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Lake House — Corrections Response Letter

Building Plan Reviewer: **City of Mercer Island**

Response to:	2012-200 Lorenzini Remodel 2R
Dated:	June 17, 2021
Permit #:	2012-200
Project address:	3310 97th Ave SE Mercer Island, WA 98040

Thursday, July 8, 2021

Please find the following responses to the correction notice.

Nonstructural

1. A vapor barrier should not be installed at basement or below-grade walls per IRC R702.7. See Wall Type W5 at Media Room 016 in Building Section 2/A4.01. See also Wall Type W5a, etc.

Response:

See A9.12 for revised wall types W5, W5a, W5b, W5c

2. Unvented attics must comply with IRC R806.5. A vapor barrier cannot be installed on the underside. Update Roof Type R6, R8, R10, R11 & R12.

Response:

- **See A9.11 for revised roof types R6,R8,R11,R12**

- There were no vapor barrier installed on the underside for R10

3. Clarify the Foundation Plan, Sheet A2.01, to identify vented and unvented crawl space areas. If applying the provisions of IRC R408.3 for unvented crawl spaces, indicate how you are complying with the noted code requirements. If venting some crawl space areas, evaluate required area and indicate how venting is provided.

Response:

- See updated notes and calculations on A2.02 for unvented crawl space area.

- See A 9.11 for updated floor type F1, and see A4.01and A4.02 for the locations .

- All crawlspaces are to be mechanically ventilated, separate permit will be submitted for mechanical system.

- See General Notes45-48 on T1.01 for extra notes about potential radon entry routes.

4. The profile of stairs must include a nosing if the tread depth is less than 11 inches per IRC R311.7.5.3. See Detail 2/A6.11. Also, it is unclear which detail applies to the guard and which detail applies to the handrail. Please clarify the drawings.
   Response:
   - See 2/A6.11 for nosing dimension updates.

   - See detail callouts on 1/A6.11and 2/A6.11.

   - See 3/A6.11 for handrail and guardrail detail at STAIRWAY 119

5. The glass panels around the stairs must be specified as safety glazing per IRC R308.4.4. Call this out on Sheet A6.11.
   Response:
   See updated notes in 1/A6.11 and 2/A6.11.

6. The handrail configuration must meet the requirements of IRC R311.7.8.3 regarding grip size. A Type II handrail must have a graspable finger recess as specified in Item 2. Update details on Sheet A6.12.
   Response:
   - 1/A6.12 and 2/A6.12 are for guardrails, see updated notes.

   - See 3/A6.11 for stairway handrail detail, no graspable finger recess is needed as the perimeter is within 6-1/4".

7. It is clear that the new pool will be reviewed under separate permit. Please clarify, however, if it will be provided with a powered safety cover per ASTM F1346 or if barriers will be incorporated into the design per 2015 International Swimming Pool and Spa Code Section 305.1.
   Response:
   - The project will use the barriers method. See the supplementary material included in the submittal package for
   Page1-6, email exchange with Don Cole about fences terminated in water
   Page7-8, pictures for existing east and west property line fences in water

   - See 5,6/A6.12 for drawings of existing fences that meeting the barrier requirements in 2015 ISPSC.

   - See 4,7/A6.12 for drawings of existing fences with addition to meet the barrier requirements in 2015 ISPSC.

- See A9.02 for exterior gates that meeting the barrier and gate requirements in 2015 ISPSC

- See A9.02 for remark update about sliding doors facing the pool, added water hazard entrances alarms in accordance with UL2017.

8. At the masonry fireplace, the ash dump cleanout requires a ferrous metal door and frame per IRC R1001.2.1. Clarify how ash removal is to be accomplished. See overall fireplace section in Building Section 1/A4.01.
   Response:
   Ash dump is removed. See A6.01

9. It appears the roof area of the A1 vented space is incorrect in the table on Sheet T1.02. It should be revised to coordinate with the plan.
   Response:
   See T1.02 for updated diagram and calculations.

