

## ***Leading edge assessment of benchmark models***

**Contact:** Karsten Winther Johansen

PhD Candidate, Technical University of Denmark

**Email:** [kawj@dtu.dk](mailto:kawj@dtu.dk)

**Date:** January 2023

### **1. Introduction**

Thank you very much for agreeing to support my research project on construction site safety analysis. Your input will be extremely valuable, and I greatly appreciate your time.

The following documents introduce the two benchmark models, which are to be assessed by you as a domain expert participant. The images have been annotated with the elevation and coordinates of the building elements (please note that all measures and coordinates are in millimeters). The images and annotation should enable you, as a domain expert, to highlight the leading edges needing fall protection systems. Please note that access to the areas should **not** be considered. Assume that all platforms and surfaces are and should be reachable to personnel.

**1.1. Purpose** – The output of this workshop is used to create a ground truth that can afterward be digitized and compared to the outputs of automated safety analysis software tools.

**1.2. Procedure** - The workshop will be carried out in a four-step approach in two parts:

Part 1:

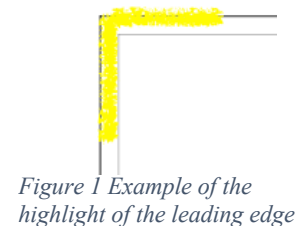
- 1) Short meeting with an introduction to the content of this document.
- 2) Assessment by you as a participating domain expert.
- 3) Return the assessment by email.

Part 2:

- 4) An online meeting with all participating domain experts discussing the assessments if these differ.

**1.3. Guide** - The participant is asked to:

- Fill out the empty fields in Table 2.
- Highlight the leading edges in both models (model A: Figure 2, and model B: Figure 3, Figure 4). Please see the yellow marking in Figure 1 for an example.
- Available mitigation equipment is guard railing and cover panels (Note: use different colors if both are applied).
- You are very welcome to add comments, while assessing.



*Figure 1 Example of the highlight of the leading edge*

**1.4. Content overview:**

- Regulation overview
  - Presents an overview of the values stated in the regulation.
- Domain expert questionnaire
  - Captures information about the participant.
- Model A domain expert assessment
  - Figure 2, which should be used to annotate leading edges in model A.
- Model B domain expert assessment
  - Figure 3 and Figure 4, which should be used to annotate leading edges in model B.
- Model A appendix for spatial understanding
  - Provides a set of model views to facilitate a spatial understanding of model A
- Model B appendix for spatial understanding
  - Provides a set of model views to facilitate a spatial understanding of model B

## 2. Regulation overview

Table 1 provides an overview of the values that should be used to assess the two models. The values are extracted from the European regulation.

*Table 1 Overview of regulation values extracted from European regulation regarding fall protection system*

Natural language formulations	Attribute	Symbol	EU
The minimum distance, from an elevated surface to a lower surface which an item or a human being could fall onto, which would require a form of fall protection equipment.	Fall distance	$f_d$	<b>2m</b>
The minimum width of an area where a worker is allowed to be present.	Surface width	$w_s$	<b>60cm</b>
Maximum dimension of hole in a surface, where chosen mitigation will be a coverboard	Cover dimension	$c_w$	<b>Not stated</b> (best practice)

## 3. Domain expert information questionnaire

Please fill out the following table to share your work experience.

*Table 2 Domain expert work experience*

Before assessment:

Work country		
Experience (years)		
Usual project types		
Usual project sizes (EUR)		
Do you agree with the regulation shown Table 1	Yes:	No:
If no, what differs from your understanding.	(Please follow the above rules, to make results comparable)	

After assessment:

Did you use the attached 3D models	Yes:	No:
Time spent (minutes)	Model A:	Model B:

#### 4. Model A (low complexity model)

This section is meant for the assessment of Model A. Further geometrical information is provided in Appendix A

