

MIDDLE EAST TECHNICAL UNIVERSITY

CE4002-BUILDING INFORMATION MODELLING

HW-I

**PART 1**

**1. a.** In ground floor view, one of the exterior walls is moved to the outer side by 1m, connected walls are also extended 1 m automatically and the floor plan also gets larger which means the width of the floor plan is increased by 1m. These changes are all made by the software itself.

**b.** After moving the workspace roof elevation to 6,27 meters, the walls of the workplace are extended to 6,27 meters. However, the ceiling of the workplace keeps its previous elevation. The reason is that; the walls were connected to the given elevation; however, the ceiling was unconnected because its level was not set as workplace elevation.

**2.** To connect a wall to other existing ones, user does not need to use any extra commands or procedures. This is because Revit is an integrated BIM platform which means it includes not only the physical properties but also the functional properties of a structure. One of the functional properties is the parametric information in objects which can be defined as geometric definitions with associated rules. These rules enable the software to have no inconsistencies and if there is any inconsistency, it can be modified automatically. Therefore, in Revit when the user is drawing the walls, they are connected to each other automatically and if there is any redundancy such as two walls intersecting, the software eliminates this problem and creates a clean display with removing the edges.

**3.** When the wall is placed it has some initial height and top constraints. After the top constraint is removed by attaching it to the ceiling, a new parametric rule is defined that includes the connection for the ceiling and the wall together. This way, user eliminates the need for manually editing the wall’s properties when the design is changed. If the user changes the height of the ceiling or the wall, they both act accordingly to the change. Therefore, any clashes or conflicts that may arise with the change can be eliminated beforehand.

**PART 2**

In this part project scheduling of a building construction is made with the software Navisworks. Construction process is described with activities that are linked in the software. This way one can visualize the whole phase of construction.

When doing the analysis it is assumed that there are seven working days in a week.

1. We defined the linkage of the task according to parts A, B, C first since the given is based on level only.
2. Yes, but not in time scheduling it is beneficial for construction phase of Project. Because the procedure of construction can be seen and controlled in the parts one by one easily. Using subtasks for schedule causes some difficulty while selecting the elements, columns for example for part A of level 1, however the model reflects the real process in construction. If there is any problem any delaying because of any malfunction during construction, one can deal with this situation and its causes easily.
3. Opportunity of using the Autodesk Navisworks is that having a tool which is interoperable with other programs. Moreover, we defined a Task ID file we can easily apply the change in schedule or the design to the 4D simulation. We have the selected objects that have the data and one can change the data for any object and it will automatically effect all other elements.
4. There are several benefits of using 4D system. One of them is that we can see clearly the process of construction day by day. And, for example, we can control any elements that is important for any reason specifically. Another one is that if there is any problem about project but not seen in design phase, the 4D system provides chance to realize it before construction. And the another advantage of 4D system is saving time to create Schedule for Project which is very important for engineer and also owner. With 4D model and Autodesk Navisworks quantity takeoff can be done so the budget also can be determined. Disadvantage of it is that the program is very complex and hard to use so it has to be simplified. User interface can be improved for easiness in using the software.
5. We will learn how to combine model and the schedule of a project. Based on 4D model we understand how to proceed the construction process. The model also eliminates or reduces the probability for problems during the construction phase. A value will certainly be gained in terms of finances and time. One more benefit is that, this model visualizes the construction phase and this way people have an easier time imagining or seeing the process. Moreover, 4D modelling creates more accurate and detailed work plan and increases the effectiveness of communication between clients, designers and constructers. One drawback is that developing a 4D model from 2D documents is a hard task and it requires highly trained staff.