

2020 Seismic Design Competition Clarifications

All clarification requests and answers will be posted on this page. Please read the official rules and all clarifications before submitting a clarification request.

1. Introduction

Q1.1: In the section of the problem statement we would like to clarify about the location of the project, we know that it is in downtown San Diego but we would like to know what types of structures are around our land, which streets and what is the scale and dimensions of it. (Universidad Iberoamericana)

A:

The only known information about the site location is that it is in downtown San Diego.

Q1.2: For the proposal submission stage, isn't all participants have to be a student member of the national EERI organization? Or we can apply the student member after the announcement for the invitation to the competition? (Universiti Teknologi Malaysia)

A:

You may apply as a student member after competition invitations have been released if you are unable to apply beforehand.

2. Scoring

Q2.1: If N_d is equal to zero (no dampers used), does the equation for "Damping Devices Cost" still get applied? With N_d equal to zero, the damping devices cost would be a non-zero value even with their being no dampers in the structure. (SUNY University at Buffalo)

A:

If $N_d = 0$ (i.e. no damping device(s) used), C_d is not taken into account in the calculation of your Annual Building Cost.

Q2.2: Does the accelerometer only measure in one direction? I.e. if the ground motion is in the North-South direction and the tower responds with some shaking in the East-West direction, would that be picked up in the accelerometer? (University of Toronto)

A:

The accelerometer will only measure in the direction of the shaking.

Q2.3: Which of the following acceleration values are we expected to predict? 1. The peak acceleration at the top of the tower recorded in any horizontal direction 2. The peak acceleration at the top of the tower recorded in the direction parallel to the shake table motion. (Cal Poly SLO)

A:

As stated in Section 2.2 all teams are expected to predict peak roof displacement and acceleration for both ground motions in both horizontal directions.

3. Competition Awards

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4. Design Proposals and Damping Device Approval Process

Q4.1: For the level 1 to level 5, empty part, is it possible to do any structure at the void part, just make sure it doesn't touch the base? (Universiti Teknologi Malaysia)

A:

Structural members in the non-buildable area both touching and not touching the base will be considered a violation of section 5.7d. All elements of the building for floors 1-5 must be contained in the buildable area shown in Figure 5-1 of the Official Rules.

Q4.2: Hello, our group get confused about "provides the predicted weight of the structure to demonstrate material efficiency". Is this weight of the balsa wood model or of the real concrete or steel building. Thx!

A:

You should provide the expected weight of your physical balsa wood structure.

5. Structural Model

Q5.1: Section 5.6.a states that the "dead load connections are centered in plan-view in relation to the center of the base plate". In the axis of threading, does the centroid of the dead load rod coincide with the combined centroid of the 2 sets of dead load plates? (University of British of Columbia)

A:

The dead load rod will be centered along the dimension parallel to the shaking direction. The dead load rod can be shifted along the axis perpendicular to the shaking direction. See Design Guide for guideline images.

Q5.2: Does this include the dimensions of notched cross-sections? If a team were to use members 0.09"x0.09"x15" but with notches that were 0.045" deep, creating a small section of the member that was 0.045"x0.09", would this be considered a violation? Further, would this be a violation if the notch was used to connect two members so that there wouldn't be a free notch/gap? (Once the two members would be glued together, there would be no dimension on the building less than .09".) (UC Berkeley)

A:

This would be considered a violation of Section 5.2a which states that no frame member shall have an individual dimension that is smaller than 0.09 in. The notches described above would constitute a violation as they result in individual dimensions less than the minimum size.

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Q5.3: How is the 2.25in minimum height clearance for floor area measured and does it apply for the entire floor, or does it apply for just access points? How and where are access points measured? For floors $f > 1$, what is the difference between an access point originating from the interior of the structure versus the exterior of the structure? (UC San Diego)

A:

The minimum height clearance applies to the entire floor, measured from the top of the floor beams vertically to any member crossing the horizontal plane until you reach the bottom of the next floor. The two required access points are essential for the occupants of your building to access any area from the interior of the building that you consider as rentable floor area. Access points cannot be considered from the exterior of the building for floors above the first story so there are no dimensional restrictions for the exterior of your building.

Q5.4: Are there any restrictions about the placement of vertical structural elements inside the rentable floor area? (Technical University of Civil Engineering Bucharest)

A:

Yes, there are restrictions regarding the placement of vertical structural elements within the rentable floor area. Please refer to section 5.6.c Rentable Floor Area to see the requirements and restrictions for structural members within the rentable floor area.

