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| To: Lauri Strauss Principal in Charge design2 LAST inc 543 Main St., Suite 101 Edmonds, WA 98020 | Date: July, 22,2019 |
| From: Brian Moll, P.E., S.E. | Project: Whatcom Cty Jail – Smoke Evac |
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Smoke Evacuation System – Structural Commentary:

Hollow core slab by its very nature is not conducive to large openings being cut into it after it has been designed and installed. Openings for a hollow core slab designed system typically require all openings be known and located on the design drawings so that the hollow core slab manufacturer can adjust the prestressed strand layout and add mild reinforcing and/or steel embeds to address the loss of strength and stress concentrations that result from the opening. Openings are limited in size, and quite often located so that it is shared between two adjacent panels. This is true whether the hollow core slab is used in the horizontal orientation such as a floor or roof slab, or the vertical orientation such a bearing/shear wall.

The size of the penetrations through the roof hollow core slab, required for the smoke evacuation system, 36x36 and 48x48 would compromise the structural integrity of the existing hollowcore slab. Therefore, the existing hollow core roof slab would need to be removed and a new cast-in-place system added back in with the smoke evacuation system penetrations cast in. This would allow the additional reinforcing necessary to address the penetrations in the new conventionally reinforced slab.

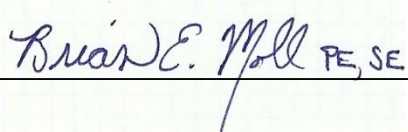
The openings would essentially occur in each 8' wide hollow core slab, therefore requiring the removal of the entire 27'-4" spanning hollowcore roof slab over the housing units. Removal of the Hollowcore slab would require a crane to lift the individual hollowcore slabs as they are sawcut free. In addition the existing concrete at each end of the hollowcore would need to be carefully chipped away to free the hollowcore from the wall dowels and embed connections. The roof would be replaced by an approximately 12" thick conventionally reinforced concrete slab. It is likely this process would need to be phased, with replacement work occurring simultaneously with the removal work, so that the bearing walls were not unbraced due to a missing roof diaphragm for long periods of time.

For the hollowcore wall panels at the western side of the housing units, the new 24"x48" penetrations would also likely compromise the integrity of the vertical and lateral load carrying ability of the panels. In this instance, the stucco and insulation would need to be removed and an estimated new 4"-6" +/- thick reinforced shotcrete layer added to compensate. It is likely this additional shotcrete load would need to be carried down to foundation.

CONCLUSIONS/LIMITATIONS:

1. It seems that due to the complexity and inherent risk with this type of strengthening / upgrade required to accommodate the proposed smoke evacuation system, that the jail would need to be empty of county workers and inmates, in and adjacent to, the area in which the work was being done.
2. It would be prudent to bring on a General Contractor that does this type of upgrade work as a consultant to discuss likely costs, risk, potential safety, and phasing issues.

Please contact us if you have questions.

Signed: 

Date: 22 July 2019

Sincerely,

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Principal-in-Charge

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