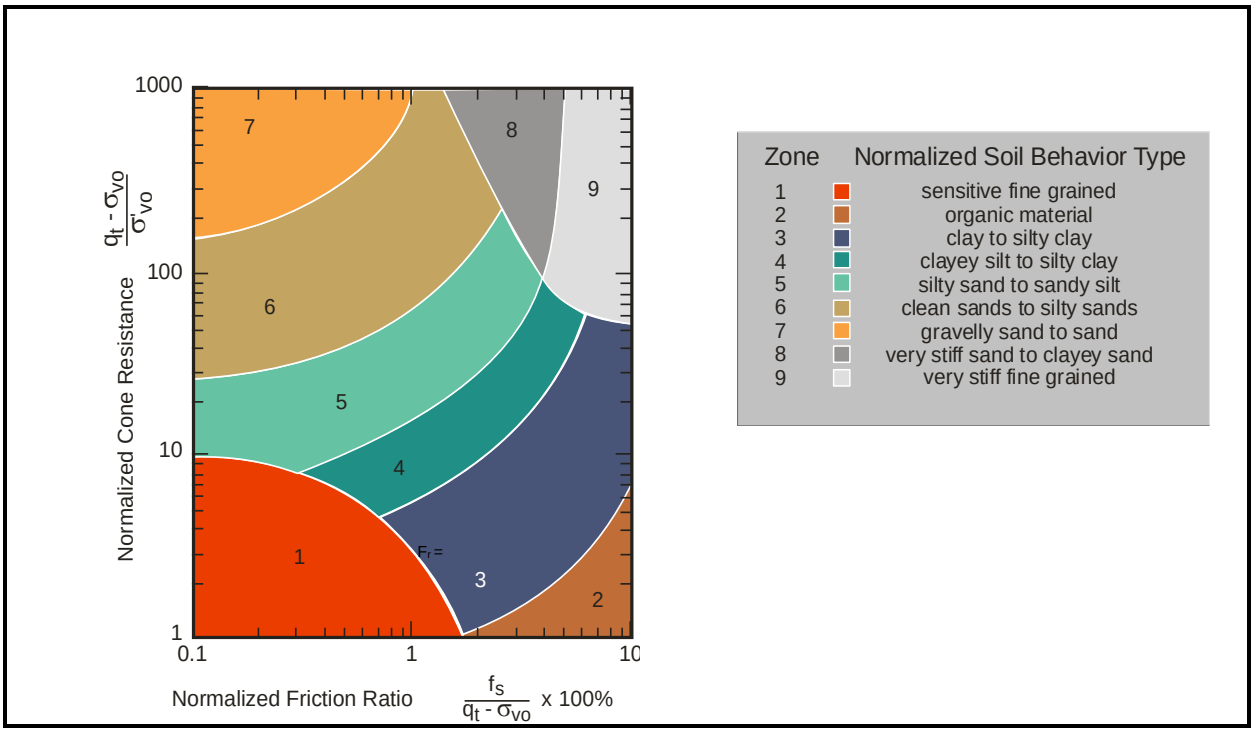


Figure 2. Normalized Soil Behavior Type Classification Chart (SBTn)

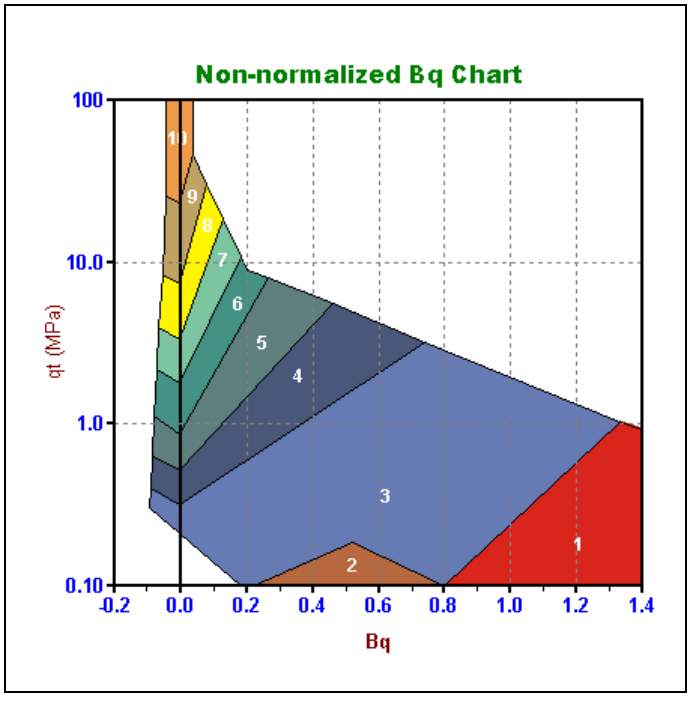


Figure 3a. Alternate Soil Behavior Type Chart (SBT Bq): q_t - B_q

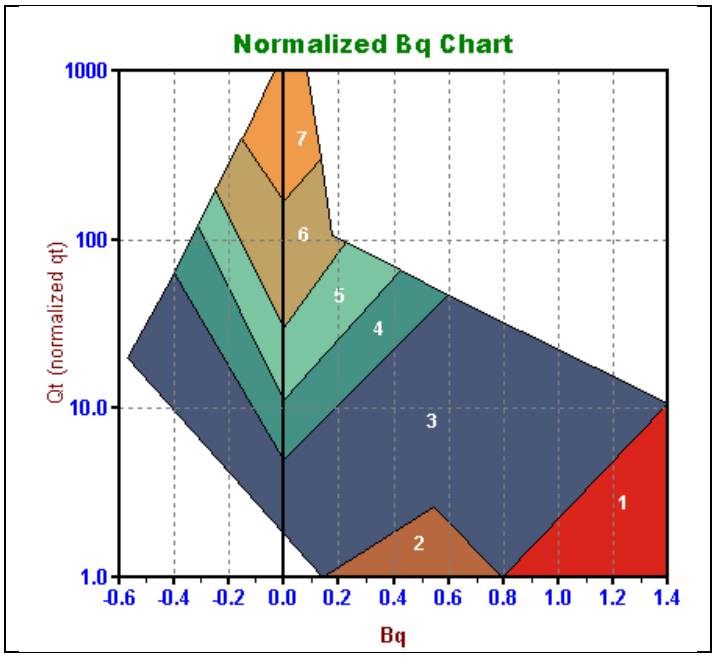


Figure 3b. Alternate Soil Behavior Type Charts (SBT Bqn): Q_t-B_q

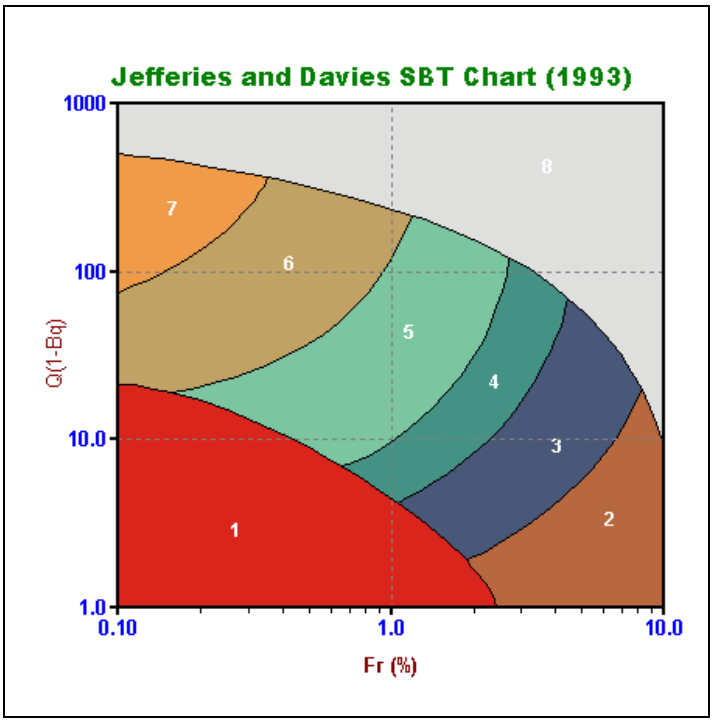


Figure 3c. Alternate Soil Behavior Type Charts: $Q(1-B_q)$ - F_r

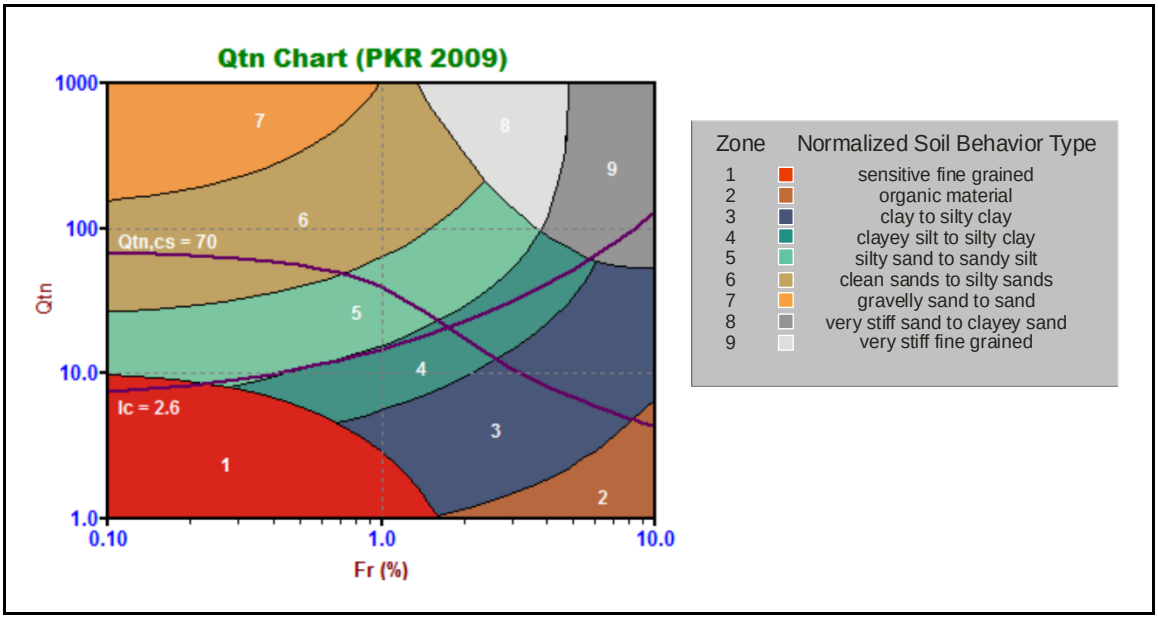


Figure 4. Normalized Soil Behavior Type Chart using Q_{tn} (SBT Qtn)

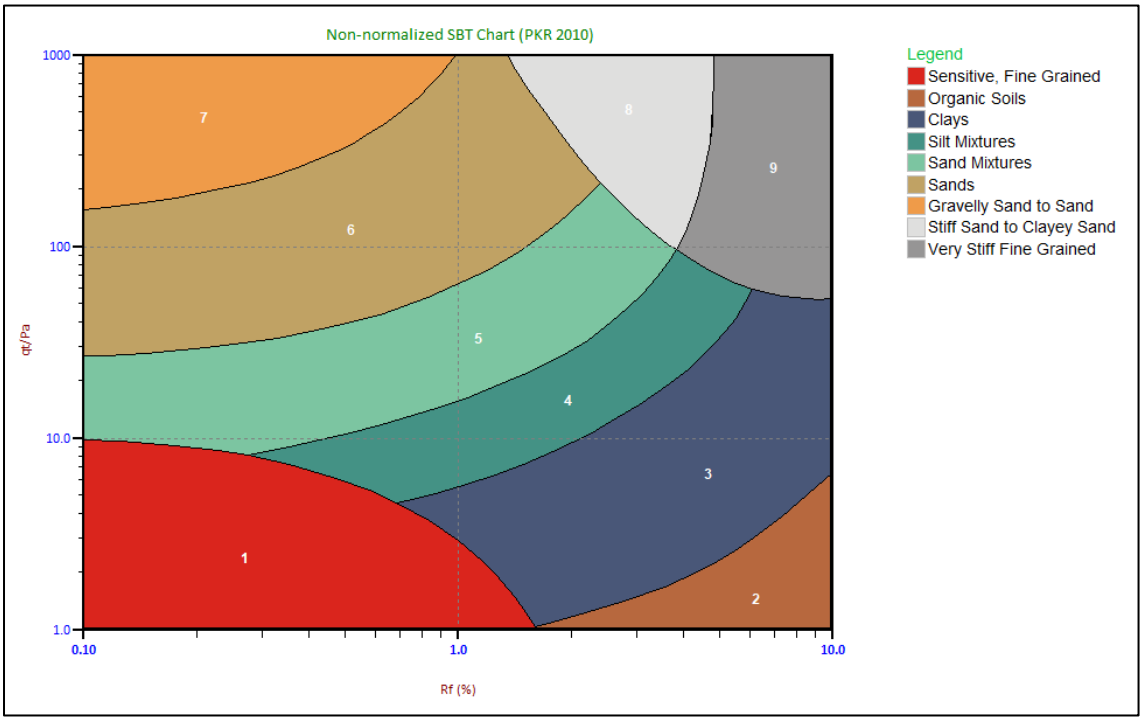


Figure 5. Non-normalized Soil Behavior Type Chart (2010)

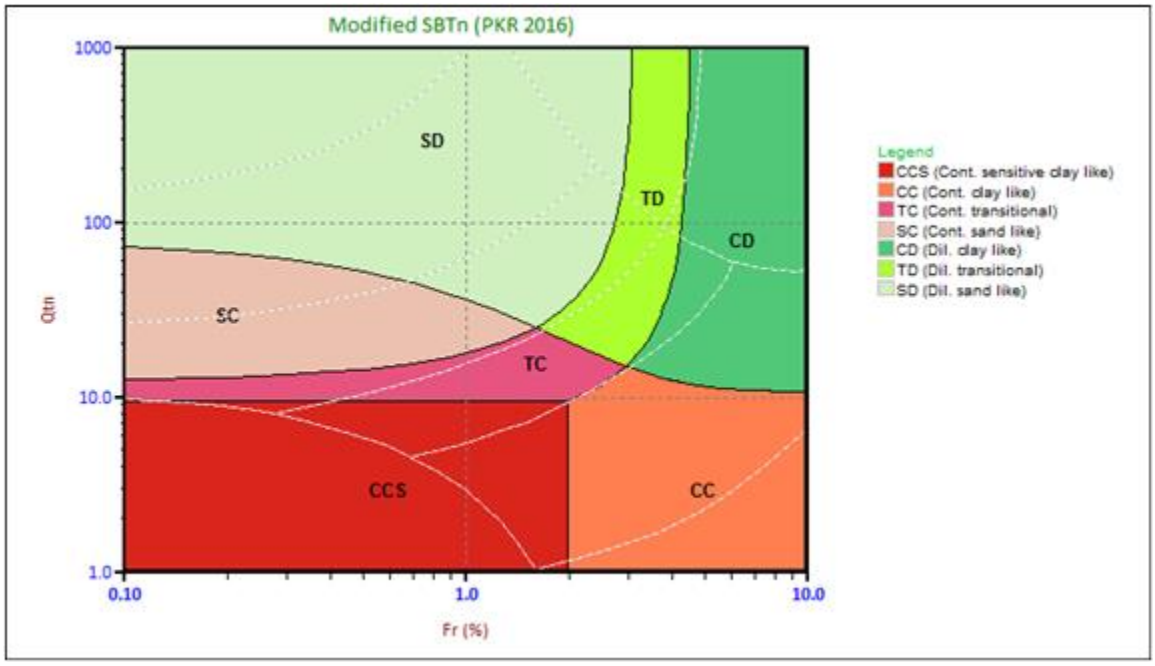


Figure 6. Modified SBTn Behavior Based Chart

Details regarding the geotechnical parameter calculations are provided in Tables 1a and 1b. The appropriate references cited are listed in Table 2. Non-liquefaction specific parameters are detailed in Table 1a and liquefaction specific parameters are detailed in Table 1b.

Where methods are based on charts or techniques that are too complex to describe in this summary, we recommend that the user refer to the cited material. Specific limitations for each method are described in the cited material.

Where the results of a calculation/correlation are deemed *'invalid'* the value will be represented by the text strings "-9999", "-9999.0", the value 0.0 (Zero) or an empty cell. Invalid results will occur because of (and not limited to) one or a combination of:

1. Invalid or undefined CPT data (e.g., drilled out section or data gap).

2. Where the calculation method is inappropriate, for example, drained parameters in a material behaving in an undrained manner (and vice versa).

3. Where input values are beyond the range of the referenced charts or specified limitations of the correlation method.

4. Where pre-requisite or intermediate parameter calculations are invalid.

The parameters selected for output from the program are often specific to a particular project. As such, not all of the calculated parameters listed in Tables 1and 1a may be included in the output files delivered with this report.

The output files are typically provided in Microsoft Excel XLS, XLSX or CSV format. The ConeTec software has several options for output depending on the number or types of calculated parameters desired or those specifically contracted for by the client. Each output file is named using the original file base name (from the .COR file) followed

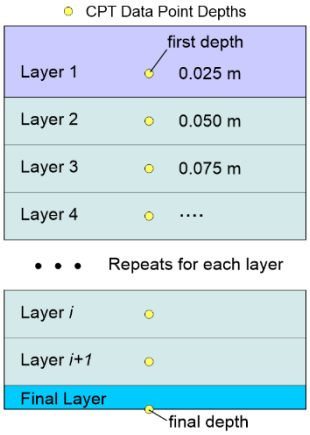
by a three or four character indicator of the output set selected (e.g. BSC, TBL, NLI, NL2, IFI, IFI2, IFI3) and possibly followed by an operator selected suffix identifying the characteristics of the particular calculation run.

Table 1a. CPT Parameter Calculation Methods – Non liquefaction Parameters

Reference Notes: CK* - Common Knowledge, U* - Unpublished

Calculated Parameter	Description	Equation	Ref
Depth	Mid Layer Depth *(where calculations are done at each point then Mid Layer Depth = Recorded Depth)*	*[Depth (Layer Top) + Depth (Layer Bottom)]/ 2.0*	CK*
Elevation	Elevation of Mid Layer is based on the sounding collar elevation supplied by the client or through a site survey In Sweden a variation of elevation is used where the elevation increases with depth. We refer to this as inverse elevation.	Elevation = Collar Elevation – Depth InverseElevation = Collar Elevation + Depth	CK* N/A
Avg qc	Averaged recorded tip value (q_c)	$Avgqc = \frac{1}{n}\sum_{i=1}^{n} q_c$ *n=1 when calculations are done at each point*	CK*
Avg qt	Averaged corrected tip (q_t) where: $q_t = q_c + (1-a)\cdot u_2$ Averaged q_t is not calculated using the average q_c and averaged u values. Averaged q_t is based on the average of the q_t values calculated at each data point.	$Avgqt = \frac{1}{n}\sum_{i=1}^{n} q_t$ *n=1 when calculations are done at each point*	1
Avg fs	Averaged sleeve friction (f_s) No pore pressure corrections are applied to f_s.	$Avgfs = \frac{1}{n}\sum_{i=1}^{n} fs$ *n=1 when calculations are done at each point*	CK*
Avg Rf	Averaged friction ratio (R_f) where friction ratio is defined as: $R_f = 100\% \cdot \frac{fs}{q_t}$	$AvgRf = 100\% \cdot \frac{Avgfs}{Avgqt}$ *not an average of individual R_f values*	CK*
Avg u	Averaged dynamic pore pressure *(u)*	$Avgu = \frac{1}{n}\sum_{i=1}^{n} u_i$ *n=1 when calculations are done at each point*	CK*
Avg Res	Averaged Resistivity (this data is not always available since it is a specialized test requiring an additional module)	$AvgRes = \frac{1}{n}\sum_{i=1}^{n} Resistivity_i$ *n=1 when calculations are done at each point*	CK*
Avg UVIF	Averaged UVIF ultra-violet induced fluorescence (this data is not always available since it is a specialized test requiring an additional module)	$AvgUVIF = \frac{1}{n}\sum_{i=1}^{n} UVIF_i$ *n=1 when calculations are done at each point*	CK*
Avg Temp	Averaged Temperature (this data is not always available)	$AvgTemp = \frac{1}{n}\sum_{i=1}^{n} Temperature_i$ *n=1 when calculations are done at each point*	CK*
Avg Gamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$AvgGamma = \frac{1}{n}\sum_{i=1}^{n} Gamma_i$ *n=1 when calculations are done at each point*	CK*
SBT	Soil Behavior Type as defined by Robertson et al 1986 (often referred to as Robertson and Campanella, 1986)	See Figure 1	1, 5
SBTn	Normalized Soil Behavior Type as defined by Robertson 1990 (linear normalization using Q_t, now referred to as Q_{t1})	See Figure 2	2, 5

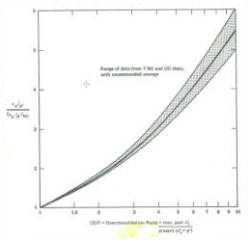
Calculated Parameter	Description	Equation	Ref
SBT-Bq	Non-normalized Soil Behavior type based on non-normalized tip resistance and the B_q parameter	See Figure 3a	1, 2, 5
SBT-Bqn	Normalized Soil Behavior type based on normalized tip resistance (Q_t, now called Q_{t1}) and the B_q parameter	See Figure 3b	2, 5
SBT-JandD	Soil Behavior Type as defined by Jeffries and Davies	See Figure 3c	7
SBT Qtn	Soil Behavior Type as defined by Robertson (2009) using a variable stress ratio exponent for normalization based on $I_{c\ (PKR\ 2009)}$	See Figure 4	15
Modified Non-normalized SBT Chart SBT (PKR2010)	This is a revised version of the simple 1986 non-normalized SBT chart (presented at CPT '10). The revised version has been reduced from 12 zones to 9 zones to be similar to the normalized Robertson charts. Other updates include a dimensionless tip resistance normalized to atmospheric pressure, q_t/P_a, on the vertical axis and a log scale for non-normalized friction ratio, R_f, along the horizontal axis.	See Figure 5	33
Modified SBTn (contractive /dilative)	Modified SBTn chart as defined by Robertson (2016) indicating zones of contractive/dilative behavior. Note that ConeTec displays the chart with colors different from Robertson. ConeTec's colors were chosen to avoid confusion with soil type descriptions.	See Figure 6	30
Unit Wt.	Unit Weight of soil determined from one of the following user selectable options: 1) uniform value 2) value assigned to each SBT zone 3) value assigned to each SBTn zone 4) value assigned to SBTn zone as determined from Robertson and Wride (1998) based on q_{c1n} 5) values assigned to SBT Qtn zones 6) values based on Robertson updated non-normalized Soil Behavior Type Chart (2010b) 6) Mayne f_s (sleeve friction) method 7) Robertson and Cabal 2010 method 8) user supplied unit weight profile The last option may co-exist with any of the other options.	See references	3, 5, 15, 21, 24, 29, 33

Calculated Parameter	Description	Equation	Ref
TStress σ_v	Total vertical overburden stress at Mid Layer Depth *A layer is defined as the averaging interval specified by the user where depths are reported at their respective mid-layer depth.* For data calculated at each point layers are defined using the recorded depth as the mid-point of the layer. Thus, a layer starts half-way between the previous depth and the current depth unless this is the first point in which case the layer start is at zero depth. The layer bottom is half-way from the current depth to the next depth unless it is the last data point. Defining layers affects how stresses are calculated since the unit weight attributed to a data point is used throughout the entire layer. This means that to calculate the stresses the total stress at the top and bottom of a layer are required. The stress at mid layer is determined by adding the incremental stress from the layer top to the mid-layer depth. The stress at the layer bottom becomes the stress at the top of the subsequent layer. Stresses are NOT calculated from mid-point to mid-point. For over-water work the total stress due to the column of water above the mud line is taken into account where appropriate.	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ *where* γ_i is layer unit weight h_i is layer thickness 	CK*
EStress σ_v'	Effective vertical overburden stress at mid-layer depth.	$\sigma_v' = \sigma_v - u_{eq}$	CK*
Equil u u_{eq} or u_0	Equilibrium pore pressures are determined from one of the following user selectable options: 1) hydrostatic below the water table 2) user supplied profile 3) combination of those above When a user supplied profile is used/provided a linear interpolation is performed between equilibrium pore pressures defined at specific depths. If the profile values start below the water table then a linear transition from zero pressure at the water table to the first defined pointed is used. Equilibrium pore pressures may come from dissipation tests, adjacent piezometers or other sources. Occasionally, an extra equilibrium point ("assumed value") will be provided in the profile that does not come from a recorded value to smooth out any abrupt changes or to deal with material interfaces. These "assumed" values will be indicated on our plots and in tabular summaries.	For the hydrostatic option: $u_{eq} = \gamma_w \cdot (D - D_{wt})$ where u_{eq} is equilibrium pore pressure γ_w is the unit weight of water D is the current depth D_{wt} is the depth to the water table	CK*
K_0	Coefficient of earth pressure at rest, K_0.	$K_O = (1 - \sin\Phi') OCR^{\sin\Phi'}$	17
C_n	Overburden stress correction factor used for $(N_1)_{60}$ and older CPT parameters.	$C_n = (P_a/\sigma_v')^{0.5}$ where $0.0 < C_n < 2.0$ *(user adjustable, typically ranging from 1.7 to 2.0)* P_a *is atmospheric pressure (100 kPa)*	4, 12

Calculated Parameter	Description	Equation	Ref
C_q	Overburden stress normalizing factor.	$C_q = 1.8 / [0.8 + (\sigma_v'/P_a)]$ where *$0.0 < C_q < 2.0$ (user adjustable)* *P_a is atmospheric pressure (100 kPa)* *Robertson and Wride define C_q to be the same as C_n. The Olson definition above is used in the program.*	3, 12
N_{60}	SPT N value at 60% energy calculated from q_t/N ratios assigned to each SBT zone. This method has abrupt N value changes at zone boundaries.	*See Figure 1*	5
$(N_1)_{60}$	SPT N_{60} value corrected for overburden pressure.	$(N_1)_{60} = C_n \bullet N_{60}$	4
$N_{60}I_c$	SPT N_{60} values based on the I_c parameter, as defined by Robertson and Wride 1998 (3), or by Robertson 2009 (15).	$(q_t/P_a)/ N_{60} = 8.5 (1 – I_c/4.6)$ $(q_t/P_a)/ N_{60} = 10^{(1.1268 – 0.2817Ic)}$ P_a being atmospheric pressure	3, 5 15, 31
$(N_1)_{60}I_c$	SPT N_{60} value corrected for overburden pressure (using N_{60} I_c). User has 3 options.	*1) $(N_1)_{60}Ic = C_n \bullet (N_{60} I_c)$* 2) $q_{c1n}/ (N_1)_{60}I_c = 8.5 (1 – I_c/4.6)$ 3) $(Q_{tn})/ (N_1)_{60}I_c = 10^{(1.1268 – 0.2817Ic)}$	4 5 15, 31
S_u or S_u (N_{kt})	Undrained shear strength based on q_t S_u factor N_{kt} is user selectable.	$Su = \frac{qt - \sigma_v}{N_{kt}}$	1, 5
S_u or S_u (N_{du}) or S_u ($N_{\Delta u}$)	Undrained shear strength based on pore pressure S_u factor $N_{\Delta u}$ is user selectable.	$Su = \frac{u_2 - u_{eq}}{N_{\Delta u}}$	1, 5
D_r	Relative Density determined from one of the following user selectable options: 1) Ticino Sand 2) Hokksund Sand 3) Schmertmann (1978) 4) Jamiolkowski (1985) - All Sands 5) Jamiolkowski et al (2003) (various compressibilities, K_o)	See reference (methods 1 through 4) Jamiolkowski et al (2003) reference	5 14
PHI ϕ	Friction Angle determined from one of the following user selectable options (methods 1 through 4 are for sands and method 5 is for silts and clays): 1) Campanella and Robertson 2) Durgunoglu and Mitchel 3) Janbu 4) Kulhawy and Mayne 5) NTH method (clays and silts)	See appropriate reference	5 5 5 11 23
Delta U/q_t $\Delta u/q_t$ du/q_t	Differential pore pressure ratio (older parameter used before B_q was established)	$= \frac{\Delta u}{qt}$ *where:* $\Delta u = u - u_{eq}$ *and u = dynamic pore pressure* *u_{eq} = equilibrium pore pressure*	39

Calculated Parameter	Description	Equation	Ref
B_q	Pore pressure parameter	$Bq = \frac{\Delta u}{qt - \sigma_v}$ where: $\Delta u = u - u_{eq}$ *and* u *= dynamic pore pressure* u_{eq} *= equilibrium pore pressure*	1, 2, 5
Net q_t or qtNet	Net tip resistance (used in many subsequent correlations)	$qt - \sigma_v$	36
q_e or qE or q_E	Effective tip resistance (using the dynamic pore pressure u_2 and not equilibrium pore pressure)	$q_t - u_2$	36
qeNorm	Normalized effective tip resistance	$\frac{qt - u_2}{\sigma_v'}$	36
Q_t or Norm: Qt or Q_{t1}	Normalized q_t for Soil Behavior Type classification as defined by Robertson (1990) using a linear stress normalization. Note this is different from Q_{tn}. This parameter was renamed to Q_{t1} in Robertson, 2009. Without normalization limits this parameter calculates to very high unrealistic values at low stresses.	$Qt = \frac{qt - \sigma_v}{\sigma_v'}$	2, 5, 15
F_r or Norm: Fr	Normalized Friction Ratio for Soil Behavior Type classification as defined by Robertson (1990)	$Fr = 100\% \cdot \frac{fs}{qt - \sigma_v}$	2, 5
Q(1-B_q) Q(1-B_q) + 1	Q(1-B_q) grouping as suggested by Jefferies and Davies for their classification chart and the establishment of their I_c parameter. Later papers added the +1 term to the equation.	$Q \cdot (1 - Bq)$ $Q \cdot (1 - Bq) + 1$ *where Bq is defined as above and Q is the same as the normalized tip resistance,* Q_{t1}*, defined above*	6, 7, 34
q_{c1}	Normalized tip resistance, q_{c1}, using a fixed stress ratio exponent, n (this method has stress units)	$q_{c1} = q_t \cdot (Pa/\sigma_v')^{0.5}$ where: P_a = atmospheric pressure	21
q_{c1} (0.5)	Normalized tip resistance, q_{c1}, using a fixed stress ratio exponent, n (this method is unit-less)	$q_{c1}(0.5) = (q_t/P_a) \cdot (Pa/\sigma_v')^{0.5}$ where: P_a = atmospheric pressure	5
q_{c1} (C_n)	Normalized tip resistance, q_{c1}, based on C_n (this method has stress units)	$q_{c1}(Cn) = C_n * q_t$	5, 12
q_{c1} (C_q)	Normalized tip resistance, q_{c1}, based on C_q (this method has stress units)	$q_{c1}(Cq) = C_q * q_t$ (some papers use q_c)	5, 12
q_{c1n}	normalized tip resistance, q_{c1n}, using a variable stress ratio exponent, n (where n=0.0, 0.70, or 1.0) (this method is unit-less)	$q_{c1n} = (q_t / P_a)(P_a/\sigma_v')^n$ where: P_a = atm. Pressure and n varies as described below	3

Calculated Parameter	Description	Equation	Ref
I_c or Ic (RW1998)	Soil Behavior Type Index as defined by Robertson and Wride (1997, 1998) for estimating grain size characteristics and providing smooth gradational changes across the SBTn chart. Ic(RW1998) is different from that of Jefferies and Davies (7) and is different from Ic(PKR2009).	$I_c = [(3.47 - \log_{10}Q)^2 + (\log_{10} Fr + 1.22)^2]^{0.5}$ *Where:* $Q = \left(\frac{qt - \sigma_v}{P_a}\right)\left(\frac{P_a}{\sigma_v'}\right)^n$ *Or* $Q = q_{c1n} = \left(\frac{qt}{P_a}\right)\left(\frac{P_a}{\sigma_v'}\right)^n$ *depending on the iteration in determining I_c* *And Fr is in percent* *P_a = atmospheric pressure* *n has the following distinct values:* *0.5, 0.75 and 1.0* *and is determined in an iterative manner based on the resulting I_c in each iteration* *Note that NCEER replaced 0.75 with 0.70*	3, 4, 5 10
I_c (PKR 2009)	Soil Behavior Type Index, I_c (PKR 2009) is based on a variable stress ratio exponent n, which itself is based on I_c (PKR 2009). An iterative calculation is required to determine I_c (PKR 2009) and its corresponding n (PKR 2009).	*I_c (PKR 2009) =* *$[(3.47 - \log_{10}Q_{tn})^2 + (1.22 + \log_{10}F_r)^2]^{0.5}$*	15
n (PKR 2009)	Stress ratio exponent n, based on I_c (PKR 2009). An iterative calculation is required to determine n (PKR 2009) and its corresponding I_c (PKR 2009).	*n (PKR 2009) = 0.381 (I_c) + 0.05 (σ_v'/P_a) – 0.15*	15
Q_{tn} (PKR 2009)	Normalized tip resistance using a variable stress ratio exponent based on I_c (PKR 2009) and n (PKR 2009). An iterative calculation is required to determine Q_{tn} (PKR 2009).	*$Q_{tn} = [(qt - \sigma_v)/P_a](P_a/\sigma_v')^n$* *where P_a = atmospheric pressure (100 kPa)* *n = stress ratio exponent described above*	15
FC	Apparent fines content (%)	*FC=1.75($Ic^{3.25}$) - 3.7* *FC=100 for $I_c > 3.5$* *FC=0 for $I_c < 1.26$* *FC = 5% if $1.64 < I_c < 2.6$ AND $F_r<0.5$*	3
I_c Zone	This parameter is the Soil Behavior Type zone based on the I_c parameter (valid for zones 2 through 7 on SBTn or SBT Qtn charts)	$I_c < 1.31$ Zone = 7 $1.31 < I_c < 2.05$ Zone = 6 $2.05 < I_c < 2.60$ Zone = 5 $2.60 < I_c < 2.95$ Zone = 4 $2.95 < I_c < 3.60$ Zone = 3 $I_c > 3.60$ Zone = 2	3
CD	The contractive / dilative boundary on Robertson's Modified SBTn (contractive/dilative) Chart shown in Figure 6 above. The boundary is marked as CD = 70 on the chart in the relevant paper. Similar to the $Q_{tn,cs}$ = 70 line in Figure 4.	$CD = 70 = (Q_{tn} - 11)(1 + 0.06F_r)^{17}$ lower bound of CD = 60: $CD = 60 = (Q_{tn} - 9.5)(1 + 0.06F_r)^{17}$	30

Calculated Parameter	Description	Equation	Ref
I_B	Hyberbolic fit defining the boundary between SBT soil types proposed by Schneider as a better fit than the I_c circles. I_B = 32 represents the boundary for most sand like soils. I_B = 22 represents the upper boundary for most clay like soils. The region between I_B=22 and I_B=32 is the "transitional soil" zone.	$I_B = 100\ (Q_{tn} + 10) / (70 + Q_{tn}\ F_r)$	30
State Param or State Parameter or ψ	The state parameter index, ψ, is defined as the difference between the current void ratio, e, and the critical void ratio, e_c. Positive ψ - contractive soil Negative ψ - dilative soil This is based on the work by Been and Jefferies (1985) and Plewes, Davies and Jefferies (1992) This method uses mean normal stresses based on a uniform value of K_0 or a calculated K_0 using methods described elsewhere in this document	See reference	6, 8
Yield Stress σ_p'	Yield stress is calculated using the following methods 1) General method 2) 1st order approximation using q_tNet (clays) 3) 1st order approximation using Δu_2 (clays) 4) 1st order approximation using q_e (clays) 5) Based on Vs	All stresses in kPa 1) $\sigma_p' = 0.33 \cdot (q_t - \sigma_v)^{m'} (\sigma_{atm}/100)^{1-m'}$ where $m' = 1 - \frac{0.28}{1 + (I_c / 2.65)^{25}}$ 2) $\sigma_p' = 0.33 \cdot (q_t - \sigma_v)$ 3) $\sigma_p' = 0.54 \cdot (\Delta u_2)$ $\Delta u_2 = u_2 - u_0$ 4) $\sigma_p' = 0.60 \cdot (q_t - u_2)$ 5) $\sigma_p' = (Vs/4.59)^{1.47}$	19 20 20 20 18
OCR OCR(JS1978) YSR(Mayne2014) YSR (qtNet) YSR (deltaU) YSR (qe) YSR (Vs) OCR (PKR2015)	Over Consolidation Ratio based on 1) Schmertmann (1978) method involving a plot plot of S_u/σ_v' /($S_u/\sigma_v')_{NC}$ and OCR  2) based on Yield stresses described above 3) approximate version based on qtNet 4) approximate version based on Δu 5) approximate version based on effective tip, q_e 6) approximate version based on shear wave velocity, V_s and σ_v' 7) based on Qt	1) requires a user defined value for NC Su/P_c' ratio 2 through 5) *based on yield stresses* 6) YSR (Vs) = $\sigma_p'(Vs) / \sigma_v'$ 7) OCR = $0.25 \cdot (Qt)^{1.25}$	9 19 20 20 20 18 32
Es/qt	Intermediate parameter for calculating Young's Modulus, E, in sands. It is the Y axis of the reference chart. Note that Figured 5.59 from reference 5, Lunne, Robertson and Powell, (LRP) has an error. The X axis values are too high by a factor of 10. The plot is based on Baldi's (not Bellotti as cited in	Based on Figure 5.59 in the reference	5, 37

Calculated Parameter	Description	Equation	Ref
	LRP) original Figure 3 where the X axis is: $\frac{q_c}{\sqrt{\sigma_v'}}$ (both in kPa) with a range of 200 to 3000. Figure 5.59 from LRP shows a dimensionless form of the equation, q_{c1}, displaying the same range of values. Figure 5.59's X axis uses $q_{c1} = \left(\frac{q_c}{P_a}\right)\left(\frac{P_a}{\sigma_v'}\right)^{0.5}$ The two expressions are not the same: they differ by a factor of $\frac{\sqrt{P_a}}{P_a}$. With P_a taken to be 100 kPa the factor is 1/10. Substituting typical values of 200 bar (20000 kPa) for q_c and 225 kPa for σ_v' one gets: 20000 / 15 = 1333.33 for Bellotti's axis and $(200/1)(100/225)^{0.5}$ = 200 * (10/15) = 133.3 for LRP's axis (noting that P_a = 1 bar) showing a factor of 10 difference.		
Es or E_s Young's Modulus E	Young's Modulus based on the work done in Italy. There are three types of sands considered in this technique. The user selects the appropriate type for the site from: a) OC Sands b) Aged NC Sands c) Recent NC Sands Each sand type has a family of curves that depend on mean normal stress. The program calculates mean normal stress and linearly interpolates between the two extremes provided in the E_s/q_t chart. E_s is evaluated for an axial strain of 0.1%.	Mean normal stress is evaluated from: $\sigma_m' = \frac{1}{3}(\sigma_v' + \sigma_h' + \sigma_h')$ where σ_v'= vertical effective stress σ_h'= horizontal effective stress *and* $\sigma_h = K_o \cdot \sigma_v'$ with K_o assumed to be 0.5	5
Delta U/TStress $\Delta u / \sigma_v$	Differential pore pressure ratio with respect to total stress	$= \frac{\Delta u}{\sigma_v}$ *where:* $\Delta u = u - u_{eq}$	39
Delta U/EStress, P Value, Excess Pore Pressure Ratio $\Delta u/\sigma_v'$	Differential pore pressure ratio with respect to effective stress. Key parameter (P, Normalized Pore Pressure Parameter, Excess Pore Pressure Ratio) in the Winckler et. al. static liquefaction method.	$= \frac{\Delta u}{\sigma_v'}$ *where:* $\Delta u = u - u_{eq}$	25, 25a
Su/EStress S_u/σ_v'	Undrained shear strength ratio with respect to vertical effective overburden stress using the S_u (N_{kt}) method	= *Su* (N_{kt}) / σ_v'	9, 23
Vs or V_s	Recorded shear wave velocities (not estimated). The shear wave velocities are typically collected over 1 m depth intervals. Each data point over the relevant depth range is assigned the same V_s value.	recorded data	27
Vp or V_p	Recorded compression wave (or P wave) velocities (not estimated). The P wave velocities are typically collected over 1 m depth intervals. Each data point over the relevant depth range is assigned the same V_p value.	recorded data	27

Calculated Parameter	Description	Equation	Ref
V_{s30} V_{s100}	The average shear wave velocity of the near surface materials to a depth of 30 m (100 ft). It is based on the sum of all travel times through all layers in the top 30m (100 ft). V_{s100} is the same calculation as V_{s30} except down to a depth of 100 feet.	$V_{s30} = \frac{total\ thickness\ of\ all\ layers\ to\ 30\ m}{\Sigma\left(\frac{layer\ thickness}{layer\ shear\ wave\ velocity}\right)}$ $V_{s30} = \frac{total\ thickness\ of\ all\ layers\ to\ 30\ m}{\Sigma\ (layer\ travel\ times)}$	38
G_{max}	G_{max} determined from SCPT shear wave velocities (not estimated values). Note that seismic data (V_s) is collected over set depth intervals (typically 1 meter). Each data point over the test segment is assigned the same V_s value. Since soil density changes with depth, slightly different G_{max} values may be calculated over the test depth interval.	$G_{max} = \rho V_s^2$ where ρ is the mass density of the soil determined from the estimated unit weights at each test depth	27
qtNet/G_{max}	Net tip resistance ratio with respect to the small strain modulus G_{max} determined from SCPT shear wave velocities (not estimated values)	$= (qt - \sigma_v) / G_{max}$ where $G_{max} = \rho V_s^2$ and ρ is the mass density of the soil determined from the estimated unit weights at each test depth	15, 28, 30
qUlt	A site specific and client specific parameter for estimating the limiting stress for "crane walk" accessibility	$q_{ult} = CraneWalkFactor \cdot S_u$ Where: *CraneWalkFactor* is client provided	U*
Estimated G_o	Estimated value for small strain shear modulus	$G_o = 0.0188[10^{(0.55Ic + 1,68)}](q_t - \sigma_v)$	15
Estimated E_{25}	Estimated value for Young's Modulus, E, at a 25% working load	$E_{25} = \alpha_E$ (qtNet) where $\alpha_E = 0.015[10^{(0.55Ic + 1,68)}]$	15
k_{SBT}	Estimated soil permeability derived from Soil Behavior Type (SBT) Chart I_c values.	For $1.0 < I_c \leq 3.27$: $k = 10^{(0.952 - 3.04Ic)}$ in m/s For $3.27 < Ic < 4.0$: $k = 10^{(-4.52 - 1.37Ic)}$ in m/s	35
M or D' Constrained Modulus	Constrained Modulus based on 1) Robertson, M 2) Mayne, D'	1) Robertson $M = \alpha_M (q_t - \sigma_v)$ $I_c > 2.2$ (fine grained) $\alpha_M = Qt$ when $Qt < 14$ $\alpha_M = 14$ when $Qt > 14$ $Ic < 2.2$ (coarse grained) $\alpha_M = 0.0188\ [10^{(0.55Ic + 1.68)}]$ $D' = \alpha_D (qt - \sigma_v)$ where $\alpha_D = 5$	32 23

Table 1b. CPT Parameter Calculation Methods – Liquefaction Parameters

Calculated Parameter	Description	Equation	Ref
K_{SPT} or K_s	Equivalent clean sand factor for $(N_1)60$	$K_{SPT} = 1 + ((0.75/30) \bullet (FC - 5))$	10
K_{CPT} or K_c (RW1998)	Equivalent clean sand correction for q_{c1N}	$K_{cpt} = 1.0$ for $I_c \leq 1.64$ $K_{cpt} = f(I_c)$ for $I_c > 1.64$ (see reference) $K_c = -0.403\ I_c^4 + 5.581\ I_c^3 - 21.63 I_c^2 + 33.75\ I_c - 17.88$	3, 10
K_c (PKR 2010)	Clean sand equivalent factor to be applied to Q_{tn}	$K_c = 1.0$ for $I_c \leq 1.64$ $K_c = -0.403\ I_c^4 + 5.581\ I_c^3 - 21.63 I_c^2 + 33.75\ I_c - 17.88$ for $I_c > 1.64$	16
$(N_1)_{60cs}I_C$	Clean sand equivalent SPT $(N_1)_{60}I_c$. User has 3 options.	1) $(N_1)_{60cs}Ic = \alpha + \beta((N_1)_{60}I_c)$ 2) $(N_1)_{60cs}Ic = K_{SPT} * ((N_1)_{60}I_c)$ 3) $(q_{c1ncs})/(N_1)_{60cs}I_c = 8.5\ (1 - I_c/4.6)$ FC ≤ 5%: $\alpha = 0,\ \beta = 1.0$ FC ≥ 35% $\alpha = 5.0,\ \beta = 1.2$ 5% < FC < 35% $\alpha = exp[1.76 - (190/FC^2)]$ $\beta = [0.99 + (FC^{1.5}/1000)]$	10 10 5
q_{c1ncs}	Clean sand equivalent q_{c1n}	$q_{c1ncs} = q_{c1n} \bullet K_{cpt}$	3
$Q_{tn,cs}$ (PKR 2010)	Clean sand equivalent for Q_{tn} described above - Q_{tn} being the normalized tip resistance based on a variable stress exponent as defined by Robertson (2009)	$Q_{tn,cs} = Q_{tn} \cdot K_c$ (PKR 2016)	16
Su(Liq)/ESv or $S_u(Liq)/\sigma_v'$	Liquefied shear strength ratio as defined by Olson and Stark	$\frac{S_u(Liq)}{\sigma_v'} = 0.03 + 0.0143(q_{c1})$ Note: σ_v' and s_v' are synonymous	13
Su(Liq)/ESv or $S_u(Liq)/\sigma_v'$ (PKR 2010)	Liquefied shear strength ratio as defined by Robertson (2010)	$\frac{S_u(Liq)}{\sigma_v'}$ Based on a function involving $Q_{tn,cs}$	16
S_u (Liq) (PKR 2010)	Liquefied shear strength derived from the liquefied shear strength ratio and effective overburden stress	$S_u(Liq) = \sigma_v' \cdot \left(\frac{S_u(Liq)}{\sigma_v'}\right)$	16
Cont/Dilat Tip	Contractive / Dilative q_{c1} Boundary based on $(N_1)_{60}$	$(\sigma_v')_{boundary} = 9.58 \times 10^{-4}\ [(N_1)_{60}]^{4.79}$ q_{c1} is calculated from specified q_t(MPa)/N ratio	13
CRR	Cyclic Resistance Ratio (for Magnitude 7.5)	$q_{c1ncs} < 50$: $CRR_{7.5} = 0.833\ [q_{c1ncs}/1000] + 0.05$ $50 \leq q_{c1ncs} < 160$: $CRR_{7.5} = 93\ [q_{c1ncs}/1000]^3 + 0.08$	10
Kg or K_g	Small strain Stiffness Ratio Factor, K_g	$[G_{max}/q_t]/[q_{c1n}{}^{-m}]$ m = empirical exponent, typically 0.75	26

Calculated Parameter	Description	Equation	Ref
K_g*	Revised K_g factor extended to fine grained soils (Robertson).	$K_g^* = (G_o / q_n)(Q_{tn})^{0.75}$ where q_n is the net tip resistance = $q_t - \sigma_v$	30
SP Distance	State Parameter Distance, Winckler static liquefaction method	Perpendicular distance on Q_{tn} chart from plotted point to state parameter Ψ = -0.05 curve	25
URS NP Fr	Normalized friction ratio point on Ψ = -0.05 curve used in SP distance calculation		25
URS NP Q_{tn}	Normalized tip resistance (Q_{tn}) point on Ψ = -0.05 curve used in SP Distance calculation		25

Table 2. References

No.	Reference
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No.	Reference
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Piezocone Calibration Sheets

CONETEC

Adara Systems Ltd.
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CERTIFICATE OF CALIBRATION

Calibration Information			
Cone Serial Number	EC855	Model	A15 T1500 F15 U35
Date	2024-02-08		
Technician Performing Calibration	Richard Chen	Signature	
Calibration Approved By	Vishrut Khunt	Signature	

Lab Condition	As Found	As Left		
Lab Temperature	N/A	23˚C		
Lab Humidity	N/A	29%	Reason for Calibration	Repair

Cone Information				
Tip Stress Limit	1500	bar	Tip End Area	15 cm²
Friction Stress Limit	15	bar	Friction Surface Area	225 cm²
Pressure Limit	35	bar	RTD Location	Pressure Carrier
X-Inclinometer Limit	30	degrees	Geophone	X and Z
Y-Inclinometer Limit	30	degrees	Temperature Range	-20°C to 60°C

Baseline Summary: (For Reference Only)

Channel	Units	As Found	As Left
Tip	bar	-0.001	0.503
Sleeve	bar	0.000	-0.012
Pressure	bar	0.037	1.012
X-Inclinometer	degrees	-0.675	0.000
Y-Inclinometer	degrees	1.925	0.000
Temperature	˚C	24.574	22.279

Classified in accordance with ISO 22476-1:2012 Class 1
Classified in accordance with ISO 22476-1:2012 Class 2

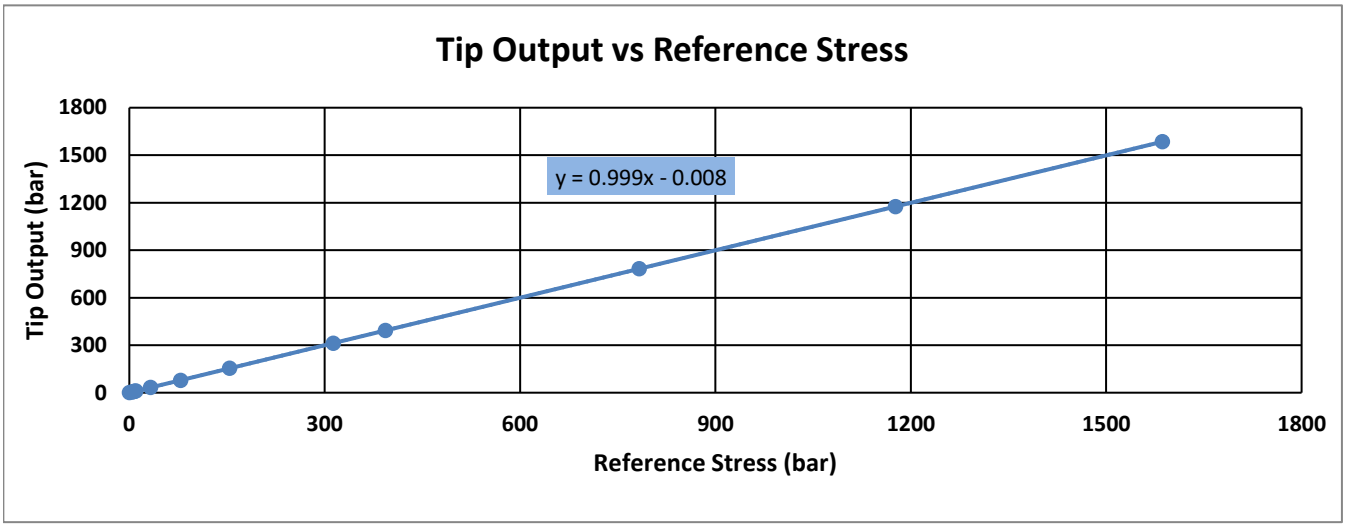
Calibrated in general accordance with the ASTM D5778-20 and D7400-08 standards

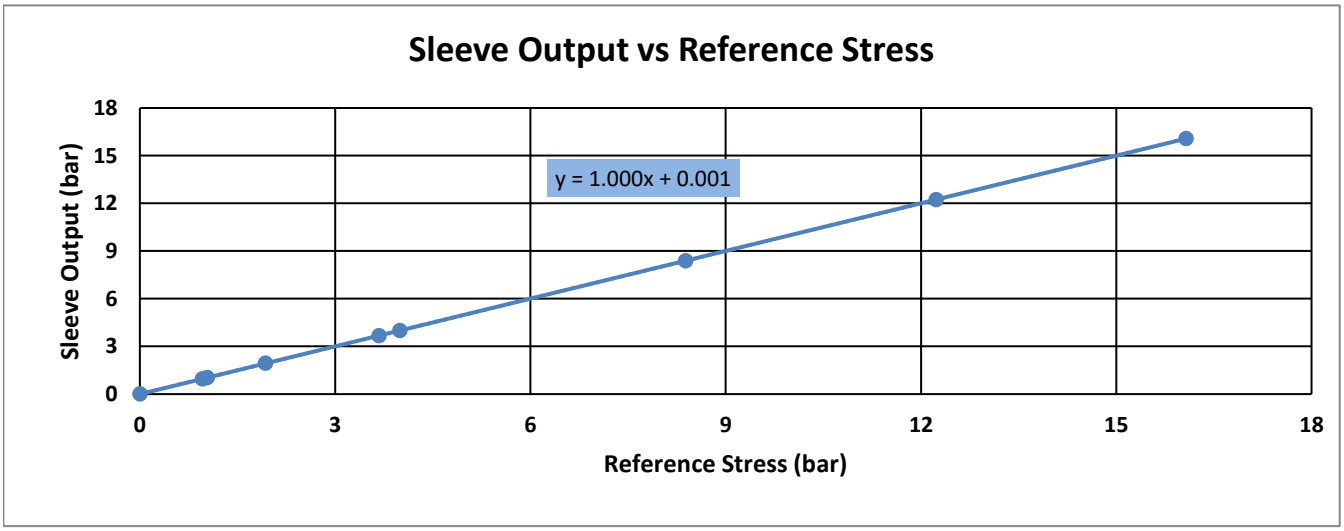
Calibrated with Adara calibration procedure EC_CPTCAL-2.2

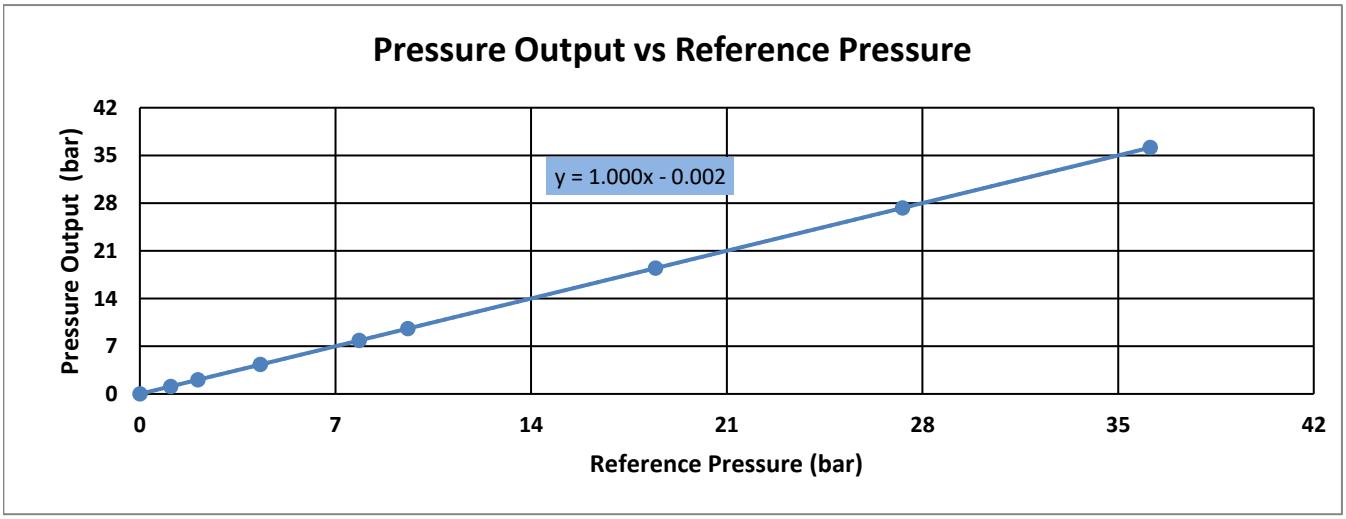
Collective uncertainty of the measurement standards conforms to a test uncertainty ratio (TUR) of 3:1 for tip and sleeve measurement and 4:1 for pressure measurement with a confidence level k=2

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Cone Output vs Reference Stress/Pressure Plots







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Calibration Results

Tip Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	0.08%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.10%	PASS

Sleeve Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	0.05%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.14%	PASS

Pressure Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	0.02%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.18%	PASS

X-Inclinometer Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.37%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.75%	PASS

Y-Inclinometer Calibration					
	As Found			As Left	
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.25%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.50%	PASS

Seismic Calibration					
	As Found			As Left	
Trigger Delay Error	N/A	N/A	Trigger Delay Error	0.01%	PASS

Temperature Calibration			
Full Scale Error	0.18%	PASS	

Channel	Cold	Room	Hot	Units
Ref_Temp	4.8	22.1	42.7	˚C
Tip	-2.473	-0.197	2.769	bar
Sleeve	0.012	-0.016	-0.038	bar
Pressure	1.042	1.057	1.054	bar
Temperature	4.941	21.927	42.790	˚C

Tip Temperature Coefficient	0.138 bar/˚C	PASS
Sleeve Temperature Coefficient	-0.001 bar/˚C	PASS
Pressure Temperature Coefficient	0.000 bar/˚C	PASS

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Testing Equipment Details

Testing Machines	Model Number	Serial Number	Calibration Number	Due Date
Tip Load Cell	Precision	P-10289	100490	2025-09-18
Sleeve Load Cell	Precision	P-10868	100579	2025-10-01
Digital Loadcell Indicator	4215	62140	100490	2024-07-18
Fluke Reference Pressure Monitor	RPM4 A10Ms	3910	100835	2024-12-12
Tektronix Function Generator	AFG3021B	C030955	100751	2024-10-20
Thermometer	THS-222-555	D23255834	100410	2024-07-11
Thermometer	THS-222-555	D23255829	100410	2024-07-11
Thermometer	THS-222-555	D20345575	100565	2024-07-14

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Adara Error Definitions

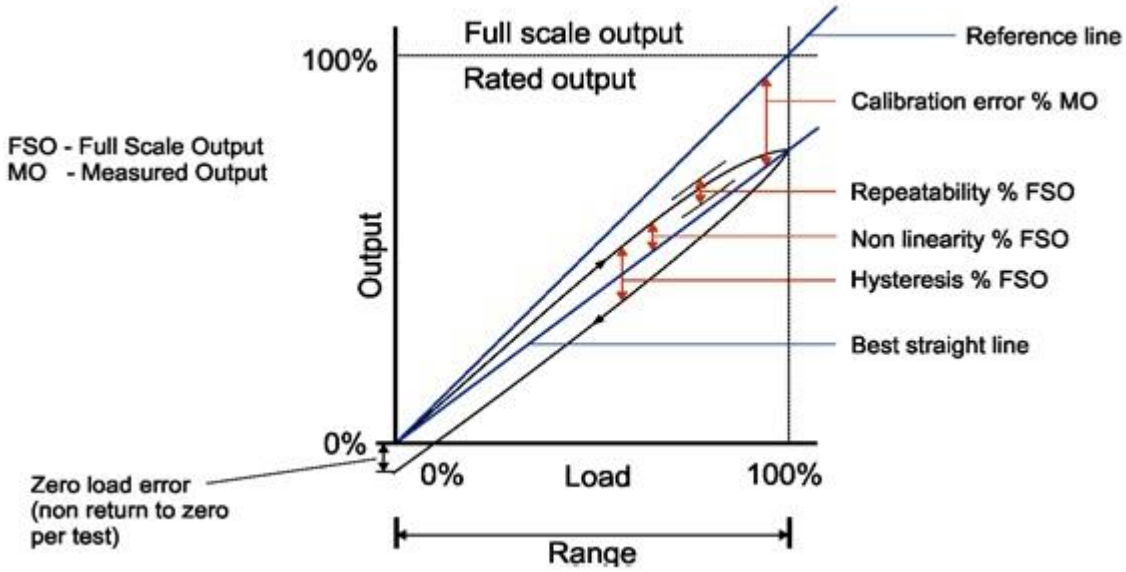


Figure 1: Definition of Calibration Terms for Load Cell and Transducers (Adapted from [1])

Actual Sensitivity	The slope of the best fit line through all data points starting at zero load.
Slope Error	The error in the best fit line compared to the ideal linear calibration in % . Slope Error = (Best Fit Slope - Ideal Slope) / Ideal Slope
Maximum Non Linearity	This value represents the maximum error (absolute value) relative to the best fit line considering each calibration point starting at loads greater than approximately 10% of FSO. The reported errors are a percent error of FSO. Adara's Pass/Fail criteria is 0.5% of FSO (ASTM is 0.5% of FSO at loads > 20% FSO).
Calibration Error	This value represents the maximum error (absolute value) in the recorded load value as compared to the actual load value for each calibration point for loads greater than approximately 10% of FSO. Adara's Pass/Fail criteria for the tip and sleeve is 0.5% of MO and 1.0% of MO for the pore pressure (ASTM for the tip and sleeve is 1.5% and 1.0% of MO respectively at loads greater than 20% of FSO)

Temperature Check Passing Criteria

Tip Temperature Coefficient	<0.200	bar/˚C
Sleeve Temperature Coefficient	<0.005	bar/˚C
Pressure Temperature Coefficient	<0.0196	bar/˚C

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ASTM D5778-20 Annex A Summary [1]

A1.4 Force Transducer Calibration Requirements

A1.4.1 states the following limits:

Non Linearity	Tip	≤ +0.5% of FSO
	Sleeve	≤ +1.0% of FSO
Calibration Error	Tip	≤ +1.5% of MO at loads > 20% FSO
	Sleeve	≤ +1.0% of MO at loads > 20% FSO

A1.5 Pressure Transducer Calibrations

A1.5.1 limits:

Non Linearity	Pore Pressure	≤ +1.0% of FSO
Calibration Error	Pore Pressure	not specified

ISO 22476 -1:2012 Summary [2]

Section 5.2 states the following allowable minimum accuracy

Class 1	Cone Resistance	35 kPa or 5%
	Sleeve Friction	5 kPa or 10%
	Pore Pressure	10 kPa or 2%
Class 2	Cone Resistance	100 kPa or 5%
	Sleeve Friction	15 kPa or 15%
	Pore Pressure	25 kPa or 3%

Note: ISO Compliance is based on low end calibration only.

References

[1] ASTM D5778-20. "Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils". ASTM, West Conshohocken, PA, USA.

[2] ISO 22476-1:2012. "Geotechnical investigation and testing - Field Testing - Part 1: Electrical cone and piezocone penetration test". ISO, Geneva, Switzerland.

ASTM D7400-08. "Standard Test Methods for Downhole Seismic Testing". ASTM, West Conshohocken, PA, USA.

