

DESIGN TOGETHER

WITH BUILDING INFORMATION MODELING

2020
COMPETITION SPECIFICATION

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1. WHO IS LC ITU?

LC ITU was established in 1990, because of the limited number of clubs in the university because of addressing different engineering groups took this name. However, due to the increase in the number of clubs and the founders being civil engineers, it became a community organizing organizations only for civil engineering students.

Our Mission

LC ITU, in contact with the sector and its alumni, organizes a wide range of events, bringing together engineers of the future, creating an environment for sharing knowledge and ideas. LC ITU organizes technical, social and artistic activities; adopts the corporate governance philosophy while performing all these organizations.

Our Vision

Members who take an active role in the LC ITU are put into life as individuals with advanced organizational skills and successful teamwork. LC ITU members increase their cultural knowledge while developing their engineering teachings; They start their careers as a competent engineer who knows the sector closely and has high communication skills.

2. WHAT IS DESIGN TOGETHER WITH BIM?

LC ITU which is established in 1990, made on impression with various events and competitions. Design Together with BIM is first organized in 2014. Main purpose of the competition is to increase the usage of the BIM. What is expected from the participants is to build teams formed of at least 1 civil engineering student, 1 mechanical engineering student and 1 architecture student and to design the project according to given specification while using BIM system.

Our Mission

Our mission is increasing the usage of the BIM (Building Information Modeling) system which construction industry needs to help engineering students designing public welfare projects as competent engineers.

Our Vision

LC ITU supports engineering students to be graduated as well-educated engineers.

3. DESIGN TOGETHER WITH BIM COMPETITION RULES

1. People should participate Design Together with BIM as a team.
2. Each team has to contain at least 1 civil engineering, 1 mechanical engineering and 1 architecture student and each team can have minimum 3, maximum 6 people.
3. Civil and mechanical engineering students have to be at least juniors in terms of credit that have been given successfully and architecture student has to be at least sophomores in terms of credit that have been successfully. Graduate students can also participate.
4. One student cannot participate in more than one team.
5. Applications will be open from 1st November 2019 to 24th November 2019. Applications will be submitted online.
6. Approved teams will be given pre-training of Autodesk Revit and Navisworks by the experts at ITU Civil Engineering Faculty on 6-7-8 December. Only 1 civil engineering, 1 mechanical engineering and 1 architectural student in each team will be able to attend the pre-training in total 3 people.
7. Competitors whose registration is approved must attend the pre-training to be held.
8. Students who are relative of any jury member cannot participate to the competition.
9. It is expected from teams to design the building stated on the specification with using BIM system.
10. Foreign contestants do not have to attend to the pre-education which is on 6-7-8 December 2019. Necessary instructional documents will be provided online by us.
11. Teams can advise from consultant on condition that team has to give information about consultant to LC ITU.
12. Deadline for the projects is 15th of February 2020. Projects will be delivered online.
13. The award ceremony will be held on February 29, 2020 at the Civil Engineering Convention, another event of LC ITU.
14. Committee of competition has every right deleting rejecting registration if it is necessary.
15. LC ITU and supporters of competition have every right of publication and presentation of projects.
16. Teams that will not obey the rules will be eliminated.
17. LC ITU reserves the right to make changes to the competition and the program of the competition.

4. COMPETITION PROCESS

The competition starts after the participants are accepted. The competition continues with a series of pre-trainings including BIM Processes and various programs at ITU Civil Engineering Faculty. After the pre-trainings, teams will have 10 weeks to complete their projects according to the specifications provided to them. After 10 weeks, the teams that submit the projects are evaluated by the jury. The competition ranking is shared with the public at CivilCon, another activity of LC ITU.

Within the scope of the competition, the teams are expected to make concept design of a building by adopting the BIM principle. Teams are expected to make Data Based Parametric Design using various programming languages (Python, C # etc.) and / or visual programming tools (Dynamo, Grasshopper, etc.) when making concept design of the Building. Also using Generative Design are recommended.