10. The attic vent graphic on Sheet T1.02 shows a portion of the garage with an unvented roof. The structural drawings also imply an unvented roof; see the Roof Framing Plan on Sheet S2.2 and Details 16 & 18/S4.1 which show the insulation above the plywood sheathing. We do not find that Building Section 1/A4.02 is showing the unvented portion of the roof over the garage correctly. Please update the section and reference the appropriate Roof Type as R7 does not appear correct.
    Response:
    - See sheet T1.02 for updates on attic vent location diagram.

    - Roof framing updated in 1/A4.01,S2.2, 18/S4.2, and R7 in A9.11

11. We have made the following revisions to the Mercer Island Cover Sheet to return to the City with the approved plans:
    - We have added erosion control measures, observe and monitor excavation, subsurface drainage placement, and verify fill materials and compaction to the required geotechnical special inspections.

    - We have added shotcrete placement to the required special inspections since shotcrete is addressed in the Structural Notes.

    - We have removed connector plate wood trusses from the list of deferred submittals as that would not be required on this project.

- We have filled in the incomplete information for energy code compliance. We referred to Sheet T1.02 for building envelope, whole house ventilation, and energy credit information.

12. Building Section 1/A4.02 is cut through Garage 101; however, we have some questions in regard to the separation at the dwelling to show compliance with IRC R302.6. As noted above, it appears this section is not drawn correctly. Please revise as needed. Additionally, since the attic above the garage is to be considered part of the dwelling, then 5/8" Type "X" GWB should be provided at the underside of the roof trusses.

    Response:

    - See 1/A4.02 for updated roof at Garage.

    - Min. code requirements for GWB between garage and attic space is 1/2", thus no need to change the GWB around the garage.

13. Clarify if combustible framing is intended around the exterior BBQ at Family Terrace 109 (i.e., at the cabinetry). Provide a section through the BBQ bump-out area and detail framing configuration.

    Response:

    - See 3/A6.12 for section through BBQ and detail framing configuration.

    - See additional notes around the BBQ on A2.03 1/A3.01,2/A3.02, 1/A4.02

Energy and Ventilation

1. Insulation should be added to Roof Type R2, Sheet A9.11. See Building Section 2/A4.01.

    Response:

    Replaced R2 with R3, See A4.01 and A4.02 for revised roof type tags in sections.

2. Insulation should be added to Wall Type W8, Sheet A9.12. For example, refer to the attic space over Master Bedroom 114 in Building Section 2/A4.01.

    Response:

    See A9.12 for revised wall types W8 and W8a.

3. Insulation R-value should be added to Wall Type W23, Sheet A9.13. Refer to heated Mechanical 004, Sheet A2.02.

    Response:

    No action is needed. Wall 23 does not require insulation since it is between two heated rooms.

4. Assembly F9a is referenced in Building Section 2/A4.01 above Exercise 008. This floor is part of the exterior envelope and must be insulated. Update the assembly, Sheet A9.11, to specify R-value of insulation. R-38 is the minimum requirement for prescriptive energy code

compliance.

Response:

Replaced F9a with R21, See updated assembly tag at on 2/A4.01.

5. Specify an insulated roof assembly at the portion of roof that extends past Grid A at Sitting Room 108 as depicted in Building Section 1/A4.01.

   Response:

   Roof type tag was added to the portion of roof in 1/A4.01

6. The building thermal envelope would be around Infrared Sauna 007. Wall Types W22a & W34a as shown in Building Section 1/A4.01 should be insulated. Additionally, clearly show how slab-on- grade is insulated with thermal break per IRC R402.2.9.

   Response:

   - See A2.02 and 1/A4.01 for updated west wall of Sauna007, which are W22a &W34.

   - See updated thermal break notes in A2.01 and A4.01. No other detail is required.

7. You have selected Option 2b, Air Leakage Control and Efficient Ventilation from WSEC Table R406.2. This requires a reduction to the tested air leakage rate to 2.0 air changes per hour maximum. Update Energy and Ventilation Note 2, Sheet T1.02, to coordinate.