APPENDIX B
Laboratory Test Results

Exploration	Sample ID	Depth	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit	Plastic Limit	Water Content (%)	USCS Group Symbol	Soil Description
B-1	G-1	1.0								
B-1	S-2	5.0	38.1	54.0	7.9			22.0	SP-SM	POORLY GRADED SAND WITH SILT AND GRAVEL
B-1	S-3	10.0								
B-1	S-4	15.0						61.3		
B-1	S-5	20.0								
B-1	S-6	25.0								
B-1	S-7	30.0						97.3		
B-1	S-8b	34.3								
B-1	S-8a	35.3	0.0	53.5	46.5			106.1	SM	SILTY SAND
B-1	S-9	40.0						102.4		
B-1	S-10	45.0								
B-1	S-11	50.0						13.4		
B-2	G-1	1.5				111	36	49.6	CH	FAT CLAY
B-2	S-2	5.0						31.6		
B-2	S-3	10.0								
B-2	S-4	15.0								
B-2	S-5	20.0								
B-2	S-6	25.0								
B-2	S-7	30.0						14.3		

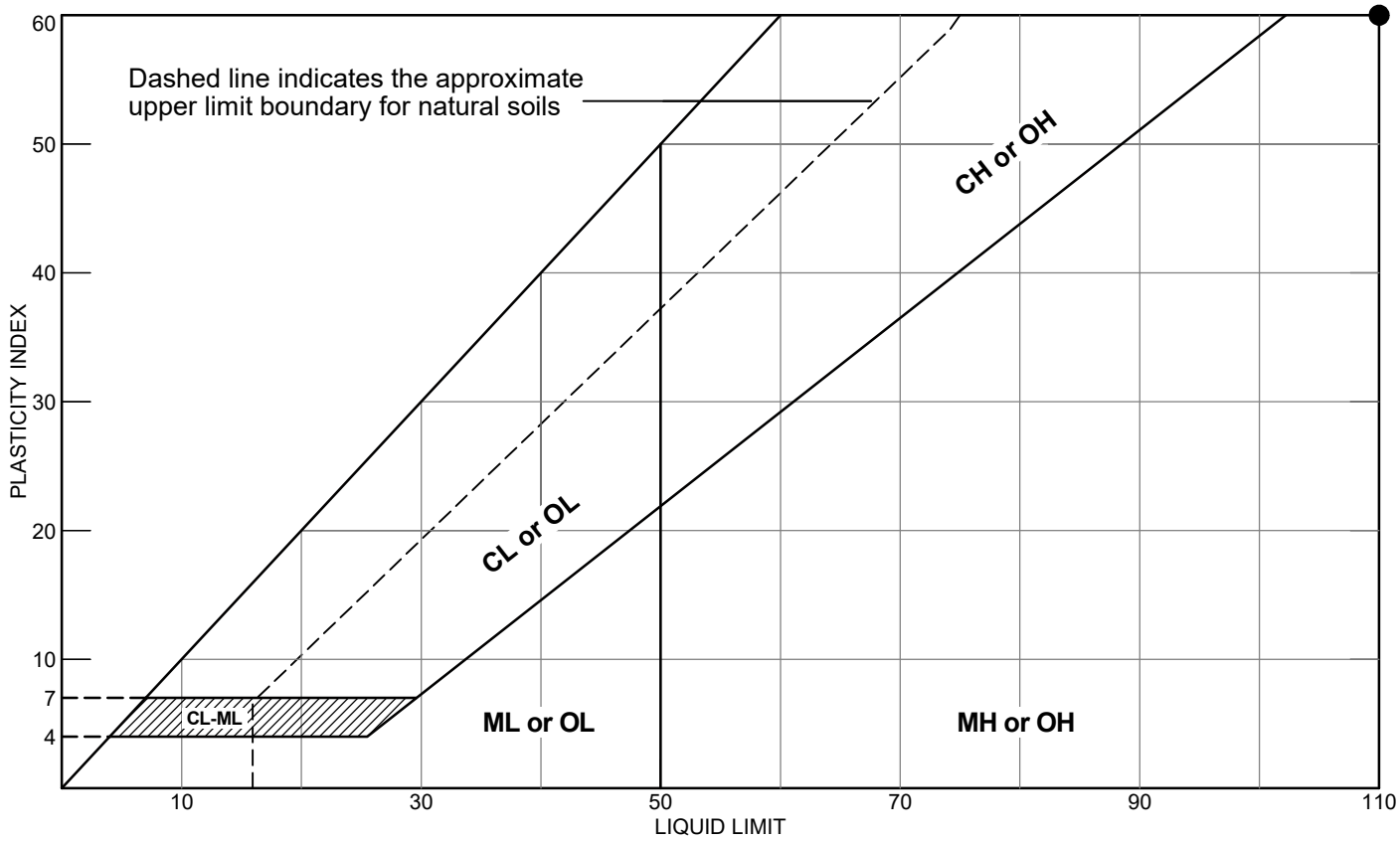
HALEY ALDRICH

Project: Aberdeen School District - Relocation Site 1
Location: Aberdeen, Washington
Project No.: 0211414-000

Summary of Laboratory Results

Figure **B-1**
Sheet **1 of 1**

SEATTLE - HALAB SUMMARY (FOR REPORTS) - C:\USERS\TMERLIN\ONEDRIVE - HALEYALDRICH.COM\DESKTOP\HC_LIBRARY GLB - 10/30/24 09:29 - //HALEYALDRICH.COM/SHARE/CF/PROJECTS/0211414/PERMANENT GINT FILE\0211414-000_ABERDEEN SD RELOCATION SITE 1_GINT.GPJ - tmerlin



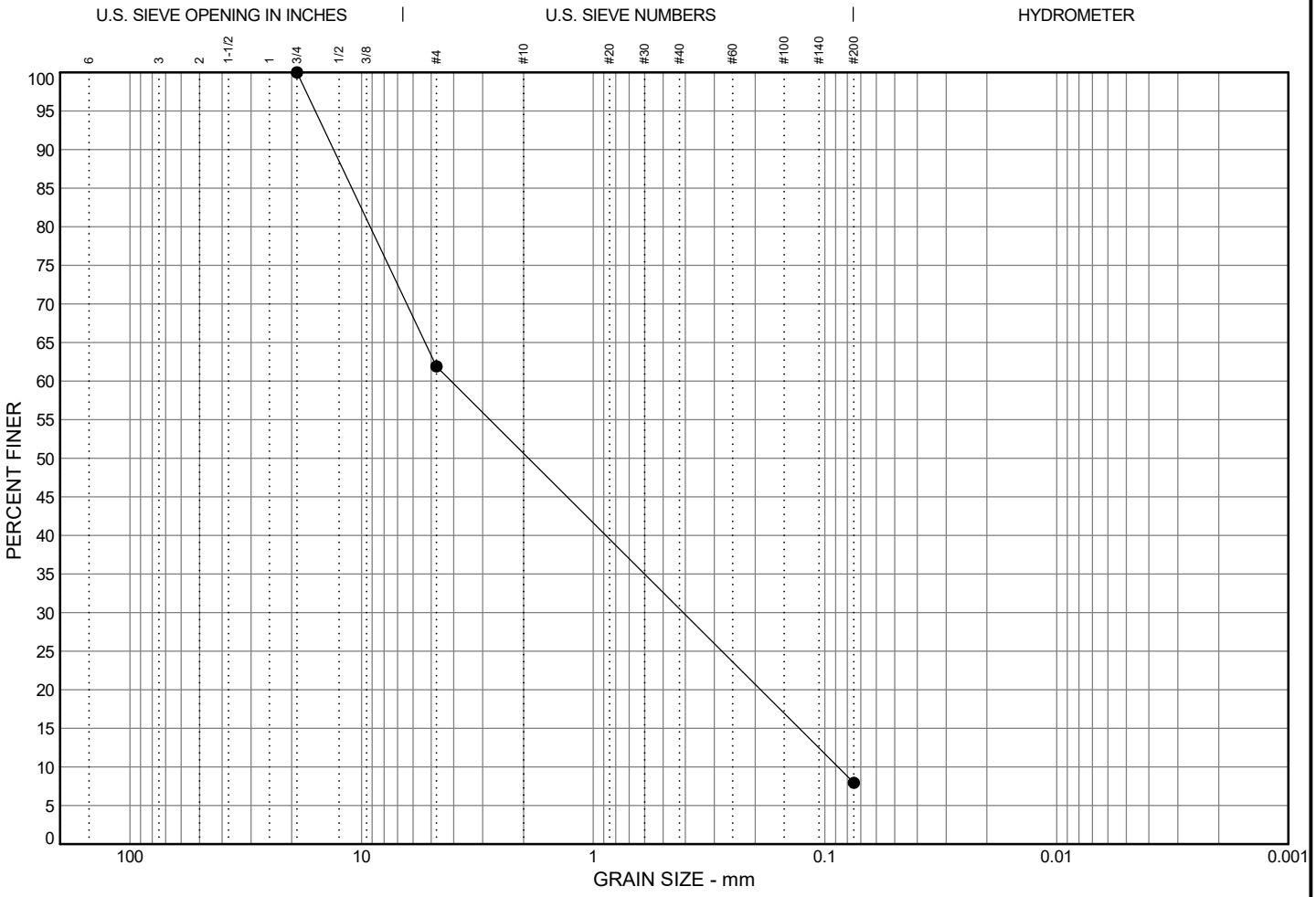
Location and Description	LL	PL	PI	-#200	MC%	USCS
● **Source:** B-2 **Sample No.:** G-1 **Depth:** 1.5 to 2.0 FAT CLAY	111	36	75	NT	50	CH

Remarks:

●

HALEY ALDRICH	Project: Aberdeen School District - Relocation Site 1 Location: Aberdeen, Washington Project No.: 0211414-000	**Liquid Limit, Plastic Limit, and Plasticity Index**	Figure **B-2** Sheet **1 of 1**

HA ATTERBERG LIMITS C:\USERS\TIMERLIN\ONEDRIVE - HALEY ALDRICH,COM\DESKTOP\HC_LIBRARY GLB - 1/30/24 09:30 - \\HALEYALDRICH.COM\SHARE\CORP\PROJECTS\0211414\PERMANENT GINT FILE\0211414-000_ABERDEEN SD RELOCATION SITE 1_GINT.GPJ - tmerlin



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Location and Description	% Cobbles	% Gravel	% Sand	% Silt	% Clay	MC%	USCS
● **Source:** B-1 **Sample No.:** S-2 **Depth:** 5.0 to 6.5 POORLY GRADED SAND WITH SILT AND GRAVEL	0.0	38.1	54.0	7.9		22	SP-SM

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			11.008	4.103	1.902	0.409	0.129	0.088	0.46	46.68

Remarks:

● low recovery, not a full sieve

HALEY ALDRICH	Project: Aberdeen School District - Relocation Site 1 Location: Aberdeen, Washington Project No.: 0211414-000	**Particle-Size Analysis**	Figure **B-3** Sheet **1 of 1**

HA GRAIN SIZE - C:\USERS\TMERLIN\ONEDRIVE - HALEY ALDRICH\DESKTOP\HC_LIBRARY (GLB - 10/22/24 09:27 - \\HALEYALDRICH.COM\SHARE\DPROJECTS\0211414\PERMANENT GINT FILES\0211414-000_ABERDEEN SD RELOCATION SITE 1_GINT.GPJ - tmerlin

APPENDIX C
Historical Plans and Geotechnical Logs

REPORT OF FOUNDATION INVESTIGATION

PROPOSED ADDITION
WEATHERWAX HIGH SCHOOL
ABERDEEN, WASHINGTON

for

ABERDEEN SCHOOL DISTRICT NO. 5

REPORT NO 47

DAMES & MOORE
CONSULTANTS IN APPLIED EARTH SCIENCES
SOIL MECHANICS · ENGINEERING GEOLOGY · GEOPHYSICS

ATLANTA
CHICAGO
HONOLULU
HOUSTON
LOS ANGELES
NEW YORK
PORTLAND
SALT LAKE CITY
SAN FRANCISCO
SEATTLE

421 THIRD AVENUE WEST · SEATTLE 99, WASHINGTON · ATWATER 4-8160
ASSOCIATE: JOSEPH LAMONT, JR.

June 6, 1962

Aberdeen School District No. 5
1001 Summit Street
Aberdeen, Washington

Attention: Mr. Steve N. Turk

Gentlemen:

We submit herewith three copies of our "Report of Foundation Investigation, Proposed Addition, Weatherwax High School, Aberdeen, Washington".

This investigation was accomplished under the authority of your Purchase Order No. 8966. The extent of the investigation was planned in discussions with representatives of the office of Robert B. Price, Architect, and Norman G. Jacobson, Jr. & Associates, Consulting Engineers. The results of our explorations and our conclusions and recommendations were discussed with your architects and engineers as data became available during the course of the investigation. As work progressed, it became apparent that adequate survey data were not available, and further work on the investigation was temporarily halted with the concurrence of your architects and engineers while a survey was performed. Information gained from this survey has been utilized in our evaluations, particularly with respect to the support of the first floor slab in the proposed addition.

It has been a pleasure to serve you on this project. If any questions arise concerning the recommendations presented herein, we would be pleased to discuss them with you.

Yours very truly,

DAMES & MOORE

By Joseph Lamont Jr.
Joseph Lamont, Jr.

JL-JKT:fm
3 copies submitted
cc: Robert B. Price, A.I.A. (2)

cc: Norman G. Jacobson, Jr. & Associates (2)

REPORT OF FOUNDATION INVESTIGATION

PROPOSED ADDITION

WEATHERWAX HIGH SCHOOL

ABERDEEN, WASHINGTON

for

ABERDEEN SCHOOL DISTRICT NO. 5

SCOPE

We present in this report the results of a foundation investigation at the site of a proposed addition to the existing Weatherwax High School in Aberdeen, Washington. The proposed addition will be located on the south side of the existing school building on East Third Street between North H and North I Streets. The location is shown on the Plot Plan, Plate 1.

The purpose of the investigation is to determine the nature of the soils and rock which underlie the proposed building location, and to provide recommendations for foundation support. The scope of work includes determining allowable soil bearing pressures if spread footings are found to be feasible, recommending required penetrations for appropriate types of piling if pile foundations are required, evaluating the settlement behavior of the structural frame and floor slab, and providing recommendations with regard to any special site preparation that may be necessary as the result of conditions encountered.

DESIGN CONSIDERATIONS

The proposed addition will be three stories in height, and will occupy an area of approximately 76 by 224 feet in plan dimensions. We understand that the building will be of steel frame construction with column spacings at approximately 28 foot on centers in an east-west direction. Column spacing across the building in a north-south direction will be 32 feet on each side with a 12-foot corridor in the middle. We understand that column loads, excluding those which would be imposed by structurally-supporting the ground floor slab, will be in

the range of 134 to 204 kips.

We understand that the ground floor elevation of the proposed addition will be established approximately three feet below the grade of the ground floor in the existing building. This will require some excavation in the north and west portions of the building area and the placement of fill in the remainder of the area. The maximum depth of cut and fill will be on the order of two feet.

SITE CONDITIONS

The soil and rock conditions underlying the site were explored by drilling six borings at the locations shown on Plate 1. A description of the field explorations and the detailed log of each boring is presented in Appendix A.

The site of the proposed addition is currently lawn area which is traversed by two concrete walks. Occasional trees exist on the site. The site is overlain by fill soils consisting of sandy loam and sand with varying amounts of gravel. The thickness of this fill ranges from two to 13½ feet at the boring locations. The fill soils vary from loose to moderately compact and possess moderate strength characteristics. Underlying the fill soils are deposits of very soft, weak, organic silty loam and moderately soft silty clay and sandy clay. In Borings 1, 4, and 5 the soft silty loam soils extend to bedrock. In Boring 6 the silty soils were underlain by the moderately soft clay. The clay deposit was encountered in Borings 2 and 3 from beneath the fill to the surface of the underlying rock. From information which we have been able to obtain concerning the past history of the site, it is our opinion that these soft silty soils have filled in an old stream channel which crossed the site in a generally northwest to southeasterly direction.

Bedrock was encountered in each of the six borings, and consists of gray and brown sandstone. Weathering of the surface of the sandstone is generally light, with a maximum weathered zone of approximately four feet being observed. The surface elevation of the sandstone varies irregularly across the site. The rock was found to be the deepest in Boring 5, which we believe is located near the deepest point of the old channel which crosses the site at an angle to the long axis of the proposed addition.

Ground water observations were made in the borings following completion of drilling. The water level varies between Elevation 14 and 16. The observed levels in each boring are shown on the boring logs in Appendix A.

CONCLUSIONS AND RECOMMENDATIONS

We recommend that the proposed addition be supported on pile foundations. Pile-support should also be provided for the ground floor slab. The soft compressible soils which underlie the site are not suitable for the support of spread foundations, and the placement of fill or floor loads over these soils will cause settlements which could range up to several inches in magnitude.

From our discussions with your engineers during the course of the investigation, we understand that steel H-piles are being considered for support of the structure. Pile sizes would be 8BP36 and 12BP74. We recommend that maximum design loads on the H-piles be limited to 50 tons per pile for the eight-inch piles and 100 tons per pile for the 12-inch piles. These capacities are for the total of all design loads, and piles carrying these loads must be driven to firm refusal into the underlying bedrock. We recommend that the larger piles be driven with a steam-operated, pile-driving hammer delivering approximately 24,000 foot-pounds of energy per blow, and that the smaller piles be driven with a similar type hammer delivering at least 15,000 foot-pounds of energy per blow. We suggest that refusal be considered as a penetration of

less than one inch for the final ten blows. In general, we anticipate that penetration into the rock of on the order of five feet should be able to be obtained using the hammer sizes indicated above. Settlement of the structure thus supported on pile foundations will be negligible.

As indicated above, the placement of any new loads over the existing soils will cause settlements. We estimate that the placement of fill in the southeast portion of the building area to raise the grade to a level approximately three feet lower than the first floor in the existing building will result in settlements in the range of two to four inches. Because of the thickness and organic nature of the underlying compressible soils, it is anticipated that these settlements will occur slowly over a period of two to three years. If the ground floor were not supported on piling, the addition of the new floor loads would cause additional settlements in the range of one to three inches. Settlements of the floor slab in areas of cut would be approximately one-half to one inch throughout most of the cut area, and would range up to approximately one and one-half to two inches in the vicinity of Boring 5 and across the old stram channel where the soft soils extend to greater depth. Therefore, differential settlements of appreciable magnitude would be experienced, both across the floor slab and between the floor slab and the structural frame. It is for this reason that we recommend that the ground floor slab also be supported on piling driven to refusal in the underlying bedrock.

Some settlement of sidewalks leading into the structure should be anticipated in areas where new fill is placed. Unless these walkways are structurally-supported, some future maintenance should be expected due to the differential settlement between the walkways and the pile-supported structure.

In general, the soils which will be excavated in the cut area will be predominantly granular and will provide suitable fill material for raising the grade in the easterly portion of the building area. Since this fill will not support any structural loads, it need be placed only with moderate compactive effort.

We understand that you are planning to load test one or more of the foundation piles in the initial stages of construction. We suggest that this load test be performed under the supervision of qualified personnel in order to obtain the maximum benefit from the test results. We would be pleased to confer with you in planning the procedure for testing the piling, and to assist your contractor in the performance of the actual test.

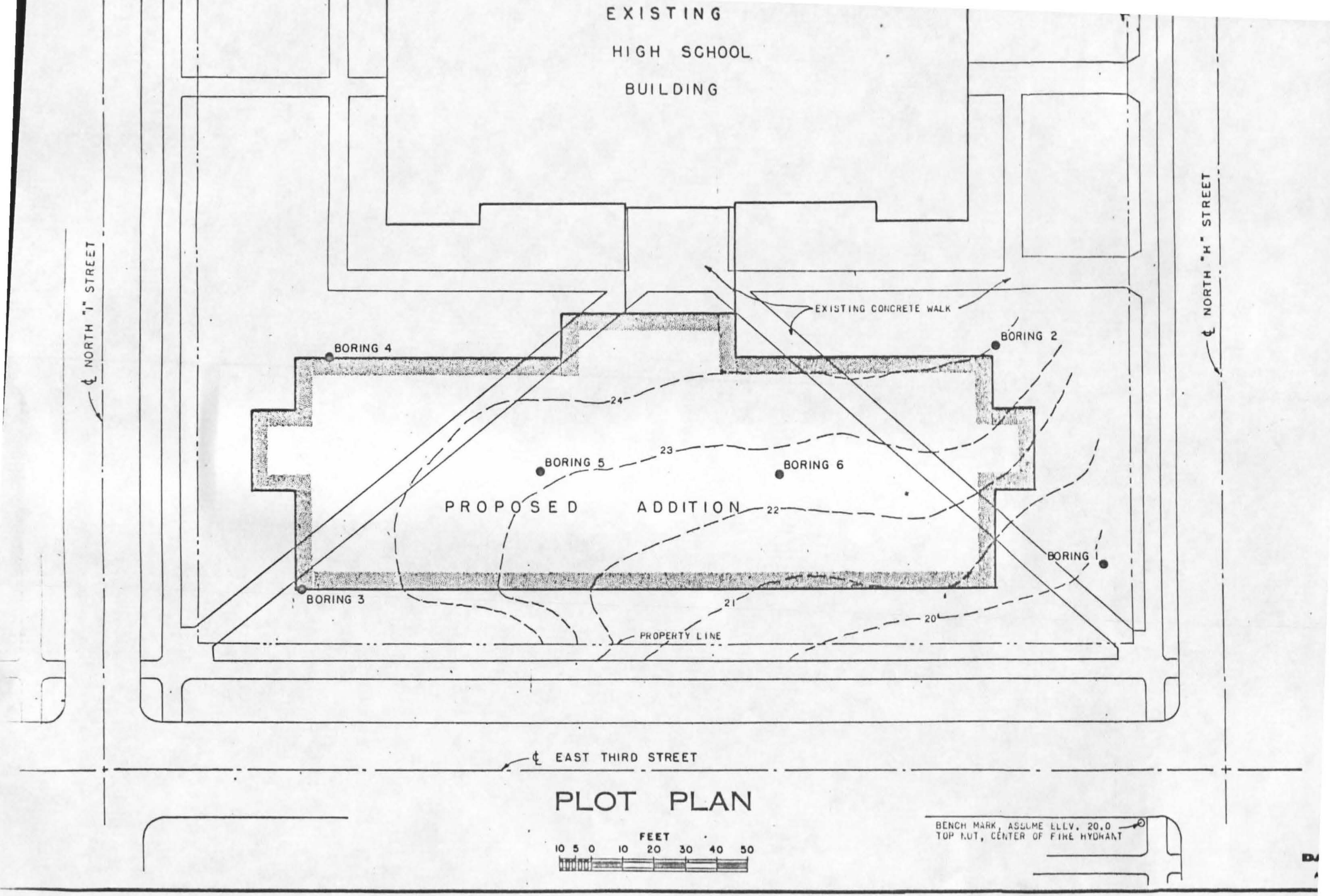
Respectfully submitted,

DAMES & MOORE

By Joseph Lamont Jr.

June 6, 1962 Joseph Lamont, Jr.




EXISTING
HIGH SCHOOL
BUILDING
℄ NORTH "I" STREET
℄ NORTH "H" STREET
EXISTING CONCRETE WALK
BORING 4
BORING 2
24
BORING 5
23
BORING 6
PROPOSED ADDITION
22
BORING 1
BORING 3
21
20
PROPERTY LINE
℄ EAST THIRD STREET
FEET
10 5 0 10 20 30 40 50
BENCH MARK, ASSUME ELEV. 20.0
TOP NUT, CENTER OF FIRE HYDRANT

PLOT PLAN

APPENDIX A

FIELD EXPLORATIONS

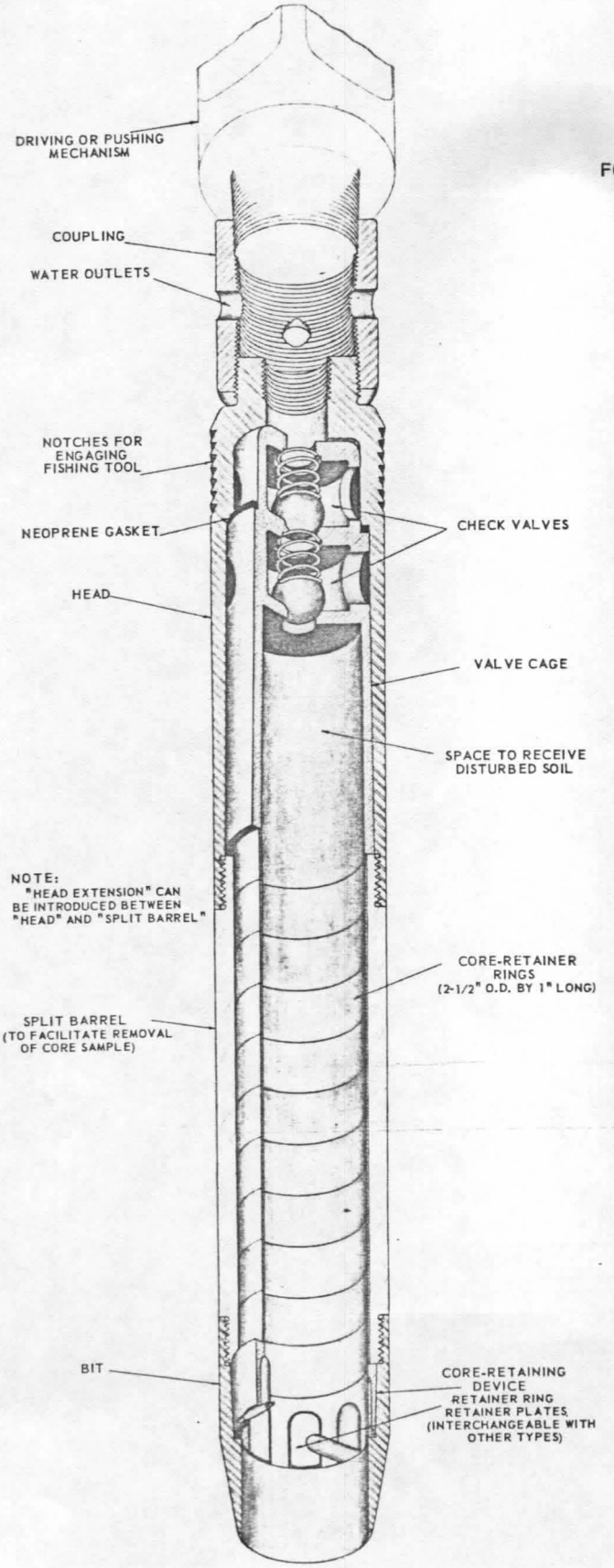
The soils underlying the site of the proposed school addition were explored by drilling six borings with power-operated, cable-tool drilling equipment. The borings were drilled into rock and ranged in depth from 29½ to 47½ feet. The locations of the borings are shown on the Plot Plan, Plate 1. The borings were located, with respect to the existing building, by our field engineer, and ground surface elevations have been determined from the survey data obtained by Mr. W. E. Berglund and are based on the datum used on his site survey dated May 2, 1962.

The soils were classified in the field by visual and textural examination, and a continuous log of the soils encountered in each boring was maintained by our engineer. The detailed boring logs are presented on Plates A-1 through A-5. The nomenclature used in classifying the soils is described in the Soil Classification Chart on Plate A-6. Undisturbed samples of the soils were obtained from each boring utilizing a sampler of the type illustrated on page A-2. The blows required to drive the sampler a distance of 12 inches with a weight of 275 pounds and a stroke of 24 inches are shown immediately above the sample notations on the boring logs.

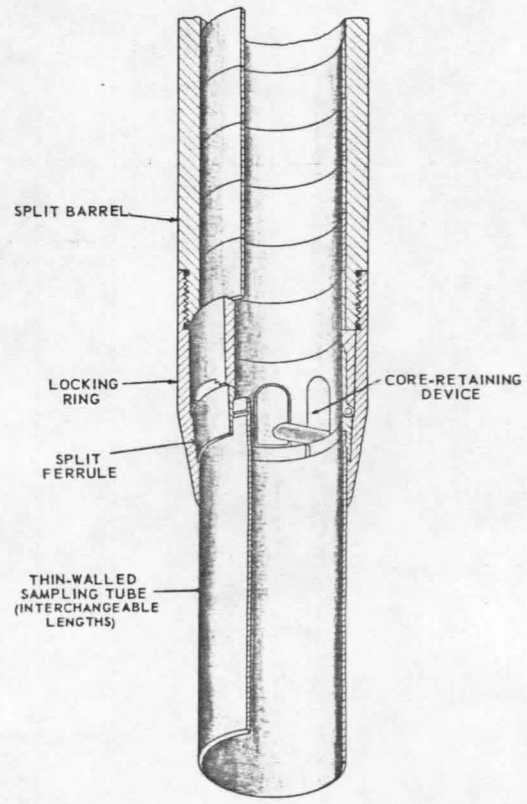
Ground water observations were made in each of the borings following the completion of drilling. The results of these observations are shown on the boring logs. All borings were backfilled by School District personnel.

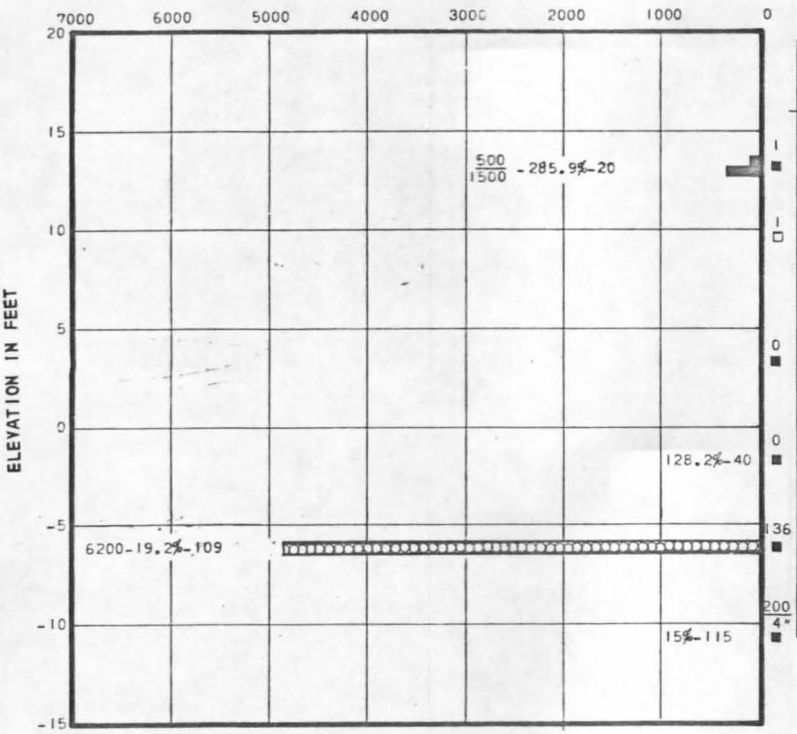
SOIL SAMPLER TYPE U

FOR SOILS DIFFICULT TO RETAIN IN SAMPLER
U. S. PATENT NO. 2,318,062



ALTERNATE ATTACHMENTS





BORING 1

ELEVATION 19.5 ±

BROWN SANDY LOAM WITH ROOTS IN TOP 6 IN. (FILL)

GRAY ORGANIC SILTY LOAM (VERY SOFT)

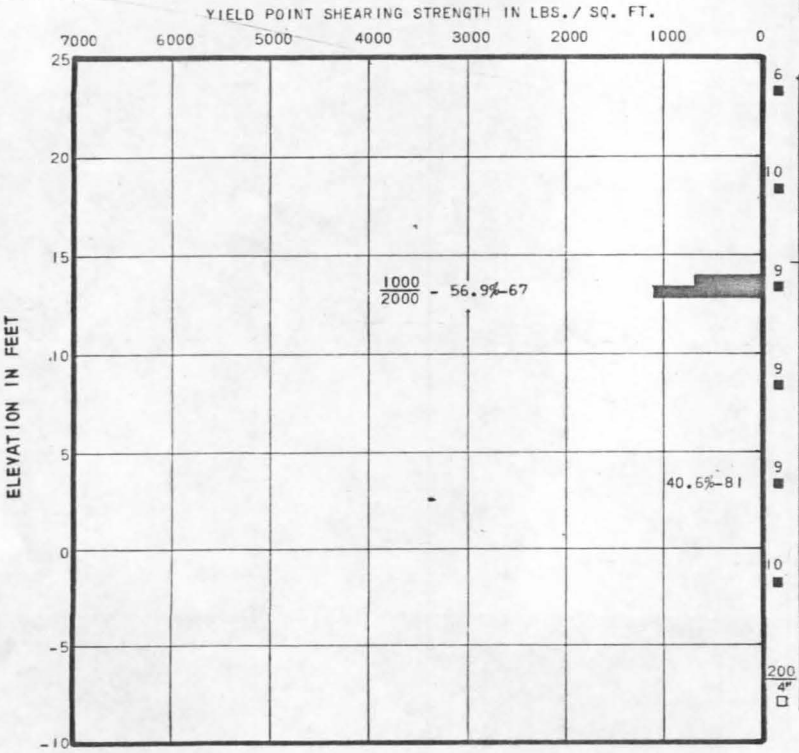
WATER LEVEL, 3-28-62.

LOG

OCCASIONAL THIN LENSES OF GRAY COARSE SAND

GRAY STREAKED WITH RUST BROWN SANDSTONE (MODERATE TO LOW DEGREE OF CEMENTATION, WEATHERED TO A DEPTH OF 26½ FEET)

BORING CASED TO ELEVATION -4.5



BORING 2

ELEVATION 24.0±

DARK BROWN SANDY LOAM WITH OCCASIONAL GRAVEL AND ROOTS (FILL)

BROWN FINE TO COARSE SAND WITH GRAVEL AND SILT BINDER (FILL) (MODERATELY LOOSE)

LIGHT BROWN SILTY CLAY (MODERATELY SOFT)

GRADES TO GRAY IN COLOR

WATER LEVEL, 3-30-62.

OCCASIONAL THIN LENSES OF GRAY FINE SAND

INCREASING SAND CONTENT

GRAY AND BROWN SANDSTONE (MODERATELY SOFT AND WEATHERED TO A DEPTH OF 28½ FEET)

BECOMES SOUND

BORING CASED TO ELEVATION 7.0

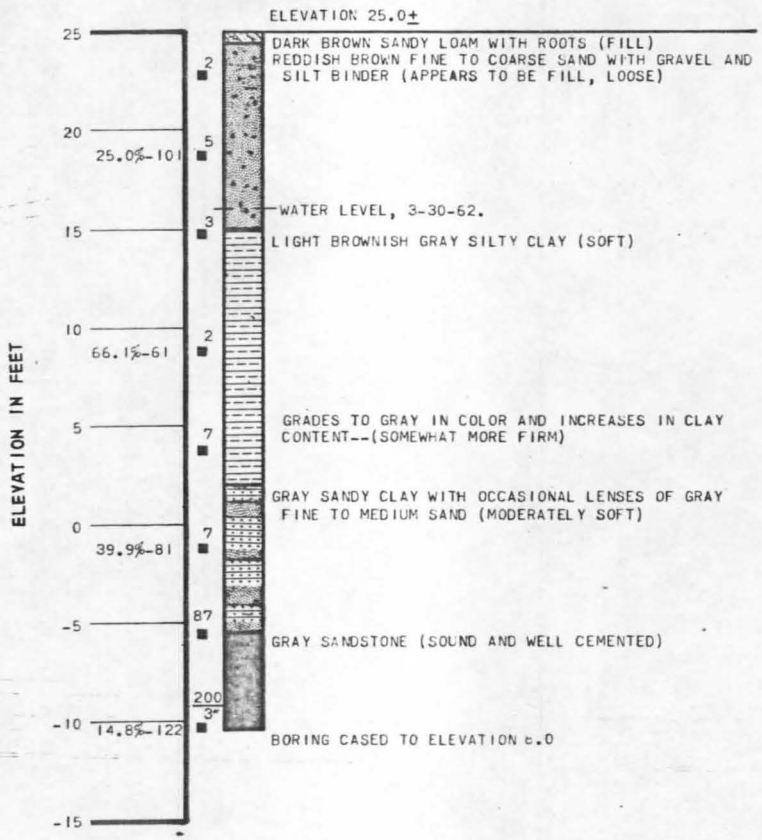
NOTE:
ELEVATIONS REFER TO AN ASSUMED DATUM. ELEVATION 20.0 = TOP NUT, CENTER OF FIRE HYDRANT, LOCATED ON THE SOUTH WEST CORNER OF THE INTERSECTION OF NORTH H STREET AND EAST THIRD STREET.

LOG OF BORINGS

DAMES & MOORE
APPLIED EARTH SCIENCES

PLATE A-1

BORING 3

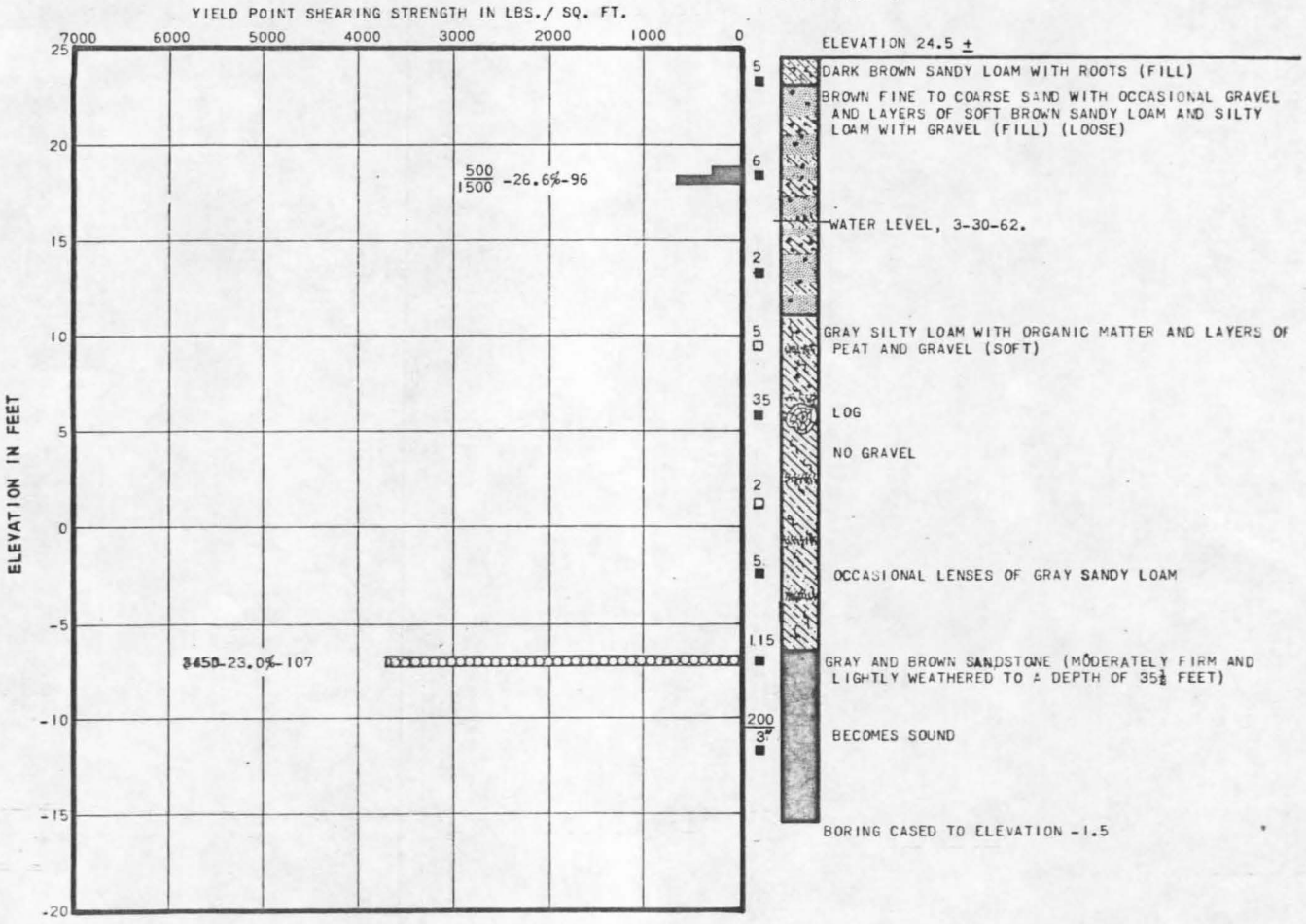


LOG OF BORINGS

DAMES & MOORE
APPLIED EARTH SCIENCES

PLATE A-2

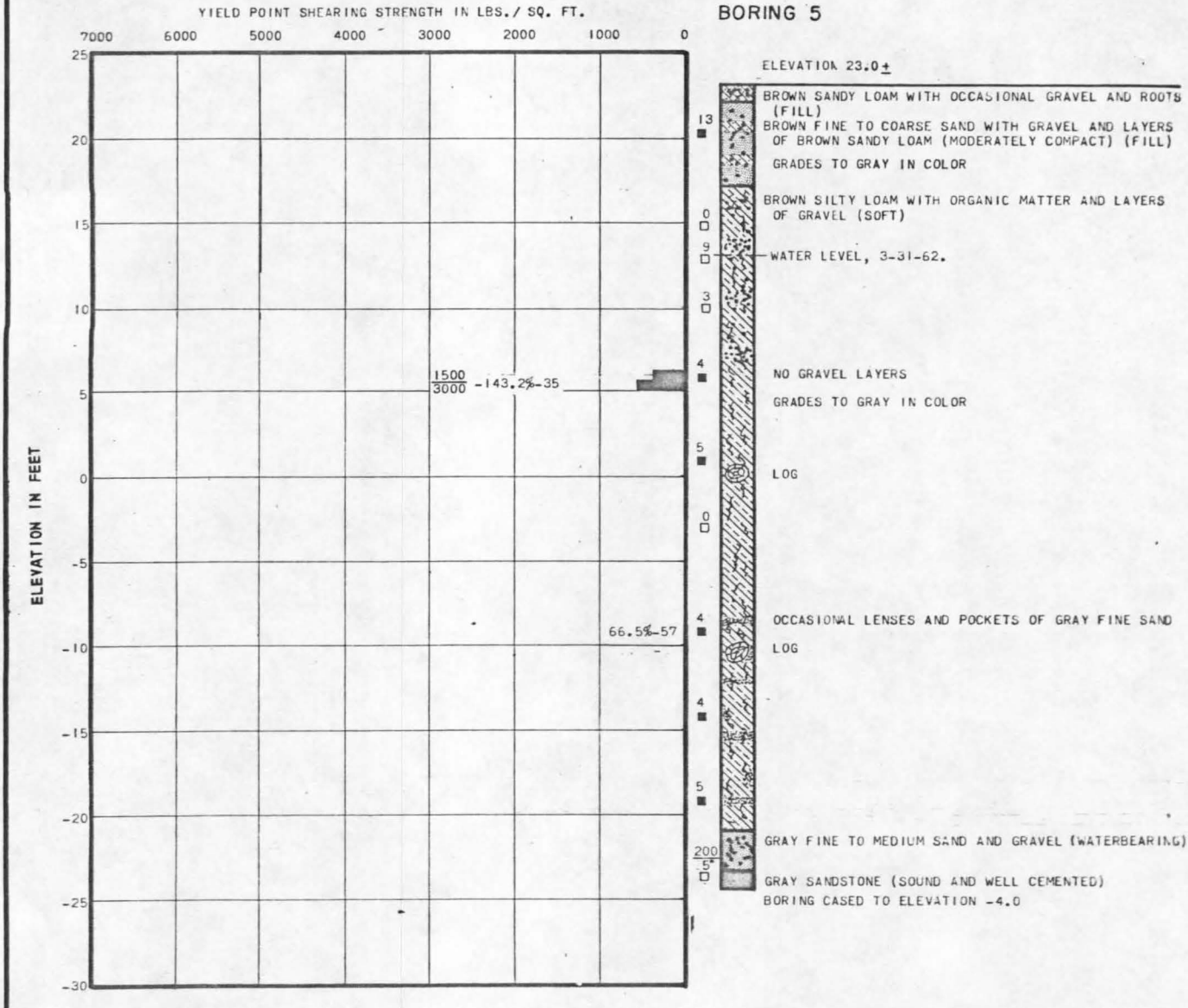
BORING 4



LOG OF BORINGS

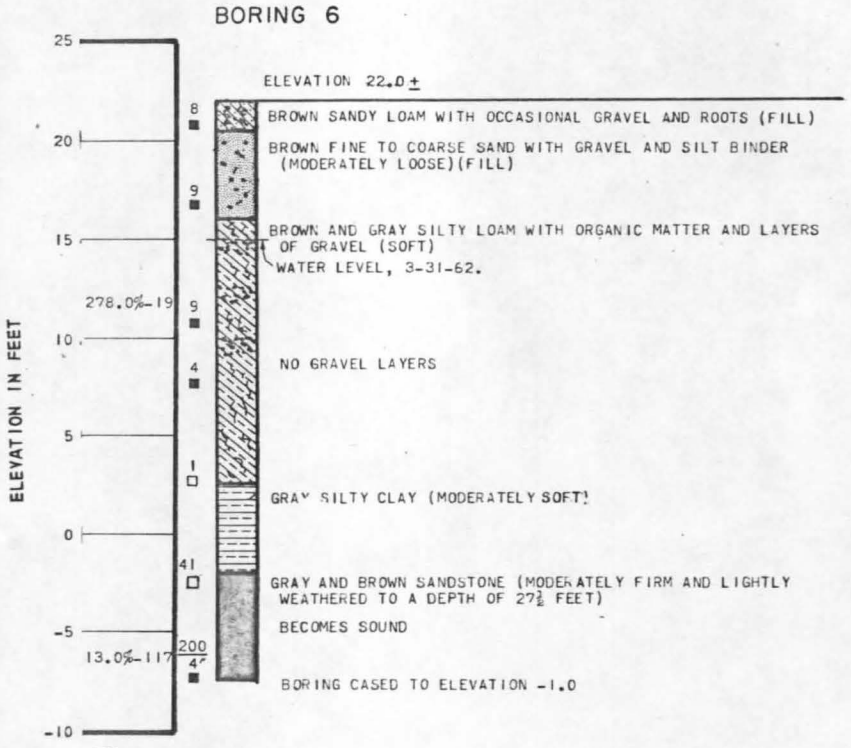
DAMES & MOORE
APPLIED EARTH SCIENCES

PLATE A-3



LOG OF BORINGS

DAMES & MOORE
APPLIED EARTH SCIENCES



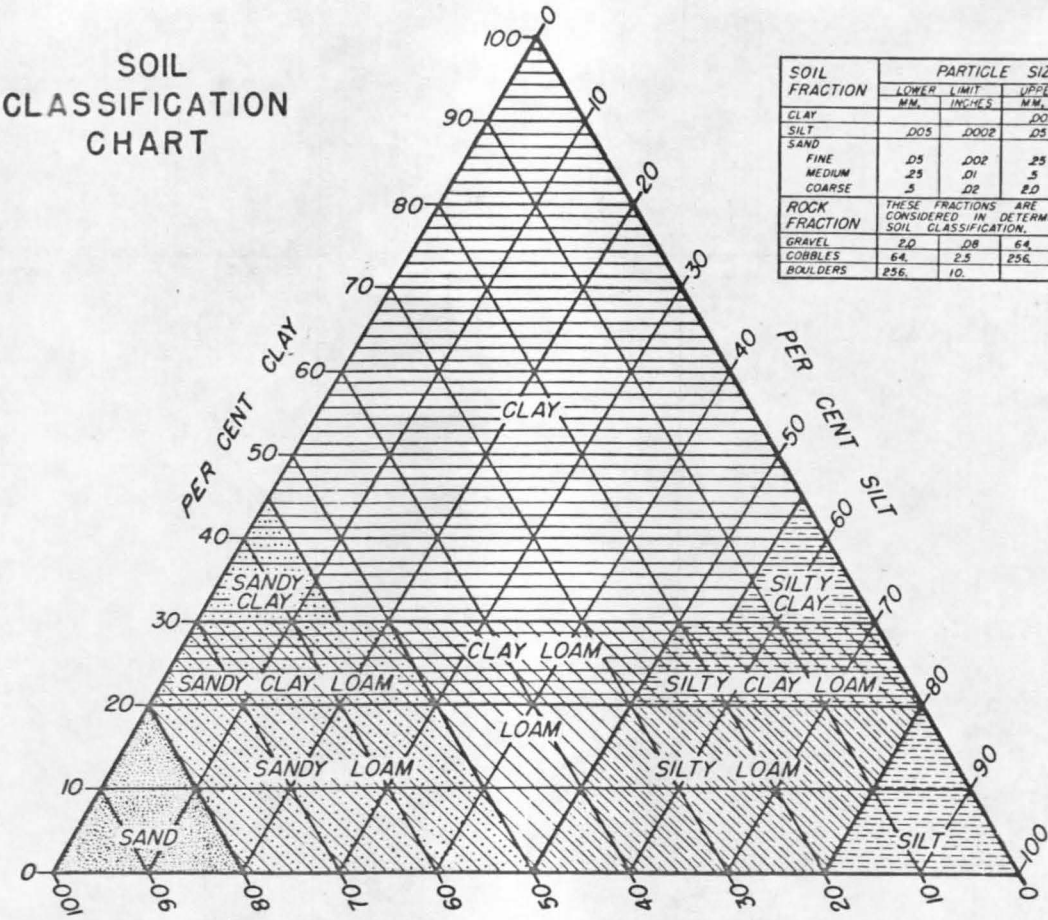
LOG OF BORINGS

DAMES & MOORE
APPLIED EARTH SCIENCES

PLATE A-5

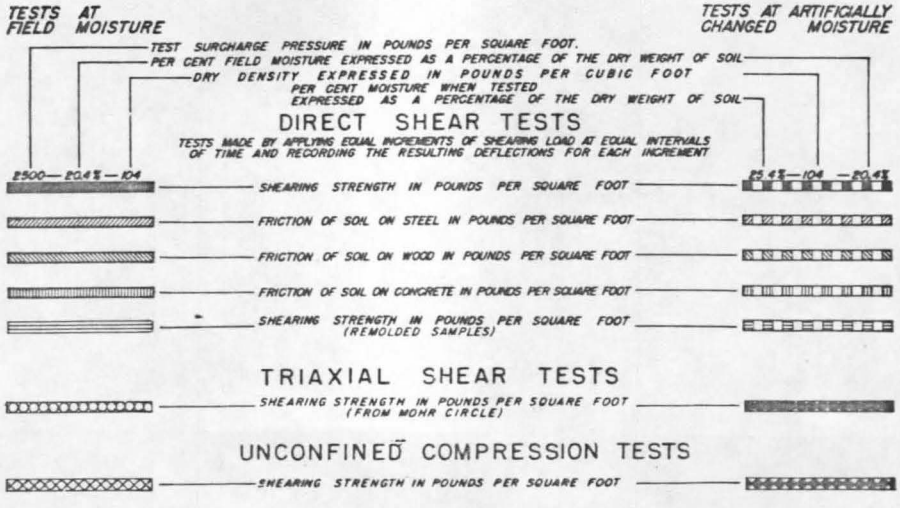
SOIL CLASSIFICATION CHART

SOIL FRACTION	PARTICLE SIZE			
	LOWER LIMIT MM.	LOWER LIMIT INCHES	UPPER LIMIT MM.	UPPER LIMIT INCHES
CLAY			.005	.0002
SILT	.005	.0002	.05	.002
SAND				
FINE	.05	.002	.25	.01
MEDIUM	.25	.01	.5	.02
COARSE	.5	.02	2.0	.08
ROCK FRACTION	THESE FRACTIONS ARE NOT CONSIDERED IN DETERMINING SOIL CLASSIFICATION.			
GRAVEL	2.0	.08	64.	2.5
COBBLES	64.	2.5	256.	10.
BOULDERS	256.	10.		



(PERCENTAGES GIVEN ARE BY DRY WEIGHT)

KEY TO TEST DATA



12 ↓ BLOWS REQUIRED TO DRIVE SAMPLER ONE FOOT WEIGHT = 275 LBS., STROKE = 24 INCHES

12 ■ INDICATES DEPTH AT WHICH UNDISTURBED SAMPLE WAS EXTRACTED

12 ⊠ INDICATES DEPTH AT WHICH DISTURBED SAMPLE WAS EXTRACTED

12 □ INDICATES DEPTH OF SAMPLING ATTEMPT WITH NO RECOVERY

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

DAMES & MOORE
SOIL MECHANICS ENGINEERS

PLATE A-6

BY DATE
PLATE OF
BY DATE
CHECKED BY DATE

APPENDIX B

LABORATORY TESTS

The pertinent physical characteristics of the foundation soils were determined from a series of laboratory tests on representative undisturbed samples. The tests included direct shear tests, triaxial compression tests, consolidation tests, and moisture and density determinations.

The shearing strengths of the soils were determined from the results of the direct shear tests. The method used in performing these tests is described on page B-3. A constant rate of shearing deflection was maintained throughout each test. The results of the direct shear tests, showing the yield-point strengths, are presented to the left of the appropriate sample notations on the boring logs on Plates A-1 through A-6.

Triaxial compression tests were performed on samples of the sandstone to define its strength characteristics. These tests were performed on six-inch long, two and one-half inch diameter samples which were subjected to a constant rate of deflection while confined at a uniform pressure. The yield-point strengths of the rock were determined from the resulting stress-strain plot of the test results and a Mohr circle analysis. These data are also presented to the left of the appropriate sample notations on the boring logs on Plates A-1 and A-3. The nomenclature used in presenting the strength test data is described in the Key to Test Data on Plate A-6.

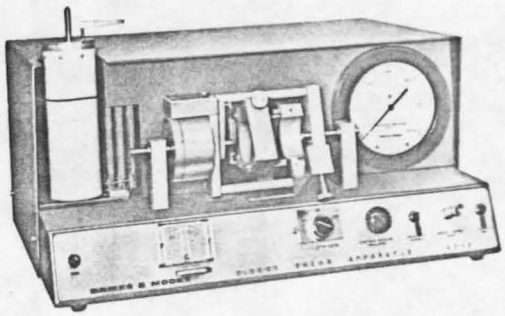
Consolidation tests were performed on representative samples of the compressible soils to provide data for estimating settlements. The results of these tests are presented on Plate B-1. The test procedure is described on page B-4.

Moisture and density determinations were performed in conjunction with each of the above tests and on additional selected samples to provide data

to assist in correlating the soils. The results of these tests are also presented to the left of the appropriate sample notations on the boring logs.

METHOD OF PERFORMING DIRECT SHEAR AND FRICTION TESTS

DIRECT SHEAR TESTS ARE PERFORMED TO DETERMINE THE SHEARING STRENGTHS OF SOILS. FRICTION TESTS ARE PERFORMED TO DETERMINE THE FRICTIONAL RESISTANCES BETWEEN SOILS AND VARIOUS OTHER MATERIALS SUCH AS WOOD, STEEL, OR CONCRETE. THE TESTS ARE PERFORMED IN THE LABORATORY TO SIMULATE ANTICIPATED FIELD CONDITIONS.



DIRECT SHEAR TESTING
& RECORDING APPARATUS

EACH SAMPLE IS TESTED WITHIN THREE BRASS RINGS, TWO AND ONE-HALF INCHES IN DIAMETER AND ONE INCH IN LENGTH. UNDISTURBED SAMPLES OF IN-PLACE SOILS ARE TESTED IN RINGS TAKEN FROM THE SAMPLING DEVICE IN WHICH THE SAMPLES WERE OBTAINED. LOOSE SAMPLES OF SOILS TO BE USED IN CONSTRUCTING EARTH FILLS ARE COMPACTED IN RINGS TO PREDETERMINED CONDITIONS AND TESTED.

DIRECT SHEAR TESTS

A THREE-INCH LENGTH OF THE SAMPLE IS TESTED IN DIRECT DOUBLE SHEAR. A CONSTANT PRESSURE, APPROPRIATE TO THE CONDITIONS OF THE PROBLEM FOR WHICH THE TEST IS BEING PERFORMED, IS APPLIED NORMAL TO THE ENDS OF THE SAMPLE THROUGH POROUS STONES. A SHEARING FAILURE OF THE SAMPLE IS CAUSED BY MOVING THE CENTER RING IN A DIRECTION PERPENDICULAR TO THE AXIS OF THE SAMPLE. TRANSVERSE MOVEMENT OF THE OUTER RINGS IS PREVENTED.

THE SHEARING FAILURE MAY BE ACCOMPLISHED BY APPLYING TO THE CENTER RING EITHER A CONSTANT RATE OF LOAD, A CONSTANT RATE OF DEFLECTION, OR INCREMENTS OF LOAD OR DEFLECTION. IN EACH CASE, THE SHEARING LOAD AND THE DEFLECTIONS IN BOTH THE AXIAL AND TRANSVERSE DIRECTIONS ARE RECORDED AND PLOTTED. THE SHEARING STRENGTH OF THE SOIL IS DETERMINED FROM THE RESULTING LOAD-DEFLECTION CURVES.

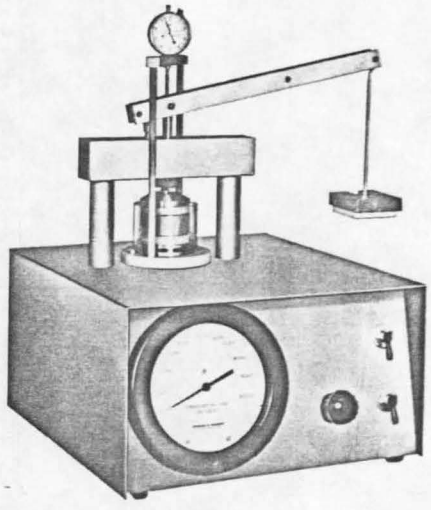
FRICTION TESTS

IN ORDER TO DETERMINE THE FRICTIONAL RESISTANCE BETWEEN SOIL AND THE SURFACES OF VARIOUS MATERIALS, THE CENTER RING OF SOIL IN THE DIRECT SHEAR TEST IS REPLACED BY A DISK OF THE MATERIAL TO BE TESTED. THE TEST IS THEN PERFORMED IN THE SAME MANNER AS THE DIRECT SHEAR TEST BY FORCING THE DISK OF MATERIAL FROM THE SOIL SURFACES.

METHOD OF PERFORMING CONSOLIDATION TESTS

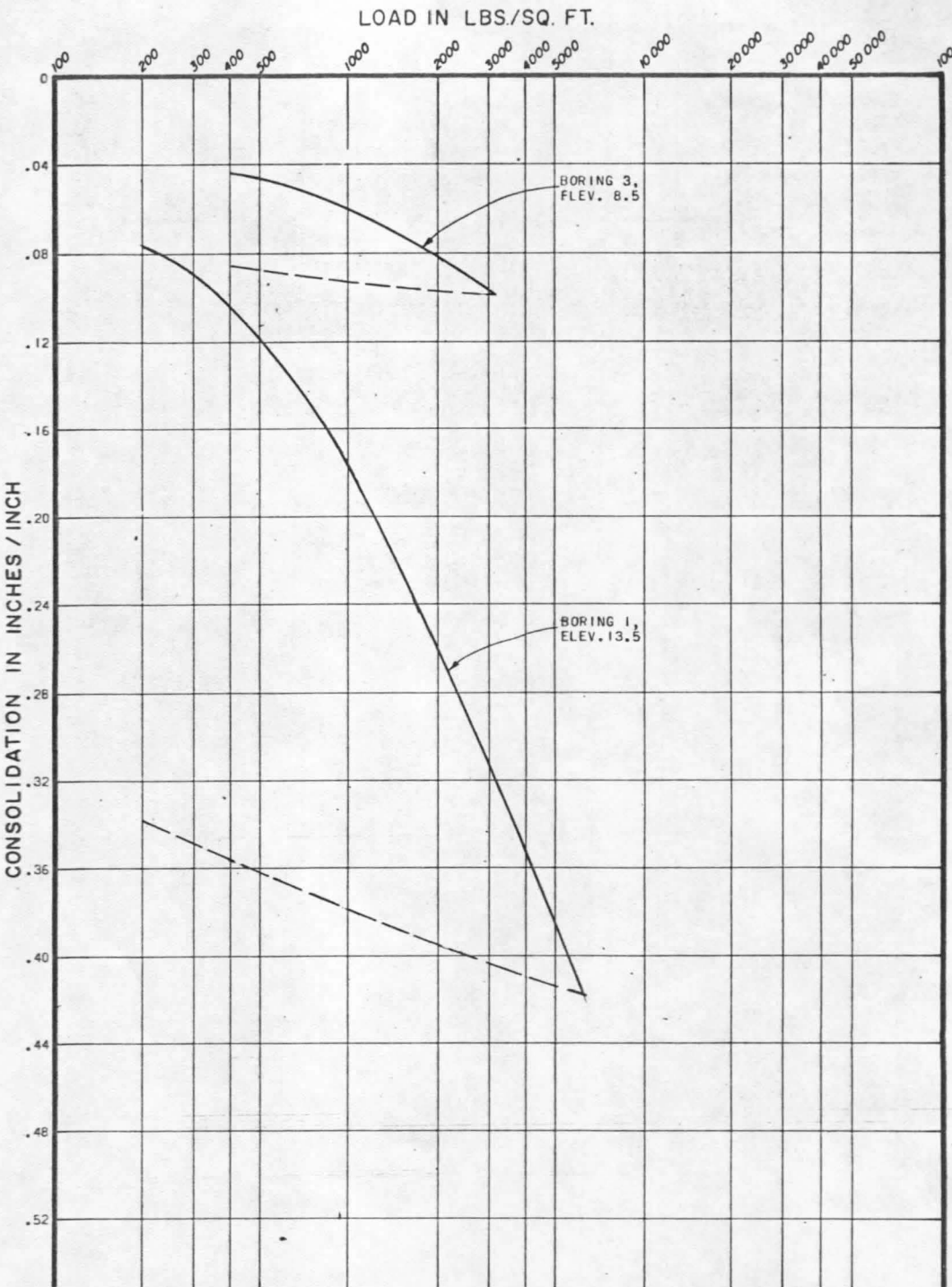
CONSOLIDATION TESTS ARE PERFORMED TO EVALUATE THE VOLUME CHANGES OF SOILS SUBJECTED TO INCREASED LOADS. TIME-CONSOLIDATION AND PRESSURE-CONSOLIDATION CURVES MAY BE PLOTTED FROM THE DATA OBTAINED IN THE TESTS. ENGINEERING ANALYSES BASED ON THESE CURVES PERMIT ESTIMATES TO BE MADE OF THE PROBABLE MAGNITUDE AND RATE OF SETTLEMENT OF THE TESTED SOILS UNDER APPLIED LOADS.

EACH SAMPLE IS TESTED WITHIN BRASS RINGS TWO AND ONE-HALF INCHES IN DIAMETER AND ONE INCH IN LENGTH. UNDISTURBED SAMPLES OF IN-PLACE SOILS ARE TESTED IN RINGS TAKEN FROM THE SAMPLING DEVICE IN WHICH THE SAMPLES WERE OBTAINED. LOOSE SAMPLES OF SOILS TO BE USED IN CONSTRUCTING EARTH FILLS ARE COMPACTED IN RINGS TO PREDETERMINED CONDITIONS AND TESTED.



DEAD LOAD-PNEUMATIC CONSOLIDOMETER

IN TESTING, THE SAMPLE IS RIGIDLY CONFINED LATERALLY BY THE BRASS RING. AXIAL LOADS ARE TRANSMITTED TO THE ENDS OF THE SAMPLE BY POROUS DISKS. THE DISKS ALLOW DRAINAGE OF THE LOADED SAMPLE. THE AXIAL COMPRESSION OR EXPANSION OF THE SAMPLE IS MEASURED BY A MICROMETER DIAL INDICATOR AT APPROPRIATE TIME INTERVALS AFTER EACH LOAD INCREMENT IS APPLIED. EACH LOAD IS ORDINARILY TWICE THE PRECEDING LOAD. THE INCREMENTS ARE SELECTED TO OBTAIN CONSOLIDATION DATA REPRESENTING THE FIELD LOADING CONDITIONS FOR WHICH THE TEST IS BEING PERFORMED. EACH LOAD INCREMENT IS ALLOWED TO ACT OVER AN INTERVAL OF TIME DEPENDENT ON THE TYPE AND EXTENT OF THE SOIL IN THE FIELD.



BORING	ELEVATION	SOIL TYPE	MOISTURE CONTENT		DRY DENSITY IN LBS./CU. FT.
			BEFORE	AFTER	
1	13.5	GRAY ORGANIC SILTY LOAM	181.0%	116.3%	28
3	8.5	LIGHT BROWNISH GRAY SILTY CLAY	66.1%	61.4%	61

CONSOLIDATION TEST DATA

DAMES & MOORE
SOIL MECHANICS ENGINEERS

PLATE B-1

BY _____ DATE _____
PLATE _____ OF _____
BY _____ DATE 6-9-62
CHECKED BY _____ DATE _____

TCF

VIII. Tsunmai Innundation Report

Tsunami Hazard Assessment of the Aberdeen, WA School Sites

Project Report

December 1, 2024

Loyce M. Adams and Randall J. LeVeque
HyperNumerics LLC

Prepared for the Aberdeen School District

Submitted to TCF Architecture PLLC, Tacoma, WA

Contents

1 Introduction **4**

2 Topography and Bathymetry **5**

2.1 1/3 Arc-second and 2 Arc-second DEMs 5

2.2 Coarser DEMs 7

3 Calculation regions and their resolutions **10**

4 Earthquake Sources **16**

4.1 Cascadia megathrust events 16

4.2 L1up_1.117 19

5 Modeling considerations, uncertainties, and limitations **21**

5.1 Tide stage and sea level rise 21

5.2 Subsidence 21

5.3 Structures 22

5.4 Bottom friction 22

5.5 Tsunami modification of bathymetry and topography 22

6 Results – Pre-quake B0 and post-quake B topography/bathymetry **23**

7 Results – Pre-quake B0 and post-quake B for each footprint **27**

7.1 B-Street footprint 27

7.2 I-StreetParking footprint 29

7.3 I-StreetVacant footprint 31

7.4 K-Street footprint 33

8 Results – Maximum inundation depths and speeds **35**

9 Results – Max inundation depths and speeds for each footprint **44**

9.1 B-Street footprint 44

9.2 I-StreetParking footprint 47

9.3 I-StreetVacant footprint 51

9.4 K-Street footprint 54

10 Results – Transects **58**

11 Results – Gauge output **66**

12 Analysis – Minimum pre-quake Build Elevation (MBE) **81**

13 Discussion **84**

References 84

1 Introduction

This report summarizes tsunami modeling results prepared for the Aberdeen School District to assess the tsunami hazard for three sites within Aberdeen, WA. The first site is the Robert Gray Elementary school on B-Street. The second site is the McDermoth Elementary school on K-Street. The interest is possible retrofitting of these schools assuming horizontal evacuation to higher ground is possible during an earthquake and tsunami hazard. The third site is on I-Street and consists of a vacant lot where new facilities might be built in the future, plus an adjacent parking lot. Horizontal evacuation is also assumed to be possible for this site.

The two pink rectangles in Figure 1 are the selected study regions ("fgmax regions") for our modeling. The smaller rectangle is from longitude -123.815 to longitude -123.8075 and from latitude 46.9825N to 46.9875N and contains a yellow footprint around the Robert Gray Elementary School plus Gauges 3 and 4. The larger rectangle is from longitude -123.8275 to -123.8075 and from latitude 46.9725N to 46.9825N. It contains three footprints of interest. One surrounds the McDermoth Elementary School on K-Street and contains Gauges 2 and 6. The second footprint is around the vacant lot on I-street and contains Gauges 1 and 5. The third footprint is around the Parking Lot on I-street and contains Gauge 7. Time series of quantities of interest are collected at these seven gauges. The study regions also cover a portion of Aberdeen, WA and the Hoquiam and Wiskah Rivers.