The **concept design** was defined in the project phases at:
<https://www.ribaplanofwork.com/PlanOfWork.aspx>.

5. PROJE ALANI VE YAPILACAK YAPI

The project area has been determined as an empty parcel across the Technopolis Building within the ITU Ayazaga Campus. Satellite image of the parcel is given below.



Competition Area Satellite Photo

6. DESIGN

6.1. STRUCTURAL DESIGN

The structure to be constructed will be a 2 or 3 storey reinforced concrete structure. The design of the reinforced concrete building shall be made in accordance with the TS500 - Calculation and Construction Rules of Reinforced Concrete Structures and the Regulation on Buildings to be Built in Earthquake Zones (2018).

The following values shall be taken as the basis in the structural analysis.

- Coordinates of the project area: 41.107495, 29.027019
- Local soil class is ZC.

- Ground safety stress is ground = 300kN / m².

Other required quantities must be determined depending on the system and regulations established.

6.2. ARCHITECTURAL DESIGN

The project includes the design of a cultural center to serve students in the area provided within the ITU Ayazağa Campus.

It is recommended to design open spaces around the building and an entrance platform / square allowing different outdoor activities. Teams can propose transition spaces and recreation platforms between the social spaces around the building and the landscape and the fringes that define them. These areas can also be associated with different functions within the building.

The teams are obliged to keep the building units in their needs program in the structure indicated below.

Requirements	Birim (m ²)
Entrance/Lobby/Exhibition Areas	150
Multi-purpose Hall (100 persons)	200
Foyer + Social Areas (Connected to Cafe)	150
Workshops (2 x 100 m ²)	200
Working/Meeting rooms (2 x 100 m ²)	200
Management Office (open office for 4-5 employees)	50
Cafe	100
WC	50
Warehouses (2x50 m ²)	100
HVAC Center	50
Electrical/System Room	50
Outdoor parking (for 20 vehicles)	500
Reji room	20
Garden and Outdoor Activities	It will be built on the land.
Circulation	35-40% of the given areas will be taken.

** This program can be increased or decreased by 10% based on design decisions or additional functions to be proposed.*

The teams are expected to give importance to daylight and visual comfort by considering the interaction and collective activity functions within this center. It is expected that simple but effective structural and tectonic systems will be proposed in the building envelope.

Depending on the flooring system to be used, the height of the floor will be determined by considering the passing of the equipments belonging to mechanical and electrical systems. Warehouses and spaces with mechanical systems can be considered in the basement. The upper shell / roof of the building can be designed as a steel frame which can be integrated with the reinforced concrete system. Decisions on these issues are left to the competitors.

6.3. MECHANICAL DESIGN

The structure's mechanical installation works will be designed in an integrated way. Each of the mechanical installation disciplines will be coordinated among each other and the other project disciplines. In this context, the installation works below will be designed:

- Heating-Cooling Installation
- Ventilation-Air Conditioner Installation
- Fresh Water Installation
- Waste Water And Rainfall Installation
- Fire Protection Installation

At the mechanical installation projects; maintaining the visual-esthetical integrity, implementing-operating easily and maintaining the operational efficiency will be considered to the utmost. It is expected that the HVAC systems will be passed over by being organised responsively in a body with the structure's architectural style and venue setup, and by being provided with the suitable services. Nonetheless, the selected systems' performance and technical specifications about heating/cooling and ventilation matters must be considered. Especially, in the event that ventilation ducts being visible, it will be attached importance to the ventilation ducts' cross sections and forms. It must be taken care of the selected systems' indoor and around the building locations and settlements.

**** The units that are mentioned in the instructions are considered necessary and are expected to be found in your structure.**

**** Competitors must make decisions about the design together.**

7. OTHER DESIGN DETAILS

Teams should form family and smart materials that they predict to be used in their structures within the scope of preliminary preparation.