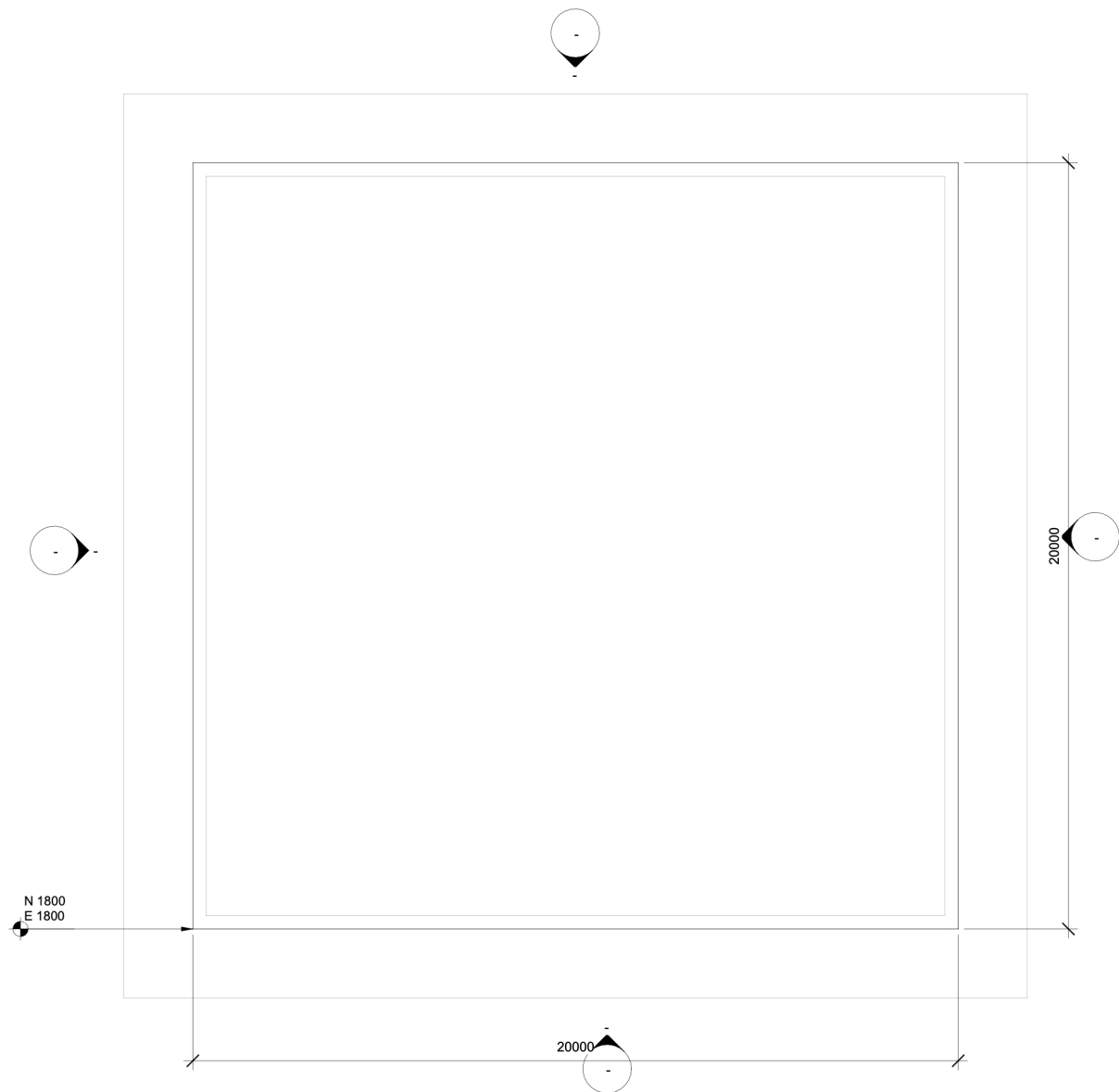


Figure 2 Top-down view with dimensions.

