

Date: 11/03/2022

Paul Michell GLMV Architecture 9229 Ward Parkway Blvd Suite 210 Kansas City, MO 64114

Reference: Lee's Summit Fire Station 4 Storm Shelter Peer Review

Dear Mr. Michell,

As requested, we have conducted a peer review of the storm shelter portion of the above referenced project to determine conformity to the 2020 ICC 500. Our review is based on the signed and sealed drawings dated October 19, 2022. Based on the drawings provided, the storm shelter appears to be approximately 17' by 45' and located on the first floor of the new fire station. The shelter is constructed with masonry walls and cast in place concrete roof supported on shallow foundations and the adjacent floor structure is attached to the shelter roof.

For the purpose of this report, any references to "EOR" pertain to the overall structural engineer of record for the project (Leigh and O'Kane), and any references to "AOR" pertain to the architect of record (GLMV Architecture, Inc).

Construction Documents Comments:

We reviewed the construction documents to verify the required design information and correct structural design criteria per Chapters 1 (Sections 106, 107, 110 and 111) and 3 are shown and suggest the following modifications:

- 1. Section 106.2.1.13 A floor plan specifically locating the storm shelter on the Architectural and Structural drawings is required. A blow up has been provided on G-004, but it is not called out on the overall floor plans.
- Section 106.2.1.18 Venting area is required to be listed. Architectural sheet G-004 indicates it is
 per the MEP drawings, but we are not able to find it on the MEP drawings. We recommend either
 the Mechanical Engineer or AOR list the venting requirements associated with Section 702.4. All
 venting penetrations need to be coordinated with the EOR.
- 3. Section 111.1 Structural observations shall be provided during construction of the shelter by a registered professional. This requirement needs to be listed in the construction documents.

Sheet S-302

1. Sections A1 and C6 indicate a connection to the storm shelter with an edge angle and post installed anchors. The embedment length for the anchor was not provided so the connection strength could not be reviewed. The EOR should verify that the storm shelter has been designed for a force which equals the ultimate failure strength of the connection, or the element being connected, whichever is less, per Section 304.9.

Sheet S-303

1. Sections A4 shows the storm shelter slab cantilevered over an inset drinking fountain. A calculation was not found for this unique condition. The EOR should verify that the storm shelter slab has been designed for the cantilever loads combined with the connection loads per Section 304.9.

Sheet S-307

Section C2 indicates the requirements for louver opening protection in the shelter lid. The section shows the #4 bars to be spaced at 2 ³/₄" on center. Considering the rebar diameter, the clear area is 2 ¹/₄" x 2 ¹/₄" with an area of 5.06 square inches. However, per section 306.6, the maximum area must not exceed 3 ¹/₂" square inches. We recommend decreasing the spacing to 2 ¹/₄" on center each way.

Sheet M101

1. The HVAC plan shows a 4" diameter dryer vent extending through the storm shelter roof. It is unclear how this is possible considering the missile protection detail C2/S-307. We recommend the EOR and AOR coordinate the penetration requirements for the dryer vent.

Calculation Comments:

Structural calculations were provided by Leigh and O'Kane, dated 10.19.22. We provide the following comments:

- 1. On page 3 of 799, a statement has been included regarding connection to the storm shelter and that the main structure is considered independent from the shelter. However, per the drawing sections, the floor structure is connected to the storm shelter. We recommend revising the sentence to indicate the floor attachment.
- On page 11 of 799, the Kd factor is listed as 0.85. ICC 500 Section 304.3 requires a factor of 1.0 for determining the wind loads. We recommend the EOR confirm that the correct coefficient was used in the MFWRS pressure calculations, and the shelter has been designed for the correct wind forces.
- 3. On pages 11 and 16 of 799, the internal pressure coefficients are listed as +/- 0.18 in the general wind load requirements. The subsequent load case tables show the coefficients as +/- 0.55 that are listed on the drawings. We recommend the EOR confirm that the correct coefficients were used in the pressure calculations, and the shelter has been designed for the correct wind forces.
- 4. On page 50 of 799, the maximum ultimate slab moment is listed as 12.0 kft/ft. However, based on our calculations, the maximum dead plus live load moment is 17.6 kft/ft. While the slab calculation indicates that the capacity is sufficient for the higher moment, we recommend review of the maximum loading and capacity to confirm sufficiency.

This concludes our review of the currently available construction documents for the storm shelter. Based on our review, we recommend acceptance of the storm shelter design pending the modifications listed herein. It must be noted that our limited scope of work does not include an exhaustive review of the entire structural design for the project. The responsibility for the adequacy of the design of the storm shelter and all other structural elements of the project remains with the EOR. Our review consists of structural design items and criteria only, and additional peer reviews should be provided for other disciplines for chapters 4, 5, 6, and 7 of the ICC 500. Please call us if you have any questions or need additional clarification concerning these comments. Should you desire us to continue with a more detailed review or have any questions regarding this report, please let us know.

Sincerely,

John Funk, PE Principal