   Response:

   See revised Energy and Ventilation notes #2 on sheet T1.02

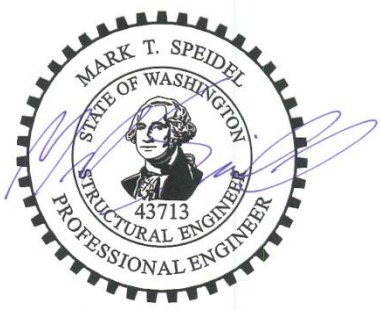
I.L. GROSS
STRUCTURAL ENGINEERS

PROJECT MEMORANDUM

Date: July 5, 2021

To: Bob Swain
Robert Edson Swain Architects
Seattle, WA

From: Mark Speidel, P.E., S.E.
I.L. Gross Structural Engineers, LLC



Re: *Lorenzini Remodel (Lake House) at 3310 97th Ave SE Permit No. 2012-200*

I am writing this letter in response to the structural items posed in the correction letter by Crystal Kolke of Kolke Consulting Group, Inc. on behalf of the City of Mercer Island in her review letter, dated June 17, 2021.

General

1. Please label the inspections referenced in Note 13, Sheet S1.0, as special inspections.

   The title of the inspections under note #13 has been changed to 'Special Inspections' as requested.

2. The Roof Plan, Sheet S2.2, cuts Details 16, 17, & 25/S3.2 at the chimney. There is no Detail 16. Also, we do not find Detail 21/S3.2 cut in plan. Please clarify.

   The detail showing the connection of the 6x6 roof purlins to the CMU chimney has been corrected to box 16 on S3.2

3. Detail 23/S3.2 is cut on the Foundation Plan, Sheet S2.0, at the fireplace, but Detail 23/S3.2 is not a section through the foundation. Provide a relevant detail to show compliance with IRC R1001.2.

   Detail 21/S3.2 has been added to the plan set and referenced on S2.0 and 23/S3.2 to clarify the foundation dimensions below the fireplace.

4. Clarify the location of required straps providing seismic anchorage of the masonry chimney as required per IRC R1001.4.1. We find Detail 17/S3.2 cut on the Roof Framing Plan; however, show each location of the strap and connection to the roof framing members as indicated per code. The same clarification is needed at the floor.

   Specific callouts for the PA22 and PA28 floor and roof strap ties have been added to the plans as well as being shown in details 17 and 22/S3.2

5. The cantilevered stairway needs to be fully evaluated and detailed.

a. We are not finding any framing at the floating stair on Sheet S1.1 or S1.2. Please indicate where this information is on the drawings.

Sheet S1.1 is the general structural notes, and there is no sheet S1.2 in this set. Detail 15/S3.1 for structure supporting the stairs is called out at the stairway on S2.1.

b. We find Detail 15/S3.1 showing the connection of the WT to the CMU wall; however, this detail refers to Detail 11/S5.1 which does not exist.

The callout for the embed plate in detail 15 has been corrected to 12/S5.1.

c. We are unable to locate the calculations for the floating stair. Please indicate page number in your calculation packet.

The calculations for the floating stairs and their connection have been included again for reference.

Gravity

6. Please provide typical details cut in plan to show where to find clarity at steel beams to wood columns. For example, along Grid A on the Roof Framing Plan is an HSS beam at the Garage that is supported by 3x4 posts below or along Grid F there is an HSS beam at the Private Terrace supported on a GL-column below.

Details 11 and 12 have been added to sheet S4.2 to show the connection of the HSS beams to the wood framing supports.

7. Please provide a detail of the condition where three GLBs frame into the HSS column at Grid 9C on the Roof Framing Plan.

Detail 18/S5.0 has been added to the plan set showing the connection at this intersection.

8. A new WF beam is added on Sheet S2.1 between Hallway 122 and Bedroom 125. Detail 4/S5.0 is cut on the Main Floor Framing Plan; should this be Detail 4/S5.1?

Yes, the detail callout has been corrected to 4/S5.1

9. Please call out the existing joists at the west wing, Sheet S2.1, where the span symbol is showing between Grids 3-4 & A & C.

A callout specifying the existing joists in this wing has been added to the floor plans.

Lateral

10. The forces to the reaction lines in the revised calculations appears significantly different than originally calculated. For example, the shear to Type D & E shear walls at the upper level were determined on page 13 of 158

of the original calculations as 8.47k (see Vapp). Pages 7 & 8 of the revised calculations show 3.7k to the Type D reaction line and 2.0k to the Type E reaction line. If not relying on the original shears at each floor (starting on page 12 of 160 of the original calculations), then provide new calculations determining shear forces at each level and how these forces are distributed to each reaction line. We are unable to follow the revised calculations and they are hard to read due to some light linework on the scans.