## 5. Model B (edge case model)

**This section is meant for the assessment of Model B. Further geometrical information is provided in Appendix B**

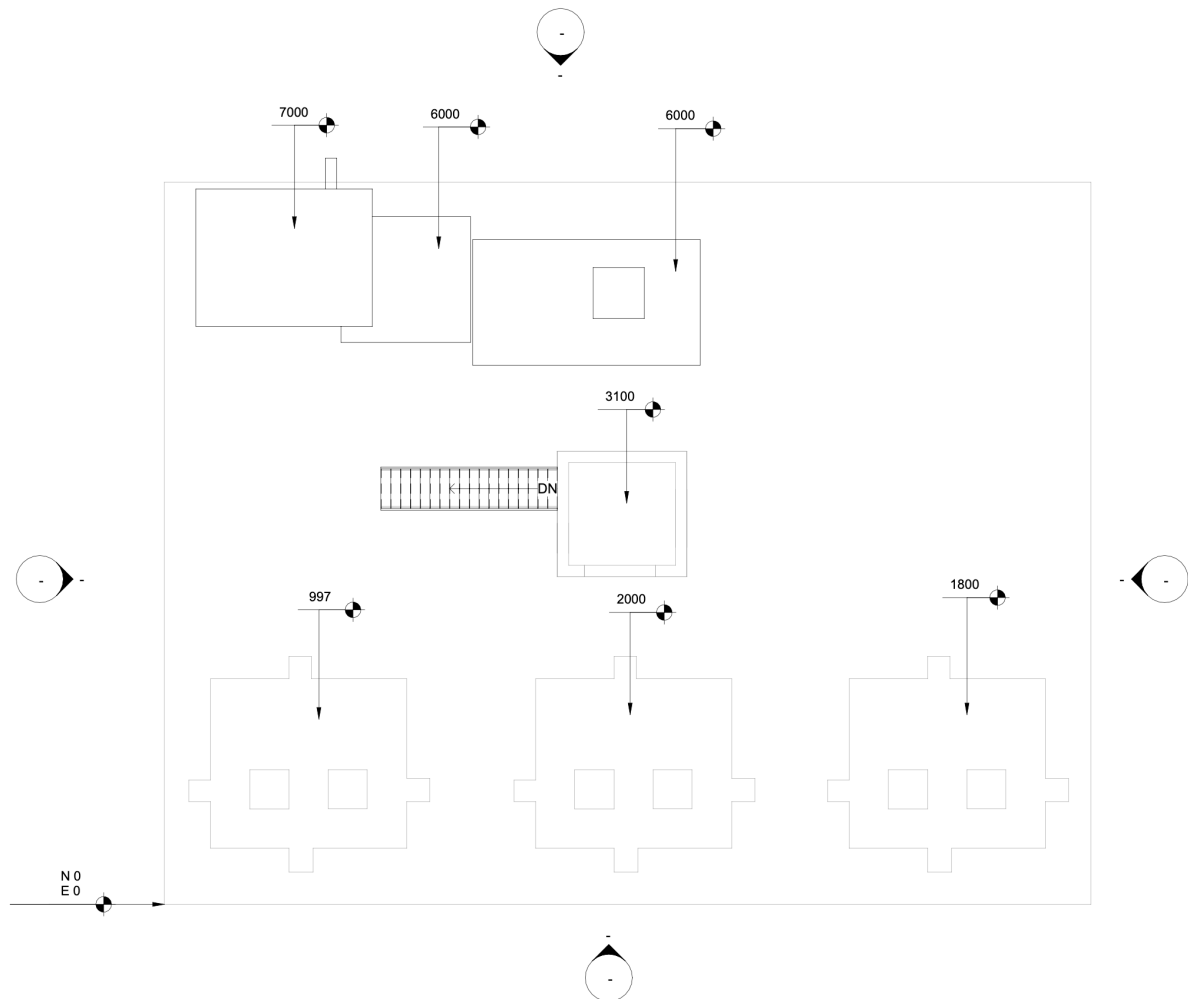


Figure 3 Top-down view 1 of 2 with elevation annotated.

