HAVNESLOTTET STEGE

Proposal for an Artistic Reconstruction

Sketch Design Booklet

Gijs Van Vaerenbergh
23/12/2021

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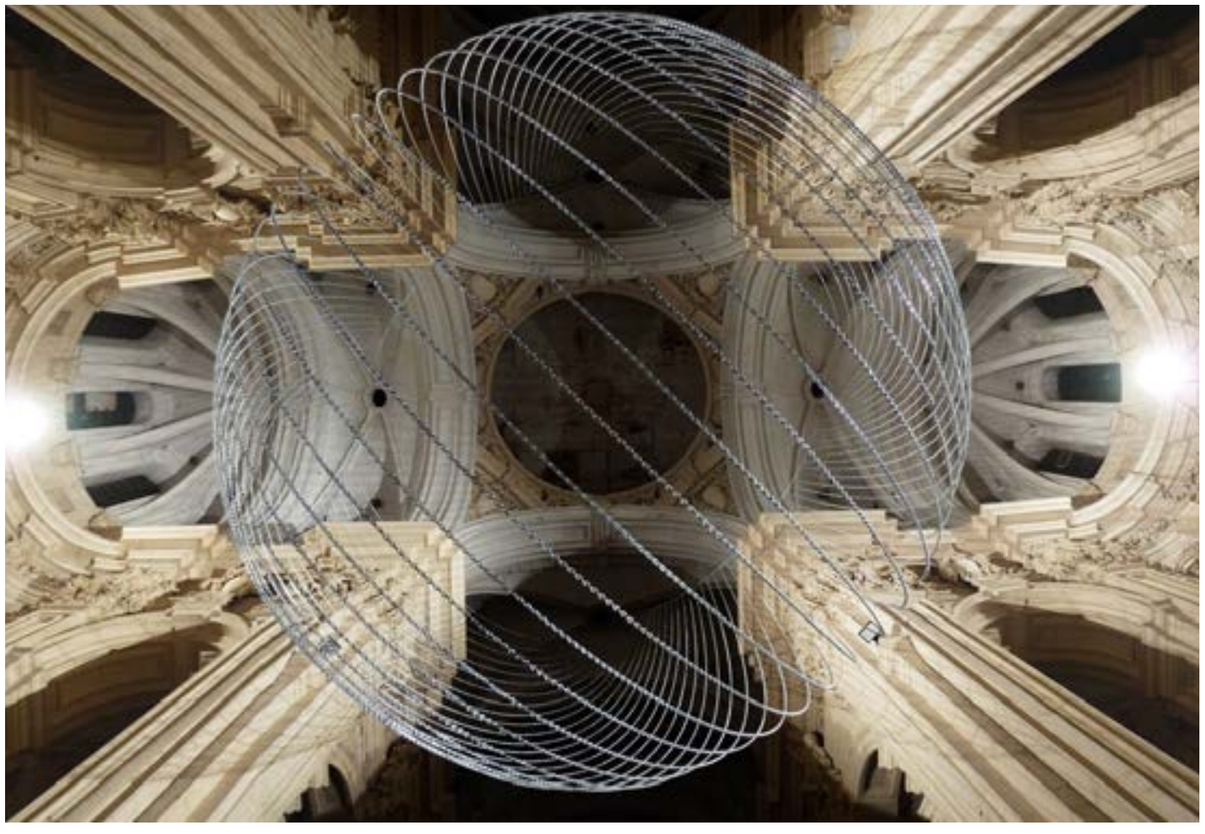

The Upside Dome - St. Michiel Church, Leuven, Belgium

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The Giant Sulpture - Kasterlee, Belgium

Study for a Windmill - Dilbeek, Belgium

Tabernacle - Watou

Colonnade - Brugge

01. Existing Situation

Stege, Demark - Google imagery

Stege, Demark - Google imagery

Stege, Demark - Google imagery

Stege, Demark - Google imagery

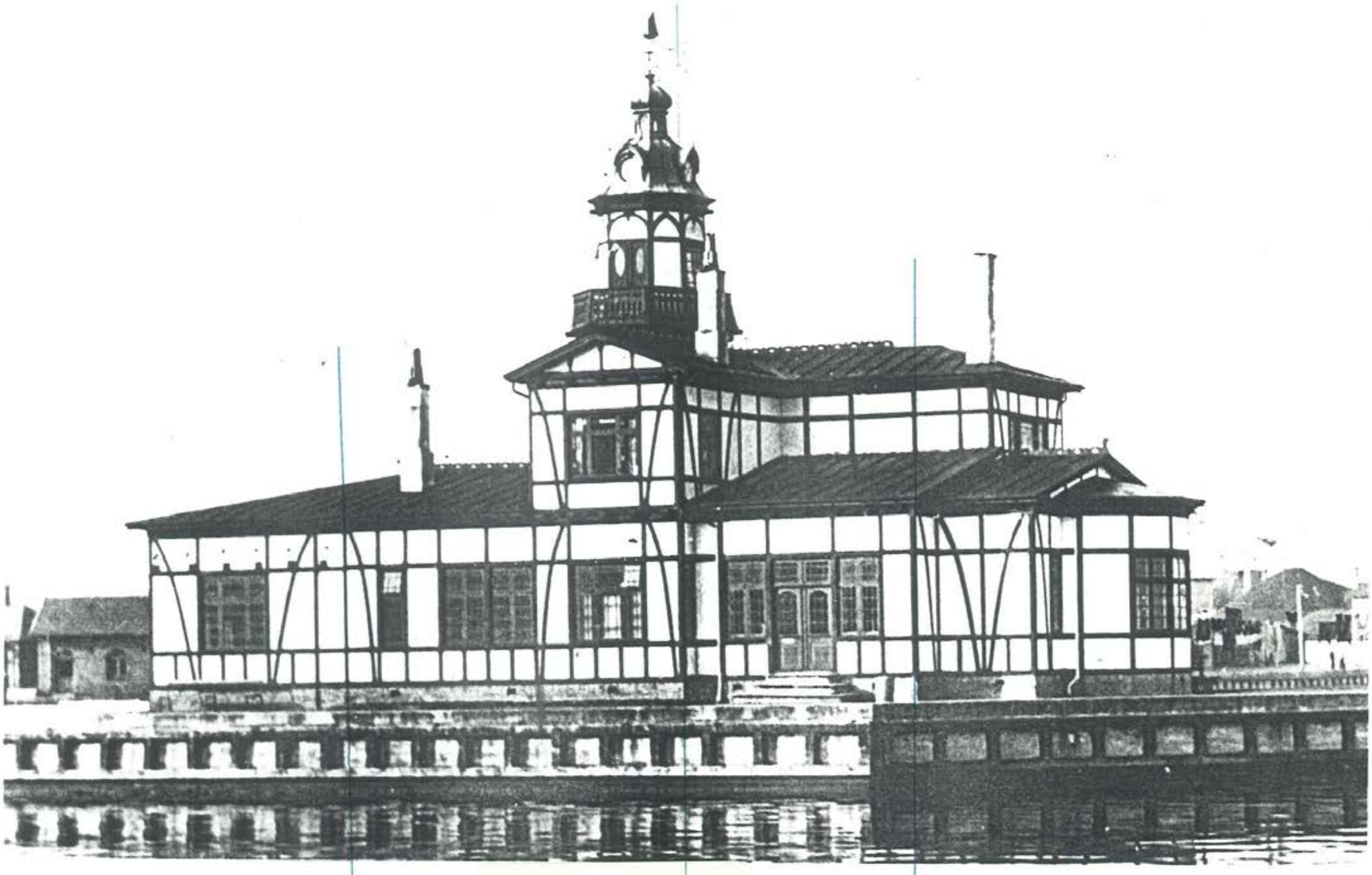
Existing Situation - Perpective view towards harbour

Existing Situation - Perpective view towards harbour

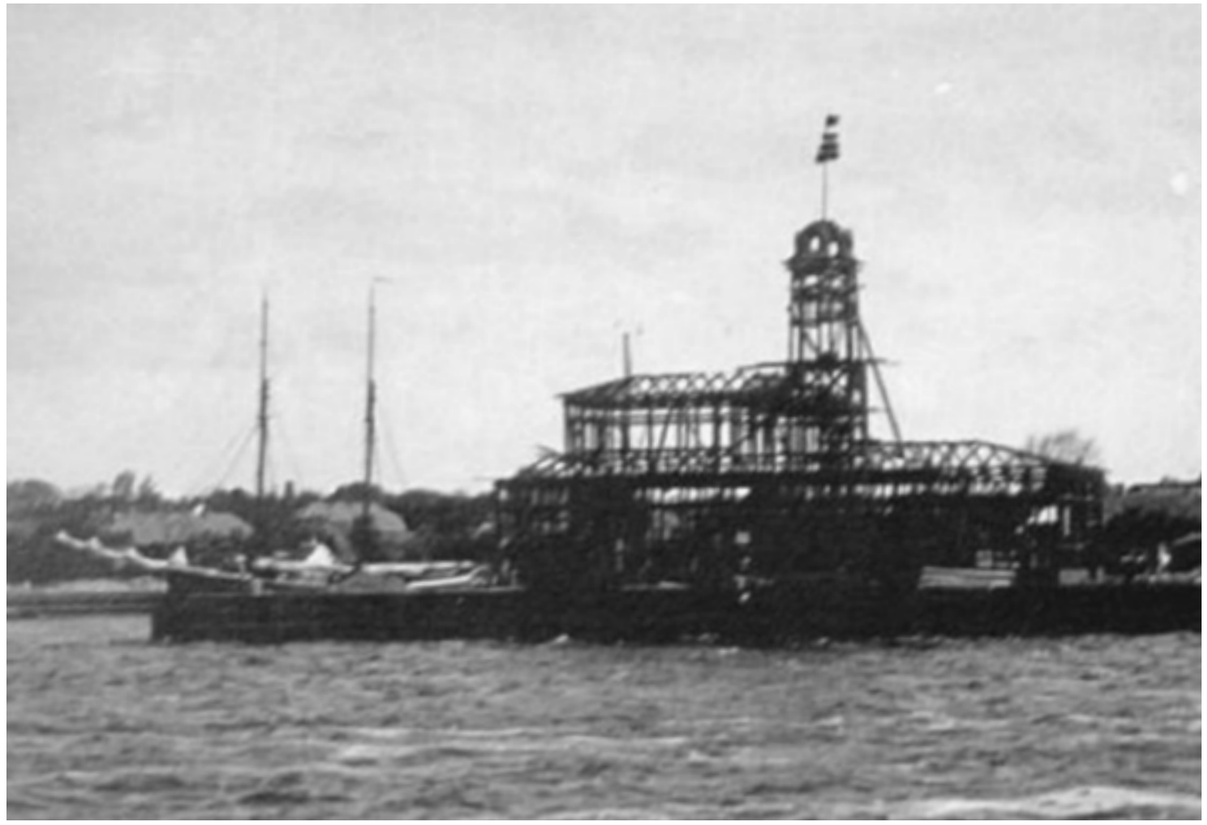
Existing Situation - Perpective view from the harbour

Existing Situation - Perpective view towards the harbour

02. Stege Harbor Castle

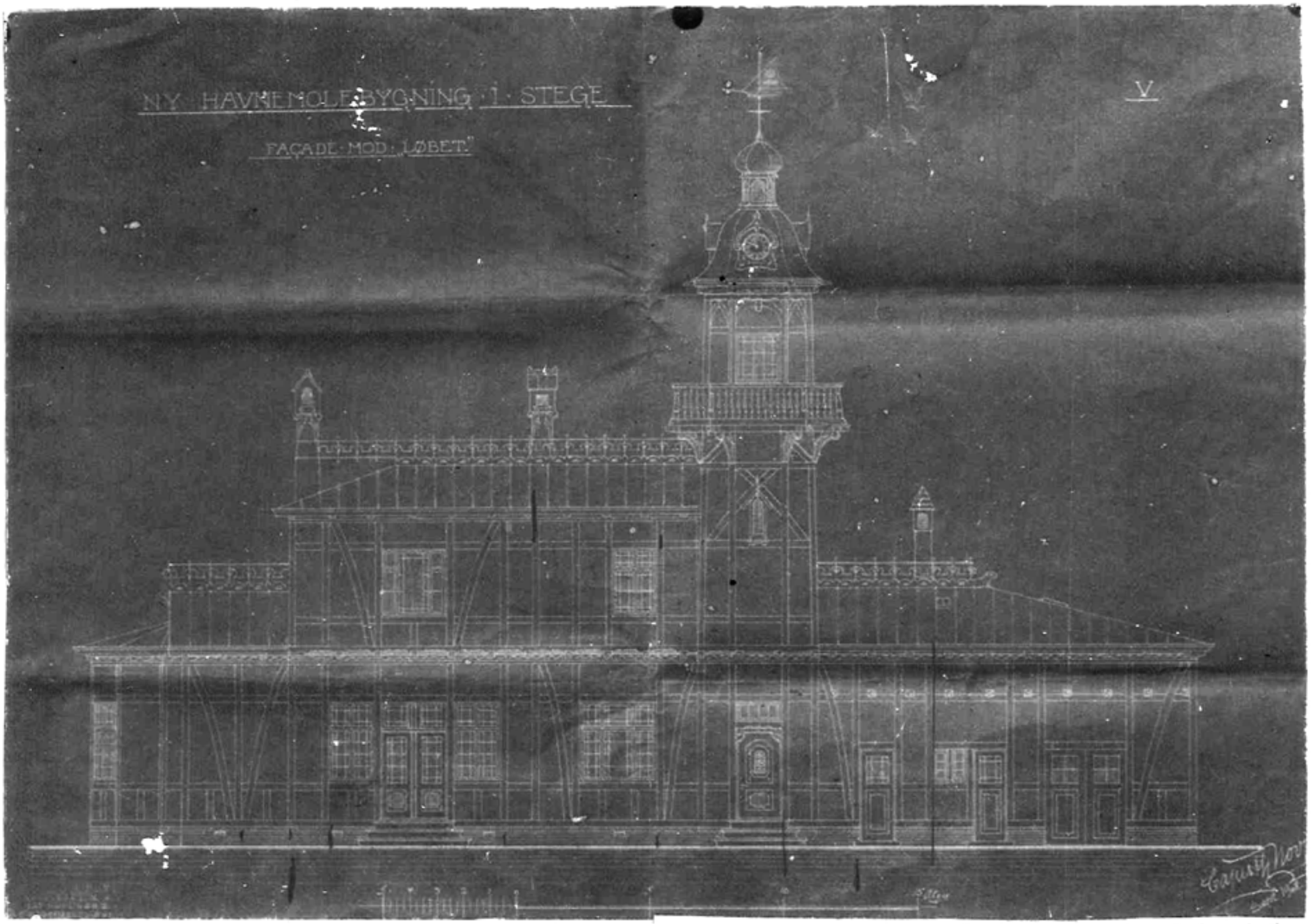


Historical photos of Stege Harbor Castle 1909 - 1965



Historical photos of Stege Harbor Castle 1909 - 1965

Historical photos of Stege Harbor Castle 1909 - 1965



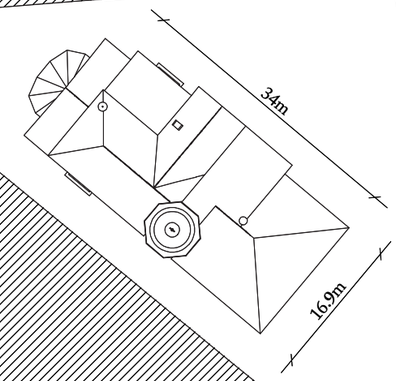
Tegning til "Havneslottet".

Knud Sehested Stege

Prisbelønnet
Vordingborg
1901

Historical drawing of Stege Harbor Castle. Architect Cajus Novi

Project Stege Harbour Castle
Tekening Site plan
Datum ~~02/11/2021~~
Schaal 1:2000 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Site plan
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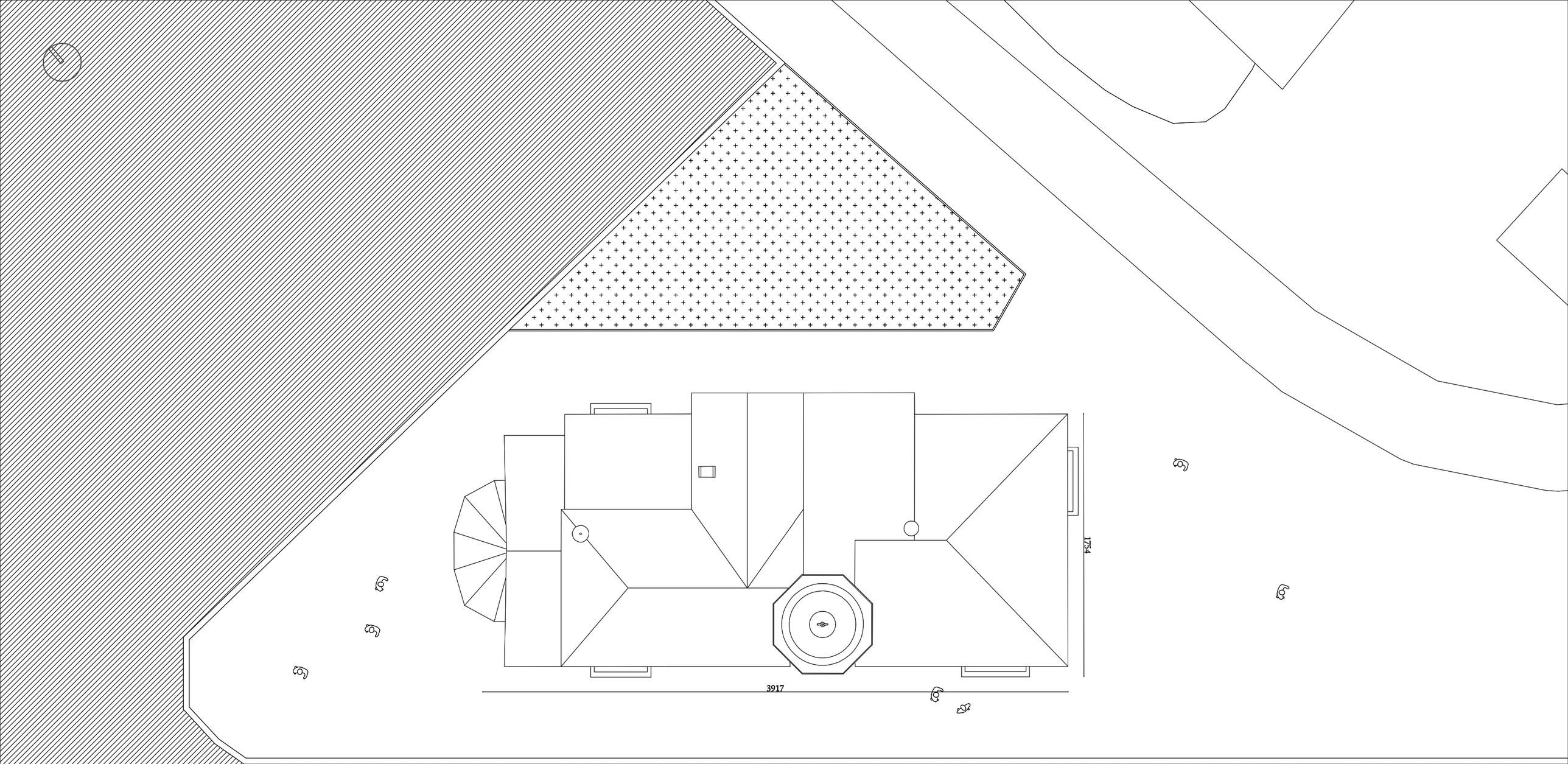
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
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Datum 15/12/2021
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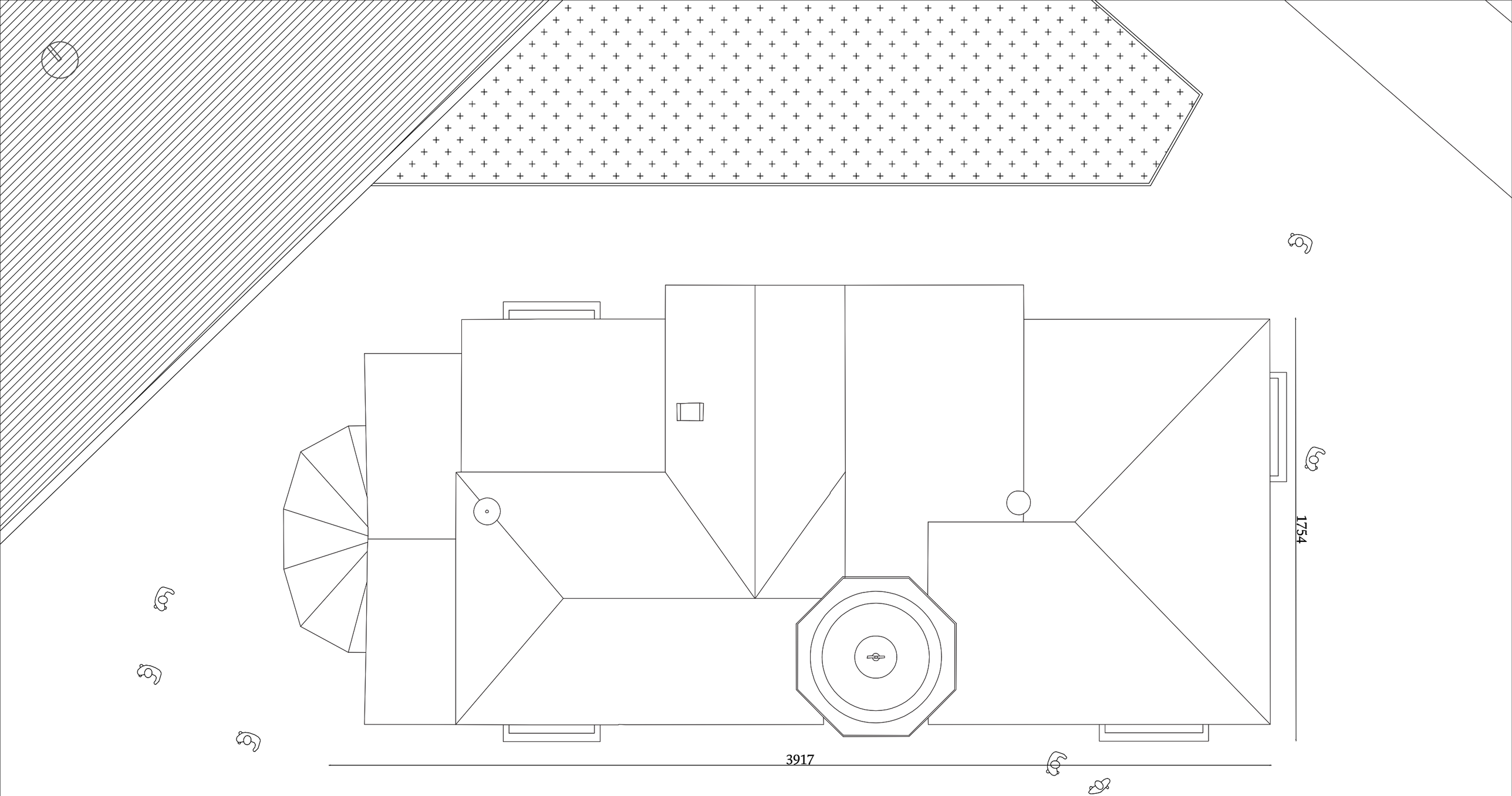
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Recreated plan
Datum 15/12/2021
Schaal 1:150 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen

Project Stege Harbour Castle
Tekening Recreated elevation
Datum 15/12/2021
Schaal 1:150 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen

Project Stege Harbour Castle
Tekening Recreated elevation
Datum 15/12/2021
Schaal 1:150 - op A3
Architect Gijs Van Vaerenbergh
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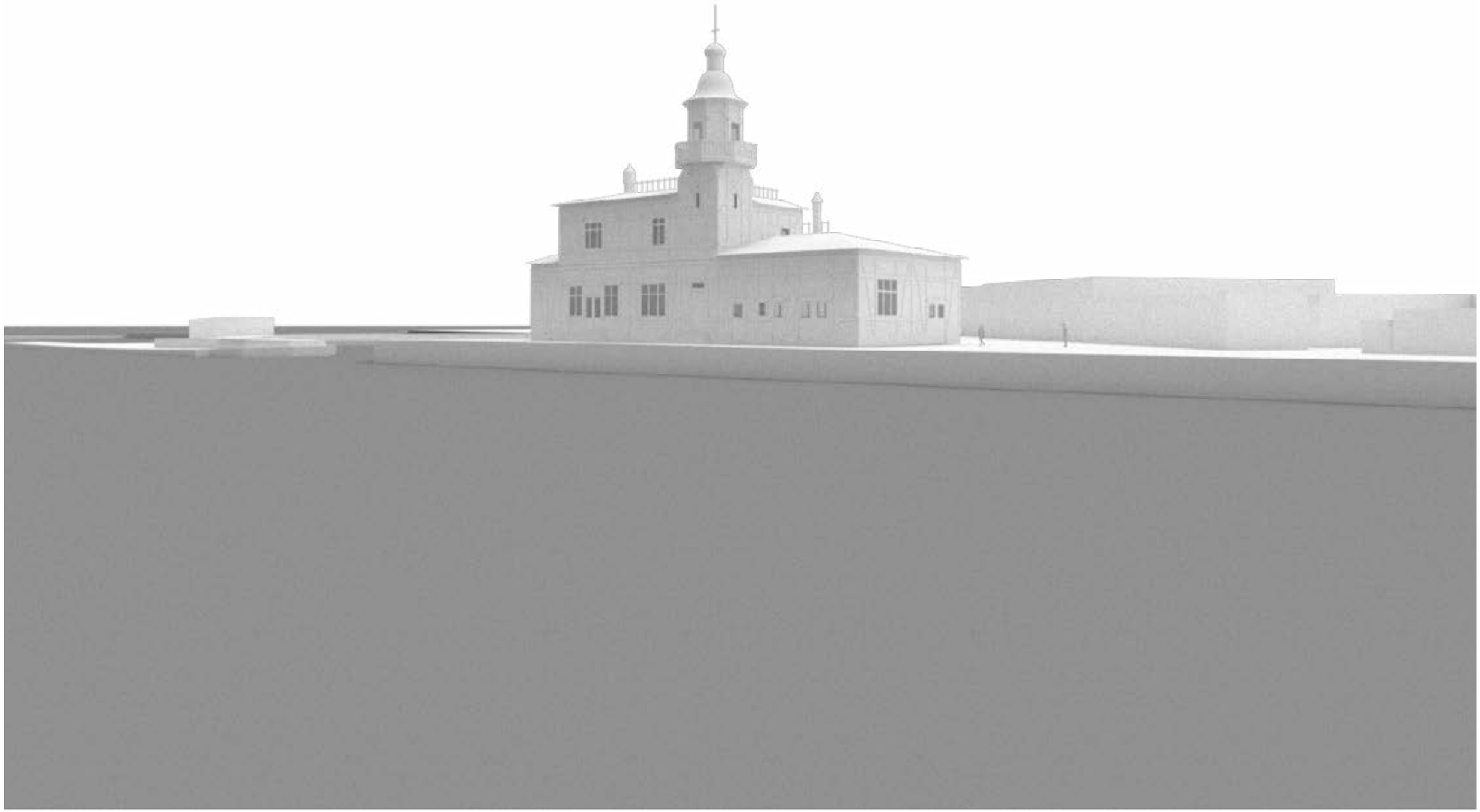
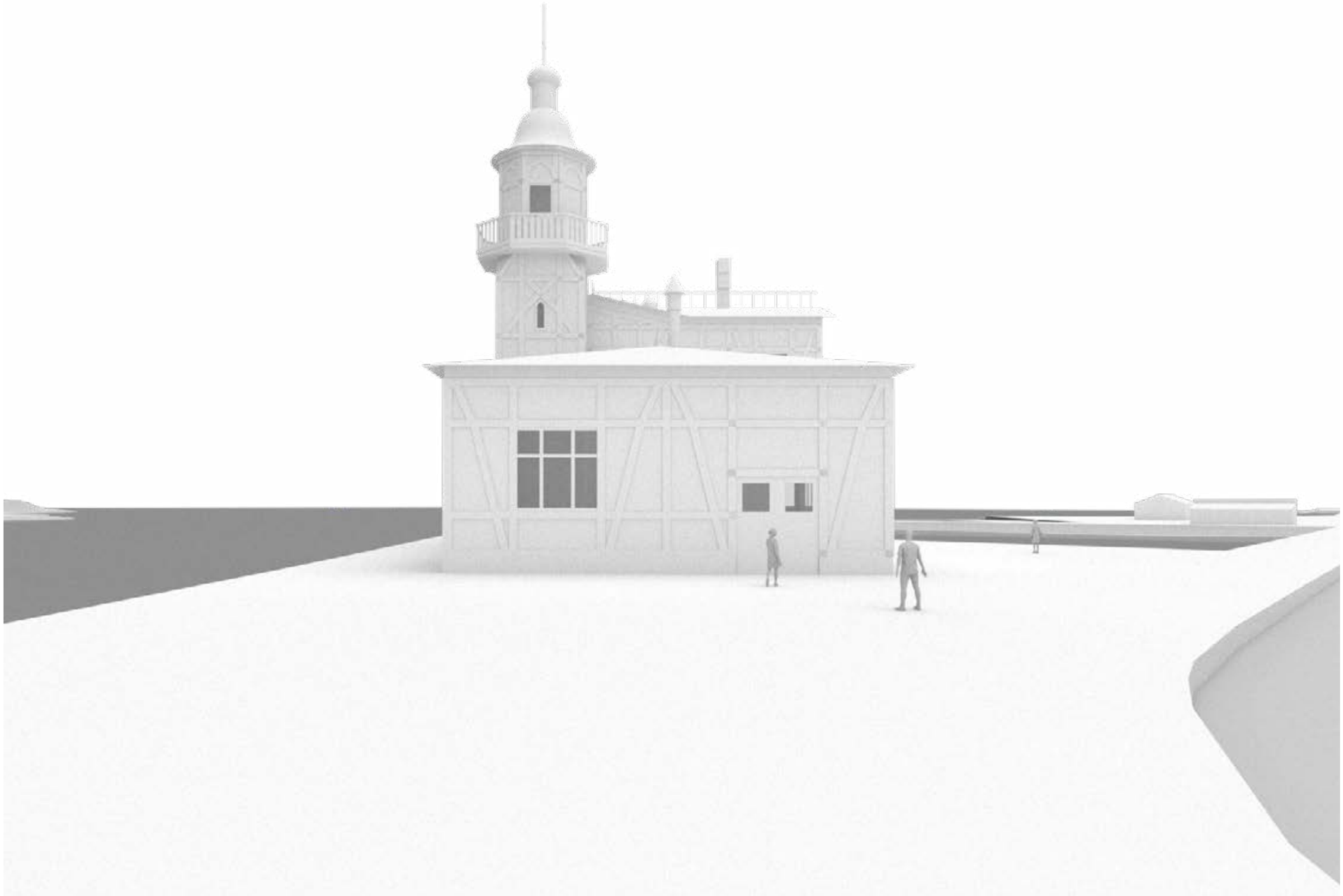
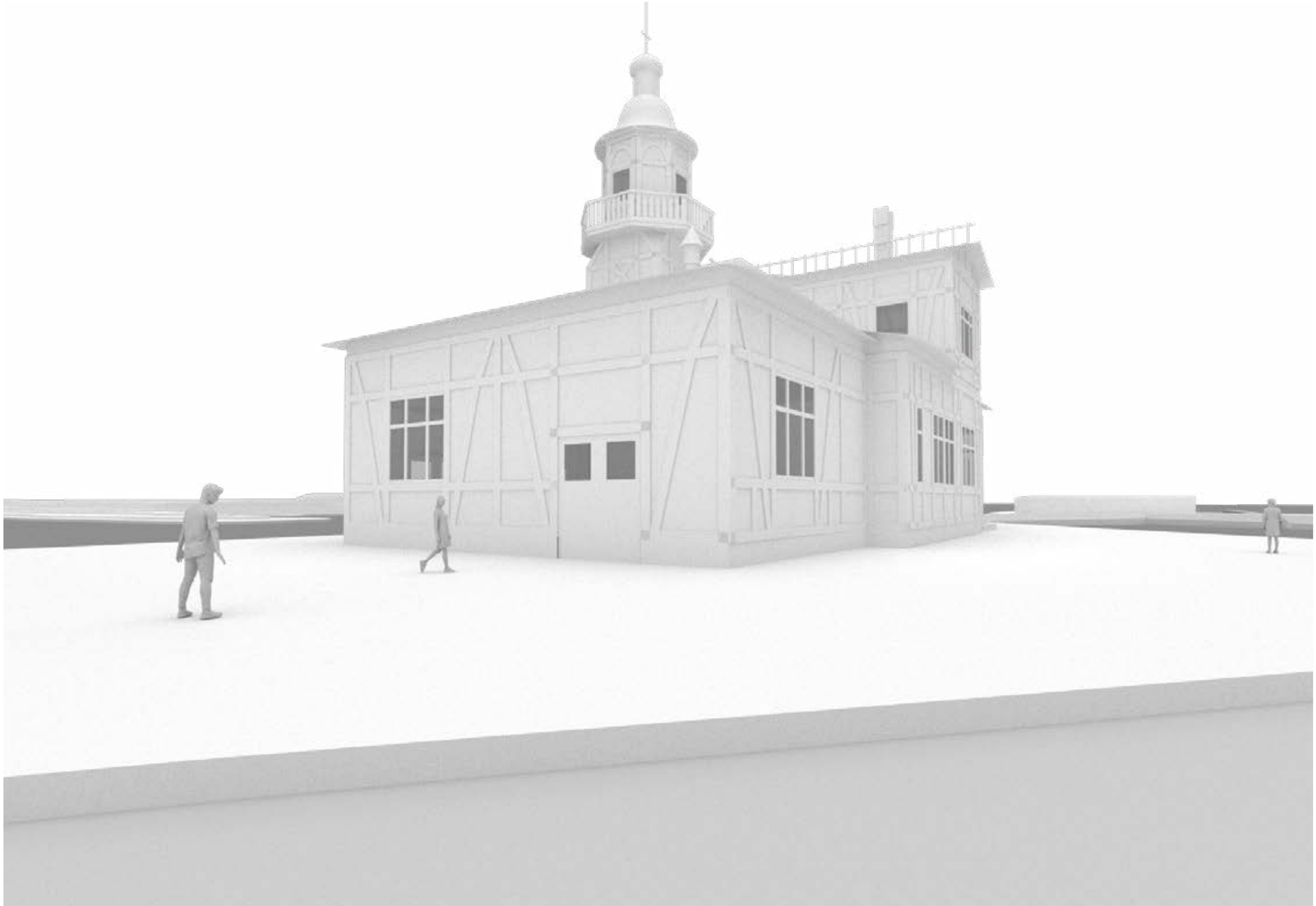


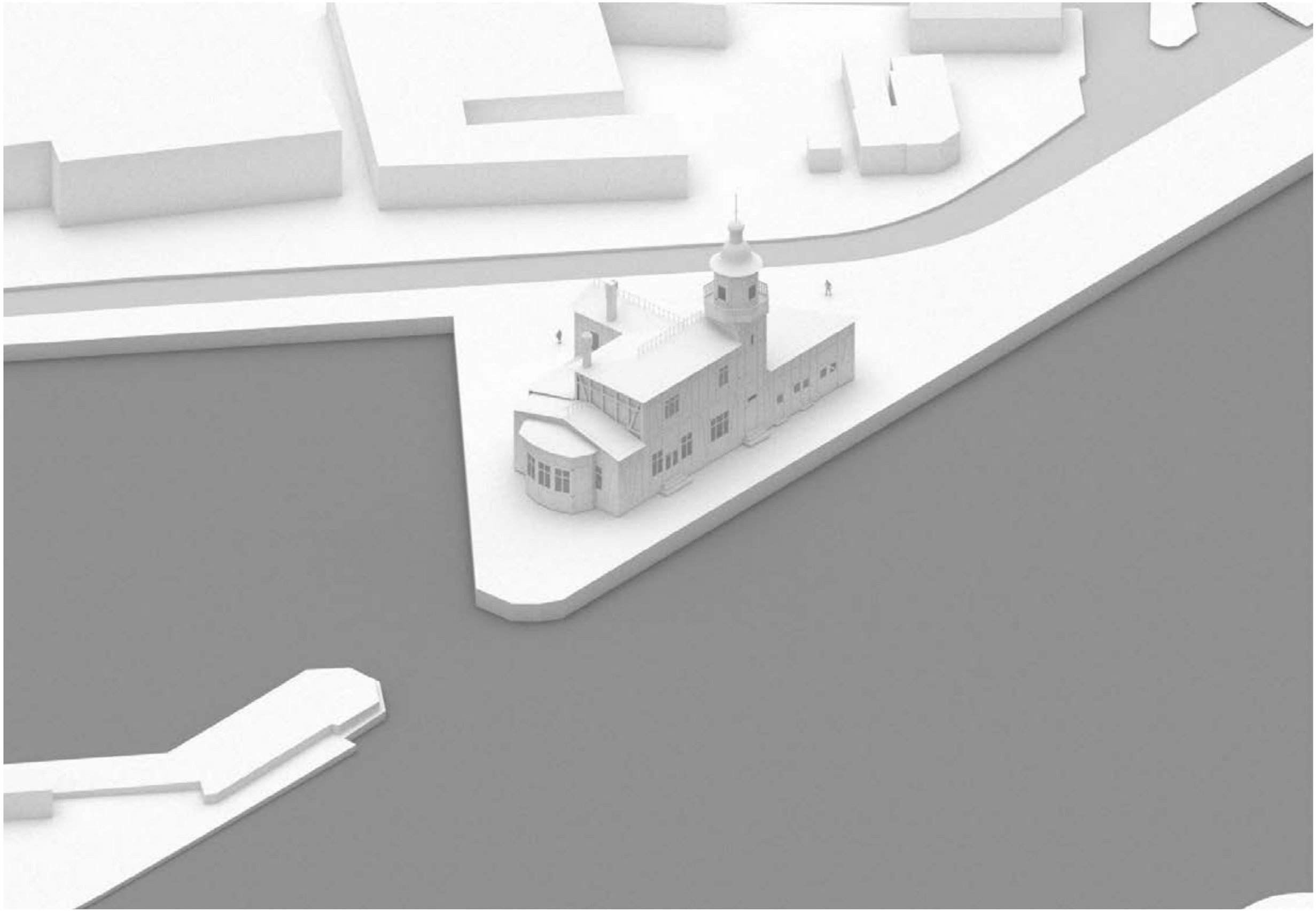
Stege castle recreated



Stege castle recreated



Stege castle recreated



Stege castle recreated

03. References for the Structure

Windmill by Gijs Van Vaerenbergh

Windmill by Gijs Van Vaerenbergh

04. Preliminary Structural Analysis

Bollinger + Grohmann

STRUCTURAL ANALYSIS RESULTS

General

The following load cases are taken into account:

- G0 (self weight)
- Wx (Wind in X direction)
- Wy (Wind in Y)

Steel S355 square hollow sections are used in different sizes depending on the forces;

The cross sections have been optimized to withstand four different ULS load combinations:

- 1.35 G0 + 1.5 Wx
- 1.35 G0 – 1.5 Wx
- 1.35 G0 + 1.5 Wy
- 1.35 G0 – 1.5 Wy

The following pages show loads, displacements and stresses for a load combination of self weight and wind in Y direction for meshes with target edge length 2m, 1m, and 0.5m

STRUCTURAL ANALYSIS RESULTS

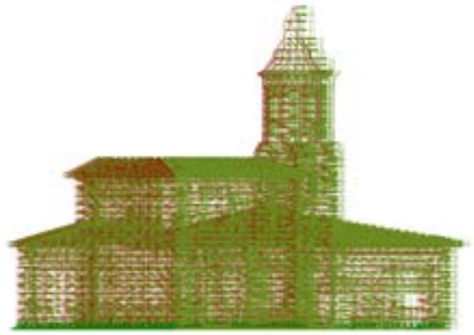
2m mesh (~35t steel)

Supports and Loads (self weight + 0.09 kN/m wind load in Y):

STRUCTURAL ANALYSIS RESULTS

1m mesh (~40t steel)

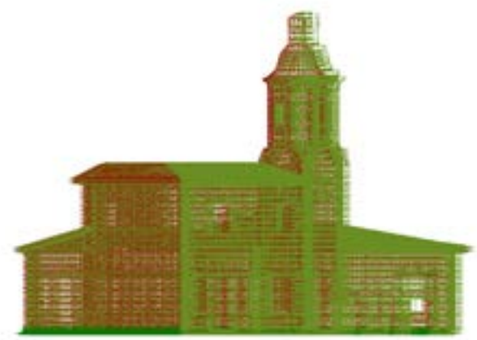
Supports and Loads (self weight + 0.09 kN/m wind load in Y):



STRUCTURAL ANALYSIS RESULTS

0.5m mesh (~55t steel)

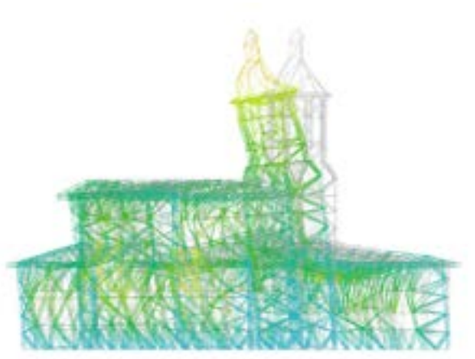
Supports and Loads (self weight + 0.09 kN/m wind load in Y):



STRUCTURAL ANALYSIS RESULTS

2m mesh (~35t steel)

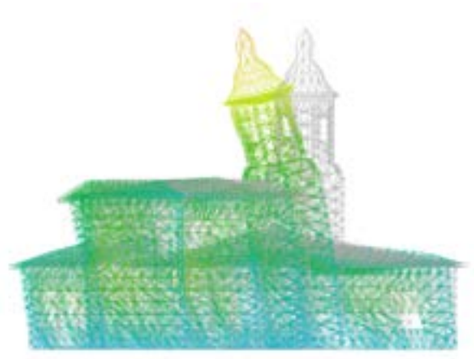
Displacements (max 5.5 cm in SLS):



STRUCTURAL ANALYSIS RESULTS

1m mesh (~40t steel)

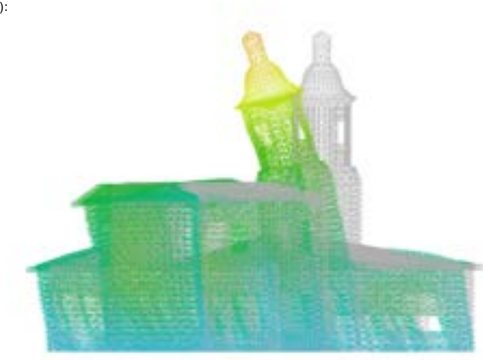
Displacements (max 7.5 cm in SLS):



STRUCTURAL ANALYSIS RESULTS

0.5m mesh (~55t steel)

Displacements (max 8.5 cm in SLS):



STRUCTURAL ANALYSIS RESULTS

2m mesh (~35t steel)

Stresses (max 377 MPa in ULS):

STRUCTURAL ANALYSIS RESULTS

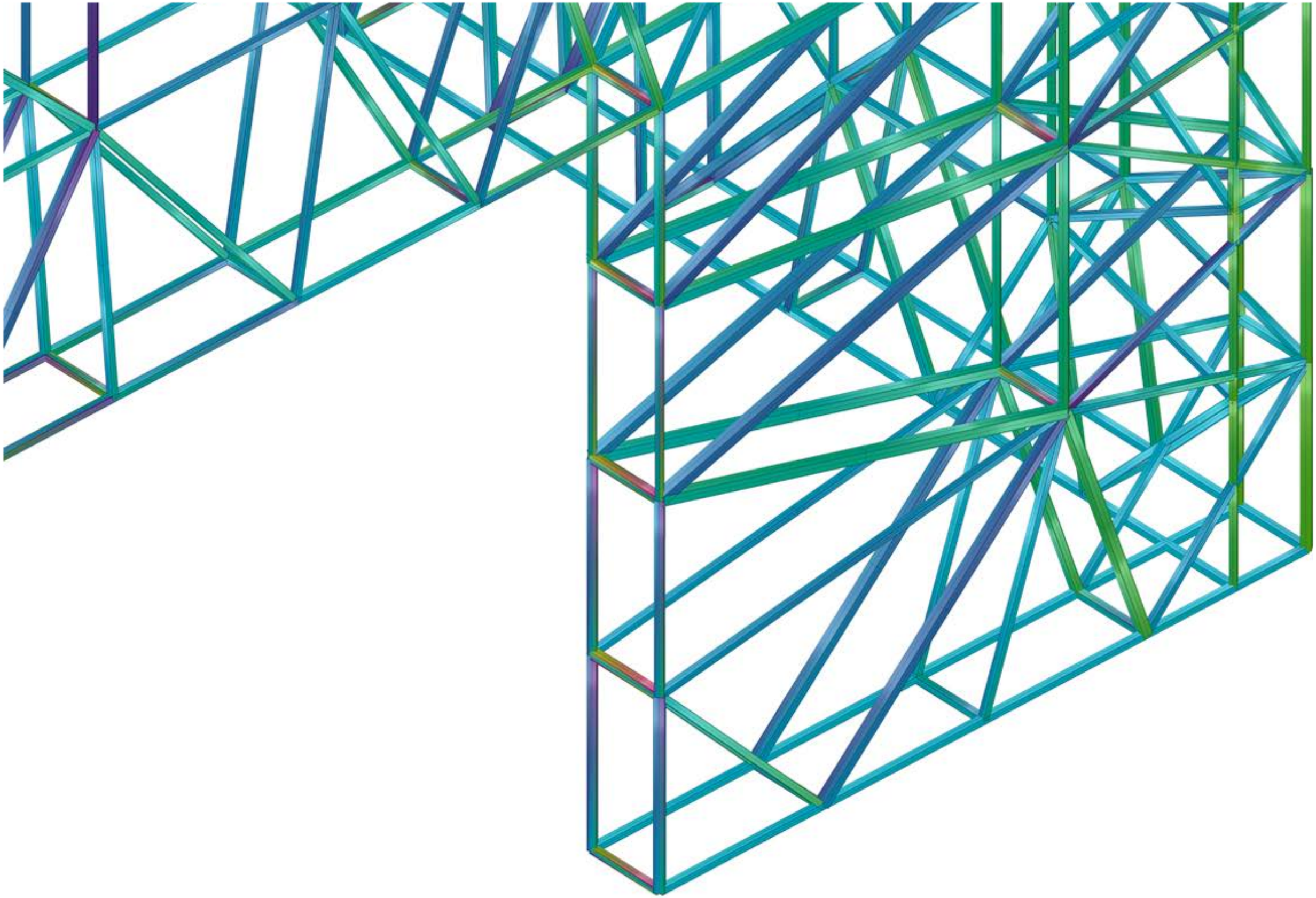
1m mesh (~40t steel)

Stresses (max 399 MPa in ULS):

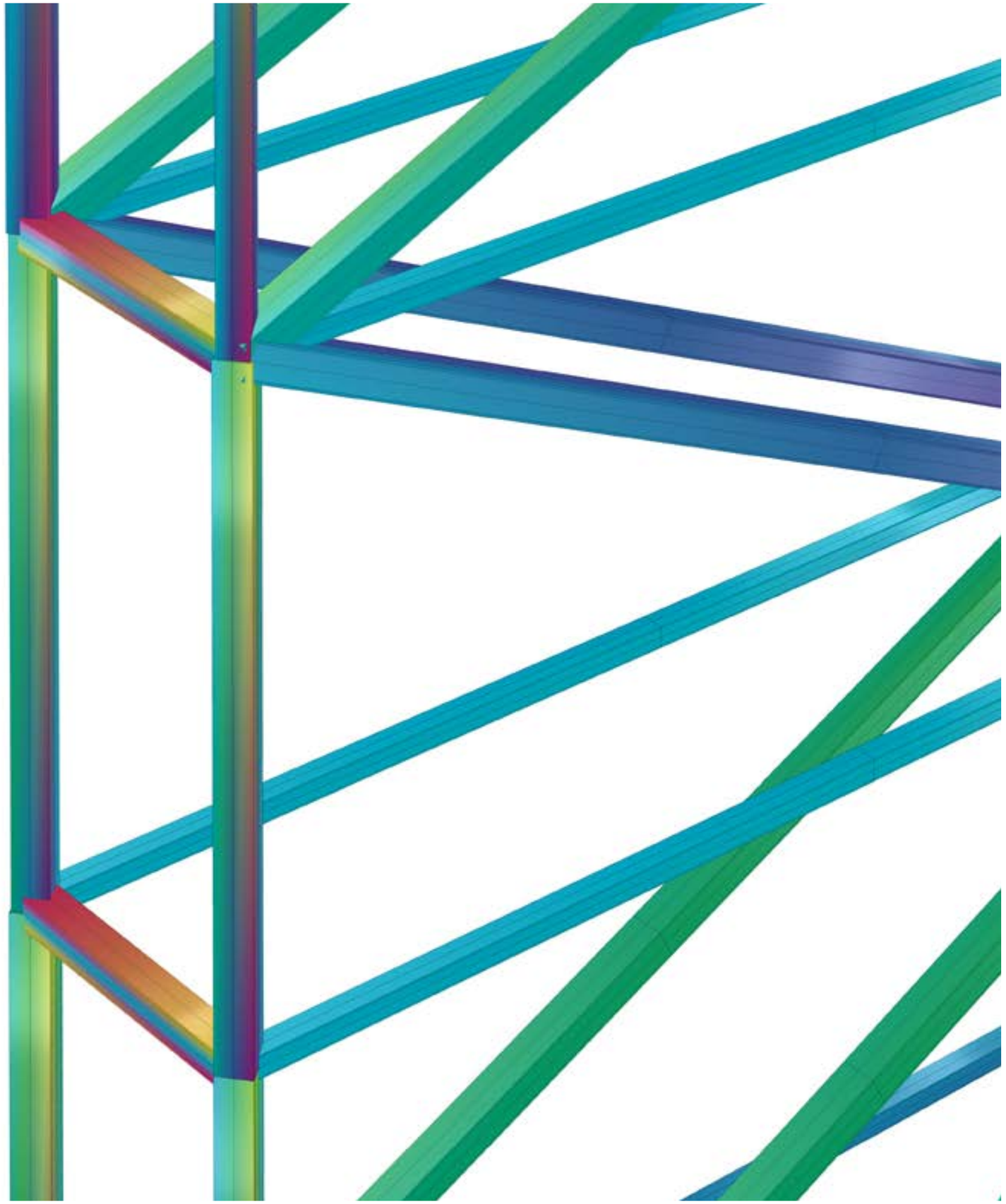
STRUCTURAL ANALYSIS RESULTS

0.5m mesh (~55t steel)

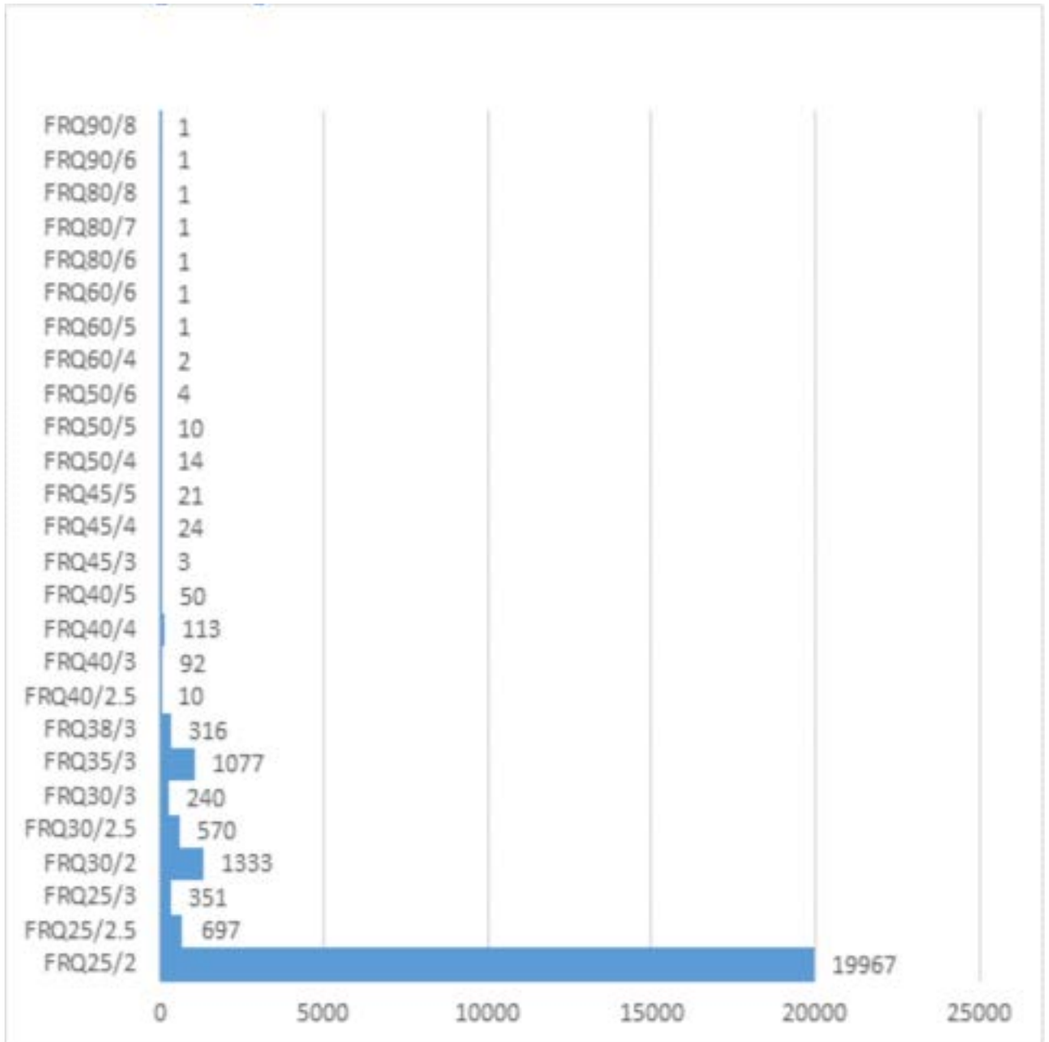
Stresses (max 373 MPa in ULS):