The "fgmax regions" are where GeoClaw results are provided for each considered earthquake. An fgmax grid is a fixed grid (fg) on which is saved the maximum (max) values of model variables attained during the duration of the simulation, including the fundamental variables water depth (h) and water speed (s) derived from the velocity components ($s = \sqrt{u^2 + v^2}$), as well as other quantities of interest derived from the depth (h) and west-east and south-north momenta (hu and hv), the quantities modelled in the shallow water equations. Also saved is the maximum value of the momentum flux (hss). We also compute the time the maximum depth is obtained as well as the time of arrival of the first significant (positive) wave at each grid point. These fgmax points lie on a grid with spacing 1/3" by 1/3" that is aligned with the DEM grids. All points at this resolution within the pink rectangles make up the fgmax points.

The American Society of Civil Engineers (ASCE) outlined standards for building a Vertical Evacuation Structure (VES) within a tsunami inundation zone. These standards are described in [10] and [9] and were used to develop earthquake sources for use in the tsunami modeling for this project. These sources are called `L1up_x1.117` and `ASCE_SIFT` and they satisfy the 2022 ASCE standards in [12] as well as the 2021 WA State Building Code standards given in [1]. A third earthquake Cascadia Subduction Zone source, called `CSZ_L1-extended-pmel` satisfies the 2021 WA State building code given in [1], and as a result is also considered a valid tsunami source for this study. The procedure we used to develop these sources and show their ASCE 7-22 compatibility and 2021 Washington State Building Code compatibility can be reported in a separate Compliance Report, [5] if desired by Aberdeen. A medium sized source, called `CSZ_M1`, although not compatible with either ASCE 7-22 or the 2021 Washington Building Code, is considered for comparison purposes.

For this study, we modelled the tsunami produced by `CSZ_L1-extended-pmel` with and without sea-level rise, the tsunami produced by `CSZ_M1` without sea-level rise, and the tsunami produced by `L1up_x1.117` with sea-level rise using the GeoClaw Version Version 5.10.0 software [11]. In all these simulations, we used the Manning value 0.025 which corresponds to gravelly earth and is commonly used in tsunami inundation studies.

A historical sea-level rise value of 0.114 meters in the next 100 years was obtained from the closest NOAA Tide Station to Aberdeen that reports historical sea rise, which was at Toke Point, WA. A sea-level rise value of 0.114 meters above the usual mean high water (MHW) was used. This is modeled in GeoClaw as an increase above MHW in the background sea level in the same way we would model an increased tidal stage above MHW. Considerations for choosing this value are given in Section 5.1.

The "Maximum Considered Tsunami" (MCT), found from these model runs, then determines the values

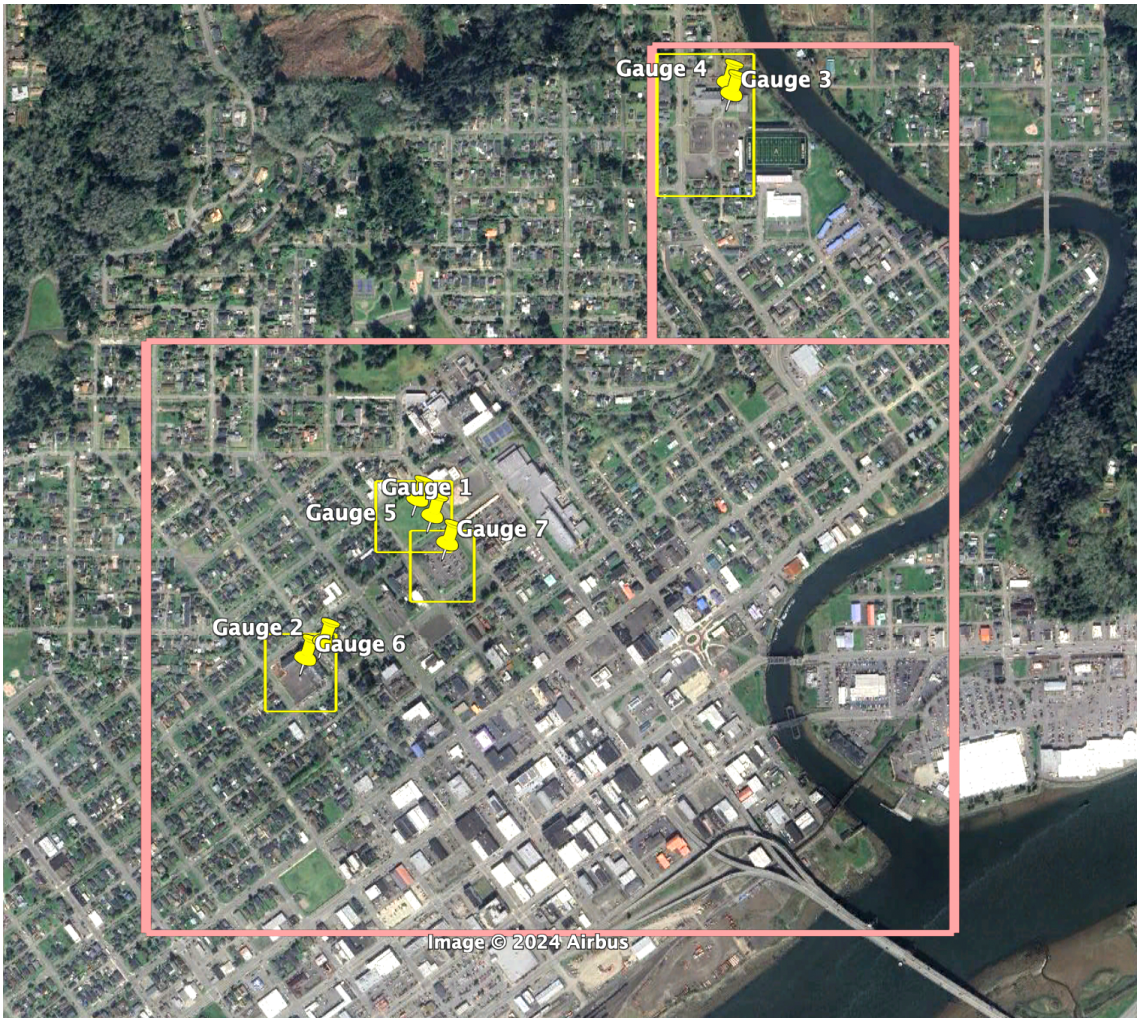


Figure 1: The two pink rectangles show the study regions ("fgmax regions") where maximum values are collected at the 1/3 arc sec resolution. The yellow rectangles are footprints surrounding McDermoth School (Gauges 2 and 6), the Vacant Lot on I-Street (Gauges 1 and 5), the Parking Lot on I-Street (Gauge 7), and Robert Gray School (Gauges 3 and 4). Imagery from Google Earth.

used in the design of a new structure or a retrofit of an existing structure. This MCT is considered to be the tsunami that results from either an ASCE compatible source or one that meets the 2021 Washington State Building Code standards and also includes the effect of sea level rise.

2 Topography and Bathymetry

All DEMs and project data utilize World Geodetic System 1984 (WGS84, ESPG:4326) as the standard coordinate system for this study. The fine-resolution coastal grids are referenced to Mean High Water (MHW).

2.1 1/3 Arc-second and 2 Arc-second DEMs

Output from the model was requested at grid points spaced 1/3" in longitude and 1/3" in latitude, with the points aligned with cell centers of the 1/3" DEM files that are available for the coastal region. (Note that 1/3" in latitude is approximately 10.3 m. At this latitude, 1/3" in longitude is approximately 6.9 m).

Grays Harbor 1/9" topography tiles of 2021 adjusted to MHW were used to construct 1/3" topography in the rectangular area between -124.25 and -123.750093 longitude and 46.8 and 47.149907 latitude. This area encompasses all of Grays Harbor and our study region and is depicted as the 1/3" rectangle in Figure 2.

These same Grays Harbor 1/9" topography tiles of 2021 were also used to construct the 2" topography for the rectangular area between -124.5 and -123.75 longitude and 46.75 and 47.25 latitude. This area is depicted as the 2" rectangle in Figure 2.

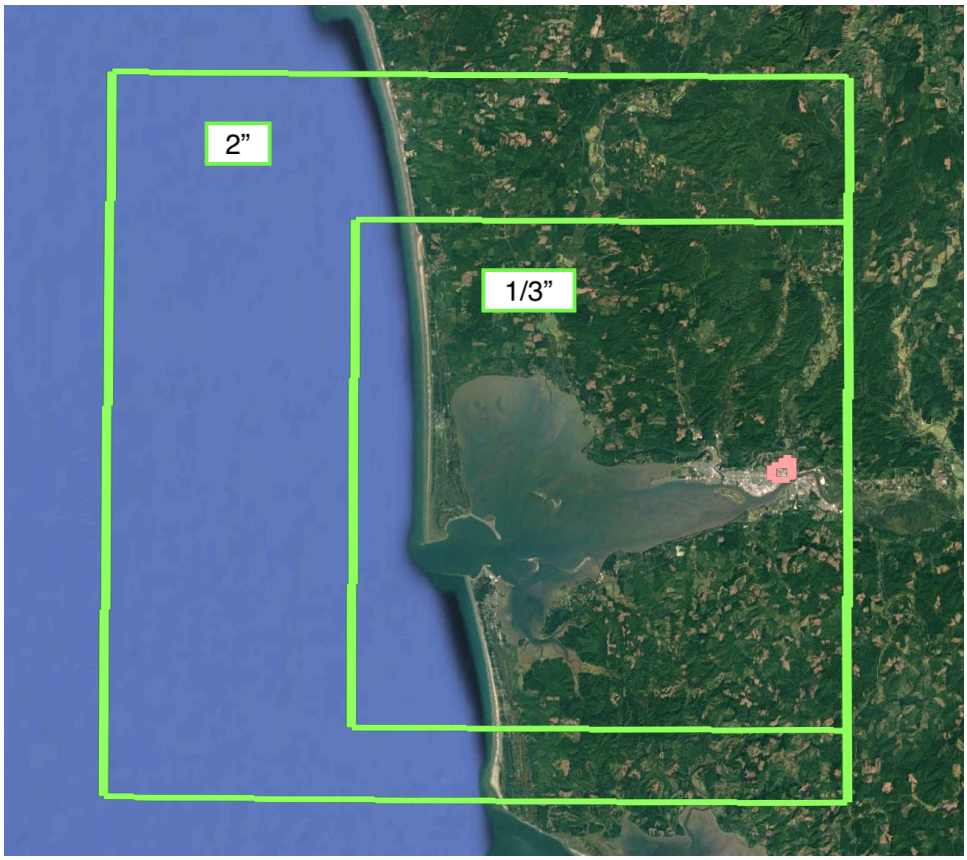


Figure 2: The extents of the 1/3" and 2" Grays Harbor DEMs are shown in the rectangular areas. Imagery from Google Earth.

We elected to use the Astoria, Oregon 1/3 Arc-second MHW Coastal Digital Elevation Model of 2012 [17] to make a coarsened 2" DEM since it was properly adjusted to MHW over a larger area than other available data sets. This 2" DEM extends south of our study area and covers the rectangular area between -124.59 and -123.6 longitude and 45.9 and 47.16 latitude. This area is depicted as the larger green 2" rectangle in Figure 3. The 2" DEMs are used for computations in their rectangular area that is not also covered by the finer 1/3" DEM.

GeoClaw uses finite volume methods with adaptive mesh refinement, and the finest grid resolution near regions of interest was set to the desired resolution of 1/3" by 1/3". It is important to note, however, that in the finite volume formulation the given DEM files are used to construct a piecewise bilinear function interpolating at the DEM points, and averages of this function over grid cells are then used as the topography values in the numerical method. Hence a cell that is centered at a DEM point overlaps 4 bilinear functions meeting at this point and the "GeoClaw topography" used in this grid cell will depend on the DEM values at 9 neighboring points. Moreover, if there is co-seismic subsidence (or uplift) in a cell the final GeoClaw topography value in this cell (which we denote by B) will include this deformation.

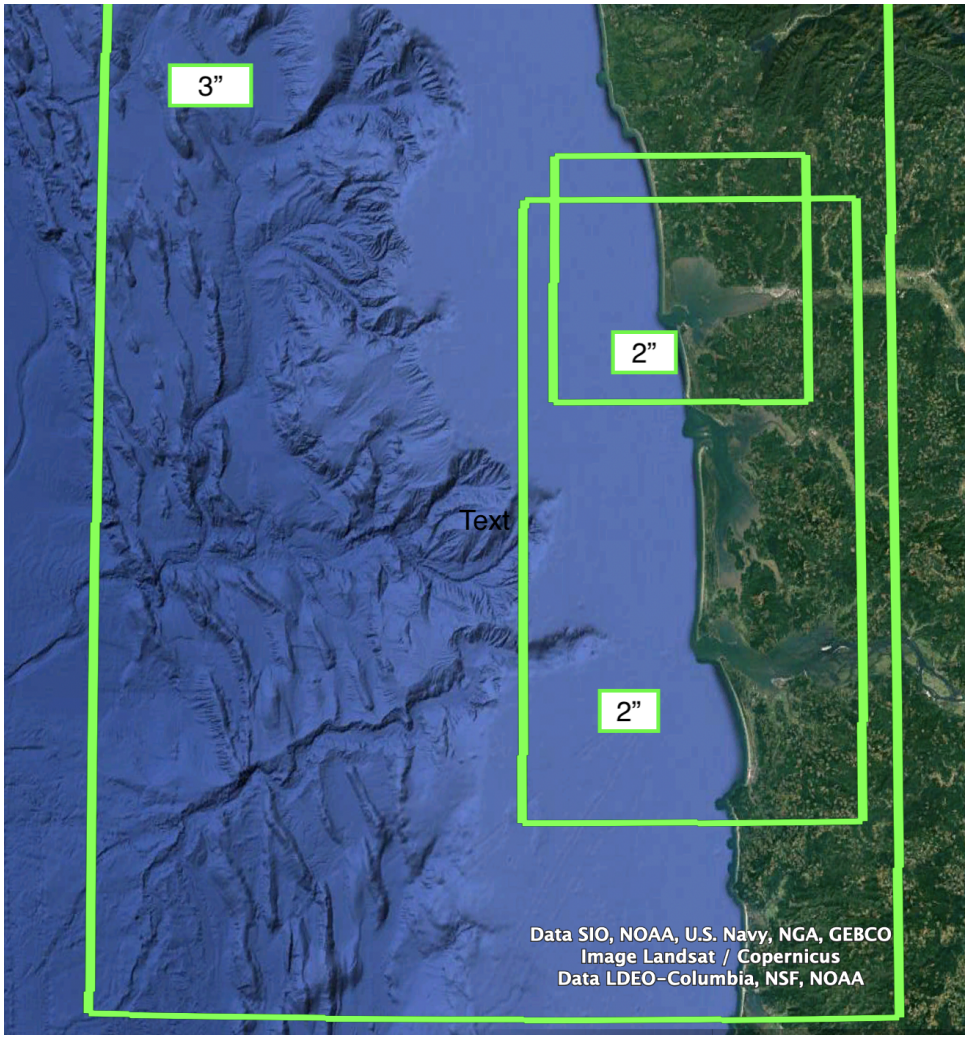


Figure 3: The extent of the 2” Grays Harbor DEM is shown in the smaller 2” rectangle. The extent of the Astoria 2” DEM is shown in the larger 2” rectangle. The 3” DEM of Figure 4 is partially depicted as well. Imagery from Google Earth.

2.2 Coarser DEMs

Outside the regions where the 2” and 1/3” DEMs described above were used, a 3” DEM was used. The 3” DEM was cropped from the `nw_pacific` 3-arcsecond DEM available at [18]. The area covered by this DEM is from longitude -125.85 to -123.5 and from latitude 45.5N to 49N. The 3” DEM encompasses the -200 meter depth contour offshore from Grays Harbor. Figure 5 shows the extent of the 3” DEM and the -200 meter contour line in this area.

Outside the 3” DEM region, we used 15 arc sec topography for the Pacific Ocean from the global dataset [13] which is referenced to MSL but is only used in water deeper than -200 meters, and has a resolution that does not resolve coastal features enough for the vertical datum to matter.

The 3” DEM is used for computations in its rectangular area that is not also covered by the finer 2” or 1/3” DEMs, and likewise, the 15” DEM is used for computations in its rectangular area that is not also covered by finer DEMs. These DEMs are shown in Figure 4.

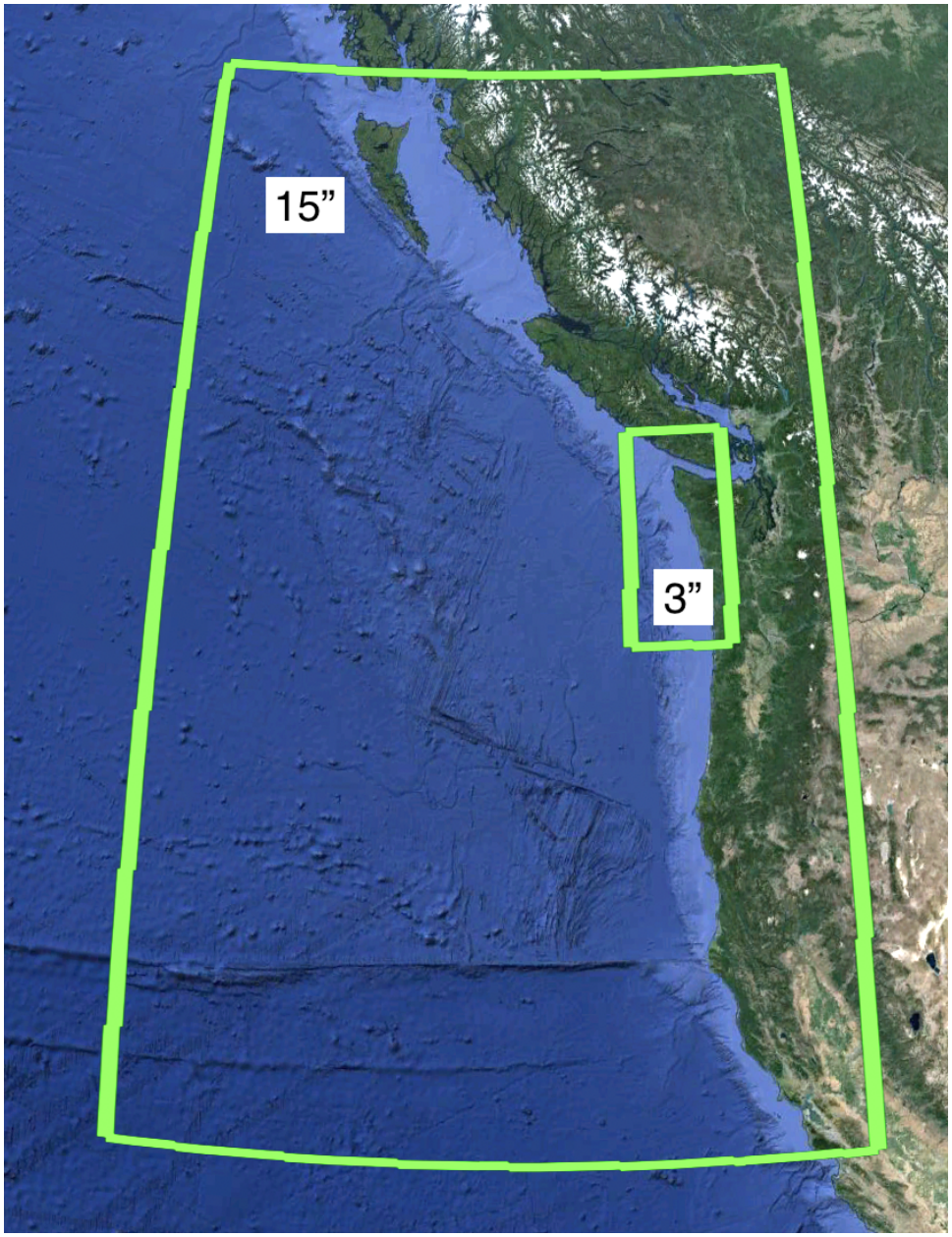


Figure 4: The extents of the 3” and 15” DEMs are shown in the rectangular areas. Imagery from Google Earth.

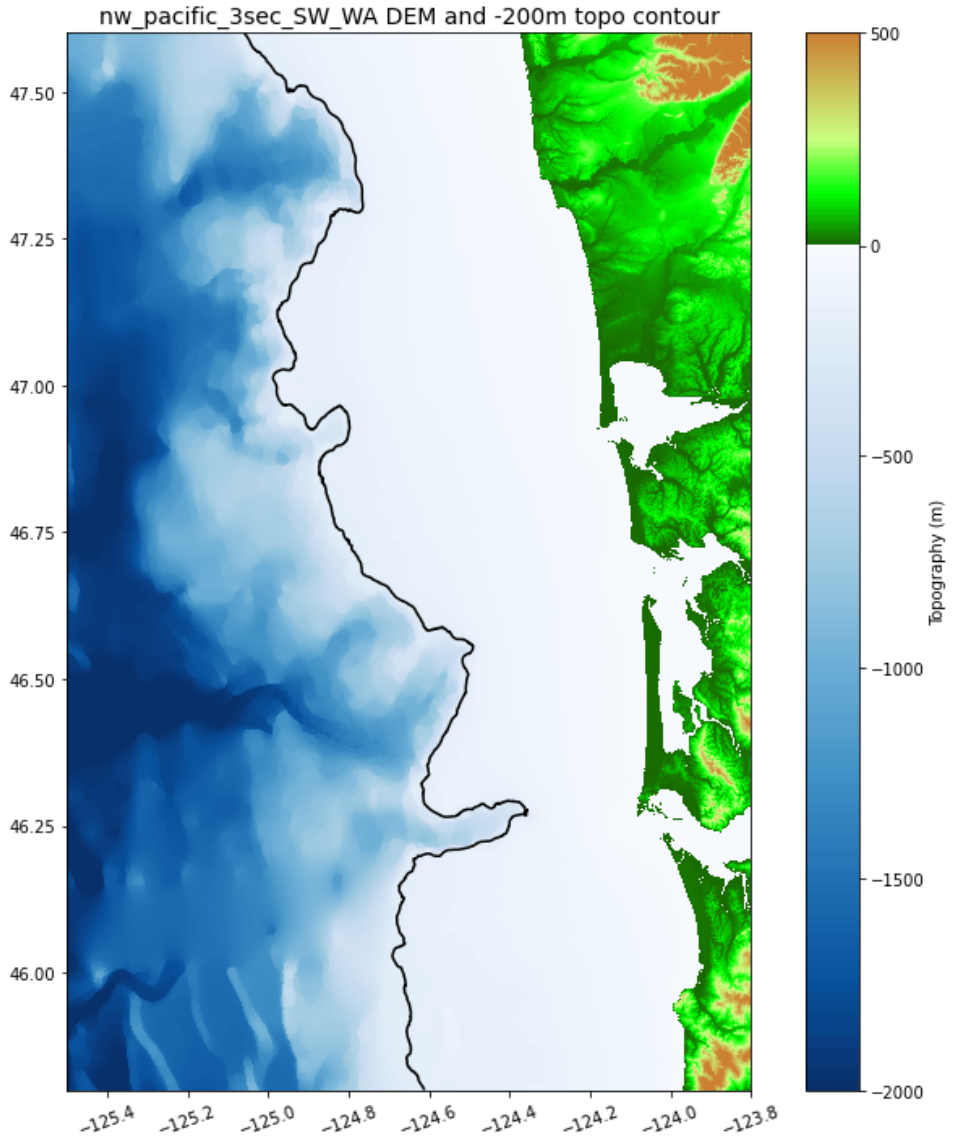


Figure 5: The extent of a 3" DEM is shown in the rectangular area. This DEM was cropped from the `nw_pacific` 3-arcsecond DEM available at [18] and is also shown in Figure 4. The black line is the -200 meter depth contour offshore from Grays Harbor. Outside this region, 15 arcsec topo is used. Imagery from Google Earth.

3 Calculation regions and their resolutions

The GeoClaw calculation regions from finest to coarsest were 1/3”, 1”, 3”, 6”, 12”, variable 12” to 24”, and variable 4’ to 24” in the deep ocean. The 1/3” and 1” calculations were all within the 1/3” DEM area. The 3” calculations were mostly within the 1/3” DEM region with some within the 2” DEM region. The 6” calculation away from shore were mostly in the 3” DEM region and those closer to shore were within the 2” and 1/3” DEM regions. Likewise the other coarser calculations were either in the 15’ DEM or 3” DEM areas away from shore and in the finer DEM areas around the Grays Harbor and Aberdeen areas.

In the figures that follows, the yellow regions depict computational resolution and the green regions depict the DEM resolution used. In both cases the resolution that is actually used is that of the finest resolution covering the location.

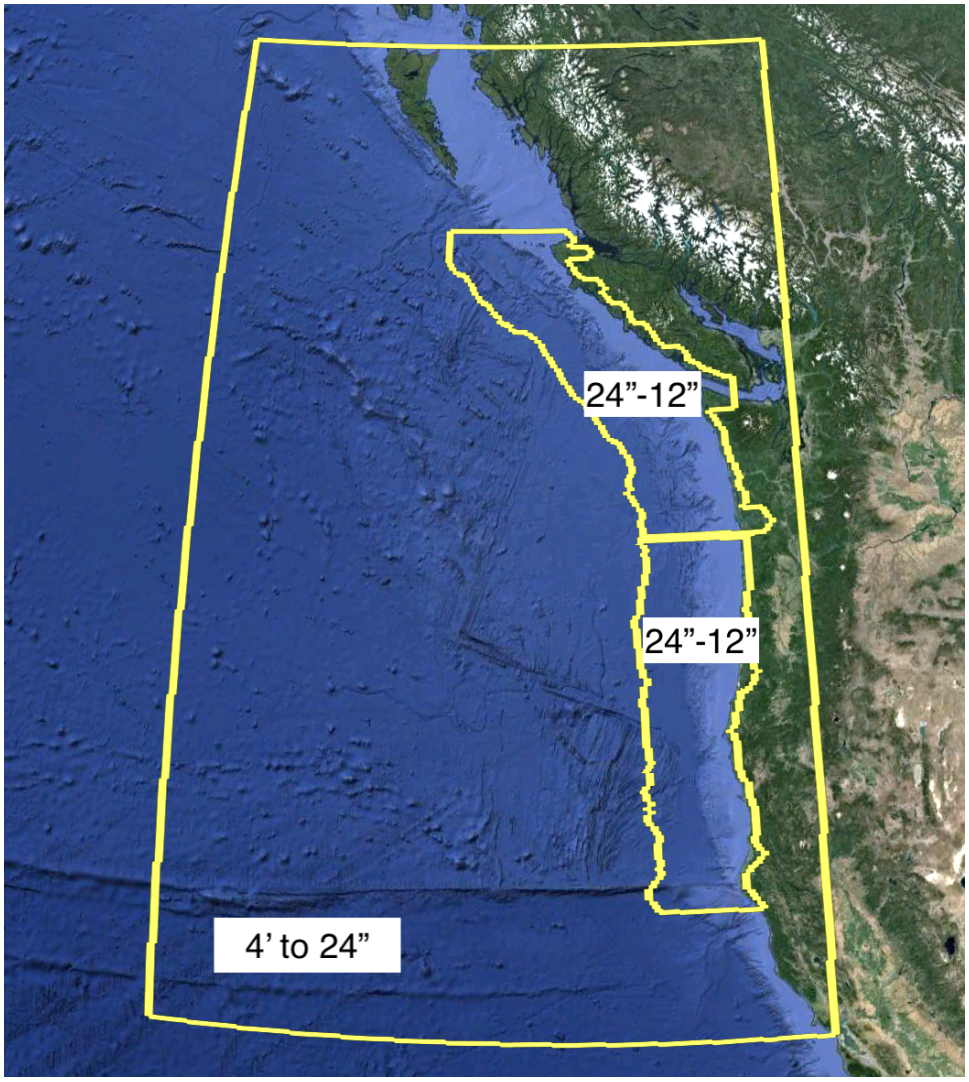


Figure 6: The extent of the variable 4’ to 24” computational region is shown in the large yellow rectangle. The two ruled rectangles follow the coastal area and are the 24” to 12” computational regions. Imagery from Google Earth.

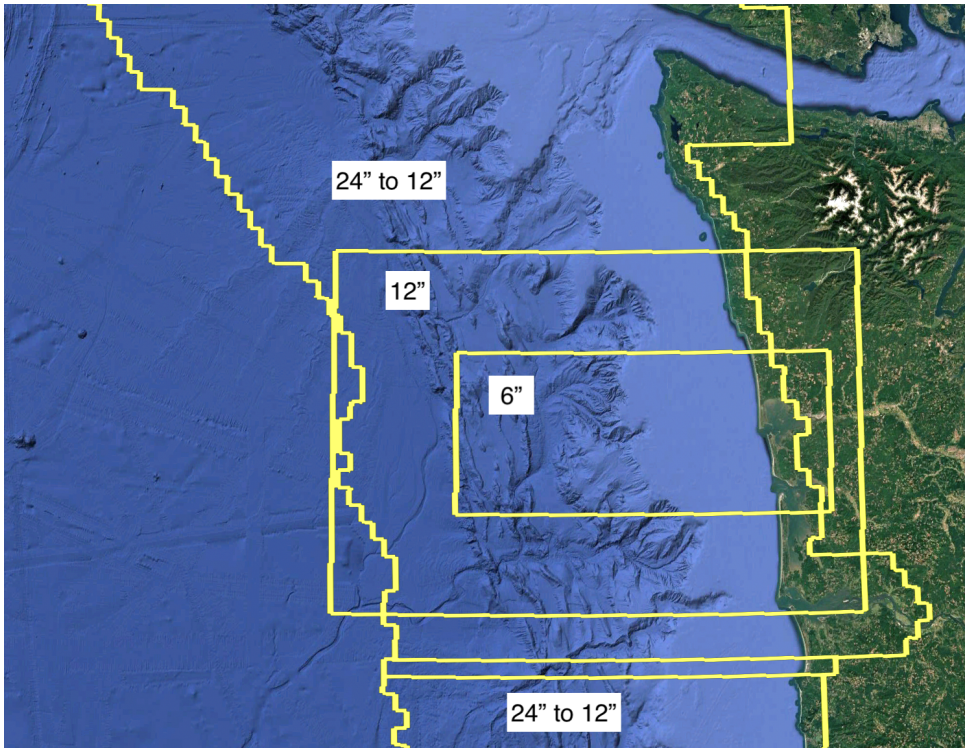


Figure 7: The extent of a 12” computational region is shown as the larger yellow rectangle and the extent of a 6” computational region is shown as the smaller yellow rectangle. These rectangles surround the Grays Harbor area and are shown in relation to the two ruled rectanglular 24” to 12” computational regions of Figure 6. Imagery from Google Earth.

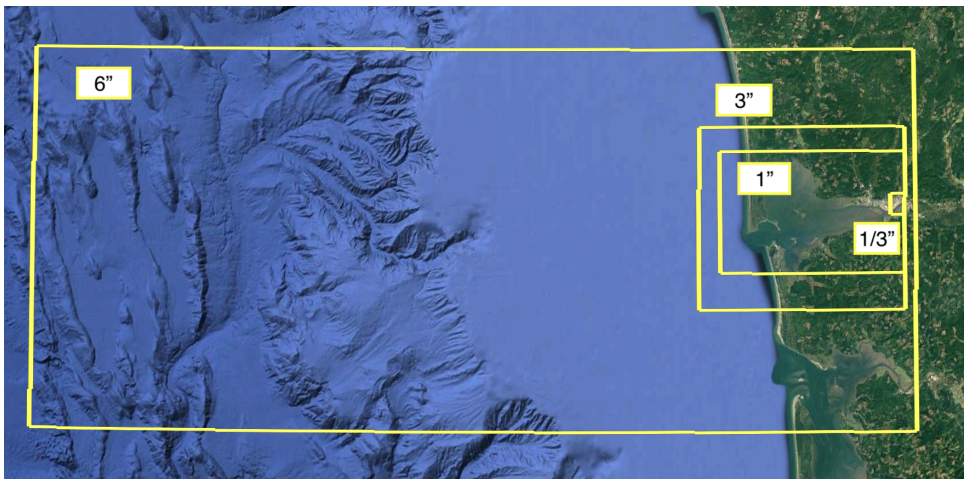


Figure 8: The extents of the 6”, 3”, 1”, and 1/3” computational regions are depicted as the four yellow rectangles. Notice that 1” computation is guaranteed within Grays Harbor with 1/3” computation surrounding a region encompassing the study area in Aberdeen. Imagery from Google Earth.



Figure 9: The extents of the 1” and 1/3” computational regions are depicted as the yellow rectangles. Notice that 1” computation is guaranteed within Grays Harbor with 1/3” computation surrounding a region encompassing the pink study area in Aberdeen. Imagery from Google Earth.

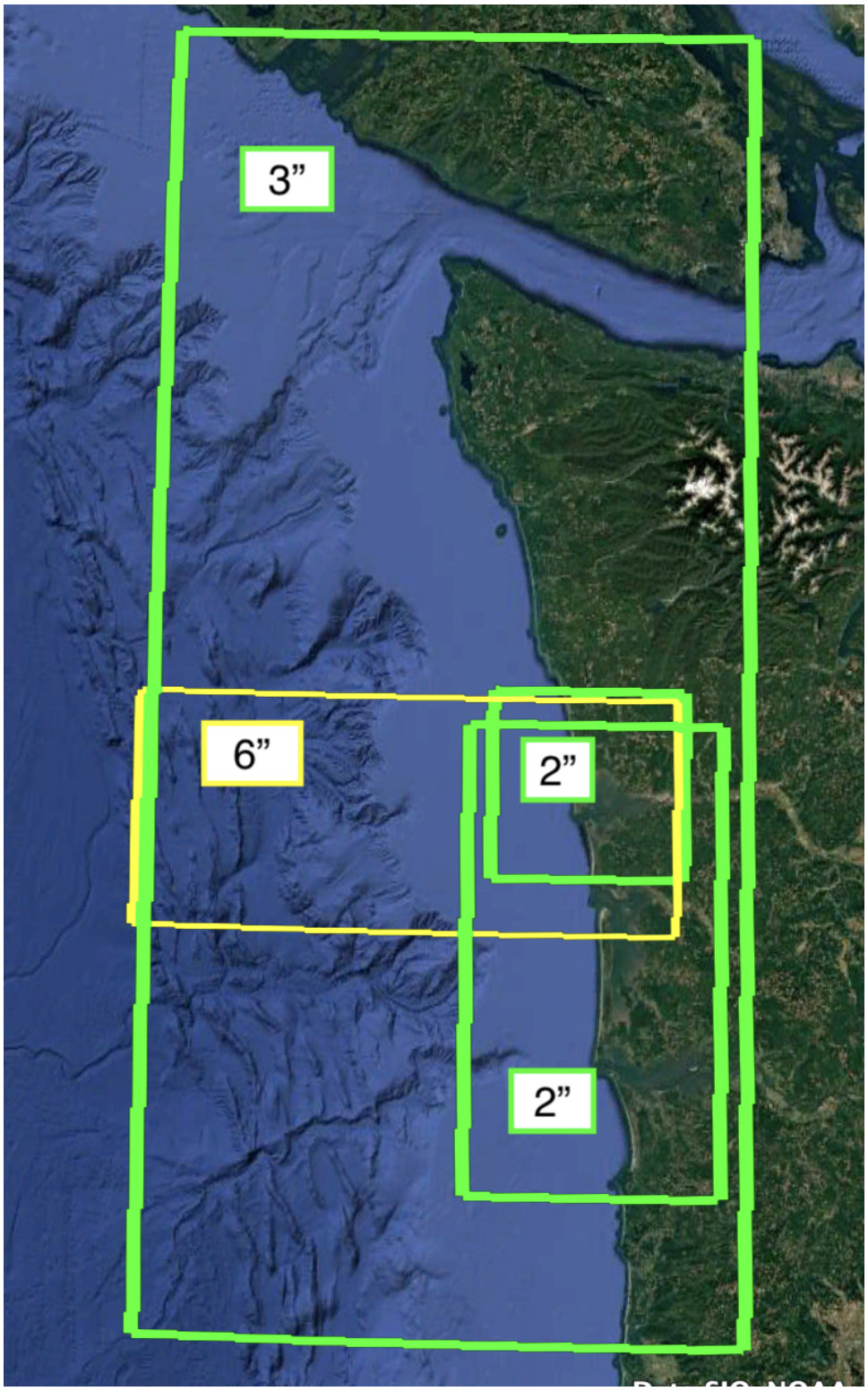


Figure 10: The 6” computational region is supported away from shore by the 3” DEM. Closer to the Grays Harbor area, it is supported by 2” DEMs. Imagery from Google Earth.

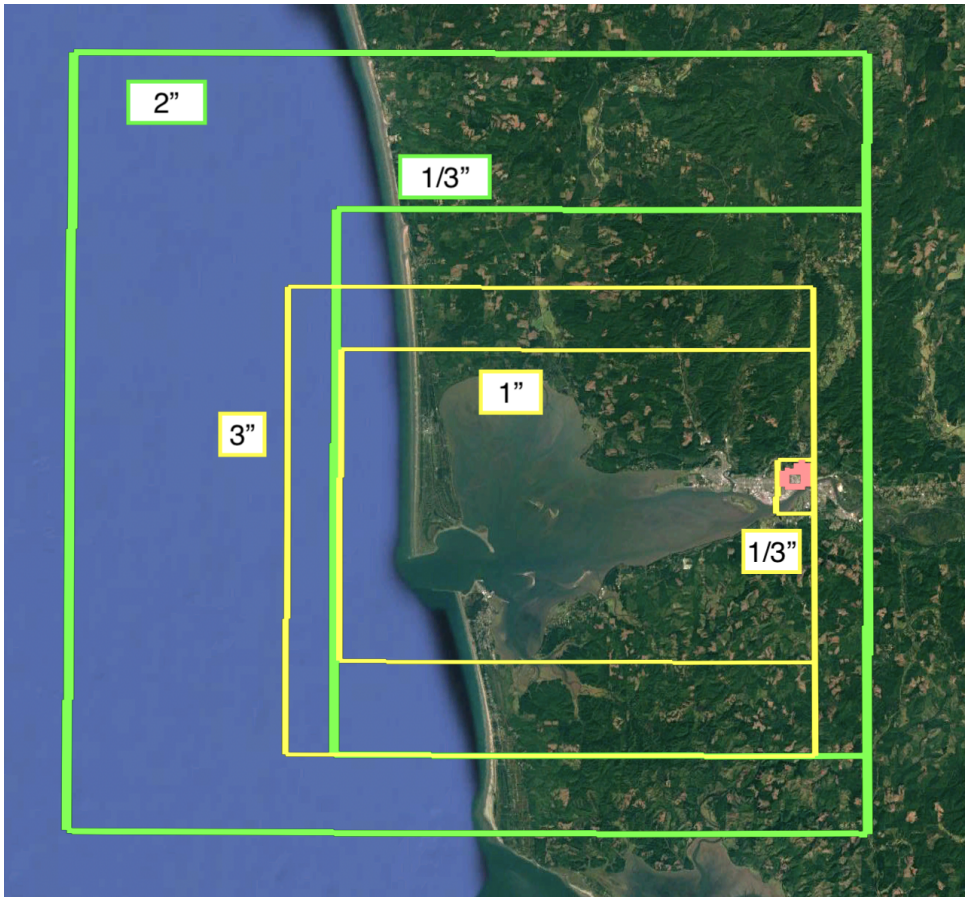


Figure 11: The 3” computational region is supported by the 2” and 1/3” DEMs. The pink study area within the 1/3” computational region is also depicted. Imagery from Google Earth.

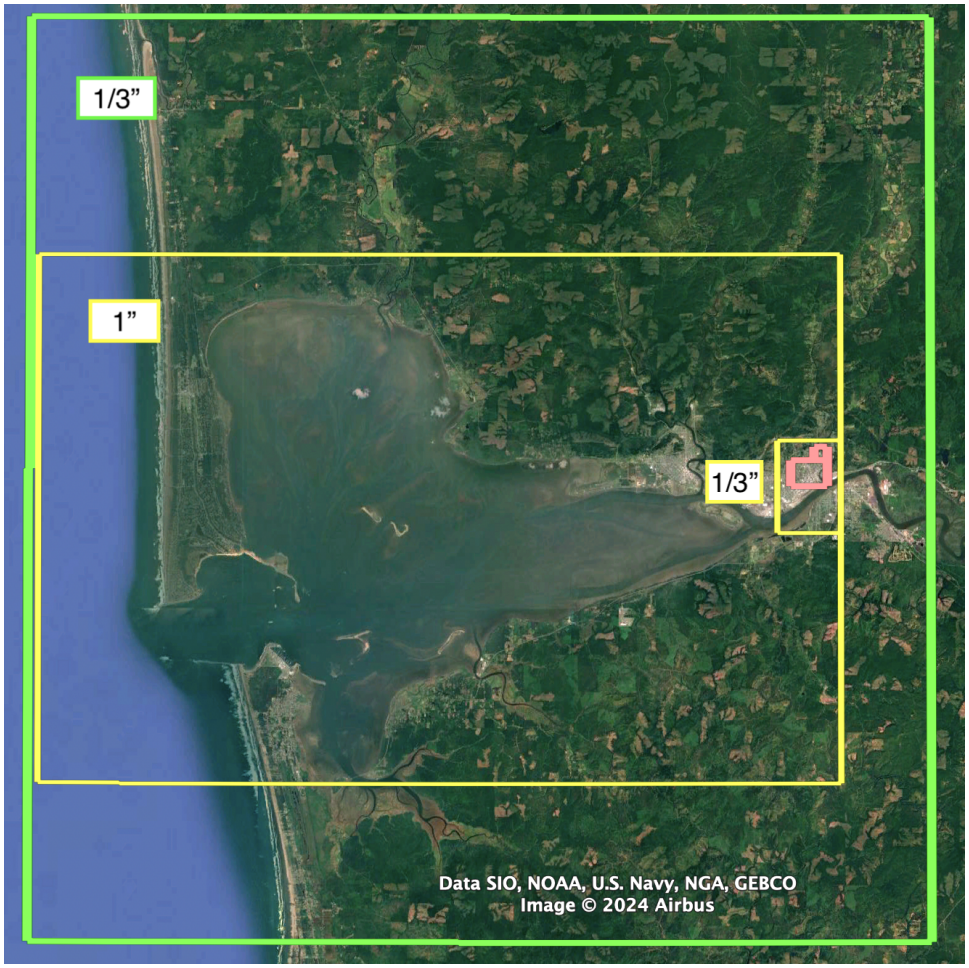


Figure 12: Both the 1” and 1/3” computational regions are supported by the 1/3” DEM. The pink study area within the 1/3” computational region is also depicted. Imagery from Google Earth.

4 Earthquake Sources

In [5] we identified three Cascadia Subduction Zone (CSZ) sources that are compliant under the 2021 Washington State Building Code [1]. Two of these sources are also compliant under ASCE 7-22 [12]. This means any one of them could be used as a source for the "Maximum Considered Tsunami" after incorporating sea-level rise. In consultation with the project team, we chose to present results for two of these sources, using an increase of 0.114 meters above MHW to model sea-level rise. The first, called `L1up_x1.117` is described in Section 4.2 is ASCE 7-22 compliant. The second, called `CSZ_L1-extended-pmel` is described in Section 4.1. It is not ASCE 7-22 compliant, but does meet the 2021 Washington State Building Code compliance test.

We will give results for `CSZ_L1-extended-pmel` without any sea-level rise in order to compare with the Washington State TDZ maps. We also give results for `CSZ_M1`, a medium-sized Cascadia source without sea-level rise, to compare with the larger `CSZ_L1-extended-pmel` without sea-level rise. The `CSZ_M1` is thought to be more likely to happen. We note that `CSZ_M1` does not meet the 2021 WA Building Code nor the ASCE 7-22 standards.

We begin by first describing in Section 4.1 the Cascadia Subduction Zone (CSZ) source that is typically used in WA State tsunami studies, as it is the basis for the development of the `L1up_x1.117` ASCE 7-22 compatible source.

4.1 Cascadia megathrust events

The probability that an earthquake of magnitude 8 or greater will occur on the Cascadia Subduction Zone (CSZ) in the next 50 years has been estimated to be 10-14% (Petersen, et. al., 2002 [20]). The last such event occurred in 1700 (Satake, et al., 2003 [21]; Atwater, et al., 2005 [7]) and future events are expected to generate a destructive tsunami that will inundate Washington Pacific coast communities within tens of minutes after the earthquake main shock.

The State of Washington and the State of Oregon have long used a CSZ source called L1 as the Cascadia magnitude 9.0 source for tsunami hazard assessment, based on the set of sources developed by Witter et al. for a study of Bandon, OR in [24] and [23]. They used the geologic evidence to divide past events into size classes and identified 3 L-size events and 1 XL-size event over the past 10,000 years, suggesting a 1/2500 annual probability of an event of size L or larger. They also produced 3 hypothetical seafloor deformations for each size class (e.g. L1, L2, L3) and of these L1 potentially produces the largest tsunami since it includes a splay fault with rupture close to the surface. Hence using L1 as the 2500-year event is considered a conservative choice. The M-size events in Witter et al. have a return time of only 1000 years and are not sufficiently conservative, while XL, with a 10,000 year return time is too extreme.

The L1 source used in the Oregon study was truncated at about latitude 48.5N. For the past several years, Washington State has used a modified version of this source that was extended to the north along Vancouver Island to roughly latitude 51. This modified source was produced by the NOAA Center for Tsunami Research (NCTR), part of the Pacific Marine Environmental Laboratory (PMEL) in Seattle, and is referred to as `CSZ_L1-extended-pmel` in recent reports on Washington State modeling, e.g. [3, 22, 4]. The seafloor deformation is shown in Figure 13 for this CSZ extended source.

Waves from a `CSZ_L1-extended-pmel` event begin hitting parts of the study region within 1 hour after the event (which is assumed to be instantaneous in our modeling). There is also significant subsidence of the coast from these events which happens at the time of the earthquake, so locations in the water become hazardous immediately.

The maximum water depth and speeds recorded at the fgmax points for this CSZ event typically occur within the first four to five hours post-quake. Larger speeds are sometimes seen offshore at later times, particularly if strong vortices are generated that continue to travel around the region. At a few isolated onshore points the maximum depth is seen later, perhaps due to an accumulation of water from multiple waves. Our job runs are for 10 hours post-quake.

This CSZ_L1-extended-pmel source is modified in Section 4.2 to produce one of the ASCE compatible sources for this study.

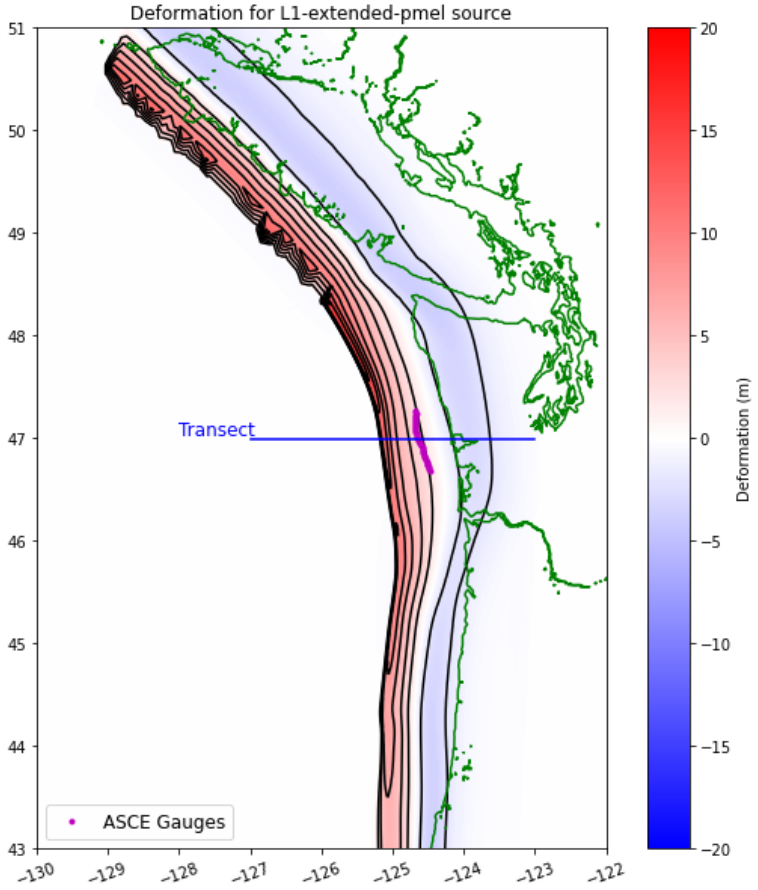


Figure 13: Surface deformation of the L1 source, with maximum uplift 15.08 m and maximum subsidence −3.98 m. Red contours show uplift (2 meter interval), blue contours show subsidence (1 meter interval). The magenta dots are the selected ASCE gauges 98-142 from north to south. The transect on the plot is at the latitude of the mouth of Grays Harbor (46.916N).

For comparison to the CSZ_L1-extended-pmel source plotted in Figure 13, we plot the deformation of the CSZ_M1 source in Figure 14 below. Notice that this source is not extended as far north and has much less uplift and subsidence than the CSZ_L1-extended-pmel source as indicated in the numbers on the colorbar.

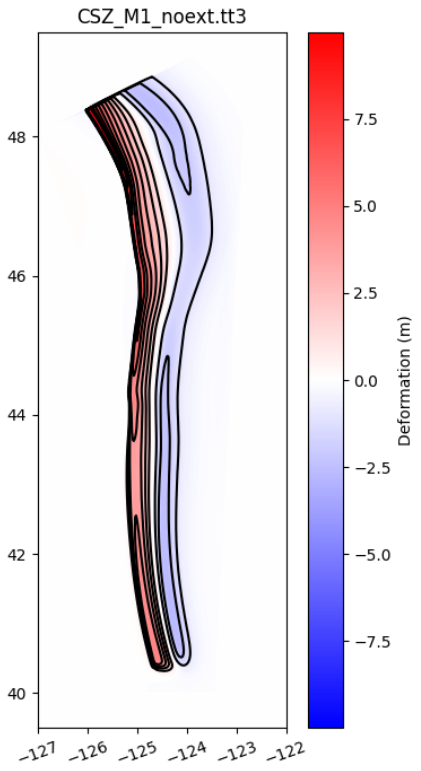


Figure 14: Surface deformation of the `CSZ_M1` source, with maximum uplift 9.93 meters and maximum subsidence −2.749 meters. Red contours show uplift (2 meter interval), blue contours show subsidence (1 meter interval).

4.2 L1up_1.117

In the Compliance report [5], we showed that the `CSZ_L1-extended-pmel` source was not an ASCE 7-22 compatible source under our running conditions. However, the `CSZ_L1-extended-pmel` amplitudes at the selected ASCE gauges can be examined to determine how to modify this source to obtain one that is indeed ASCE compatible. We simply multiply the region of subsidence of the `CSZ_L1-extended-pmel` source by a factor that will match a reasonable level of subsidence at the Aberdeen site and the uplift region by a constant factor that will meet the ASCE compliance conditions. This procedure was used to design a source for the Shoalwater Bay Indian Tribe Tower VES project [2]. Since we were the first group to apply the ASCE guidelines to a VES project, we had substantial discussions with several members of the ASCE committee that developed the guidelines and with the Shoalwater Bay Indian Tribe VES peer review committee who agreed this procedure was adequate. Once the factors are determined, the source is constructed and a GeoClaw run is made to verify the amplitudes at the ASCE gauges are indeed compatible with ASCE's amplitude values.

Details of the procedure and proof of compliance are given in [5] for source `L1up_x1.117` where we multiplied the uplift region of `CSZ_L1-extended-pmel` by the factor 1.117 and the subsidence portion by 1.0. We note that the amount of subsidence produced by `CSZ_L1-extended-pmel` is already sufficient on land near Aberdeen and producing more with an amplification factor greater than 1.0 was not warranted. Our factor of 1.0 came from the the fact that the subsidence of this source matched well that predicted by the ASCE Design Tool for 2022 [6] as addressed in the Compliance report [5].

The crustal deformation of this source is shown in Figure 15. The transects and ASCE gauges referenced in the figure and analysis details of the compatibility of this source are described in the Compliance report [5].

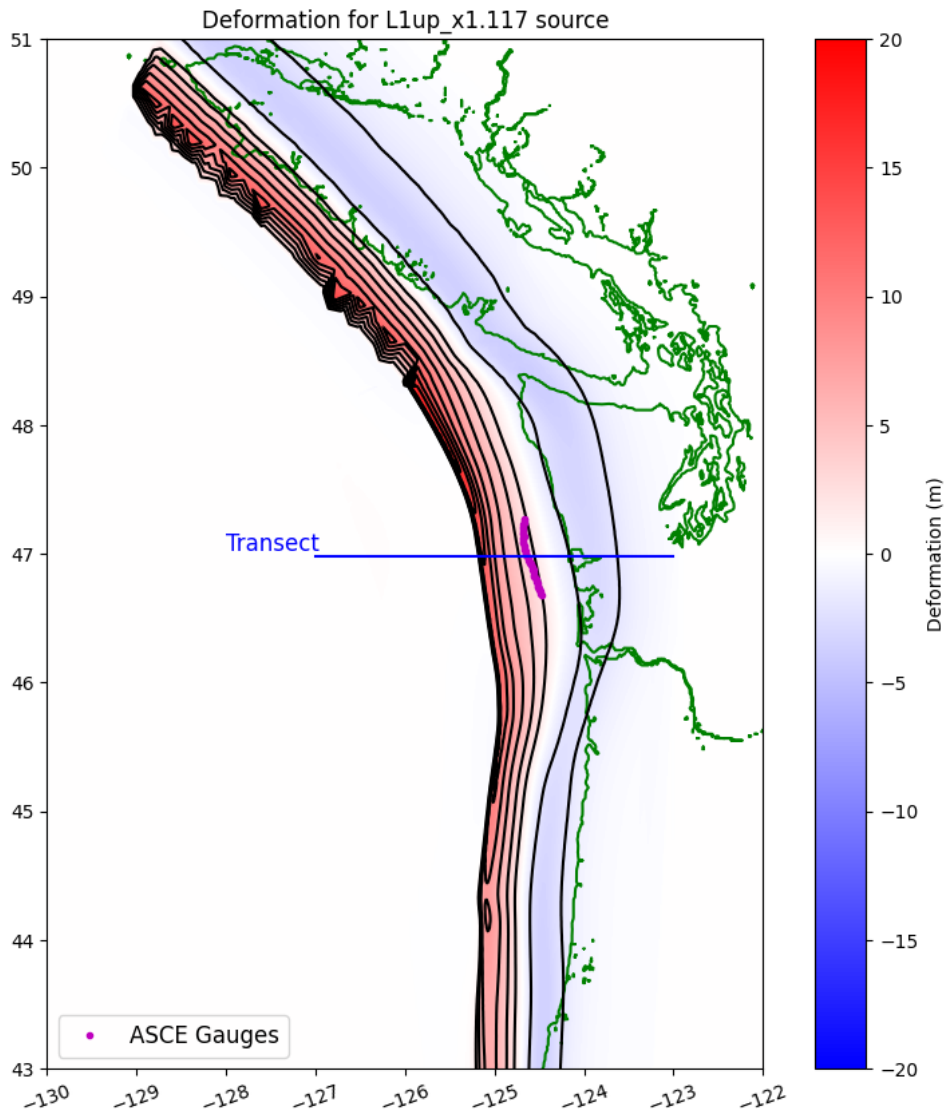


Figure 15: The deformation of the `L1up_x1.117` source. The magenta dots are the selected ASCE gauges 98-142 from north to south. The transect on the plot is at the latitude of the mouth of Grays Harbor (46.916N). The subsidence (in blue) is the same as that of the CSZ_L1-extended-pmel source in Figure 13, only the shade of the red uplift region is increased by the 1.117 factor. The maximum uplift is 16.844 meters and the maximum subsidence is -3.98 meters.

5 Modeling considerations, uncertainties, and limitations

The simulations of tsunami generation, propagation and inundation were conducted with the GeoClaw model. This model solves the nonlinear shallow water equations, has undergone extensive verification and validation (e.g. [8, 16]), and has been accepted as a validated model by the U.S. National Tsunami Hazard Mitigation Program (NTHMP) after conducting multiple benchmark tests as part of an NTHMP benchmarking workshop [14].

Several important geophysical parameters must be set in the GeoClaw software, and some physical processes are not included in these simulations, which use the two-dimensional shallow water equations. These are discussed below along with their potential effect on the modeling results.

5.1 Tide stage and sea level rise

Tsunami inundation simulations are often performed with the ocean initially at rest and at a level that corresponds to MHW at the site of interest, which is also the vertical datum of the DEMs used (elevation $Z = 0$ corresponds to the shoreline at MHW.) This practice is conservative, in the sense that the severity of inundation will generally increase with a higher background sea level. Larger tide levels do occasionally occur, but the assumption of MHW is standard practice in studies of this type.

Tidal currents are ignored in the present work. This is consistent with past tsunami inundation modeling we have done for Washington State, including studies of Vertical Evacuation Structure sites. Tsunamis combined with strong tidal currents could result in higher inundation than what is shown in this study.

For this study a much more conservative value of the initial sea level has been used, MHW plus an additional 0.114 meters.

In particular, 0.114 meters accounts for a sea level rise of 0.114 meters by year 2125. This value was obtained by using the historical rise that is published for the tide station at Toke Point, WA, the closest such station to Aberdeen, WA where historical relative sea level rise data is available from NOAA. For this station, there was a 95% confidence that the relative sea-level rise by 2125 was in the range 0.043 meters plus or minus 0.071 meters. This says there is only a 2.5% chance such is rise is greater than 0.114 meters. The year 2125 accounts for a 100 year life span of the structure.

To put this in context, the tide gauge located in Aberdeen, WA [19] shows that Mean Higher High Water (MHHW) at Aberdeen is roughly 0.212 meters above MHW. The highest observed tide at this location from historical data was about 1.355 meters above MHW in December 1982. The highest astronomical tide was 0.916 meters above MHW. So, the historical sea-level rise of 0.114 meters is less than even MHHW.

Sea level rise and an increased tidal stage above MHW are additive in GeoClaw and produce an increased GeoClaw background sea level above MHW. So, using 0.114 meters above MHW as the GeoClaw background sea level accounts for the historical sea level rise by 2125 but not for any increased sea level due to a higher tide stage than MHW whenever the tsunami arrives. Even though it is not necessary to account for increased tidal stage to meet the 2021 WA Building Code or the ASCE 7-22 standards, if information about such a hazard is desired, additional tsunami runs with a background GeoClaw sea level greater than 0.114 meters would be required, for example SLR=0.114+0.212 would account for both historical sea-level rise and a MHHW tidal stage when the tsunami arrives.

5.2 Subsidence

The CSZ events have significant co-seismic subsidence at all coastal regions in this study. The subsidence is accounted for in the GeoClaw modeling, since the initial DEM provided for the region is modified by the earthquake deformation.

5.3 Structures

Buildings were not included in the simulations, the topographic DEMs provided for this study are "bare earth". The presence of structures will alter tsunami flow patterns and generally impede inland flow. To some extent the lack of structures in the model is therefore a conservative feature, in that their inclusion would generally reduce inland penetration of the tsunami wave. However, as in the case of the friction coefficient, impeding the flow can also result in deeper flow in some areas. It can also lead to higher fluid velocities, particularly in regions where the flow is channelized, such as when flowing up streets that are bounded by buildings.

5.4 Bottom friction

The tsunami simulations are performed over "bare earth" topography that is devoid of structures or vegatation. Bottom friction is modeled in GeoClaw by a standard procedure that introduces a frictional source term in the momentum equations, with an adjustable parameter known as Manning's coefficient of friction, n, which can be set based on the roughness of the earth. Standard procedure for many tsunami inundation studies (including those we have performed for Washington State) is to use the value $n = 0.025$ everywhere, which corresponds to "rough gravel". This practice meets the 2021 Washington State Building Code and the ASCE 7-22 standards. Smaller values would correspond to smoother surfaces, such as the bottom of Grays Harbor. This choice of 0.025 is conservative in some sense, because the presence of trees, structures and vegetation would justify the use of a larger value, which might tend to reduce the inland flow. On the other hand, larger friction values can lead to deeper flow in some areas, since the water may pile up more as it advances more slowly across the topography. Additionally, this assumption may neglect other possible localized effects that vegetation and structures can have on the path and flow of the tsunami. For example, higher fluid velocities may exist in regions where neighboring buildings could channelize flow. This may lead to locally faster current speeds in some heavily built-up urban environments that are not recorded in our model results.

5.5 Tsunami modification of bathymetry and topography

Severe scouring and deposition are known to occur during a tsunami, undermining structures and altering the flow pattern of the tsunami itself. Again, this movement of material requires an expenditure of tsunami energy that tends to reduce the inland extent of inundation. On the other hand, if natural berms or ridges along the coastline (or man-made levies or dikes) are eroded by the tsunami, then some areas can experience much more extensive flooding. There is no erosion or deposition included in the simulations presented here.

6 Results – Pre-quake B0 and post-quake B topography/bathymetry

In this section we show the pre-quake(B0) and post-quake(B) topography/bathymetry within the Aberdeen study area for the three earthquake sources we are considering in this study. This study area subsides with each of these sources. With the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources, it subsides by the same amount which is around 2.85 meters or 9.35 feet across the study area, and with the `CSZ_M1` source it subsides by a smaller amount with is about 1.87 meters or 6.15 feet.

This susidence, caused by the earthquake, is permanent and in some places the land drops to where the post-quake topography/bathymetry (B) is below MHW. This means that some locations in the study area will now have a direct path to Grays Harbor and at MHW each day will be flooded. Since B is referenced to MHW and is negative when B is below MHW, the amount of daily flooding will be -B meters for a background ocean level of MHW. When SLR is included and the background ocean level is MHW+SLR, the amount of daily flooding will be -B+SLR meters where B is less than this background ocean level.

We show the hazard due to just subsidence in a plan view plot across the study area for these three sources. The pre-quake B0 is the same for all the sources and is shown in Figure 16. The post-quake B is the same for the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources and is shown in Figure 17. Figure 18 shows the post-quake B for the `CSZ_M1` source. In Section 7, we give the same B0 and B in blowup plots isolated to each of the yellow footprint regions called B-Street, I-StreetParking, I-StreetVacant, and K-Street. These blowup plots also indicate the minimum and maximum values of B and B0 within each footprint.

Post-quake, the tsunami comes in on the subsided bathymetry B. This additional hazard gives rise to inundation in the study area. Post-tsunami, some of this flooding drains out, but daily when the tide is at the background ocean level MHW+SLR, locations where B is below this background level can be expected to have -B+SLR meters of flooding.

The maximum inundation depths above B and the maximum speed of the tsunami across the study area are described in plan view plots in Section 8. In Section 9, we give the same information within each of the yellow footprint regions.

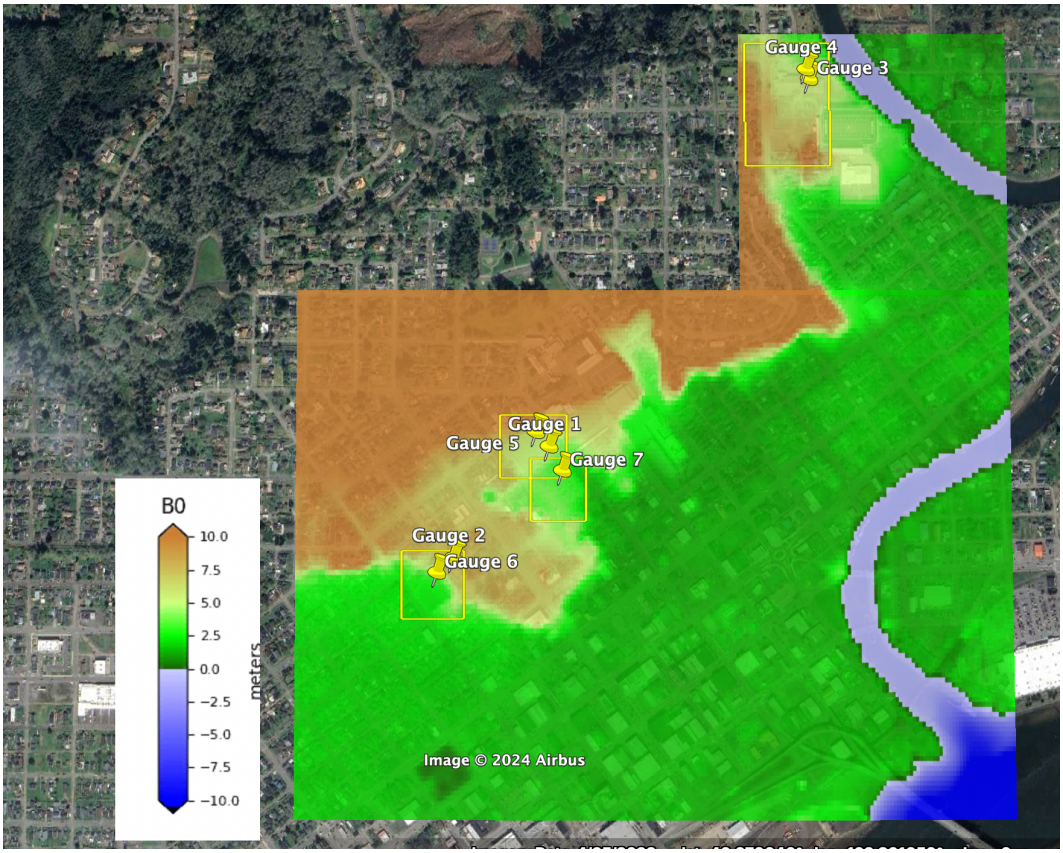


Figure 16: The pre-quake topography/bathymetry B0 in meters above MHW for the Aberdeen study region.