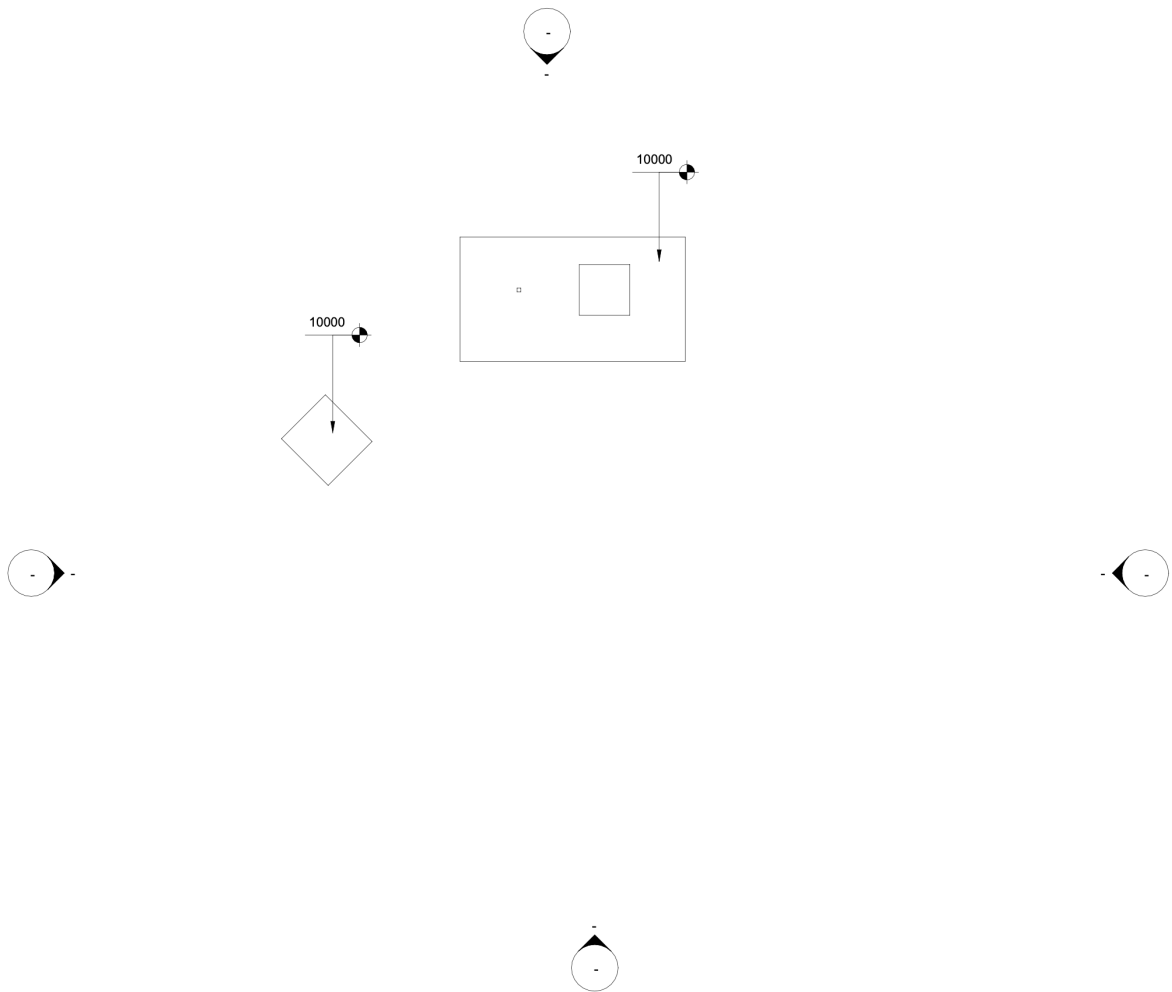


Figure 4 Top-down view 2 of 2 with elevation annotated.

## Appendix A: Model A (low complexity)

The content of this section is only meant to provide a spatial understanding and does not need to be assessed.

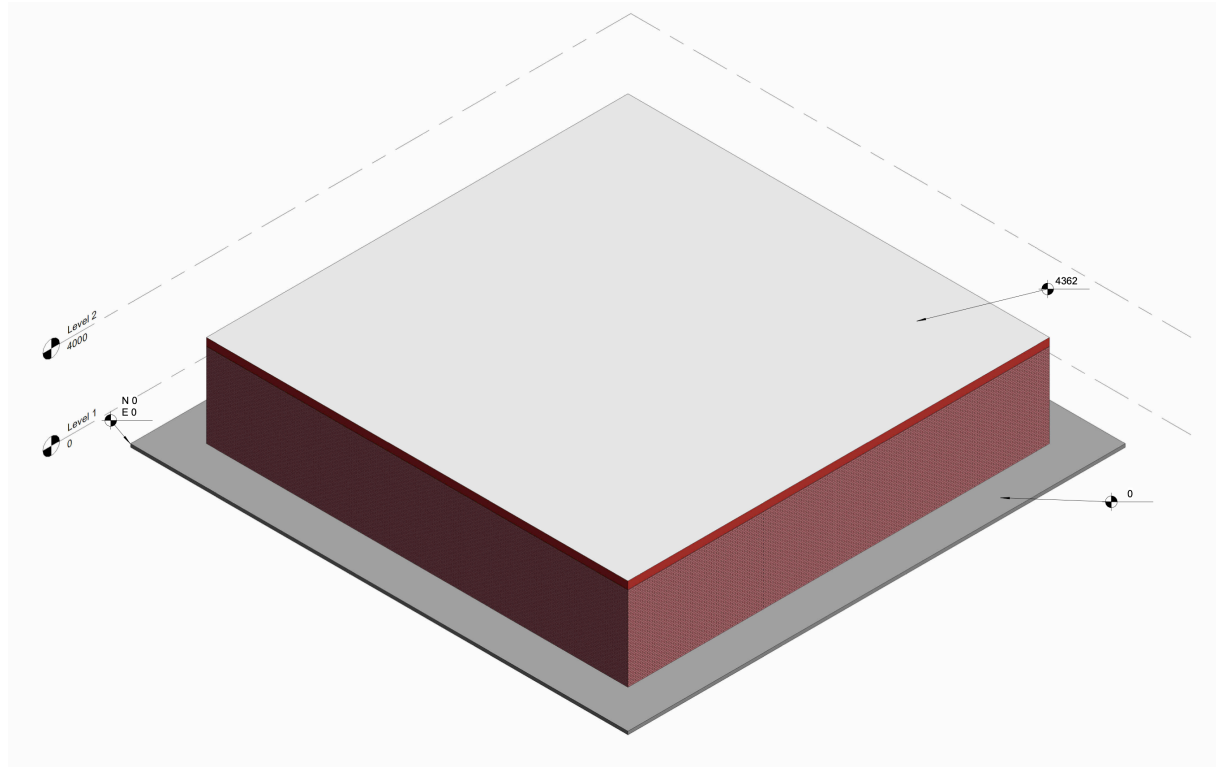


Figure 5 3D view with elevation annotated.