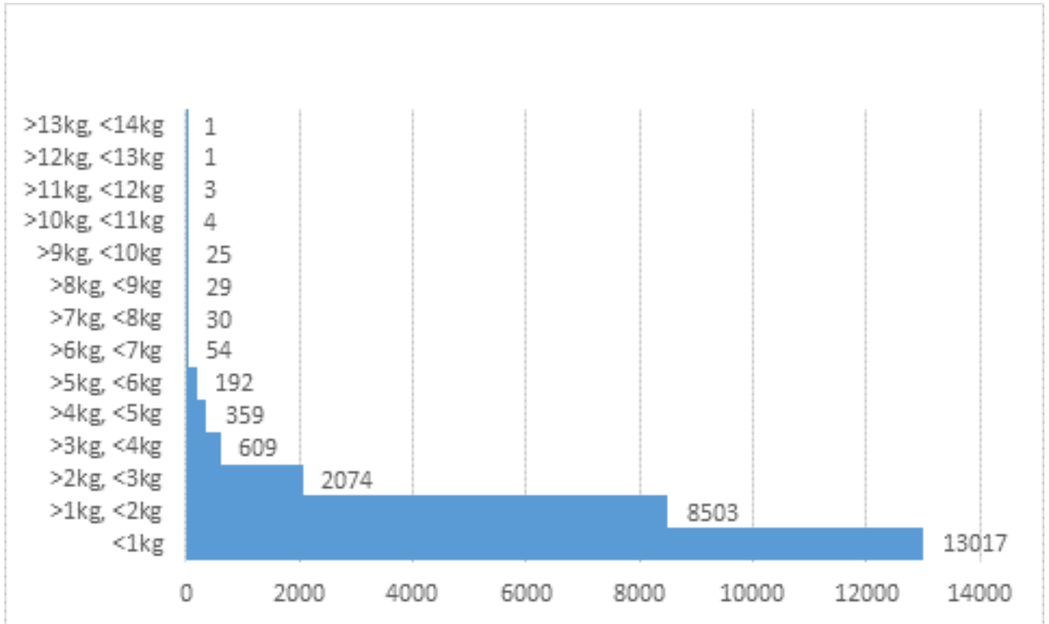
Isometric detail view of the stresses



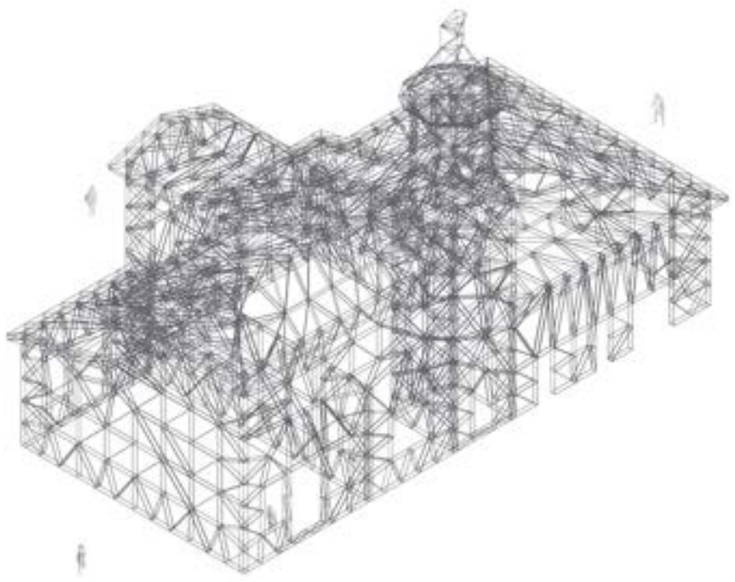
Isometric detail zoom-in view of the stresses



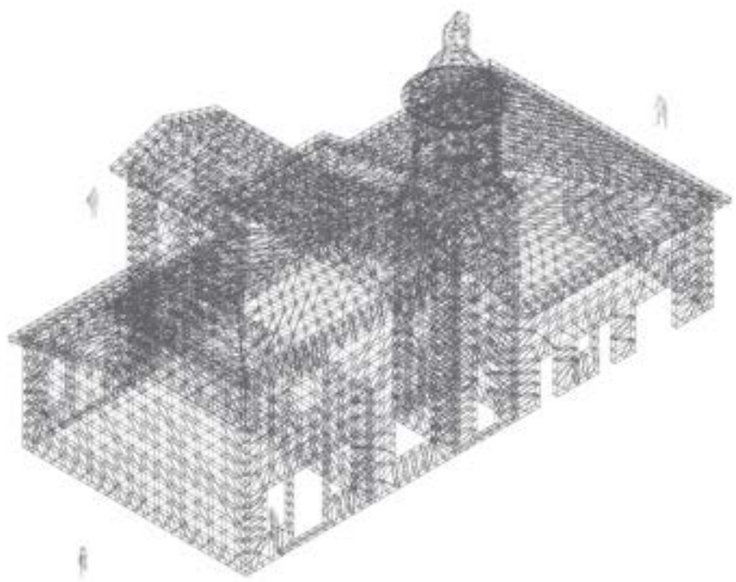
Currently considered cross section of the rectangular tubes



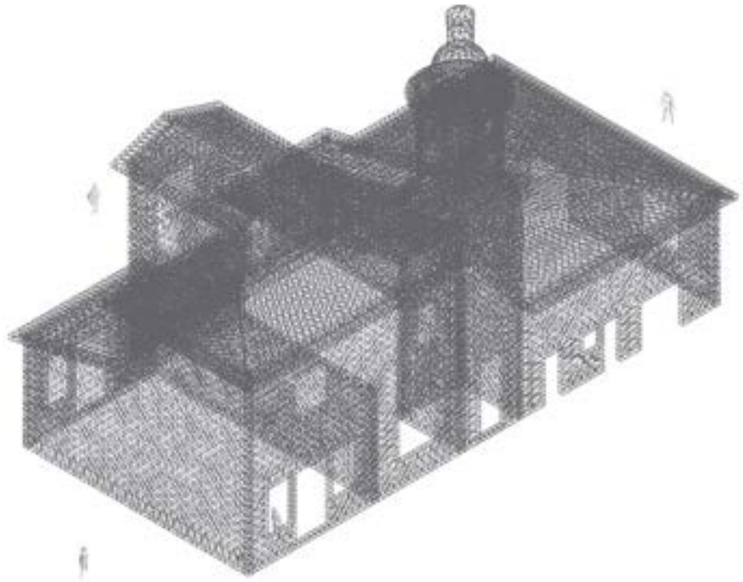
Currently considered weights of the rectangular tubes



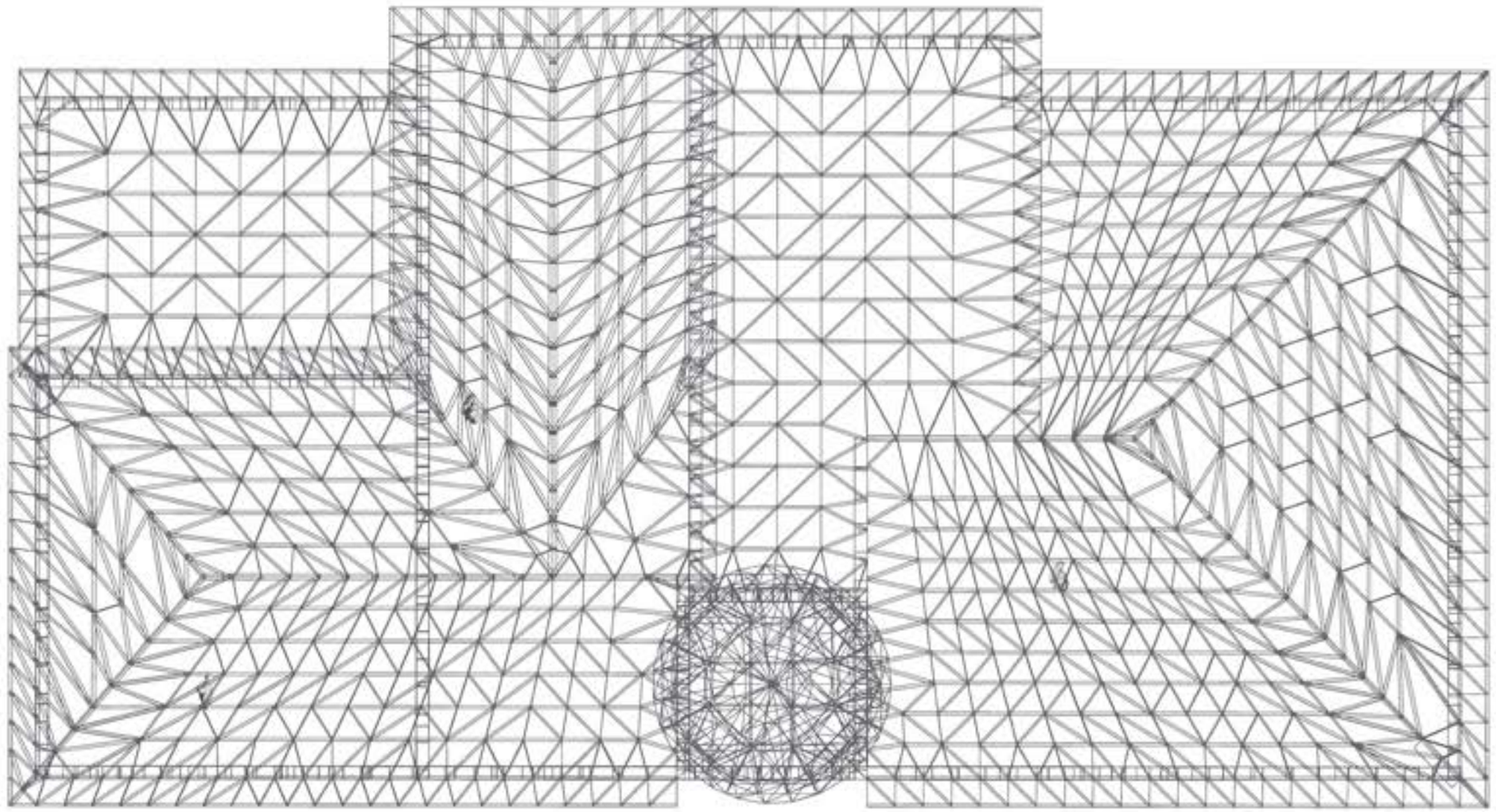
2m length
35 tonnes
3cm thick



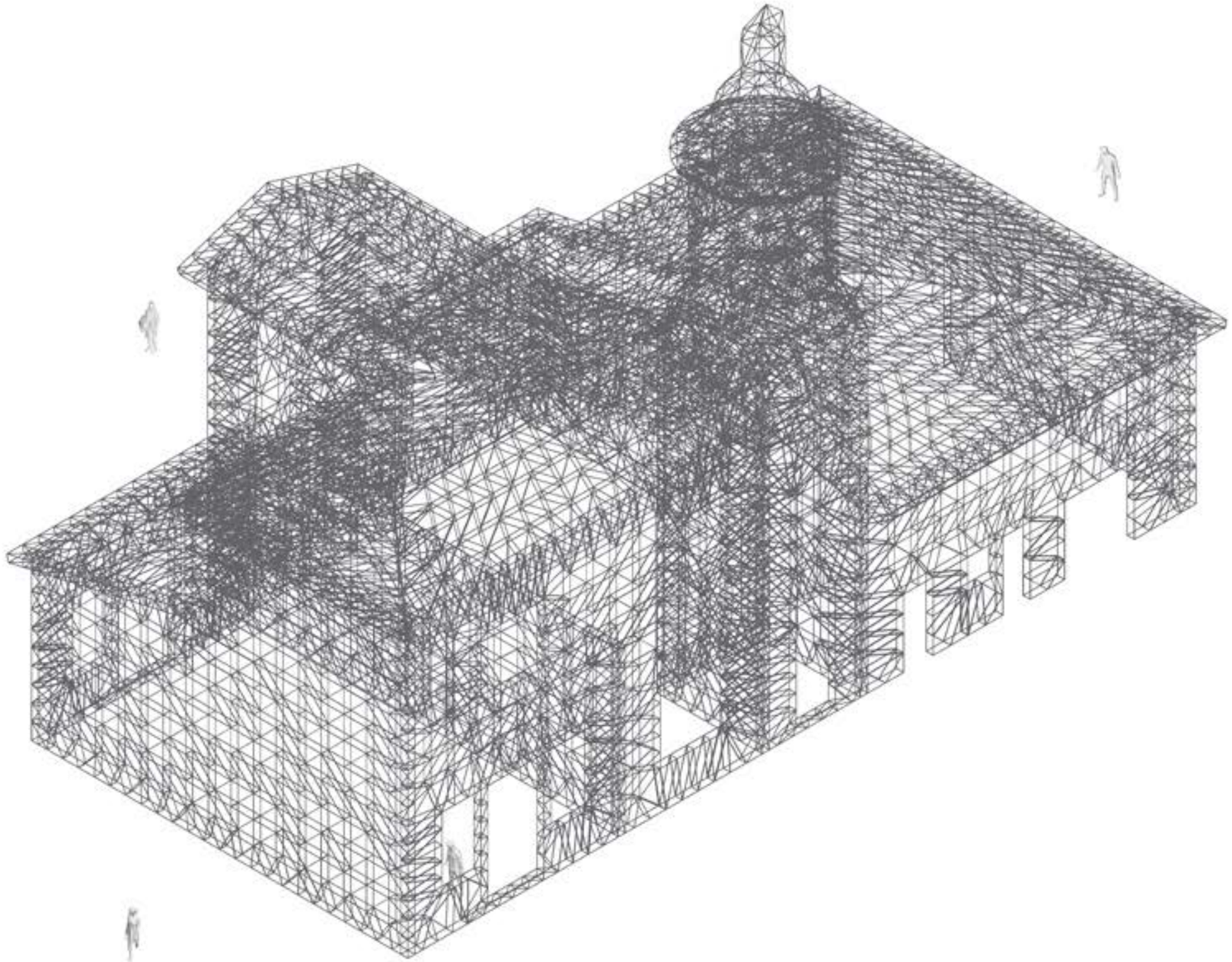
1m length
40 tonnes
3cm thick



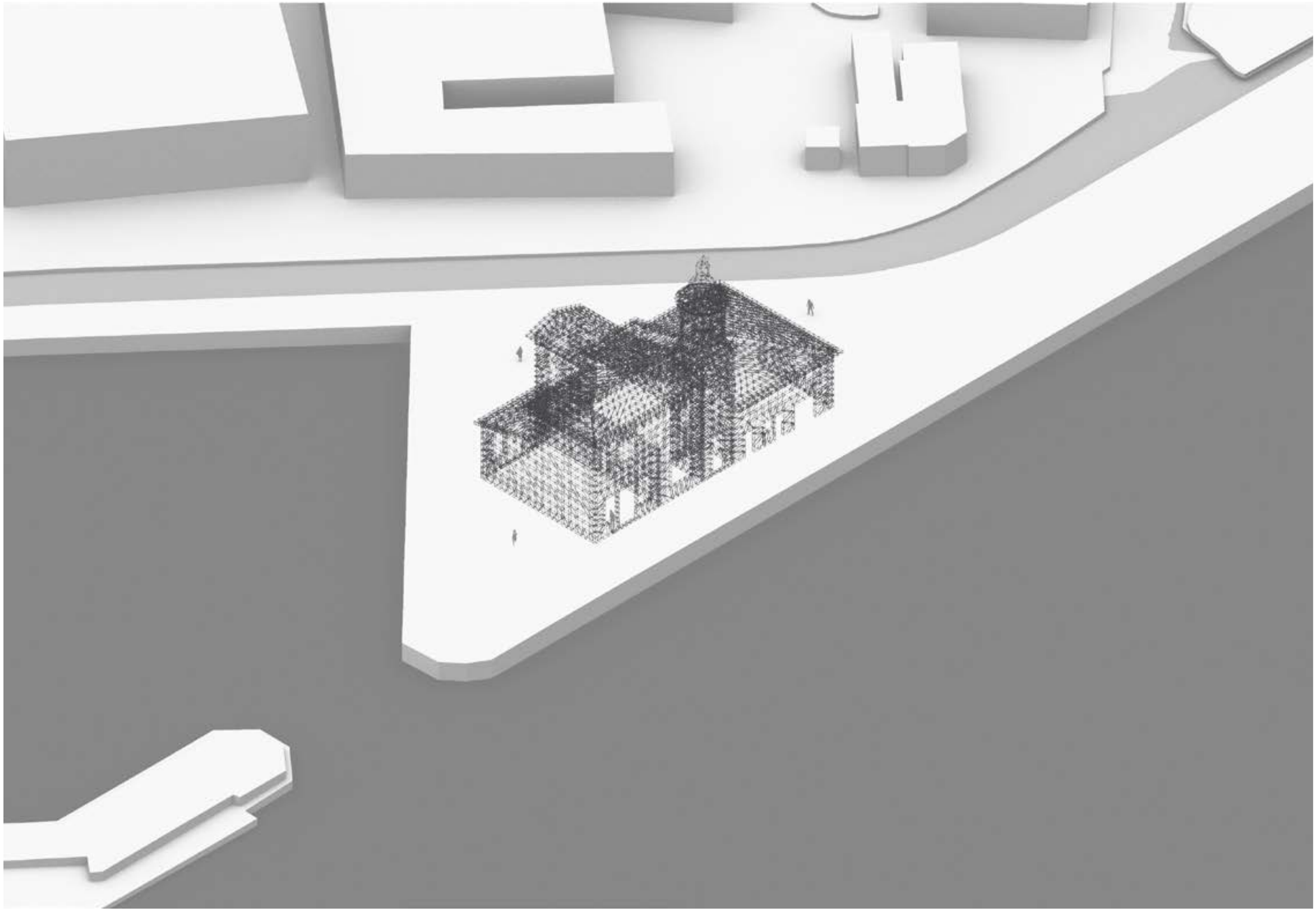
0.5m length
55 tonnes
3cm thick



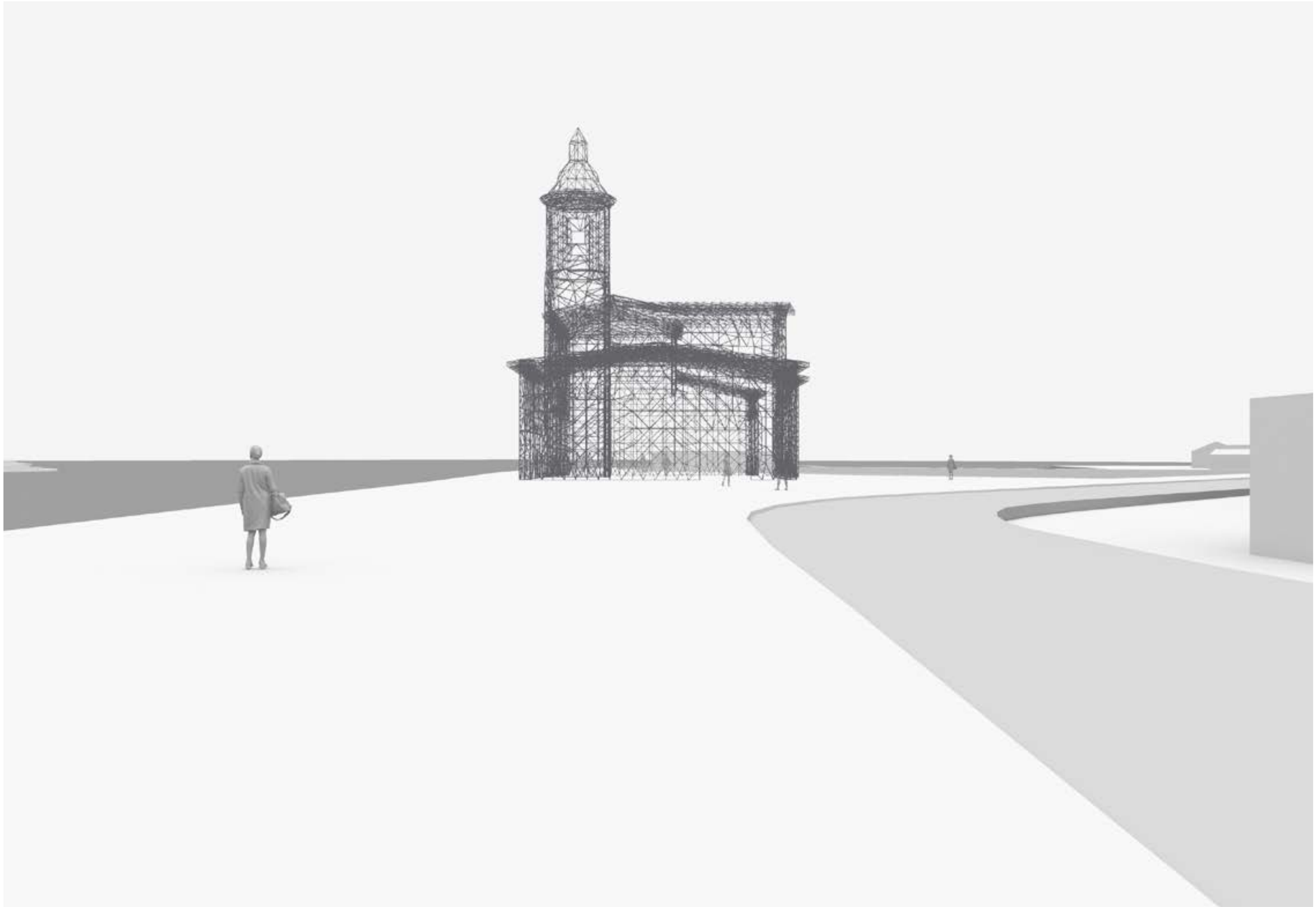
1m length, 40 tonnes, plan



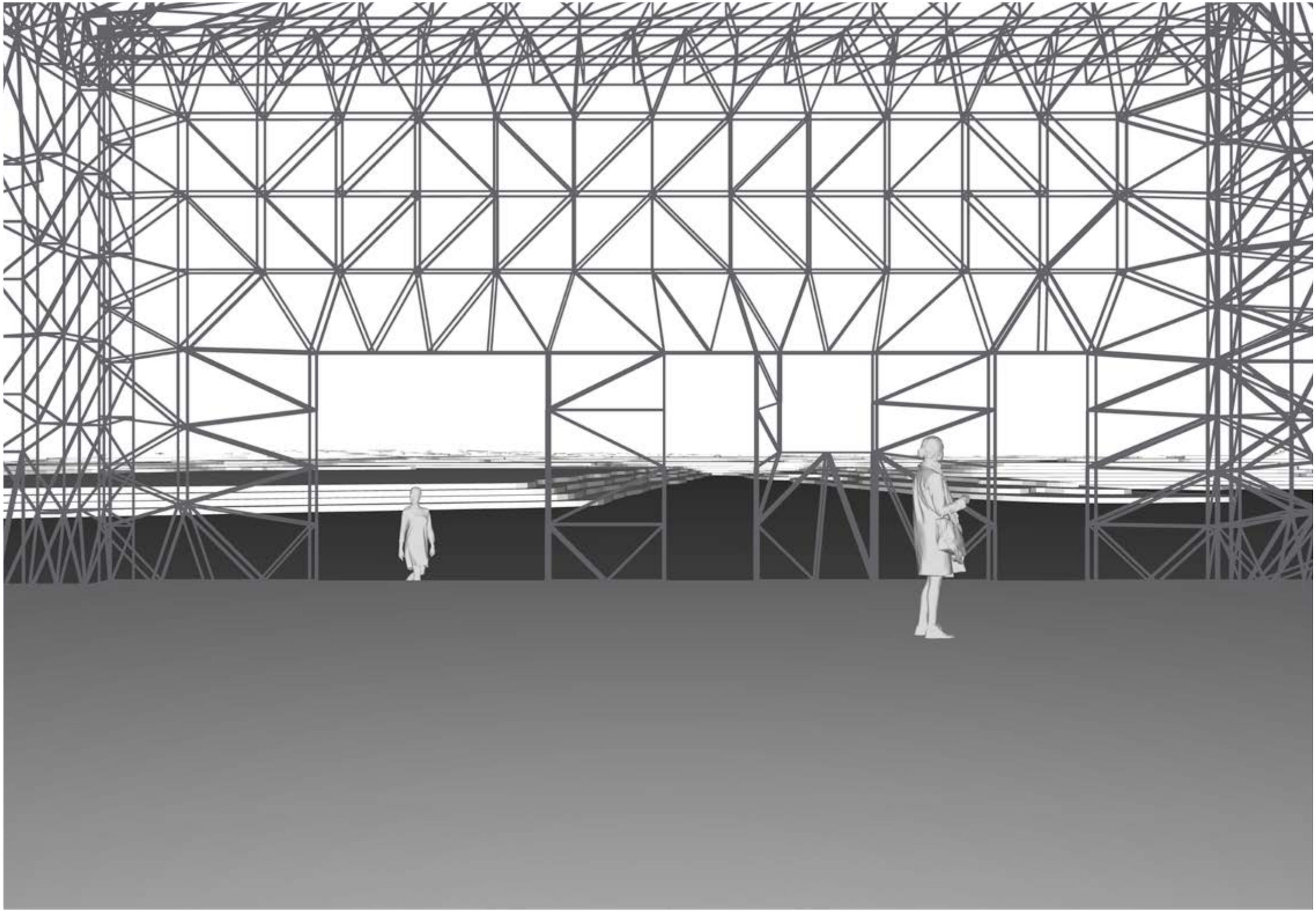
1m length, 40 tonnes, isometric view close up