The teams must determine the LODs of the building units themselves. The LODs are expected to be based on the *"BIM Forum LEVEL OF DEVELOPMENT (LOD) SPECIFICATION PART I & COMMENTARY For Building Information Models and Data April 2019"*.

The teams are expected to form the LOD matrix and be included in the BEPs of the teams.

LOD Matrix: is the tabulating the detail levels of the model elements.

8. BIM PROCESS MANAGEMENT

8.1. WORK PROGRAMS

The teams are expected to form two work programs. These are Contest Work Program and Construction Work Program.

Competition Work Program is the work program that the teams will use within the scope of the competition.

The Construction Work Program is the work program of the structures created by the teams.

Teams must create a 4D simulation video using Navisworks, adhering to the Construction Work Program.

8.2. BIM EXECUTION PLAN (BEP)

Teams must create a 4D simulation video using Navisworks, adhering to the Construction Work Program.

8.3. CLASH STRATEGY

The teams are expected to define a conflict strategy first. Teams should perform clash analysis of their structures, depending on the clash strategy they have identified.

It is recommended to use Navisworks program when performing clash analysis.

It is requested that there will be no hard conflicts in the project to be delivered.

The teams are expected to produce a Clash Test Report for their clash analysis.

“Clash Strategies and Clash Test Reports” determined by the teams should be included in the BEP.

8.4. COMMON DATA ENVIRONMENT (CDE)

Teams will use BIM 360 as the Common Data Environment during the competition. A total of 3 BIM 360 licenses will be provided to each team, one for each discipline.

Teams are expected to comply with the standard given in the specification when they folder their files.

9. DATA BASED DESIGN WITH PARAMETRIC DESIGN AND GENERATIVE DESIGN

While constructing the concept design of their structures, the teams are expected to design their structures by adopting the principle of parametric design in the structural and mechanical disciplines and adopting the generative design principle in the architectural discipline. Teams are expected to create Parametric Design elements in the form of the structure, and are recommended to create Generative Design elements.

The teams are expected to use visual programming tools and / or programming languages when modeling according to the analysis outputs during the modeling of the structure which is analyzed mechanically and structurally.

* During the reporting of Generative Design and Parametric Design, teams should report why and how Generative Design and Parametric Design use and their advantages and disadvantages.

* It is recommended to use Revit Dynamo Refinery or Rhinoceros Grasshopper for Generative Design.

* Teams are expected to turn to Data Based Design when producing outputs in all processes.

10. SUSTAINABILITY STRATEGY

The teams are expected to perform building energy analyzes without applying any work items under this heading. The teams are then expected to form a sustainability strategy based on the results of their energy analysis.

After applying sustainability strategies in their structures, teams are expected to conduct energy analysis for their structures again.

Teams should consider energy optimizations when determining sustainability strategies.

When determining a sustainability strategy, teams can use the following practices:

- Positioning the solar panel and determining the angle
- Material selection and form design
- Optimizing building systems
- Insulation
- Mass analysis calculations

Generative Design can be used for energy analysis and layout of the building.

11. PRESENTATION

The teams submitting their projects are expected to present their projects to the jury and prepare a presentation from the teams for the jury evaluation meeting, which allows the jury to ask questions about the teams' projects. In addition, this presentation will be used in public vote with animation video. Below you will find a presentation of the teams.

DESIGN TOGETHER WITH BIM PRESENTATION DRAFT

- Cover Page
- Contents
- BIM Execution Plan
- BIM in Architectural Design
- Generative Design in Architectural Design
- BIM in Structural Design
- BIM in Mechanical Design
- The codes that used by team (Python, Dynamo vb.)
- Work Schedule (Zamana göre projenin iş planlaması)
- Resolved Incompatible Clash List (Up to 3 samples)
- Work Coordination (Görev dağılımları, birlikte çalışma aşamaları)
- Sustainability Strategy Studies and Energy Analysis
- References

*** Teams are expected to explain how they use BIM and data, rather than design details during their presentation.**

12. PUBLIC VOTE DETAILS

In order for the teams to participate in the public vote, they should upload the model file to <https://viewer.autodesk.com> and submit the link to the model file, animation video and jury evaluation presentations to the competition committee.