Q5.5: Can we add damping device and submit the damping proposal details after this first proposal submission? (Universiti Teknologi Malaysia)

A:

Yes, please see the SDC website for important dates. The damping device submission deadline is Friday, January 31, 2020.

Q5.6: Are the dead load rods in floors 5-19 tethered to the extents of the structural frame or the extents of the floor plan, in the case that there are external structural elements? (NYU)

A:

Please refer to Section 4 (Floor Dead Load Connections) of the Design Guide posted on the official website.

Q5.7: Will the template used to check the maximum floor areas for floors 1-5, be raised flush with the level 5 floor beams, or will it continue up to the base elevation of floor 6? (University of Boulder Colorado)

A:

Two separate templates will be used. One template used to check floor layouts from the Base through Floor 5, and another from Floor 6 and above.

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Q5.8: Is there a minimum distance between two faying surfaces? (ie. can two faying surfaces be 0.5 in apart?) (Cornell University)

A:

There is not a minimum distance between two faying surfaces. For frame members, no single faying surface shall exceed 1 in. in any direction from centroid of faying surface.

Q5.9: (1) Does there need to be two access points into each individual floor area, or does there need to be two access points between two adjacent areas (if the area is adjacent to one area on the South, and is adjacent to a completely separate area on the West, therefore they would need to be four access points for that given area). And (2) We are confused about the access point requirements. Looking at the L-Shaped base below the 6th floor, between the southwest leg of the "L" and the northwest square corner of the "L" (assuming they are two separate floor areas), does there need to be TWO 1" x 2.25" openings that will fit in the 4.5 inch width, between the two areas? The same would apply between the northeast leg and the northwest square corner (again assuming they are separate floor areas). Or, does there only need to be two access points per independent floor area (there would only need to be one access point between the SW leg and the NW square, and one access point between the NE leg and the NW square; another access point would be needed for the SW leg and another for the NE leg so that each floor area has 2 access points). (SUNY Buffalo)

A:

For the base level you need two access points into your building so that it could be entered by occupants. For each level above the base you must provide two access points which would allow the occupants of your building to access any and all parts of the floor area you plan to be considered "rentable floor area". Occupants of your building should have access to any area of the building that you are including in your annual revenue.

Q5.10: The rules state that each rentable floor area must have "at least two access points or doorways," but also state that an access point is defined as "a clear opening" with the minimum dimensions of 1" x 2.25". Is it required to have 2 distinctly separate access points, or just a total access point area of 2" x 2.25? (UBC)

A:

There must be two separate access points.

Q5.11: Nowhere in the rules does it say that the access points for a given area need to be flush with the floor beam below (the floor area to which the access point belongs). Is this correct? This would mean that an access point could be elevated above the floor beam, so long as the opening is 1"W x 2.25"H. (SUNY Buffalo)

A:

Correct, the rules do not specify this. Therefore, it is acceptable to have the required opening at any location above the floor beam.

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Q5.12: Based on section 5.7c if we go over the maximum area defined in a given floor, will the area of this floor be annulled or will the area of that level be partially considered? (Pontificia Universidad Católica Madre y Maestra)

A:

Any floor area that exceeds the maximum area will not be considered in calculating the FABI.

Q5.13: Can one floor beam rest above another floor beam, such that the floor will be twice as thick as a normal floor. Does this affect doorways, the height requirement, and the spacing between floor members? (Cornell University)

A:

The maximum member sizes, height requirements, and allowable faying surfaces, can not be violated with members rest on top of each other.

Q5.14: Section 5.6a states that "The dead weights should be able to be installed and nuts be tightened to ensure a snug fit without breaking any of the connections, frame members, or wall members in the structural model" so are we allowed to cut a hole through a wall member in order to attach the dead weights to it? (Technical University of Civil Engineering Bucharest)

A:

Yes you can cut a hole through the wall to be able to pass through the dead weight rod as long as you satisfy the other requirements of Section 5.6.

Q5.15: Can we add inter-level bracings from the 5th floor to the 6th floor, which are the bracings between the L-shape level to the rectangular level, to support the extra part like cantilevers? (University of Illinois at Urbana-Champaign)

A:

Inter-level bracing is allowed between level 5 and 6 as long as Section 5.7 is not violated.