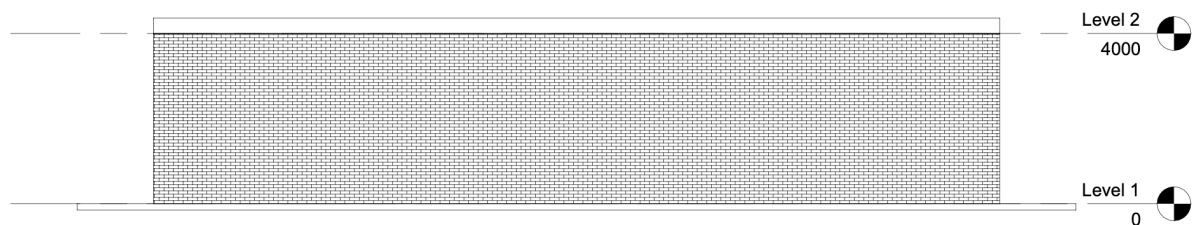


Figure 6 Sectional view east.

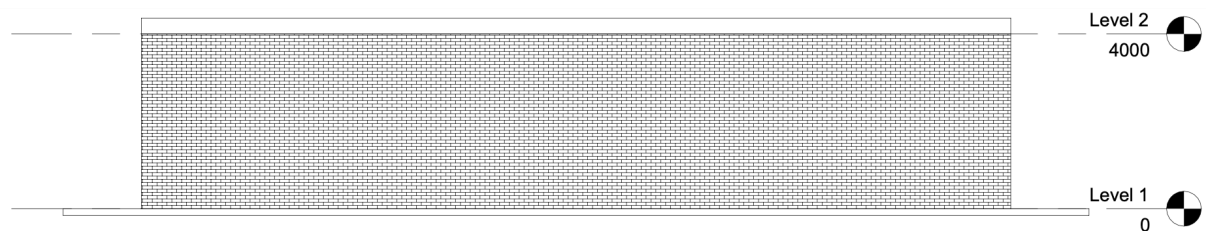


Figure 7 Sectional view north.

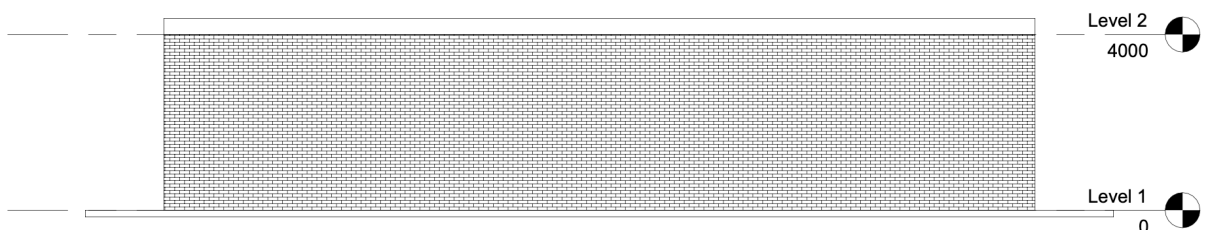


Figure 8 Sectional view south.

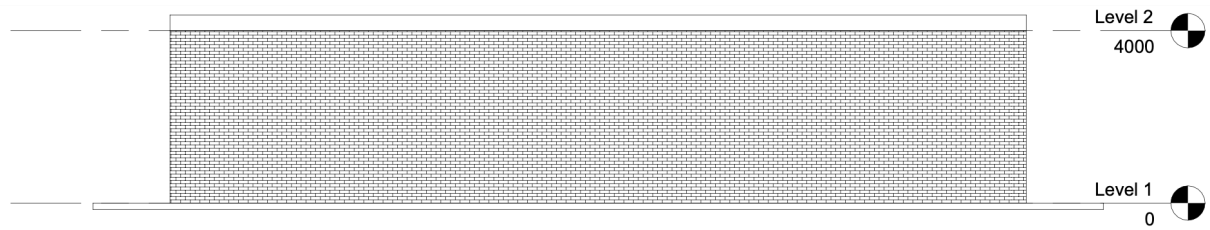


Figure 9 Sectional view west.