1m length, 40 tonnes, isometric view



1m length, 40 tonnes, perspective view



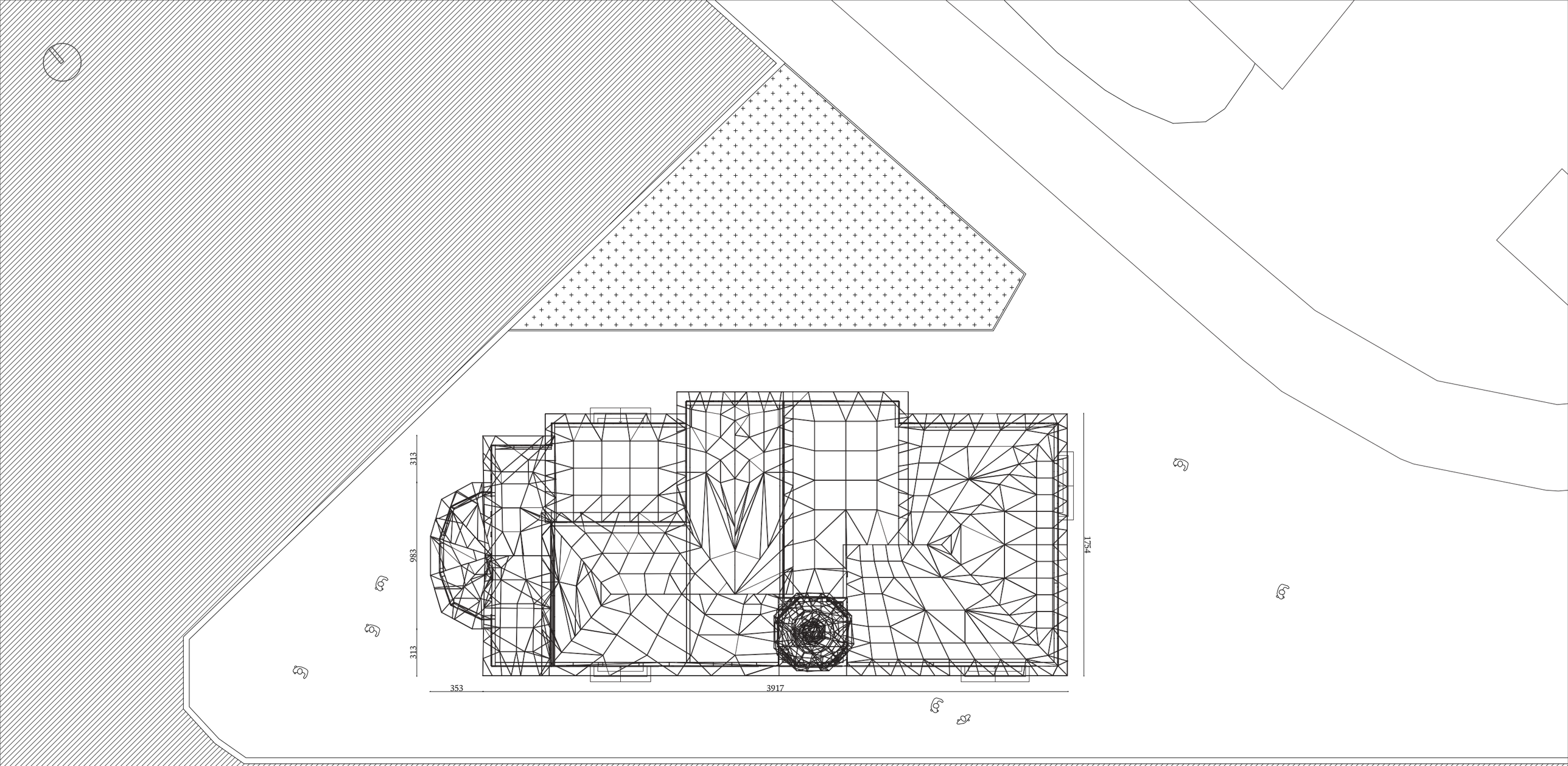
1m length, 40 tonnes, perspective interior view

1m length, 40 tonnes, perspective view in the context

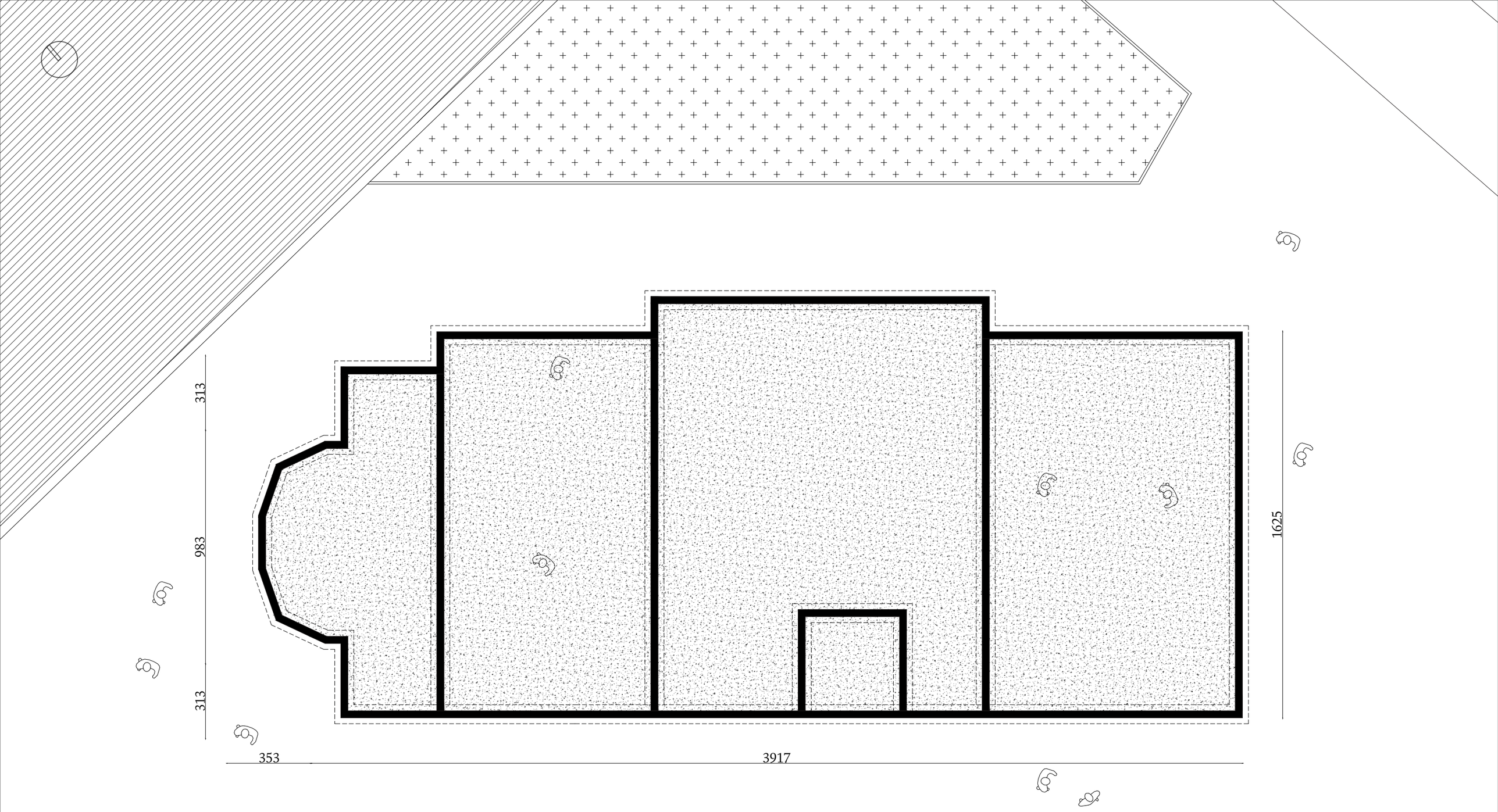
1m length, 40 tonnes, perspective view from the distance

05. Optimised Triangulated Mesh

Original triangulated mesh reduced to 25km length



Project Stege Harbour Castle
Tekening Roof plan
Datum 15/12/2021
Schaal 1:250 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Floundation plan
Datum 17/12/2021
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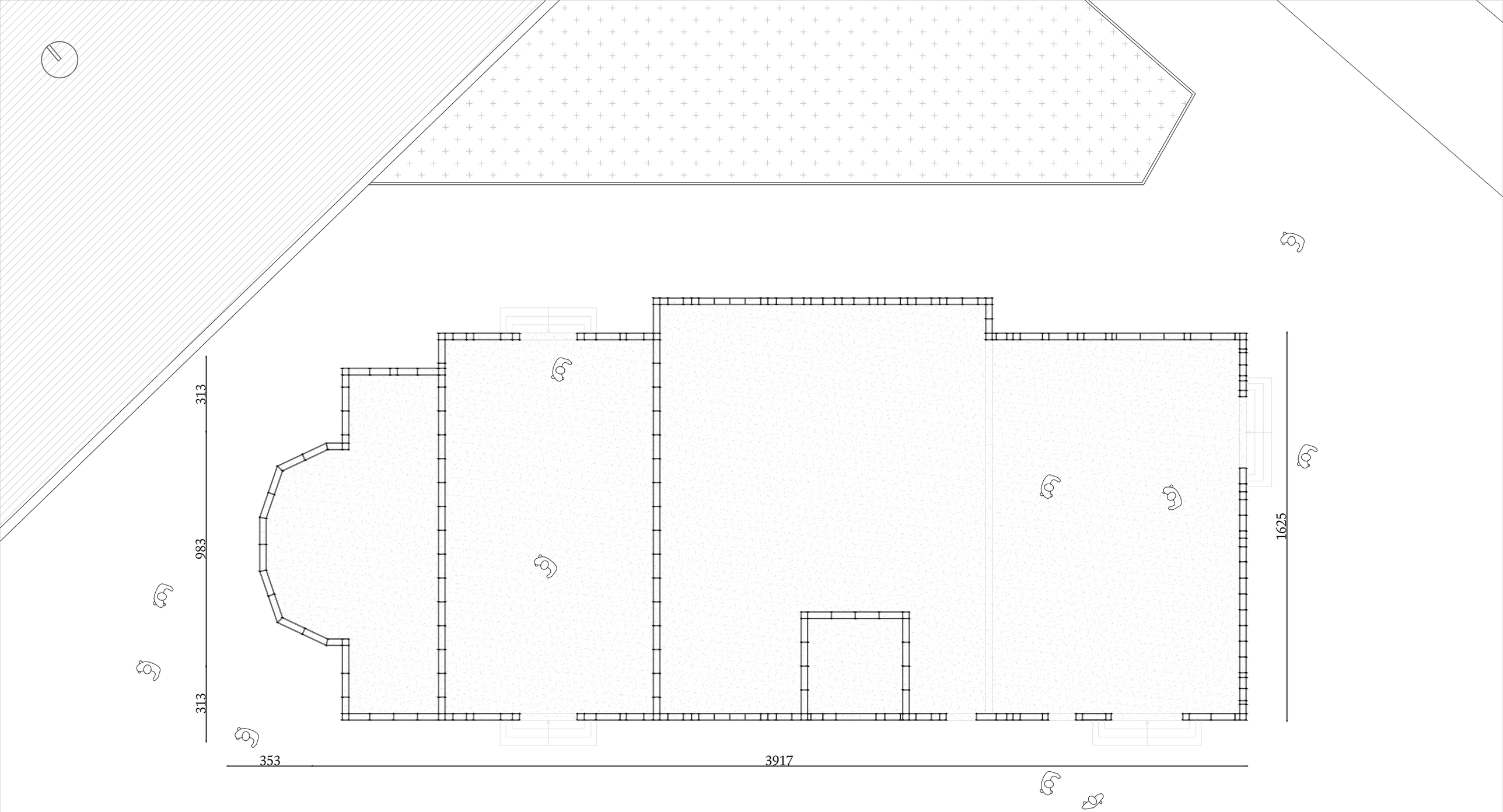
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Floor plan
Datum 15/12/2021
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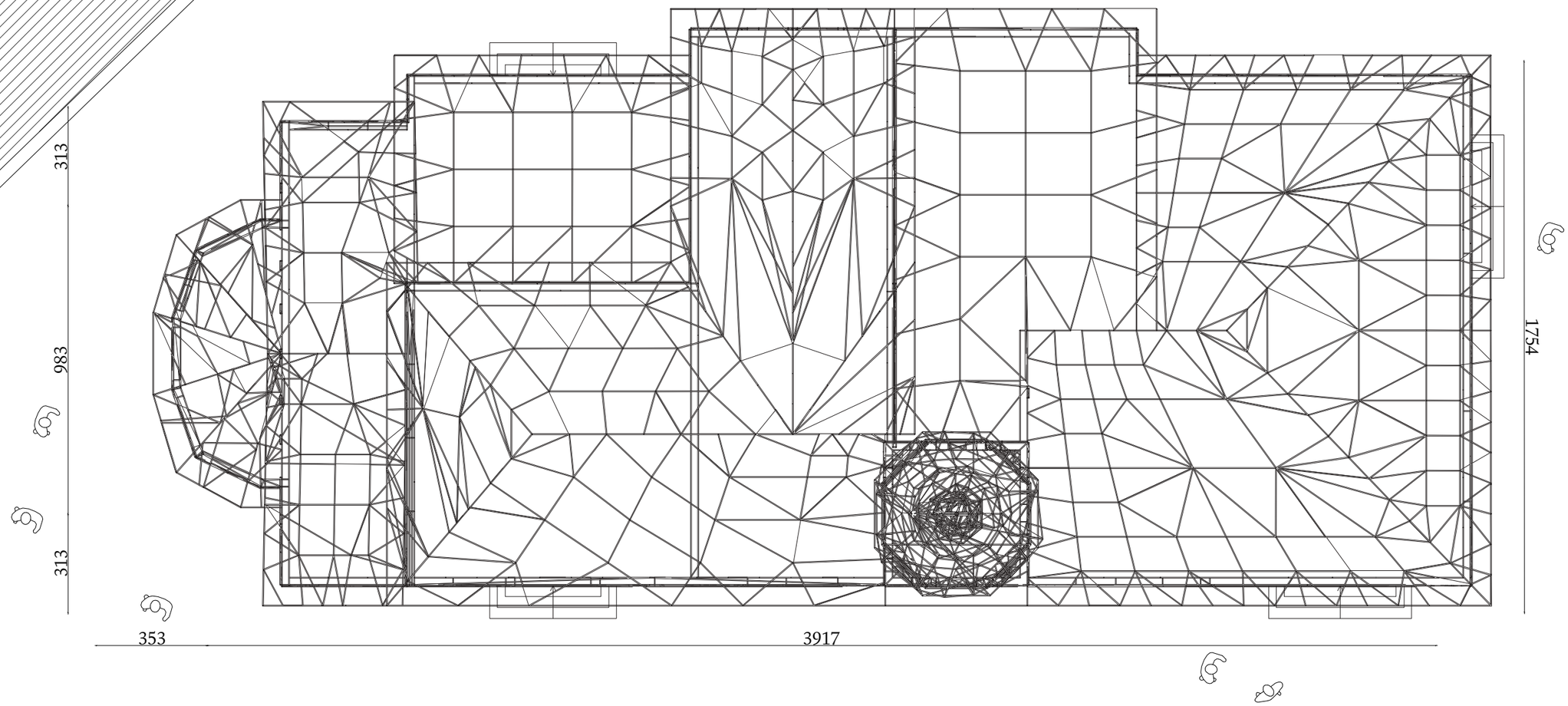
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Roof plan
Datum 15/12/2021
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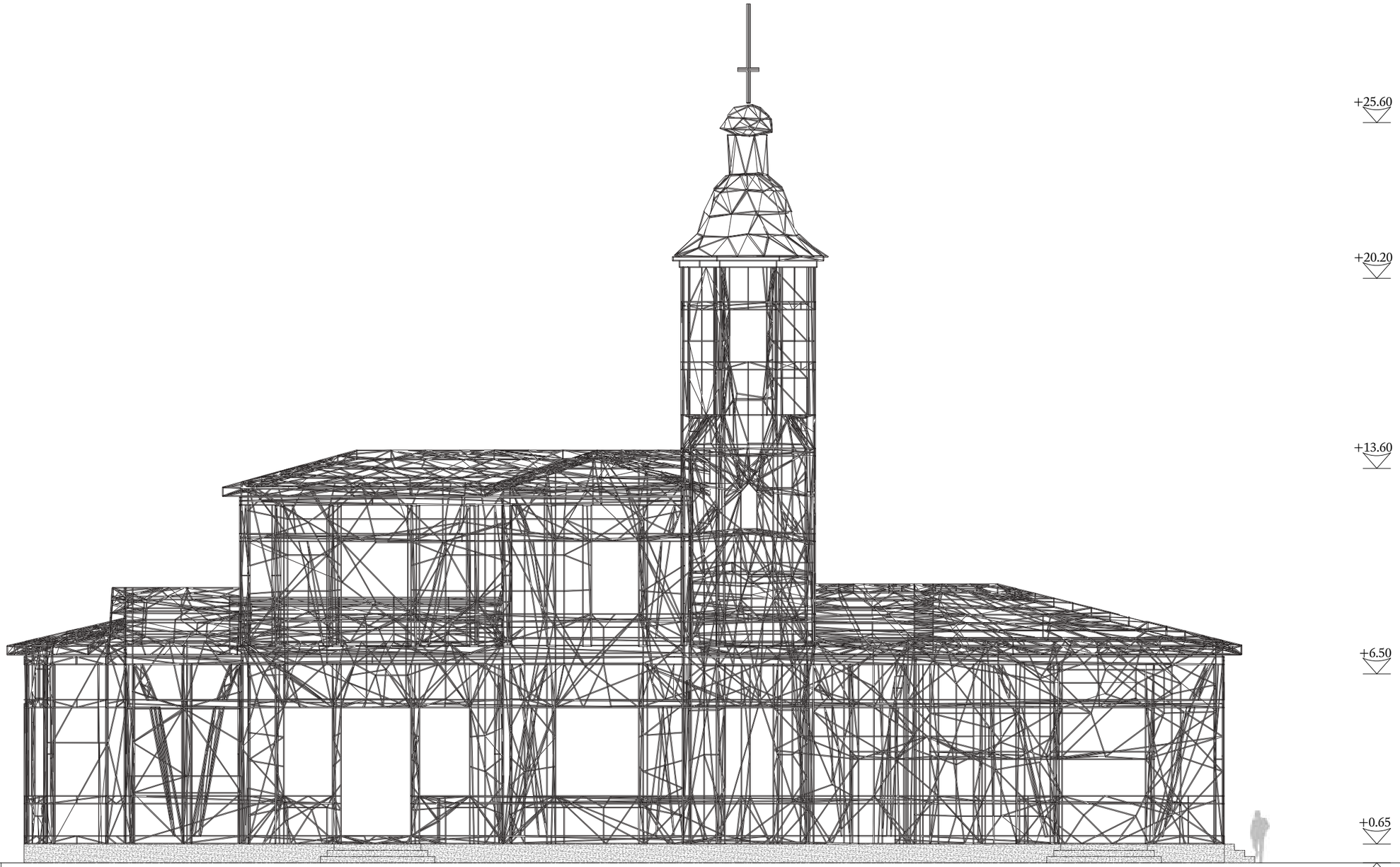
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Elevation
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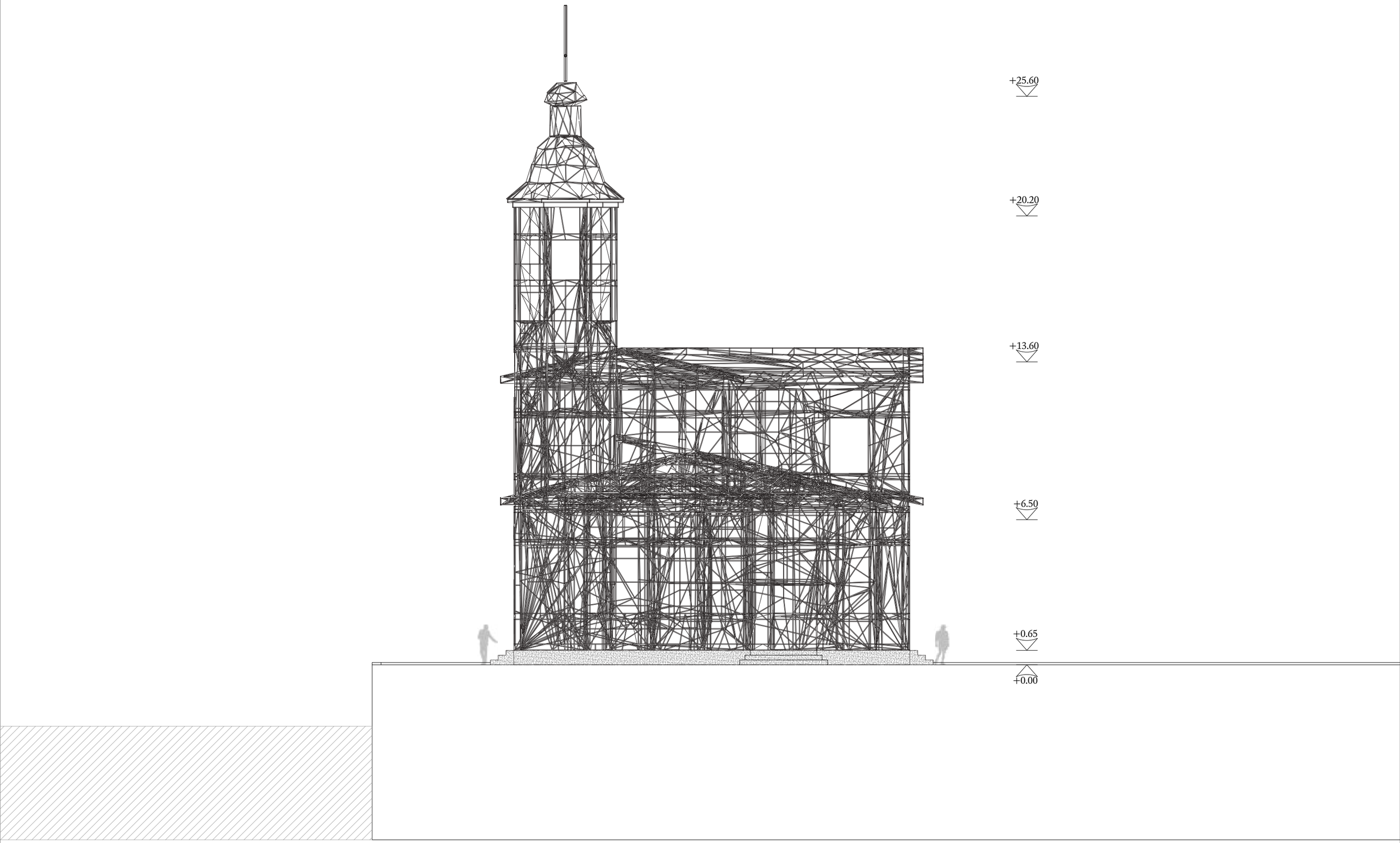
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Elevation
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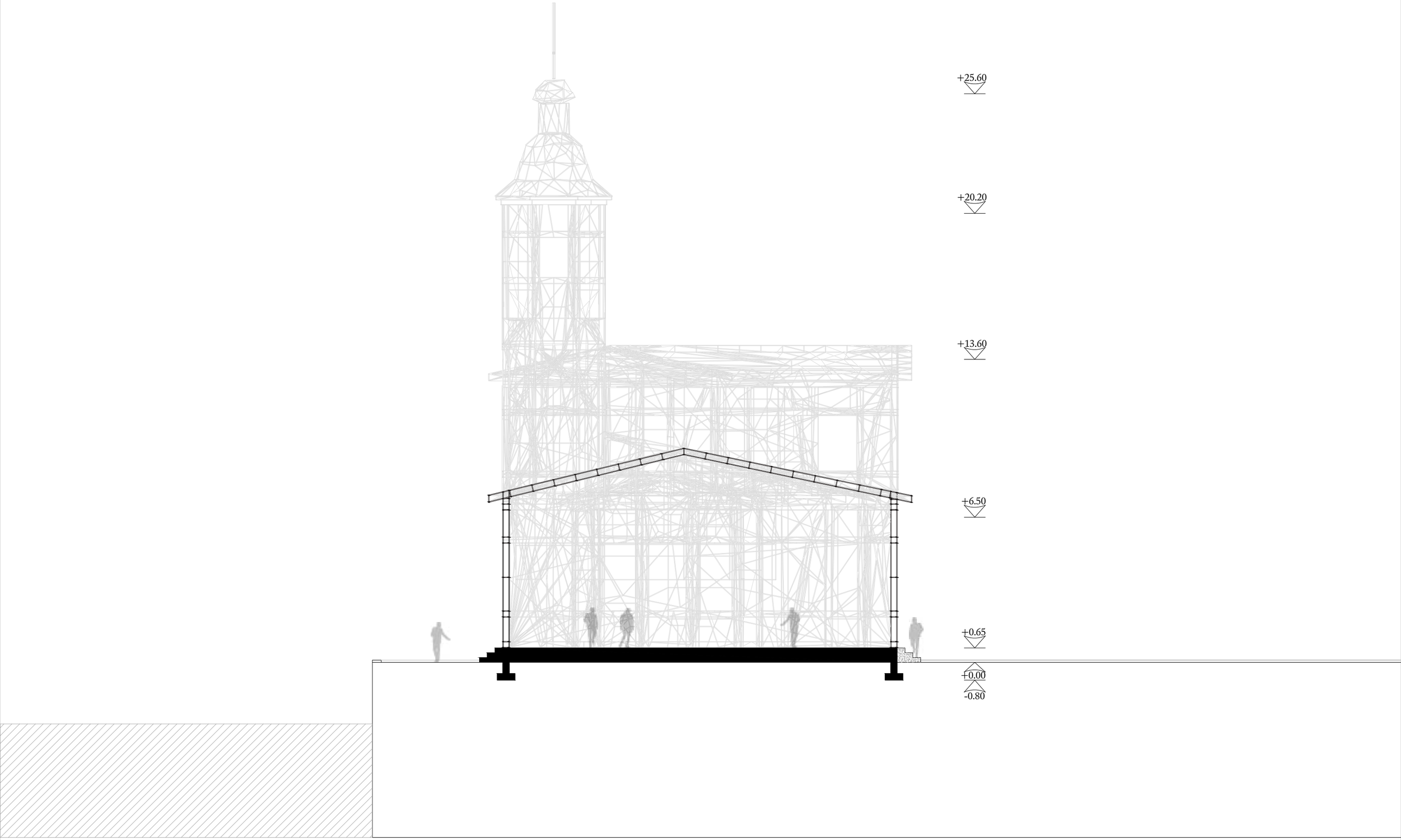
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Cross section
Datum 17/12/2021
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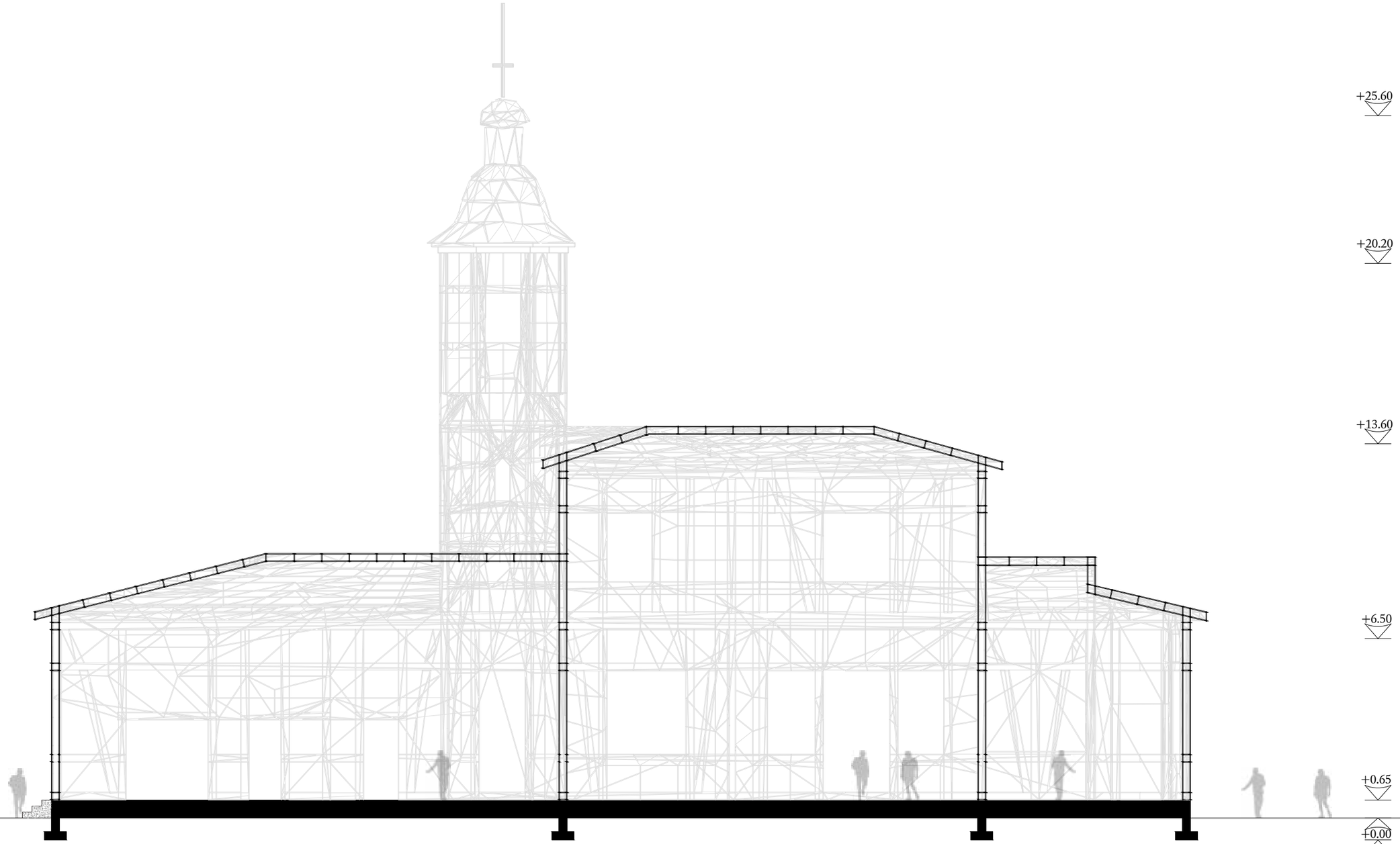
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Elevation
Datum 17/12/2021
Schaal 1:150 - op A3
Architect Gijs Van Vaerenbergh
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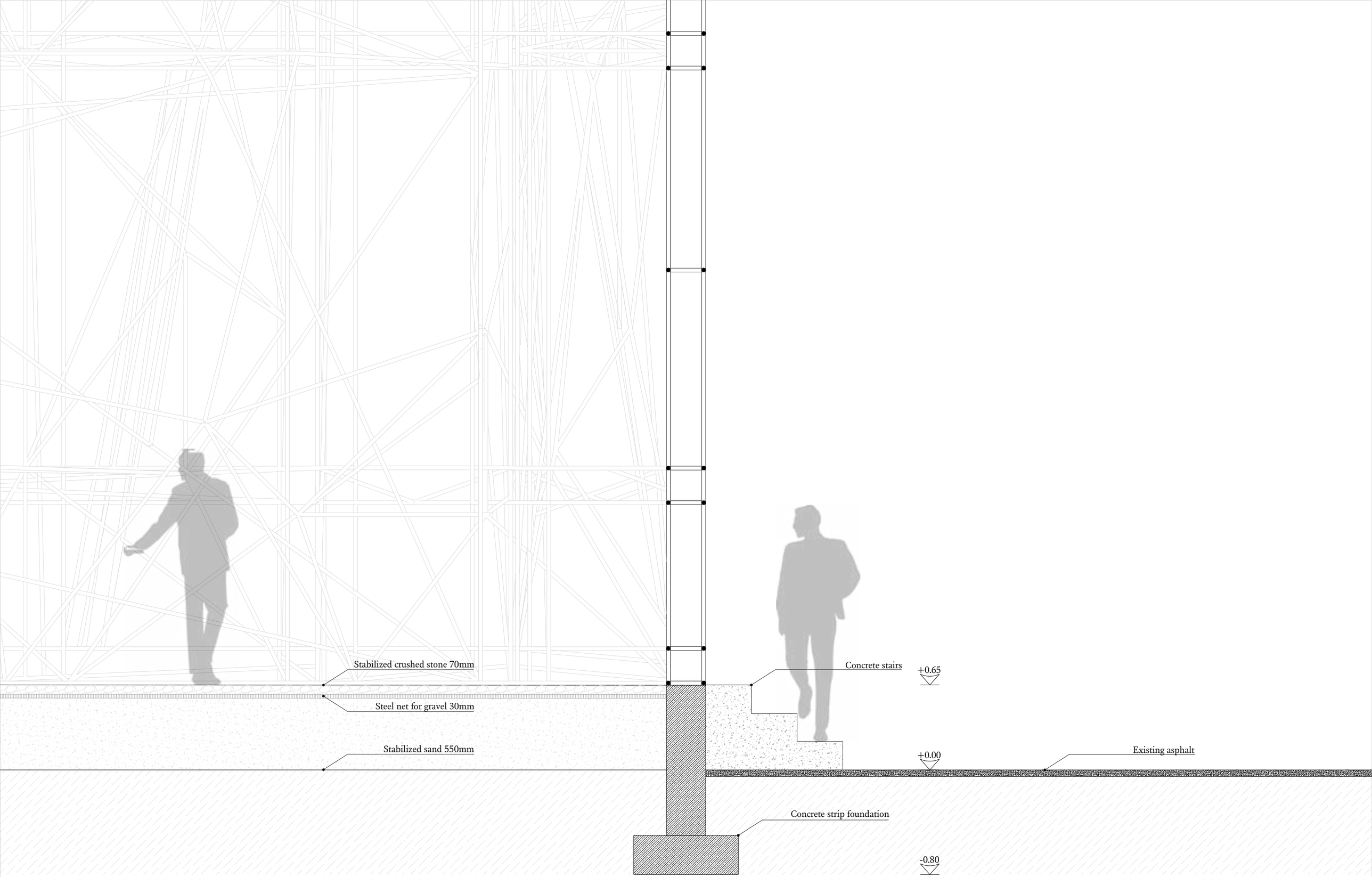

