



June 27, 2024

Sam Adams  
3508 96<sup>th</sup> Ave SE  
Mercer Island, WA 98040

Re: Responses to 2/23/2024 Review Comments  
Adams Residence

Following are our written responses to the 2/23/2024 structural review comments for Adams Residence from the City of Mercer Island.

### Structural

1. [S1.1] ASCE 7-16 doesn't have a lateral system with this description (sheathed with steel sheets) with R=3. Please provide documentation of the engineering approach to the lateral system. IBC 2021 does provide some guidance for lateral design with an R=3, but with other constraints imposed on the detailing.

*Response: We are proposing a lateral system quality assurance and verification based on the following:*

- a. *We have revised the design so that the seismic force resisting system complies with section 3115.8.4.2(1) of the 2021 IBC, specifically design and details will be in accordance with ASCE 7, Table 12.2.1 for light-framed bearing wall systems with shear panels of all other materials.*
  - b. *Allowable shear values shall be demonstrated by testing per section 3115.8.4.3. Each container wall to resist lateral loads will be tested by the manufacturer after construction and before shipping. Testing will be performed in accordance with International Standards Organization standards for shipping containers and each will be provided with a certificate showing test loads, test results, and conformance. Target test loads are provided on the plans with test criteria. Note that the containers are expected to be in the elastic range with a maximum of 0.0019 which is within AISC erection tolerance for column shipping pieces.*
  - c. *See below for additional QA requirements.*
2. [S1.1] I can find no reference for this standard. This project is IBC 2018, which does not reference intermodal shipping containers as a structural material. They are incorporated into IBC 2021 section 3115, which may be helpful to specify. Regardless of the code basis established, please develop a program for the inspection and acceptance of cargo containers as a building material. One such available resource is published by Los Angeles Department of Building Safety: <https://www.ladbs.org/docs/default-source/publications/information-bulletins/building-code/cargo-container-conversion-to-building-modules.pdf>

*Response: The standard is referenced in chapter 31 of the 2021 IBC, section 3115.8. See above for proposed testing to meet 2021 IBC requirements. This project does not use cargo containers converted to buildings. These are purpose-built steel buildings similar to cargo containers in construction.*

3. [S1.1] Provide a comprehensive statement of special inspection conforming to WSBC 1704.3 in the construction documents. Include each required inspection for construction types used. Include in the statement a specific section addressing WSBC 1705.1.1 for gravity and lateral components of the container construction, and the appropriate special inspections (both during fabrication and during erection/construction)

*Response: Once the containers are on site, the exterior welds are to be observed per the special inspections sheet. All exterior welds are to be inspected and a representative area of the internal welds will be exposed and inspected.*

4. [S1.1] 1704.6 doesn't have guidance for structural observation of modular buildings. There are no conventional hold-downs shown in the drawings, although there is an embed 4/S3.2.

This is a very specialized and non-standard construction type for residential construction. 1704.6 asks to "identify the frequency and extent" of the observations. Please develop a detailed schedule of the appropriate times for the registered design professional to visit the site or observe any fabrication and for what purposes.

1704.6 also requires the observer to prepare and submit a letter to the building official at the conclusion of construction. Include in these structural notes clear instructions that the construction will be made available for all phases noted in the schedule, and that the final close out letter to the building official is required prior to final inspection.

*Response: The modular buildings are steel buildings, which use common materials and techniques of construction. Although unusual in residential construction, the details of construction in this project are commonly used in commercial, industrial, and other construction industries. We have engineering design and construction administration experience with steel framed commercial buildings with similar details of construction. Structural observation is noted on the plans to be required for the fabricated structural steel, including connections between containers to complete the floor and roof diaphragm (9/S5.1, 8/S.53, 12/S5.3), container to container connections (7/S5.2, 8/S5.2, 7/S5.3), and embeds (4/S3.2). In addition, we will observe the delivered containers prior to the start of construction for damage, and conformance to the plans and details.*

5. [S1.1] Incorporate all values from the provided geotechnical report into these notes and refer to the report by project number (or date) and stamping engineer.

*Response: A reference to the Geotech report has been added to S1.1 and the appropriate values incorporated.*

6. [S2.1] 4/S3.2 is not called on plan. how many locations does it occur?

*Response: 4/S3.2 does not apply to sheet S2.1. See holddown/embed locations on S2.2.*

7. [S2.2] If the shear transfer mechanism from interior walls in the N/S direction is out-of-plane loading on the top of the basement walls, provide a design for the applied load for the wall.

*Response: The lateral loading does not create out-of-plane loading on the top of basement walls, all lateral loading is sent to in-plane walls.*

8. [S2.2] Provide a load path for the interior shear walls that do not continue to grade. For shear walls that do continue to grade or for collectors which receive shear from a diaphragm, clarify the attachment to grade (for instance, at Grid 6 there is no foundation detail below the shear panel)

*Response: Shear walls at interior locations land on beams or columns that transfer overturning forces down to the foundation. Updated calculations can be found in the calc packet that dictates the load path.*

*The lateral loads are transferred through the diaphragms to the concrete retaining walls.*



9. [S2.3] Provide all structural details of the re-support of structure and connections for C5 members. Remember that this stair penetrates both container floor and container ceiling structure.

*Response: The stair framing is part of the original custom container framing by the manufacturer and will follow connection details 4/S5.1*

10. [S2.4] 7/S5.3?

