



January 14, 2025

via e-mail

Ms. Sharon Bloom
City of Lee's Summit
220 SE Green Street
Lee's Summit, MO 64064

RE: Storm Shelter Structural Peer Review
Lee's Summit Joint Operations Facility
Lee's Summit, Missouri

Dear Ms. Bloom:

As requested, TESSERE has conducted a peer review of the storm shelter portion of the above referenced Project to determine conformity to the 2014 ICC 500. Our review is based on the Construction Drawings provided to us on 11/20/2024. The Drawings have multiple issue dates along with multiple dates on the signed professional seals.

This report pertains to the architectural review referenced in the attached structural review by Leigh and O'Kane.

CONSTRUCTION DOCUMENTS COMMENTS:

1. Sheet G-103 – Required Design Information:
 - a. Note 2: ICC 500 2014 Section 107.2.2 – This requirement is called out on Sheet S-000 under Design, but the reference that says 22020 should be 2020.
 - b. Note 4: ICC 500 2014 Section 107.2.4 – Specify which Structural Sheet this information is located on.
 - c. Note 5: ICC 500 2014 Section 107.2.5 – Specify which Structural Sheet this information is located on.
 - d. Note 6: ICC 500 2014 Section 107.2.6 – Specify which Structural Sheet this information is located on. I could not find this information.
 - e. Note 7: ICC 500 2014 Section 107.2.7 – Specify which Structural Sheet this information is located on. I could not find this information.
 - f. Note 10: ICC 500 2014 Section 107.2.10 – Plans say to reference Architectural Drawings for doors and overhead coiling door information. The details for these doors are either not provided on the Drawings or they do not show how the doors will be anchored to the building. Specification Section 081113 does not call out any anchorage for concrete. In Section 107.2.5, the Construction Documents shall provide or include any special manufacturer's details or installation instructions for systems or equipment designed for the storm shelter.
 - g. Note 16: ICC 500 2014 Section 107.2.16 – Venting area is required to be listed on the Plans.
 - h. Note 18: ICC 500 2014 Section 107.2.18 – Specify which structural sheet this information is located on. I could not find this information.

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2. ICC 500 2014 Section 106.4 – Structural observations shall be provided during construction of the shelter by a registered professional. This should be listed in the Construction Documents. ICC 500 2014 Section 306.8 – Concrete expansion joints or precast concrete panel joints 3/8-inch or less in width sealed with a joint material in accordance with ASTM C920 for concrete. I could not find any information on the joint sizes, nor did I have the Specification for joint material to review.

Based on TESSERE's review, we recommend acceptance of the storm shelter design pending the modifications and confirmations listed in this report. TESSERE's limited scope of Work does not include an extensive review of the entire building design for this 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. This review consists of architectural design items and criteria only.

Sincerely,

TESSERE

A handwritten signature in black ink, appearing to read 'Chaz Prunte', with a stylized, cursive script.

Chaz Prunte | AIA
Project Manager | Architect

RCP/jh

c (w/enc.): 18225R24001



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01/09/2025

Sharon Bloom
City of Lee's Summit
220 SE Green Street
Lee's Summit, MO 64063

RE: Lee's Summit Joint Operations Facility – Storm Shelter Structural Peer Review

Dear Ms. Bloom,

As requested, Leigh + O'Kane has conducted a peer review on the structural information of the storm shelter portion of the above referenced project to determine conformity to the 2014 ICC 500. Our review is based on the construction drawings and structural calculations provided to us on 11/20/2024. The drawings have multiple issue dates along with multiple dates on the signed professional seals. The structural calculations that were provided have multiple dates associated with different sheets of the calculations and are not signed and sealed by the Engineer of Record (EOR). A supplemental calculation was provided to us on 12/16/2024 for the wind loading on the storm shelter. This supplemental calculation is dated 9/2/2024 and is not signed and sealed by the EOR.