Project Stege Harbour Castle
Tekening Foundation detail
Datum 19/12/2021
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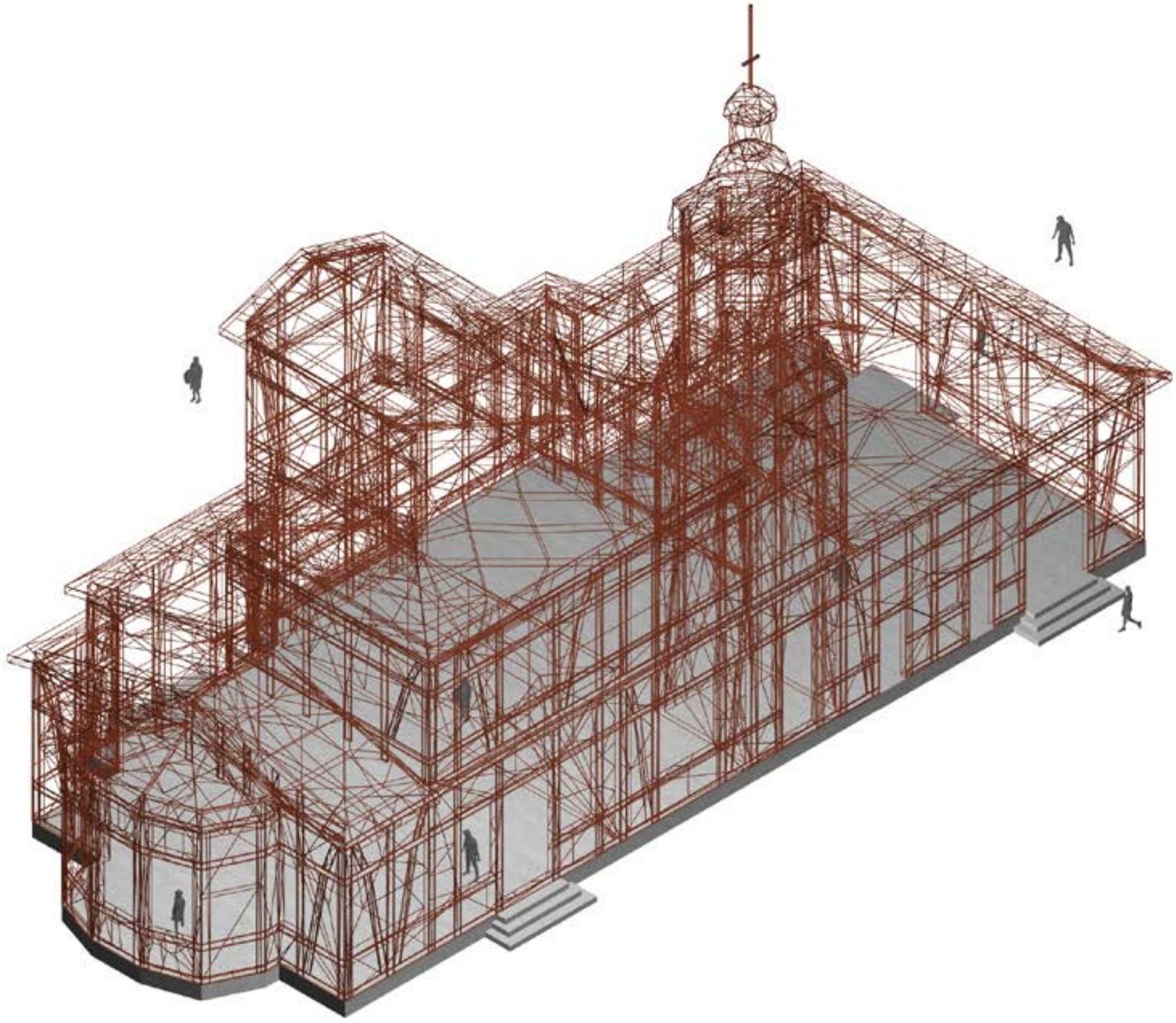
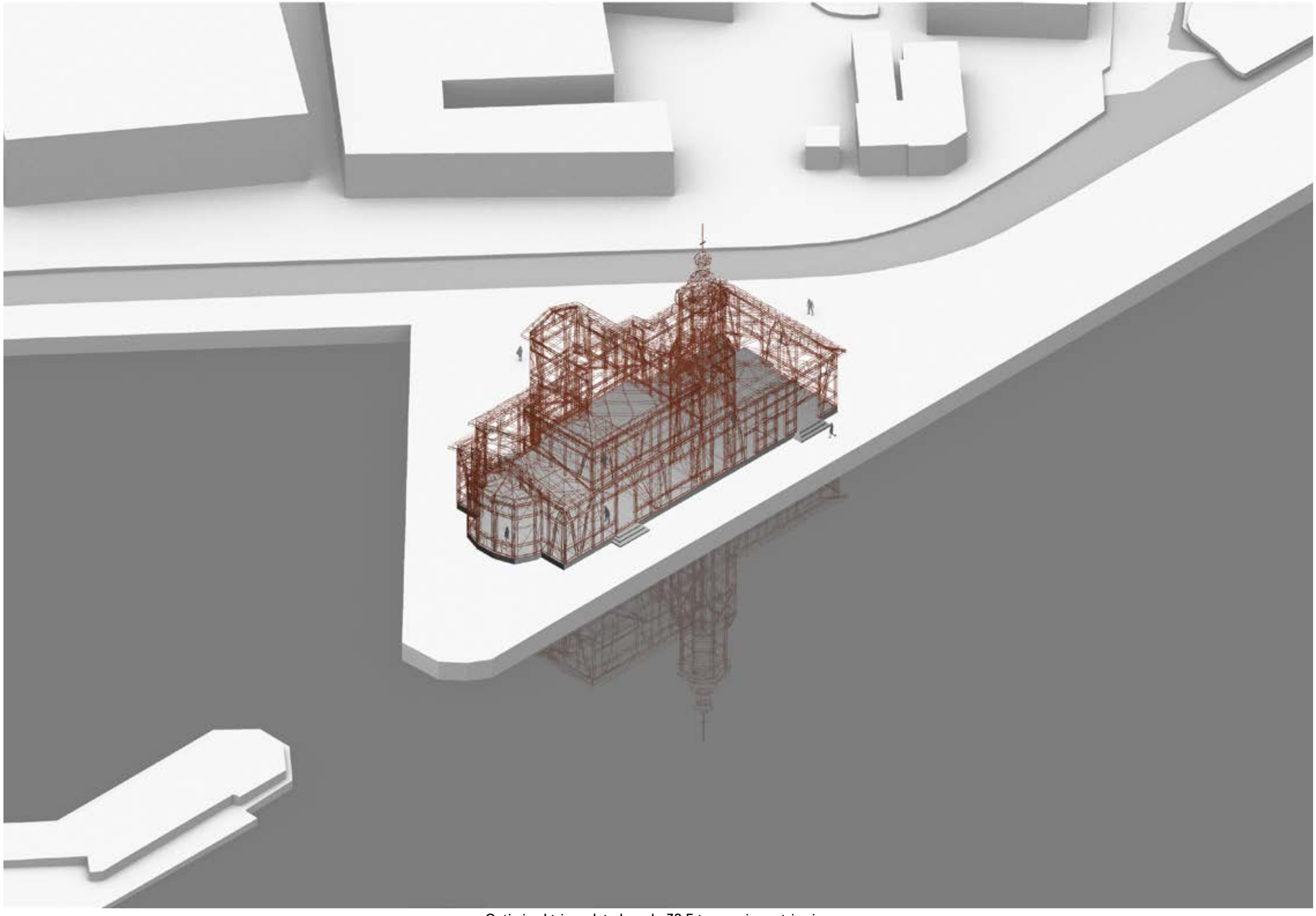
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Optimised triangulated mesh, 38,5 tonnes, isometric view close up

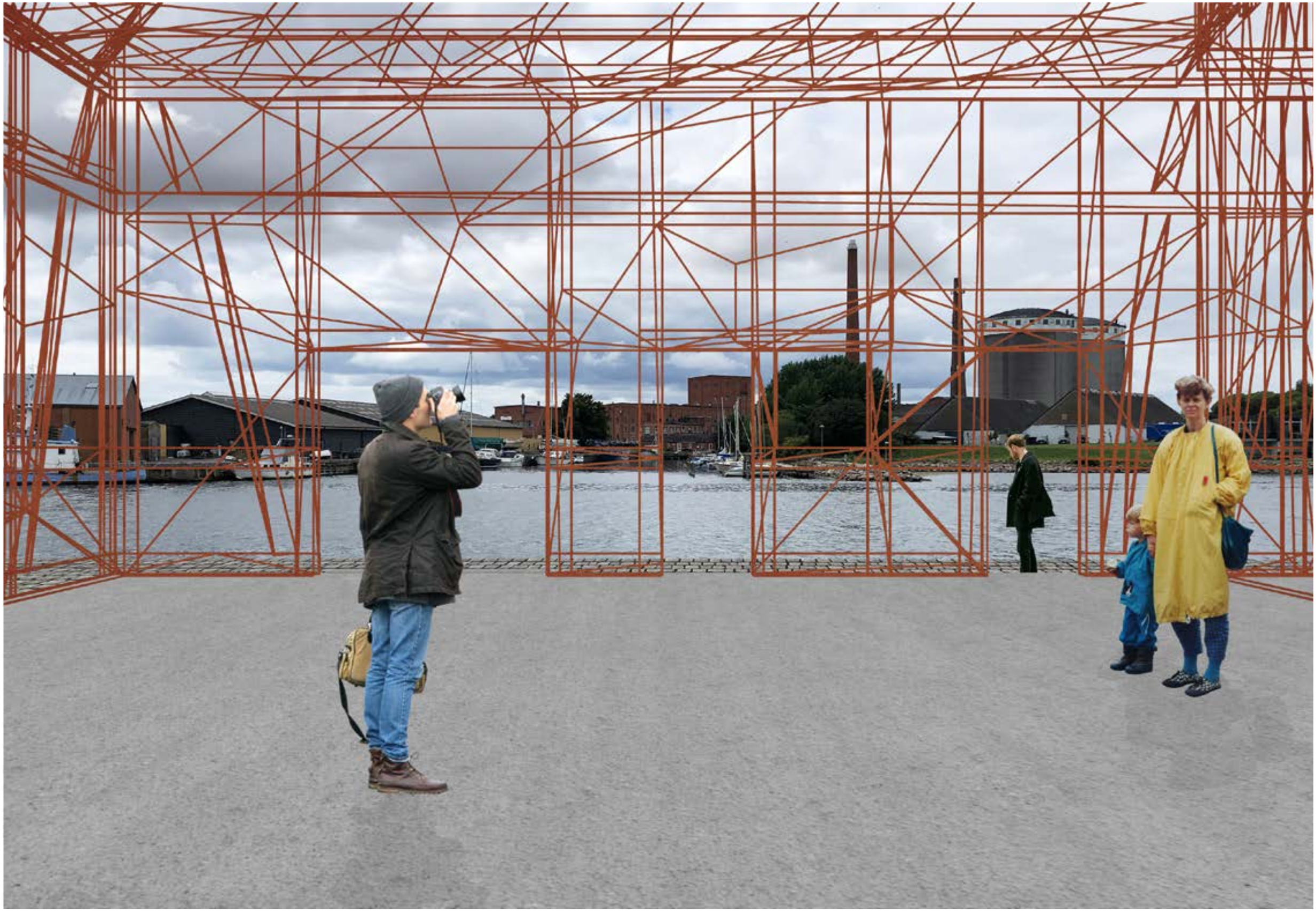


Optimised triangulated mesh, 38,5 tonnes, isometric view

Optimised triangulated mesh, 38,5 tonnes, perspective view in a context

Optimised triangulated mesh, 38,5 tonnes, perspective view in a context

Optimised triangulated mesh, 38,5 tonnes, perspective view

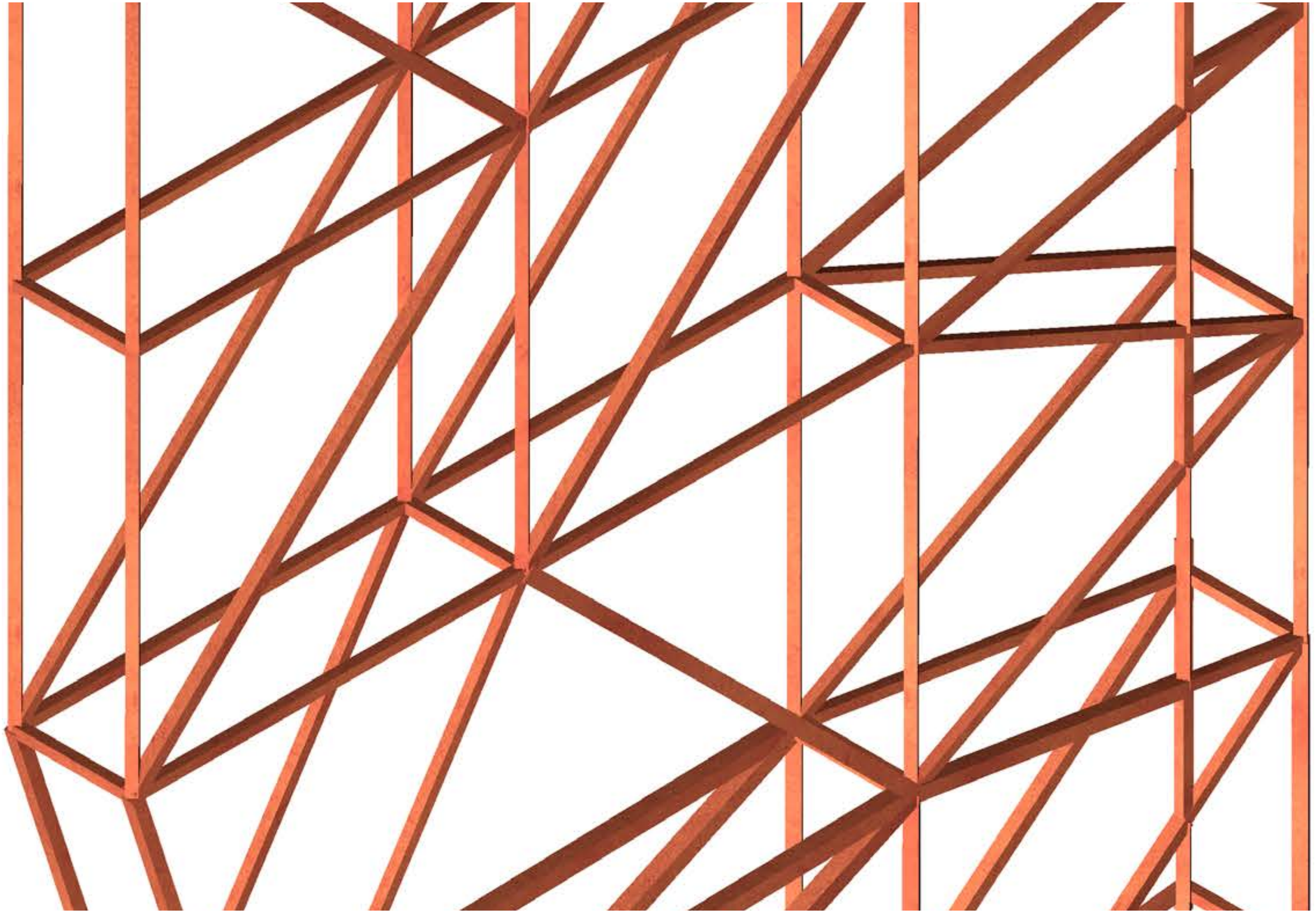


Optimised triangulated mesh, 38,5 tonnes, perspective interior view in a context

Optimised triangulated mesh, 38,5 tonnes, perspective interior view in a context

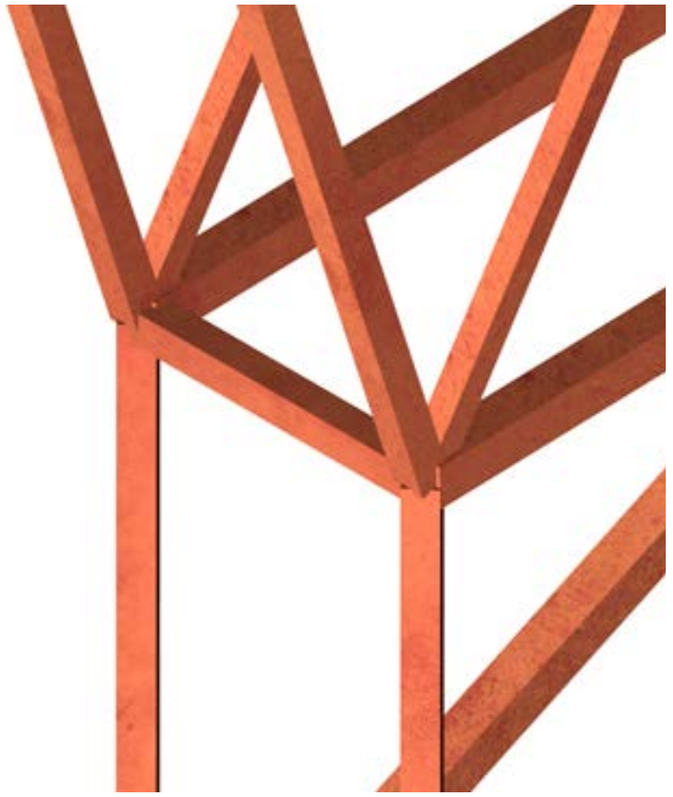
06. Sructural Principles

Option 1 - Assembling together with community (tent-like structure)
Option 2 - Pre-fabricated pieces afterwards assembled on site (rectangular section)
Option 3 - Pre-fabricated pieces afterwards assembled on site (circular section)