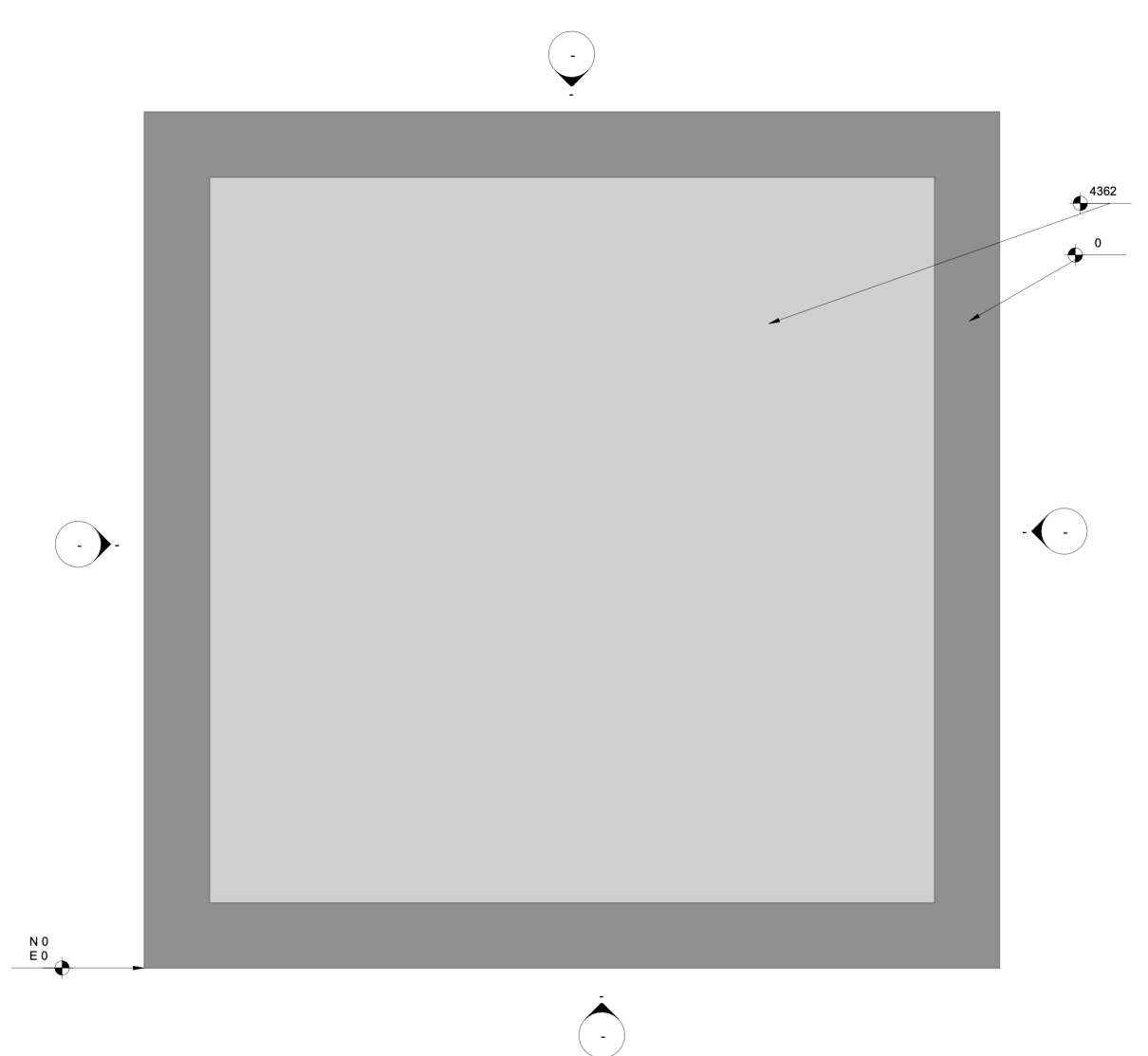


Figure 10 Top-down shaded view with elevation.

## Appendix B: Model B (edge case model)

The content of this section is only meant to provide a spatial understanding and does not need to be assessed.