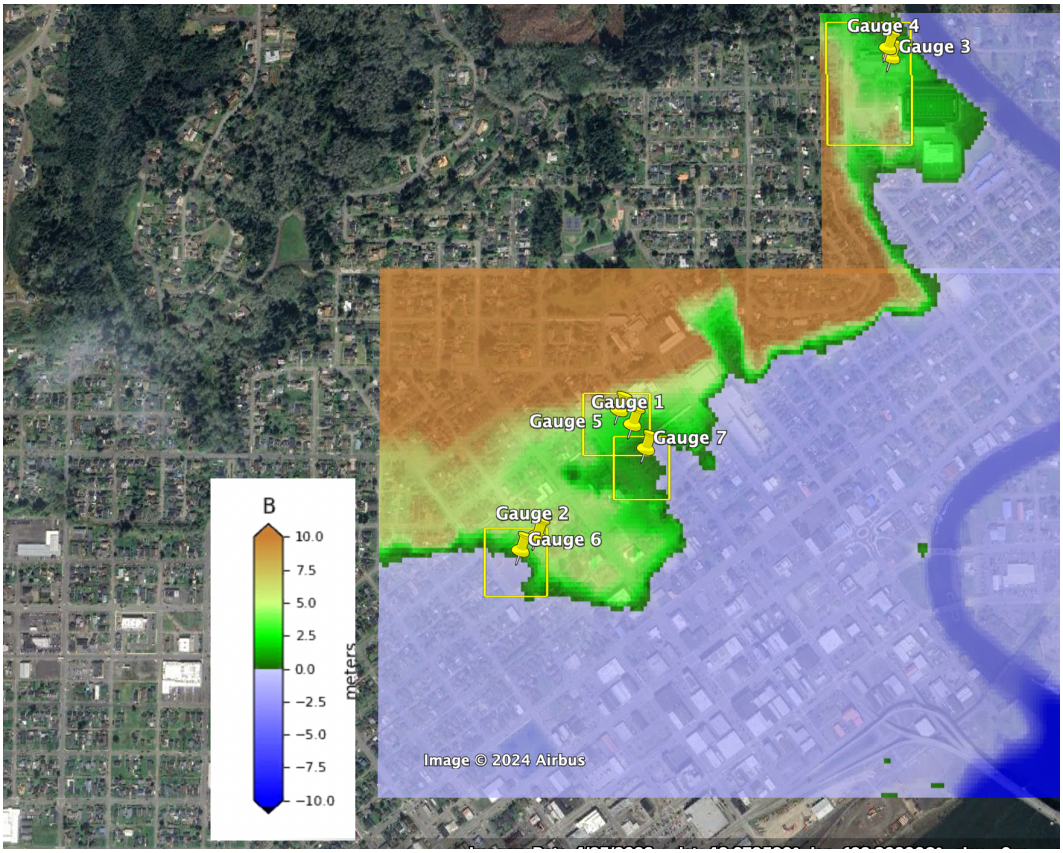


Figure 17: The post-quake topography/bathymetry B in meters above MHW for the Aberdeen study region for the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources.

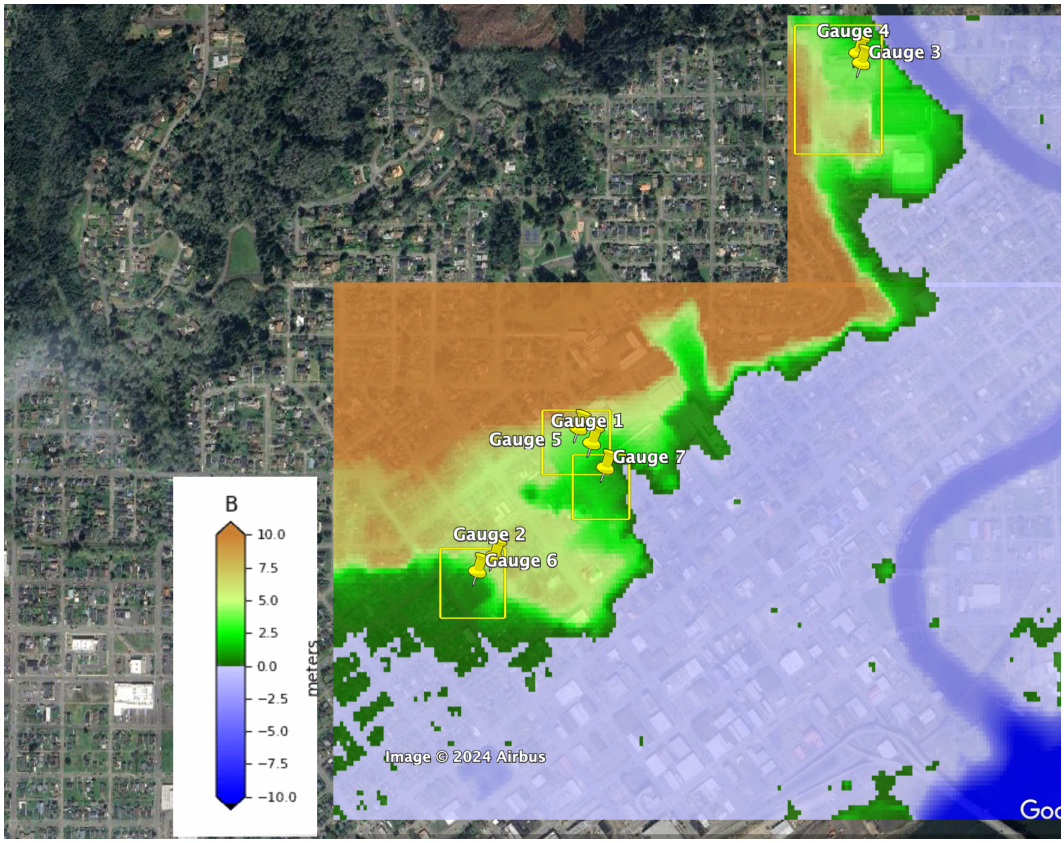


Figure 18: The post-quake topography/bathymetry B in meters above MHW for the Aberdeen study region for the `CSZ_M1` source.

7 Results – Pre-quake B0 and post-quake B for each footprint

7.1 B-Street footprint

The pre-quake bathymetry B0 is the same for all sources considered and is given in Figure 19. The post-quake bathymetry B for the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources is the same and for the B-Street footprint is given in Figure 20. The post-quake bathymetry B for the `CSZ_M1` source for the B-Street footprint is given in Figure 21.

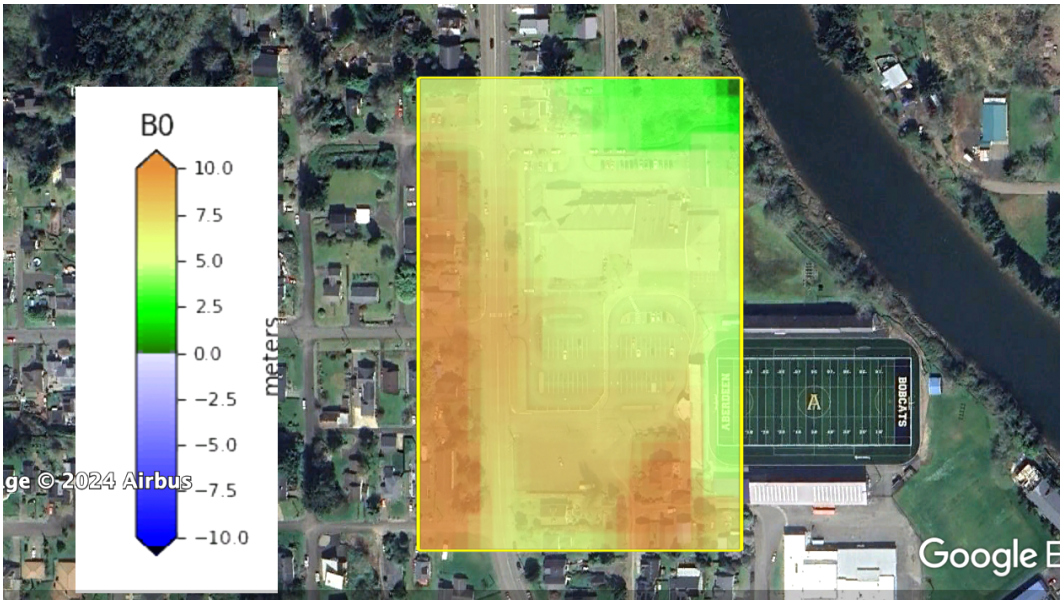


Figure 19: The pre-quake topography/bathymetry B0 in meters above MHW for the Aberdeen B-Street footprint. The min/max values of B0 were 0.15 and 14.02 meters (or 0.48 and 46.00 feet) above MHW.

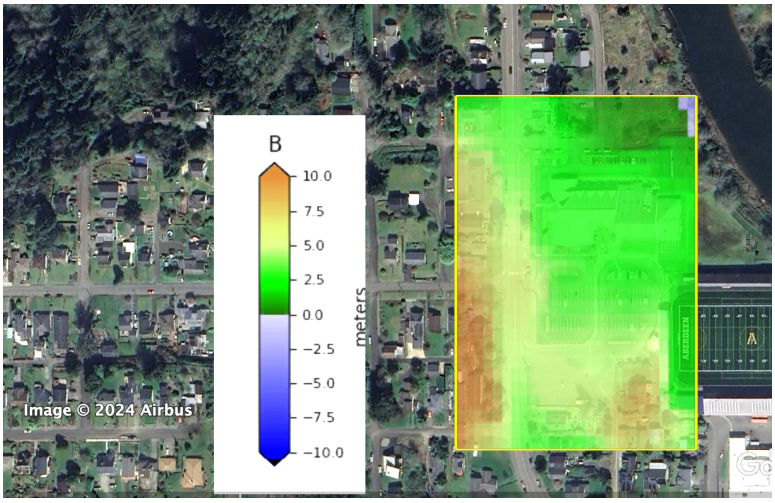


Figure 20: The post-quake topography/bathymetry B of the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources in meters above MHW for the Aberdeen B-Street footprint. The min/max values of B were -2.67 and 11.20 meters (or -8.76 and 36.73 feet).

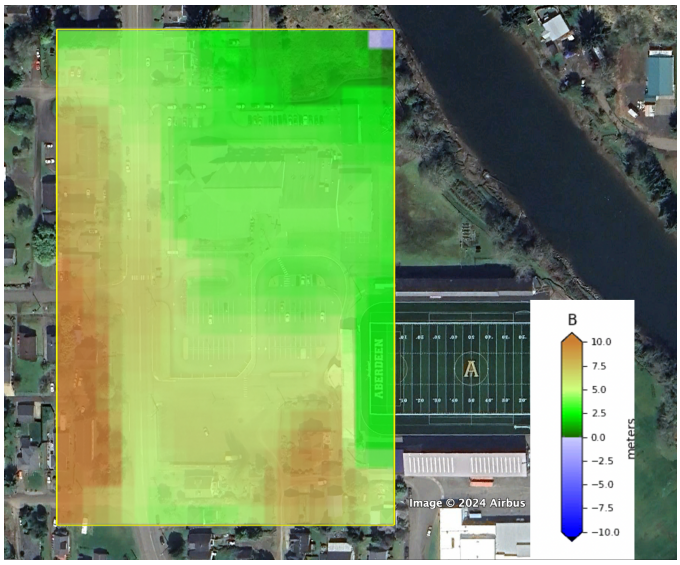


Figure 21: The post-quake topography/bathymetry B of the `CSZ_M1` source in meters above MHW for the Aberdeen B-Street footprint. The min/max values of B were -1.71 and 12.16 meters (or -5.62 or 39.89 feet).

7.2 I-StreetParking footprint

The pre-quake bathymetry B0 is the same for all sources considered and is given in Figure 22. The post-quake bathymetry B of the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources for the I-StreetParking footprint is given in Figure 23. The post-quake bathymetry B of the `CSZ_M1` source with no SLR for the I-StreetParking footprint is given in Figure 24.

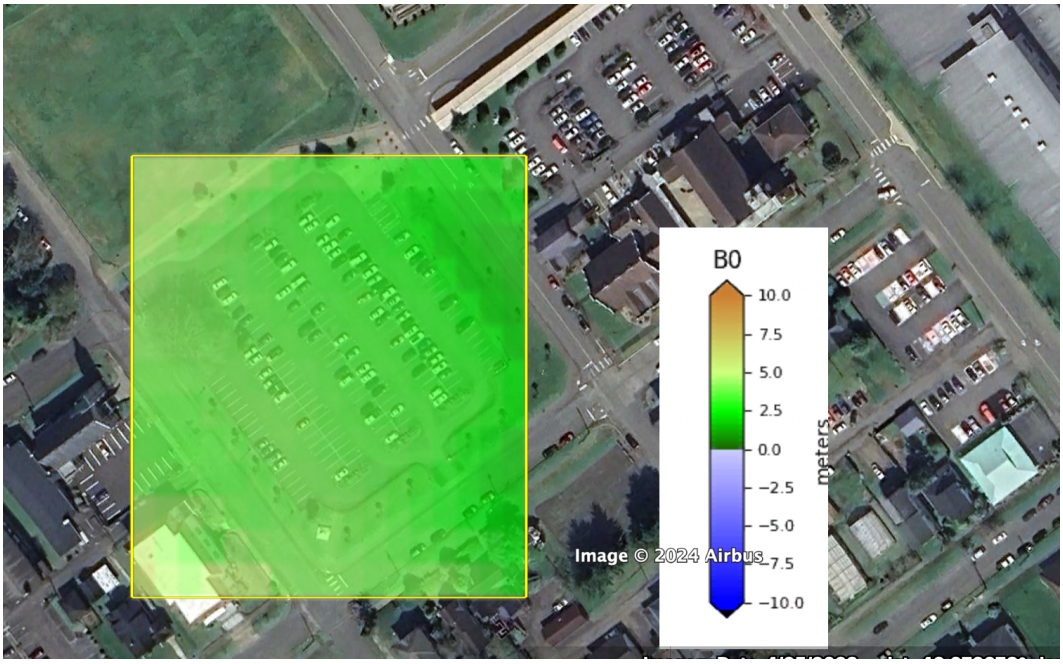


Figure 22: The pre-quake topography/bathymetry B0 in meters above MHW for the Aberdeen I-StreetParking footprint. The min/max values of B0 were 1.55 and 6.20 meters (or 5.09 and 20.32 feet) above MHW.

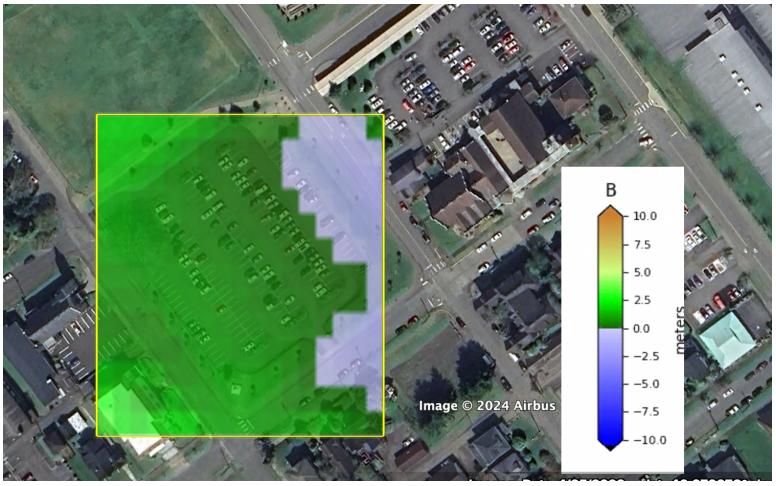


Figure 23: The post-quake topography/bathymetry B of the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources in meters above MHW for the Aberdeen I-StreetParking footprint. The min/max values of B were -1.28 and 3.36 meters (or -4.22 and 11.01 feet) above MHW.



Figure 24: The post-quake topography/bathymetry B of the `CSZ_M1` source in meters above MHW for the Aberdeen I-StreetParking footprint. The min/max values of B were -0.32 and 4.32 meters (or -1.05 and 14.18 feet) above MHW.

7.3 I-StreetVacant footprint

The pre-quake bathymetry B0 is the same for all sources considered and is given in Figure 25. The post-quake bathymetry B of the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources in meters above MHW for the I-StreetVacant footprint is given in Figure 26. The post-quake bathymetry B of the `CSZ_M1` source in meters above MHW for the I-StreetVacant footprint is given in Figure 27.

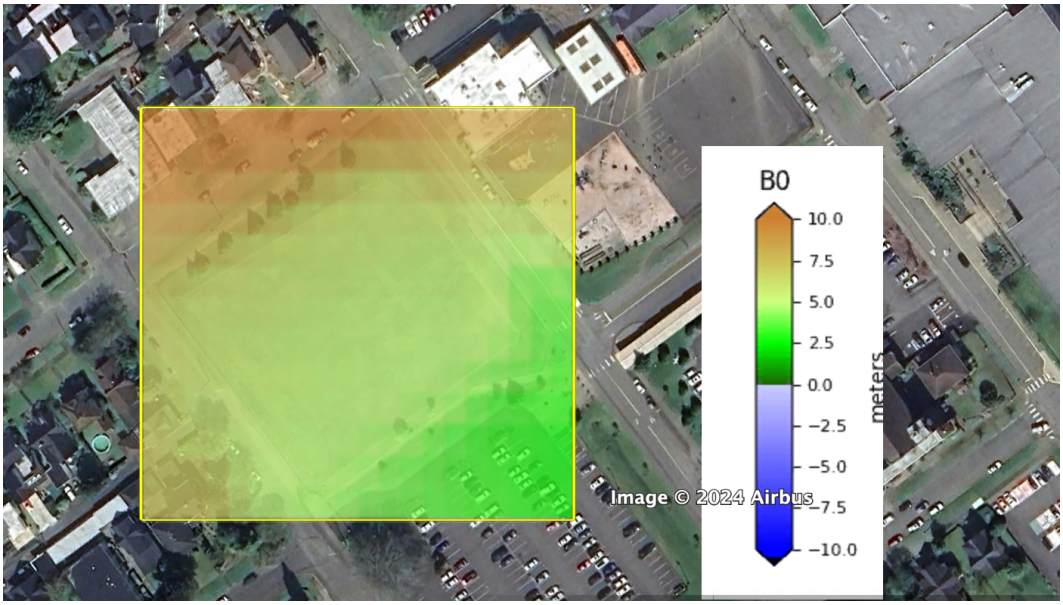


Figure 25: The pre-quake topography/bathymetry B0 in meters above MHW for the Aberdeen I-StreetVacant footprint. The min/max values of B0 were 2.85 and 12.62 meters (or 9.34 and 41.41 feet) above MHW.

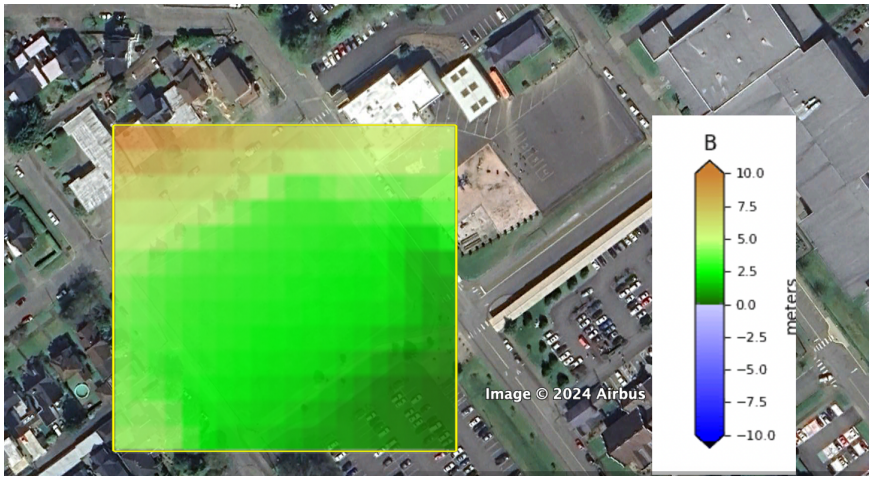


Figure 26: The post-quake topography/bathymetry B of the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources in meters above MHW for the Aberdeen I-StreetVacant footprint. The min/max values of B were 0.01 and 9.78 meters (or 0.03 and 32.09 feet) above MHW.

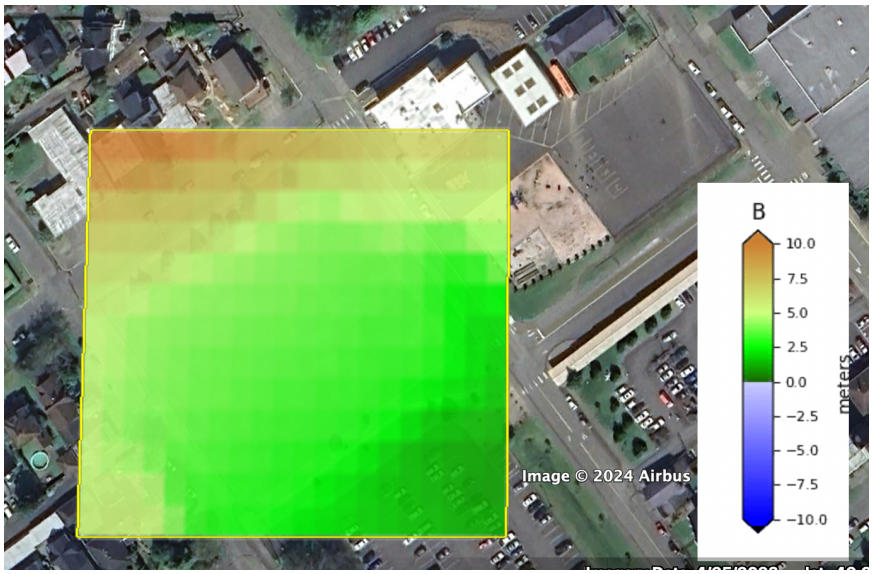


Figure 27: The post-quake topography/bathymetry B of the `CSZ_M1` source in meters above MHW for the Aberdeen I-StreetVacant footprint. The min/max values of B were 0.97 and 10.75 meters (or 3.19 and 35.26 feet) above MHW.

7.4 K-Street footprint

The pre-quake bathymetry B0 is the same for all sources considered and is given in Figure 28. The post-quake bathymetry B of the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources in meters above MHW for the K-Street footprint is given in Figure 29. The post-quake bathymetry B of the `CSZ_M1` source in meters above MHW for the K-Street footprint is given in Figure 30.

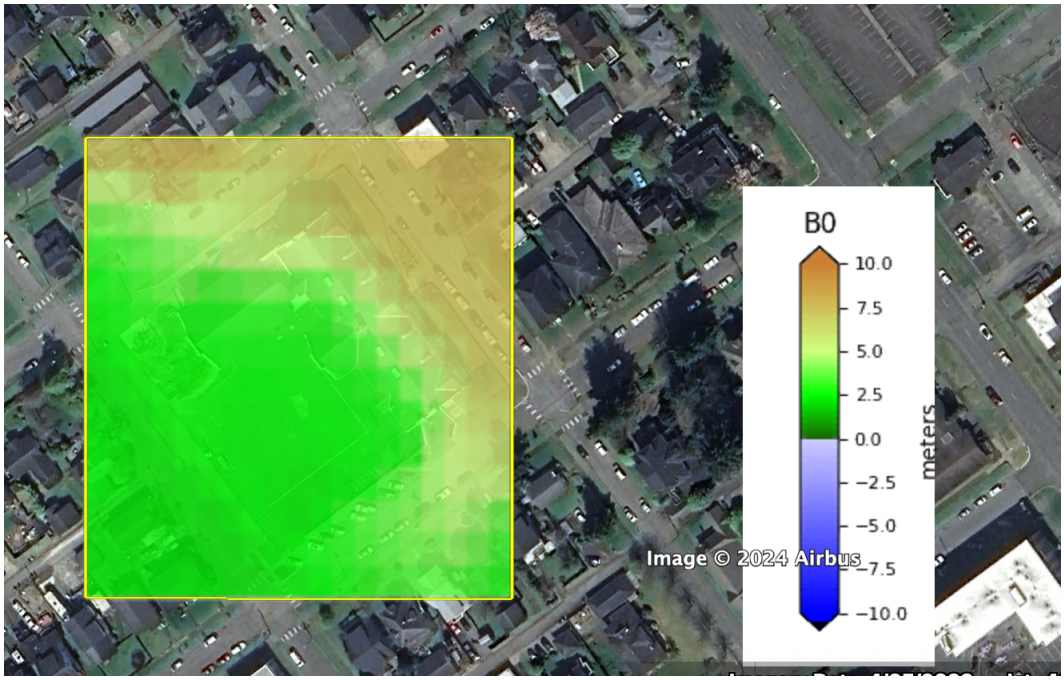


Figure 28: The pre-quake topography/bathymetry B0 in meters above MHW for the Aberdeen K-Street footprint. The min/max values of B0 were 1.97 and 8.09 meters (or 6.45 and 26.53 feet) above MHW.

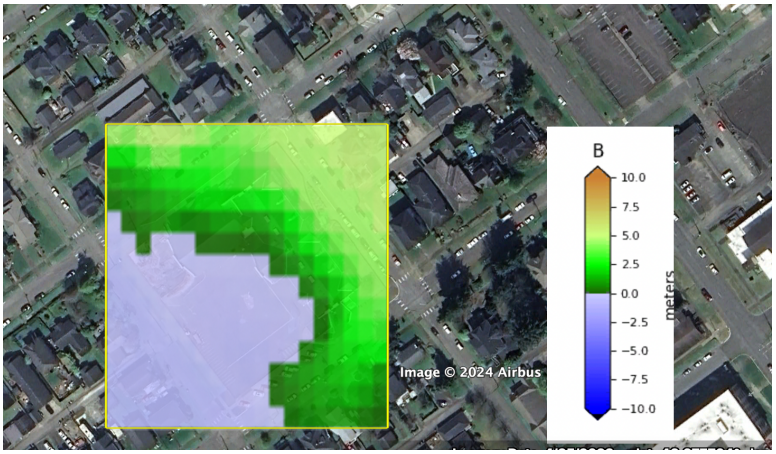


Figure 29: The post-quake topography/bathymetry B of the `CSZ_L1-extended-pmel` and `L1up_x1.117` sources in meters above MHW for the Aberdeen K-Street footprint. The min/max values of B were -0.88 and 5.24 meters (or -2.88 and 17.20 feet) above MHW.

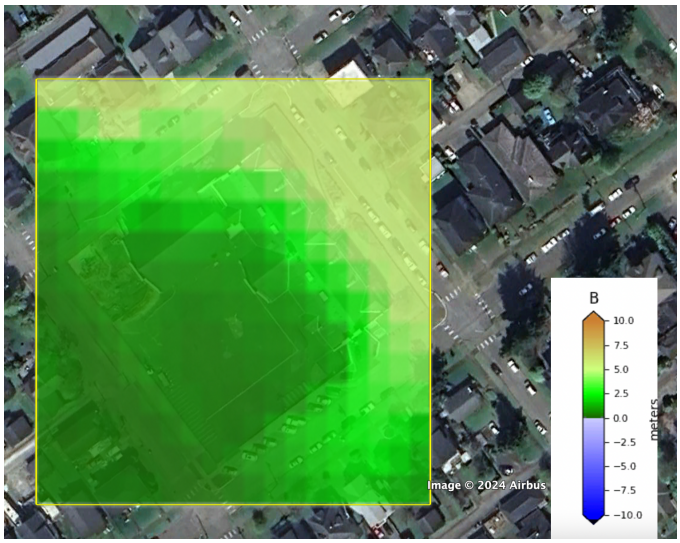


Figure 30: The post-quake topography/bathymetry B of the `CSZ_M1` source in meters above MHW for the Aberdeen K-Street footprint. The min/max values of B were 0.09 and 6.21 meters (or 0.29 and 20.38 feet) above MHW.

8 Results – Maximum inundation depths and speeds

The simulation results are presented for the sources/SLR combinations for this study:

1. CSZ L1_extended-pmel without SLR
2. CSZ M1 without SLR
3. CSZ L1_extended-pmel with SLR=0.114 meters
4. L1up_x1.117 with SLR=0.114 meters

For all simulations, we used Manning $n = 0.025$. The maximum onshore inundation depth in meters and maximum water speeds in meters/sec for the `CSZ_L1-extended-pmel` source without sea-level rise are shown in Figures 31 and 32 respectively. Results for the `CSZ_M1` source without sea-level rise are shown in Figures 33 and 34. Results for the `CSZ_L1-extended-pmel` source with SLR=0.114m are shown in Figures 35 and 36. Finally, results for the `L1up_x1.117` source with SLR=0.114m are shown in Figures 37 and 38. In Section 9, we give the same maximum inundation depth and maximum speed in blowup plots within each of the yellow footprint regions called B-Street, I-StreetParking, I-StreetVacant, and K-Street. These blowup plots also indicate the minimum and maximum values of these quantities within each footprint.

All plots show the maximum values recorded during the computation over the full simulation time of 6 hours for the simulations without sea-level rise and for 10 hours for the simulations that included the sea-level rise, SLR=0.114 meters. That is, the background GeoClaw sea-level was taken as MHW+SLR. These quantities are shown only in onshore regions where the initial topography was above MHW ($B0 > 0$).

In addition to the plots shown in this report, we have also produced high-resolution png files in a form that has been embedded in kmz files to facilitate viewing the input data and results on Google Earth, for example. The low resolution figures in this report cannot possibly show all the details whereas with the kmz files the user can zoom in to explore the results in more detail. These kmz files can be found at [15].

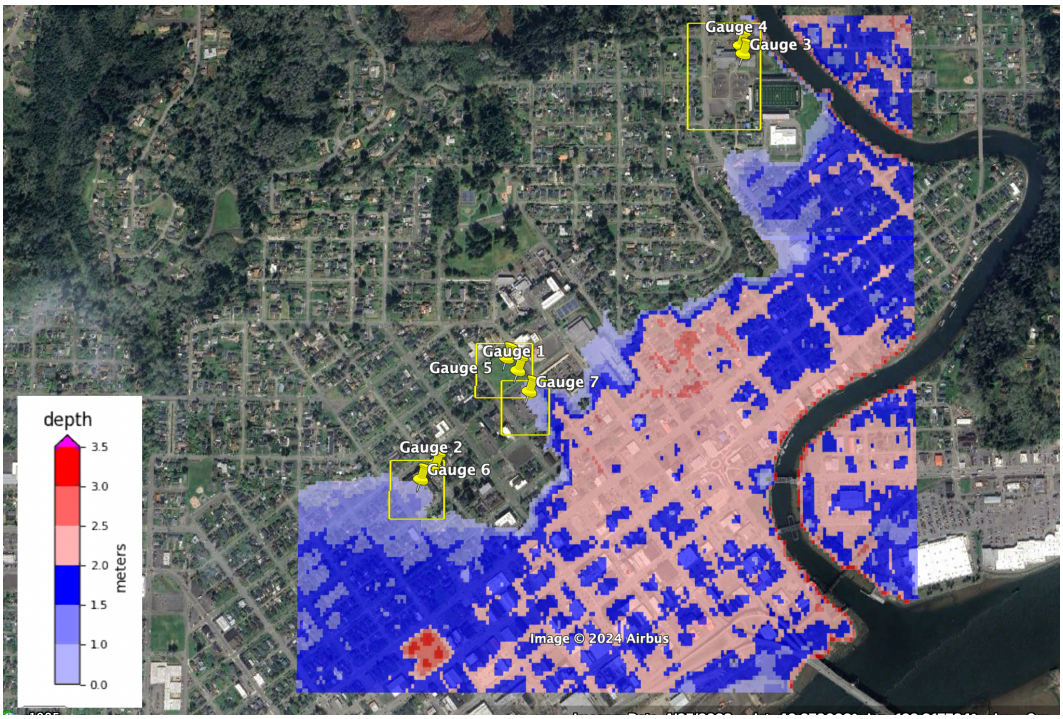


Figure 31: `CSZ_L1-extended-pmel` results for the Aberdeen study region. Plot shows the maximum inundation depth in meters for initially-onshore points. The initial sea level was MHW meters and Manning $n = 0.025$. The min/max values of max inundation depth were 0.00 and 3.35 meters in the big study area and 0.00 and 3.06 meters in the small study area.

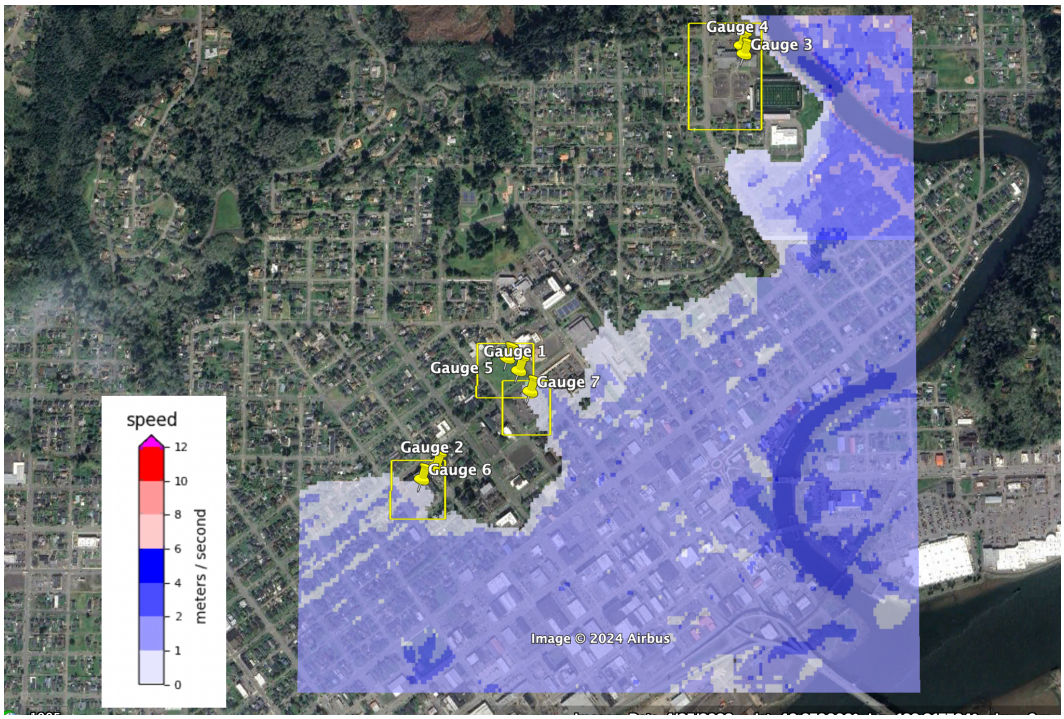


Figure 32: `CSZ_L1-extended-pmel` results for the Aberdeen study regions. Plot shows the maximum flow speed (m/sec) for all fgmax points. The initial sea level was MHW meters and the Manning $n = 0.025$. The min/max values of max speed were 0.00 and 4.61 m/sec in the big study area and 0.00 and 4.23 m/sec in the small study area.

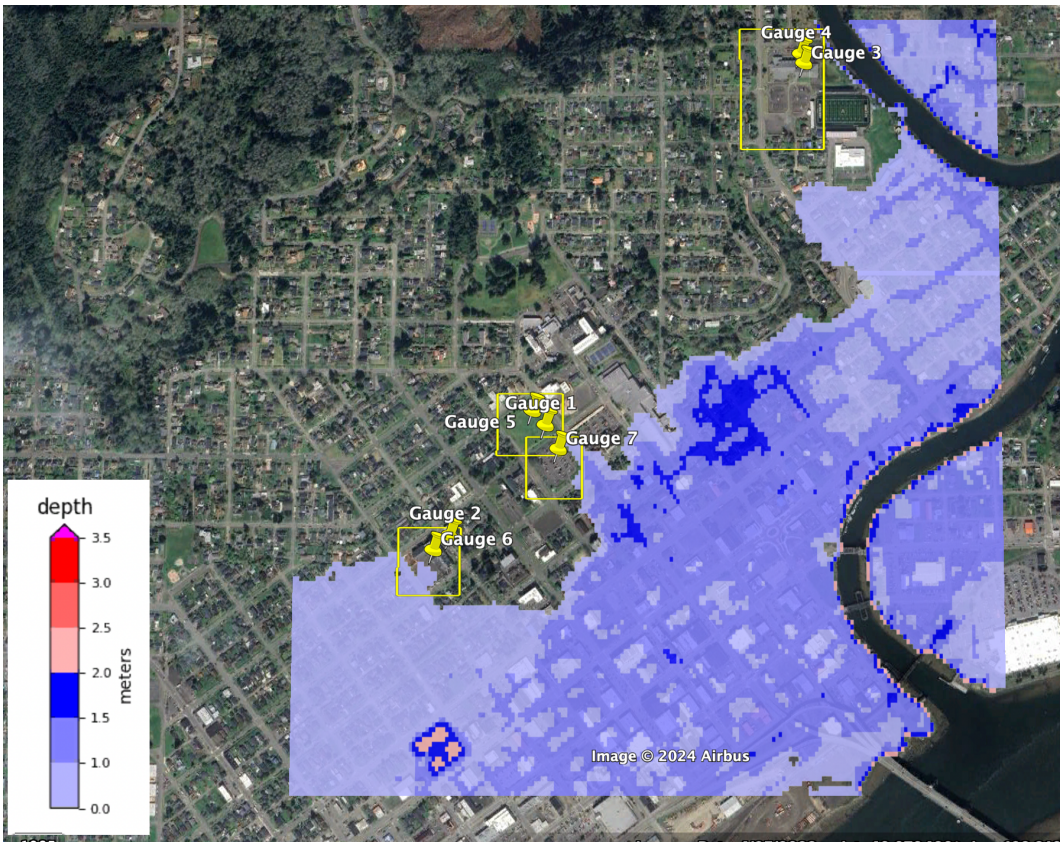


Figure 33: `CSZ_M1` results for the Aberdeen study region. Plot shows the maximum inundation depth (m) for initially-onshore points. The initial sea level was MHW meters and Manning $n = 0.025$. The min/max values of max inundation depth were 0.00 and 2.45 meters in the big study area and 0.00 and 2.08 meters in the small study area.

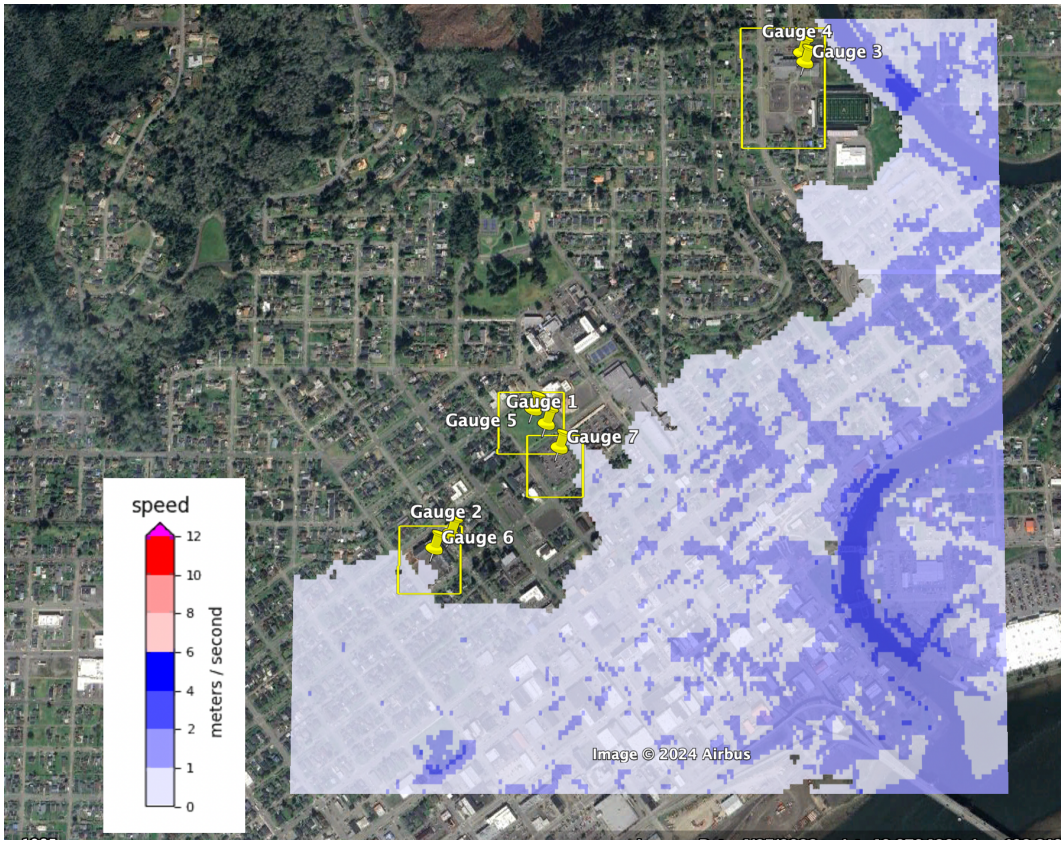


Figure 34: `CSZ_M1` results for the Aberdeen study regions. Plot shows the maximum flow speed (m/sec) for all fgmax points. The initial sea level was MHW meters and the Manning $n = 0.025$. The min/max values of max speed were 0.00 and 3.35 m/sec in the big study area and 0.00 and 3.61 m/sec in the small study area.

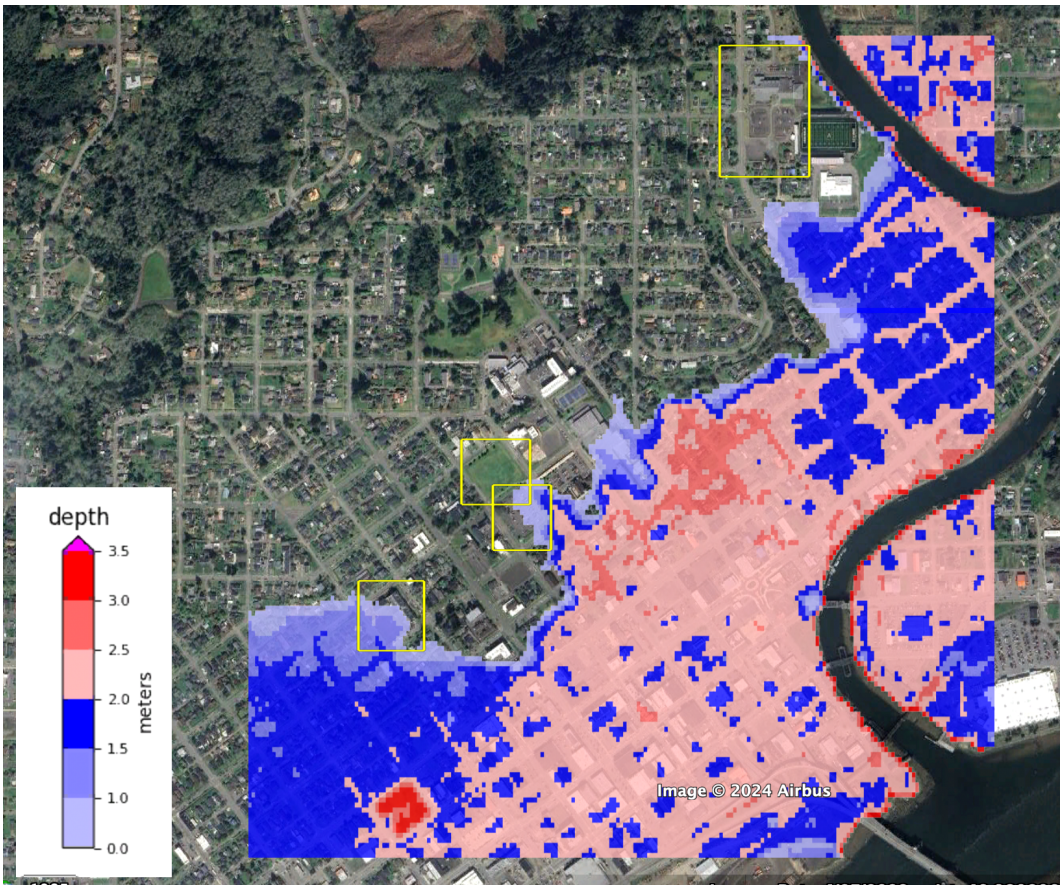


Figure 35: `CSZ_L1-extended-pmel_SLR0114` results for the Aberdeen study region. Plot shows the maximum inundation depth (m) for initially-onshore points. The initial sea level was MHW + 0.114 meters and Manning $n = 0.025$. The min/max values of max inundation depth were 0.00 and 3.47 meters in the big study area and 0.00 and 3.20 meters in the small study area.

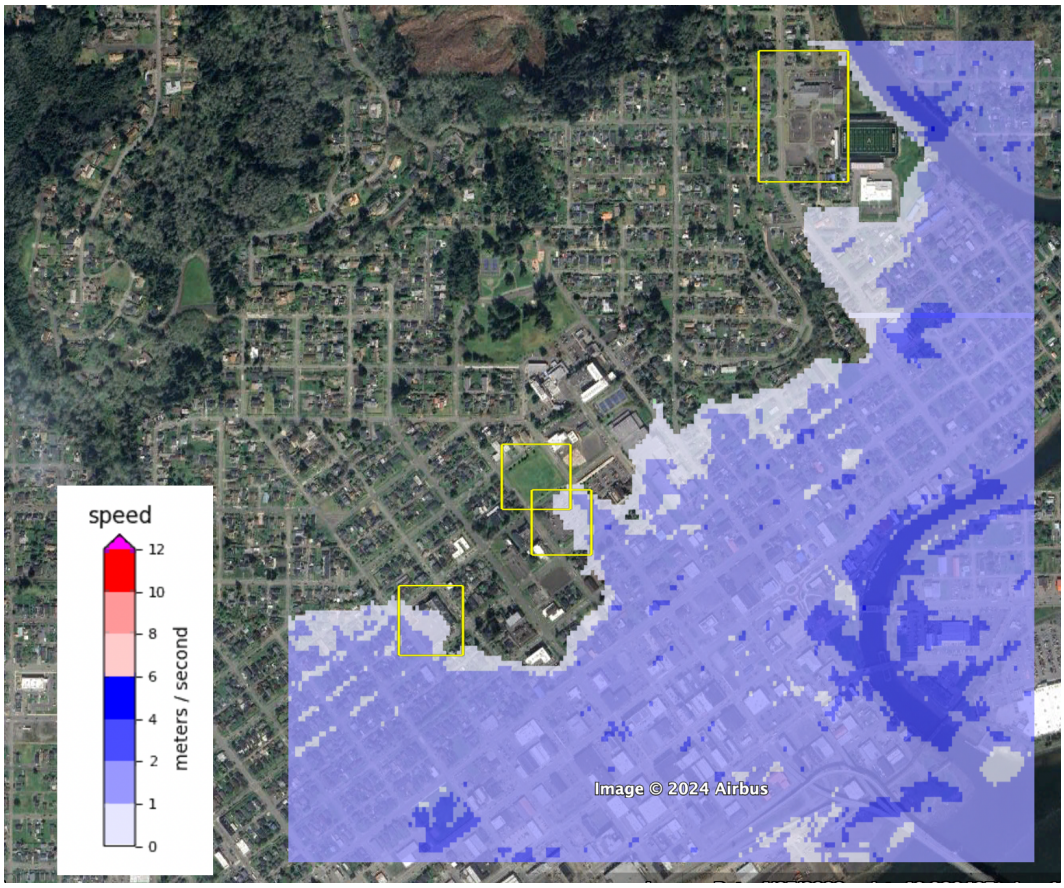


Figure 36: `CSZ_L1-extended-pmel_SLR0114` results for the Aberdeen study regions. Plot shows the maximum flow speed (m/sec) for all fgmax points. The initial sea level was MHW + 0.114 meters and the Manning $n = 0.025$. The min/max values of max speed was 0.00 and 4.79 m/sec in the big study area and 0.00 and 4.03 m/sec in the small study area.

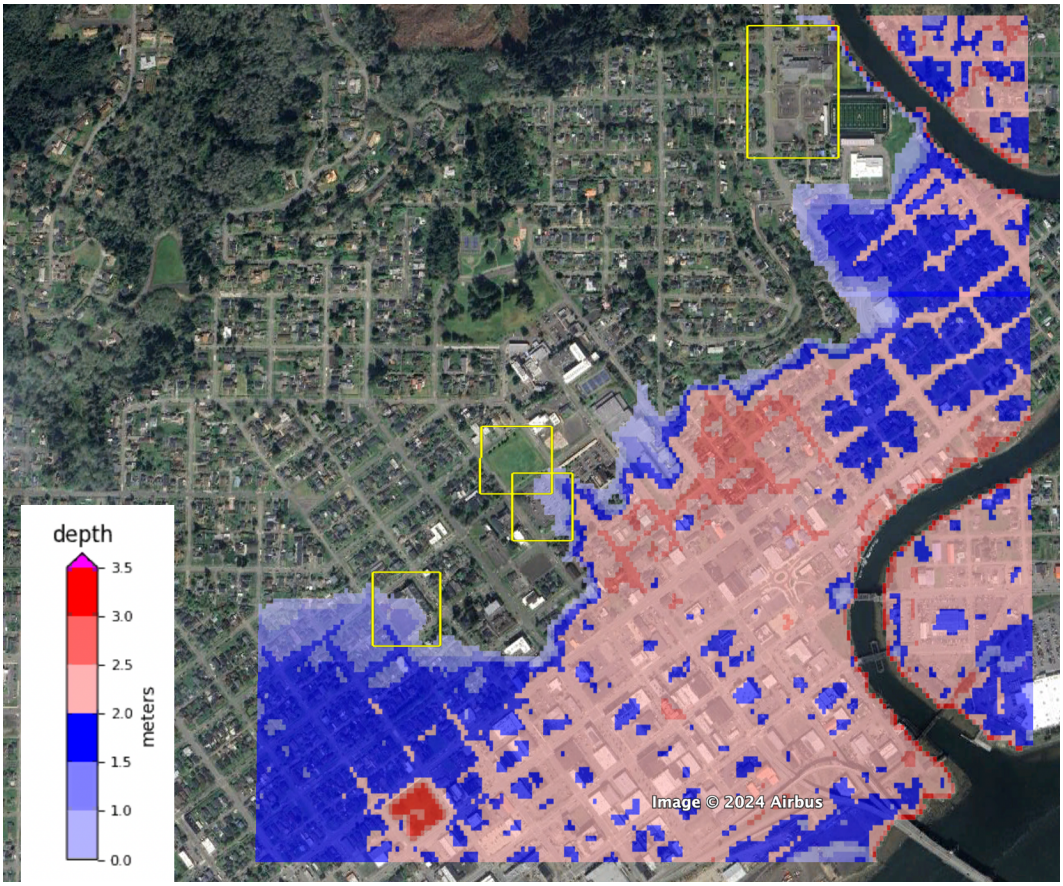


Figure 37: `L1up_1.117_SLR0114` results for the Aberdeen study region. Plot shows the maximum inundation depth (m) for initially-onshore points. The initial sea level was MHW plus 0.114 meters and Manning $n = 0.025$. The min/max values of max inundation depth were 0.0 and 3.48 meters in the big study area and 0.00 and 3.22 meters in the small study area.

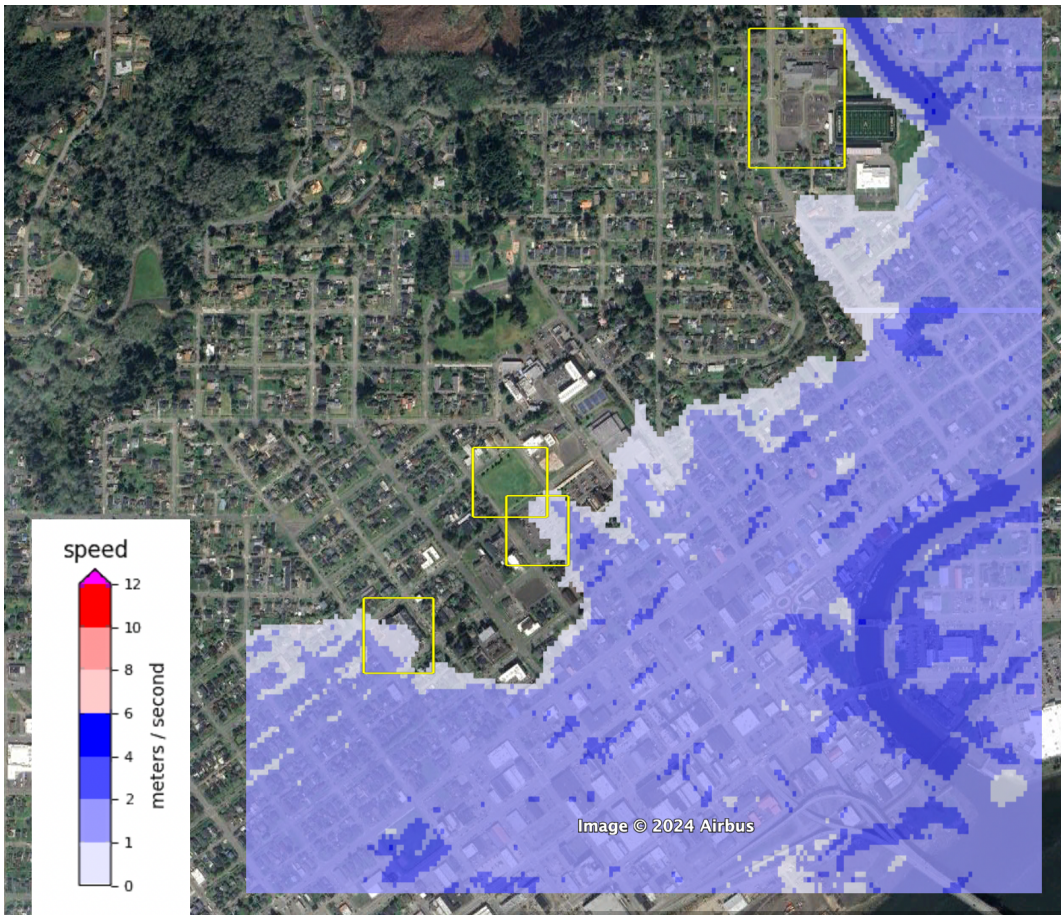


Figure 38: `L1up_1.117_SLR0114` results for the Aberdeen study region. Plot shows the maximum flow speed (m/sec) for all fgmax points. The initial sea level was MHW plus 0.114 meters and the Manning $n = 0.025$. The min/max values of max speed were 0.00 and 5.10 m/sec in the big study area and 0.00 and 4.24 m/sec in the small study area.

9 Results – Max inundation depths and speeds for each footprint

9.1 B-Street footprint

The maximum inundation depth h in meters for the `CSZ_L1-extended-pmel` source with no SLR for the B-Street footprint is given in Figure 39. This inundation is in the far corner of the footprint, away from the school. The maximum speed, $s = 0$ around the school and is not plotted. The maximum inundation depth $h = 0$ and the maximum speed $s = 0$ for the `CSZ_M1` source with no SLR for the B-Street footprint and are not plotted. The maximum inundation depth h in meters and the maximum speed s in m/sec for the `CSZ_L1-extended-pmel` source with SLR=0.114m for the B-Street footprint are given in Figures 40 and 41, respectively. The maximum inundation depth h in meters and the maximum speed s in m/sec for the `L1up_x1.117` source with SLR=0.114m for the B-Street footprint are given in Figures 42 and 43, respectively.

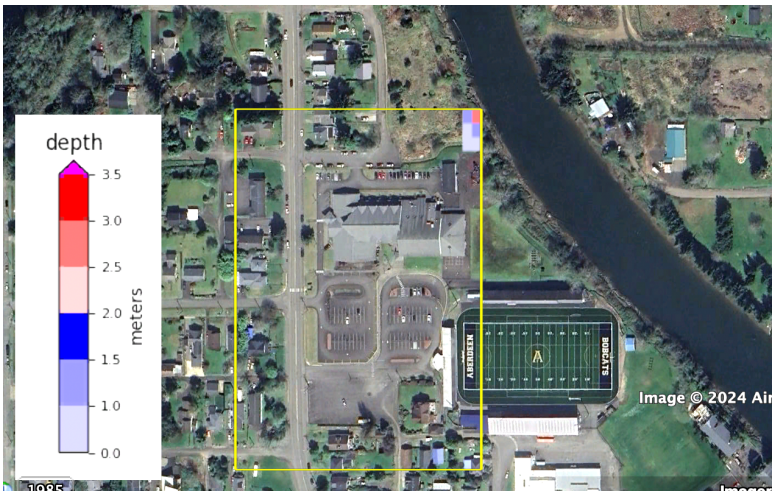


Figure 39: The maximum inundation depth h in meters of the `CSZ_L1-extended-pmel` source with no SLR for the Aberdeen B-Street footprint. The min/max values of max inundation depth were 0.00 and 2.86 meters or 0.00 and 9.37 feet. The inundation was near the Wiskah River and away from Robert Gray Elementary School.

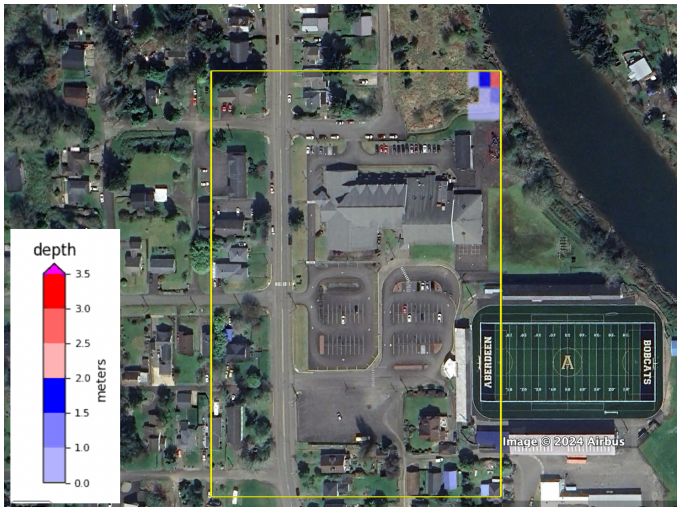


Figure 40: The maximum inundation depth h in meters of the `CSZ_L1-extended-pmel` source with SLR=0.114m for the Aberdeen B-Street footprint. The min/max values of max inundation depth were 0.00 and 3.00 meters or 0.00 and 9.84 feet.

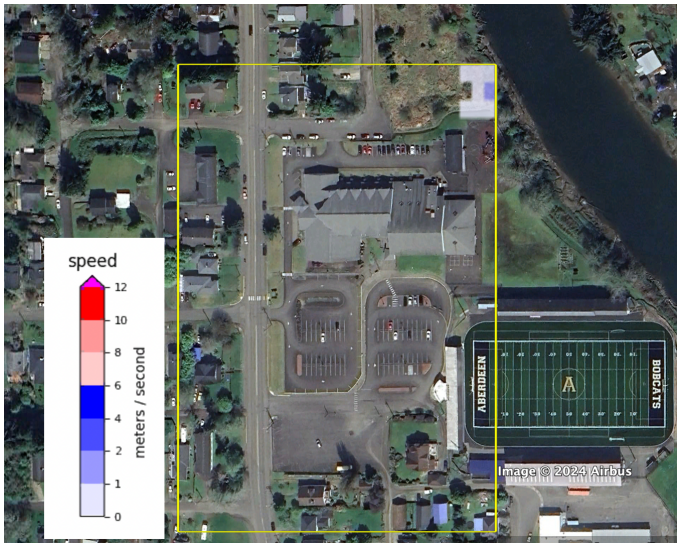


Figure 41: The maximum speed s in m/sec of the `CSZ_L1-extended-pmel` source with SLR=0.114m for the Aberdeen B-Street footprint. The min/max values of max speed s where $h > 0$ were 0.20 and 1.29 m/sec or 0.65 and 4.24 ft/sec.

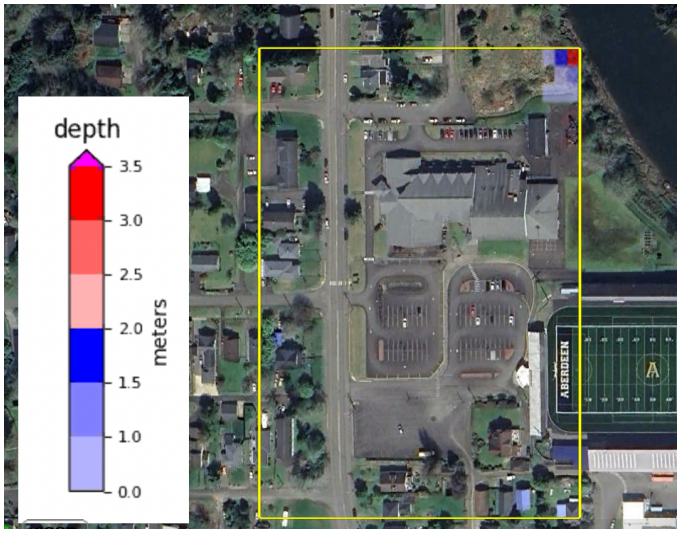


Figure 42: The maximum inundation depth h in meters of the `L1up_x1.117` source with SLR=0.114m for the Aberdeen B-Street footprint. The min/max values of max inundation depth were 0.0 and 3.02 meters or 0.0 and 9.91 feet.

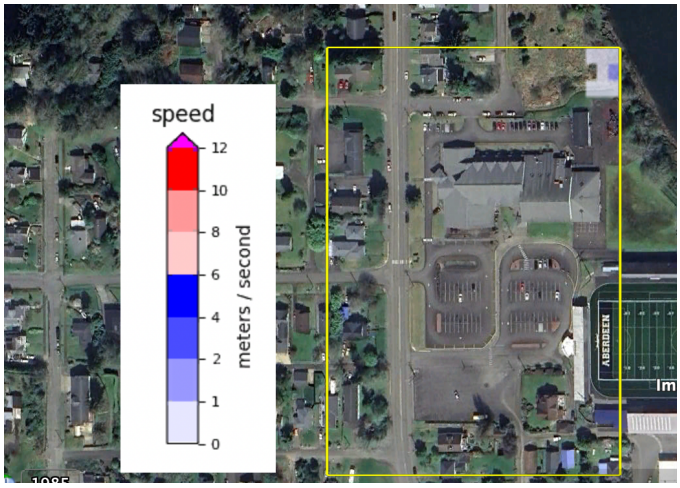


Figure 43: The maximum speed s in m/sec of the `L1up_x1.117` source with SLR=0.114m for the Aberdeen B-Street footprint. The min/max values of max speed s where $h > 0$ were 0.24 and 1.28 m/sec or 0.78 and 4.20 ft/sec.

9.2 I-StreetParking footprint

The maximum inundation depth h in meters and the maximum speed s in m/sec for the `CSZ_L1-extended-pmel` source with no SLR for the I-StreetParking footprint are given in Figures 44 and 45, respectively. The maximum inundation depth h and the maximum speed s in m/sec for the `CSZ_M1` source with no SLR for the I-StreetParking footprint are given in Figures 46 and 47, respectively. The maximum inundation depth h in meters and the maximum speed s in m/sec for the `CSZ_L1-extended-pmel` source with SLR=0.114m for the I-StreetParking footprint are given in Figures 48 and 49, respectively. The maximum inundation depth h in meters and the maximum speed s in m/sec for the `L1up_x1.117` source with SLR=0.114m for the I-StreetParking footprint are given in Figures 50 and 51, respectively.



Figure 44: The maximum inundation depth h in meters of the `CSZ_L1-extended-pmel` source with no SLR for the Aberdeen I-StreetParking footprint. The min/max values of max inundation depth were 0.00 and 1.81 meters or 0.00 and 5.93 feet.