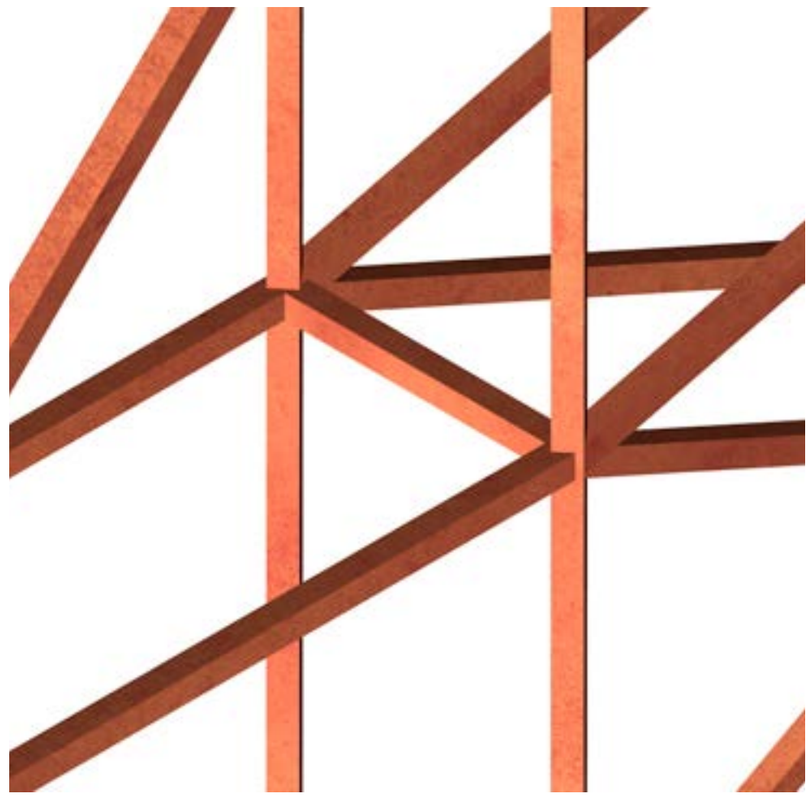


Fragment of different typologies of joints

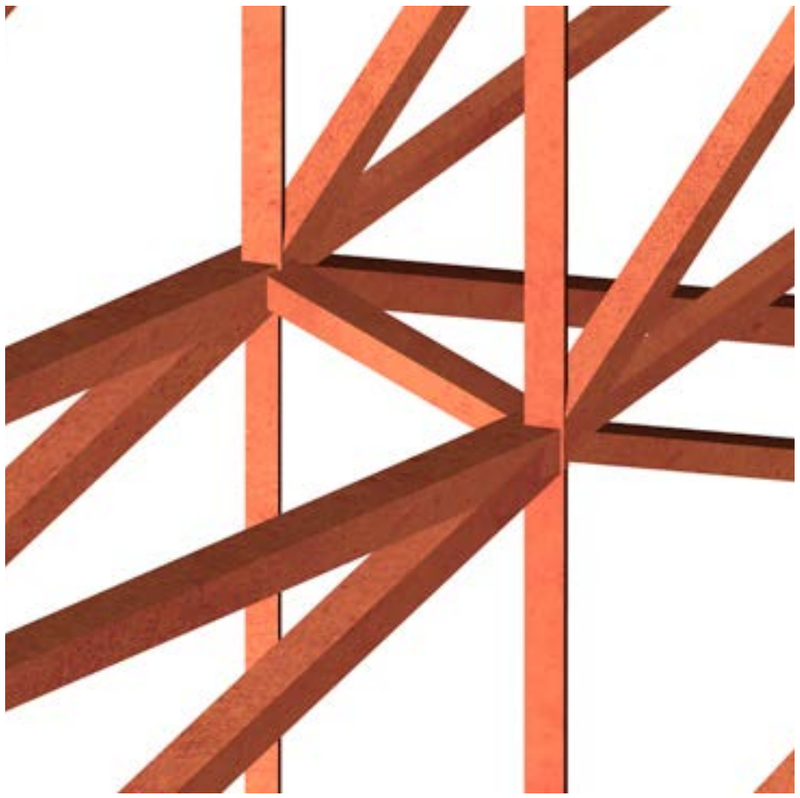
Joint of 5



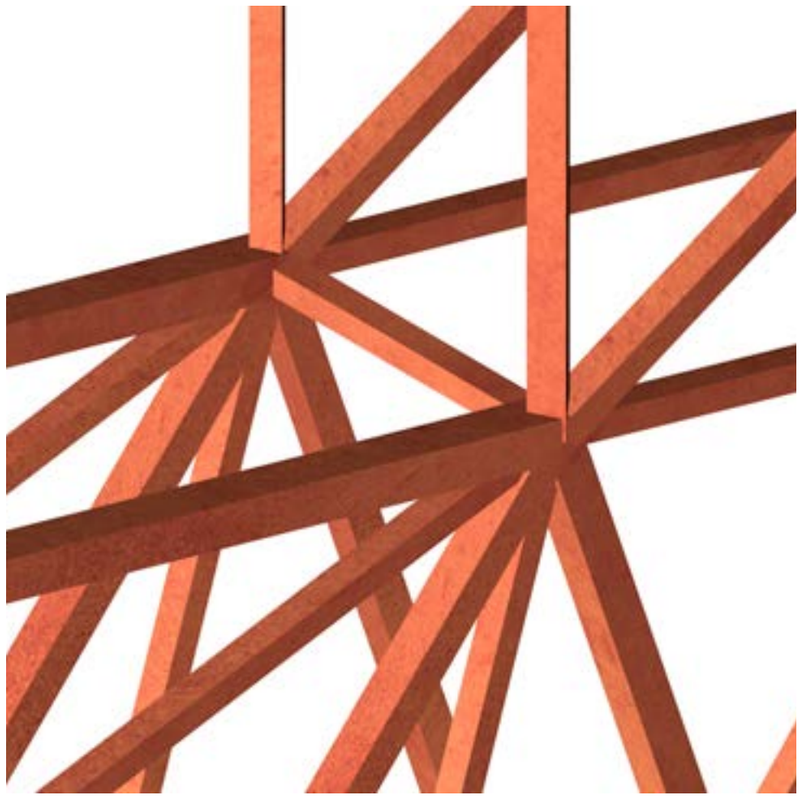
Joint of 5



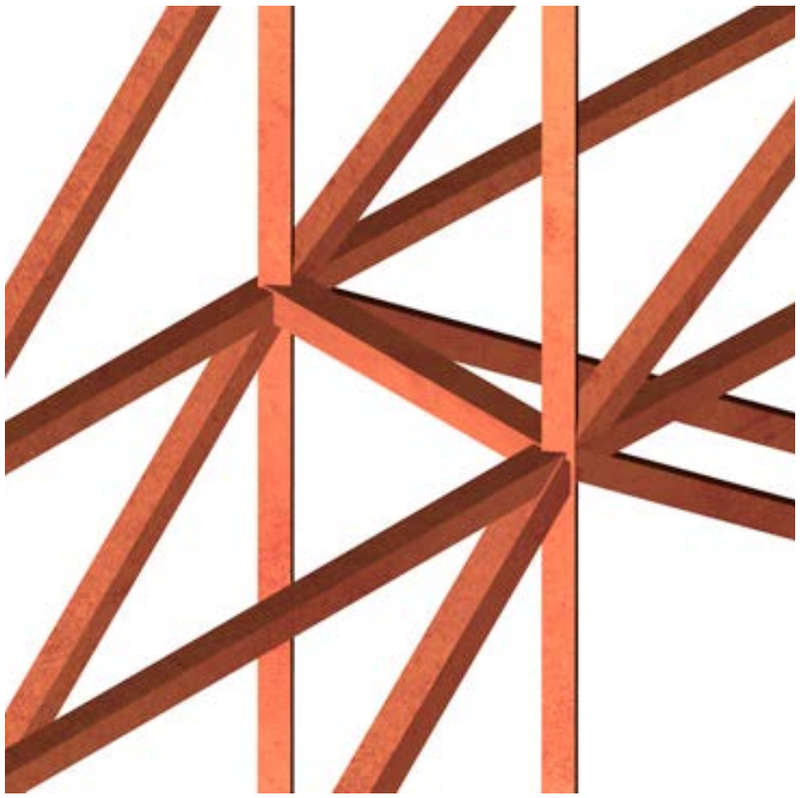
Joint of 6



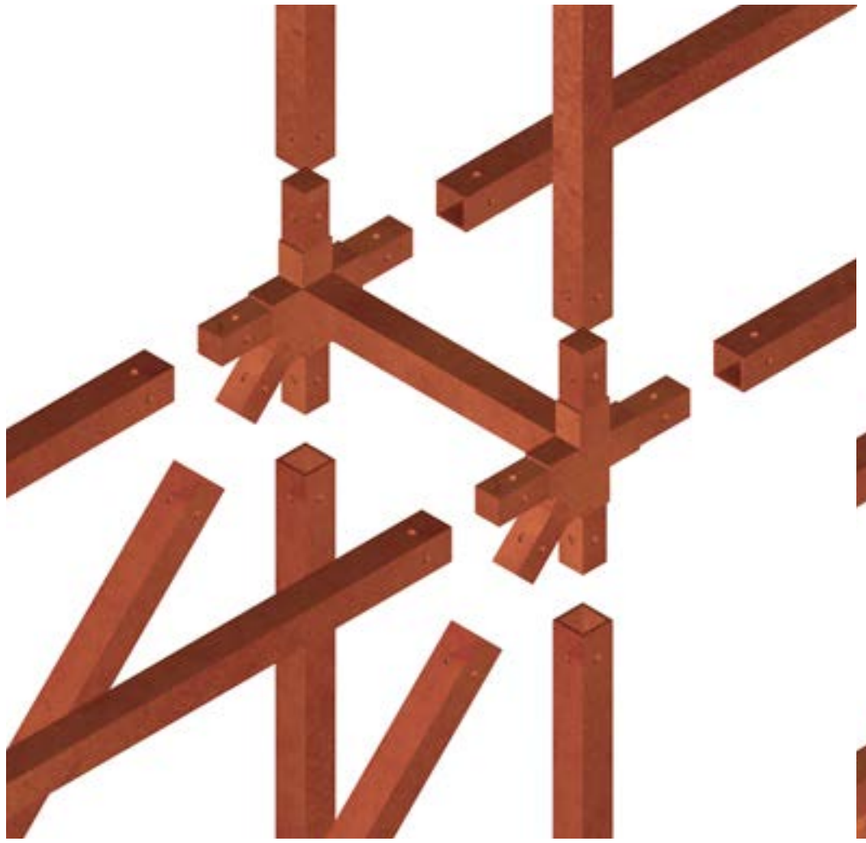
Joint of 8



Joint of 9

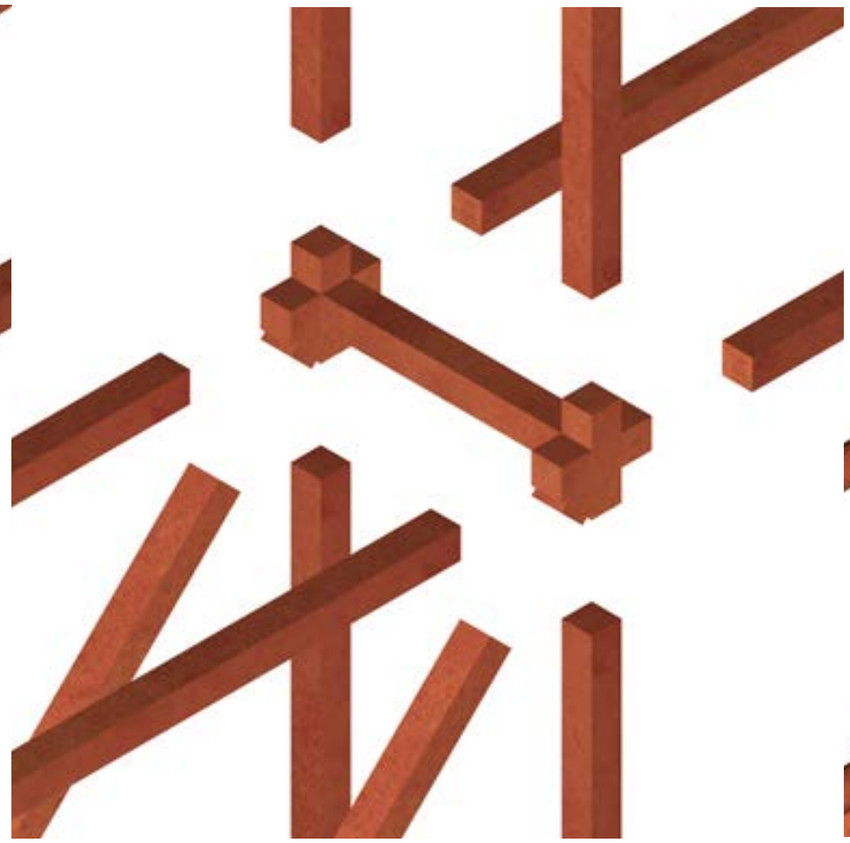


Joint of 8



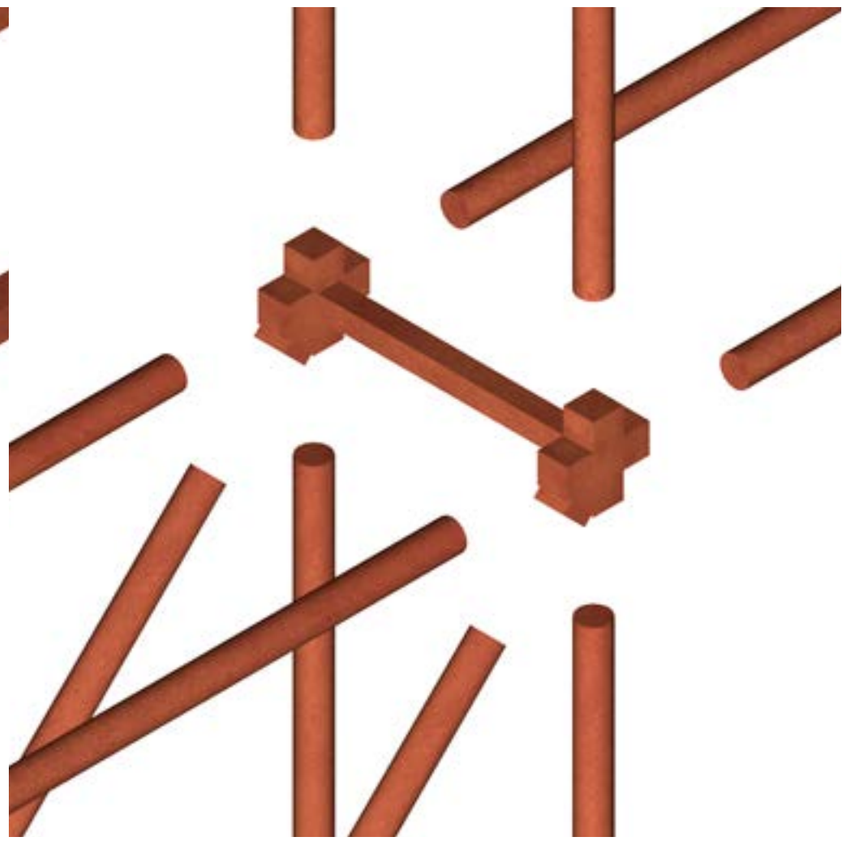
Option 1

Hollow-core steel tubes
Attached to solid laser-cut perpendicular elements
Fixed with screws / rivets
Rectangular section
Assembling together with community on site



Option 2

Solid steel tubes
Welded in workshop on solid laser-cut perpendicular elements
Pre-fabricated in bigger pieces of 2m x 2m x 5m
Rectangular section
Bigger pre-fabricated pieces assembled and welded on site

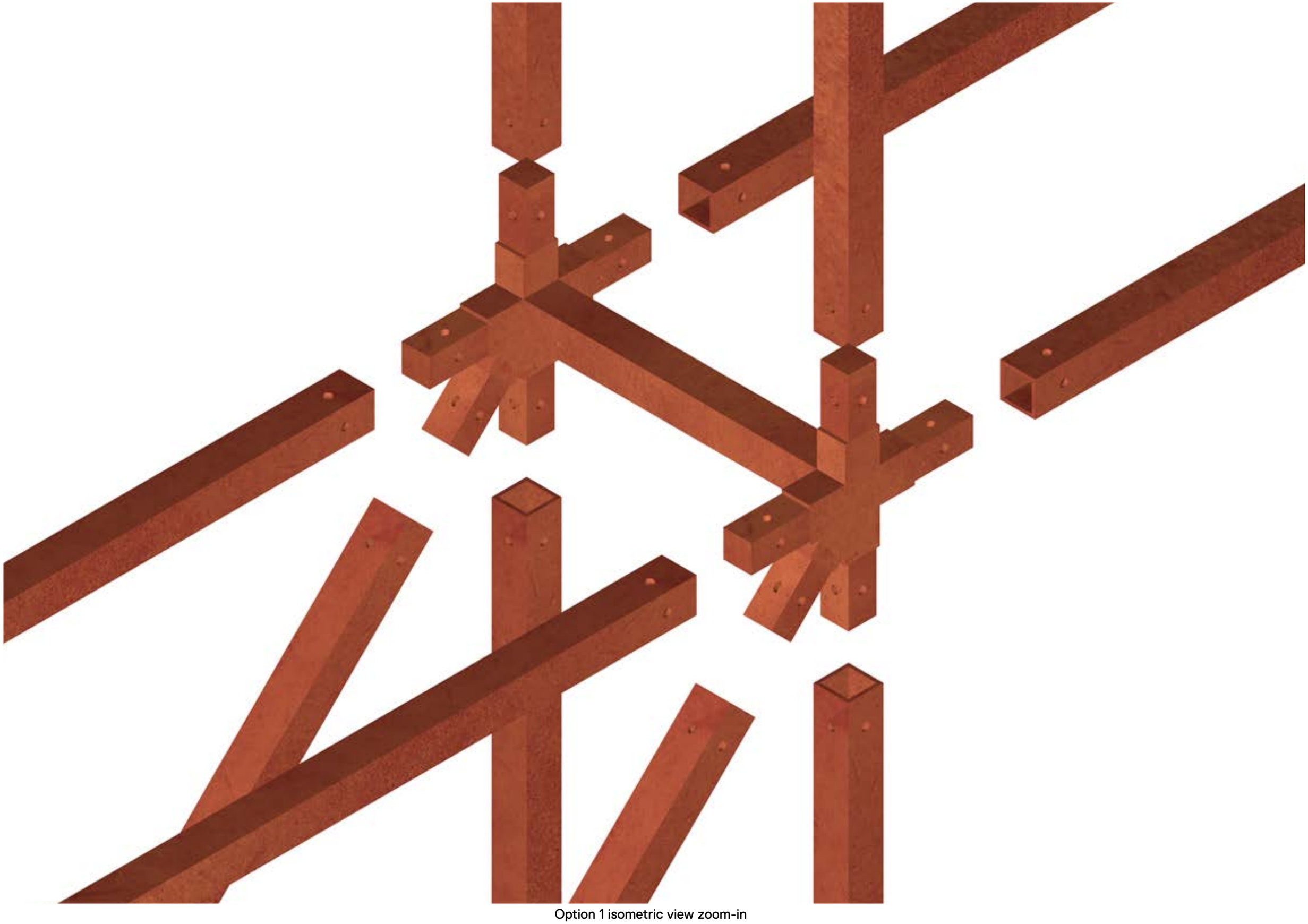


Option 3

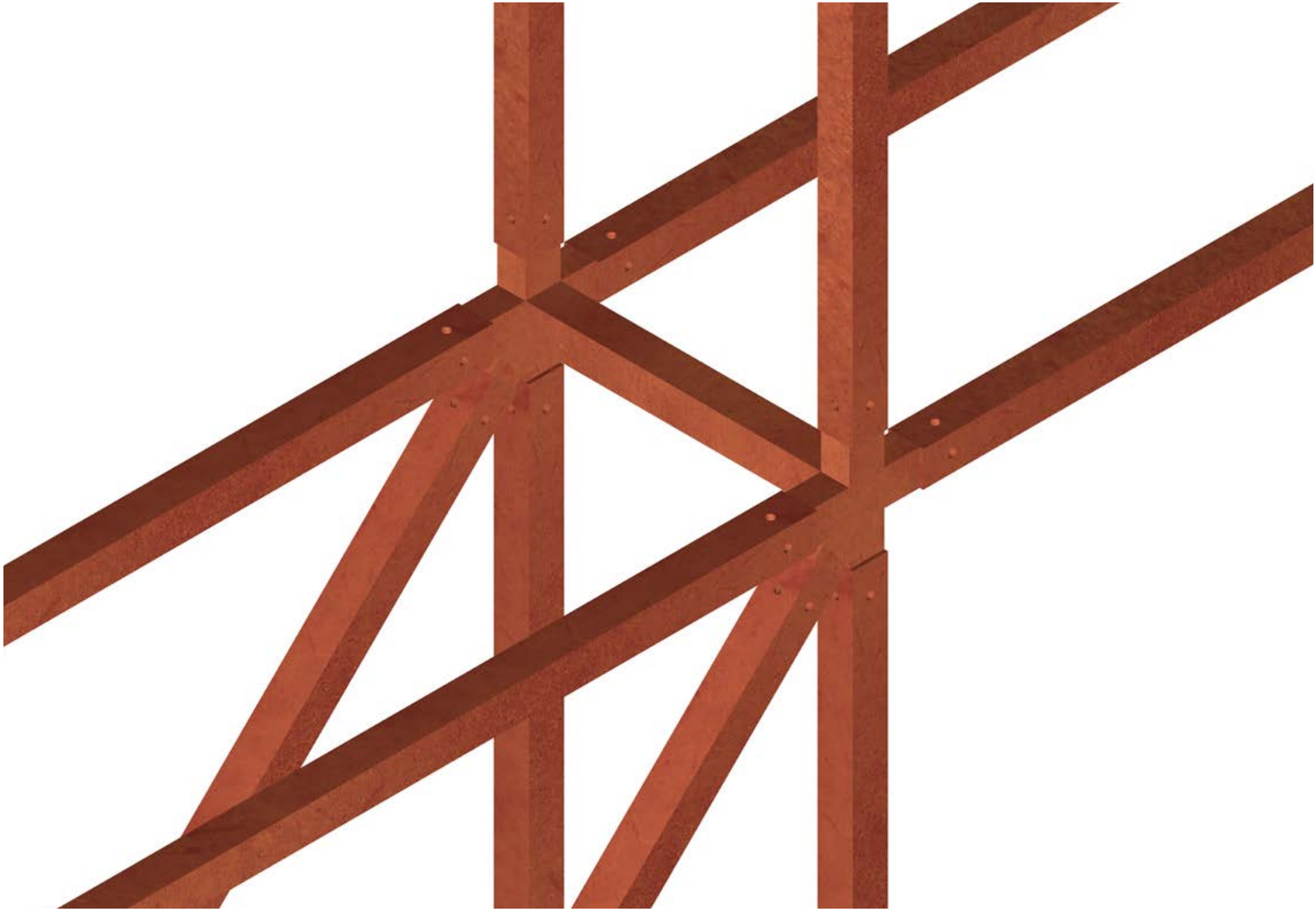
Solid steel tubes
Welded in workshop on solid laser-cut perpendicular elements
Pre-fabricated in bigger pieces of 2m x 2m x 5m
Circular section
Bigger pre-fabricated pieces assembled and welded on site

Option 1

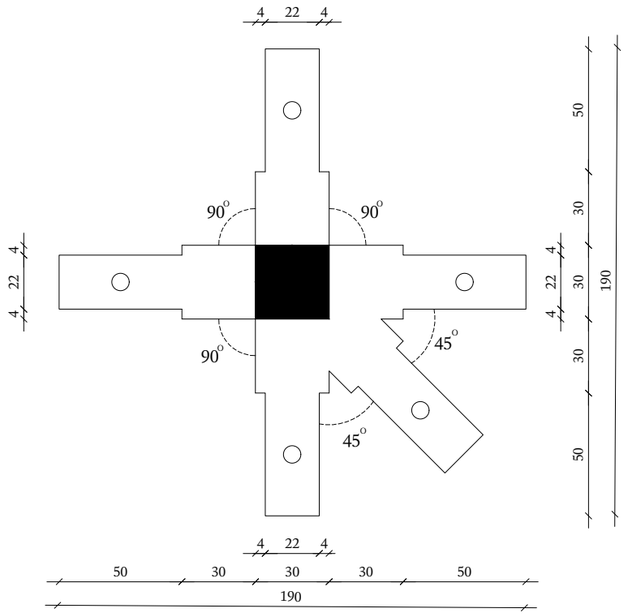
Option 1 isometric view



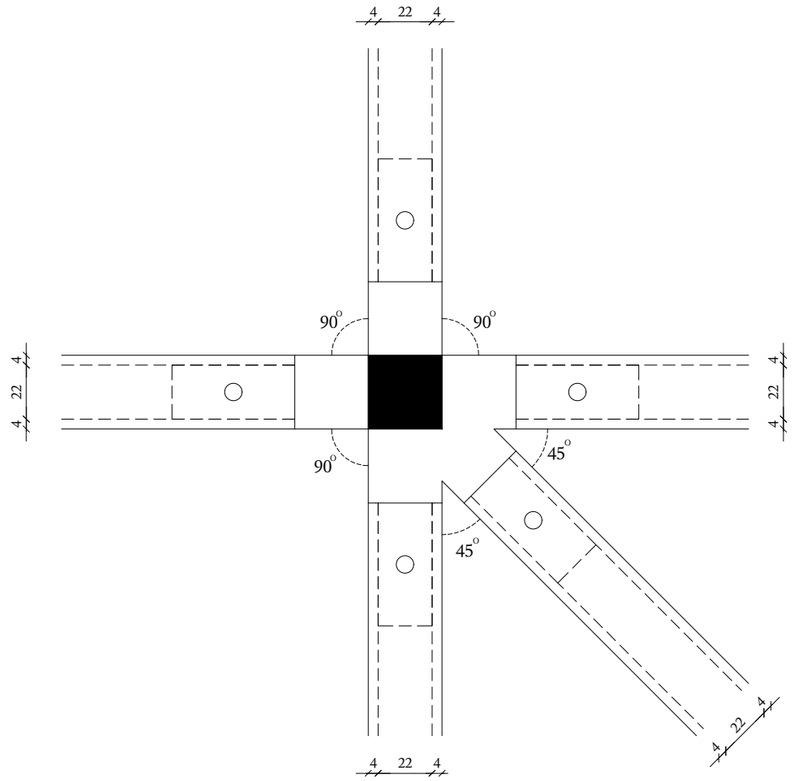
Option 1 isometric view zoom-in



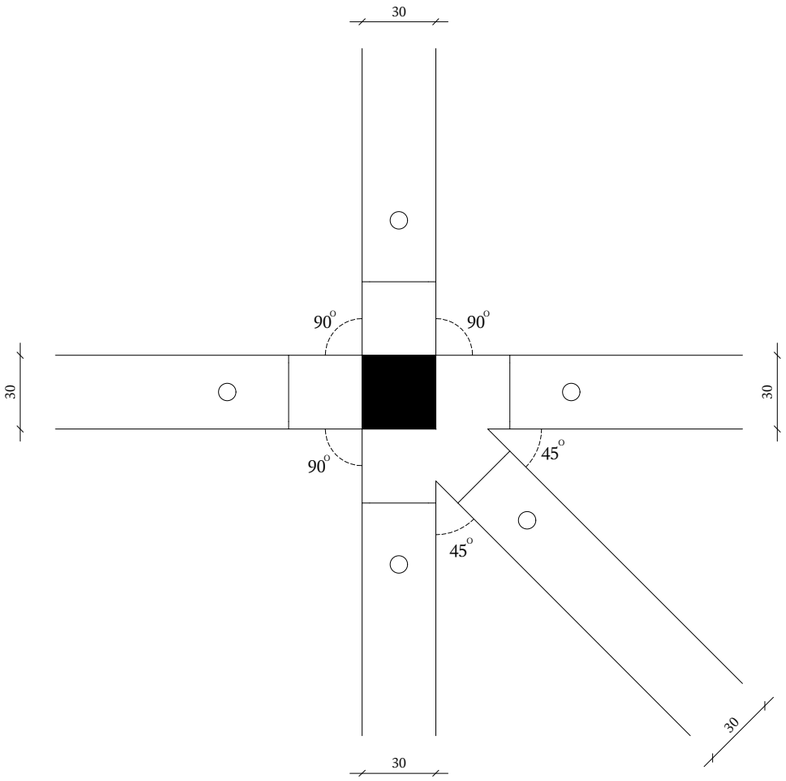
Option 1 isometric view zoom-in



1.Solid laser-cut junction element

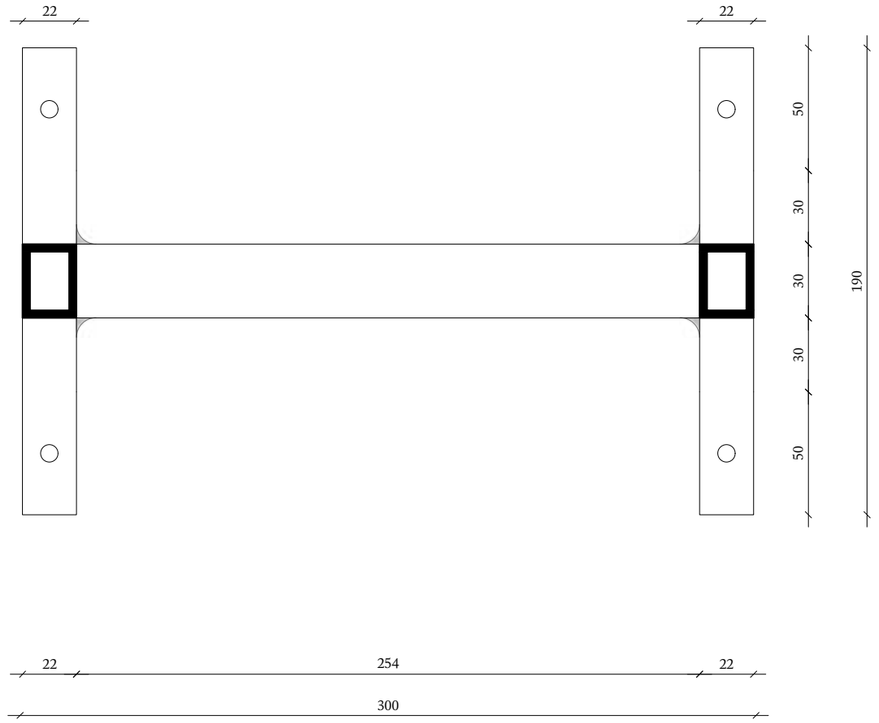


2.Rectangular section tubes attached to the solid junction element

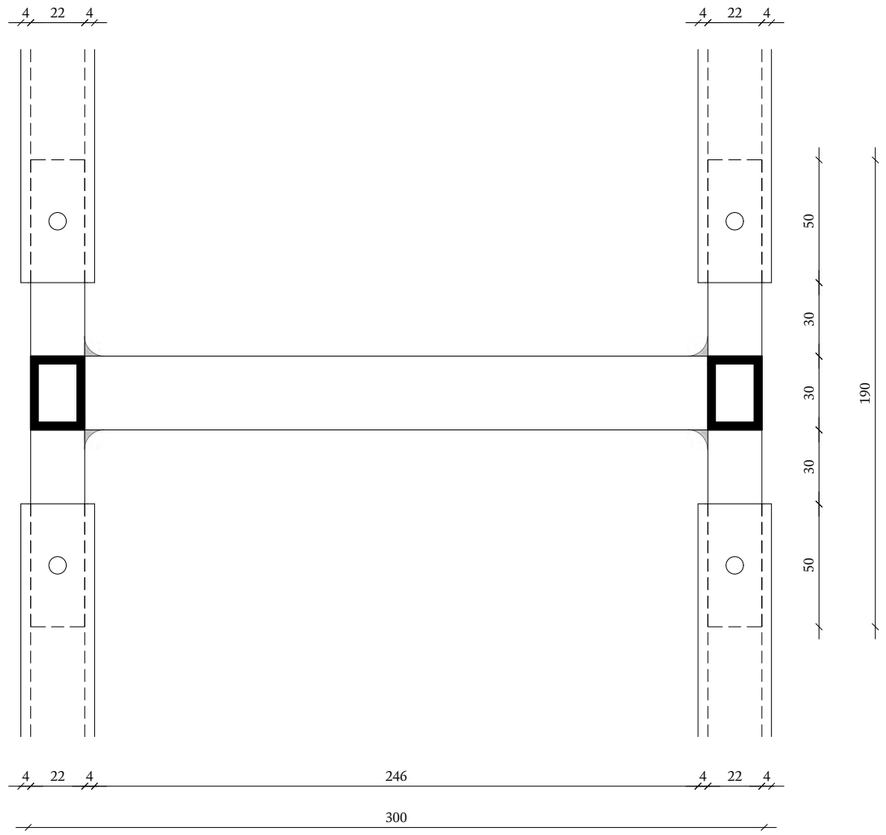


3.All attached rectangular section tubes screwed to the solid junction element

Project Stege Harbour Castle
Tekening Option 1 front view
Datum 09/12/2021
Schaal 1:25 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