As requested in the previous review, the lateral forces at the roof levels were evaluated based on each individual roof diaphragm, resulting in a new distribution of the shear forces. The revised lateral design analysis calculations have been rescanned and are attached. Please let me know if you still have difficulty reading them.

11. You indicated that the horizontal structural irregularity of re-entrant corners was considered in the design and design forces were increased 25 percent for the following elements of the seismic force-resisting system: 1) connections of diaphragms to vertical elements and to collectors, and 2) collectors and their connections, including connections to vertical elements, of the seismic force-resisting system per ASCE 12.3.3.4. Please explain were this was evaluated in the calculations (please provide page number) and detailed on the drawings (please reference appropriate details).

    The 25% diaphragm collector increases were accounted for in the diaphragm forces spreadsheet, including the calculations for the roof diaphragm to shear wall collector length that was added to the spreadsheet. Where the wall or collector length was not sufficient, drag struts or diaphragm straps have been added to engage more of the roof diaphragm and deliver the loads to the shear walls. Please see note #6 on S2.2, as well as details 16/S3.2, 8/S4.2, and 16/S5.0.

12. Show how portions of structure are "interconnected" as required by ASCE 12.1.3. Provide appropriate attachment between separate wings as required. You indicated this was provided; however, please clarify the applicable call-outs in plan and details such as along Grid 8 at Grids C & D.

    At Grid 8/C, detail 3/S4.2 was included in response to the previous comments to show how the center wing roof interconnects with the lower side wing roofs. Additionally, details 4/S4.2, 17/S4.1, and 16/S5.0 have been added to show the connections between the roof levels.

13. For resistance to seismic loads, wood-frame diaphragm in open-front structures must meet the requirement in SDPWS 4.2.5.2. Evaluate, by providing calculations, the impacts at the open front condition along Grid 1 at the Garage considering these requirements. Please cut a detail on the Roof Framing Plan along Grid 2.5 above the Garage.

    The open sided diaphragm at the west wing roof has been evaluated as an

open front diaphragm, including a rotational analysis for the distribution of the shear loads in each direction at this wing. This analysis is included again with this response letter. Detail 17/S4.2 has been added to the plans to show the framing transition between the trusses and purlins at the garage roof, but note that the roof diaphragm remains continuous across the framing transition.

14. We are concerned with the lateral stability of the central wing of the structure for forces in E/W orientation since this part of the structure does not have lateral resisting elements on the upper floor. This high roof will need special detailing to drag shears to other wings of the structure that have lateral-resisting elements. Specific construction requirements in SDPWS 4.2.6 need to be considered for this design.

    The East-West shear in the center high roof is delivered to shear walls M and N at the west sing and walls U and V around the chimney at the east end of the high roof. The forces at the west end are delivered through connections between the two roofs, as shown in details 3&4/S4.2 and 16/S5.0. The connections to the CMU chimney walls at the east end are detailed on sheet S3.2. Drag struts and diaphragm straps are shown on the plans to collect and deliver the diaphragm forces to these elements as required by the SPDWS.

15. The central upper roof must be provided with uplift connectors all around. We do not find any of the details around this roof element showing uplift connectors. For example, see Details 3 & 4/ S4.2 and 6 & 20/S5.0. Also, provide a detail on the east perimeter of the roof.

    Uplift Clips have been added to details 3, 4, 6, and 20, and a plan note has been added to S2.2 to clarify their requirement.

16. Only an 8' length of shear wall exists for the Type H shear wall. 20' is assumed on page 8 of the revised calculations though you indicated this error was corrected. Evaluate shear and overturning for reduced length.

    Shear Wall H has been revised for the remaining 8' of length centered on the foundation wall. The wall is still a W6 shear wall, and HDU2 holdowns have been added at the ends of the wall.

17. Clarify the following at the Type B shear walls per page 6 of the revised calculations:

a. The calculations indicate holdowns are required at the lower level; we only find a holdown on the north end of the wall on Sheet S2.0.