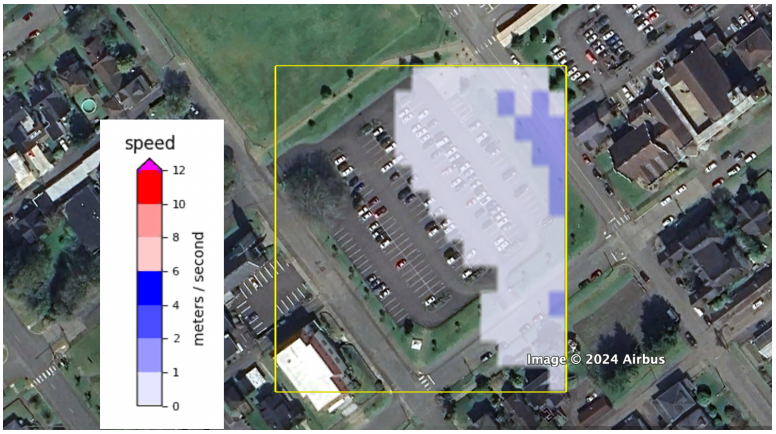


Figure 45: The maximum speed s in m/sec of the `CSZ_L1-extended-pmel` source with no SLR for the Aberdeen I-StreetParking footprint. The min/max values of max speed s where $h > 0$ were 0.00 and 1.80 m/sec or 0.00 and 5.90 ft/sec.



Figure 46: The maximum inundation depth h in meters of the `CSZ_M1` source with no SLR for the Aberdeen I-StreetParking footprint. The min/max values of max inundation depth were 0.00 and 0.91 meters or 0.00 and 2.99 feet.

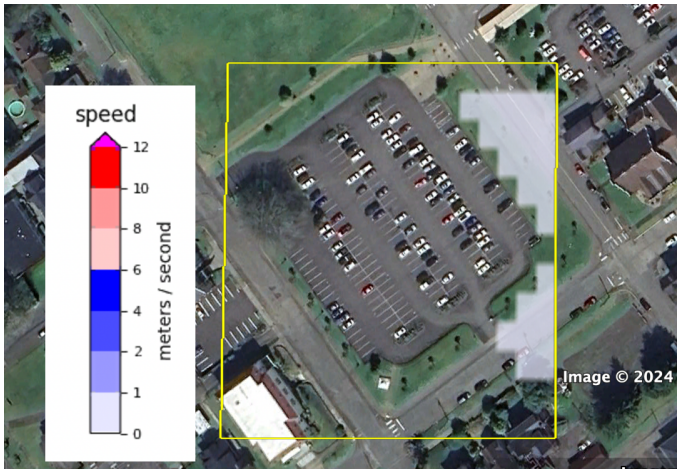


Figure 47: The maximum speed s in m/sec of the `CSZ_M1` source with no SLR for the Aberdeen I-StreetParking footprint. The min/max values of max speed s where $h > 0$ were 0.09 and 0.41 m/sec or 0.30 and 1.34 ft/sec.

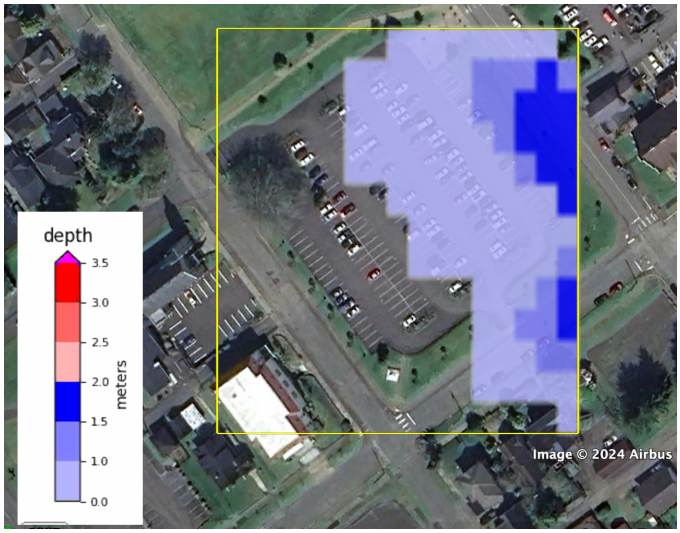


Figure 48: The maximum inundation depth h in meters of the `CSZ_L1-extended-pmel` source with SLR=0.114m for the Aberdeen I-StreetParking footprint. The min/max values of max inundation depth were 0.00 and 1.94 meters or 0.00 and 6.38 feet.

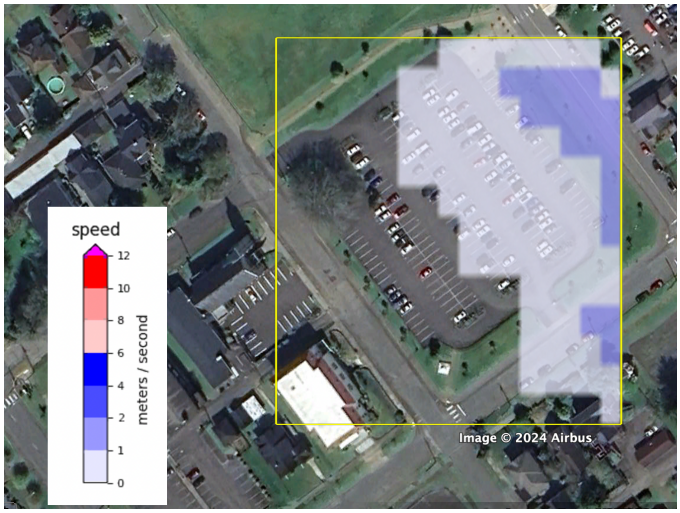


Figure 49: The maximum speed s in m/sec of the `CSZ_L1-extended-pmel` source with SLR=0.114m for the Aberdeen I-StreetParking footprint. The min/max values of max speed s where $h > 0$ were 0.05 and 1.92 m/sec or 0.16 and 6.29 ft/sec.

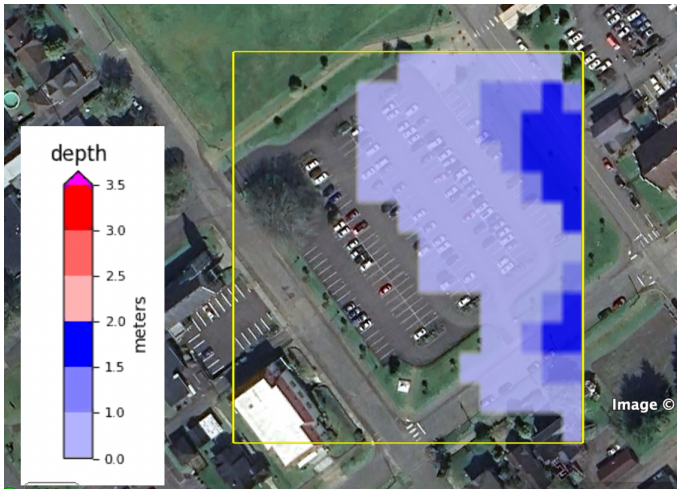


Figure 50: The maximum inundation depth h in meters of the `L1up_x1.117` source with SLR=0.114m for the Aberdeen I-StreetParking footprint. The min/max values of max inundation depth were 0.0 and 1.95 meters or 0.0 and 6.41 feet.

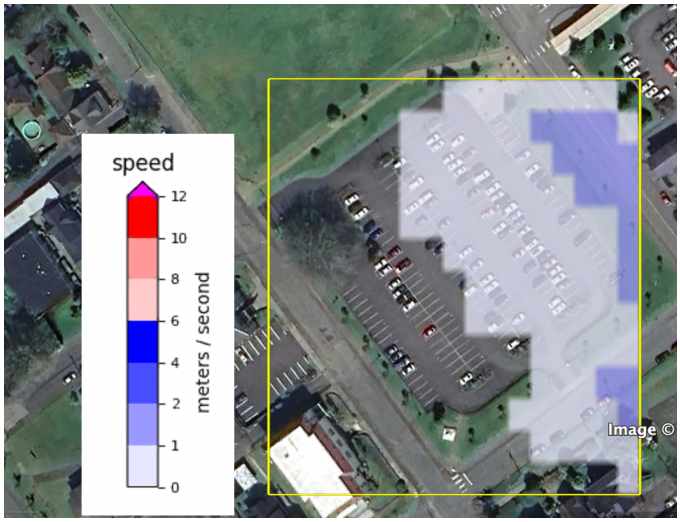


Figure 51: The maximum speed s in m/sec of the `L1up_x1.117` source source with SLR=0.114m for the Aberdeen I-StreetParking footprint. The min/max values of max speed s where $h > 0$ were 0.07 and 1.94 m/sec or 0.24 and 6.37 ft/sec.

9.3 I-StreetVacant footprint

The maximum inundation depth h in meters and the maximum speed s in m/sec for the `CSZ_L1-extended-pmel` source with no SLR for the I-StreetVacant footprint are given in Figures 52 and 53, respectively. The maximum inundation depth $h = 0$ and the maximum speed $s = 0$ for the `CSZ_M1` source with no SLR for the I-StreetVacant footprint are not plotted. The maximum inundation depth h in meters and the maximum speed s in m/sec for the `CSZ_L1-extended-pmel` source with SLR=0.114m for the I-StreetVacant footprint are given in Figures 54 and 55, respectively. The maximum inundation depth h in meters and the maximum speed s in m/sec for the `L1up_x1.117` source with SLR=0.114m for the I-StreetVacant footprint are given in Figures 56 and 57, respectively.

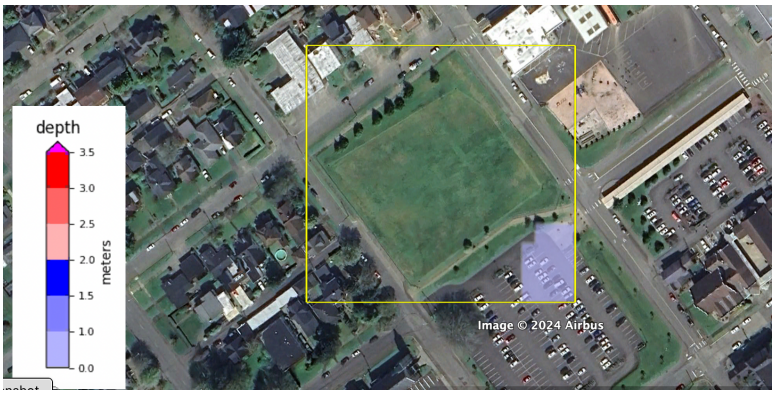


Figure 52: The maximum inundation depth h in meters of the `CSZ_L1-extended-pmel` source with no SLR for the Aberdeen I-StreetVacant footprint. The min/max values of max inundation depth were 0.00 and 0.52 meters or 0.00 and 1.70 feet.

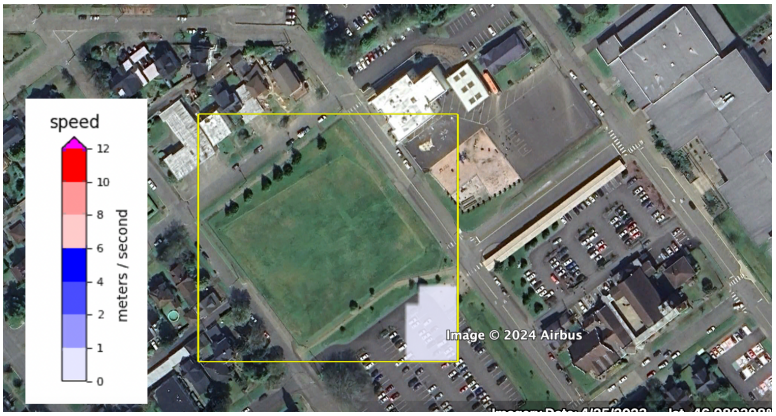


Figure 53: The maximum speed s in m/sec of the `CSZ_L1-extended-pmel` source with no SLR for the Aberdeen I-StreetVacant footprint. The min/max values of max speed s where $h > 0$ were 0.00 and 0.49 m/sec or 0.00 and 1.61 ft/sec.

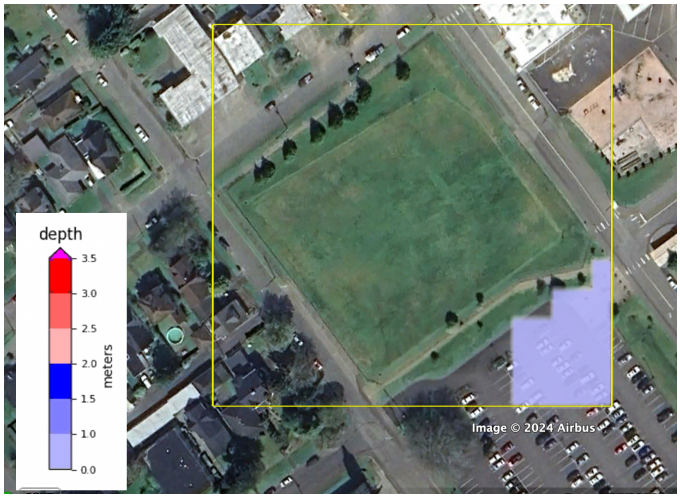


Figure 54: The maximum inundation depth h in meters of the `CSZ_L1-extended-pmel` source with SLR=0.114m for the Aberdeen I-StreetVacant footprint. The min/max values of max inundation depth were 0.00 and 0.65 meters or 0.00 and 2.15 feet.

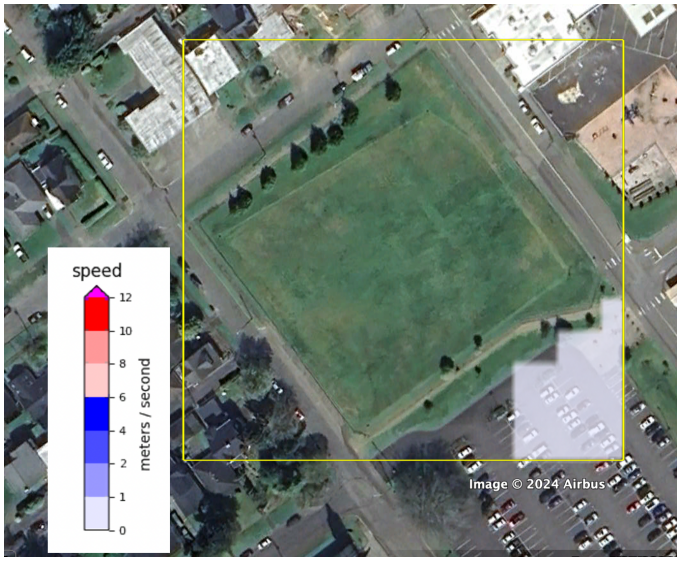


Figure 55: The maximum speed s in m/sec of the `CSZ_L1-extended-pmel` source with SLR=0.114m for the Aberdeen I-StreetVacant footprint. The min/max values of max speed s where $h > 0$ were 0.06 and 0.68 m/sec or 0.18 and 2.23 ft/sec.



Figure 56: The maximum inundation depth h in meters of the `L1up_x1.117` source with SLR=0.114m for the Aberdeen I-StreetVacant footprint. The min/max values of max inundation depth were 0.0 and 0.65 meters or 0.0 and 2.15 feet.

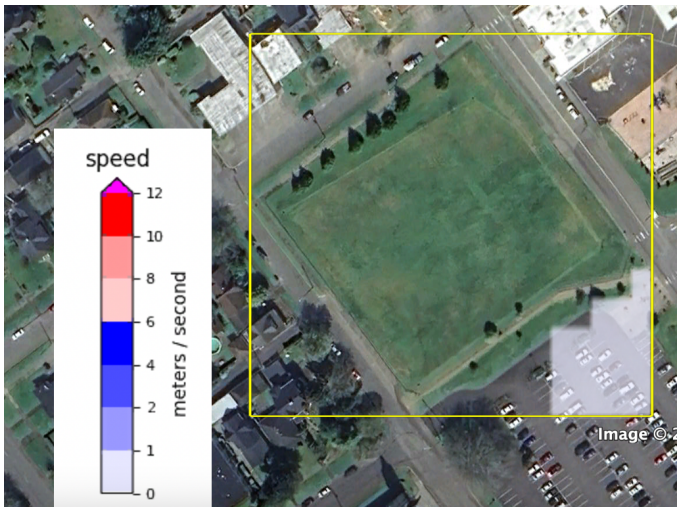


Figure 57: The maximum speed s in m/sec of the `L1up_x1.117` source with SLR=0.114m for the Aberdeen I-StreetVacant footprint. The min/max values of max speed s where $h > 0$ were 0.06 and 0.68 m/sec or 0.18 and 2.23 ft/sec.

9.4 K-Street footprint

The maximum inundation depth h in meters and the maximum speed s in m/sec for the `CSZ_L1-extended-pmel` source with no SLR for the K-Street footprint are given in Figures 58 and 59, respectively. The maximum inundation depth h in meters and the maximum speed s in m/sec for the `CSZ_M1` source with no SLR for the K-Street footprint are given in Figures 60 and 61, respectively. The maximum inundation depth h in meters and the maximum speed s in m/sec for the `CSZ_L1-extended-pmel` source with SLR=0.114m for the K-Street footprint are given in Figures 62 and 63, respectively. The maximum inundation depth h in meters and the maximum speed s in m/sec for the `L1up_x1.117` source with SLR=0.114m for the K-Street footprint are given in Figures 64 and 65, respectively.



Figure 58: The maximum inundation depth h in meters of the `CSZ_L1-extended-pmel` source with no SLR for the Aberdeen K-Street footprint. The min/max values of max inundation depth were 0.00 and 1.42 meters or 0.00 and 4.66 feet.

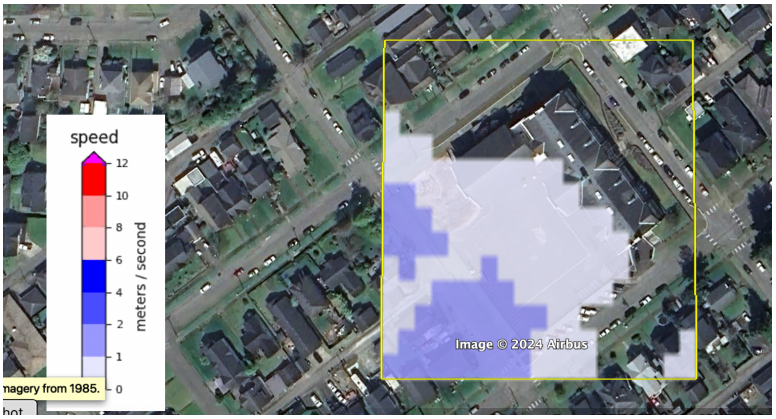


Figure 59: The maximum speed s in m/sec of the `CSZ_L1-extended-pmel` source with no SLR for the Aberdeen K-Street footprint. The min/max values of max speed s where $h > 0$ were 0.13 and 1.67 m/sec or 0.41 and 5.46 ft/sec.



Figure 60: The maximum inundation depth h in meters of the `CSZ_M1` source with no SLR for the Aberdeen K-Street footprint. The min/max values of max inundation depth were 0.00 and 0.47 meters or 0.00 and 1.55 feet.



Figure 61: The maximum speed s in m/sec of the `CSZ_M1` source with no SLR for the Aberdeen K-Street footprint. The min/max values of max speed s where $h > 0$ were 0.06 and 0.61 m/sec or 0.18 and 2.00 ft/sec.

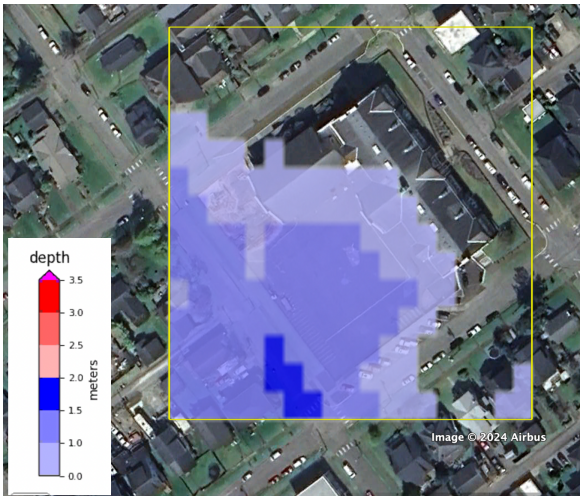


Figure 62: The maximum inundation depth h in meters of the `CSZ_L1-extended-pmel` source with SLR=0.114m for the Aberdeen K-Street footprint. The min/max values of max inundation depth were 0.00 and 1.55 meters or 0.00 and 5.09 feet.

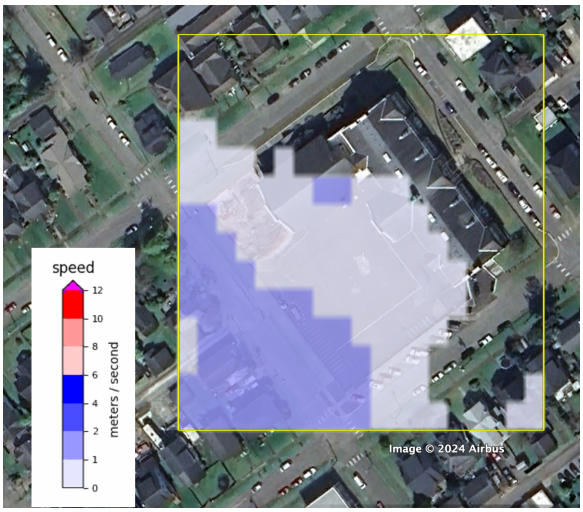


Figure 63: The maximum speed s in m/sec of the `CSZ_L1-extended-pmel` source with SLR=0.114m for the Aberdeen K-Street footprint. The min/max values of max speed s where $h > 0$ were 0.12 and 1.76 m/sec or 0.38 and 5.77 ft/sec.

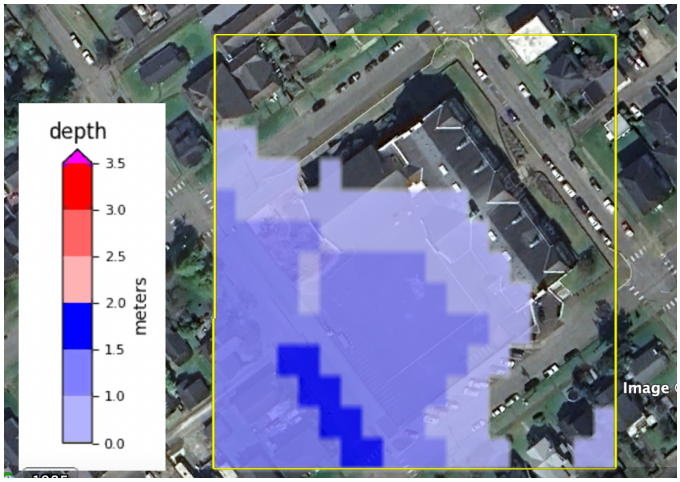


Figure 64: The maximum inundation depth h in meters of the `L1up_x1.117` source with SLR=0.114m for the Aberdeen K-Street footprint. The min/max values of max inundation depth were 0.0 and 1.57 meters or 0.0 and 5.16 feet.

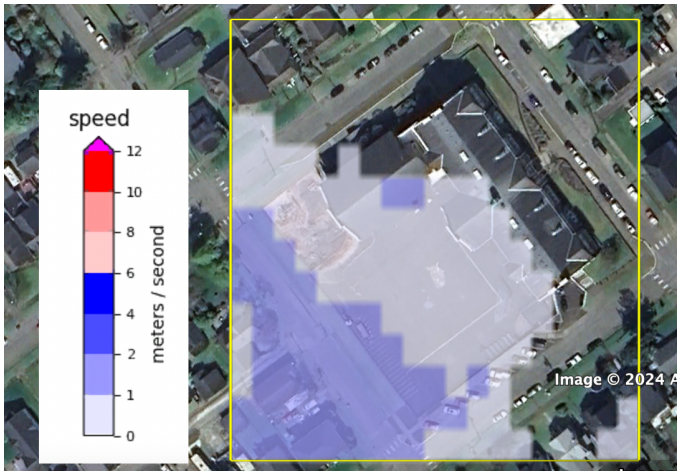


Figure 65: The maximum speed s in m/sec of the `L1up_x1.117` source with SLR=0.114m for the Aberdeen K-Street footprint. The min/max values of max speed s where $h > 0$ were 0.14 and 1.75 m/sec or 0.45 and 5.73 ft/sec.

10 Results – Transects

We placed a west-east transect at the latitude of each of the 7 gauges depicted in Figure 1. The transect starts at the western boundary of the study region and goes through the gauge and ends at the eastern boundary of the study region. These 7 transects are shown in Figures 66 and 67 and are labelled G1 to G7.

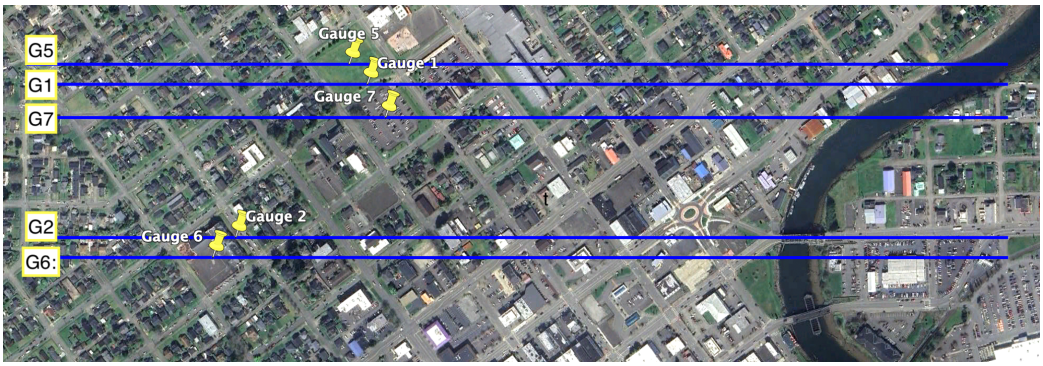


Figure 66: Transects G1, G2, G5, G6, and G7 in the large rectangular study area of Figure 1.

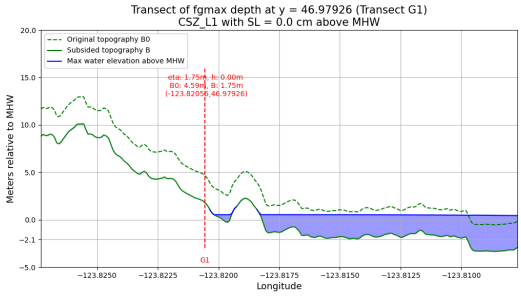


Figure 67: Transects G3 and G4 in the small rectangular study area of Figure 1.

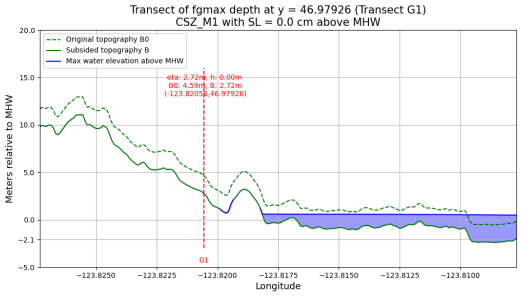
The shaded blue region in Figures 68 to 74 shows the maximum inundation depth $h_{\max}$ from the four different tsunami simulations along Transects G1 to G7, respectively. In these figures, the top left plot shows results for source `CSZ_L1-pmel-extended` with no SLR, the top right plot shows results for source `CSZ_M1` with no SLR. The bottom left plot shows results for source `CSZ_L1-extended-pmel` with SLR=0.114 meters and the bottom right plot shows results for source `L1up_x1.117` with SLR=0.114 meters.

It is also possible in these plots to observe the different subsidence for each event. In each case the original topography B0 is shown as the dashed green curve, and the post-earthquake subsided topography B is shown as the solid green curve. Also, the upper solid blue line in the figures is the maximum inundation elevation $\mathrm{IE}_{\max}$, the maximum elevation above MHW of the shaded blue inundation depth above the post-quake bathymetry B. Hence, the relationship $\mathrm{IE}_{\max} = h_{\max} + \mathrm{B}$ is shown along with the parts $\mathrm{IE}_{\max}$, $h_{\max}$, and B. (Note: $\mathrm{IE}_{\max}$ is referred to as eta in the figures and only Gauges 6 and 7 are inundated.)

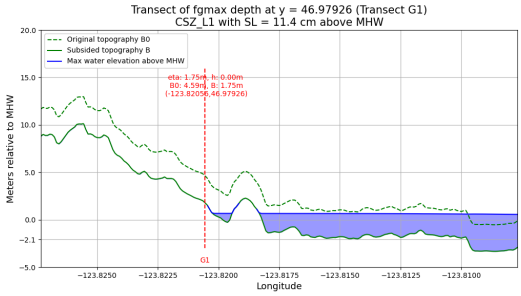
`CSZ_L1-extended-pmel` with no SLR



`CSZ_M1` with no SLR



`CSZ_L1-extended-pmel` with SLR=0.114m



`L1up_x1.117` with SLR=0.114m

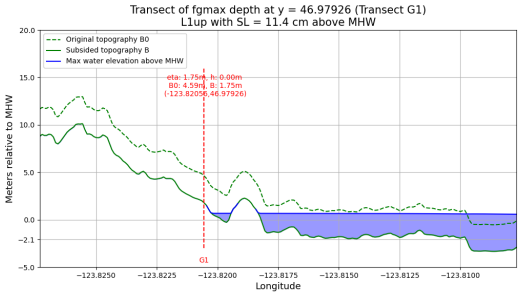
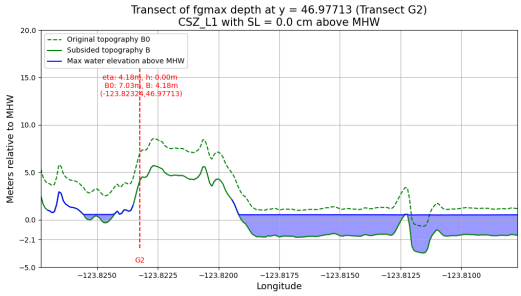
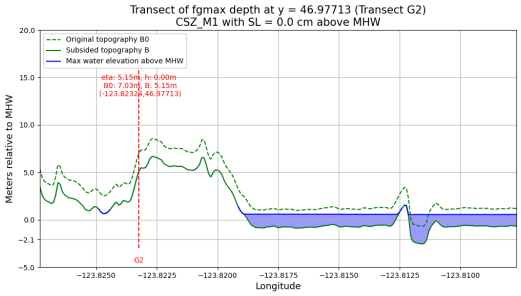


Figure 68: **Transect G1.** Maximum inundation depth $h_{\max}$ along a west-east transect through Gauge G1.

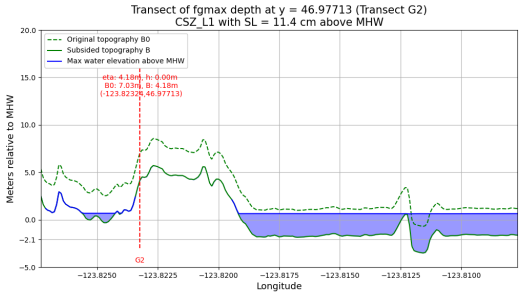
`CSZ_L1-extended-pmel` with no SLR



`CSZ_M1` with no SLR



`CSZ_L1-extended-pmel` with SLR=0.114m



`L1up_x1.117` with SLR=0.114m

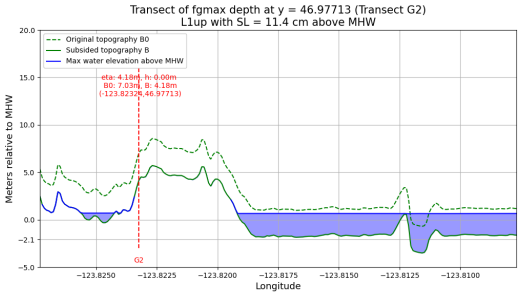
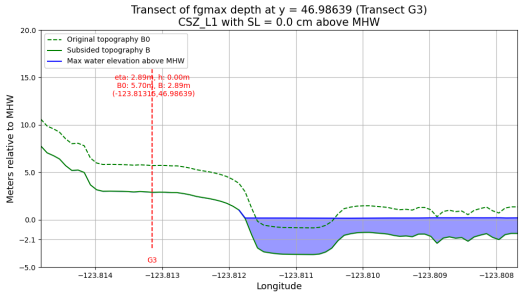
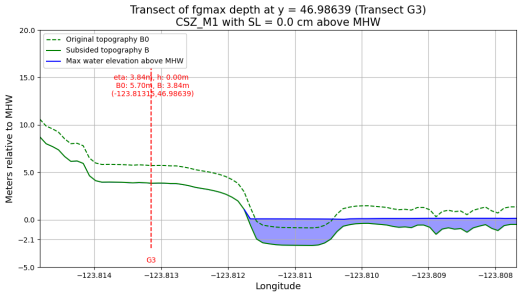


Figure 69: **Transect G2.** Maximum inundation depth $h_{\max}$ along a west-east transect through Gauge G2.

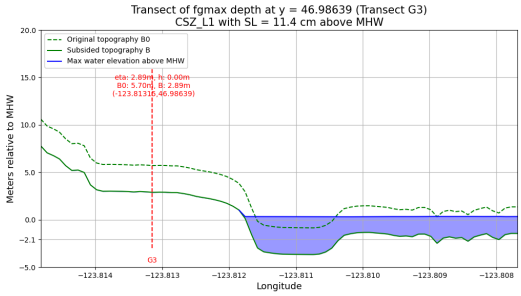
`CSZ_L1-extended-pmel` with no SLR



`CSZ_M1` with no SLR



`CSZ_L1-extended-pmel` with SLR=0.114m



`L1up_x1.117` with SLR=0.114m

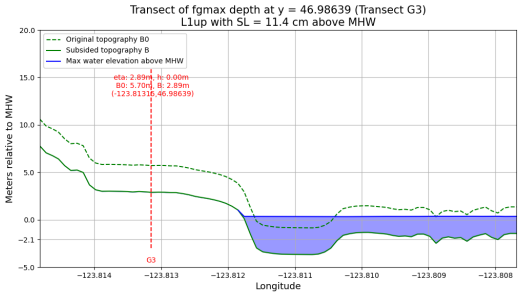
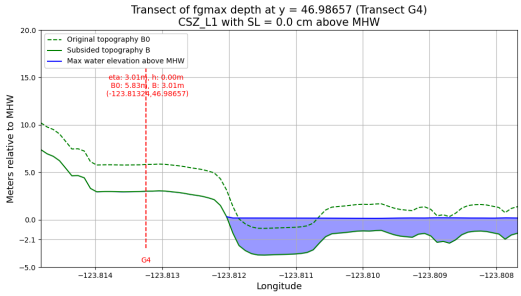
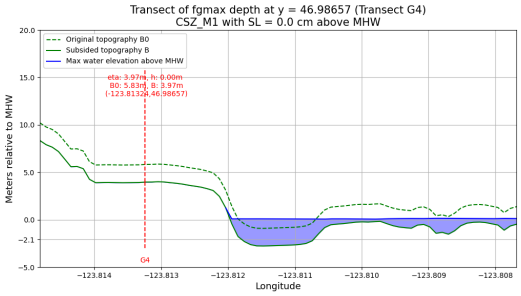


Figure 70: **Transect G3.** Maximum inundation depth $h_{\max}$ along a west-east transect through Gauge G3.

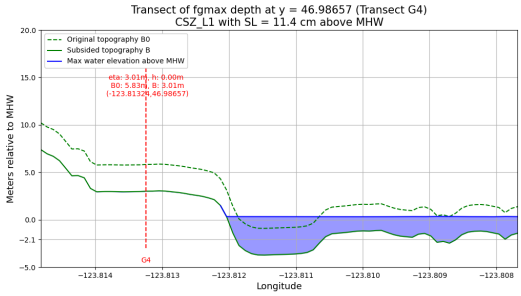
`CSZ_L1-extended-pmel` with no SLR



`CSZ_M1` with no SLR



`CSZ_L1-extended-pmel` with SLR=0.114m



`L1up_x1.117` with SLR=0.114m

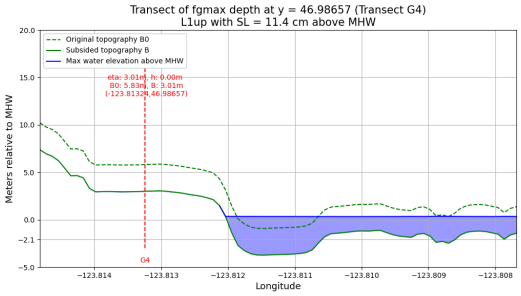
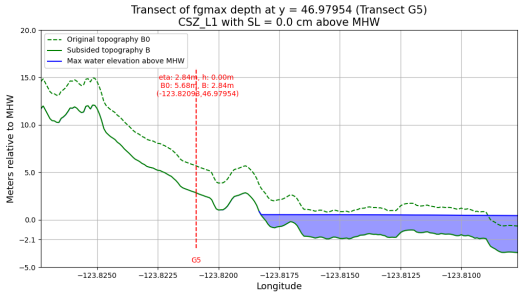
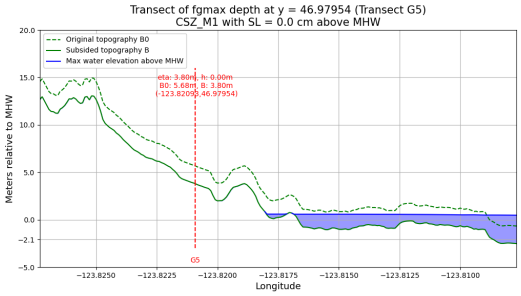


Figure 71: **Transect G4.** Maximum inundation depth $h_{\max}$ along a west-east transect through Gauge G4.

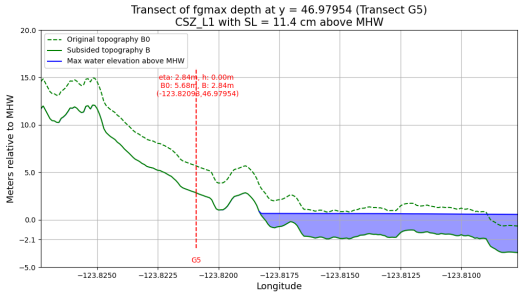
`CSZ_L1-extended-pmel` with no SLR



`CSZ_M1` with no SLR



`CSZ_L1-extended-pmel` with SLR=0.114m



`L1up_x1.117` with SLR=0.114m

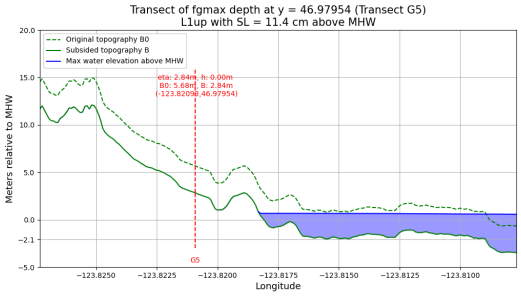
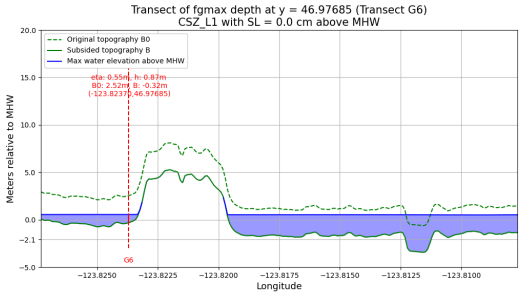
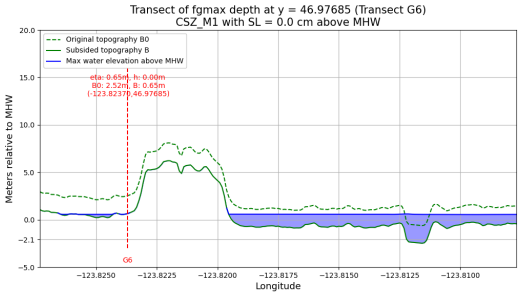


Figure 72: **Transect G5.** Maximum inundation depth $h_{\max}$ along a west-east transect through Gauge G5.

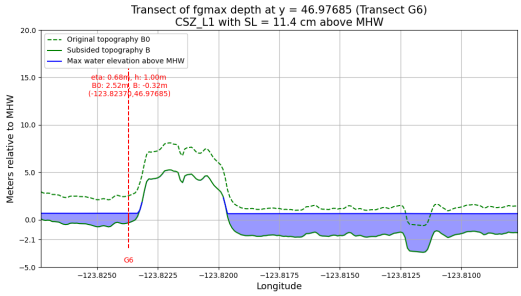
CSZ_L1-extended-pmel with no SLR



CSZ_M1 with no SLR



CSZ_L1-extended-pmel with SLR=0.114m



L1up_x1.117 with SLR=0.114m

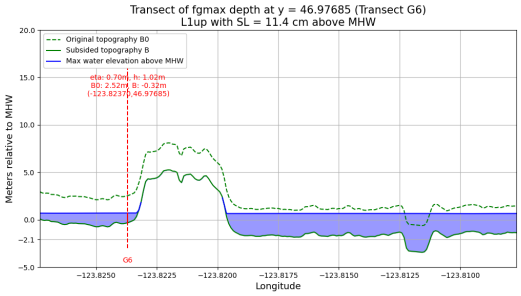
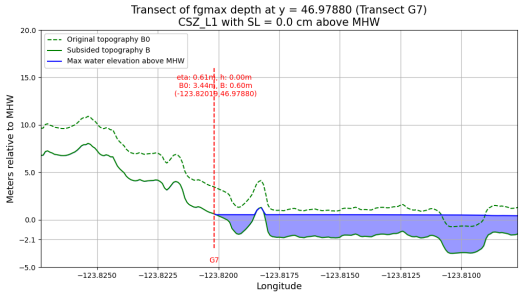
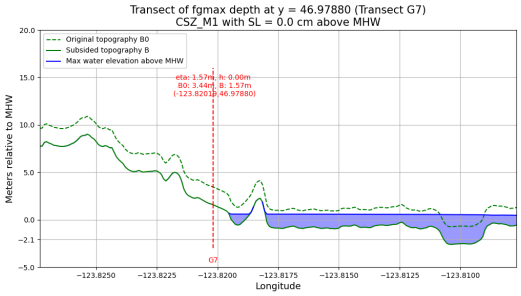


Figure 73: **Transect G6.** Maximum inundation depth $h_{\max}$ along a west-east transect through Gauge G6.

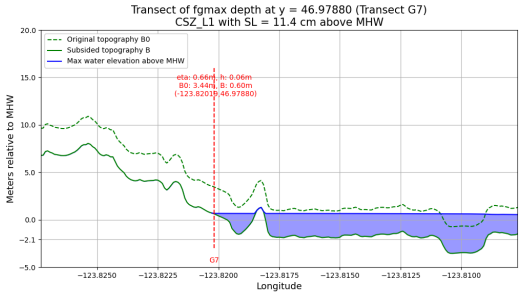
`CSZ_L1-extended-pmel` with no SLR



`CSZ_M1` with no SLR



`CSZ_L1-extended-pmel` with SLR=0.114m



`L1up_x1.117` with SLR=0.114m

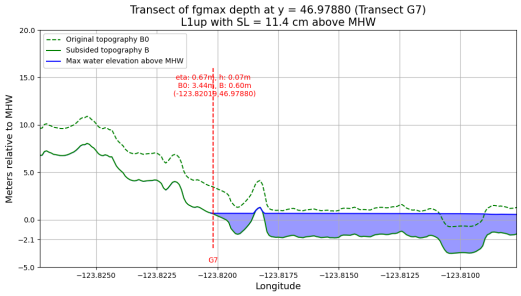


Figure 74: **Transect G7.** Maximum inundation depth $h_{\max}$ along a west-east transect through Gauge G7.

11 Results – Gauge output

Figures 66 and 67 show the location of the simulated gauges 1-7 listed in Table 1 that are used to capture time series of the flow depth / surface elevation and of the current velocity, momentum, and momentum flux over the course of each simulation. All of the gauges fall within the 1/3" by 1/3" fgmax regions shown by the pink rectangles in Figure 1.

For each gauge, the plots starting on page 67 show the water depth (inundation depth h)/surface elevation (inundation elevation IE), speed, momentum, momentum flux, pre-quake and post-quake bathymetry/topography for sources `CSZ_L1-extended-pmel` with no SLR, `CSZ_M1` with no SLR, `CSZ_L1-extended-pmel` with SLR=0.114m, and `L1up_x1.117` with SLR=0.114m. All simulations used Manning $n = 0.025$.

Note that the vertical scale for each surface elevation and speed plot varies between locations and events in order to clearly show the results, and is set by the maximum amplitude in each case. Examining these gauges gives an indication that the run times chosen for these simulations were sufficiently long to capture the maximum depth and speed at each point.

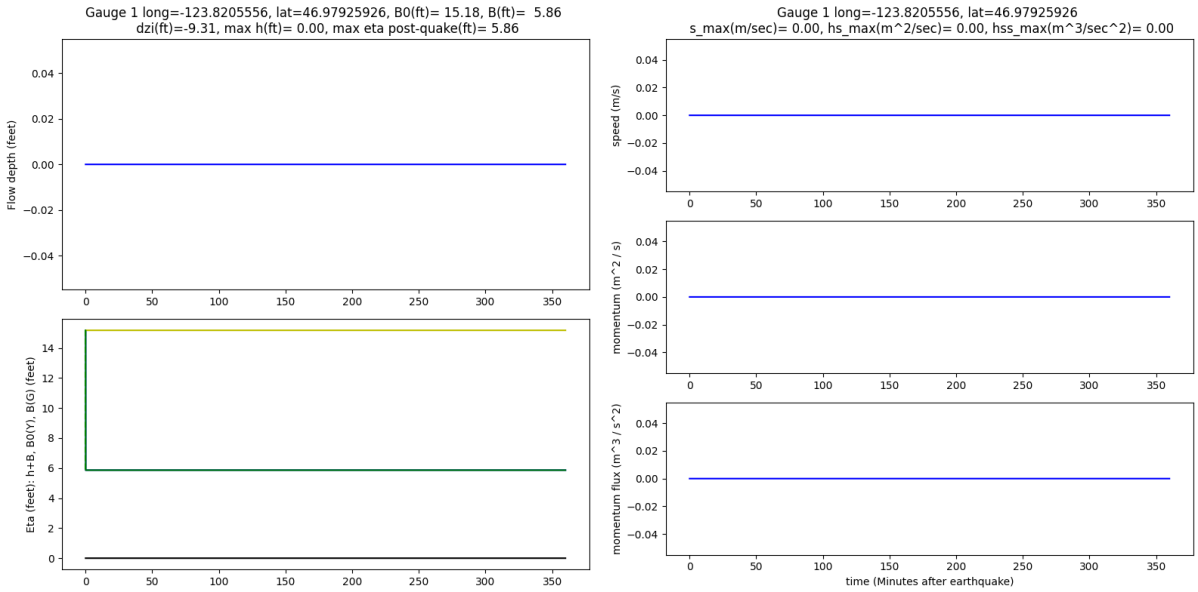
It should be noted that no inundation was seen at Gauges 1, 2, 3, 4, and 5, but in Section 10 we saw that there is inundation as well as subsidence that leaves some locations on the west-east transects through them permanently below MHW.

No.	Longitude	Latitude	Location
1	-123.82055556	46.979259259	Transect G1 in I-StreetVacant footprint
2	-123.82324074	46.977129630	Transect G2 in K-Street footprint
3	-123.81314815	46.986388889	Transect G3 in B-Street footprint
4	-123.81324074	46.986574074	Transect G4 in B-Street footprint
5	-123.82092593	46.979537037	Transect G5 in I-StreetVacant footprint
6	-123.82370370	46.976851852	Transect G6 in K-Street footprint
7	-123.82018519	46.978796296	Transect G7 in I-StreetParking footprint

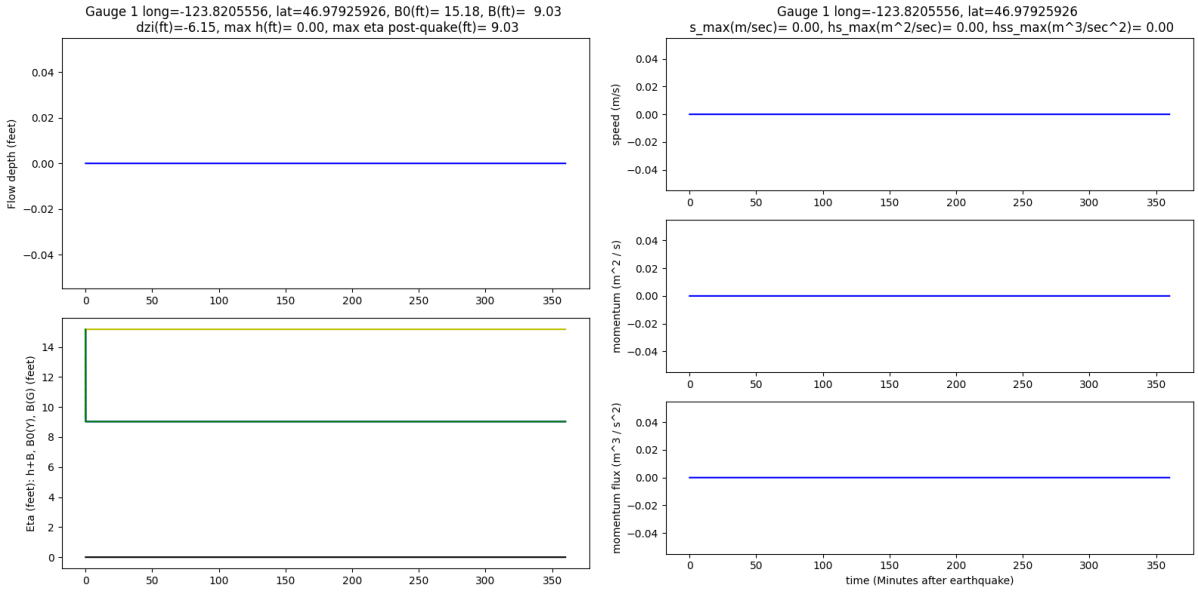
Table 1: Location of synthetic gauges 1-7.

Gauge 1: On Transect G1 in I-StreetVacant footprint
(B0=4.626m)

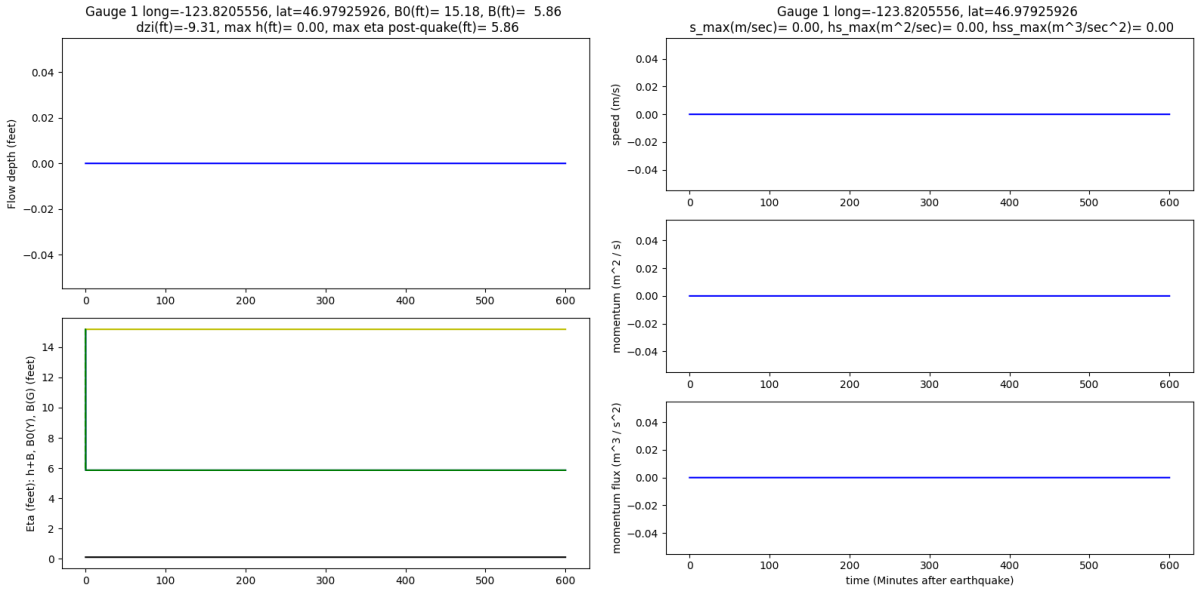
CSZ_L1-extended-pmel with no SLR, 0.025 Manning:
(B=1.787m, h=0.0, IE=max(h)+B=B, arrival=no arrival)



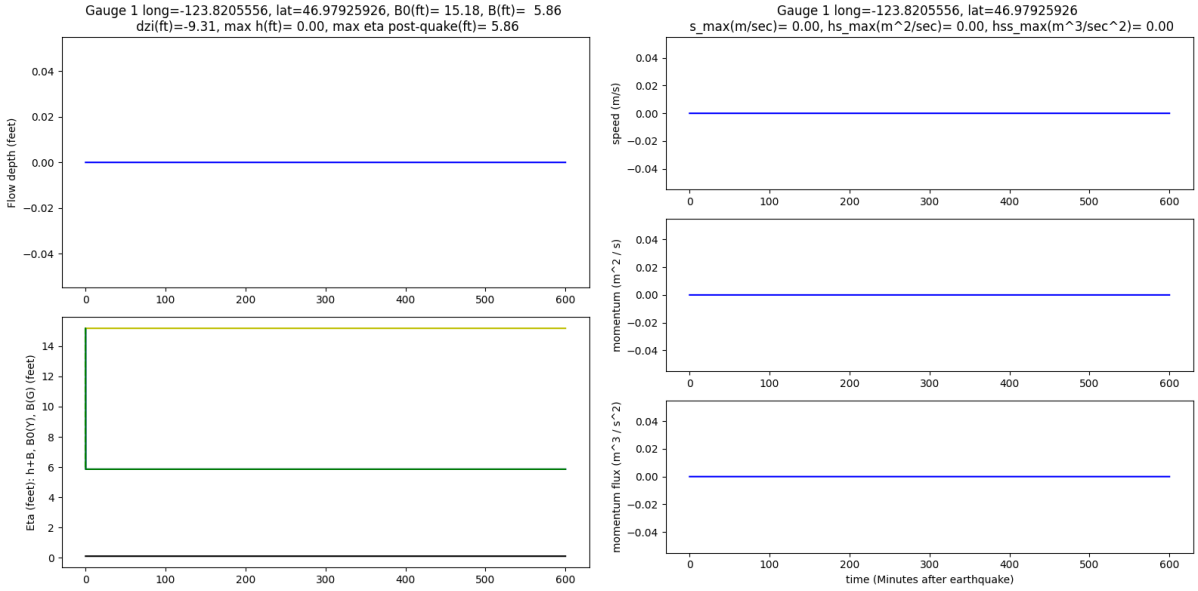
CSZ_M1 with no SLR, 0.025 Manning:
(B=2.752m, h=0.0m, IE = max(h)+B = B, arrival: no arrival)



CSZ_L1-extended-pmel at MHW+0.114m, 0.025 Manning:
(B=1.787m, h=0.0, IE=max(h)+B=B, arrival=no arrival)

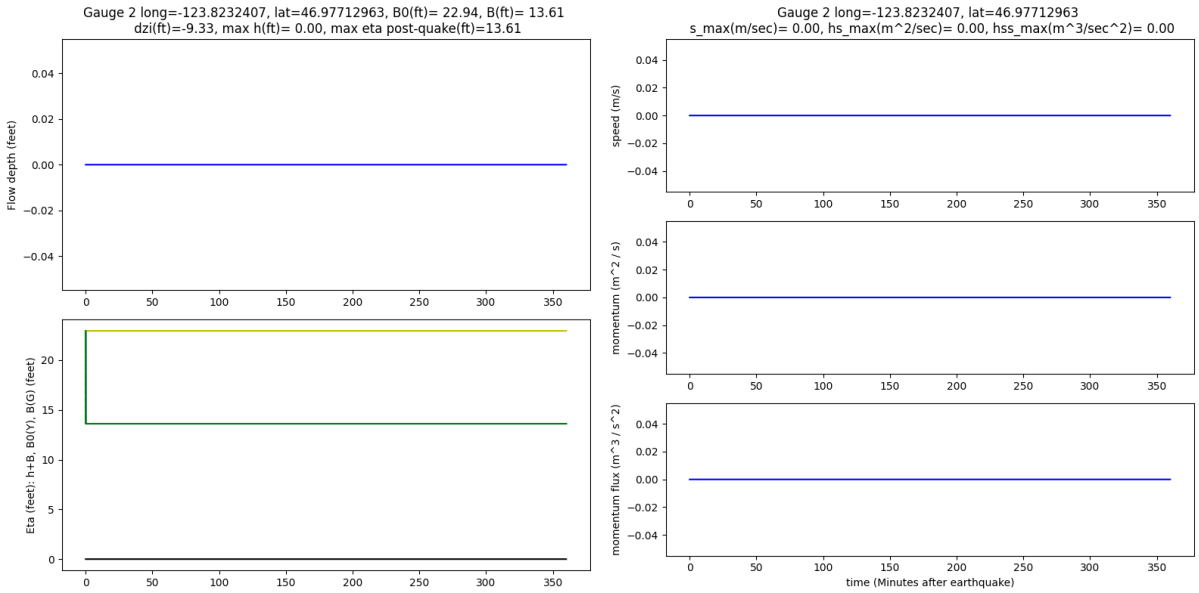


L1up_x1.117 at MHW+0.114m, 0.025 Manning:
(B=1.787m, h=0.0, IE=max(h)+B=B, arrival=no arrival)

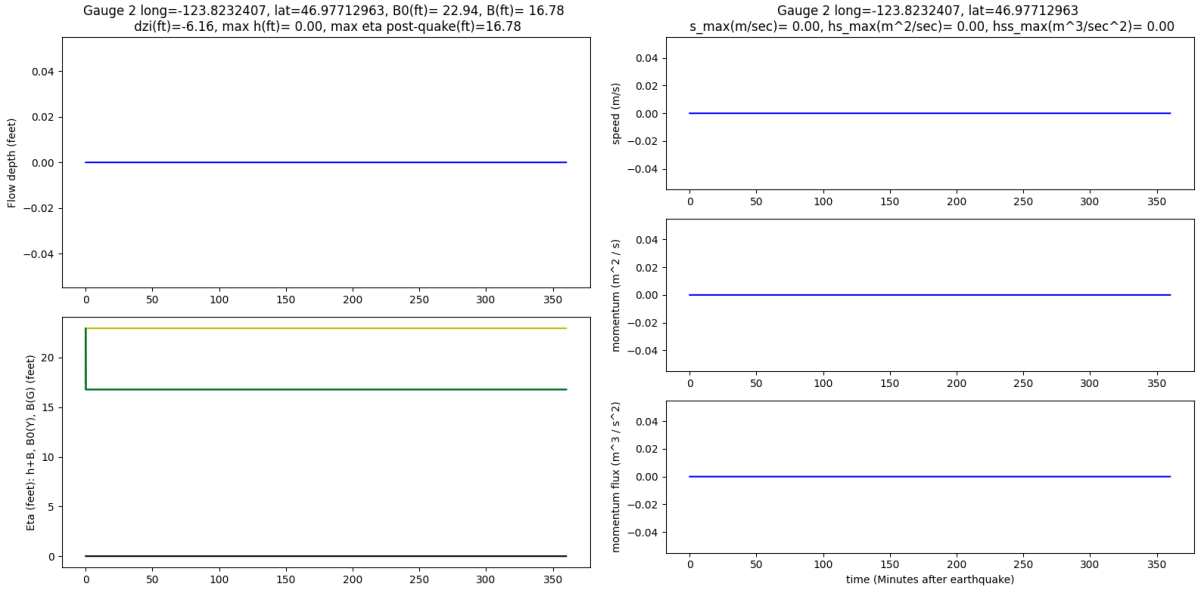


Gauge 2: On Transect G2 in K-Street footprint
(B0=6.992m)

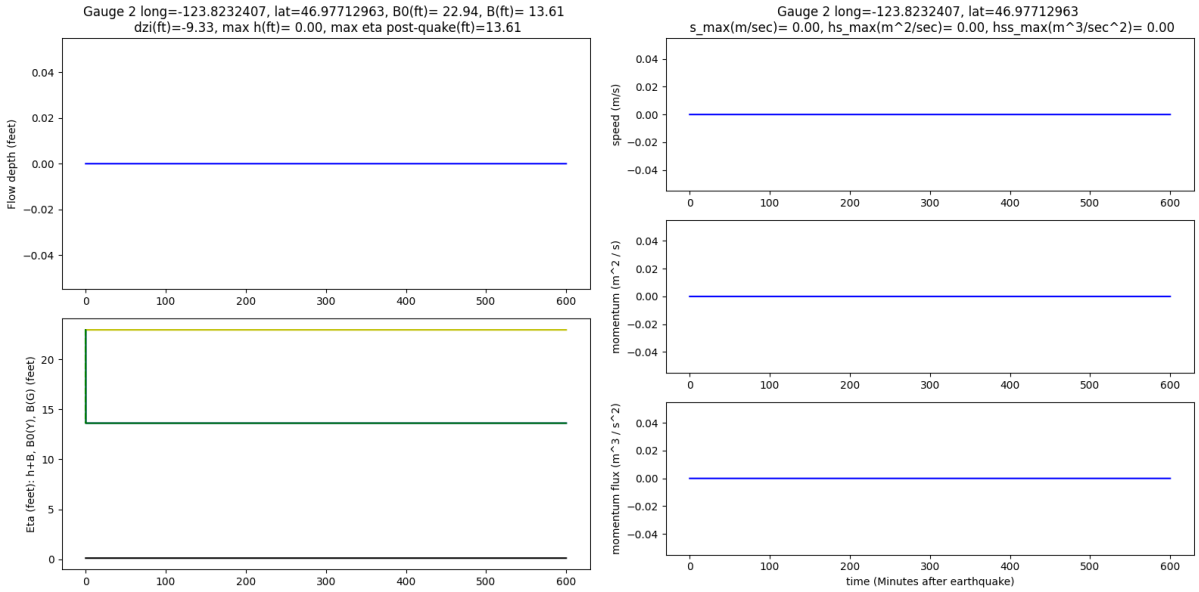
CSZ_L1-extended-pmel with no SLR, 0.025 Manning:
(B=4.148m, h=0.0, IE=max(h)+B=B, arrival=no arrival)



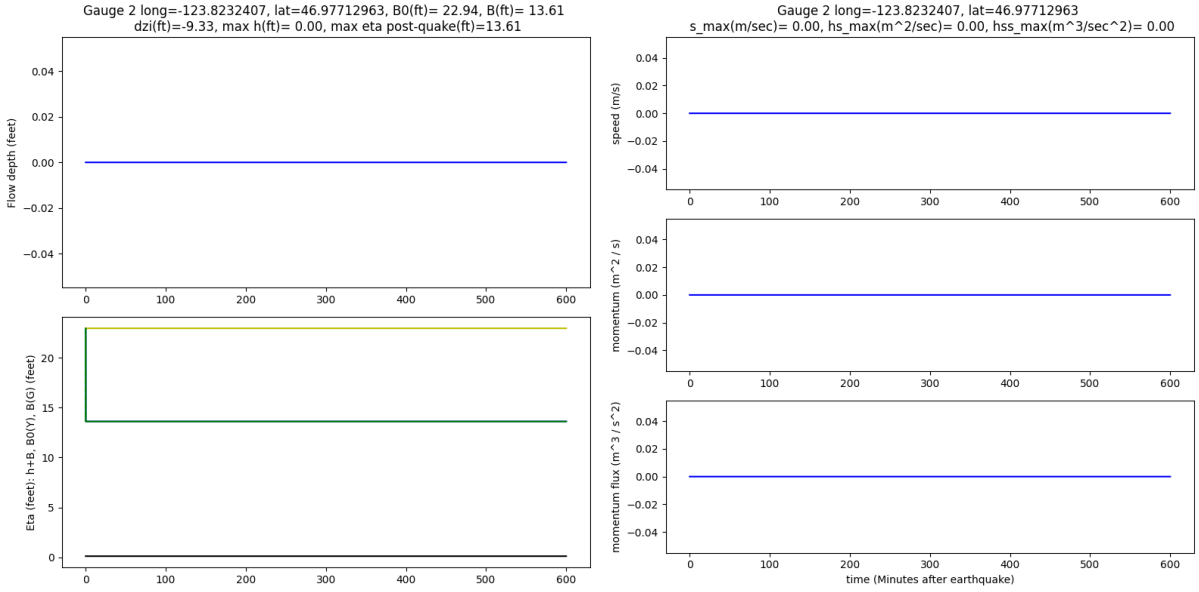
CSZ_M1 with no SLR, 0.025 Manning:
(B=5.115m, h=0.0m, IE = max(h)+B = B, arrival: no arrival)



CSZ_L1-extended-pmel at MHW+0.114m, 0.025 Manning:
(B=4.148m, h=0.0, IE=max(h)+B=B, arrival=no arrival)