1. 2 solid laser-cut junction elements joined by solid perpendicular solid tube

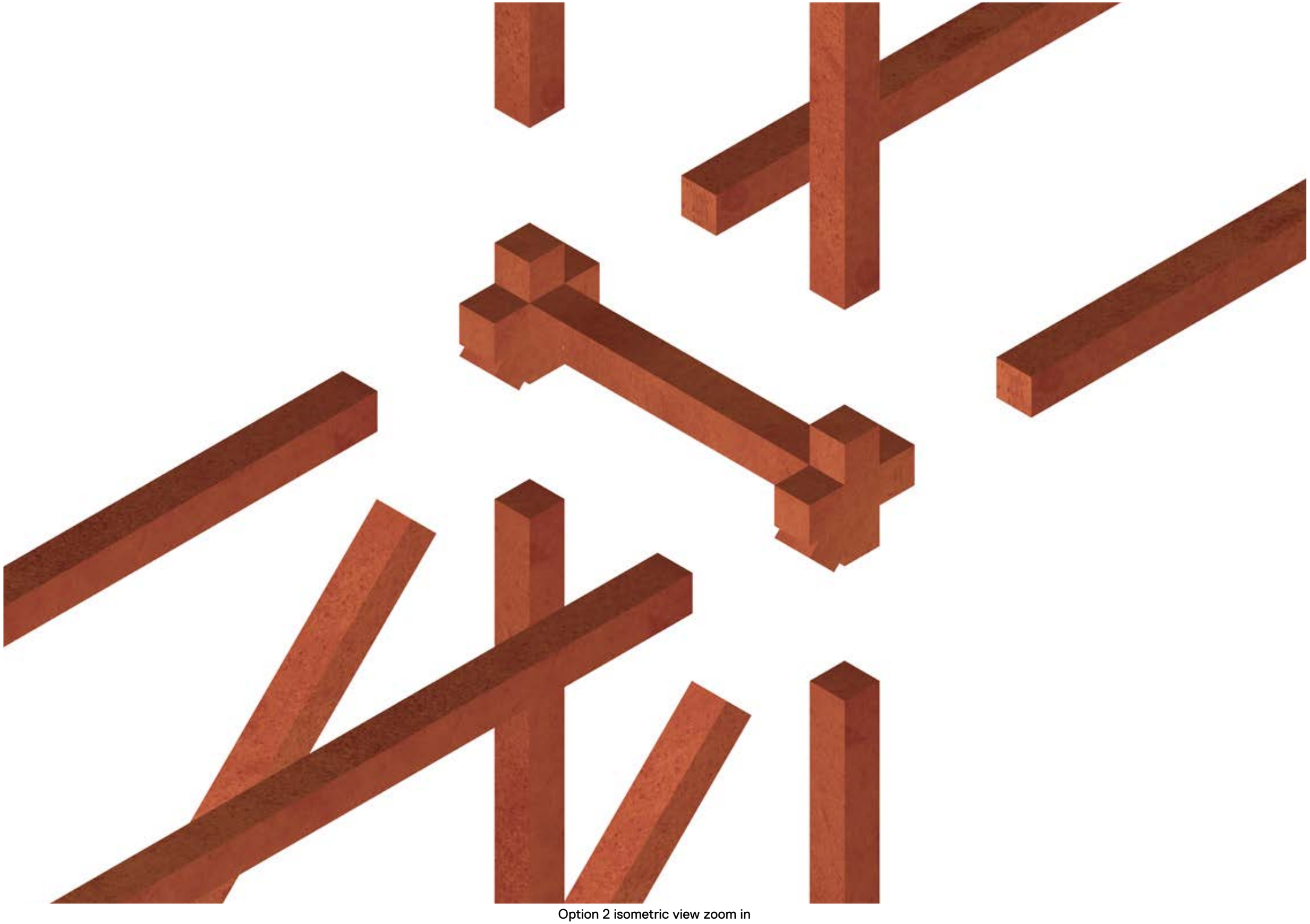


2. All attached rectangular section tubes screwed to the solid junction element

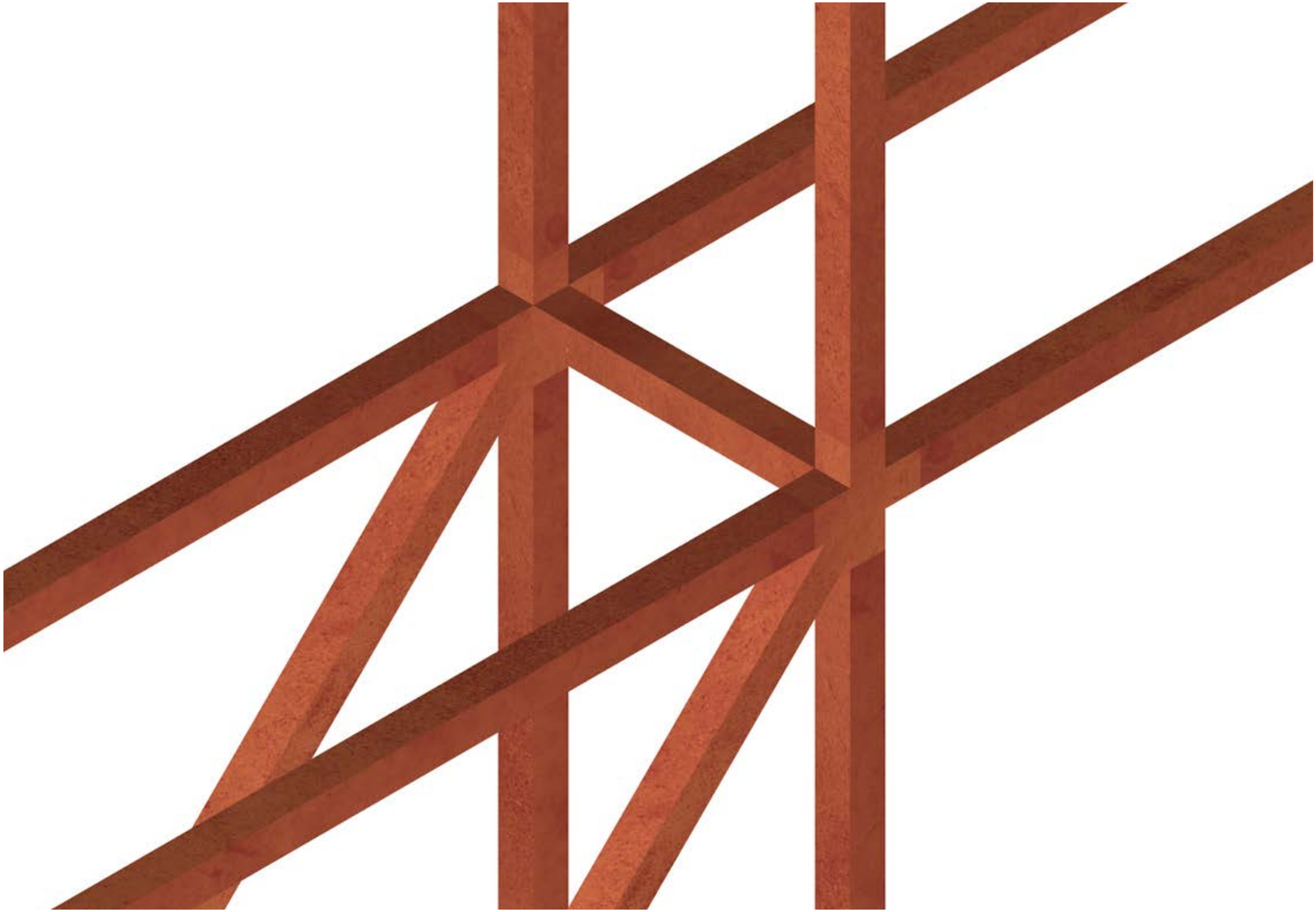
Project Stege Harbour Castle
Tekening Option 1 side view
Datum 09/12/2021
Schaal 1:25 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen

Option 2

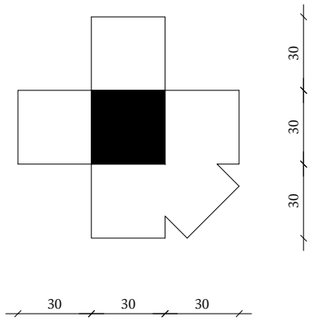
Option 2 isometric view



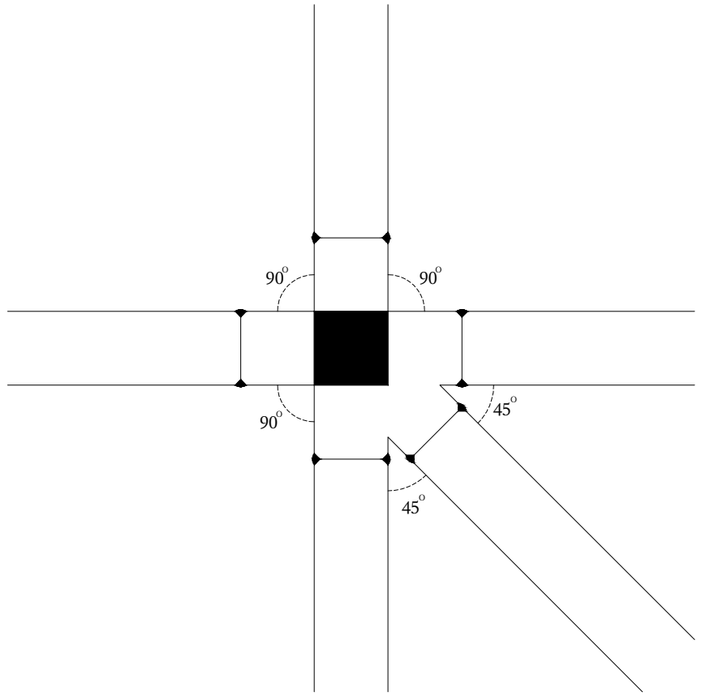
Option 2 isometric view zoom in



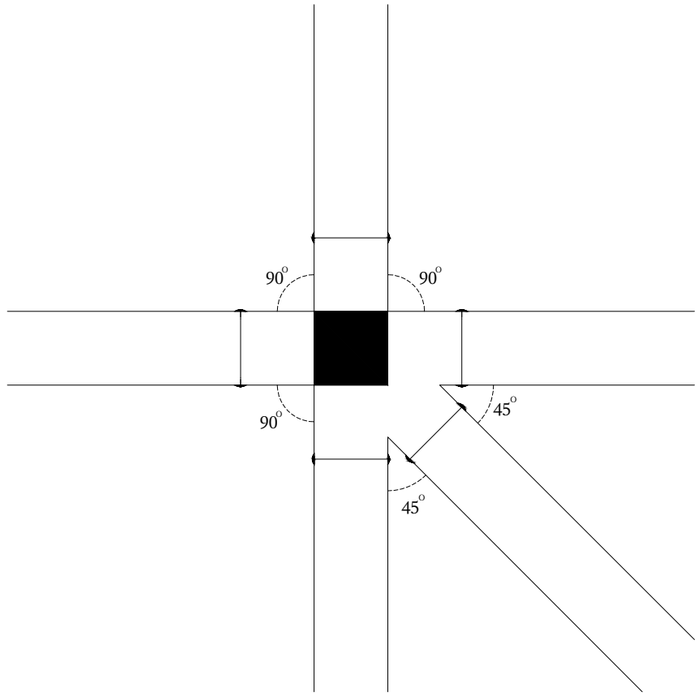
Option 2 isometric view zoom in



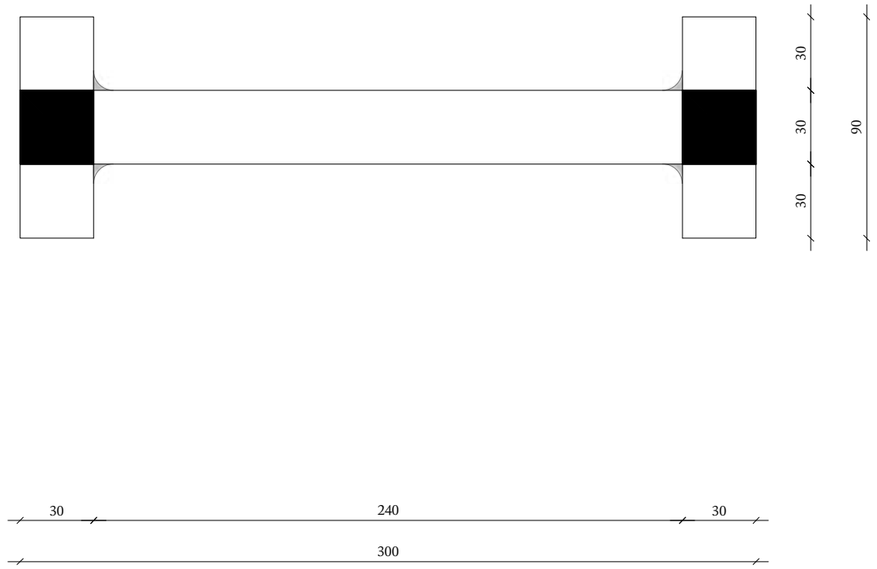
1.Solid laser-cut junction element



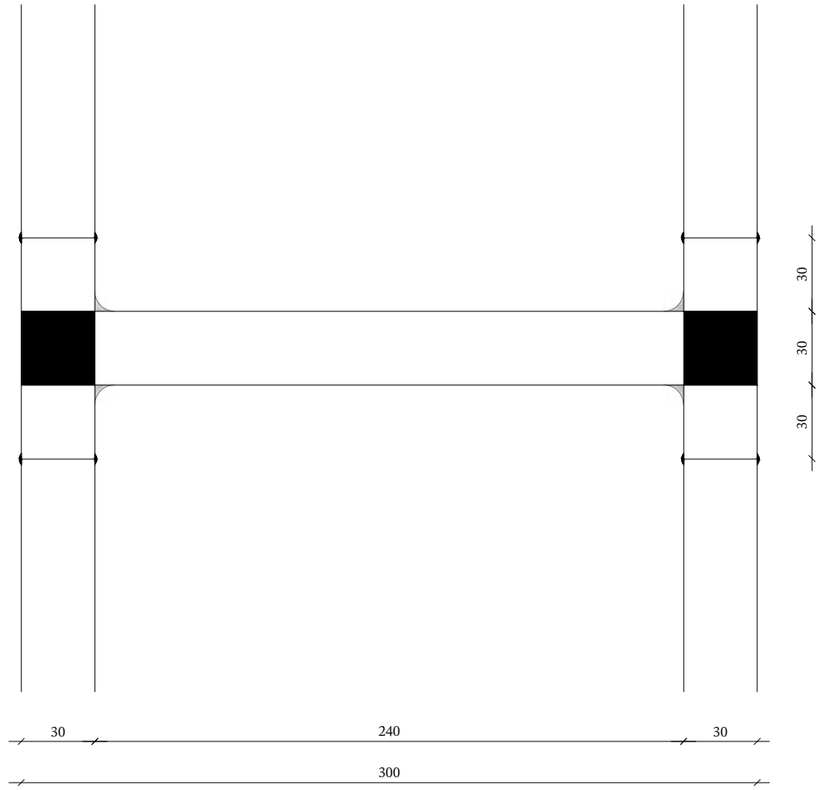
2. Solid rectangular section tubes attached and welded to solid junction piece



Project Stege Harbour Castle
Tekening Option 2 front view
Datum 09/12/2021
Schaal 1:25 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



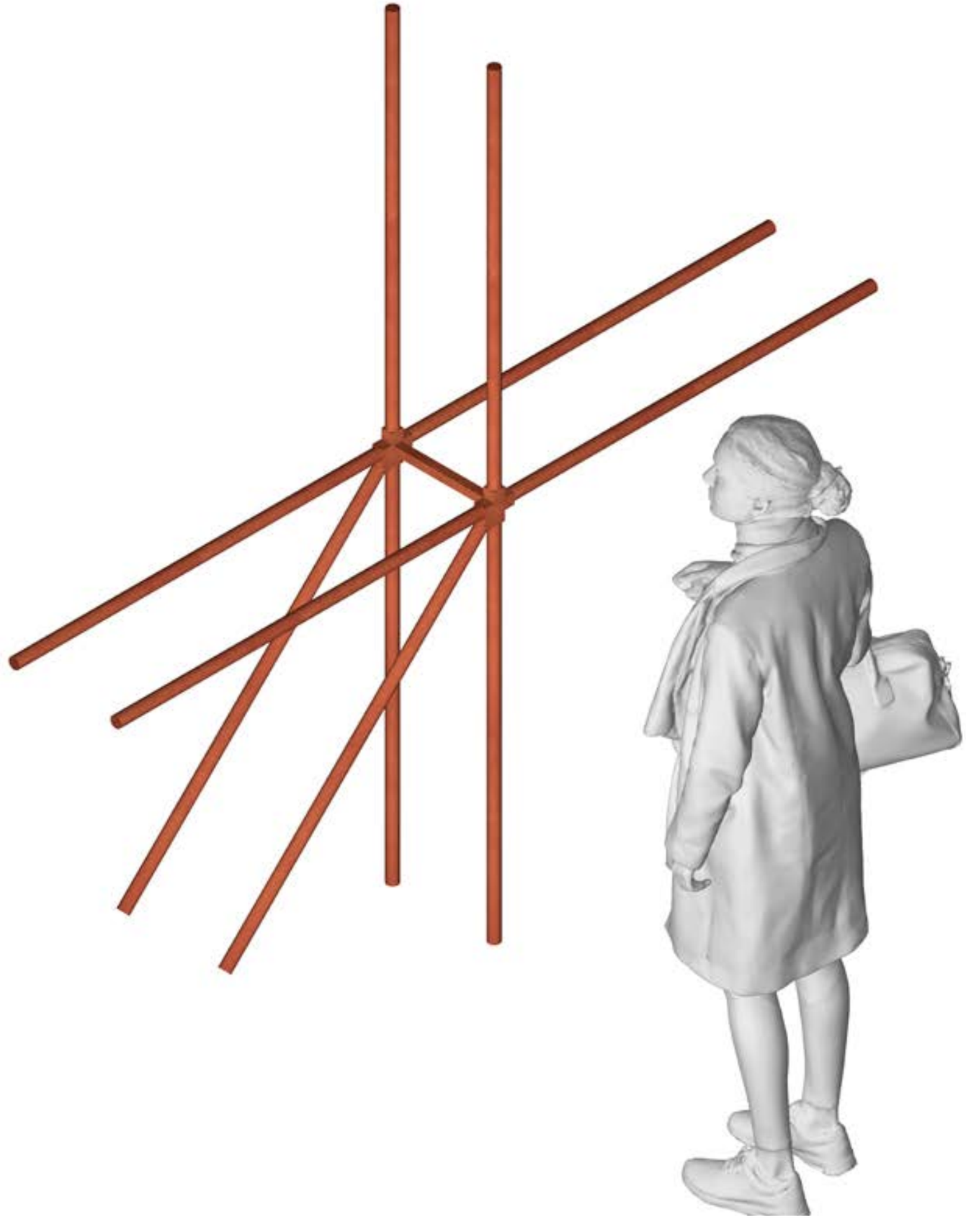
1. 2 solid laser-cut junction elements joint by solid perpendicular solid tube

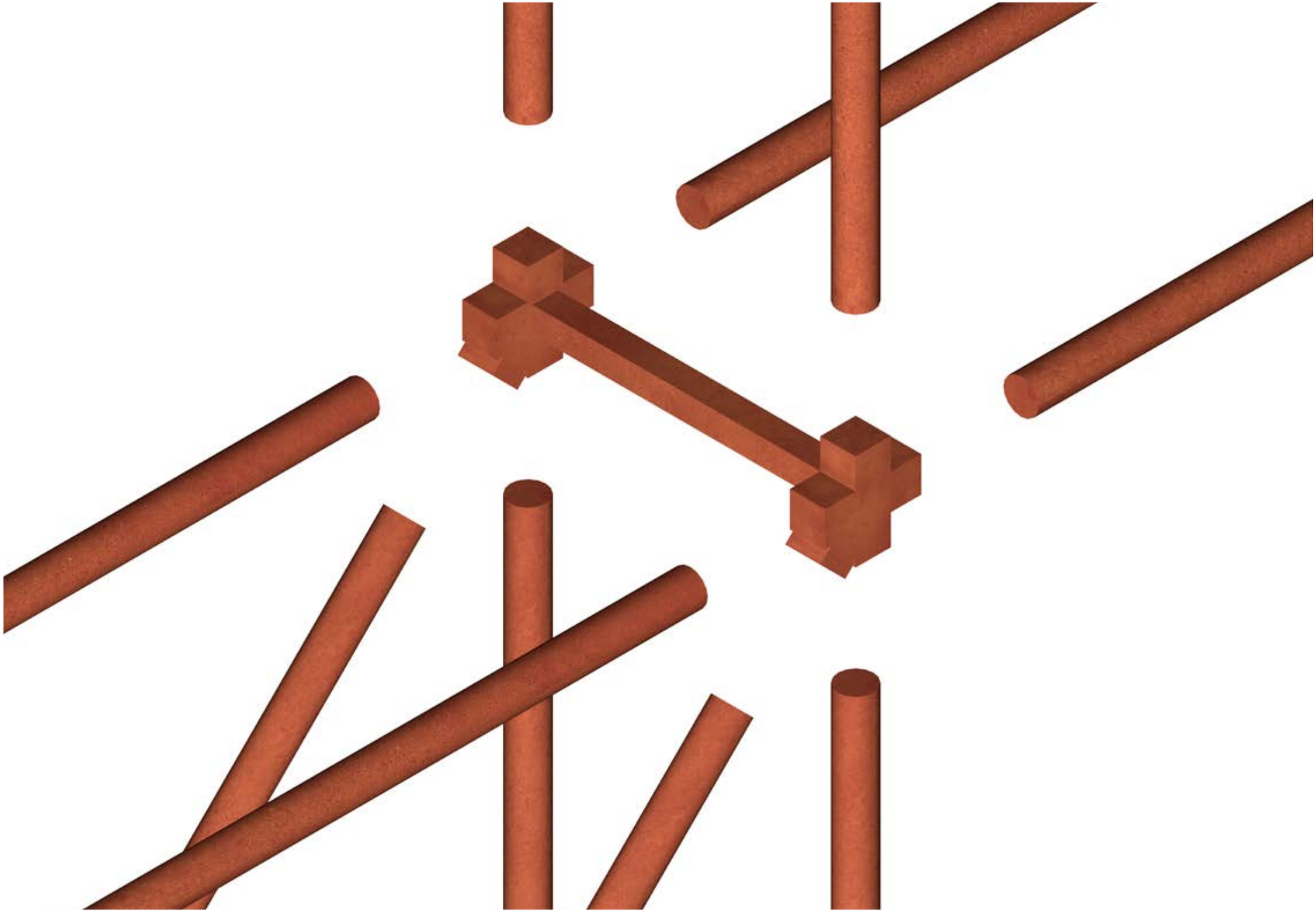


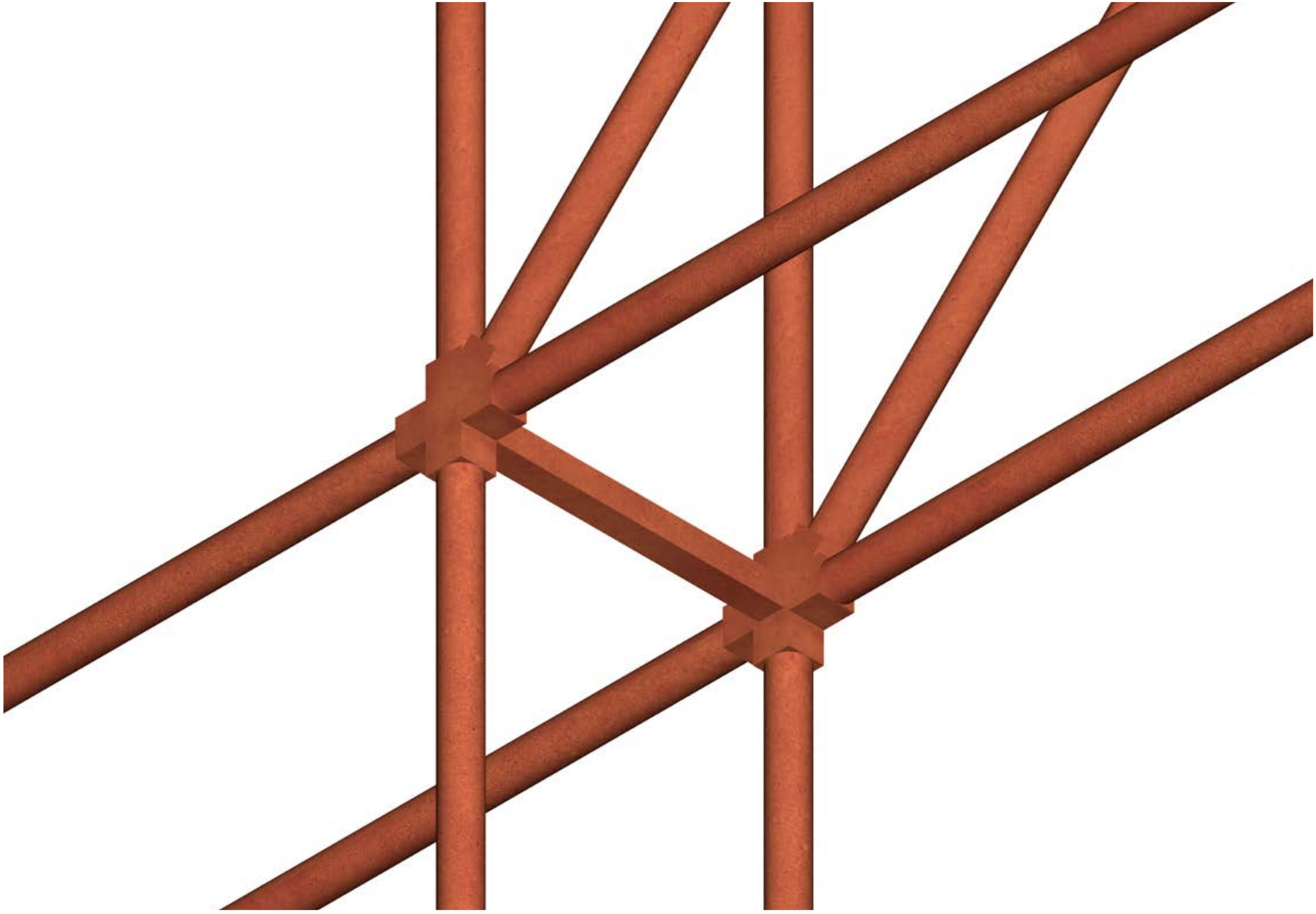
2. All attached rectangular section tubes welded to the solid junction elements