Based on the information provided on the drawings, the storm shelter appears to be approximately 133 feet long by 84 feet wide with a height of 36 feet. It is located as the southern portion of the new structure and appears to be structurally independent from the northern portion of the new building. It is two story construction with a cast-in-place concrete shallow foundation system, structural precast concrete walls, a steel composite beam system for the second-floor structure, and precast concrete double tees as the roof structure.

For the purpose of this report, and references to "EOR" pertain to the structural engineer of record for the project (J&S Structural Engineers), and any references to "AOR" pertain to the architect of record (Hoefler Welker).

Construction Documents Comments:

Leigh + O'Kane has reviewed the construction documents to verify the required design information and correct structural design criteria per Chapters 1 (Sections 106 and 107) and Chapter 3 of the 2014 ICC 500 are shown. Below are the comments as they relate to this review.

1. Section 106.4 – Structural observations by a registered professional are required during the construction of the storm shelter. This requirement needs to be listed in the construction documents.
2. Section 107.2.1 – Sheet G-103, Note 16 states "Venting area provided and locations within shelter: refer to mechanical documents." Venting area and locations for the storm shelter were not found in the mechanical drawings provided. It is recommended that these items be provided in the construction documents.
3. Section 107.2.2 – When a storm shelter is to be constructed as a portion of a host building, the walls and floors enclosing the shelter shall be clearly indicated on the drawings. Sheets S-100, S-200, and S-201 don't appear to have the walls and floors of the storm shelter clearly defined. It is suggested to add information that defines what walls and floors are part of the storm shelter.
4. Section 302.1 – EOR to ensure that the storm shelter is designed using ASCE 7, section 2.3 load combinations with W determined in accordance with Section 304 of the 2014 ICC 500. This information was not apparent in the received calculation set.



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5. Section 303.1.1 – The design team is to ensure that the design rainfall rates have been calculated by adding 6 inches of rainfall per hour to the rainfall rates established from Figure 303.2 of the 2014 ICC 500. This information was not apparent in the construction documents received.
6. EOR to ensure that any underground portions of the storm shelter have been designed for buoyancy forces and hydrostatic loads assuming the ground water level is at the surface of the ground at the entrance to the storm shelter, or adequate drainage is available to justify designing for a lower ground water level.
7. Section 304.3 – The wind load calculation for the storm shelter show that the wind loads have been calculated using a Wind Directionality Factor (K_d) = 0.85. Section 304.3 of the 2014 ICC 500 requires the wind loads to storm shelters be calculated using a K_d = 1.0. It is recommended that the EOR confirm that the correct coefficient was used in the MFWRs pressure calculations and that the storm shelter has been designed for the correct wind forces.
8. Section 306.3 – The design team is to ensure that all openings in the shelter envelope are protected by doors complying with section 306.3.1, windows complying with section 306.3.2, other impact-protective systems complying with section 306.4 or baffled to prevent wind-borne debris from entering the shelter protected occupant area in accordance with Section 306.5.
9. Section 309.1 – The design team is to ensure that all penetrations through the storm shelter envelope comply with section 309 of the 2014 ICC 500.
10. Sheet S-311 Detail 24 shows the connection of the diaphragm to the precast walls with an embed. Loading to the precast embed is shown as vertical dead and live load only. It is anticipated that diaphragm shear load would be present at this connection as well. It is recommended that the diaphragm shear transfer loading be listed to ensure the proper design of the embedded plate in the supporting precast concrete walls.

Based on Leigh + O'Kane's review, we recommend acceptance of the storm shelter design pending the modifications and confirmations listed in this report. Leigh + O'Kane's limited scope of work does not include an extensive review of the entire structural design for this 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. This review consists of structural design items and criteria only. Additional peer reviews should be provided for other disciplines for chapters 4, 5, 6, and 7 of the 2014 ICC 500. Please contact Leigh + O'Kane if you have any questions pertaining to these comments.

Sincerely,

Wayne Hess, P.E.
Director of Engineering
Leigh + O'Kane