Q5.16: Can we use 4 layers of MDF ? (total thickness will be 0.47) We do not have Plywood for this dimensions. (Ozyegin University)

A:

As can be seen in Section 5.8b and 5.8c, the related requirements for the base plate are that it is made of plywood or MDF and is between 0.25 in. to 0.50 in. thick.

Q5.17: (5.7b) "Interior floor beams shall be flush with the top of the perimeter beams. The plane defined by the top of the perimeter beams, the floor, shall be flat and level." Is there a tolerance to this? I.e. if we were to put 0.1" thick members on top of the interior floor beams that would mean they are not perfectly flush with the perimeter beams? (University of Toronto)

A:

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There is a 0.25in tolerance for the floor height measured from the top of the base plate, such a height is defined by the top of the perimeter floor beams. Any beams that are not flush with the perimeter beams will be considered a violation.

Q5.18: Can we draw the base floor 5in and others 2.5in ? (Ozyegin University)

A:

No, this is not allowed. According to section 5.7, the floors $f = 2$ to $f = F$, the elevation shall be equal to: $Floor\ Elevation_f = 6\ [in.] + (f - 2)(3\ [in.])$

Q5.19: Are there any restrictions on the number of overlapping areas between elements (faying surfaces), as long as the overlapping surfaces are glued together, and the dimensional limitations of the faying surfaces and elements are met? (Technical University of Cluj Napoca)

A:

For frame members, no single faying surface shall exceed 1 in. in any direction from centroid of faying the surface. Excess glue requirements are defined in section 3.2 of the rules.

Q5.20: It is said in Figure 5-1 and 5-2 that the given dimensions are the maximum ones. Can we go less than the dimensions? For instance 12" side to be 11", which the template can still pass freely. (University of Illinois at Urbana Champaign)

A:

Yes, these are maximum dimensions. Anything that fits within the template will be compliant with the dimension rules.

Q5.21: If there is a floor at dead connection, and the edge of the floor is not directly perpendicular to the dead load, can beveled washers be provided to ensure adequate attachment between the load and the structure? (University of Texas)

A:

Section 6.3 specifies the washers that will be used at competition. No additional washers will be allowed.

Q5.22: Are vertical columns (frame members normal to the base plate) restricted to the maximum length of a frame member, 15 inches? And does the minimum distance of 0.5" between frame members also apply to the minimum distance between vertical columns? (Virginia Tech)

A:

Yes, columns are considered frame members and thus has to be within the dimensions specified in Section 5.2.a.

Q5.23: "Judges must be able to visually observe the extent of all members for measuring. Judges reserve the right to use destructive inspection methods after completion of shaking and assess penalties in this section". If we create a small shear core that cannot

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be seen inside during judging, will this result in deductions? We understand that the inside of the shear wall core will not count as rentable floor area, and we also understand that destructive testing might take place after shaking. (Virginia Tech)

A:

Shear walls must satisfy all the requirements of wall members stated in Section 5.3. Destructive inspection after shaking to assess penalties may take place as stated in the rules.

6. Strong Ground Motion Testing

Q6.1: Do the dead load rods need to be centered with respect to the base plate, or can they be centered with respect to the building as shown in the design guide image in section 4? (Can floors 6+ have the same dead load configuration as floors 1-5) (Purdue University) (Purdue University)

A:

The dead load rod will be centered along the dimension parallel to the shaking direction. The dead load rod can be shifted along the axis perpendicular to the shaking direction. See Design Guide for guideline images.

Q6.2: Why have this year's ground motion records not been posted yet? Have they not changed from last year, or are they still being created and the website not updated? We'd like to get started on the analysis as soon as possible. (University of Massachusetts Amherst)

A:

Ground motions will be available and posted on the website in mid November.

Q6.3: The ground motion records at the website is not available(grey color). (Universiti Teknologi Malaysia)

A:

Please refer to the website and Q6.2.

Q6.4: (6.1) Is the ground motion given what is being inputted into the shake table, or the measured base acceleration of the actual shake table? I.e. does the ground motion given take into account the performance curve of the shake table either with or without the masses attached? (University of Toronto)

A:

Please read the README file that was released with the Ground Motions.

Q6.5: What kind of (and how heavy) weights will the shaking table be fixed with, and also, in what way will they be fastened onto the table? (Technical University of Cluj Napoca)

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A:

Please read section 6.5 for weight specifications.

- 7. Score Sheets
- 8. Rule Clarifications
- 9. Judging and Appeals