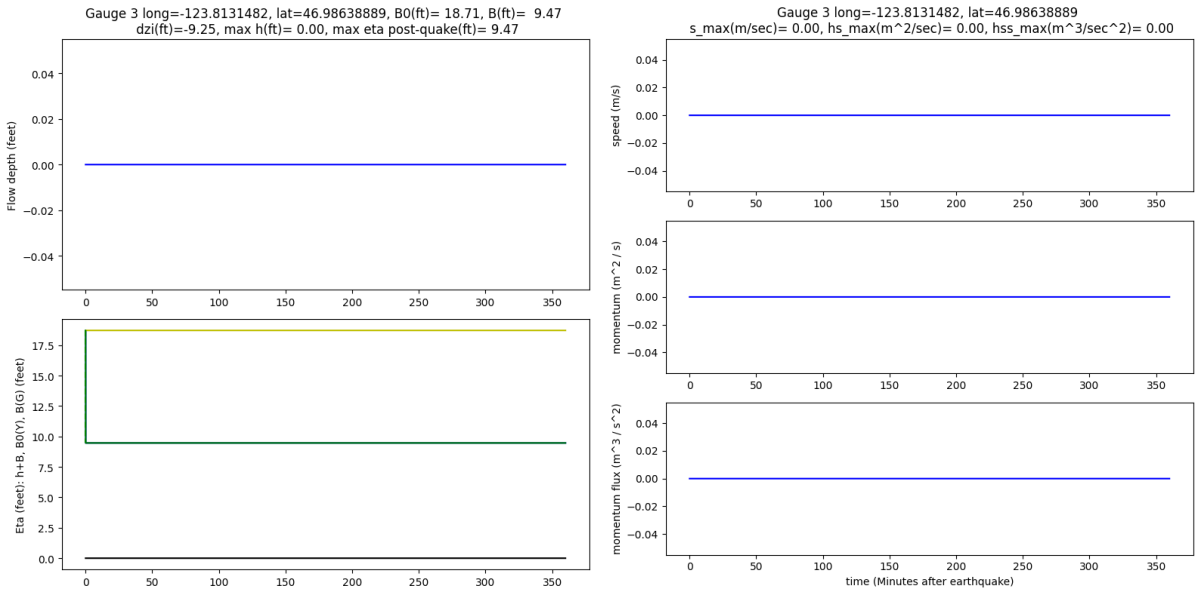


L1up_x1.117 at MHW+0.114m, 0.025 Manning:
(B=4.148, h=0.0, IE=max(h)+B=B, arrival=no arrival)

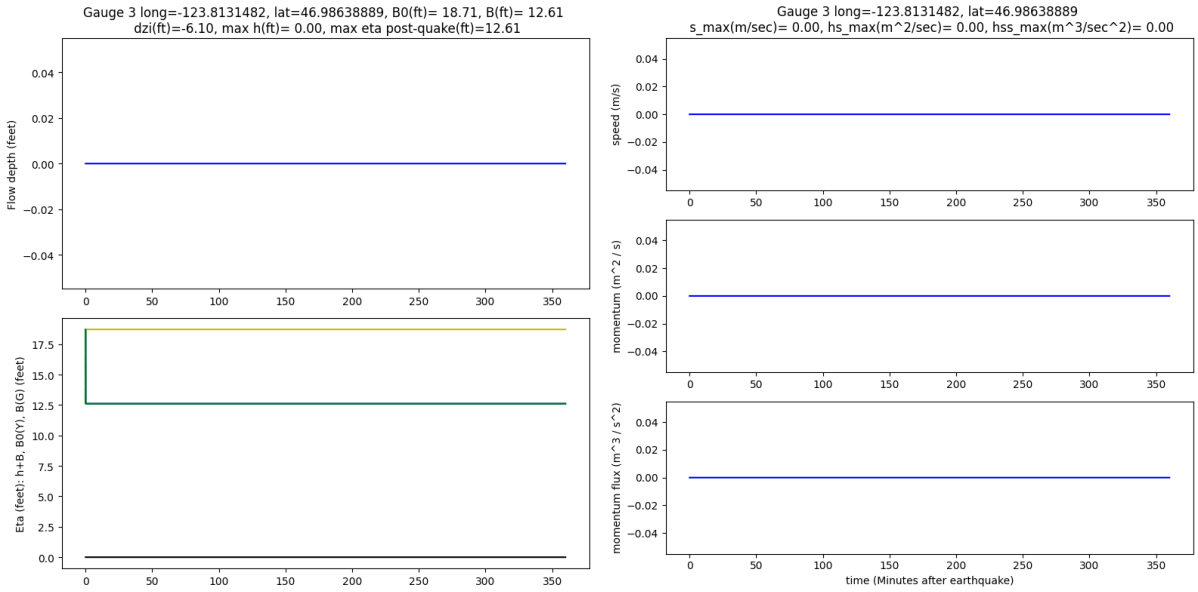


Gauge 3: On Transect G3 in B-Street footprint
(B0=5.703m)

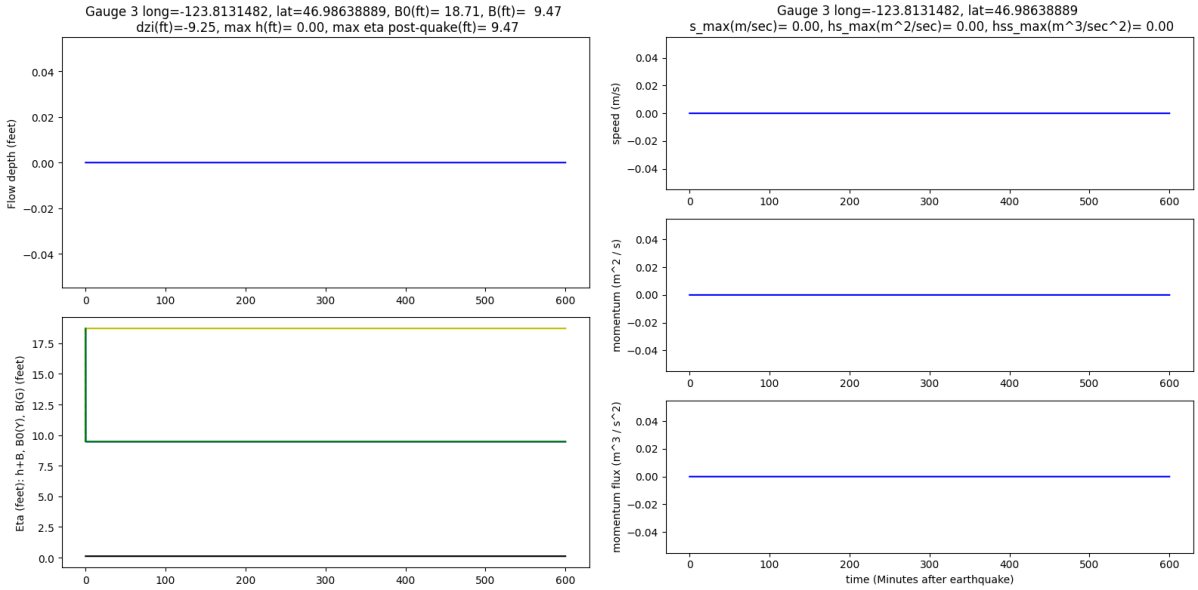
CSZ_L1-extended-pmel with no SLR, 0.025 Manning:
(B=2.885m, h=0.0, IE=max(h)+B=B, arrival=no arrival)



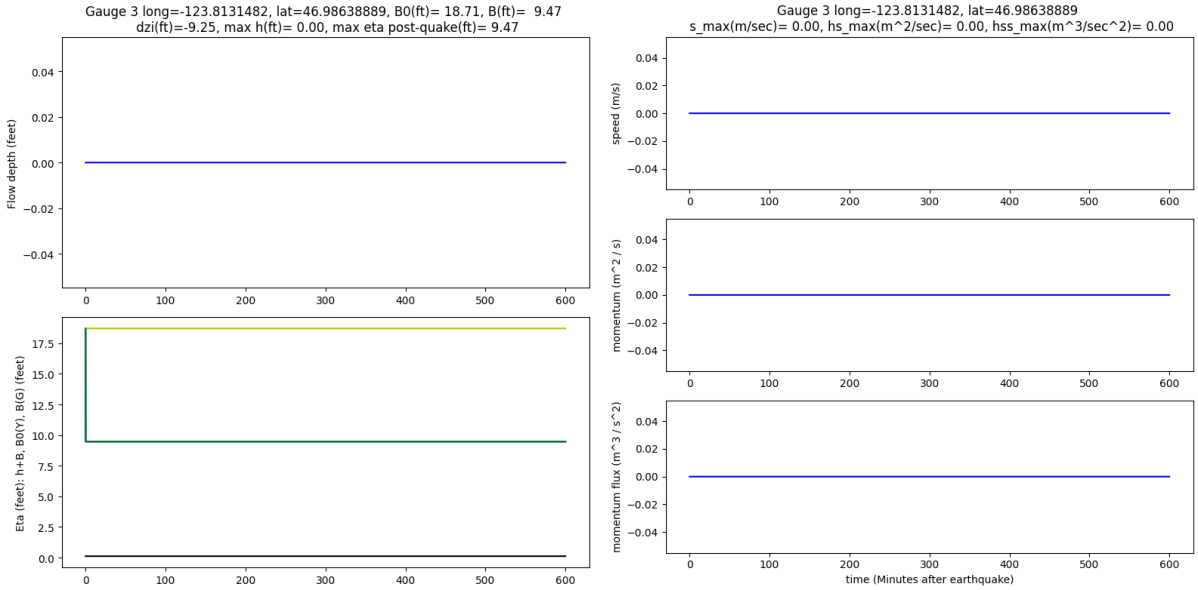
CSZ_M1 with no SLR, 0.025 Manning:
(B=3.844m, h=0.0m, IE = max(h)+B = B, arrival: no arrival)



CSZ_L1-extended-pmel at MHW+0.114m, 0.025 Manning:
(B=2.885m, h=0.0, IE=max(h)+B=B, arrival=no arrival)



L1up_x1.117 at MHW+0.114m, 0.025 Manning:
(B=2.885m, h=0.0, IE=max(h)+B=B, arrival=no arrival)

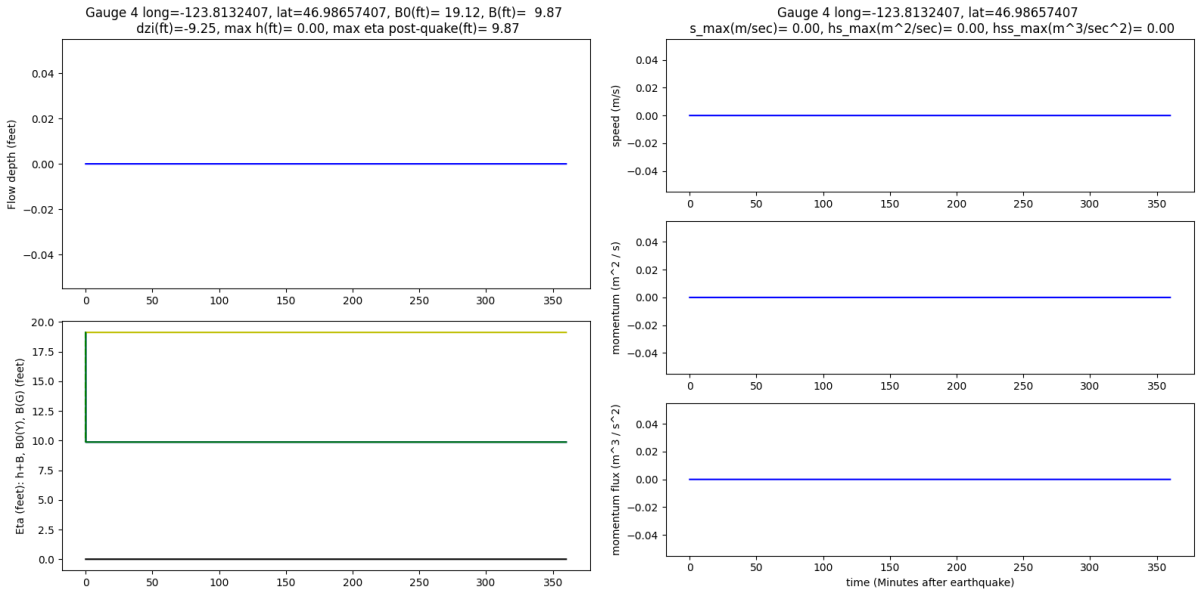


Gauge 4: On Transect G4 in B-Street footprint

(B0=5.828m)

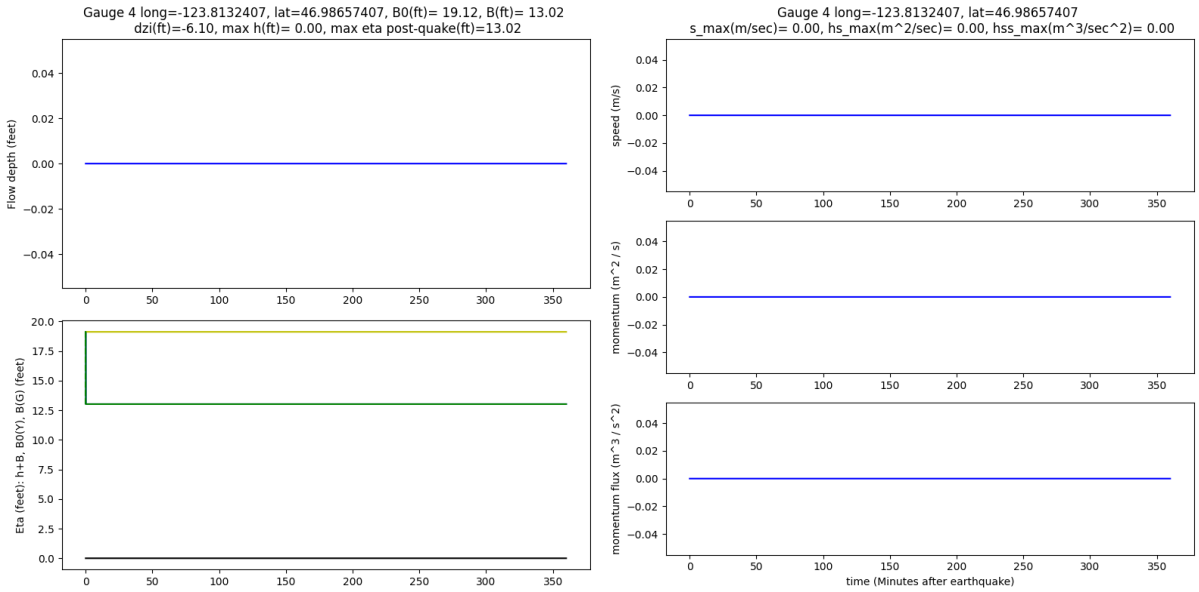
CSZ_L1-extended-pmel with no SLR, 0.025 Manning:

(B=3.009m, h=0.0, IE=max(h)+B=B, arrival=no arrival)

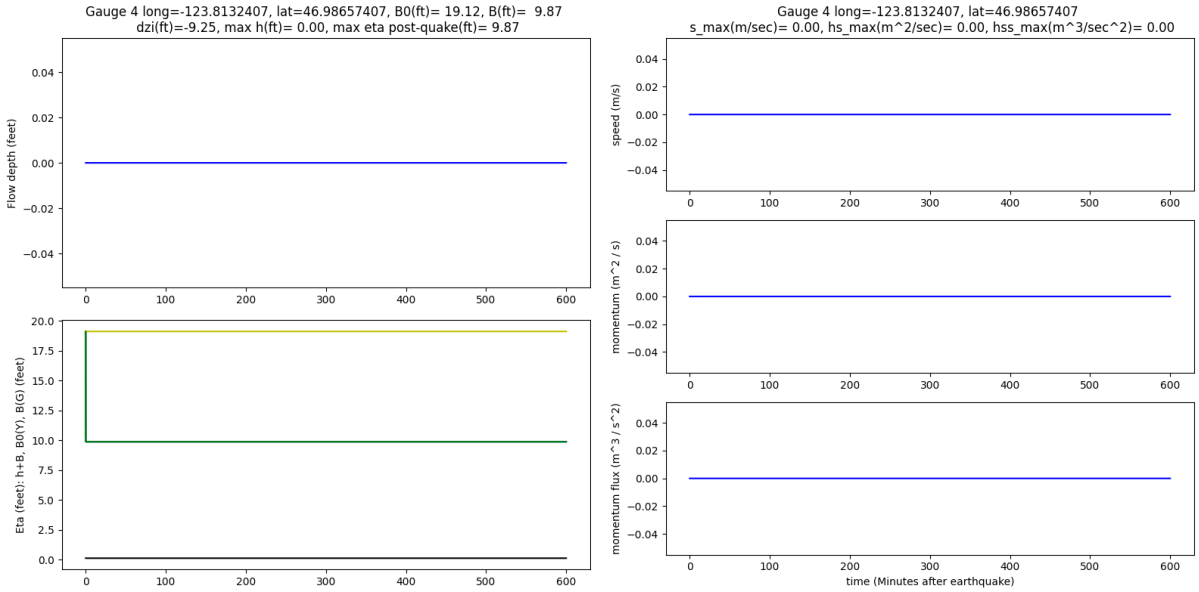


CSZ_M1 with no SLR, 0.025 Manning:

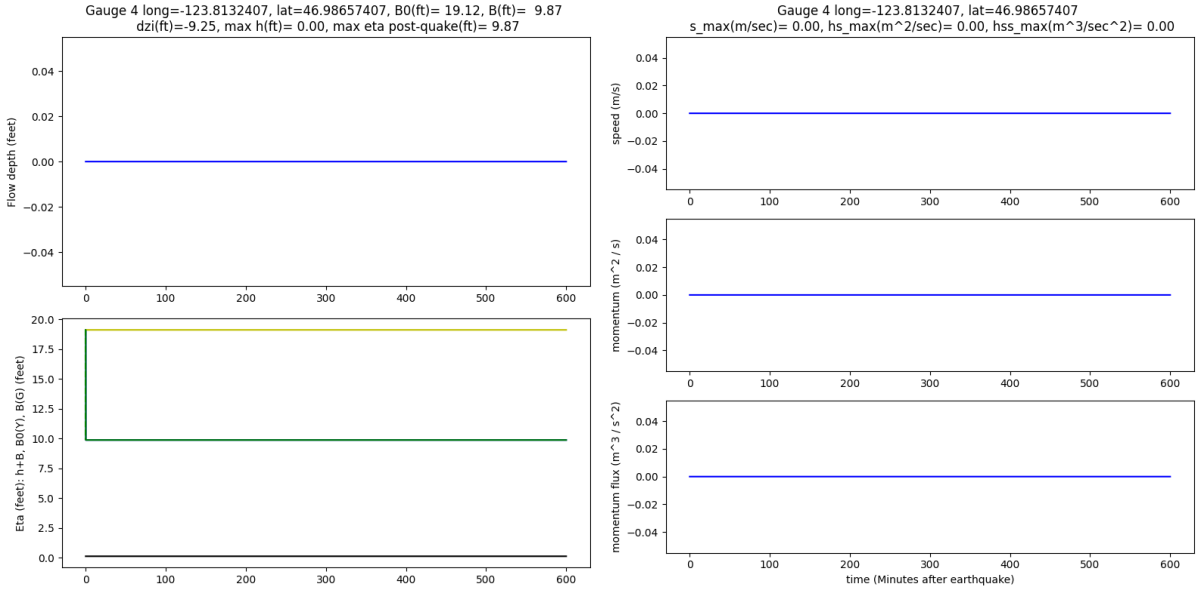
(B=3.968m, h=0.0m, IE = max(h)+B = B, arrival: no arrival)



CSZ_L1-extended-pmel at MHW+0.114m, 0.025 Manning:
(B=3.009m, h=0.0, IE=max(h)+B=B, arrival=no arrival)

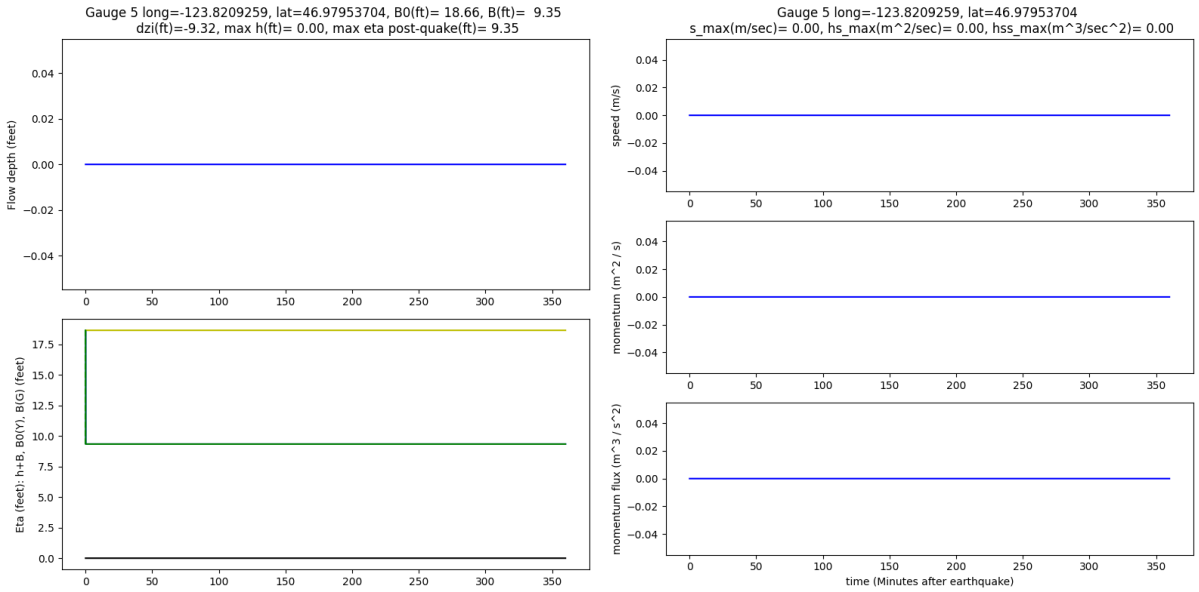


L1up_x1.117 at MHW+0.114m, 0.025 Manning:
(B=3.009m, h=0.0, IE=max(h)+B=B, arrival=no arrival)

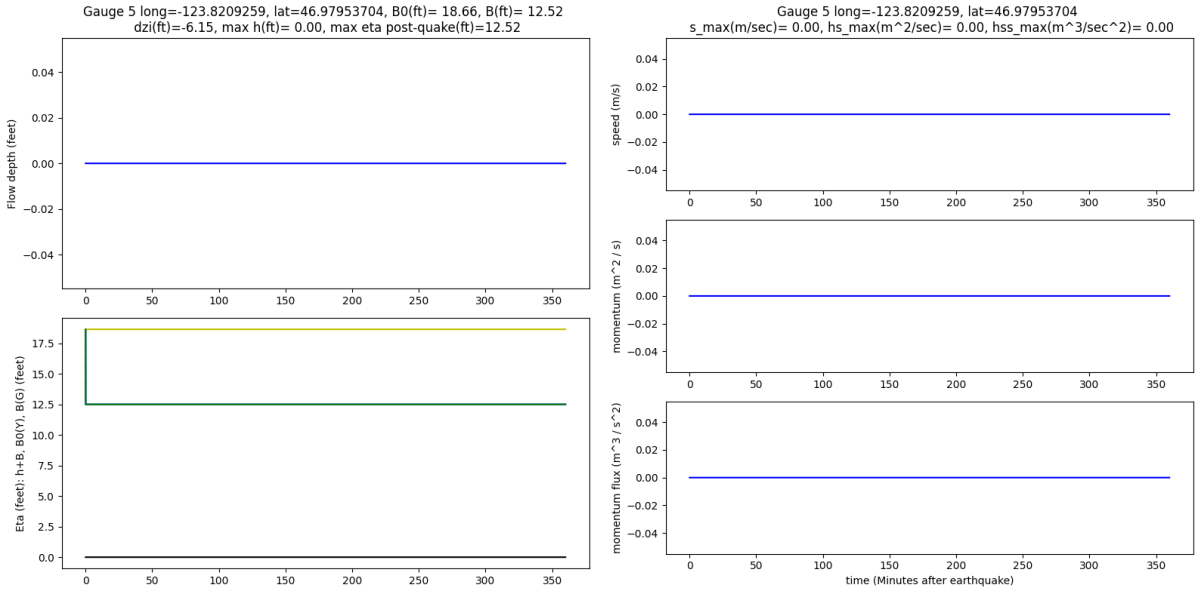


Gauge 5: On Transect G5 in I-StreetVacant footprint
(B0=5.688m)

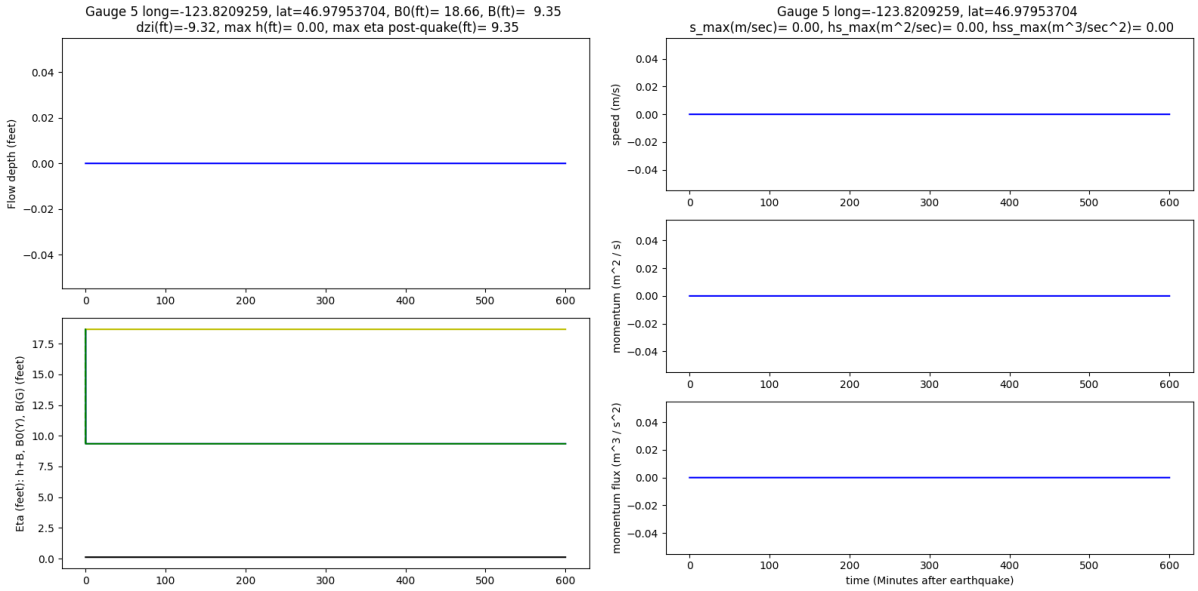
CSZ_L1-extended-pmel with no SLR, 0.025 Manning:
(B=2.849m, h=0.0, IE=max(h)+B=B, arrival=no arrival)



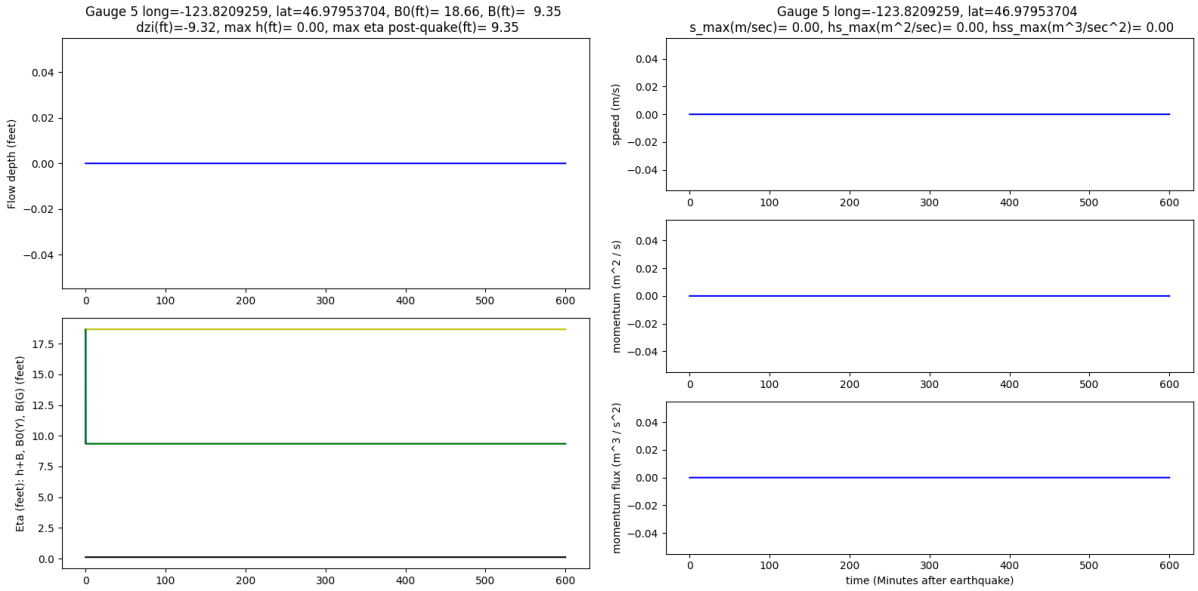
CSZ_M1 with no SLR, 0.025 Manning:
(B=3.815m, h=0.0m, IE = max(h)+B = B, arrival: no arrival)



CSZ_L1-extended-pmel at MHW+0.114m, 0.025 Manning:
(B=2.849m, h=0.0, IE=max(h)+B=B, arrival=no arrival)

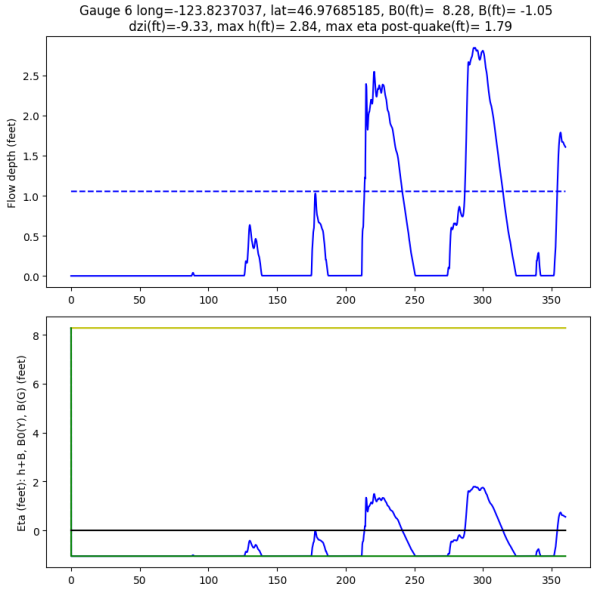


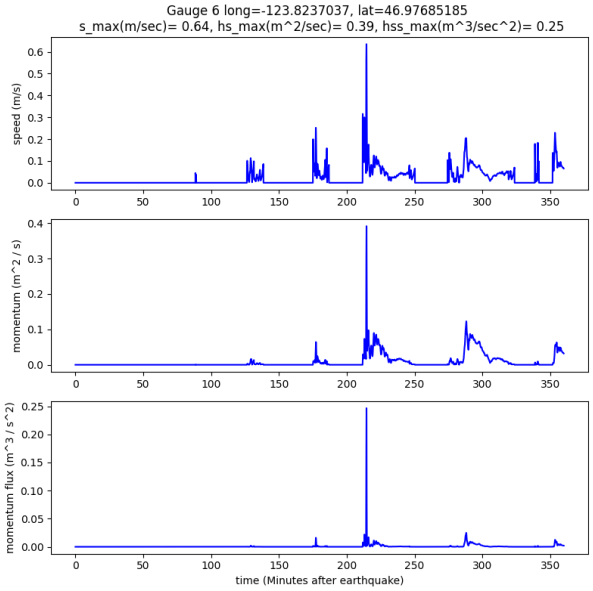
L1up_x1.117 at MHW+0.114m, 0.025 Manning:
(B=2.849m, h=0.0, IE=max(h)+B=B, arrival=no arrival)



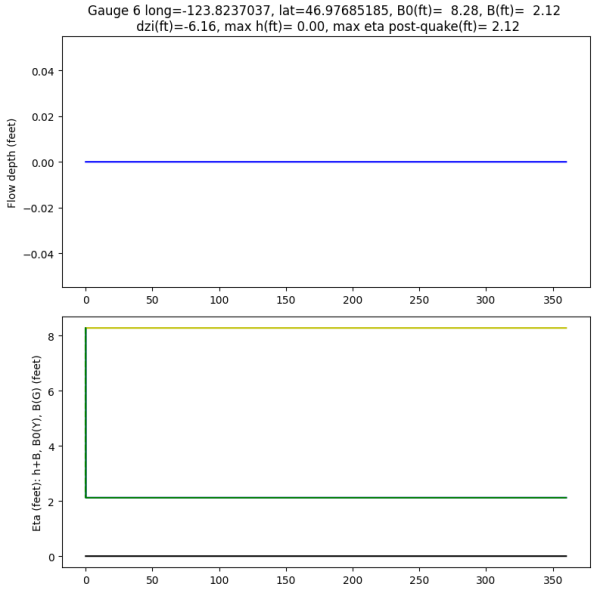
Gauge 6: On Transect G6 in K-Street footprint
(B0=2.524m)

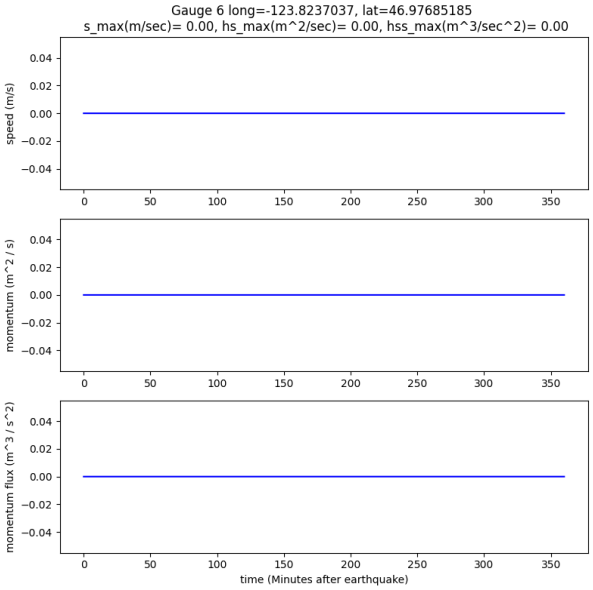
CSZ_L1-extended-pmel with no SLR, 0.025 Manning:
(B=-0.321m, h=0.87m, IE=max(h)+B=0.55m, arrival=127min)



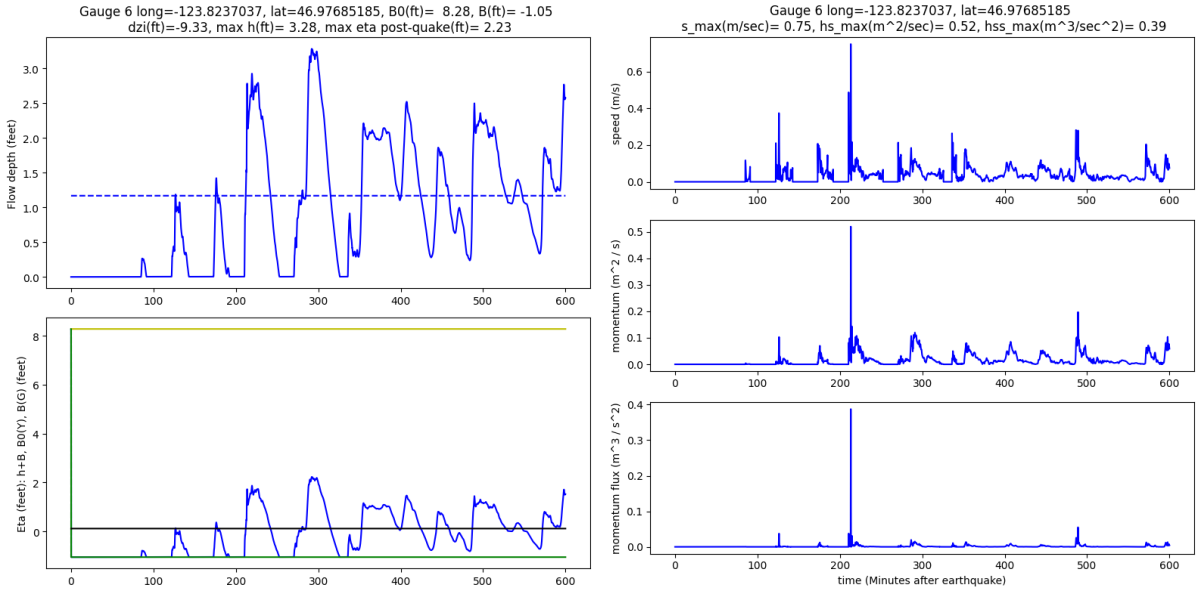


CSZ_M1 with no SLR, 0.025 Manning:
(B=0.646m, h=0.0m, IE = max(h)+B = B, arrival: no arrival)

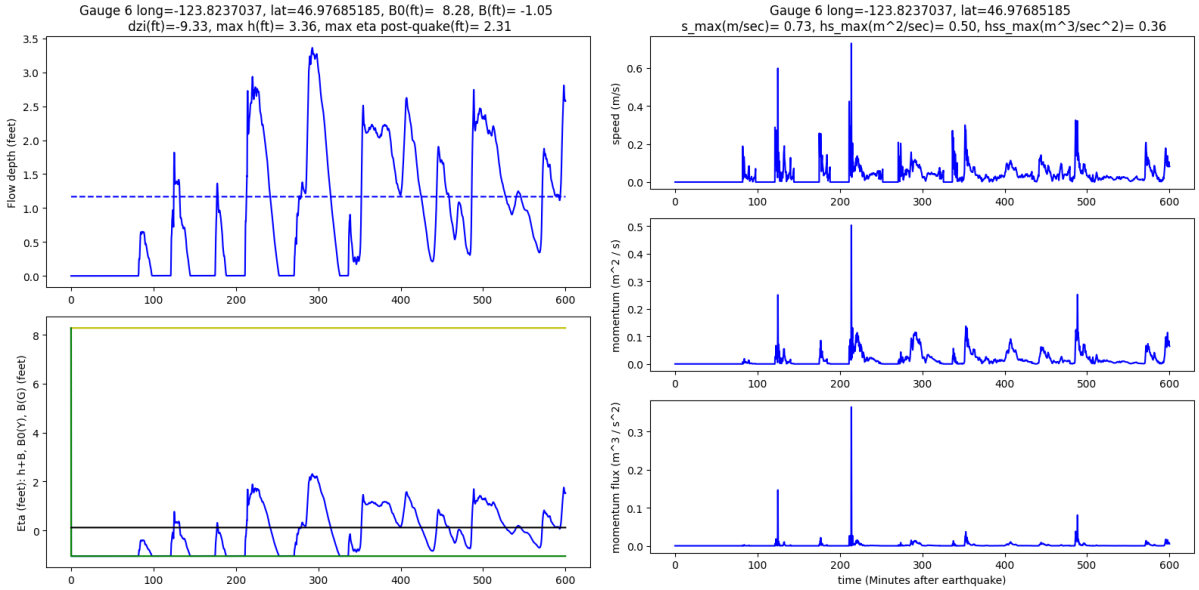




CSZ_L1-extended-pmel at MHW+0.114m, 0.025 Manning:
(B=-0.321m, h=1.00, IE=max(h)+B=0.68m, arrival=85.7min)

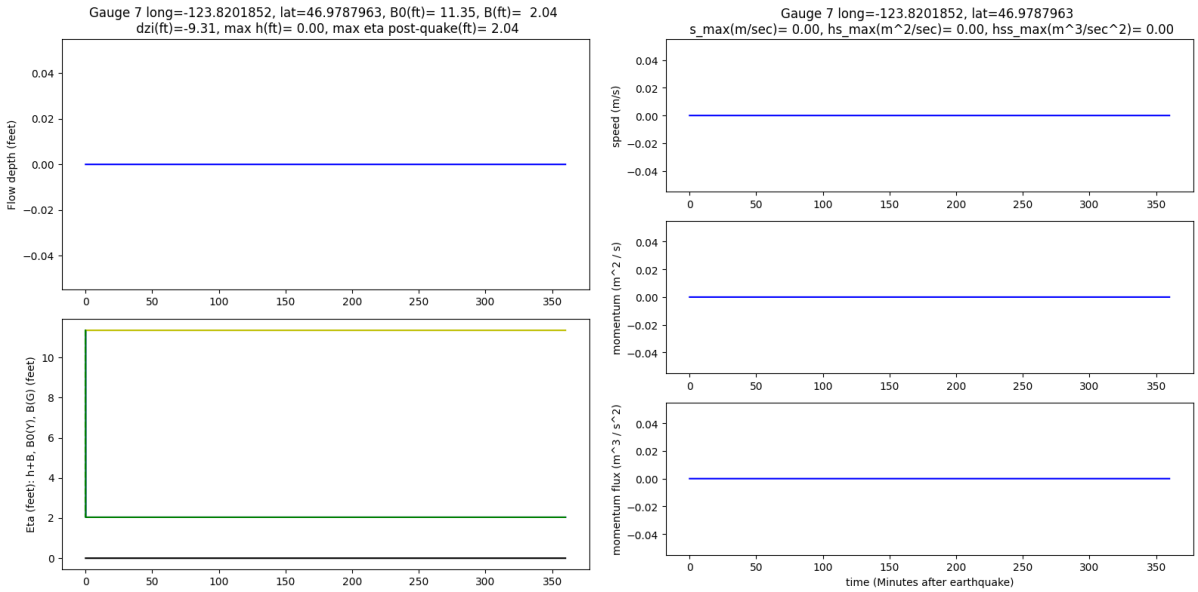


L1up_x1.117 at MHW+0.114m, 0.025 Manning:
(B=-0.321m, h=1.02m, IE=max(h)+B=0.70, arrival=82.2min)

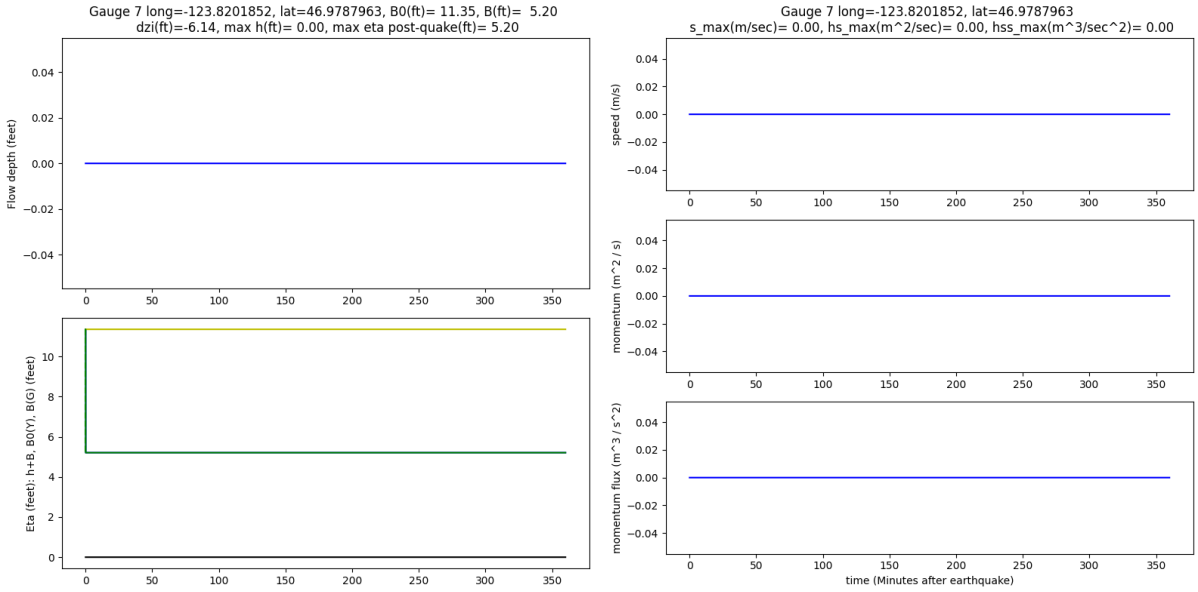


Gauge 7: On Transect G7 in I-StreetParking footprint
(B0=3.459m)

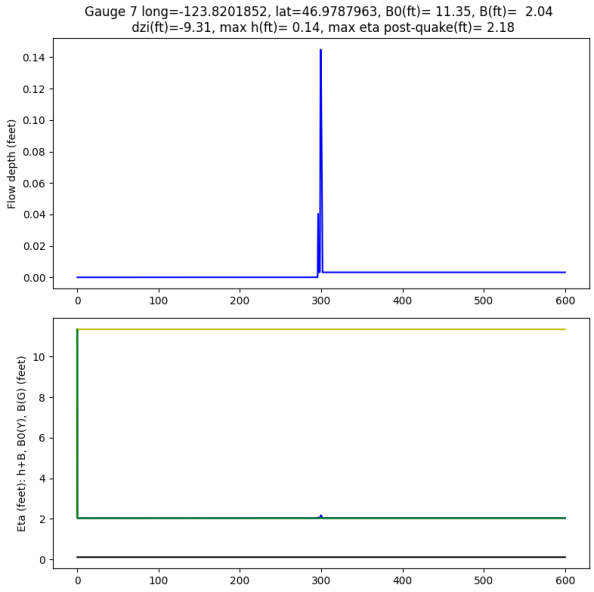
CSZ_L1-extended-pmel with no SLR, 0.025 Manning:
(B=0.621m, h=0.0, IE=max(h)+B=B, arrival=no arrival)

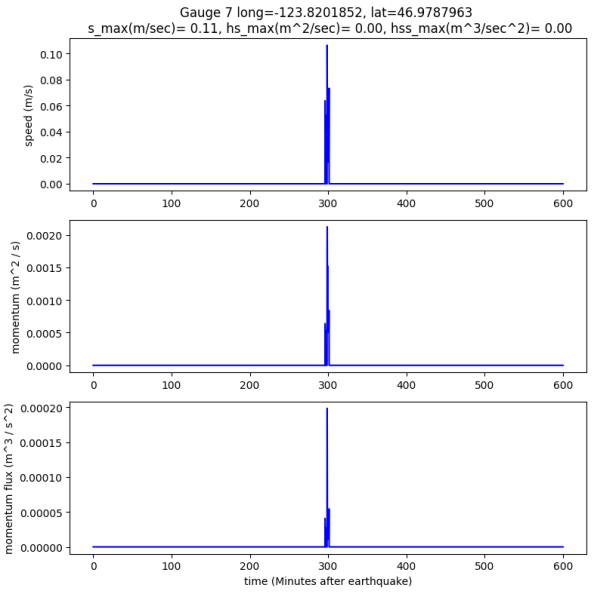


CSZ_M1 with no SLR, 0.025 Manning:
(B=1.586m, h=0.0m, IE = max(h)+B = B, arrival: no arrival)

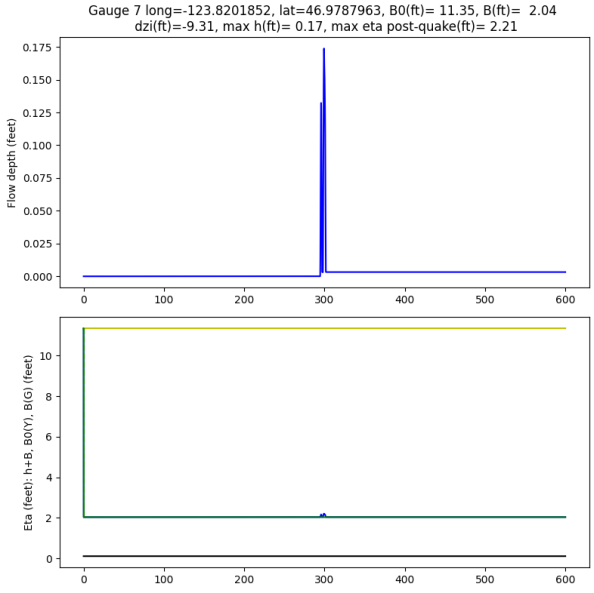


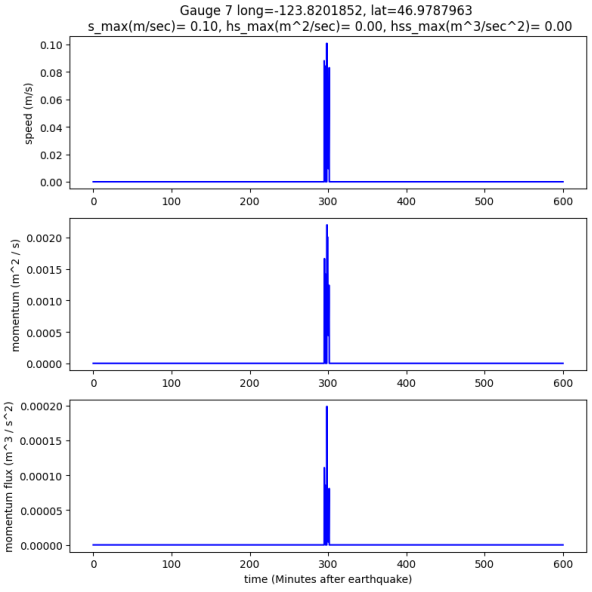
CSZ_L1-extended-pmel at MHW+0.114m, 0.025 Manning:
(B=0.621m, h=0.04m, IE=max(h)+B=0.67m, arrival=299.5min)





L1up_x1.117 at MHW+0.114m, 0.025 Manning:
(B=0.621m, h=0.05, IE=max(h)+B=0.67, arrival=299.1min)





12 Analysis – Minimum pre-quake Build Elevation (MBE)

ASCE 7-22 outlines standards for building a Vertical Evacuation Structure (VES) within a tsunami inundation zone. These standards are described in [12]. Likewise, the 2021 State of Washington Building Code gives its standards in [1]. For both, the minimum pre-quake build elevation above MHW to the first VES occupiable level, MBE, for a single location is calculated as follows and illustrated in Figure 75.

1. Obtain the max inundation depth h_{max} (in meters) above the post-quake ground elevation B (in meters above MHW) from a tsunami simulation.
2. Calculate the post-quake max inundation elevation $IE_{\max} = h_{\max} + B$. (Shown as η_{max} in Figure 75.)
3. Calculate the post-quake min elevation to the first occupiable VES level as $ME = 1.3\eta_{max} + S$ where S is 10 ft (3.048 m) or 1-story.
4. Calculate the minimum height of the VES in meters as $MH = ME - B$.
5. Calculate the pre-quake elevation to the first occupiable VES level as $MBE = B0 + MH$ where $B0$ is the pre-quake bathymetry (in m. above MHW). Notice that $MBE = ME - (B - B0)$ where $\Delta B = B - B0$ and that MH is also $MH = MBE - B0$.

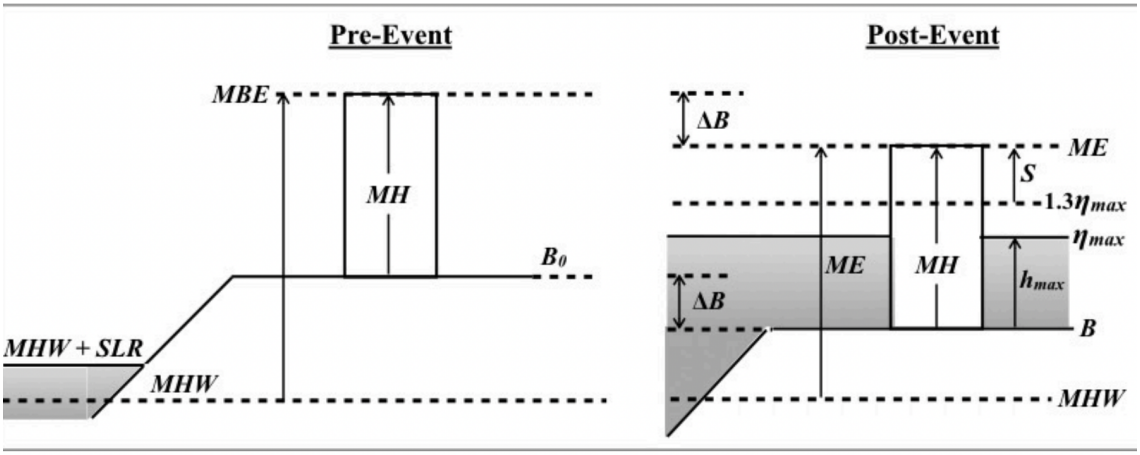


Figure 75: **Left:** Pre-Event geometry, showing the VES minimum height to the lowest refuge level, MH, as the distance between the elevations MBE and $B0$. $B0$ is the elevation of the pre-quake bathymetry/topography referenced to MHW and MBE is the minimum elevation of the lowest refuge level referenced to MHW. Before performing the tsunami simulation, the water level is adjusted to include the sea level rise, $SLR = 0.114m$. **Right:** Post-Event geometry showing the co-seismic subsidence $\Delta B < 0$, the elevation B of the subsided topography/bathymetry relative to MHW, the maximum tsunami inundation depth $h_{\max}$ above B, the maximum inundation elevation $IE_{\max}$ pictured as $\eta_{\max}$, and the minimum elevation post-quake ME referenced to MHW of the first occupiable level of the VES. MH is also calculated as $ME - B$ since the structure simply drops with subsidence.

Often engineers want to know the maximum elevation MBE over the entire footprint of the VES and build up to this elevation pre-quake to achieve a top flat surface. We call this elevation MBE_{flat}. The height of the VES above the pre-quake bathymetry $B0$ at a single location will be called MH_{flat} and is $MH_{\text{flat}} = MBE_{\text{flat}} - B0$. For the `L1up_x1.117` source with SLR=0.114m, Figures 76, 77, and 78 show the I-StreetParking footprint results and Figures 79, 80, and 81 show the K-Street footprint results. Table 2 gives results for the single location Gauge 6 which is in the K-Street footprint.

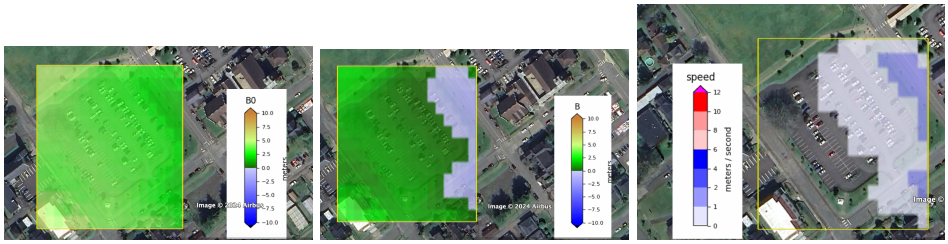


Figure 76: I-StreetParking footprint results for the `L1up_x1.117` source with SLR=0.114m. **Left**: The pre-quake topography $B0$ elevation in m. above MHW. The min/max values were 1.55 and 6.20 m. or 5.09 and 20.32 ft above MHW. **Middle**: The post-quake topography B elevation in m. above MHW. The min/max values were -1.28 and 3.36 m. or -4.22 and 11.01 ft above MHW. **Right**: The maximum speed s in m/sec. The min/max values were 0.07 and 1.94 m/sec or 0.24 and 6.37 ft/sec.

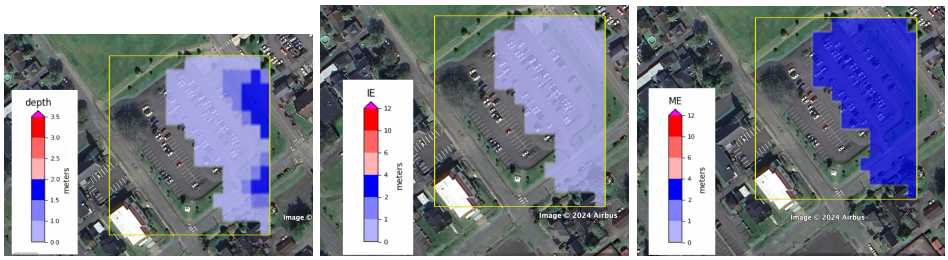


Figure 77: I-StreetParking footprint results for the `L1up_x1.117` source with SLR=0.114m. **Left:** h_{max} in m. The min/max values 0.0 and 1.95 m. or 0.0 and 6.41 ft. above B. **Middle:** IE in m. above MHW. The min/max values were 0.66 and 0.68 m. or 2.17 and 2.23 ft. above MHW. **Right:** ME in m. above MHW. The min/max values were 3.91 and 3.93 m. or 12.83 and 12.90 ft. above MHW.

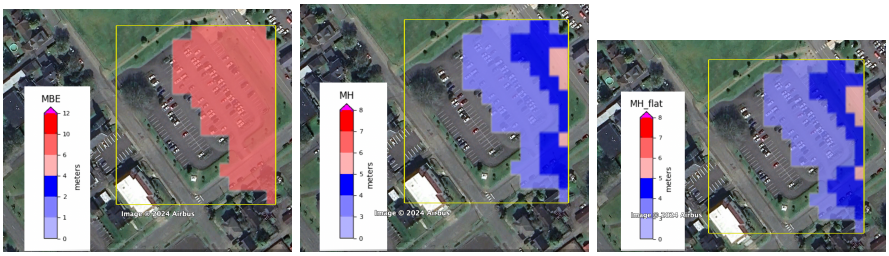


Figure 78: I-StreetParking footprint results for the `L1up_x1.117` source with SLR=0.114m. **Left**: The MBE elevation in m. above MHW. The min/max values were 6.75 and 6.77 m. or 22.13 and 22.21 ft. $MBE_{\text{flat}} = 22.21$ ft. **Middle:** MH in m. The min/max values were 3.26 and 5.20 m. or 10.69 and 17.07 ft. **Right:** MH_{flat} in m. The min/max values were 3.27 and 5.22 m. or 10.72 and 17.11 ft.

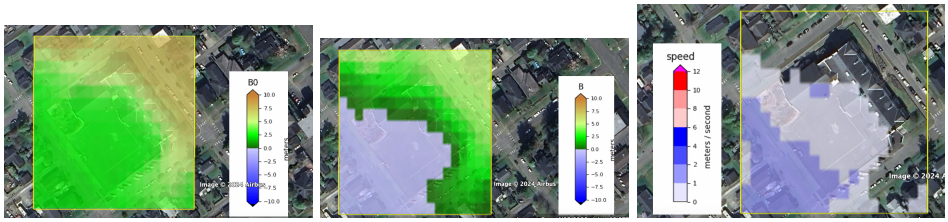


Figure 79: K-Street footprint results for the `L1up_x1.117` source with SLR=0.114m. **Left**: The pre-quake topography $B0$ elevation in m. above MHW. The min/max values of $B0$ were 1.97 and 8.09 m. or 6.45 and 26.53 ft above MHW. **Middle**: The post-quake topography B elevation in m. above MHW. The min/max values of B were -0.88 and 5.24 m. or -2.88 and 17.20 ft above MHW. **Right**: The maximum speed s in m/sec. The min/max values of max speed s were 0.14 and 1.75 m/sec or 0.45 and 5.73 ft/sec.

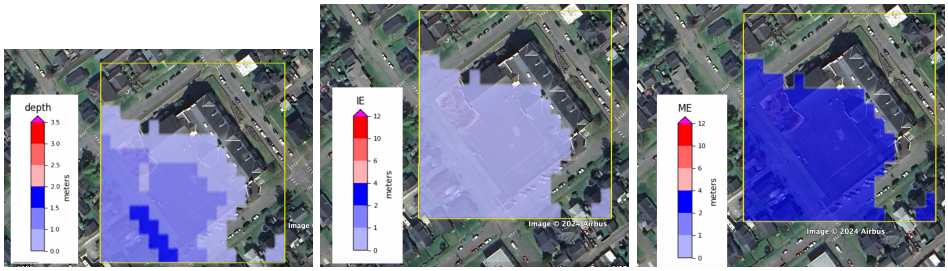


Figure 80: K-Street footprint results for the `L1up_x1.117` source with SLR=0.114m. **Left:** h_{max} in m. The min/max values of h_{max} were 0.0 and 1.57 m. or 0.0 and 5.16 ft. above B. **Middle:** IE in m. above MHW. The min/max values of IE were 0.65 and 0.71 m. or 2.13 and 2.32 ft. above MHW. **Right:** ME in m. above MHW. The min/max values of ME were 3.89 and 3.97 m. or 12.77 and 13.01 ft. above MHW.

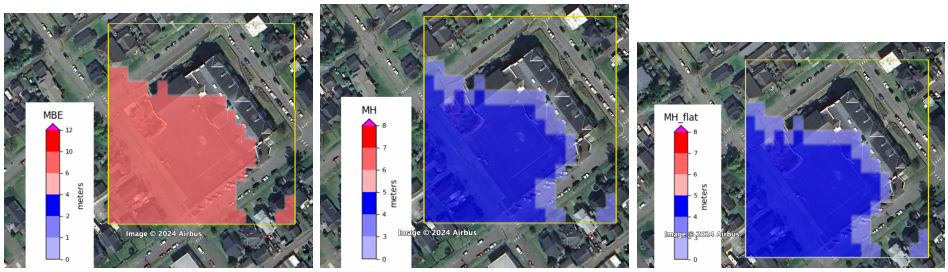


Figure 81: K-Street footprint results for the `L1up_x1.117` source with SLR=0.114m. **Left**: The MBE elevation in m. above MHW. The min/max values of MBE were 6.74 and 6.81 m. or 22.10 and 22.34 ft. $MBE_{\text{flat}} = 22.34$ ft. **Middle:** MH in m. The min/max values of MH were 3.29 and 4.83 m. or 10.78 and 15.84 ft. **Right:** MH_{flat} in m. The min/max values of MH_{flat} were 3.29 and 4.84 m. or 10.81 and 15.89 ft.

GAUGE 6	Units	L1up	CSZ_L1	Terminology
$B0$	ft above MHW	8.28	8.28	Elevation of pre-quake topography
ΔB	ft	-9.33	-9.33	Subsidence): $B - B0 < 0$
B	ft above MHW	-1.05	-1.05	Elevation of post-quake topography
$h_{\max}$	ft above B	3.36	3.28	Inundation depth above elevation B
$IE_{\max}$	ft above MHW	2.31	2.23	Inundation Elevation $h_{\max} + B$
ME	ft above MHW	13.00	12.90	Min Elevation post-quake of first occupiable level
MBE	ft above MHW	22.34	22.23	Min Elevation pre-quake of first occupiable level
MH	ft	14.05	13.95	Minimum height to first occupiable level
MH_{flat}	ft	14.06	13.95	Height of VES from $B0$ to MBE_{flat}
MBE_{flat}	ft above MHW	22.34	22.23	Maximum MBE over the footprint

Table 2: Results and analysis for Gauge 6. The source `L1up_x1.117` with SLR=0.114m is referred to as **L1up**, and the `CSZ_L1-extended-pmel` with SLR=0.114m as **CSZ_L1**.

13 Discussion

The "Maximum Considered Tsunami" (MCT) is usually taken to be the one producing the highest results of MBE_{flat} for the building site. The results in this report have shown that the sources `L1up_x1.117` and `CSZ_L1-extended-pmel` with SLR=0.114m give very similar results. Neither source gave inundation around the Robert Gray Elementary School or in the vacant lot on I-Street (The I-StreetVacant footprint did show inundation in its SE corner, but that was really within the parking lot and not the vacant lot.) The McDermoth campus on K-Street and the I-Street Parking lot have very similar inundation with both these sources. Furthermore, latitude transects through all 7 gauges show similar inundation west and east of these sites.