13. PROJECT DELIVERY FILES AND SCORING CHART

13.1. DESIGN (20 POINTS)

The submission of the desired files in this section is mandatory for the project to be considered for jury evaluation.

- 3D models (with .rvt and .IFC extensions) with concept design must be delivered.
- Teams must form Families (with .rfa extension) and data loaded elements (with .rfa extension) to be used in their projects within the scope of preliminary preparation. Teams must specify their families separately. These files must be submitted to the competition committee by 30.12.2019. Teams are obliged to notify the Competition Committee of any changes to the content or number of such files.
- Within the scope of each project discipline;
 - Floor plans,
 - System function diagrams,
 - Column diagrams,
 - Section views,
 - Calculation reports must be created.
- Calculation reports will be delivered as PDF.
- Plans, diagrams, sheets and views will be created in the model file.
- Takımlar projelerini gösteren bir animasyon videosu (.avi uzantılı) ve yapılarının farklı açılardan, farklı kısımlarının görselleri (10 adet ve .jpg uzantılı) **son proje teslim tarihine** kadar teslim edilmelidir. (Animasyon videosu boyutu 300 MB, her bir görselin boyutu 10MB ile sınırlıdır.)

13.2. BIM PROCESS MANAGEMENT (25 POINTS)

- Teams must prepare BEP (with .pdf extension) for their projects and this plan is expected to be followed in project processes. Teams should deliver BEP by **deadline**.
- Teams should follow their conflict strategy and make conflict analysis of their structures and resolve incompatible conflicts and prepare a Clash Test Report (with .pdf extension). This report should be submitted by the project **deadline**.
- The teams should be delivered their competition work program (with .pdf or .XER extension), building work program (with .pdf or .XER extension) and 4D Navisworks simulation video (.avi extension) and 4D Navisworks file (with .nwd extension).. The established work schedule must be submitted to the competition committee by 30.12.2019. The construction work program, simulation video and 4D Navisworks file must be submitted by the **deadline**.

- Teams should form the schedule for each project discipline as Schedule in Revit. It should be ensured that the quantity information is included in the model during model delivery.
- Teams must deliver the LOD Matrix (with .pdf or .xlsx extension) that they have created by the deadline for project submission.

13.3. SUSTAINABILITY STRATEGY (20 POINTS)

- Teams should prepare a report (with .pdf extension) for their energy analysis within the scope of Sustainability Strategy and submit this report by the **deadline**.

13.4. DATA BASED DESIGN WITH PARAMETRIC DESIGN AND GENERATIVE DESIGN (20 POINTS)

- Teams should submit the reports (with .pdf extension) of the designs they have made under the title "9. DATA BASED DESIGN WITH PARAMETRIC DESIGN AND GENERATIVE DESIGN " until the **deadline** for submission of the project.

13.5. PRESENTATION (10 POINTS)

- Teams will be given 15 minutes to present their projects to the jury. The teams are expected to adhere to the time allocated for them.
- The contents expected to be included in the presentation can be found under the title of "PRESENTATION DRAFT".
- Teams must submit their presentation materials (with .pptx and .pdf extensions) before the jury until the **deadline** for submission of the project.

13.6. PUBLIC VOTE (5 POINTS)

- Teams must submit at least the Animation Video in order to participate in the Public Vote, which will be launched following uploaded the presentation, the Animation Video and the Autodesk Viewer link. Teams that do not submit the animation video are not allowed to participate in the public vote.

14. CONTACT

The communication between the teams and the competition committee is only through the team captain by e-mail. If the teams have questions about the specification, they can contact Design Together with BIM team at: designtogether.itumhk@gmail.com