    At the main floor, the south end of Shear Wall B aligns with the foundation wall at the edge of the garage, so an HDU4 holdown was placed at the main floor in this location to anchor directly to the foundation wall below the main floor. The HDU2 located at the north end of the wall is in the crawl space as the foundation is only a shallow spread footing at this end.

b. The upper level wall holdown should be continued to the foundation. Refer to the MSTC40 on Sheet S2.1.

An HDU4 holdown has been located below the MSTC40 strap on S2.0

c. Cut a detail on the Roof Framing Plan showing shear flow connection into the shear wall below that is perpendicular to the roof trusses.

Detail 21/S4.2 has been added to the plans and referenced on S2.2

18. Clarify the following at the Type C shear walls per page 7 of the revised calculations:

a. The HHS column serves as a holdown for both Type C & N shear walls at the upper level. Please reference Detail 3/S5.1 on Sheet S2.1 at this location to clarify connection to the column, assuming that is the intended reference.

Detail 3/S5.1 is referenced in 16/S5.0, the detail showing the section through the column at the corner. An additional reference has been added on sheet S2.1 at the column location.

b. Similar to the above, the lower level column serves as a holdown. Please reference the intended detail at the same location on Sheet S2.0.

A reference to 3/S5.1 has been added to the column on S2.0

19. Clarify the following at the Type E shear walls per page 8 of the revised calculations:

a. A holdown appears to be missing from the upper floor short wall segment, Sheet S2.1.

An additional HDU2 callout has been added to S2.1

b. Evaluate the short segment for the capacity reduction requirement in SDPWS 4.3.4 considering the aspect ratio.

The aspect ratio adjustment for the short segment (0.875) has been included int eh segmented shear wall analysis, and does not change the wall type (W6) or Holdown (HDU2) required.

20. Cut a detail on the Roof Framing Plan showing shear flow connection into the Type F shear wall below that is perpendicular to the roof trusses.

Detail 21/S4.2 has been cut at Shear wall F on S2.2

21. The Type F shear wall is a wood wall at the upper level which transitions to a CMU wall below.

Explain the design philosophy with this condition. ASCE 12.2.3 addresses requirements of different seismic force-resisting systems used in combination in the same direction. Evaluate this CMU shear wall for the special reinforced

masonry shear wall requirements in TMS 402/ACI 530.

In my experience, supporting a wood framed shear wall with a reinforced CMU shear wall is a relatively straight forward evaluation. Similar to anchoring wood framed shear walls to the foundation walls around a basement level, the differences in the relative stiffness between the upper wood framed portion and the reinforced CMU wall allow for the CMU wall to be evaluated as a single-story shear wall with the added loads applied to the top of the wall. To maintain design continuity, the lateral loads for both the wood shear wall and the CMU wall have been evaluated with R factor =5.0 as required for the CMU. Please see the attached elevated example.

In your previous response, you indicated this was changed to a full height CMU wall, but it does not appear to be the case; see Detail 15/S3.1.

The framing at shear wall F is a wood shear wall above the main floor to resist the shear loads from the roof diaphragm, and transitions to the CMU masonry wall at the main floor, which in turn resists the shear loads delivered from the roof through the wood framed wall as well as the additional shear loads collected from the main floor diaphragm. The CMU wall has been evaluated as a shear wall under ACI 530 with the shear loads amplified for the appropriate factor of R=5.0 (and Omega=2.5).

22. At the Type G shear wall at the upper floor, it is unclear how shears are transferred from the upper floor to the lower floor. We do not find the walls on Sheet S2.0. Please refer to the East Elevation 1/A3.02 and clarify the shear wall continuity at the garden area off Bedrooms 124 & 125. If the lower wall is a concrete shear wall, shouldn't that be depicted on Sheet S2.0?

    The lower wall below Shear Wall G is the existing concrete basement wall along gridline F, so additional upgrades are not required. Detail 22/S4.2 has been cat along grid F to clarify the connection.

23. Detail 7/S4.1 is cut at the roof, Sheet S2.2, above the Type H shear wall. It does not appear this is the correct detail.