The more likely though not compliant source `CSZ_M1` did produce up to 3 feet of inundation near the edge of the I-Street Parking lot as seen in Figure 46 and up to 1.55 feet behind the McDermoth Elementary School as seen in Figure 60. Also, since `CSZ_M1` has less subsidence that the `CSZ_L1-extended-pmel` source, only the eastern edge of the I-Street parking lot had a post-quake bathymetry B less than the background sealevel as shown in Figure 24. The smallest B seen in this I-StreetParking footprint was $B = -1.05$ ft. This is good news, since most of the footprint area of even the I-Street parking lot will be dry after the tsunami recedes for the `CSZ_M1` tsunami. Pictures across the footprints studied that are not included in this report are available on the project website [15]

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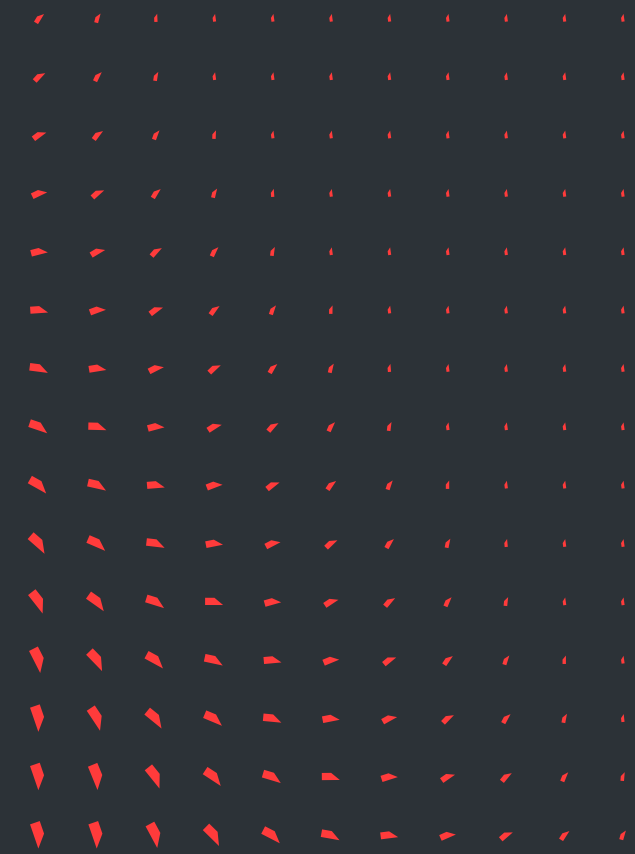
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TCF

IX. Meeting Minutes



Pre-Application Meeting

Date: 2025-06-05

Project Name: Aberdeen SD – Harbor Learning Center
TCF Architecture Project Number: 2025-001

Agenda Items:

Item #	Discussion Topic	Notes/Coordination	Direction/Instruction/Concern
1. Introductions			
1.1	**General Introduction**	• Team introduction	•

1.2	**Project Overview**	• Description of the project
		• Alternative school with primary and secondary school aged kids in multiple school programs
		  ○ Bus drop off at the high school if needed
		  ○ Most kids are dropped off or drive
		  ○ Kids arrive at different times (not a traditional school program)
		• The school is assumed to be a steel framed, two story building, roughly 46,000 SF.
		• Project scheduling
			•

2. Project Overview			

2.1	**Project Overview**	• Description of the project
		• Alternative school with primary and secondary school aged kids in multiple school programs
		  ○ Bus drop off at the high school if needed
		  ○ Most kids are dropped off or drive
		  ○ Kids arrive at different times (not a traditional school program)
		• The school is assumed to be a steel framed (type II-B), two story building, roughly 46,000 SF.
		• Project scheduling
			•

2.2	**Schematic Design Schedule**	• School is being funded via OSPI grant schedule will need to depend on funding dispersal. Grant funding is on a need basis and award dates are not confirmed.
		• Best available data –
		  ○ **Permit submittals Mid March of 2026**
		  ○ **Bidding August of 2026**
		  ○ **Construction September 2026 to Feb 2028**
			• Funding is through phases, which will lengthen the timeline; code changes may occur in the interim
			•

2.3	**Permitting**	• Can you review the standard city permitting process with us?	• Lisa Scott: start with Site Development permit first; RoW/public works permit; everything is online • Nick Bird: stormwater management (2024 Manual) is usually where people get hung up • Ross Jarvis: stormwater management pre-app meeting

			• Payment: invoice then check payment
3. Planning Discussions			
3.1	**Zoning**	• Per zoning map dating 2024-10-24, the school is within Civic zone. Is this correct?	• Zoning map is correct • Zoning code will be reflected in AMC by end of month • Other sites: zoning map will change to adapt to site selection
3.2	**Parking Needs**	• School buildings are not a listed category. Can we ask for "Director decision" per 17.65.040? • Can you confirm the best means to establish the parking requirements given the many uses of the school. • Is counting on-street parking acceptable? • Are there any screen requirements for the parking between the zoning adjacent the site? ○ Do typical requirements apply to this type of unique school program or would this be a good candidate for the director decision of parking counts	• Lisa Scott: Director decision is needed. Include high school; treat everything as an entire campus. • Andrew Hickman: the scenario is more complex and will require further study. TCF will work with the Dept • Lisa Scott: parking on vacated street not considered on-street
3.3	**Design Standards**	• **Building Design:** Per 17.63.010, a public building may be exempted from building massing and articulation standards (17.62.020). Is this a safe assumption? ○ **Is there guidance available if this chapter applies** • **Landscape Buffers:** Can you review the municipal code requirements for landscape buffers at the site? • **Fencing:** Can you review fencing requirements? Maximum height?	• Lisa Scott: the spirit of the code is so no blank walls are there. Murals or basic design would suffice • Lisa Scott & Nick Bird: visibility is a consideration; fencing shall not create any visual blockage

3.4	**Survey**	• We are in the process of finalizing a survey of the proposed site. We suspect a small portion of the proposed site overlaps the Tsunami inundation zone.
		  ○ If it does overlap, would a lot line adjustment be feasible to portion off the portion of the Tsunami zone?
		  ○ Would a boundary adjustment prevent the additional structural design requirements necessary for a site in the inundation zone?
			• Lisa Scott: a simple boundary line adjustment can be made to move the school's lot outside of the inundation zone
			• David Sommer: southern half has liquifiable soil so will need piling; can explore soil improvement so shallow foundation can still be done

4. Engineering Standards			
4.1	**Traffic Impact Requirements**	• What will be required of a traffic impact study?	•

		○ The HLC has an existing school, will traffic count need to be done on the existing school as well as the proposed site?	
4.2	**Stormwater**	• We assume there will need to be stormwater retention onsite, and due to the constraints we are assuming this will be a vaulted condition. • Are there additional storm water requirements	• Ross Jarvis: Existing swale underneath new parking lot's extent (East of site); need to change to below-grade treatment system to release clean runoff; will submit to AHJ for review and counsel
4.3	**Street Improvements**	• Some street improvements are anticipated, can you review with the design team your assumptions for street improvement impacts? • Can you confirm the ROW standards and street section details you anticipate? • What are acceptable off-street parking configurations?	• Ross Jarvis: Sidewalk repair, pavement removal, curb cuts? • Andrew Hickman: current site improvement plan shows 'worst case scenario' for budgetary and cost estimating purposes; the reality may require much less • Nick Bird: sidewalk all around to be accessible
4.4	**Accessible/Safe Routes**	• Are there city initiatives such as safe routes or accessibility requirements that we should be aware of that would impact development of offsite items, such as upgrading sidewalks and crossing beyond the immediate site?	• Nick Bird: ADA transition plan underway; additional ramps to be reviewed but nothing major yet
4.5	**Utility**	• Can you confirm the site utility purveyors? • Trash/waste service: Can you confirm the waste service requirements for enclosures? Are there any unique requirements such as a protected sanitary drain? • **Grease interceptors**: The school district is planning on using a central kitchen off-site and food delivery for meals. There will be some onsite specialty cooking for school preps (snack prep and snack bar stuff). What would trigger the requirement for grease interception? Is there a suggested design if this is required? • Service Yard / Mechanical Equipment: Type B landscape buffer	• Dave: 6" line on 8th street w/ line cap on I street; worst case can connect to Broadway for volume • Nick Bird: closest 12" line is 4th st & G st • Ross Jarvis: planning for water from 8th street but can tweak to adapt • Lisa Scott: trash enclosure only needs to be blocked from view; no screening required for roof equipment • Nick Bird: even only food warming takes place, if dishwashing equipment is used then grease traps are needed; can size down according to the calculated quantity • Eric Nordlund: might need several smaller grease

			interceptors; will connect w/ Nick Bird for discussion • Lisa Scott: will review regulations RE: landscape buffer
4.6	**Orientation**	• Current address is on 5th street, but the front of the new building seems reasonable to be 4th street	• Lisa Scott: 3rd street may be considered to be front •
5. Landscape & Ecology			
4.1	**SEPA**	• Will the city be the lead agency for SEPA?	• Lisa Scott: city will oversee the process; the earlier the better to start the process • Andrew Hickman: might be prudent to wait till school congregates again after summer • Nick Bird: any change in traffic & transportation shall occur during off-school season
4.2	**Site**	• We know of a significant tree on the site, does this tree have any special status? ○ If yes would an arborist be required for study of this existing tree? • Are there any more tree retention requirements?	• Keeping the tree. An arborist will be consulted •
4.3	**Critical Areas/Biology**	• The site is a pre-existing building site (old high school building). Is there any known critical areas or biological habitats on or near the site that we would need to be aware of?	• Nothing for now

4.4	**Onsite planting requirements**	• Can you review your onsite planting requirements
		  ○ Parking areas
		  ○ Trash screening
		  ○ Building screening.
			•

6. Fire			
6.1	**Fire truck Access**	• What kind of truck access should we anticipate at the site do you need access to the rear of the building or would street access be adequate? • Are there any unique gate requirements if a vehicle gate is used? (operable opti-com system, etc)	• Ryan Knodel: NE corner might be problematic due to hillside • Current water pressure on the street presents to problem
6.2	**Site**	• What additional hydrants would you anticipate • How is DAS signal in this area?	• Ryan Knodel: Hydrant on I street • JR Mill: FDC likely at NW corner of building

Lisa Scott: what's the estimated overall cost of the project?
Andrew Hickman: planning on 500sf, but the site improvement costs extra of that. Total cost will go down as the project moves along

MEETING MINUTES

TCF

Design Team Meeting #1

Date: 5/15/5

Project Name: Harbor Learning Center

Attendance:

Present	Name	Representing	Email
X	Steve Wachtler	TCF Architecture	stevew@tcfarchitecture.com
X	Daniel Vu	TCF Architecture	danielv@tcfarchitecture.com
X	Teta Brown	TCF Architecture	teta@tcfarchitecture.com
X	Andrew Hickman	TCF Architecture	andrew@tcfarchitecture.com
X	Eric Nordlund	Metrix Engineering	ericn@metrixeng.com
	Harrison Liao	Metrix Engineering	HarrisonL@metrixeng.com
X	Ben Prehoda	Metrix Engineering	benp@metrixeng.com
X	David Sommer	Degenkolb	dsommer@degenkolb.com
	Dan Sloat	Degenkolb	dsloat@degenkolb.com
X	Brent Hall	Clevenger	brent@clevengerassoc.com
X	Luke Vannice	Site Workshop	lukev@siteworkshop.net
	Clayton Beaudoin	Site Workshop	claytonb@siteworkshop.net
	Aimee Rozier	Site Workshop	aimeer@siteworkshop.net
	Arinze Okammor	Tenor Engineering	arinze.o@tenor-eng.com
X	Ross Jarvis	LDC	rjarvis@LDCcorp.com
	Dani Ittner	Nexus BEC	dittner@nexusbec.com
X	Ian Cummings	Nexus BEC	icummings@nexusbec.com

Item #	Discussion Topic	Notes/Coordination
1.1	**Welcome & Introductions**	• Opening Remarks • Team Introductions • FYI Thursday is Hawaiian shirt day.
1.2	**Project Overview**	• State OSPI seismic grant funding has been impacted by budget issues. • Project is currently funded for Schematic Design (SD) only. • Further funding will be evaluated by the OSPI Seismic Committee. • **Proceed using the 2021 Building Code. With the possibility of using the 2024 code the approval of the project should be delayed next fall.** • **TCF is finalizing contracts and will issue soon.**
1.3	**Project Schedule**	• Project Schedule Key Dates: ○ Design Team Kickoff Meeting: **May 15, 2025** (Bi-weekly schedule on Thursdays) ○ OPR Kick-Off Meeting: **May 22, 2025** ○ WSSP Kick-Off Meeting: **May 29, 2025** ○ 65% SD Progress Set for QA/QC: **June 30, 2025** ○ SEPA Checklist Submission to ASD: **July 9, 2025** ○ 95% SD Progress Set for Value Engineering (VE) by Sazan: **August 8, 2025** ○ VE Review Completion: **September 5, 2025** ○ 100% SD Drawings and Report Submission: **September 24, 2025**

		• Design Advisory Committee (DAC) Meetings:
		  ○ DAC Meeting #3: Review Site & Floor Plan Concepts - **May 21, 2025**
		  ○ DAC Meeting #4: Review Massing & Exterior Appearance - **June 4, 2025**
		  ○ DAC Meeting #5: Design Update Check-in - **Late June (Before Summer)**

2.1	**Documentation Expectations**	• This project will follow a traditional Design-Bid-Build (DBB) delivery method. • Documentation must be accurate and clearly defined to set expectations for low bidders.

2.2	**BIM Execution Plan**	• BIM Execution Plan Overview (Delivered by Daniel Vu - Technical BIM Lead)
		  ○ Roles and Responsibilities
		  ○ Coordination Procedures and Communication Tools
		  ○ Model Management (SD Phase Only - No Clash Detection)
		• **Amy Rozier for Landscape CAD**

3.1	**District Standards for Materials and Systems**	• Goal: Establish viable district standards for architectural, mechanical, and electrical systems. • OPR and WSSP evaluations to establish mechanical and electrical standards.
3.2	**Educational Specifications (Ed Specs)**	• Program Requirements and Priorities • Space Types and Configurations • Design Intent and Functionality
3.3	**Coordination**	• Role Clarification and Communication Protocols • Key Contacts and Responsibilities • Coordination Meetings (Design Team, CLT, DAC) • Model Sharing (As-Needed for SD Phase) • Use smart sheet for issues tracking. Link to coordination smartsheet. • Bluebeam for drawing coordination.

3.4	**Quality Control and Value Engineering**	• 65% SD Progress Set for QA/QC Review
		  ○ Review Process and Feedback
		• 95% SD Progress Set for Value Engineering (VE)
		  ○ VE to be Conducted by Sazan

4.1	**Civil**	• Existing as-builts of the site. Identify potential buried structure in the design. Identify if any risk to the owner. • **As-Builts were obtained by TCF.** • Site Survey. • **Survey is under LDC contract and is in progress for updates. Updates to include utility locates.** • **Site and zoning requirements were revised in November 2024 and we are using the new guidelines.** • Onsite stormwater retention? • **North site 1 retention design has been done during predesign and were noted to allow the site to be subdivided.**

		• Traffic – When to do a traffic study? • **When school starts again. There is no expiration of traffic information.** • Civil Discussion Items. • **Is Geotech sufficient? Design team to review the existing Geotech report and determine if their needs to be any additional study.** • **Typical bus parking will be shared with the high school, but parking will be needed to pick up and drop off for special trips.** • **Over ex may be needed to make the structural straightforward.** • **Need to evaluate the best economical solution to either over-ex or provide additional structure. LDC to verify over ex quantity for evaluation.**

4.2	**Landscape**	• Site activities:
		  ○ Daycare play areas.
		  ○ High school aged amenities.
		• Landscape Discussion Items.
		
		• **Basketball courts outdoors were discussed during pre-design.**
		• **Synthetic turf was not estimated during pre-design.**
		• **Luke requested a site coordination meeting next week. TCF to propose a time next week to discuss the site.**

4.3	**Architecture**	• ED Spec Adjacencies. • Drawing Presentation. • **(2) Schemes being presented, TCF to share via a bluebeam session on 5/15/2025** • Prepping for a type 2B building unless compelling evidence dictates otherwise. • Prep for upcoming DAC meeting. • **TCF to add North site 1 survey to its list of distributed drawings.**
4.4	**Structure**	• Assume a type 2-B non-combustible building to achieve the goals of seismic resilience and to meet budget. • **Tsumani event – If the lot is in an inundation zone then the building must be designed to resist a tsunami event.** • **Would need to propose to remove the portion of the lot that has the zone elevation?** • **Seismic joint at the gym may need to be done due to the stiffness of the gym.** • Structural discussion items.

4.5	**Food Service**	• Food service operations.
		  ○ District standard kitchen operations.
		  ○ Life skills classroom. (residential appliances – need coordination assistance)
		  ○ Student store. (residential appliances – need coordination assistance)
		• **Need to verify if a grease interceptor or trap needed for the project.**
		• **Need to verify if a hood is needed for warming kitchen.**
		• **Need to walk the existing high school – needs a meeting with meal counts and choices. Needs to meet with the district to understand needs.**
		• **Brent is available on the 22nd for a meeting with the district for food service standards, TCF to verify with the district for availability.**
		• Open discussion items.

4.6	**Mechanical**	• Need to establish District Standards • Prep for upcoming OPR and WSSP

		○ Do the dates work for OPR and WSSP ○ Propose an agenda for the OPR. Confirm required attendees. • Confirm feasibility for concept plans for DOAs and central mechanical. • Mechanical discussion • **Need to verify grease interceptor at the life-skills lab as well.** • **Will need to coordinate grease interceptor discussion.** • **Metrix to propose an OPR agenda.** • **Need to verify chemical gas and air needs for specialty science room.** • **With enough C406 credits you could use Natural Gas boilers.** • **Need C406 choice matrix to determine possible credit outcomes, TCF to share credit matrix.**
4.7	**Electrical**	• Need to establish District Standard • Prep for upcoming OPR and WSSP • Confirm feasibility for concept plans. • Electrical discussion. • **Need EV charging for designated staff – Need staffing count to determine. TCF to determine and provide the staffing count for HLC.** • **Establish DAS routing and solar zones, roof plan would be required, TCF to share as soon as it is able to.** • **Site visit and utility evaluation early on will need to establish the local utility providers.** • **Specialty lighting was not estimated, so any additional specialty lighting will be considered as a design option until the SD estimate is reviewed.**
4.8	**Acoustical**	• Site survey for noise issue. • **Need to schedule site acoustical study for a few days. Need to review with owner. 3-day weekend. TCF to coordinate 3 days where site microphones can be placed for the collection of sound data**
4.9	**Envelope**	• Review the product matrix (TCF is finalizing a product matrix with district standard products) • **TCF to proved the district preferred roof system product to Nexus.** • **District prefers sloped roofs.** • **High grade conditions on the north end of the site, Nexus to receive a copy of the Geotech report.** • **Will not seek enhanced air-barrier C406 credit.**
4.10	**Agency**	• Preapplication schedule with the city. ○ Confirm attendance for the initial pre-app with the city. ○ Civil, Arch, ESD112, Owner, Landscape, structural. • **TCF to schedule preapplication with city planner.**
5.1	**Next Steps and Action Items**	• Confirm Upcoming Meetings and Coordination Milestones • OPR Coordination is the next large milestone (May 22, 2025), followed by the WSSP (May 29, 2025). • Finalized Floor Plan Concept expected by May 21, 2025.
5.2	**Next Meeting Date**	• Scheduled for 5/29 – WSSP Kick-off meeting

MEETING MINUTES

TCF

Design Team Meeting #2

Date: 5/29/25

Project Name: Harbor Learning Center

Attendance:

Present	Name	Representing	Email
	Steve Wachtler	TCF Architecture	stevew@tcfarchitecture.com
	Daniel Vu	TCF Architecture	danielv@tcfarchitecture.com
	Teta Brown	TCF Architecture	teta@tcfarchitecture.com
	Andrew Hickman	TCF Architecture	andrew@tcfarchitecture.com
	Eric Nordlund	Metrix Engineering	ericn@metrixeng.com
	Harrison Liao	Metrix Engineering	HarrisonL@metrixeng.com
	Ben Prehoda	Metrix Engineering	benp@metrixeng.com
	David Sommer	Degenkolb	dsommer@degenkolb.com
	Dan Sloat	Degenkolb	dsloat@degenkolb.com
	Brent Hall	Clevenger	brent@clevengerassoc.com
	Luke Vannice	Site Workshop	lukev@siteworkshop.net
	Clayton Beaudoin	Site Workshop	claytonb@siteworkshop.net
	Aimee Rozier	Site Workshop	aimeer@siteworkshop.net
	Arinze Okammor	Tenor Engineering	arinze.o@tenor-eng.com
	Ross Jarvis	LDC	rjarvis@LDCcorp.com
	Dani Ittner	Nexus BEC	dittner@nexusbec.com
	Ian Cummings	Nexus BEC	icummings@nexusbec.com

Item #	Discussion Topic	Notes/Coordination
1.1	**Welcome & Introductions**	
1.2	**Project Overview**	• Proceed using the 2021 Building Code. With the possibility of using the 2024 code the approval of the project should be delayed next fall. • **Contract Updates** • **Contract for intercom updates to be executed by the OPR meeting on June 4th to discuss those projects during OPR.**
1.3	**Project Schedule**	• Project Schedule Key Dates: ○ Design Team Kickoff Meeting: **May 15, 2025** (Bi-weekly schedule on Thursdays) ○ OPR Kick-Off Meeting: **June 4th, 2025** ○ City Preapplication Tentative June 6th, 2025 ○ WSSP Kick-Off Meeting: **May 29, 2025** ○ 65% SD Progress Set for QA/QC: **June 30, 2025** ○ SEPA Checklist Submission to ASD: **July 9, 2025** ○ 95% SD Progress Set for Value Engineering (VE) by Sazan: **August 8, 2025** ○ VE Review Completion: **September 5, 2025** ○ 100% SD Drawings and Report Submission: **September 24, 2025** • Design Advisory Committee (DAC) Meetings:

		○ DAC Meeting #3: Review Site & Floor Plan Concepts - **May 21, 2025** ○ DAC Meeting #4: Review Massing & Exterior Appearance - **June 4, 2025** ○ DAC Meeting #5: Design Update Check-in – **CAN HAPPEN DURING SUMMER.**
2.1	**BIM Execution Items**	• Questions/Feedback regarding BIM Execution • CAD updates and BIM updates out from TCF today.
3.1	**District Standards for Materials and Systems**	• OPR Meeting is scheduled for 6/4
3.2	**Educational Specifications (Ed Specs)**	• Ed Spec coordination questions?
3.3	**Coordination**	• All should have access to bluebeam and Smartsheet. • Preapplication meeting was requested from the city. ○ Will request engineering, fire, and planning at minimum for discussion. • Review Smartsheet items. • Review WSSP Items
3.4	**Quality Control and Value Engineering**	
4.1	**Civil**	• As-Builts were obtained by TCF. • Site Survey. ○ Site survey update planned to be issued this week with utility locates. • Onsite stormwater retention? ○ North site 1 retention design has been done during predesign and were noted to allow the site to be subdivided. • Traffic survey ○ Traffic study to be planned for the fall. • Civil Discussion Items. ○ Is Geotech sufficient? Design team to review the existing Geotech report and determine if their needs to be any additional study. ○ Typical bus parking will be shared with the high school, but parking will be needed to pick up and drop off for special trips. ○ Over ex may be needed to make the structural straightforward. ○ Need to evaluate the best economical solution to either over-ex or provide additional structure. LDC to verify over ex quantity for evaluation.
4.2	**Landscape**	• Site activities: ○ Daycare play areas. ○ High school aged amenities. • Landscape Discussion Items.

		• Basketball courts outdoors were discussed during pre-design. • Synthetic turf was not estimated during pre-design. • Site coordination meeting occurred between Civil and Landscape.
4.3	**Architecture**	• Prepping for a type 2B building unless compelling evidence dictates otherwise. • TCF to add North site 1 survey to its list of distributed drawings.

4.4	**Structure**	• Assume a type 2-B non-combustible building to achieve the goals of seismic resilience and to meet budget.
		• Tsumani event – If the lot is in an inundation zone then the building must be designed to resist a tsunami event.
		• Would need to propose to remove the portion of the lot that has the zone elevation?
		• Seismic joint at the gym may need to be done due to the stiffness of the gym.
		• Structural discussion items.
		  ○ **No possible seismic joint. Needs to review.**
		  ○ **Need to meet and review the type 2-B choice.**

4.5	**Food Service**	• Food service operations.
		  ○ District standard kitchen operations.
		  ○ Life skills classroom. (residential appliances – need coordination assistance)
		  ○ Student store. (residential appliances – need coordination assistance)
		• Need to verify if a grease interceptor or trap needed for the project.
		• Need to verify if a hood is needed for warming kitchen.
		• Need to walk the existing high school – needs a meeting with meal counts and choices. Needs to meet with the district to understand needs.
		• Brent is available on the 22nd for a meeting with the district for food service standards, TCF to verify with the district for availability.
		• Open discussion items.
		• **Met with Jamie onsite**
		• **Oven and cooking at school – Need a hood.**
		• **Need to review with fire regarding hood requirements.**

4.6	**Mechanical**	• Need to verify grease interceptor at the life-skills lab as well. • Will need to coordinate grease interceptor discussion. • Need to verify chemical gas and air needs for specialty science room. • With enough C406 credits you could use Natural Gas boilers. • Need C406 choice matrix to determine possible credit outcomes, TCF to share credit matrix.
4.7	**Electrical**	• Need EV charging for designated staff – Need staffing count to determine. TCF to determine and provide the staffing count for HLC. • Establish DAS routing and solar zones, roof plan would be required, TCF to share as soon as it is able to. • Site visit and utility evaluation early on will need to establish the local utility providers. • Specialty lighting was not estimated, so any additional specialty lighting will be considered as a design option until the SD estimate is reviewed. • **Generator needed for the site** ○ **Need to verify duration.**

4.8	**Acoustical**	• Site survey for noise issue. ○ Tenor has reviewed the site. **Data to be analyzed.**
4.9	**Envelope**	• Review the product matrix (TCF is finalizing a product matrix with district standard products) • TCF to proved the district preferred roof system product to Nexus. • District prefers sloped roofs. • High grade conditions on the north end of the site, Nexus to receive a copy of the Geotech report. • Will not seek enhanced air-barrier C406 credit. **TCF to get information to Nexus**

4.10	**Agency**	• Preapplication schedule with the city.
		  ○ Confirm attendance for the initial pre-app with the city.
		  ○ Civil, Arch, ESD112, Owner, Landscape, structural.
		• TCF to schedule preapplication with city planner.

5.1	**Next Steps and Action Items**	• Confirm Upcoming Meetings and Coordination Milestones • OPR Coordination is the next large milestone (June 6th, 2025), followed by the WSSP (May 29, 2025).
5.2	**Next Meeting Date**	• **Scheduled for 6/12 – Massing and 3d Modeling**

MEETING MINUTES

TCF

Design Team Meeting #3

Date: 6/12/25

Project Name: Harbor Learning Center

Attendance:

Present	Name	Representing	Email
	Steve Wachtler	TCF Architecture	stevew@tcfarchitecture.com
	Daniel Vu	TCF Architecture	danielv@tcfarchitecture.com
	Teta Brown	TCF Architecture	teta@tcfarchitecture.com
	Andrew Hickman	TCF Architecture	andrew@tcfarchitecture.com
	Eric Nordlund	Metrix Engineering	ericn@metrixeng.com
	Harrison Liao	Metrix Engineering	HarrisonL@metrixeng.com
	Ben Prehoda	Metrix Engineering	benp@metrixeng.com
	David Sommer	Degenkolb	dsommer@degenkolb.com
	Dan Sloat	Degenkolb	dsloat@degenkolb.com
	Brent Hall	Clevenger	brent@clevengerassoc.com
	Luke Vannice	Site Workshop	lukev@siteworkshop.net
	Clayton Beaudoin	Site Workshop	claytonb@siteworkshop.net
	Aimee Rozier	Site Workshop	aimeer@siteworkshop.net
	Arinze Okammor	Tenor Engineering	arinze.o@tenor-eng.com
	Ross Jarvis	LDC	rjarvis@LDCcorp.com
	Dani Ittner	Nexus BEC	dittner@nexusbec.com
	Ian Cummings	Nexus BEC	icummings@nexusbec.com

Item #	Discussion Topic	Notes/Coordination
1.3	**Project Schedule**	• Project Schedule Key Dates: ○ Design Team Kickoff Meeting: **May 15, 2025** (Bi-weekly schedule on Thursdays) ○ OPR Kick-Off Meeting: **June 4th, 2025** ○ City Preapplication Tentative June 6th, 2025 ○ WSSP Kick-Off Meeting: **May 29, 2025** ○ 65% SD Progress Set for QA/QC: **June 30, 2025** ○ SEPA Checklist Submission to ASD: **July 9, 2025** ○ 95% SD Progress Set for Value Engineering (VE) by Sazan: **August 8, 2025** ○ VE Review Completion: **September 5, 2025** ○ 100% SD Drawings and Report Submission: **September 24, 2025** • Design Advisory Committee (DAC) Meetings: ○ DAC Meeting #3: Review Site & Floor Plan Concepts - **May 21, 2025** ○ DAC Meeting #4: Review Massing & Exterior Appearance - **June 4, 2025** ○ **DAC Meeting #5: Design Update Check-in – Tentative date June 25th 1:30-3:00pm.**
2.1	**BIM Execution Items**	
3.1	**District Standards for Materials and Systems**	• **OPR Meeting Update schedule during this meeting.**

3.2	**Educational Specifications (Ed Specs)**	
3.4	**Quality Control and Value Engineering**	

4.1	**Civil**	• Onsite stormwater retention
		  ○ North site 1 retention design has been done during predesign and were noted to allow the site to be subdivided.
		• Traffic survey
		  ○ Traffic study to be planned for the fall.
		• Civil Discussion Items.
		  ○ Is Geotech sufficient? Design team to review the existing Geotech report and determine if their needs to be any additional study.
		  ○ Typical bus parking will be shared with the high school, but parking will be needed to pick up and drop off for special trips.
		  ○ Over ex may be needed to make the structural straightforward.
		  ○ Need to evaluate the best economical solution to either over-ex or provide additional structure. LDC to verify over ex quantity for evaluation.
		• **Site Survey.**
		  ○ **Site survey update planned to be issued this week with utility locates.**
		• **Site Parking**
		  ○ **Assumptions for parking is to target 154 stalls. Any more then that will require an adequate and logical reason to present to the city planning office.**
		  ○ **Need to review the parent drop off area for turning radius.**
		• **Building Location**
		  ○ **Coordination with moving the building north in order to allow for more room on parent drop off.**
		• **SEPA Timing**
		  ○ **Will need to prep for the submittal in early October due to the traffic report.**
		• **Tsunami Location**
		  ○ **Ross to coordinate with the known information to establish if the inn**

4.2	**Landscape**	• Site activities:
		  ○ Daycare play areas.
		  ○ High school aged amenities.
		• Basketball courts outdoors were discussed during pre-design.
		• Synthetic turf was not estimated during pre-design.
		• **Site Parking**
		  ○ **Current AMC notes 10% planting areas, 10’ width min planters, and buffers.**
		  ○ **Need to confirm if landscape requirements will be triggered for the existing site.**
		  ○ **Plan sketch received a pedestrian pathway.**

4.3	**Architecture**	• Prepping for a type 2B building unless compelling evidence dictates otherwise. • TCF to add North site 1 survey to its list of distributed drawings.

		• **Floor Plan updates**
		  ○ **TCF is refining the current floor plan, an updated version with minor room tweaks will be issued soon.**
		• **Building Massing**
		  ○ **TCF is proceeding with concepts for the building massing targeting 6/25 DAC meeting.**

4.4	**Structure**	• Assume a type 2-B non-combustible building to achieve the goals of seismic resilience and to meet budget.
		• Tsumani event – If the lot is in an inundation zone then the building must be designed to resist a tsunami event.
		• Would need to propose to remove the portion of the lot that has the zone elevation?
		• Seismic joint at the gym may need to be done due to the stiffness of the gym.
		• **Structural Grids**
		  ○ **Need to meet in order to coordinate potential grid locations.**
		• **Building Construction type**
		  ○ **Feedback provided to TCF on the structural evaluation worksheet.**
		  ○ **Consensus of data points direct to type II-B**
		  ○ **Would like to explore some possible heavy timber used in the interior.**

4.5	**Food Service**	• Food service operations.
		  ○ District standard kitchen operations.
		  ○ Life skills classroom. (residential appliances – need coordination assistance)
		  ○ Student store. (residential appliances – need coordination assistance)
		• Need to verify if a hood is needed for warming kitchen.
		• Met with Jamie onsite
		• Oven and cooking at school – Need a hood.
		• Need to review with fire regarding hood requirements.
		• **Kitchen Background received, TCF to modify and include small storage closet.**
		• **Need to verify if a grease interceptor or trap needed for the project.**
		  ○ **Per preapplication an interceptor was suggested by the city engineer – Noted the existing of a dishwasher. Metrix to propose a design.**

4.6	**Mechanical**	• Need to verify grease interceptor at the life-skills lab as well. • Need to verify chemical gas and air needs for specialty science room. • With enough C406 credits you could use Natural Gas boilers. • Need C406 choice matrix to determine possible credit outcomes, TCF to share credit matrix. • **OPR meeting to be finished on 6/12** • **Grease Interceptor.** ○ **Grease interceptor was suggested by AHJ, Metrix to provide a design suggestion ot the city engineer.**
4.7	**Electrical**	• Need EV charging for designated staff – Need staffing count to determine. TCF to determine and provide the staffing count for HLC. • Establish DAS routing and solar zones, roof plan would be required, TCF to share as soon as it is able to. • Site visit and utility evaluation early on will need to establish the local utility providers.

		• Specialty lighting was not estimated, so any additional specialty lighting will be considered as a design option until the SD estimate is reviewed. • Generator needed for the site ○ Need to verify duration. • **OPR meeting to be finished on 6/12**

4.8	**Acoustical**	• Site survey for noise issue.
		  ○ Tenor has reviewed the site.
		  ○ **Onsite field report status**

4.9	**Envelope**	• Review the product matrix (TCF is finalizing a product matrix with district standard products) • TCF to proved the district preferred roof system product to Nexus. • District prefers sloped roofs. • High grade conditions on the north end of the site, Nexus to receive a copy of the Geotech report. • Will not seek enhanced air-barrier C406 credit. **TCF to get information to Nexus**

4.10	**Agency**	• Preapplication schedule with the city.
		  ○ Confirm attendance for the initial pre-app with the city.
		  ○ Civil, Arch, ESD112, Owner, Landscape, structural.
		• TCF to schedule preapplication with city planner.
		• **Pre application meeting on 6/6 – Updates out of the meeting?**

5.1	**Next Steps and Action Items**	• OPR Coordination is the next large milestone (June 6th, 2025), followed by the WSSP (May 29, 2025).
5.2	**Next Meeting Date**	• **Scheduled for 6/12 – Massing and 3d Modeling**

MEETING MINUTES

TCF

Design Team Meeting #4

Date: 6/26/25

Project Name: Harbor Learning Center

Attendance:

Present	Name	Representing	Email
	Steve Wachtler	TCF Architecture	stevew@tcfarchitecture.com
	Daniel Vu	TCF Architecture	danielv@tcfarchitecture.com
	Andrew Hickman	TCF Architecture	andrew@tcfarchitecture.com
	Eric Nordlund	Metrix Engineering - Mech	ericn@metrixeng.com
	Ben Prehoda	Metrix Engineering - Elec	benp@metrixeng.com
	Donald Le	Metrix Engineering - Elec	donaldl@metrixeng.com
	Harrison Liao	Metrix Engineering - Elec	HarrisonL@metrixeng.com
	David Sommer	Degenkolb	dsommer@degenkolb.com
	Josh Sizemore	Degenkolb	jsizemore@degenkolb.com
	Brent Hall	Clevenger	brent@clevengerassoc.com
	Luke Vannice	Site Workshop	lukev@siteworkshop.net
	Clayton Beaudoin	Site Workshop	claytonb@siteworkshop.net
	Aimee Rozier	Site Workshop	aimeer@siteworkshop.net
	Arinze Okammor	Tenor Engineering	arinze.o@tenor-eng.com
	Ross Jarvis	LDC	rjarvis@LDCcorp.com
	Dani Ittner	Nexus BEC	dittner@nexusbec.com
	Ian Cummings	Nexus BEC	icummings@nexusbec.com

Item #	Discussion Topic	Notes/Coordination
1.3	**Project Schedule**	• Project Schedule Update: Updated Design Schedule Issued with Meeting Agenda. • Project Schedule Key Dates: ○ Design Team Kickoff Meeting: **May 15, 2025** (Bi-weekly schedule on Thursdays) ○ OPR Kick-Off Meeting: **June 4th, 2025** ○ City Preapplication Tentative June 6th, 2025 ○ WSSP Kick-Off Meeting: **May 29, 2025** ○ 65% SD Progress Set for QA/QC to TCF: ~~**June 30, 2025**~~ **July 09, 2025** ○ 65% SD Progress Set to ASD: ~~**July 3, 2025**~~ **July 11, 2025** ○ 95% SD Progress Set for Value Engineering (VE) by Sazan to TCF: **August 8, 2025** ○ VE Review Completion: **September 5, 2025** ○ 100% SD Drawings and Report Submission: **September 24, 2025** • Design Advisory Committee (DAC) Meetings: ○ **DAC Meeting #5: Design Update Check-in – June 25th 1:00-3:00pm.** ○ **DAC Meeting #6: Design Update Check-in – TBD**
2.1	**BIM Execution Items**	• **Infrequent model sharing schedule due to rapid changes** • **New massing directive after DAC #5** • **Bluebeam session is always getting updates – consultants to leverage to fullest extent and feel free to make comments**

3.1	**District Standards for Materials and Systems**	• **OPR Meeting Update from MEP Team.** • **Confirm next OPR Meeting Time.** • **Draft OPR distributed to ASD.**
3.4	**Quality Control and Value Engineering**	• TCF to Start QC on 65% Set. • TCF review comments to Design Team on 7/23

4.1	**Civil**	• Onsite stormwater retention
		  ○ North site 1 retention design has been done during predesign and were noted to allow the site to be subdivided.
		• Traffic survey
		  ○ Traffic study to be planned for the fall.
		• Civil Discussion Items.
		  ○ Is Geotech sufficient? Design team to review the existing Geotech report and determine if their needs to be any additional study.
		  ○ Typical bus parking will be shared with the high school, but parking will be needed to pick up and drop off for special trips.
		  ○ Over ex may be needed to make the structural straightforward.
		  ○ Need to evaluate the best economical solution to either over-ex or provide additional structure. LDC to verify over ex quantity for evaluation.
		• **Site Survey.**
		  ○ **Site survey update with utility locations**
		• **Site Parking**
		  ○ **Assumptions for parking is to target 154 stalls. Any less than that will require an adequate and logical reason to present to the city planning office.**
		  ○ **Need to review the parent drop off area for turning radius.**
		• **Building Location**
		  ○ **Coordination with moving the building north in order to allow for more room on parent drop off. In this scenario the building will be located 5' north @ FFE 25.09 (previously assumed to be 26.75). This option would give more latitude for parking, drop-off, drive aisle, as well as site accessibility**
		• **SEPA Timing**
		  ○ **Will need to prep for the submittal in early October due to the traffic report and funding/phase approval.**
		• **Tsunami Location**
		  ○ **LDC to coordinate with the known information to establish if the inundation zone affects the site.**
		  ○ **Maybe reasonable to overlay current map on to simulation map; even in case of tsunami we'd at worst deal with an inch or two of water**

4.2	**Landscape**	• Site activities:
		  ○ Daycare play areas.
		  ○ High school aged amenities.
		• Basketball courts outdoors were discussed during pre-design.
		• Synthetic turf was not estimated during pre-design.
		• **Site Parking**
		  ○ **Current AMC notes 10% planting areas, 10' width min planters, and buffers.**
		  ○ **Need to confirm if landscape requirements will be triggered for the existing site.**

		○ **Need to coordinate w/ Civil on ADA parking; some planting areas may have to make way for ADA walkway** ○ Plan sketch received with a pedestrian pathway. ○ **Review new driveway with 1-way approach; see if the pedestrian walkway still works; coordinate with Civil on parking count**
4.3	**Architecture**	• Prepping for a type II-B building unless compelling evidence dictates otherwise. • TCF to add North site 1 survey to its list of distributed drawings. • **Floor Plan updates** ○ **TCF is refining the current floor plan. Review updates.** ○ **Anticipate changes in roof form, Gym wall shift, and floor opening at main Vestibule** ○ **New model share by end of week (06/27)** • **Building Massing** ○ **Discuss DAC #5 outcome RE: massing**
4.4	**Structure**	• Assume a type II-B non-combustible building to achieve the goals of seismic resilience and to meet budget. • Tsumani event – If the lot is in an inundation zone then the building must be designed to resist a tsunami event. • Would need to propose to remove the portion of the lot that has the zone elevation? • Seismic joint at the gym may need to be done due to the stiffness of the gym. • **Structural Grids** ○ **Need to establish gridlines** ○ **Need to start a preliminary framing plan** • **Building Construction type** ○ Feedback provided to TCF on the structural evaluation worksheet. ○ Consensus of data points direct to type II-B ○ **Explore some possible heavy timber used in the interior.** ○ **Discuss braced frames & trusses; any exposed structure?** ○ **Type II-B so 0 fire rating as default; confirm slab thicknesses**
4.5	**Food Service**	• Food service operations. ○ District standard kitchen operations. ○ Life skills classroom. (residential appliances – need coordination assistance) ○ Student store. (residential appliances – need coordination assistance) • Need to verify if a hood is needed for warming kitchen. • Met with Jamie onsite • Oven and cooking at school – **Need a hood**. • Need to review with fire regarding hood requirements. • Kitchen Background received, TCF to modify and include small storage closet. • **Need to verify if a grease interceptor or trap needed for the project.** ○ **Per preapplication an interceptor was suggested by the city engineer – Noted the existence of dishwasher(s). Metrix to propose a design.** ○ **Possible to use portable grease traps for spaces with insignificant amount of waste?**
4.6	**Mechanical**	• Need to verify grease interceptor at the life-skills lab as well. • Need to verify chemical gas and air needs for specialty science room. • With enough C406 credits you could use Natural Gas boilers. • Need C406 choice matrix to determine possible credit outcomes, TCF to share credit matrix. • OPR meeting to be finished on 6/12

		• **Grease Interceptor.**
		  ○ **Grease interceptor was suggested by AHJ, Metrix to provide a design suggestion to the city engineer.**
		  ○ **May have several smaller ones per city's comment. – Verify if portable grease traps are acceptable (need people to dump often)**
		  ○ **Confirm Shaft location at second floor classroom.**
		  ○ **Confirm approach for louvers and locations/areas needed.**

4.7	**Electrical**	• Need EV charging for designated staff – Need staffing count to determine. TCF to determine and provide the staffing count for HLC. • Establish DAS routing and solar zones, roof plan would be required, TCF to share as soon as it is able to. • Site visit and utility evaluation early on will need to establish the local utility providers. **Metrix planning on a site visit this week** • Specialty lighting was not estimated, so any additional specialty lighting will be considered as a design option until the SD estimate is reviewed. • Generator needed for the site ○ Need to verify duration. • **Walk through room locations and sizes** • **TCF to share updated roof plan & floor plans, pending outcome of DAC #5** • OPR meeting to be finished on 6/12

4.8	**Acoustical**	• Site survey for noise issue.
		  ○ Tenor has reviewed the site.
		  ○ Onsite field report status
		  ○ **TCF to review the report and implement design direction.**
		  ○ **Tenor to review owner's WSSP concern and touch base with TCF**

4.9	**Envelope**	• Review the product matrix (TCF is finalizing a product matrix with district standard products) • TCF to proved the district preferred roof system product to Nexus. • District prefers sloped roofs. • High grade conditions on the north end of the site, Nexus to receive a copy of the Geotech report. • Will not seek enhanced air-barrier C406 credit. • TCF to get information to Nexus • **Exterior wall materials are getting fine-tuned. Outcome from DAC #5 will provide more information.** • **TCF to schedule kick-off meeting with Nexus.**
4.10	**Agency**	• Preapplication schedule with the city. • Confirm attendance for the initial pre-app with the city. • Civil, Arch, ESD112, Owner, Landscape, structural. • TCF to schedule preapplication with city planner. • Pre application meeting on 6/6. • **TCF to schedule follow-up meeting with City to discuss emergency vehicle access and review updated site plan.**
5.1	**Next Steps and Action Items**	• **Finalize OPR** • **65% Deliverables**

5.2	**Next Meeting Date**	• **Scheduled for 7/10/2025**

MEETING MINUTES

TCF

Design Team Meeting #5

Date: 7/10/25

Project Name: Harbor Learning Center

Attendance:

Present	Name	Representing	Email
	Steve Wachtler	TCF Architecture	stevew@tcfarchitecture.com
	Daniel Vu	TCF Architecture	danielv@tcfarchitecture.com
	Andrew Hickman	TCF Architecture	andrew@tcfarchitecture.com
	Eric Nordlund	Metrix Engineering - Mech	ericn@metrixeng.com
	Ben Prehoda	Metrix Engineering - Elec	benp@metrixeng.com
	Donald Le	Metrix Engineering - Elec	donaldl@metrixeng.com
	Harrison Liao	Metrix Engineering - Elec	HarrisonL@metrixeng.com
	David Sommer	Degenkolb	dsommer@degenkolb.com
	Josh Sizemore	Degenkolb	jsizemore@degenkolb.com
	Brent Hall	Clevenger	brent@clevengerassoc.com
	Luke Vannice	Site Workshop	lukev@siteworkshop.net
	Clayton Beaudoin	Site Workshop	claytonb@siteworkshop.net
	Aimee Rozier	Site Workshop	aimeer@siteworkshop.net
	Arinze Okammor	Tenor Engineering	arinze.o@tenor-eng.com
	Ross Jarvis	LDC	rjarvis@LDCcorp.com
	Dani Ittner	Nexus BEC	dittner@nexusbec.com
	Ian Cummings	Nexus BEC	icummings@nexusbec.com

Item #	Discussion Topic	Notes/Coordination
1.3	**Project Schedule**	• Project Schedule Update: Updated Design Schedule Issued with Meeting Agenda. • Project Schedule Key Dates: ○ **65% SD Progress Set for QA/QC to TCF: ~~June 30, 2025~~ July 09, 2025** ○ **65% SD Progress Set to ASD: ~~July 3, 2025~~ July 11, 2025** ○ 95% SD Progress Set for Value Engineering (VE) by Sazan to TCF: **August 8, 2025** ○ VE Review Completion: **September 5, 2025** ○ 100% SD Drawings and Report Submission: **September 24, 2025** • Design Advisory Committee (DAC) Meetings: ○ DAC Meeting #5: Design Update Check-in – June 25th 1:00-3:00pm. ○ **DAC Meeting #6: Design Update Check-in – July 16th – Interior Renderings**
2.1	**BIM Execution Items**	
3.1	**District Standards for Materials and Systems**	• **Draft OPR distributed to ASD. Draft OPR is scheduled to be issued to the district by 7/11 Friday.**
3.4	**Quality Control and Value Engineering**	• **TCF to Start QC on 65% Set.** ○ **Bluebeam session will be uploaded.** ○ **Critical coordination items will be logged on the Smartsheet coordination log for tracking.**

		○ **All QC comments will be provided to by Friday 7/18.** • **District to be provided a 2nd Bluebeam session for comments on the 65% Set. Their comments will be due by 7/25.**
4.1	**Civil**	• Traffic survey ○ Traffic study to be planned for the fall. ○ **First day of school is August 27th per the district calendar.** • Civil Discussion Items. ○ Is Geotech sufficient? Design team to review the existing Geotech report and determine if their needs to be any additional study. ▪ **An update was requested to ESD112 – There was a mention of providing a Geotech by the end of SD.** ○ Over ex may be needed to make the structural straightforward. ▪ **Geotech update will determine the exact amount. We should anticipate a couple of feet of over-ex. Can LDC confirm a conservative amount based on the existing report?** ○ Need to evaluate the best economical solution to either over-ex or provide additional structure. LDC to verify over ex quantity for evaluation. • **Site Survey.** ○ **Site survey update with utility locations** • **Site Parking** ○ Assumptions for parking is to target 154 stalls. Any less than that will require an adequate and logical reason to present to the city planning office. ○ **ADA stalls in the middle might be challenging – Review option of accessible stalls in the middle parking area.** ○ **Schedule a discussion w/ the City to get a clear direction on parking** ▪ **Meeting scheduled for 7/11.** • **Idea of trying to accommodate a pedestrian pathway from the east to west while still balancing parking counts.** • **Overall balance of compact vs. full size stalls** • **Locations of accessible parking** • **Landscape buffers** • **Building Location** • **SEPA Timing** ○ Will need to prep for the submittal in early October due to the traffic report and funding/phase approval. • **Tsunami Location** ○ **LDC to coordinate with the known information to establish if the inundation zone affects the site.** ○ Maybe reasonable to overlay current map on to simulation map; even in case of tsunami we'd at worst deal with an inch or two of water
4.2	**Landscape**	• **Site Parking** ○ **ADA parking**; some planting areas may have to make way for ADA walkway ○ **Pedestrian Pathway Routing: Need to coordinate may eliminate parking.** ○ Review new driveway with 1-way approach; see if the pedestrian walkway still works; coordinate with Civil on parking count

		○ **Landscape buffer needed for parking lot East of site** ○ **Will need screening wall at SE corner** ○ **Review the options of adding a pedestrian path through the site.**
4.3	**Architecture**	• **Floor Plan updates** ○ **TCF is refining the current floor plan. Review updates.** ▪ **Change in 2nd floor plan layout** ○ **New model share by end of week (06/27)** • **Building Massing** ○ Discuss DAC #5 outcome RE: massing ▪ **New BIM model distributed today.**
4.4	**Structure**	• Assume a type II-B non-combustible building to achieve the goals of seismic resilience and to meet budget. • Tsumani event – If the lot is in an inundation zone then the building must be designed to resist a tsunami event. ○ **Civil to identify a line of approach based on current information.** ○ Would need to propose to remove the portion of the lot that has the zone elevation? • Structural Grids • **Building Construction type** • **Preliminary Framing** ○ **TCF, Metrix, and, Degenkolb met to coordinate the structural framing systems on 7/8. Degenkolb is revising BRB locations and will issue revision for the 65% set.** • **Roof fall protection** ○ **Need to anticipate support of the fall protection via the structural system.**
4.5	**Food Service**	• **Food service operations.** ○ District standard kitchen operations. ○ Life skills classroom. (residential appliances – need coordination assistance) ○ Student store. (residential appliances – need coordination assistance) • **Kitchen Hoods** ○ Need to verify if a hood is needed for warming kitchen. ○ Oven and cooking at school – **Need a hood**. ○ Need to review with fire regarding hood requirements. ○ **Check w/ District if Type II hood is ok; check user's needs to see if ventless appliances are ok** • **Grease Interceptor** ○ **Per preapplication an interceptor was suggested by the city engineer – Noted the existence of dishwasher(s). Metrix to propose a design.** ○ **Possible to use portable grease traps for spaces with insignificant amount of waste?** • **Appliances** ○ **Gas or Electrical – Either is fine?**
4.6	**Mechanical**	• **Need to verify grease interceptor at the life-skills lab as well.**

		• **Science Room**
		  ○ Gas or Air Needs in the science room.
		• **WSEC**
		  ○ With enough C406 credits you could use Natural Gas boilers. **No GAS**
		  ○ Need C406 choice matrix to determine possible credit outcomes, TCF to share credit matrix. https://app.smartsheet.com/sheets/4w4VFPQfXphRwx73JqGcFXP4gpQGxHxwpxmwjfc1
		• **Grease Interceptor.**
		  ○ **Grease interceptor was suggested by AHJ, Metrix to provide a design suggestion to the city engineer.**
		  ○ **May have several smaller ones per city's comment. – Verify if portable grease traps are acceptable (need people to dump often)**
		  ○ **Confirm Shaft location at second floor classroom.**
		  ○ **Confirm approach for louvers and locations/areas needed.**
		  ○ **Grease interceptor location.**
		
		• **Attic**
		  ○ **Dormers could be done if moved away from ridgeline to leave enough room at Mech Attic**
		  ○ **Good w/ fan-coil unit (in mech attic); air-water heat pump**
		• **Kitchen exhausts – pending FS input**
		• **Shafts**
		  ○ **1 shaft per classroom to get down on 1st floor**
		  ○ **Shaft size & louvers to TCF**
		• **Backup water heaters: confirm gas or electric**
		
		• **Utility Yard**
		  ○ **Will need more area at Utility Yard**

4.7	**Electrical**	• Need EV charging for designated staff – Need staffing count to determine. TCF to determine and provide the staffing count for HLC.
		• **Establish DAS routing and solar zones, roof plan would be required, TCF to share as soon as it is able to.**
		• Site visit and utility evaluation early on will need to establish the local utility providers. **Metrix planning on a site visit this week**
		• Specialty lighting was not estimated, so any additional specialty lighting will be considered as a design option until the SD estimate is reviewed.
		• Generator needed for the site
		  ○ **Need to verify duration.**
		• **TCF to share updated roof plan & floor plans, pending outcome of DAC #5**
		• **Pole matching – the looks of lamps & fixtures might not be available, but matching height is fairly easy**
		
		• **Service Yard**
		  • **Transformer vs generator fuel tank: 20-25ft without separation, 5ft-ish w/ a cmu wall between**
		
		• **MDF 2hr rated for DAS unit – could do a small closet for it**
		  • **Propose a closet for the DAS system in lieu of 2 hour MDF room.**
		  • **2-hour conduit pathway vs. fire rated raceway?**

4.8	**Acoustical**	• Site survey for noise issue.
		  ○ **TCF to review the report and implement design direction.**
		  ○ **Tenor to review owner's WSSP concern and touch base with TCF**
		  ▪ **Assume a base Bid of IEQ 4.0**
		  ▪ **Provide estimator with written narrative for a design option to produce an IEQ 4.1 compliant building.**

4.9	**Envelope**	• **Exterior wall materials are getting fine-tuned. Outcome from DAC #5 will provide more information.** • **TCF to schedule kick-off meeting with Nexus.** ○ **TCF to provide updated envelope assemblies to Nexus on 7/11 for comments.**
4.10	**Agency**	• Preapplication schedule with the city. • Confirm attendance for the initial pre-app with the city. • Civil, Arch, ESD112, Owner, Landscape, structural. • TCF to schedule preapplication with city planner. • Pre application meeting on 6/6. • **TCF to schedule follow-up meeting with City to discuss emergency vehicle access and review updated site plan.**
5.1	**Next Steps and Action Items**	• **Finalize OPR** • **65% Deliverables**
5.2	**Next Meeting Date**	• **Scheduled for 7/10/2025**

MEETING MINUTES

TCF Architecture

ASD Harbor Learning Center (HLC) Replacement
DAC Meeting #3

Meeting Date: 5/21/2025
Meeting Time: 3:00pm-5:00pm
Meeting Location: HLC & Zoom Meeting
TCF Architecture Project Number: 2025-001

Attendance:

Present	Name	Representing	Email
✓	Steve Wachtler	TCF	stevew@tcfarchitecture.com
✓	James Mill	TCF	JR@tcfarchitecture.com
	Andy Twyman	CSG | ESD 112	andrew.twyman@esd112.org
✓	Drew Pearson	CSG | ESD 112	drew.pearson@esd112.org
✓	Manuel Saldivar-Aguirre	CSG | ESD 112	manuel.saldivar-aguirre@esd112.org
✓	Lynn Green	ASD	lgreen@asd5.org
	Traci Sandtrom	ASD	tsandstrom@asd5.org
✓	Lisa Griebel	HLC	lgriebel@asd5.org
	Natalie Tillery	HLC	ntillery87@gmail.com
✓	Amy Rasler	HLC	arasler@asd5.org
	Cordell Trusty	HLC	cotrusty@asd5.org
	Bryce Fitzpatrick	HLC	bfitzpatrick@asd5.org
✓	Stephanie Hoffman	HLC	shoffman@asd5.org
	Kayla Sturm	HLC	ksturm@asd5.org
✓	Gayle Anderson	HLC	ganderson@asd5.org
✓	Kris Bitar	HLC/Teacher	Kbitar@asd5.org
✓	Emma Wimberley	HLC/GED Case Mngr	EWimberley@asd5.org
✓	Danica Alexander	HLC/Student	

Agenda Items:

Item #	Discussion Topic	Notes/Coordination
1. General		
1.1	Introductions & Sign-in	• Introductions of DAC members and project team ○ **See above for meeting attendance** • Overview of meeting objectives
1.2	Project Schedule Update	• Review key milestones and timelines. ○ **Review during the summer: SteveW discussed the ability for the group to meet during the summer break months. The group responded that they would be available if needed given schedule coordination. The following were possible meeting locations: The board room in the district offices, the community room a the high school, or the HLC given coordination with the HLC building users.**
1.3	Program Adjacencies	• Review key adjacencies from Ed Specs. ○ **The adjacency diagrams established in the "Ed-Specification" document were discussed.**

124 N. "I" Street
Tacoma, WA 98403
253.572.3993

tcfarchitecture.com

1.4	Site & Floor Plan Concept Review	• <u>General Concepts</u>
		  • **The District prefers that students who arrive by bus be dropped off at Aberdeen High School. The walking distance from the high school to the HLC is equivalent to the distance that student drivers walk from parking to class at the high school.**
		  • **The number of assigned staff parking spaces will need to be discussed in future meetings. The quantity impacts the required number of EV charging stations, which can be costly.**
		  • **TCF will fully illustrate doors, windows, and openings in the next floor plan update.**
		  • **TCF will include more detailed information in the next plan update, incorporating detailed room layout information from the Ed Spec phase.**
		  • **There will be a mechanical attic located above the classroom wings, accessed via a stair.**
		  • **A comment was made that there is currently no need for changing rooms for gym class, as students do not change clothes for that program.**
		
		• <u>Review Concept A Site Plan and Floor Plan</u>
		  ○ **SPED has a possible need for an office and/or testing room that can be shared between the (2) SPED classrooms.**
		  ○ **Need to establish "staff count" for the building to establish the number of electrical vehicle charging stations base on the newer city code.**
		  ○ **Scheme A needs to refine the central bathroom layout to improve the observability and the location. Central bathrooms were too far away from activity areas.**
		  ▪ **Some ideas were discussed in reorganization in the service areas to get a bathroom closer to the activity areas.**
		  ○ **Main activity area needs supervision. There is commonly a staff member in the activity area to supervise and assist the students.**
		  ○ **"Light-wells" in the upstairs hallway may not be worth the added risk to safety.**
		  ▪ **Outdoor roof decks are preferred.**
		  ○ **Open Doors/GED students need outside access.**
		  ○ **It would be beneficial for the Life Skills room to be located closer to the main stair, increasing its proximity to the Open Doors program on the first floor.**
		  ○ **Positioning the service yard facing the high school is not ideal, as it presents one of the most visible views of the building.**
		
		• <u>Review Concept B Site Plan and Floor Plan</u>
		  ○ **Concept B is ideal for navigation**
		  ▪ **Neuro-divergent students would be more comfortable with the simple layout.**
		  ○ **Service access to 5th Street is an ideal layout.**
		  ○ **Lisa mentioned that the Student store location on the 2nd floor is not ideal, but could work. There is an advantage to having the student store close to the Life Skills classroom. Student store on the 2nd floor will require supervision.**
		  ○ **If the library and CTE spaces are flipped north/south then the CTE could have exterior access for high school students traveling to the building to only take the CTE courses.**
		  ▪ **Library on the first floor is preferred.**
		  ○ **There is a community outreach location on the eastern side of the site. This draws activities that may not be favorable to the daycare location. The building could be mirrored to avoid this conflict.**
		  ○ **The proximity of the Life Skills room to both the Open Doors program and SPED classrooms was well received.**
		  ○ **Ideally, SPED classrooms would include an office and adjacent testing rooms.**

		○ **There was discussion about whether accessing Snug Harbor through the admin area was a concern. It was determined acceptable, as the access point is at the end of the reception area, allowing for supervised entry.** ○ **Ideally, the science classroom would open directly onto the rooftop deck.** ○ **There was discussion on how the GED students use the building:** ▪ **GED students are the most "At-risk" and react negatively to resistance in accessing their space.** ▪ **GED students may access the classroom after hours when the building is secured. Currently a staff member meets them at the door and lets them in.** ▪ **The ideal situation would allow for direct outside access for GED students to allow them to enter directly into their classroom.** ▪ **Zoning doors to prevent access to the rest of the building is critical, TCF to study possible options.**
1.5	Concept Selection & Refinement	• DAC to provide feedback on likes and dislikes of the 2 concepts. ○ **See 1.4 above** • DAC committee to help select a preferred concept. ○ **Overall the preferred concept was concept "B"** • DAC committee to provide feedback to help improve preferred concept ○ **See 1.4 above**
1.6	Take Aways	• TCF to summarize takeaways and feedback from the DAC meeting. ○ **TCF to proceed with Concept "B"** ○ **TCF to study mirroring the floor plan east-west to improve adjacencies between the program, site and off-site context.** ○ **TCF to study mirroring the Library and CTE spaces north-south.** ○ **TCF to implement the floor plan revisions discussed.** • TCF to preview next DAC Meeting agenda ○ **The next DAC meeting will focus on refining the exterior appearance and character of the building to best reflect the school district as a whole, the coastal environment, and the HLC community.**
2. Next Meeting		
2.1	DAC Meeting #4	**6/4 at 3:00 PM:** Massing/Exterior Appearance Review; In-Person at HLC & Zoom Meeting
2.2	DAC Meeting #5	**TBD:** Review potential dates and times over summer for next check-in

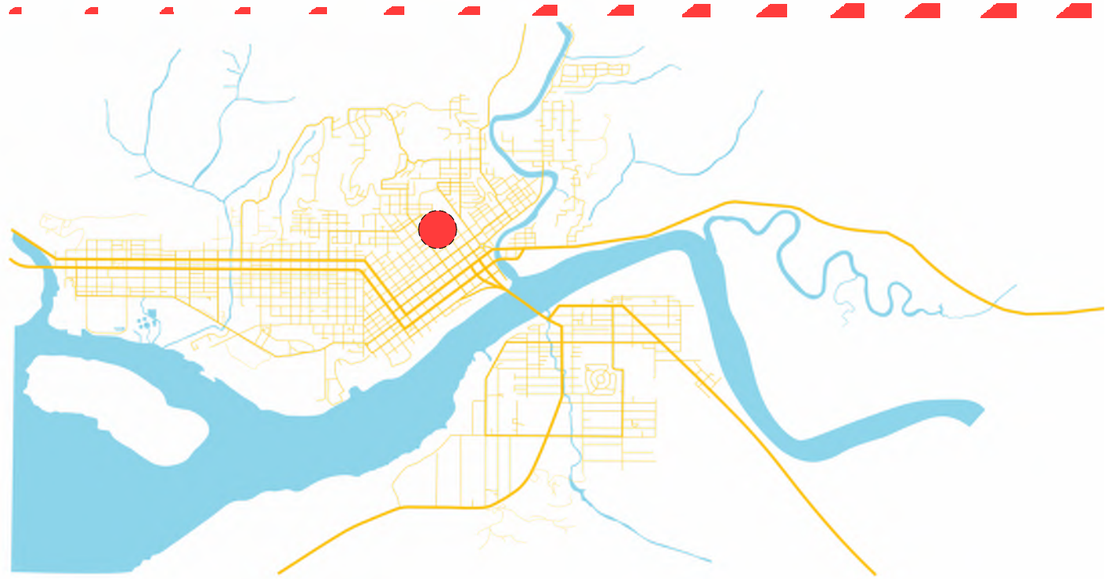
TCF

Aberdeen School District
Aberdeen, Washington

Harbor Learning Center

DAC #3 Floor Plan Presentation

Steve Wachtler | JR Mill



May 21, 2025

TCF

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Table of Contents

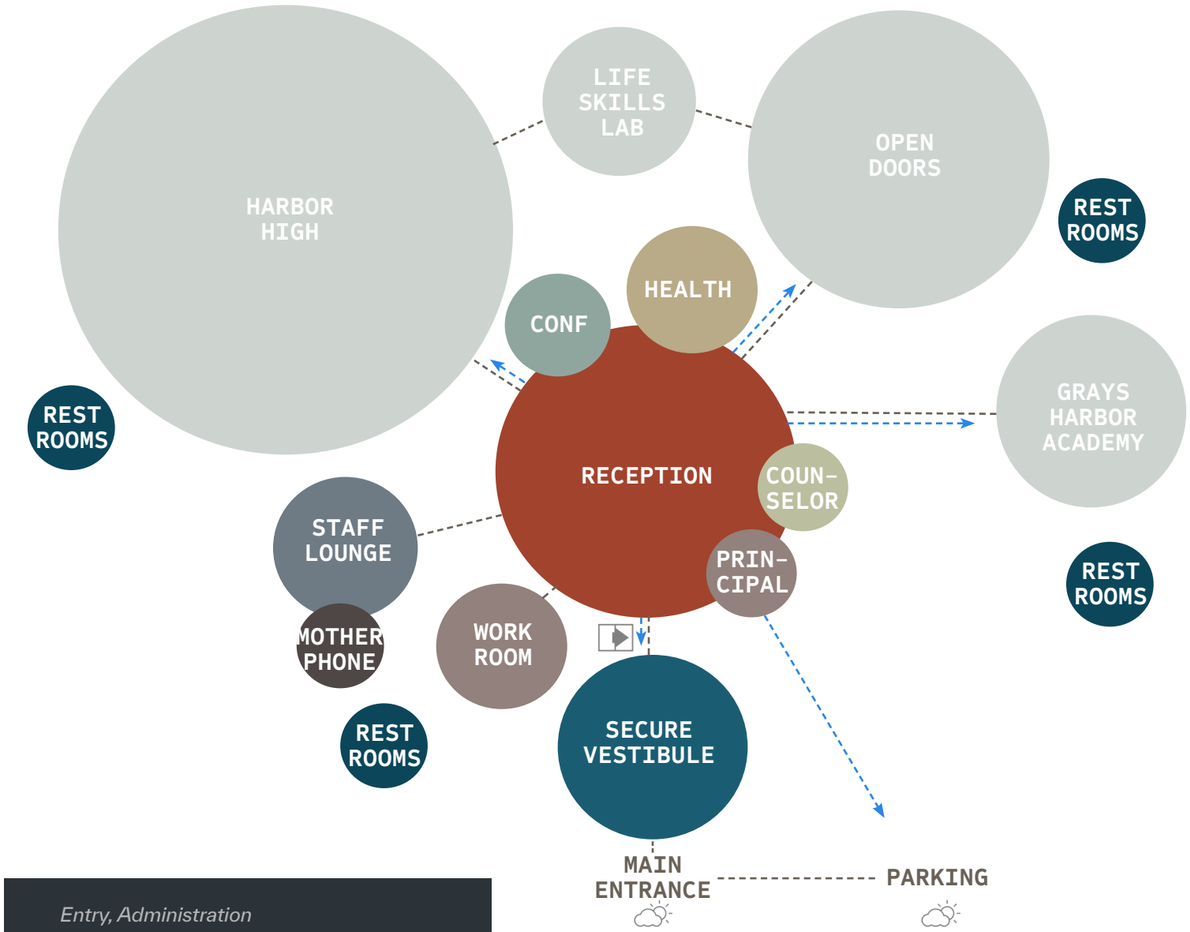
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INDEX
ADJACENCY DIAGRAMS

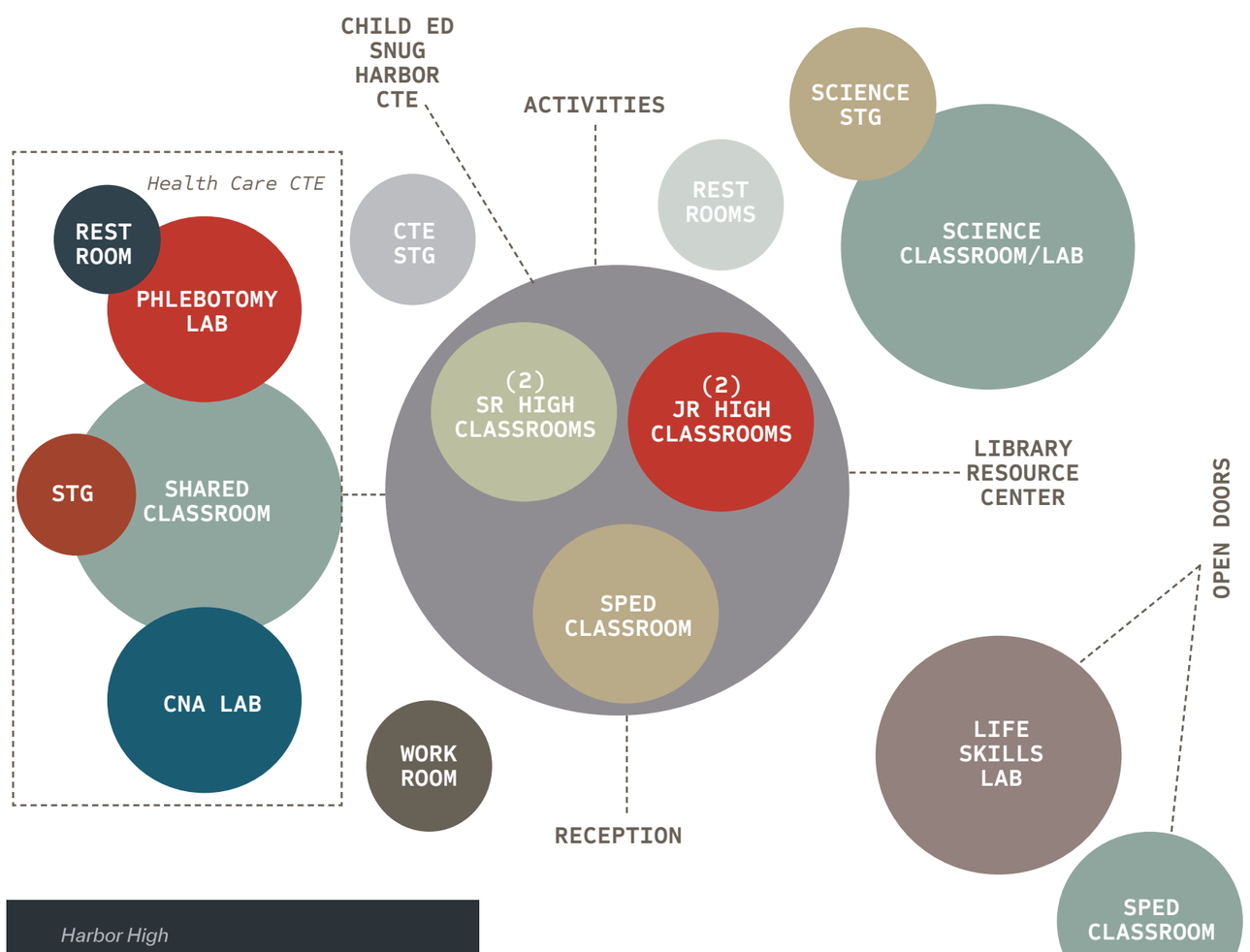
SCHEME 'A' COLORED FLOOR PLAN - 1ST LEVEL
SCHEME 'A' COLORED FLOOR PLAN - 2ND LEVEL
SCHEME 'A' SITE PLAN

SCHEME 'B' COLORED FLOOR PLAN - 1ST LEVEL
SCHEME 'B' COLORED FLOOR PLAN - 2ND LEVEL
SCHEME 'B' SITE PLAN



05/21/25





legend

- *direct connection*
- *visibility*
- *transaction window*
- *exterior*

Entry Sequence:
A secured vestibule will be used to admit visitors during school hours. The goal is to have Harbor High, Open Doors, and Grays Harbor Academy all access the same reception zone to ensure maximum visibility.