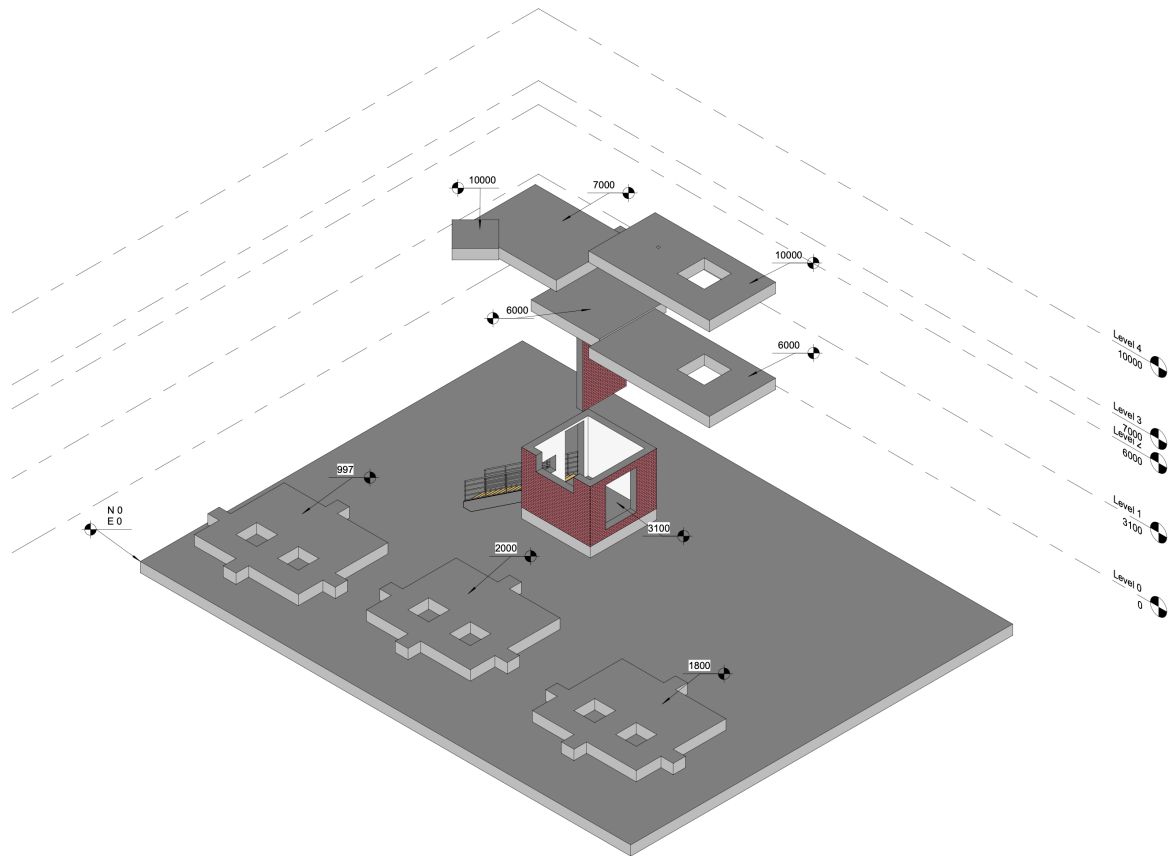


Figure 11 3D view with elevation annotated.

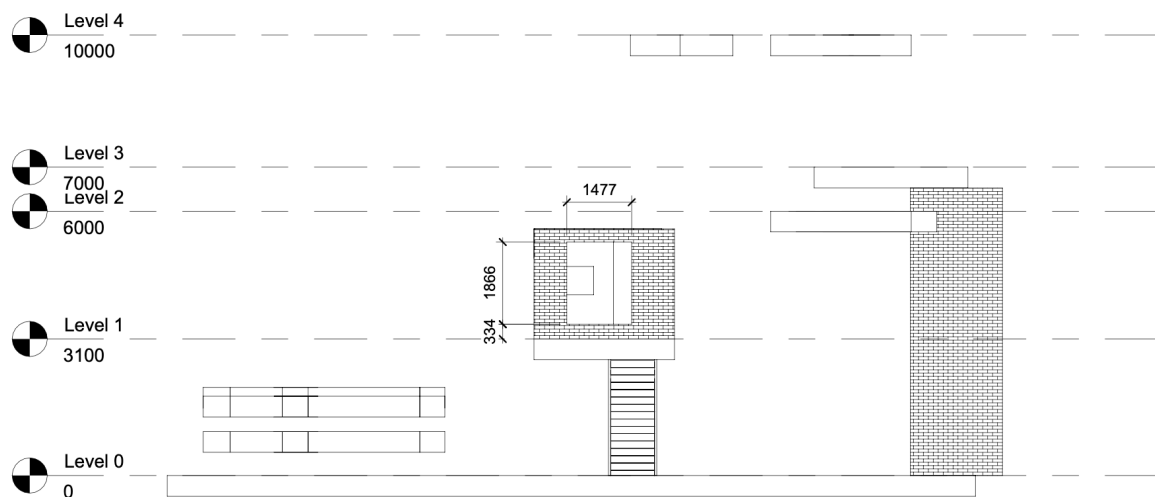


Figure 12 Sectional view east.



