



# MIDDLEBROOK ENGINEERING, LLC

July 18th, 2024

Jeff Brown Architecture, LLC  
Attn: Ms. Songyi Cho  
12181 C St S.  
Tacoma, WA 98444

## RE: CCS-Elementary

The following is a letter for the ventilation requirements for Cascade Christian School per IMC 2021 and Washington State Health and Safety Guide for K-12 Schools, 2<sup>nd</sup> edition, January 2003.

The assumption is that each space is served by existing 2.5-ton BARD units, a packaged vertical heat pump solution commonly seen in classroom portables. Each unit returns low and supplies high, allowing a distribution effectiveness of 1.

According to email correspondence, the area of the classrooms is 869 SF, the area of the library is 1344 SF, and the resource room is 488 SF. The classrooms are a combination of double and single portables. The library and resource rooms are contained within a double portable and has a partition designed to allow air to freely flow through.

All values listed below were calculated per the IMC 2021-chapter 4 table 403.3.1.1. The health department requirements that were sent to Middlebrook Engineering are 15 CFM/ occupant. The higher of the two calculated values is recommended to be used in the respective space.

- Each 869 SF classroom will need 325 CFM of OSA per IMC and has an occupancy of 22 people. The Owner requested that the space be evaluated at 25 Occupants.
  - Health Department requirement is 375 cfm. **We recommend the spaces default to the Health Department requirement of 375 CFM.**
- The library will require 235 CFM of OSA per IMC and has an occupancy of 14 people. The Resource(office) space will require 45CFM of OSA per IMC and has an occupancy of 3 people. The Owner requested that the space be evaluated at an aggregate of 32 occupants.
  - Health Department requirement for this number of occupants is a total of 480 CFM. **We would recommend that each BARD unit be rebalanced to 240 cfm since there is open transfer of conditioned air between all spaces.**

The existing BARD units should be evaluated for use with the modified CFM as well as continued use due to equipment age. In the classroom portable, it is doubtful that the existing unit will be able to handle the amount of ventilation air proposed.

A DOAS is recommended for this space to handle the ventilation load. The DOAS can potentially be an add-in module to the existing system, if the module is compatible with the legacy units.

Note, additional CFM could affect heating/ cooling loads. Please see attached Calculations.

Please let me know if you have any questions,

Sincerely,

Brian S. Middlebrook, PE, LEED AP  
Principal



Please clarify how all mechanical equipment will comply with Washington State Mechanical Code 102.7 and 105.3.

Furthermore, per provide calculations noted in the ventilation letter. You will need to also identify what option will be used for ventilation will be used as the letter is written as recommendations based upon a number of factors.

entilation Letter)