Harbor High will house CTE programs and general education classrooms. Its centralized location will offer easy access to activity spaces, restrooms, reception, and a satellite workroom for staff.

TCF

ADJACENCY DIAGRAMS

Harbor Learning Center / Aberdeen School District



COLOR LEGEND

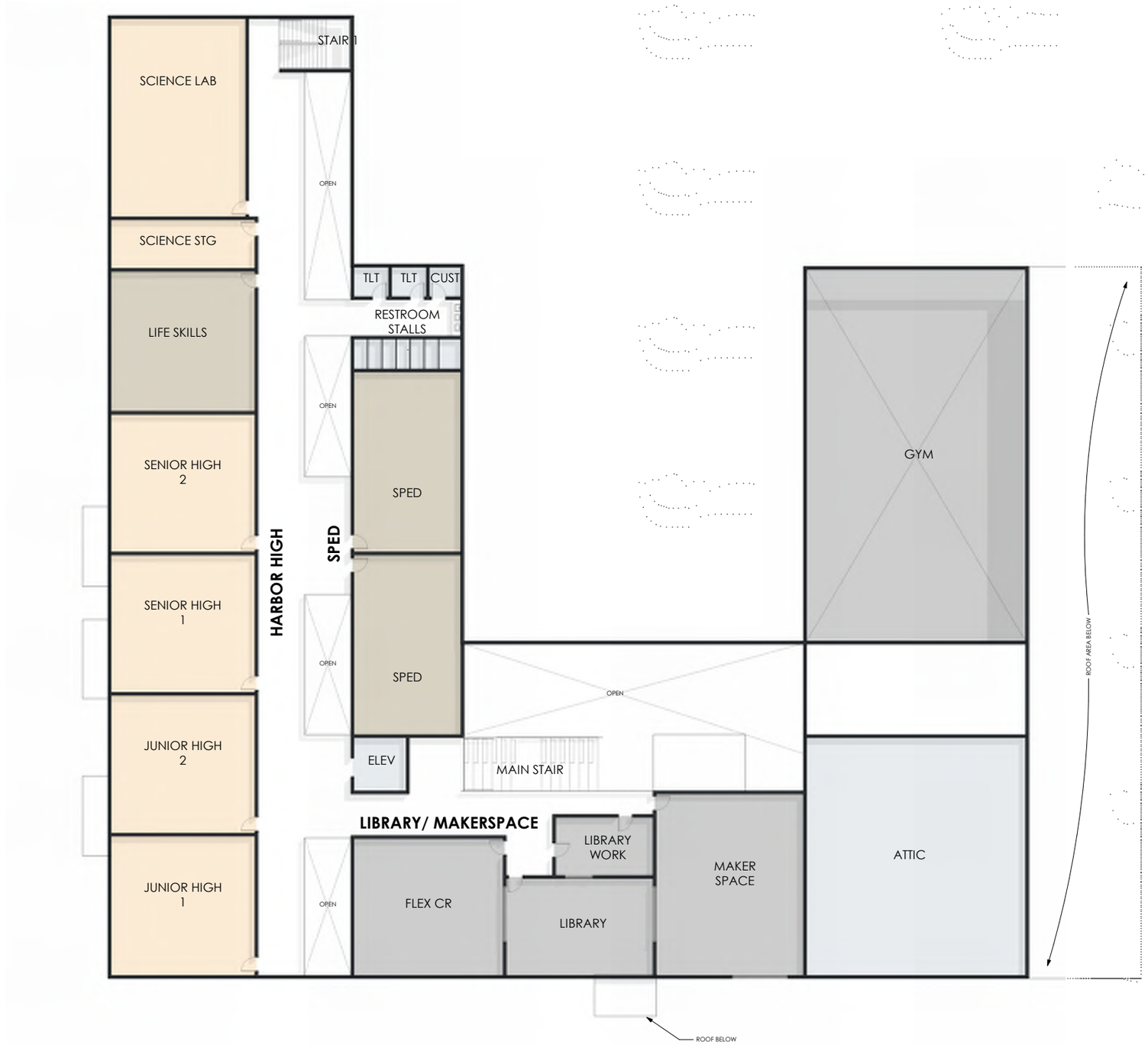
- ACTIVITIES
- ADMIN
- CTE
- GRAYS HARBOR ACADEMY
- HARBOR HIGH
- OPEN DOORS
- OUTDOOR PLAY
- SNUG HARBOR
- SPED
- SUPPORT

0 5 10 20

5/21/25

SCHEME 'A' COLORED FLOOR PLAN

Harbor Learning Center / Aberdeen School District



COLOR LEGEND

- ACTIVITIES
- ADMIN
- CTE
- GRAYS HARBOR ACADEMY
- HARBOR HIGH
- OPEN DOORS
- OUTDOOR PLAY
- SNUG HARBOR
- SPED
- SUPPORT

0 5 10 20

5/21/25

TCF

SCHEME 'A' COLORED FLOOR PLAN

Harbor Learning Center / Aberdeen School District



NOTE: DRAWING MAY BE REDUCED

0 10' 20' 40'

05/21/25

TCF

SCHEME 'A' SITE PLAN

Harbor Learning Center / Aberdeen School District



COLOR LEGEND

- ACTIVITIES
- ADMIN
- CTE
- GRAYS HARBOR ACADEMY
- HARBOR HIGH
- OPEN DOORS
- OUTDOOR PLAY
- SNUG HARBOR
- SPED
- SUPPORT

0 5 10 20

5/21/2025

TCF

SCHEME 'B' COLORED FLOOR PLAN

Harbor Learning Center / Aberdeen School District

COLOR LEGEND

- ACTIVITIES
- ADMIN
- CTE
- GRAYS HARBOR ACADEMY
- HARBOR HIGH
- OPEN DOORS
- OUTDOOR PLAY
- SNUG HARBOR
- SPED
- SUPPORT



0 5 10 20

5/21/25

SCHEME 'B' COLORED FLOOR PLAN

Harbor Learning Center / Aberdeen School District

N 5TH St

N I St

N H St

SERVICE YARD

MECH

CHILLER YARD

PLAY FIELD

SERVICE ENTRANCE

PAVED COMMONS

COVERED COMMONS

ACTIVITIES

TODDLER PLAY

CTE

SNUG HARBOR

STROLLER PATH

LIBRARY / MAKERSPACE

GRAYS HARBOR ACADEMY

ADMIN

MAIN ENTRY

DAYCARE ENTRY

PRESCHOOL PLAY

PICK-UP / DROP-OFF

EXISTING PARKING

NEW PARKING

NOTE: DRAWING MAY BE REDUCED

0 10' 20' 40'

05/21/25

TCF

SCHEME 'B' SITE PLAN

Harbor Learning Center / Aberdeen School District

MEETING MINUTES

TCF Architecture

ASD Harbor Learning Center (HLC) Replacement
DAC Meeting #4

Meeting Date: 6/4/2025
Meeting Time: 3:00pm-5:00pm
Meeting Location: HLC & Zoom Meeting
TCF Architecture Project Number: 2025-001

Attendance:

Present	Name	Representing	Email
✓	Steve Wachtler	TCF	stevew@tcfarchitecture.com
✓	James Mill	TCF	JR@tcfarchitecture.com
	Andy Twyman	CSG | ESD 112	andrew.twyman@esd112.org
	Drew Pearson	CSG | ESD 112	drew.pearson@esd112.org
✓	Manuel Saldivar-Aguirre	CSG | ESD 112	manuel.saldivar-aguirre@esd112.org
✓	Lynn Green	ASD	lgreen@asd5.org
	Traci Sandtrom	ASD	tsandstrom@asd5.org
✓	Courtney Sandstrom	ASD/Const. Lead	csandstrom@asd5.org
✓	Matt Mahon	ASD/Technology	mmahon@asd5.org
✓	Lisa Griebel	HLC/Principal	lgriebel@asd5.org
	Natalie Tillery	HLC	ntillery87@gmail.com
✓	Amy Rasler	HLC/Administrator	arasler@asd5.org
✓	Rubert Sutiovich	HLC/Teacher	rsutiovich@asd5.org
	Cordell Trusty	HLC	cotrusty@asd5.org
	Bryce Fitzpatrick	HLC	bfitzpatrick@asd5.org
	Stephanie Hoffman	HLC	shoffman@asd5.org
✓	Kayla Sturm	HLC	ksturm@asd5.org
✓	Gayle Anderson	HLC/	ganderson@asd5.org
✓	Kris Bitar	HLC/Teacher	Kbitar@asd5.org
✓	Jesse Winter	HLC/Teacher	jwinter@asd5.org
✓	Emma Wimberley	HLC/GED Case Mngr	EWimberley@asd5.org
✓	Danica Alexander	HLC/Student	

Agenda Items:

Item #	Discussion Topic	Notes/Coordination
1. General		
1.1	Introductions & Sign-in	• Introductions of DAC members and project team ○ **See above for meeting attendance**

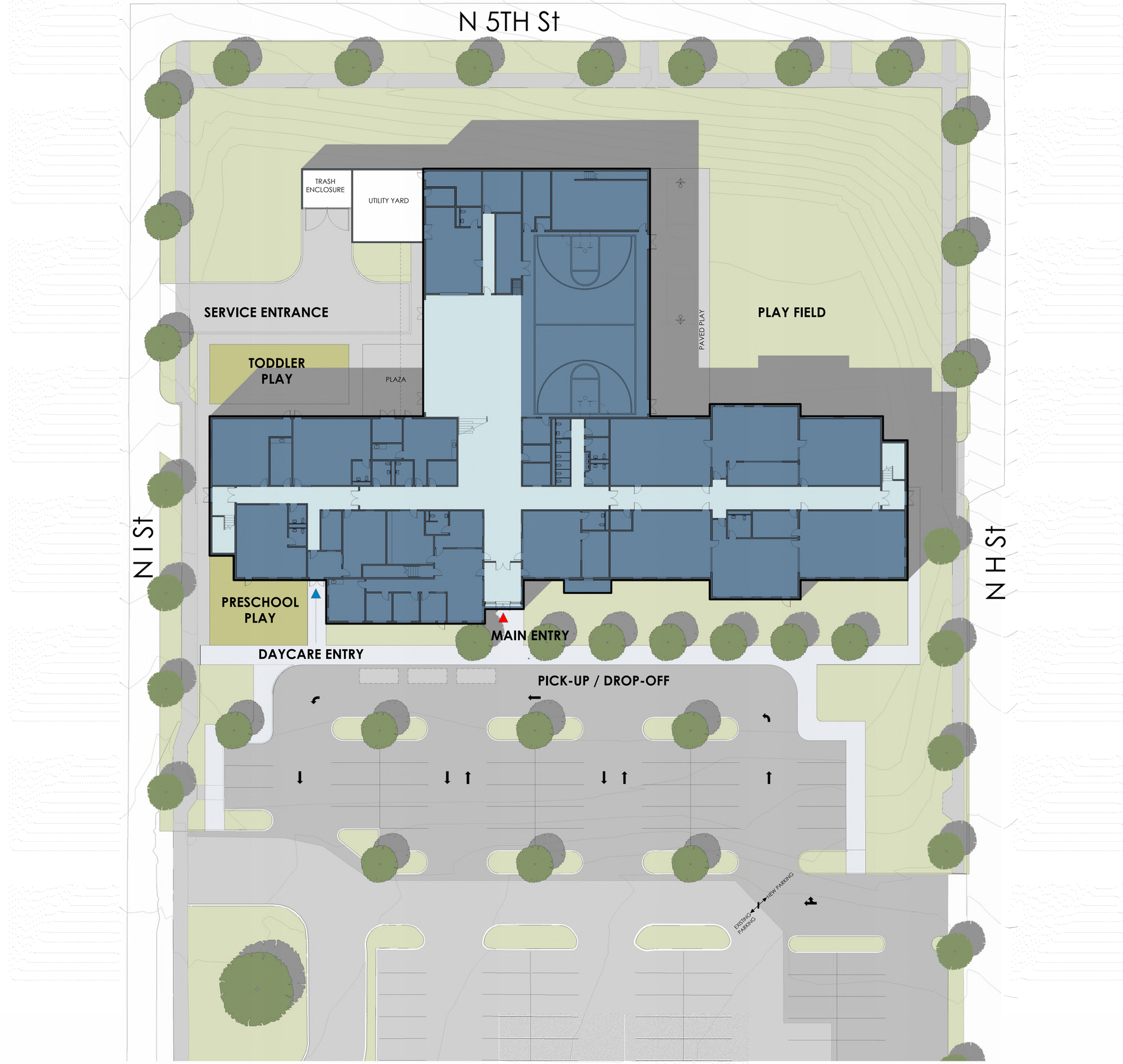
1.2	Project Schedule Update	• Review key milestones and timelines.
		  ○ Discuss DAC 5 Timing for summer check-in
		  ▪ **Confirmed date for the next meeting – there was consensus on Wednesday, June 25th, for the next DAC meeting to review the next evolution of the massing and materials.**

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Tacoma, WA 98403
253.572.3993

tcfarchitecture.com

1.3	Site & Floor Plan Concept Review	• <u>Review Concept B Site Plan and Floor Plan</u> o Library and associated spaces were relocated per the feedback of the last DAC meeting to the north side of the classroom wing. ▪ **Lynn suggested that the maker space might have some advantages on the north east corner of the building due to easier access to the exterior wall for ventilation.** ▪ **It was discussed that ventilation access will transition out the wall or to the roof and that the requirements for ventilation access are not so stringent that relocation would be needed. The structural module of the building and the alignment of walls above make the current location more cost-effective.** o SPED Classrooms now have a dedicated office and testing room. ▪ **The SPED office should have a door providing access to both SPED classrooms. There was a discussion about the need for an additional office for a security staff member. This staff member will need access to the security camera system, and the SPED office may also serve as their workspace or a new office could be created.** o CTE classrooms: an exterior door was added to the classroom. ▪ **High school students will access this classroom via the central office/ security vestibule. They can egress the building via the stairwell exit at the east side.** o Greys Harbor Academy ▪ **There was discussion about the entrance to Greys Harbor Academy through the entry vestibule. The desire for this access was confirmed. A second door from the interior of the building into the space is not required.** o Main Administration: Two layout versions were shown, the first with the reception area facing the parking lot, the second with the reception facing the center of the building. There was also discussions regarding the location of the principals office and how close it needs to be to the reception. ▪ **There was general consensus in the meeting that visual access to the interior of the building may be more important than visual security of the parking lot and approaching visitors.** ▪ **Lisa is the only administrator onsite, so there was a desire to have the principal's office close to reception to keep the principal engaged in office activities.** ▪ **There was discussion about the need for a "back entry" to the administration area to allow discrete access for the SRO if needed. An exterior door to the conference room was suggested.** o Site: ▪ **Many suggested that there should be a fence added between the service yard and the school for safety and security reasons. TCF to study fencing and gate options and present them in the next DAC meeting.**

1.4	Massing and Material Concept Exercise	• **TCF presented a building character exercise asking DAC members to place colored post-it notes on example buildings. The green-colored notes represented that the DAC member liked the style and character of the building. The blue notes indicated indifference to the style and character, and the red note meant they disliked the building. The group was also encouraged to write notes about their thoughts on the examples. The results of this activity are attached to these minutes.**
1.6	Take Aways	• TCF to summarize takeaways and feedback from DAC. ○ **TCF to develop building massing and exterior appearance options that reflect the preferences expressed by the DAC committee in the interactive exercises.** ○ **TCF to refine the floor plan based on feedback received during the meeting.** ○ **TCF to study site fencing options for safety and security.** ○ **TCF to implement the preferred administration configuration.**
2. Next Meeting		
2.1	DAC Meeting #4	**6/4 at 3:00 PM:** Massing/Exterior Appearance Review; In-Person at HLC & Zoom Meeting
2.2	DAC Meeting #5	**6/25 at 3:00 PM:** Exterior Elevations and material selections



NOTE: DRAWING MAY BE REDUCED

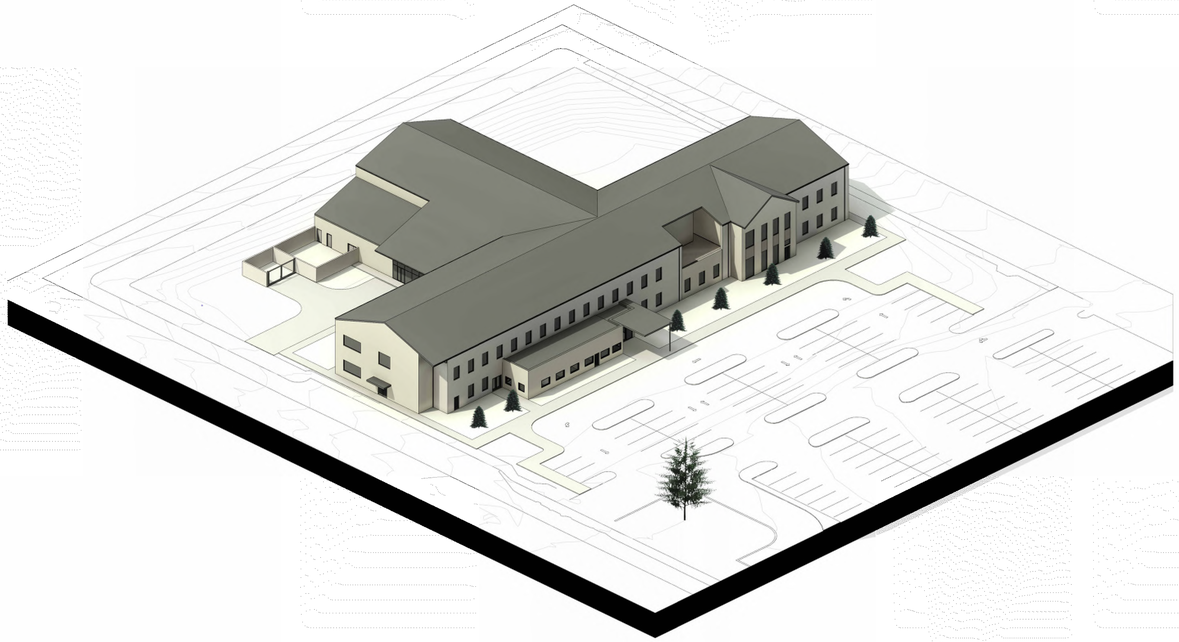
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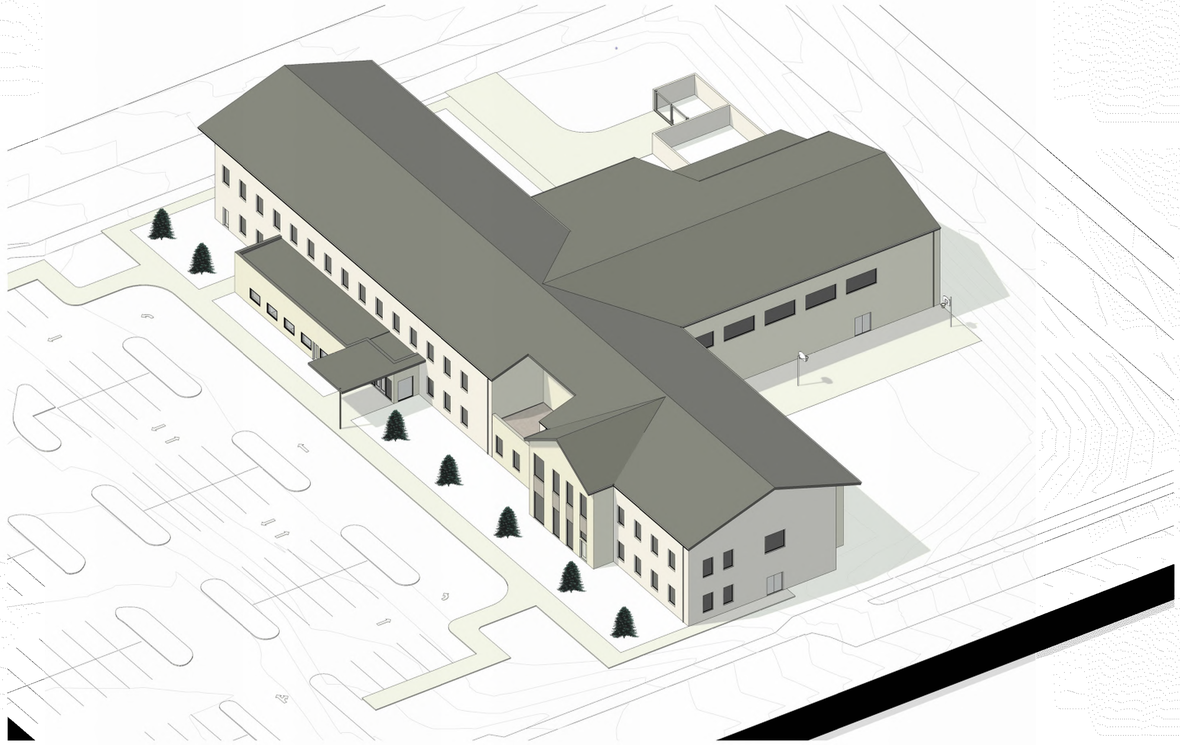
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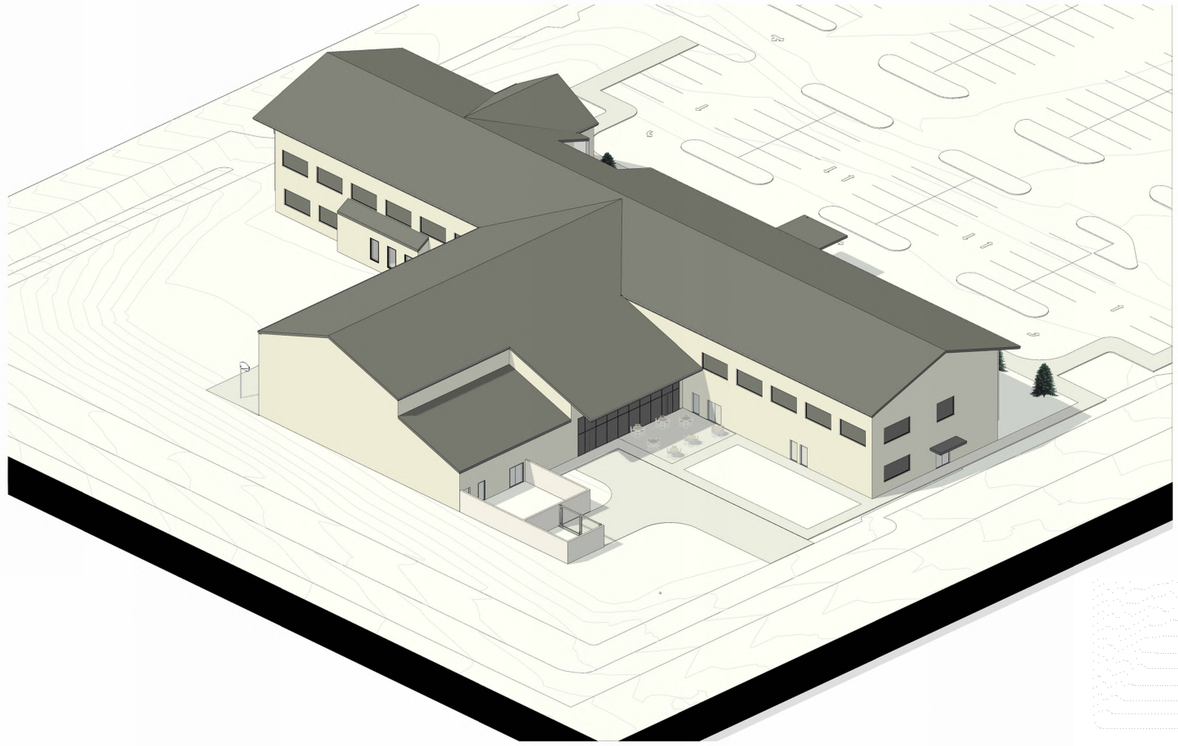
NORTH

COLORED SITE PLAN

Harbor Learning Center / Aberdeen School District









06/04/25

TCF | 3D VIEWS

Harbor Learning Center / Aberdeen School District



TCF

FIRST FLOOR PLAN

Harbor Learning Center / Aberdeen School District



LEGEND

- ACTIVITIES
- ADMIN
- CTE
- HARBOR HIGH
- OPEN DOORS
- SPED
- SUPPORT

0 5 10 20

06/04/25

NORTH

TCF

SECOND FLOOR PLAN

Harbor Learning Center / Aberdeen School District

Harbor Learning Center: Massing & Exterior Character

Architecture Tells a Story

Good architecture tells a story. TCF is committed to intentionally authoring the story of the Harbor Learning Center.

Using this analogy, we are seeking to gather high level content from which we can build a narrative frame-work to initiate a design ripe with meaning.

Our Inspiration / Influences

Where we look to find out inspiration and shape the personality of the project (or what we call “Design Attitude”):

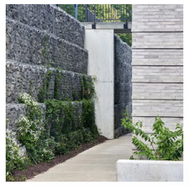
- Local context, or what can be drawn from local surroundings
- Cues and elements that indicate the project’s sustainability (or eco-friendliness) features
- How it functions – in this instance, how a school functions – can inform the aesthetics

Questions For You

1. How can the architecture represent the “personality” of your school? (examples: good neighbor, good stewards, a safe and secure place, forward-thinking, etc.)
2. What should the project say to the community? (meaning, what impression should it give)
3. What local or regional characteristics might provide design inspiration?
4. What does the architecture say about the district’s culture?

TCF | Aberdeen School District

Project Knowns



Site Retaining Walls



Solar Panels



Rood Decking

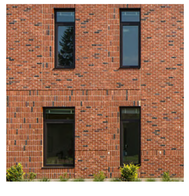


Sloped Metal Roof



Building Modularization

Mechanical Attic



Brick Cladding



Covered Entries



Sheet Metal Cladding

Shaping the Look of Learning

These images reflect a wide range of styles based on what we already know about the project. Please help us refine the direction by using the colored Post-its: mark what you like, dislike, or feel neutral about. Write 1–2 words that describe how the image makes you feel. Notes on each image can help guide your feedback.

Example words: ***welcoming, inspiring, cold, bold, calm, playful, institutional, inspiring, safe, rigid, bright, dignified.***



Warm brown brick offers a softer alternative to traditional red brick. Metal siding brings in a modern touch. Flat-roofed pop-outs add variety and resolve slope issues, while the main roof is sloped for a familiar, conventional profile.



Light brick and horizontal siding create a calm, easygoing aesthetic. The building feels grounded yet airy, thanks to tall windows and a clean, layered material palette.



A modern brick building that respects its historic context—clean lines and updated detailing blend seamlessly with the older surrounding architecture. Its contemporary form stands as a reflection of the present, while pointing toward the future.



Bold, expressive designs can make a memorable first impression and reflect a strong sense of identity for staff and students. Distinctive colors and brick patterns signal that this is a place of creativity, energy and forward thinking.

TCF | Aberdeen School District

Color Coding

LIKE

AMBIVILENCE

DISLIKE

Shaping the Look of Learning

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Soft-toned brick and clean modern lines create a calm, comfortable atmosphere making for an inviting place for both teaching and learning. The design feels warm, open and thoughtfully crafted.



A quiet, refined presence—this building uses dark brick for a timeless, sophisticated feel. The deep tone sets it apart from the red brick buildings around it, giving it a distinct identity. The varied window rhythm adds subtle energy, creating a space that feels both calm and thoughtfully designed.



The existing high school is approaching 20 years of age. It contains all the building materials that have been discussed during our predesign process. Tell us what you like or dislike about it



“With its blend of brick, metal, and glass, this building feels like a true public institution—confident, durable, and built to serve. The design strikes a balance between modern functionality and traditional character, giving it a proud, civic presence.

Color Coding

LIKE

AMBIVILENCE

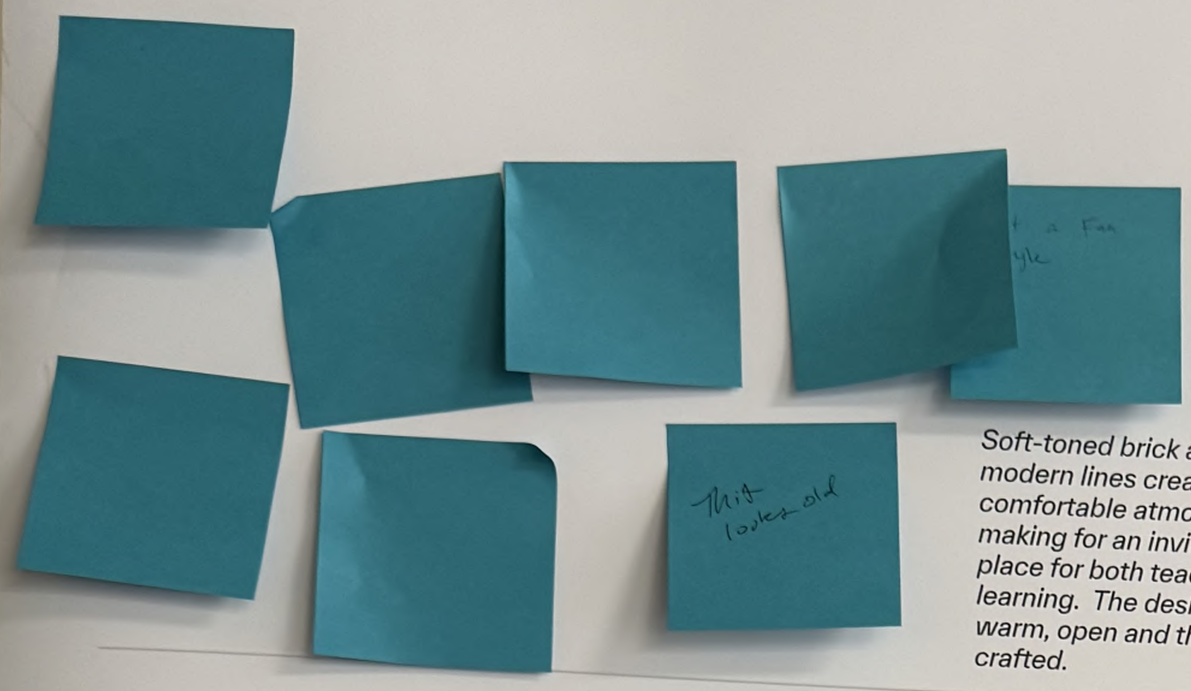
DISLIKE

TCF | Aberdeen School District

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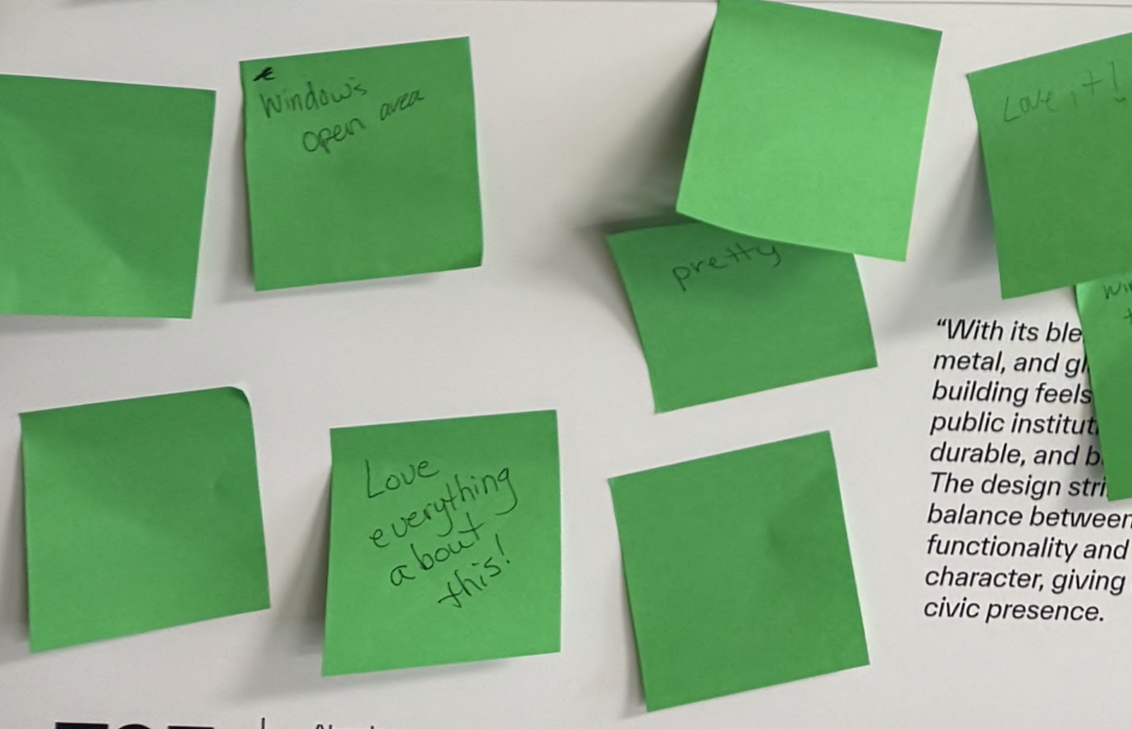


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The existi… s approac… f age. It … uilding m… ave beer… uring ou… process. Tell us what you like or dislike about it





"With its ble… metal, and gl… building feels… public institut… durable, and b… The design stri… balance between modern functionality and traditional character, giving it a proud, civic presence.



TCF | Aberdeen School District

Color Coding

LIKE

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DISLIKE

Shaping the Look of Learning

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for staff and studen
Distinctive colors
patterns signal th
place of creativi
and forward thinking



TCF | Aberdeen School District

Color Coding
- LIKE
- AMBIVILENCE
- DISLIKE

MEETING MINUTES

TCF Architecture

ASD Harbor Learning Center (HLC) Replacement
DAC Meeting #4 Follow-up

Meeting Date: 6/6/2025
Meeting Time: 9:00am-10:00pm
Meeting Location: Zoom Meeting
TCF Architecture Project Number: 2025-001

Attendance:

Present	Name	Representing	Email
✓	Steve Wachtler	TCF	stevew@tcfarchitecture.com
✓	James Mill	TCF	JR@tcfarchitecture.com
✓	Andy Twyman	CSG | ESD 112	andrew.twyman@esd112.org
✓	Drew Pearson	CSG | ESD 112	drew.pearson@esd112.org
✓	Manuel Saldivar-Aguirre	CSG | ESD 112	manuel.saldivar-aguirre@esd112.org
✓	Lynn Green	ASD	lgreen@asd5.org
✓	Lisa Griebel	HLC/Principal	lgriebel@asd5.org

Agenda Items:

Item #	Discussion Topic	Notes/Coordination
1. General		
1.1	General Overview	• Lisa requested a meeting with TCF, ESD 112 | CSG, and Lynn to review the following topics as a follow-up to DAC Meeting #4.
2. Follow up Topics		
2.1	Room Naming and Terminology	• **Life Skills Room Rename:** There isn't a specific Life Skills program associated with the SPED program at the Harbor Learning Center, and the room name "Life Skills" is considered misleading as it does not accurately represent the room's use. The room will be used by different groups within the school and will serve as a multi-use space focused on transition readiness for students. It will be used by the Open Doors program as well as CTE programs, including Family and Consumer Sciences. After discussing several options, the group landed on the name "Life Lab." • **SPED Classroom Rename:** There was a request to not label the SPED rooms as "SPED Classrooms." These rooms will function more like resource rooms and will be designed similarly to regular classrooms. To ensure future flexibility, TCF will look at designing the rooms with a higher level of acoustics. It was also requested that the previously labeled SPED classrooms be renamed simply to "Classroom."
2.2	Supervision at Commons & Cafeteria	• Lisa requested that power and data for a desk be added upstairs, adjacent to the learning stairs, to allow her to supervise the commons below and the student store area. TCF to show this in future iterations of the floor plan.
2.3	Electric Vehicle Charging Stations	• Lisa brought up the idea of working with outside vendors to see if it would be possible to coordinate having them pay for charging stations. TCF said they would have their engineers look into the idea, but noted that it's likely the project would still need to include the minimum number of chargers required by code in order to obtain the building's Certificate of Occupancy and not rely on a third party.

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PRODUCT DATA SHEET

EVAC+CHAIR 500H

THE EVAC+CHAIR® 500 WITH AN INCREASED PASSENGER WEIGHT CAPACITY OF 500LBS FOR BARIATRIC EVACUATION.

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The **EVAC+CHAIR® 500H** is a high-performance bariatric patient transport chair that permits the safe egress of mobility impaired persons from a multi-story building or a confined space.
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40 YEARS 'TRUSTED'

500H FEATURES



QUICK RELEASE SAFETY BELTS (HEAD, CHEST, THIGH)



For increased passenger safety

FRICTION TRACKS (EVAC+TRACK TECHNOLOGY)



Adjustable self braking tracks control speed of descent for easy single person operation

REFLECTIVE DECALS



For easy location in situations of poor visibility

LOCKABLE REAR WHEELS



Applied in situations where the chair needs to remain in a stationary position

ADJUSTABLE HANDLE WITH PATIENT HEAD RESTRAINT



Ergonomically designed handle for ease of deployment and compact storage with adjustable head restraint which limits movement, securing the passenger in place

DUAL POSITION SEAT



Dual position seat allows the user to decide each time which seating position they desire

FOLD AWAY GRIP HANDLE/FOOTREST



For use with 2 person operation for increased stability

HEAVY DUTY WHEELS



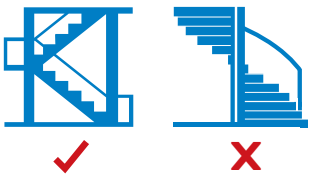
Ideal for operation over uneven terrain

500H BENEFITS

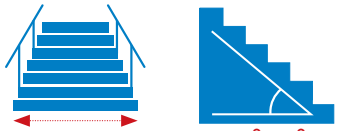
- Designed in the US & FDA Registered
- Provides a quick, easy and safe emergency evacuation
- Easy to use, single person operation
- Lightweight, no heavy lifting required
- Enables small attendants to easily move passengers three times their size
- Easy to open, ready to use in seconds
- Wall mountable, folds for compact storage
- Exceeds fire safety requirements and emergency response guidelines established to support the Americans with Disabilities Act

500H IMPORTANT INFORMATION

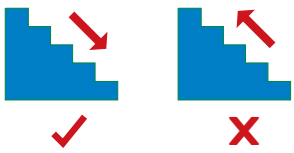
STAIRCASE TYPE



IMPORTANT DIMENSIONS



STAIRWAY TRAVEL



WEIGHT CAPACITY



ADVISORY



500H INCLUDES

- **LIFETIME WARRANTY**
- 3 Passenger Safety Belts (Head, Chest, Thigh)
- Photoluminescent Signage
- Wall Mounting Brackets
- Dust Cover
- User Guide

500H DIMENSIONS (FOLDED)

HEIGHT	WIDTH	DEPTH	WEIGHT	WEIGHT CAPACITY
45" (114.3cm)	20" (50.8cm)	9" (22.9cm)	29lbs (13.1kg)	500lbs (227kg)

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FIRST FLOOR PLAN

Harbor Learning Center / Aberdeen School District



0 5 10 20

06/04/25

NORTH

TCF

SECOND FLOOR PLAN

Harbor Learning Center / Aberdeen School District

MEETING MINUTES

TCF Architecture

ASD Harbor Learning Center (HLC) Replacement
DAC Meeting #5 – Meeting Minutes

Meeting Date: 6/25/2025
Meeting Time: 1:00pm-3:00pm
Meeting Location: HLC & Zoom Meeting
TCF Architecture Project Number: 2025-001

Attendance:

Present	Name	Representing	Email
✓	Steve Wachtler	TCF	stevew@tcfarchitecture.com
	James Mill	TCF	JR@tcfarchitecture.com
✓	Tyler Combs	TCF	Tylerc@tcfarchitecture.com
✓	Daniel Vu	TCF	Danielv@tcfarchitecture.com
✓	Andy Twyman	CSG | ESD 112	andrew.twyman@esd112.org
	Drew Pearson	CSG | ESD 112	drew.pearson@esd112.org
✓	Manuel Saldivar-Aguirre	CSG | ESD 112	manuel.saldivar-aguirre@esd112.org
✓	Lynn Green	ASD / Superintendent	lgreen@asd5.org
✓	Lisa Griebel	HLC / Principal	lgriebel@asd5.org
	Natalie Tillery	HLC	ntillery87@gmail.com
✓	Amy Rasler	HLC / Secretary	arasler@asd5.org
	Cordell Trusty	HLC	cotrusty@asd5.org
	Bryce Fitzpatrick	HLC	bfitzpatrick@asd5.org
✓	Stephanie Hoffman	HLC / Teacher	shoffman@asd5.org
✓	Kris Bitar	HLC / Teacher	Kbitar@asd5.org
✓	Kayla Sturm	HLC / Teacher	ksturm@asd5.org
✓	Danica Alexander	HLC / Student	
✓	Emma Wimberley	HLC / GED	ewumberley@asd5.org
✓	Courtney Sandstrom	ASD / PM	csandstrom@asd5.org
	Additional DAC Members TBD	HLC	TBD

Agenda Items:

Item #	Discussion Topic	Notes/Coordination
1. General		

1.1	Introductions & Sign-in	• Introductions & sign-in.
		  ○ **See above for meeting attendance.**
		• Overview of meeting objectives.
		  ○ **Select preferred exterior design concept out of 3 options.**
		  ○ **Select preferred color scheme.**
		  ○ **Provide direction on second floor plan revisions.**

1.2	Project Schedule Update	• Review key milestones and timelines.
		  ○ **Updated SD Project Schedule attached.**
		  ○ **SD 65% set to District for review on 7/11.**
		  ○ **Early August 95% SD set to Cost Estimator.**
		  ○ **Targeting Mid July for next Design Progress meeting with DAC.**

1.3	Massing & Material Concept Selection & Refinement	• Review inspiration images from the previous DAC meeting. ○ **TCF recapped the group's preferences based on example images shared at the last DAC meeting. The two most liked examples had a coastal aesthetic and felt "homey" and welcoming.**

		• DAC to provide feedback on the likes and dislikes of the three exterior design concepts. o **See attached PDF of the concepts referenced below and presented at the DAC meeting.** o **Scheme A:** ▪ **TCF described this concept as having the simplest and most economical roof form of all the schemes. Knee braces and window trim add a coastal feel, and there are ample windows for all classrooms. The design features brick veneer up to the second floor with precast accents and metal siding above. The admin area has a sloping roof, a higher canopy at the main entry, and a lower canopy at the Snug Harbor entry.** ▪ **The group felt the main entrance was not clearly identifiable. Lynn noted that she wouldn't have known where it was located if she wasn't already familiar with the floor plan.** o **Scheme B:** ▪ **TCF described this as the most traditional scheme, with dormers breaking up the roof and wall forms. It features similar materials to Concept A. The main entry is taller and more defined, while the Snug Harbor and pick-up/drop-off area has a lower canopy.** ▪ **Some felt the dormers made the roof appear too busy. Others commented that the overall look resembled an apartment complex.** o **Scheme C:** ▪ **TCF explained that this concept uses dormers to bring natural light into the second-floor hallway and to help ventilate the building. The dormers also add roof modulation. Materials are similar to the other schemes, including brick, metal siding, and precast accents. The main entry is more prominent than in some of the other concepts. The window pattern incorporates smaller accent windows to enhance the coastal character of the façade.** ▪ **The DAC responded most positively to this concept, saying it had lots of character and was immediately inviting.** ▪ **Color Options & Feedback:** • **The DAC did not favor the orange-red brick color.** • **They felt the green siding was more appropriate for a house than a school.** • **The third color scheme was preferred for its more neutral palette. The DAC asked TCF to study this scheme further using a darker brick option for review at the next meeting. Most members also expressed that they were not drawn to the yellow accent color shown in the renderings.** • DAC to help select a preferred concept. o **The DAC unanimously selected Scheme C as their preferred exterior design concept.** • DAC to provide feedback on material and color options. o **The DAC agreed that the bottom color scheme, featuring a neutral palette, was the preferred option, with a request for further exploration of a darker brick option.**
1.4	Site & Floor Plan Updates	• Review updated site plan. o **TCF shared a general site plan update with the group. Ongoing coordination is going on with the City to confirm parking and planting requirements.** o **Feedback was given that a can wash area would be desired adjacent to the custodial room.** • Review floor plan updates & second-floor design option. o **TCF shared a floor plan design option that brought more daylight deeper into the building and shifted the student store area to the east. The DAC liked and**

		were in support of the change but requested that the student store layout be reconfigured to align with the plan previously shown in the Ed Specs.
1.5	Take Aways	• TCF to summarize takeaways and feedback from DAC. ○ **TCF to move forward with Scheme C, continuing to develop the design and coordinate with engineering consultants.** ○ **TCF to study darker brick color options on the preferred neutral color scheme.** ○ **TCF to revise the student store floor plan to better align with the Ed Specs, providing more separation between customer areas and behind-the-counter functions. A direct connection between the Business & Marketing classroom will also be added.** • TCF to preview the next DAC meeting agenda. ○ **At the next DAC meeting, TCF will share additional exterior views of the building based on the selected design concept. They will present revisions to the student store based on feedback from this meeting. They will also bring a couple of engaging presentation tools, including VR and AI-generated video.**
2. Next Meeting		
2.1	DAC Meeting #6 – Design Progress Update	**DAC meeting #6 is scheduled for July 16th at 1pm at the HLC. There will be a virtual zoom option as well. Lisa will be attending the meeting virtually.**

ASD-HLC SD Phase Schedule

TCF Architecture

	Task Name	Duration	Predecessors	Start Date	End Date	Assigned To	Comments	ASD	ESD 112	TCF	Struct	Mech	Elec	Civil	Land	Food	Hardware	Cost	Envelope	VE Team
24	SD	104d		05/01/25	09/24/25															
25	CLT Meeting	0	22FS +30d	05/01/25	05/01/25		Time: 8:30-10:00	X	X	X										
26	Schematic Design Kick Off	1d	23FS +25d	05/06/25	05/06/25					X	X	X	X	X	X	X				
27	Design Team Kickoff Meeting #1	0	26FS +7d	05/15/25	05/15/25		Time: 10a-11:30am; All hands (Design Team)			X	X	X	X	X	X					
28	CLT Meeting	0	25FS +10d	05/15/25	05/15/25		Time: 8:30-10:00	X	X	X										
29	DAC Meeting #3 - Review Site & Floor Plan Concepts	0	26FS +11d	05/21/25	05/21/25		Time: 3pm & Harbor Learning Center	X	X	X										
30	OPR Kick-Off Meeting w/ ASD	0	27FS +5d	05/22/25	05/22/25		Time: TBD; Attendance: Mike P, ESD 112, TCF, Metrix	X	X	X		X	X							
31	Design Team Meeting #2 / WSSP Kick-Off	0	27FS +10d	05/29/25	05/29/25		Time: 10am-11:30a			X	X	X	X	X	X					
32	CLT Meeting	0	28FS +10d	05/29/25	05/29/25		Time: 8:30-10:00	X	X	X										
33	DAC Meeting #4 - Review Massing & Exterior Appearance Review	0	29FS +10d	06/04/25	06/04/25		Time: 3pm & Harbor Learning Center	X	X	X										
34	Pre-Application Meeting with City of Aberdeen	0		06/05/25	06/05/25		Time: TBD	X	X	X				X						
35	Design Team Meeting #3	0	31FS +10d	06/12/25	06/12/25		Time: 10am-11:30; As needed attendance			X	X	X	X	X	X					
36	CLT Meeting	0	32FS +10d	06/12/25	06/12/25		Time: 8:30-10:00	X	X	X										
37	WSSP Workshop with ASD	0	31FS +10d	06/12/25	06/12/25		Time: TBD	X	X	X										
38	DAC Meeting #5 - Design Update Check-in	1d		06/25/25	06/25/25		Time: 3pm & Harbor Learning Center	X	X	X										
39	Design Team Meeting #4	0	35FS +10d	06/26/25	06/26/25		Time: 10am-11:30; As needed attendance			X	X	X	X	X	X					
40	CLT Meeting	0	36FS +10d	06/26/25	06/26/25		Time: 8:30-10:00	X	X	X										
41	Issue Draft OPR	0		06/27/25	06/27/25					X		X	X							
42	65% SD Progress Set drawings to TCF	0		07/09/25	07/09/25						X	X	X	X	X	X				
43	QA/QC Checklist & Feedback	10d	42	07/09/25	07/22/25		QA/QC based on the 65% Set. Assume 2 weeks for QC work.			X										
44	CLT Meeting	0	40FS +10d	07/10/25	07/10/25		Time: 8:30-10:00	X	X	X										
45	Design Team Meeting #5	0	39FS +10d	07/10/25	07/10/25		Time: 10am-11:30; As needed attendance			X	X	X	X	X	X					
46	65% SD Progress Set Drawings to ASD	1d	42FS +2d	07/11/25	07/11/25					X										
47	SD Backgrounds and SD QC Feedback to Consultants	0	43	07/22/25	07/22/25		All drawings, QC Comments, and Design to Consultants for final SD Documents			X										
48	DAC Meeting #6 - Design Update Check-in	1d		07/16/25	07/16/25		Time: 1pm & Harbor Learning Center	X	X	X										
49	CLT Meeting	0	44FS +10d	07/24/25	07/24/25		Time: 8:30-10:00	X	X	X										
50	Design Team Meeting #6	0	45FS +10d	07/24/25	07/24/25		Time: 10am-11:30; As needed attendance			X	X	X	X	X	X					
51	CLT Meeting	0	49FS +10d	08/07/25	08/07/25		Time: 8:30-10:00	X	X	X										
52	Design Team Meeting #7	0	49FS +10d	08/07/25	08/07/25		Time: 10am-11:30; As needed attendance			X	X	X	X	X	X					
53	Consultant 95% SD Cost Estimate Drawings, Estimates, Reports to TCF	0	47FS +13d	08/08/25	08/08/25						X	X	X	X	X	X				
54	Submit 95% SD drawings & Draft Reprot to ASD, Cost Estimator, & VE Team	0	53FS +2d	08/12/25	08/12/25					X										
55	Cost Estimate	6d	54	08/13/25	08/20/25													X		
56	Owner SD Document Review	10d	54	08/13/25	08/26/25			X	X											
57	Draft Cost Estimate to TCF	0	55	08/20/25	08/20/25													X		
58	Final Cost Estime to TCF & VE Team	0	57FS +1d	08/21/25	08/21/25													X		
59	CLT Meeting	0	51FS +10d	08/21/25	08/21/25		Time: 8:30-10:00	X	X	X										
60	VE Kick-Off Meeting	0	58FS +1d	08/22/25	08/22/25		Time: TBD		X	X	X	X	X	X	X					
61	Final Owner Comments to TCF	0	56	08/26/25	08/26/25			X	X											
62	CLT Meeting	0	59FS +10d	09/04/25	09/04/25		Time: 8:30-10:00	X	X	X										
63	VE Review	10d	60	08/25/25	09/05/25				X	X	X	X	X	X	X					
64	VE Results Meeting	0	63	09/05/25	09/05/25		Time: TBD		X	X	X	X	X	X	X					
65	Design Team Meeting #8	0	52FS +25d	09/11/25	09/11/25		Time: 10am-11:30; As needed attendance			X	X	X	X	X	X					
66	Submit VE Responses to TCF	1d	64FS +4d	09/12/25	09/12/25						X	X	X	X	X	X				
67	Submit VE Responses to ASD	1d	64FS +4d	09/12/25	09/12/25					X										
68	CLT Meeting	0	62FS +10d	09/18/25	09/18/25		Time: 8:30-10:00	X	X	X										
69	Submit updated SD Report Docs & Drawings to TCF	0	64FS +10d	09/19/25	09/19/25						X	X	X	X	X	X				
70	100% SD Drawings, Estimate & Report to ASD	0	69FS +3d	09/24/25	09/24/25					X										

	LEGEND
123	Core Leadership Meeting (CLT) Meeting
124	Design Advisory Committee (DAC) Meetings
125	Special Meeting or Workshop
126	Design Team Meeting
127	TCF Document Delivery to ASD
128	Consultant Document Delivery to TCF



0 5 10 20

06/25/25

NORTH

TCF

FIRST FLOOR PLAN

Harbor Learning Center / Aberdeen School District



0 5 10 20

06/25/25

NORTH

SECOND FLOOR PLAN - SCENARIO 1

TCF | Harbor Learning Center / Aberdeen School District



0 5 10 20

06/25/25

NORTH

SECOND FLOOR PLAN - SCENARIO 2

Harbor Learning Center / Aberdeen School District

Massing & Color

Scheme A

Color Scheme 1:
North View



Color Scheme 2:
North View



Color Scheme 3:
North View



Massing & Color

Scheme B

Color Scheme 1:
North View



Color Scheme 2:
North View



Color Scheme 3:
North View



Massing & Color

Scheme C

Color Scheme 1:
North View



Color Scheme 2:
North View



Color Scheme 3:
North View



TCF | Aberdeen School District

Massing & Color

Schemes | Perspective



Scheme A
Perspective View



Scheme B
Perspective View



Scheme C
Perspective View

TCF | Aberdeen School District

MEETING MINUTES

TCF Architecture

ASD Harbor Learning Center (HLC) Replacement
DAC Meeting #6 – Meeting Minutes

Meeting Date: 7/16/2025
Meeting Time: 1:00pm-3:00pm
Meeting Location: HLC & Zoom Meeting
TCF Architecture Project Number: 2025-001

Attendance:

Present	Name	Representing	Email
✓	Steve Wachtler	TCF	stevew@tcfarchitecture.com
✓	James Mill	TCF	JR@tcfarchitecture.com
✓	Tyler Combs	TCF	Tylerc@tcfarchitecture.com
✓	Daniel Vu	TCF	Danielv@tcfarchitecture.com
✓	Andy Twyman	CSG | ESD 112	andrew.twyman@esd112.org
	Drew Pearson	CSG | ESD 112	drew.pearson@esd112.org
✓	Manuel Saldivar-Aguirre	CSG | ESD 112	manuel.saldivar-aguirre@esd112.org
✓	Lynn Green	ASD / Superintendent	lgreen@asd5.org
	Lisa Griebel	HLC / Principal	lgriebel@asd5.org
	Natalie Tillery	HLC	ntillery87@gmail.com
✓	Amy Rasler	HLC / Secretary	arasler@asd5.org
	Cordell Trusty	HLC	cotrusty@asd5.org
	Bryce Fitzpatrick	HLC	bfitzpatrick@asd5.org
✓	Stephanie Hoffman	HLC / Teacher	shoffman@asd5.org
✓	Kris Bitar	HLC / Teacher	Kbitar@asd5.org
✓	Kayla Sturm	HLC / Teacher	ksturm@asd5.org
	Danica Alexander	HLC / Student	
✓	Emma Wimberley	HLC / GED	ewumberley@asd5.org
✓	Courtney Sandstrom	ASD / PM	csandstrom@asd5.org
✓	Robert Sutlorich	HLC/Teacher	rsutlorich@asd5.org
✓	Matt Mahon	ASD / Technology	mmahon@asd5.org
	Additional DAC Members TBD	HLC	TBD

Agenda Items:

Item #	Discussion Topic	Notes/Coordination
1. General		

1.1	Introductions & Sign-in	• Introductions & sign-in.
		  ○ **See above for meeting attendance.**
		• Overview of meeting objectives.
		  ○ Review of progress renderings including interior views.
		  ○ Comment on a further refined color scheme.
		  ○ Review current floor and site plan layouts.

1.2	Project Schedule Update	• Review key milestones and timelines.
		  ○ SD 65% set sent to District for review on 7/11. Comments due back by July 22nd.
		  ▪ **TCF discussed that they were looking for feedback on the 65% Set from the Leadership Team and the DAC by July 22nd. Steve told the group to focus on the floor plan and site during their review.**
		  ○ August 12th 95% SD set to Cost Estimator.

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1.3	Massing & Material Concept Selection & Refinement	• Review Concept C from the last meeting. o **TCF presented updated renderings of Concept C, including additional views of the north side of the building. The yellow accent color was removed from the exterior, and additional details were shown in the renderings, including solar panels. The DAC liked the design direction presented.Review of Color options from last meeting.** o **TCF presented a darker brick version of the front building elevation. There was a split in the group on who liked the lighter brick versus the darker brick. There were comments about switching the metal siding colors between the two schemes. No one in the group disliked either color scheme, and there was a slight leaning toward the lighter color scheme, which some thought might have more of a coastal feel. Some group members suggested that seeing renderings of the two back views of the building might help the group make a decision. TCF will put together renderings of the rear of the building with the darker brick option. Some in the group thought the exterior space might feel a little dark with the darker brick option since it is a more confined space.** • Review of Refined design rendering images. (Exterior, interior, and site views) o **Permanent shading was requested at the Snug Harbor play area. This was preferred over a canvas solution. One idea was to use a portion of the covered area outside the commons to meet the shading requirement. This would be a more cost-effective solution than adding an additional canopy.** o **There was concern that there should be a physical and visual separation between the Snug Harbor play area and the HLC outdoor area.** o **TCF was asked to look into the minimum fencing height around the Snug Harbor play area. There was a comment that 48" may be the requirement. The space is large enough that it will require two gate exits with panic hardware. Snug Harbor has been penalized by the licenser in the past for having gates and hardware that were not in compliance at their existing facility.** o **Lynn said that she liked the fact that we were showing perimeter site fencing for safety and security reasons.** o **A request was made to add fencing to separate the HLC outdoor seating from the service drive.** • Review of rendering and animation (Interior only) o **TCF presented a rendering and animation of the commons/cafeteria space, showing what it would look like activated with students. TCF also pointed out the clear supervision in the space from Lisa's office on the second floor. People liked the HLC logo on the wall and the overall look and feel of the space.** o **Shades were requested on the exterior windows of the commons/cafeteria for times when the projection screen is being used. TCF said they can specify electrically operated blackout shades in that location.** • Review of virtual reality image. o **TCF passed around a VR headset that displayed a panoramic image of the commons and cafeteria, allowing users to experience the space. People liked the look and feel. Some commented that they appreciated the natural daylight in the gym, while another noted they liked the location of the projection screen on the kitchen wall.** • **TCF was given the contact information below for the new licenser.** o **Daycare Licenser contact info:** **Jess Burnside (she/her) MHRE | Child Care Licensing Supervisor** **Child Care Licensing | Region 6** **Olympia Office 360-480-1175 | Cell 360-280-4531 | Fax: 360-902-7903** **PO Box 40972, Olympia WA 98504** **Work Schedule: M-Th, 7 AM to 5:30 PM**

1.4	Site & Floor Plan Updates	• Review site plan.
		  ○ **See 1.3, Review of refined design renderings for feedback on the site design elements.**
		• Review updated floor plan specific to the 2nd floor student store area.
		  ○ **TCF presented a revised student store layout. Stephanie liked this layout, which was much closer to the layout developed as part of the Ed Spec Phase. It had a direct connection to the Business / Marketing classroom, and the layout of the store itself was much better.**
		  ○ **A question was raised regarding how building occupants in wheelchairs egress the building in case of emergencies. TCF said that elevators can't be a planned route of egress, but typically we locate semi-recessed evac sleds at each stair. A product that TCF has specified for several other districts can be found at the following link: https://evac-chair.com. See data sheet attached to the meeting minutes.**

1.5	Take Aways	• TCF to summarize takeaways and feedback from DAC Meetings.
		  ○ **TCF to continue developing drawings and design for the upcoming pricing set.**
		  ○ **TCF to create additional renderings of the exterior with the dark brick for review by the DAC (updates attached to meeting minutes).**
		  ○ **TCF to incorporate the site, fencing, and shading revisions discussed in the meeting.**
		  ○ **TCF to continue reviewing daycare requirements and reach out to the new licensor.**
		  ○ **TCF to study options for projection screen locations and incorporate requested window coverings into the documents.**
		  ○ **TCF to incorporate evac sleds into our documents at the top of each stair. Cutsheet attached to meeting minutes.**

2. Next Meeting		
2.1	Schematic Design Phase meetings are concluded	• **No more planned DAC meetings for the Schematic Design Phase. The next meetings will start up in the Design Development Phase when we begin developing all of the walls of the interior spaces and review all rooms' casework, furniture, equipment, electrical, plumbing, wall finishes, etc., in greater detail.**

Massing & Color



Color Scheme 1:
North View



Color Scheme 2:
North View

Shaping the Look of Learning



Communal Space:
Cafeteria / Commons View

Shaping the Look of Learning



Shaping the Look of Learning



Snug Harbor Play:
NOrtheast View

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