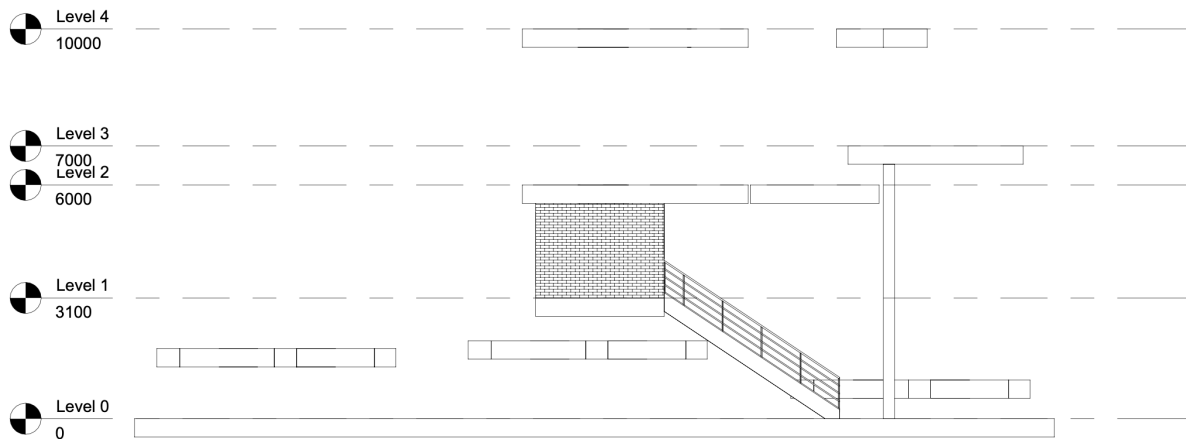


Figure 13 Sectional view north.

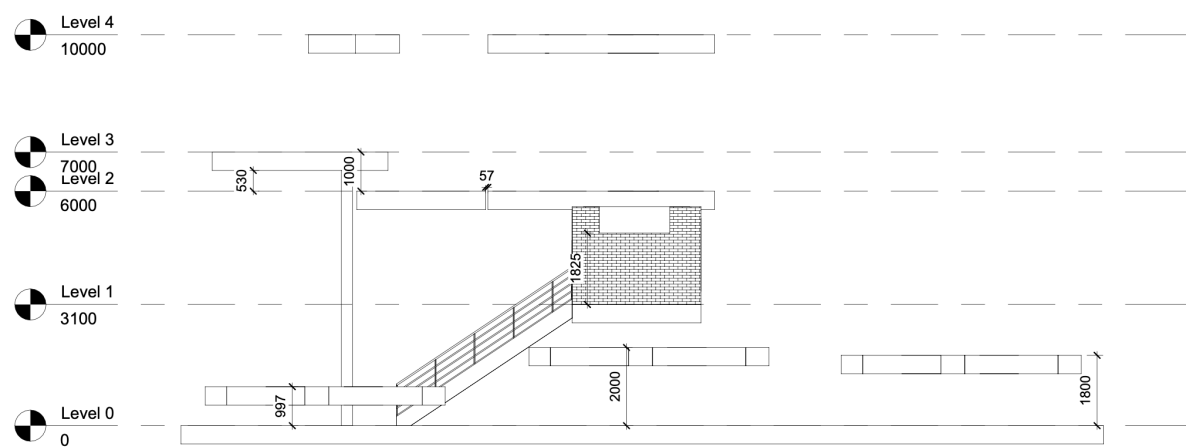


Figure 14 Sectional view south.

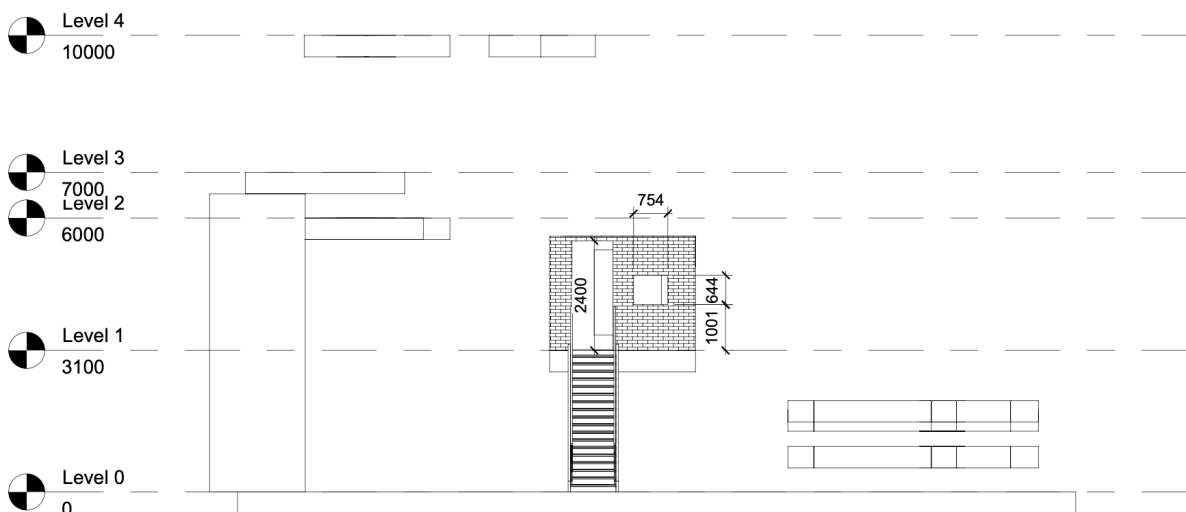


Figure 15 Sectional view west.