*Response: Plan updated*

11. [S2.4] Plan Note 7

*Response: Plans updated*

12. [S2.4] Provide detail 12/S5.1

*Response: Detail 12/S5.1 has been added.*

13. [S2.4] Provide enough structural detail to specify the floor system. Are these sleepers over the metal deck? Does the metal deck and sleeper support floor load, or are the container floors used to transfer to the W14X74 and W21 edge beams?

*Response: Detail 12/S5.1 has been added to clarify the floor system. Sleepers are over the metal deck for the floating area. The W14x74 and W21 edge beams transfer that load to the container columns which transfer it down to the foundation.*

14. [S2.4] Clarify floor deck selection. In triple-span condition, unfilled W2 floordeck is L/360 at a live load of 28 psf.

*Response: The metal floor deck has been updated appropriately.*

15. [S2.4] Please fully coordinate the configuration between structural and non-structural sheets. (3) 8' CW panels are specified on this sheet to provide support in the E/W direction. All of these panels are glazed full-width on sheet 8 elevations. This review did not check for other similar conflicts.

*Response: We understand that the architectural drawings have been coordinated with the structural drawings by the architectural designer.*

16. [S2.4] Due to conflicts between structural and non-structural sheets and requested information on material strengths, design approach, and nonstructural detailing, additional review comments are anticipated on the 2nd submittal.

*Response: Understood*

17. [S2.5] Provide a detail of the connection of the top rail to the corner post (continuous support of the top rail by corrugated wall has been modified and this connection is unknown in the original container construction)

*Response: These containers are not modified but are purpose-built by the container manufacturer to meet ISO standards. ISO standards require a 250 psf live load capacity for the container floor and two 6000 lb wheel loads 30" apart. Container top rails are welded to the corner castings per the container manufacturer.*

18. [S2.5] Detail 11/S5.3 transfers roof load from the HSS5x2 to the "top rail," presumably a component of the 3rd level container. Provide design of the top rail for the condition shown on exterior elevations on sheet 9. This condition also occurs at Grid 6.

*Response: This detail dictates the connection to allow the sloped roof. The gravity load would still transfer through the container roof system as designed by the container manufacturer. The three point loads are equivalent to a uniform load.*

19. [S2.5] None of the details on this sheet show any interaction with the container modules on the 3rd level, and 8/S5.3 shows wood framed wall at the exterior.

*Response: The span between the container towers is supported by steel beams with wood walls. The connection between the container and the span is defined by details 9/S5.1, 10/S5.3, and 12/S5.3.*

20. [S2.5] Without a gravity beam key, I'm having significant difficulty tracing the designs for the steel proposed. Calculation page 18 has a callout for W8x18, but no design appears to correspond to the length here.

*Response: We will update the calculations packet for clarity and provide updated calcs as needed.*

21. [S2.5] 12/S5.3 is cut here and HSS 6x6 is specified on the level below. Is this HSS installed to replace the container corner?

*Response: The HSS 6x6 is intended to be consistent with the corner casting size. For clarity we call it out at the corners as well.*

22. [S3.2] The retaining wall calculations provided do not appear to have been coordinated with the geotech report. (passive of 350 vs 250 in report, friction of .45 vs .3, active pressure of 35 vs 40, no 7H lateral seismic increase)

*Response: See the revised calculations.*

23. [S5.2] Shear walls described on 4/S5.2 extend from top rail to bottom rail. This detail appears to show the connection of the floor diaphragm (the decking) to the bottom rail. Please fully specify the diaphragm attachment to the rail.

*Response: The load path for each diaphragm is into the adjoining top or bottom rail. Corrugated metal roofs are welded directly to the top rail with welds to match the plate thickness. Floor diaphragms are screwed with 5/16" self-drilling self-tapping screws spaced at 10" on-center each way into the floor joists and a 1/8" horizontal angle continuously welded to the bottom rail. The loads from the bottom rail are transferred through corner connections and shims welded into the top rail where it transfers into the next shear wall segment or beam below.*

24. [S5.2] Clarify on this detail of these components are specified as part of the structural design or if they are part of the container construction (floor, joists, rails, angles, attachments of above)

*Response: Details 1, 4, 5, and 6 on S5.2 are the container designers responsibility.*

25. [S5.3] This angle appears to be the only opportunity to connect the roof diaphragm to the top rail, which continues to the corrugated shear panel. Please note the connection from deck to angle. Since this angle is continuous and would act as collector, please specify a splice for the angle.

*Response: The roof has two diaphragms. An upper diaphragm consisting of metal deck welded to the angle per detail 9/S5.2, and a lower diaphragm consisting of the container roof. The upper diaphragm serves to resist seismic loads from the roof overframing, i.e. its self-weight. The lower diaphragm is designed to resist load from the container, i.e. walls and roof. The angle is intended to deliver load from the upper roof deck to the top rail, which is continuous from corner casting to corner casting. The top rail acts as the collector. The angles are not required to be spliced.*

26. [S5.3] This detail is cut at the 3rd level and roof level. What is this material?

*Response: Insulation per the architectural drawings.*

Please call if you have any questions regarding the above information.

Sincerely,



Tyler Witthuhn, PE  
Project Engineer  
509-588-0027  
[twitthuhn@ssfengineers.com](mailto:twitthuhn@ssfengineers.com)



Zane Kanyer, PE, SE  
Principal  
509-588-0026  
[zkanyer@ssfengineers.com](mailto:zkanyer@ssfengineers.com)