    The detail has been corrected to 7/S4.2

24. Cut a detail on the Roof Framing Plan showing shear flow connection into the Type I, J, & L shear walls below the parallel roof trusses.

    Detail 13/S4.2 has been cut at these shear walls.

25. Cut a detail on the Roof Framing Plan showing shear flow connection into the Type M & Y shear walls.

    Details 19 and 20/S4.2 have been cut for these shear wall connections.

26. Detail 15/S4.2 is cut over the Type K shear wall at the roof. Due to the load to the shear wall, it appears the trusses will need to be drag trusses as the sheathed trusses would still exceed the roof diaphragm capacity. Where

drag trusses are used, the design load must be called out on the drawings for the truss manufacturer's design information.

The loading for the drag truss has been added to the plans.

27. Detail 24/S5.1 is cut at the Type K shear wall on Sheet S2.1. It appears reference should be made to Detail 25/S5.1 at the holdown to the WF beam.

Detail 24/S5.1 is a section through the shear wall above the steel beam, and is cut correctly. An additional reference for 25/S5.1 has been added at the holdown location.

28. Clarify the following at the Type M shear walls per page 9 of the revised calculations:

a. A holdown appears to be missing from the upper floor short wall segment, Sheet S2.1.

An additional HDU4 holdown has been added at the intersection with the exterior wall.

b. Holdowns are missing from the lower floor short shear wall segment, Sheet S2.0.

The callout at the east end of the short segment has been corrected to show the HDU4 holdown required. The west end is anchored to the concrete wall at the main floor.

c. How are overturning forces from the upper wall resolved at the lower level? Continue holdowns from above or evaluate forces at each level.

The forces in the long segment at the lower level are resisted by the new holdowns anchoring the existing 6x6 posts near the wall segment ends, and the HDU2 at the intersection with SW-B. An additional HDU4 has been added to align with the MSTC strap from the floor above.

29. Cut a detail on the Roof Framing Plan showing shear flow connection into the Type M shear wall. Due to the shear in the wall, it is clear a drag member will need to be provided at this location.

Detail 19/S4.2 is cut at Shear Wall M, and the 3.5x12 beam used to collect the roof load is labeled as a drag strut (DS).

30. Cut a detail on the Main Floor Framing Plan showing shear flow connection into the type O, P, R, S, X, & AA shear walls. Due to the shear in the Type O shear wall, it is clear a drag member will need to be provided at that location.

Details 25/S4.0, 5, and 9/S4.1 has been cut at these locations to clarify the framing requirements for the shear walls.

31. Cut a detail on the Main Floor Framing Plan showing shear flow connection into the Type Q shear wall and detail the skewed wall condition. Additionally,

the shear wall call-out is missing from this wall on the Foundation Plan, Sheet S2.0.

Detail 18/S3.1 is cut on S2.1 at the floor over wall Q. This wall is a concrete wall below the main floor to retain the soil between the entry and the mechanical room, as shown in the detail. The shear from the floor diaphragm is delivered to the wall through the ledger bolted to the face of the wall.

32. Cut a detail on the Roof Framing Plan showing shear flow connection into the Type V shear wall. Due to the shear in the wall, it is clear a drag member will need to be provided at this location. We find a dashed line at the roof, but unclear as to what is intended by that.

    Detail 7/S4.2 has been added to show the connection at the top of Shear Wall V. The dashed line is a CMST14 strap at the roof diaphragm used to develop the shear loads and deliver them to the walls as noted in plan note #6.

33. The Type V shear wall has HDU11 holdowns into the top of the CMU wall at the fireplace. Please detail the holdown connection. Also, please verify this holdown has sufficient capacity; coordinate with page 11 of the calculations.

    After adjusting for the reduced length between the holdowns at shear wall V, the uplift at the end of the wall V is 11.9k (strength); The HDU11 capacity adjusted for strength level forces is 12.6k. Detail 26/S3.2 has been added to show this connection requirement.

I trust that this letter, along with the updated plans and attached calculations is sufficient for your current needs on this project. As always, please let me know if you need anything else or have any additional questions.

Mark Speidel, P.E., S.E.
I.L. Gross Structural Engineers, LLC

Cc: Lakehouse file *Memo By: Mark Speidel*