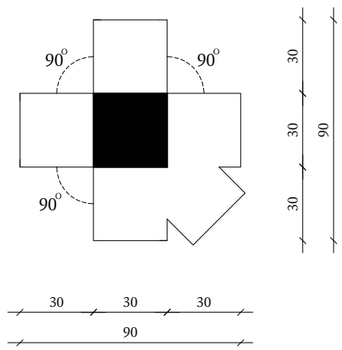
Project Stege Harbour Castle
Tekening Option 2 side view
Datum 09/12/2021
Schaal 1:25 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen

Option 3

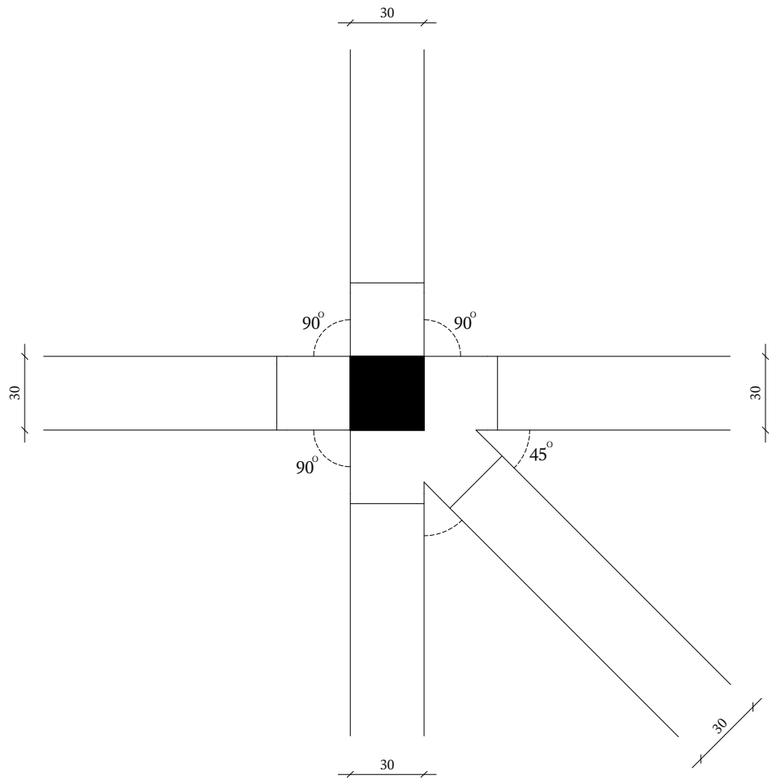




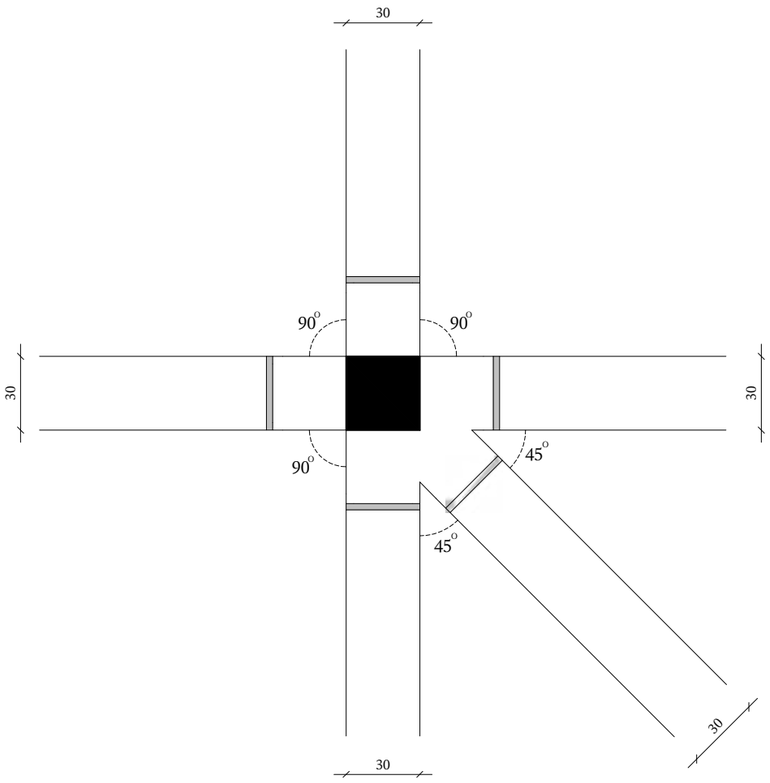




1.Solid laser-cut junction element

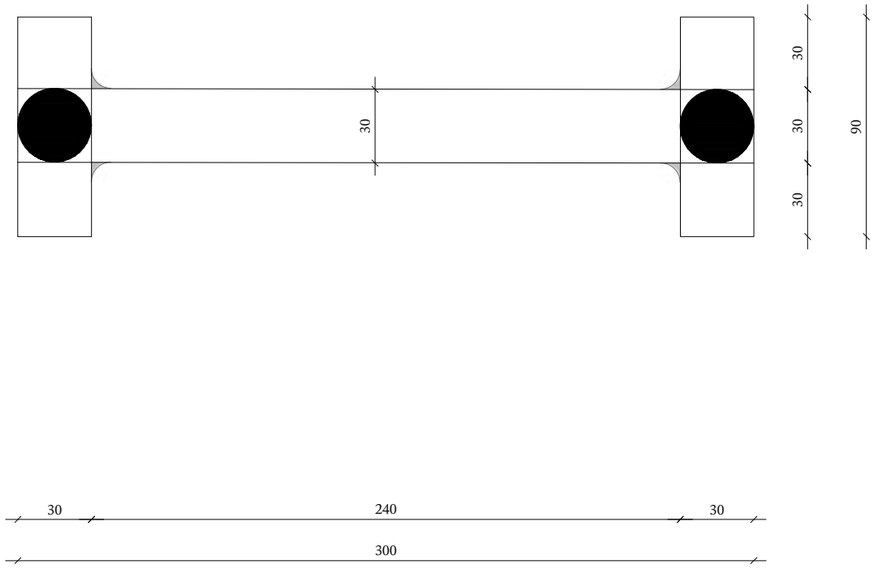


2.Circular section tubes attached to the solid junction element

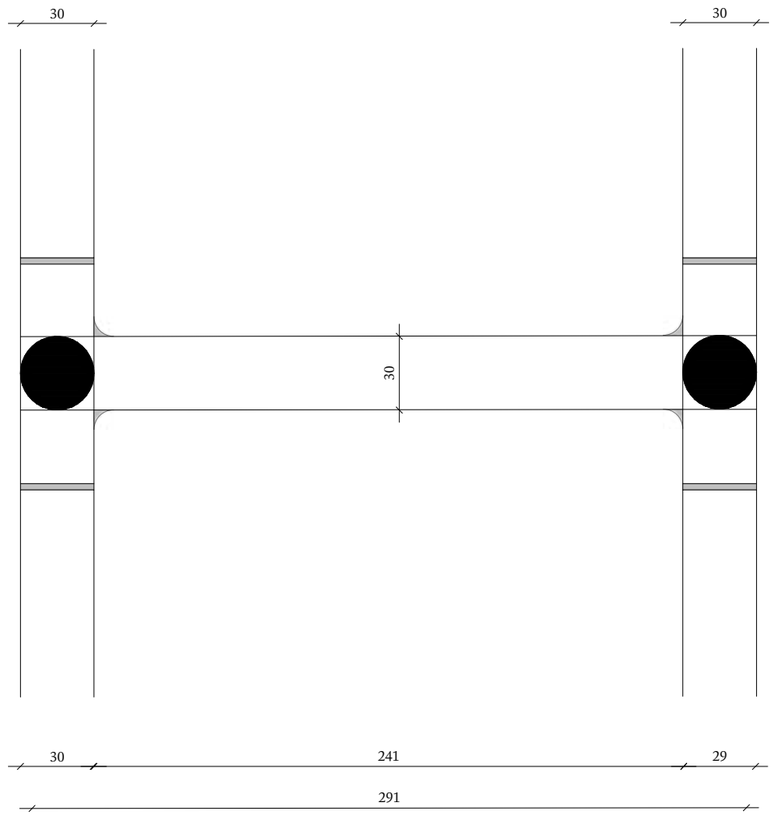


3.All attached circular section tubes welded to the solid junction element

Project Stege Harbour Castle
Tekening Option 4 front view
Datum 20/12/2021
Schaal 1:25 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



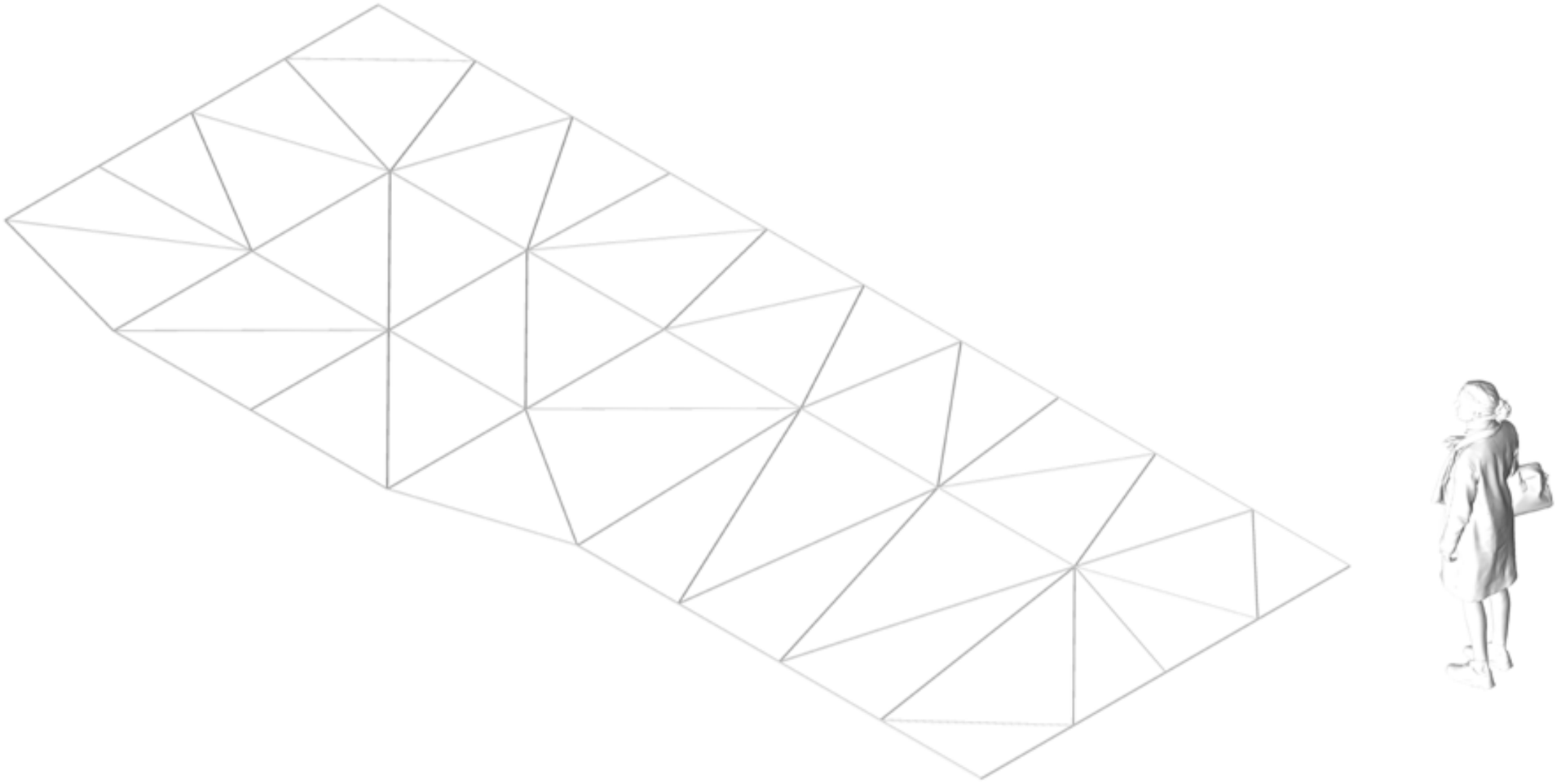
1. 2 solid laser-cut junction elements joined by solid perpendicular rectangular tube



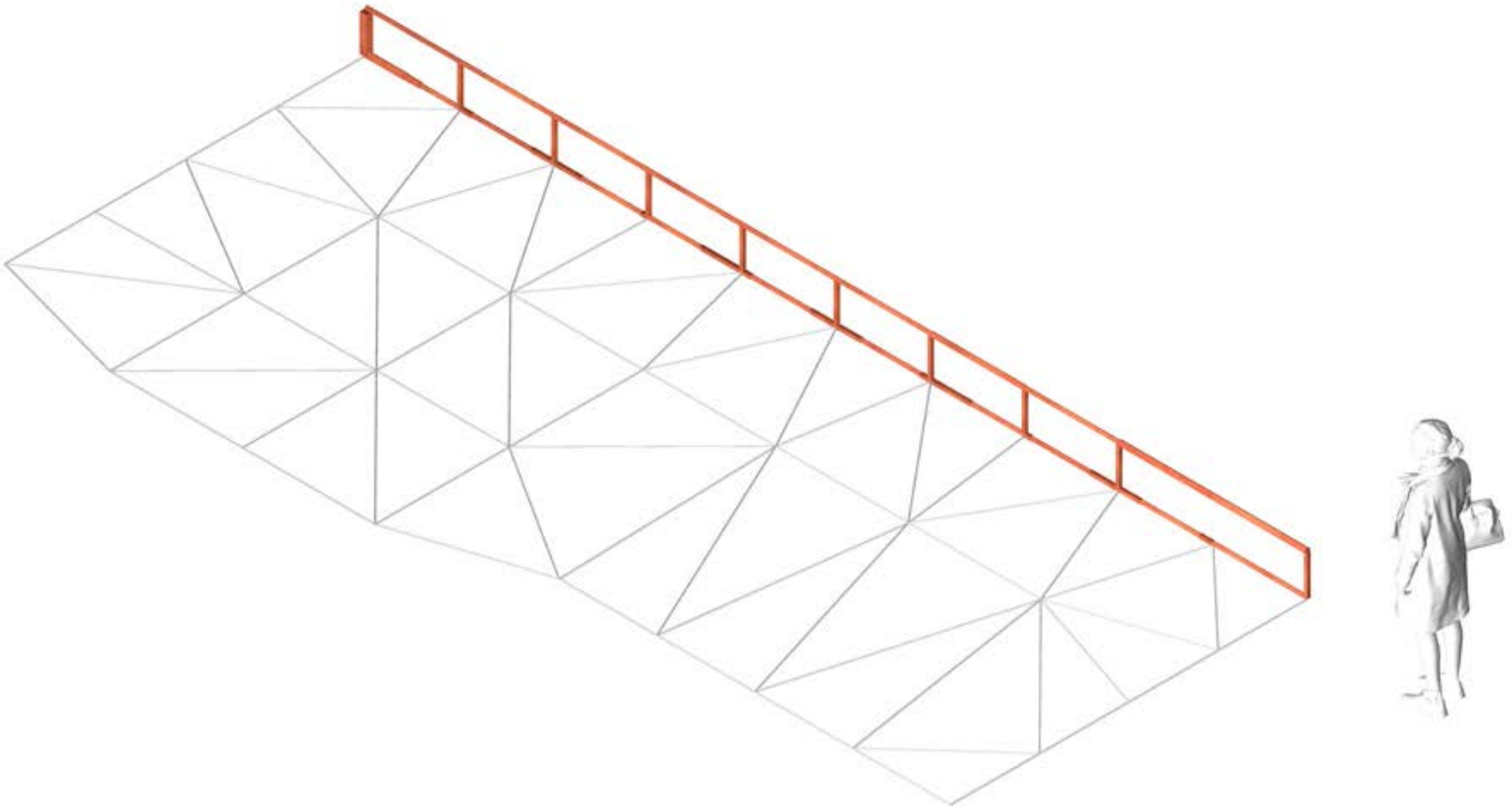
2. All attached circular section tubes welded to the solid junction element

Project Stege Harbour Castle
Tekening Option 4 side view
Datum 20/12/2021
Schaal 1:25 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen

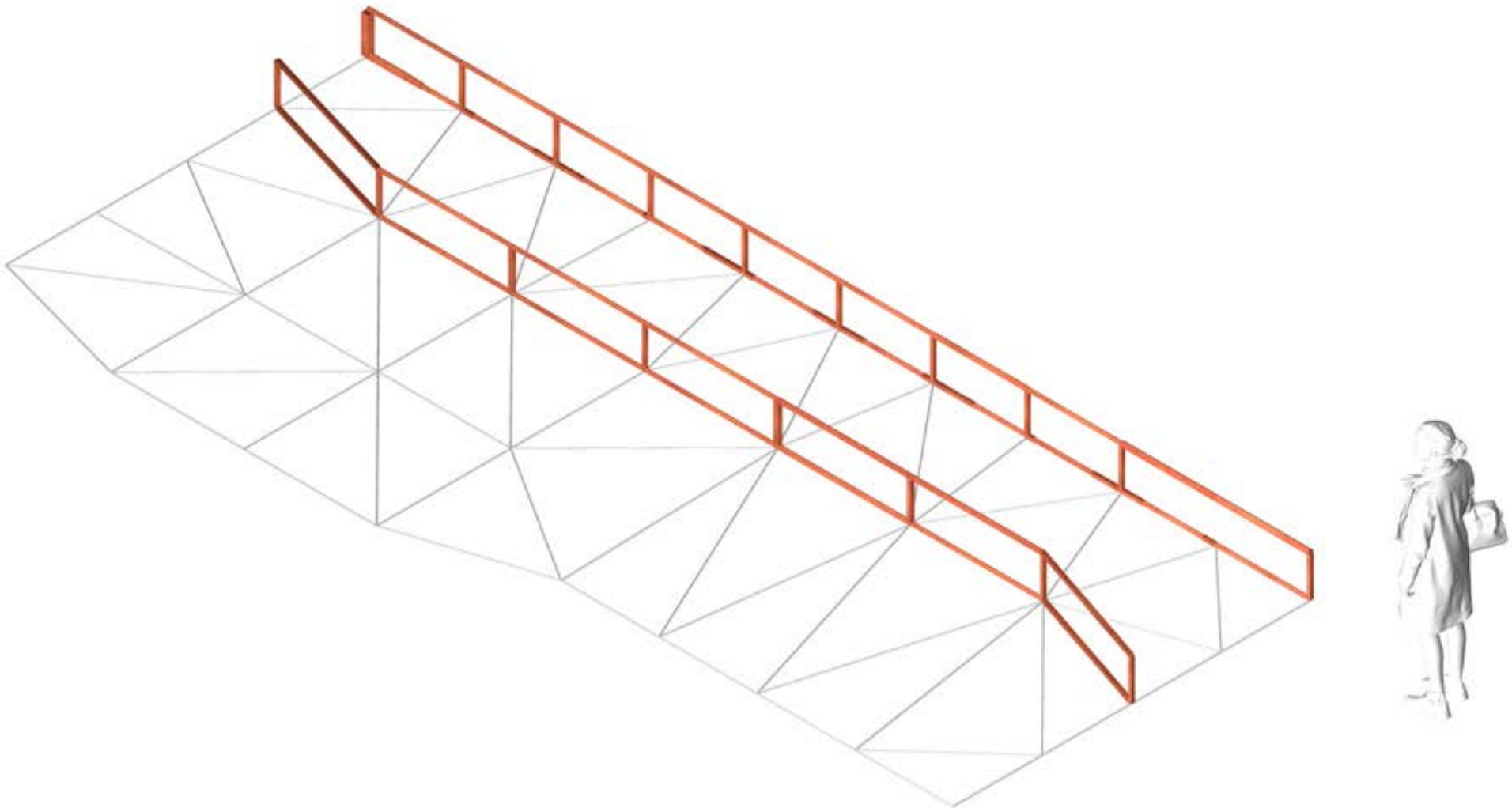
Building-up sequence



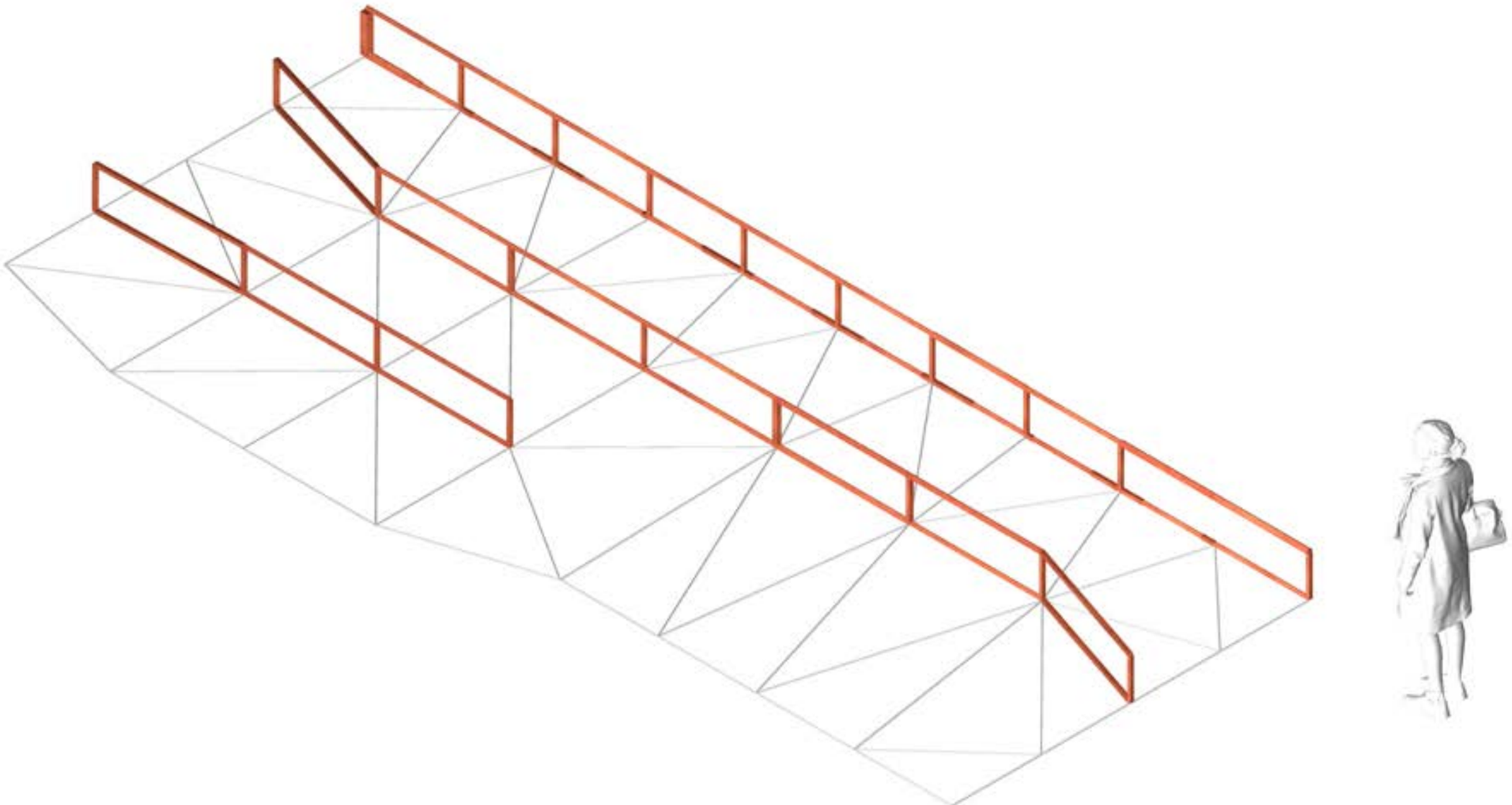
Step 1: laying out the drawing of lines horizontally



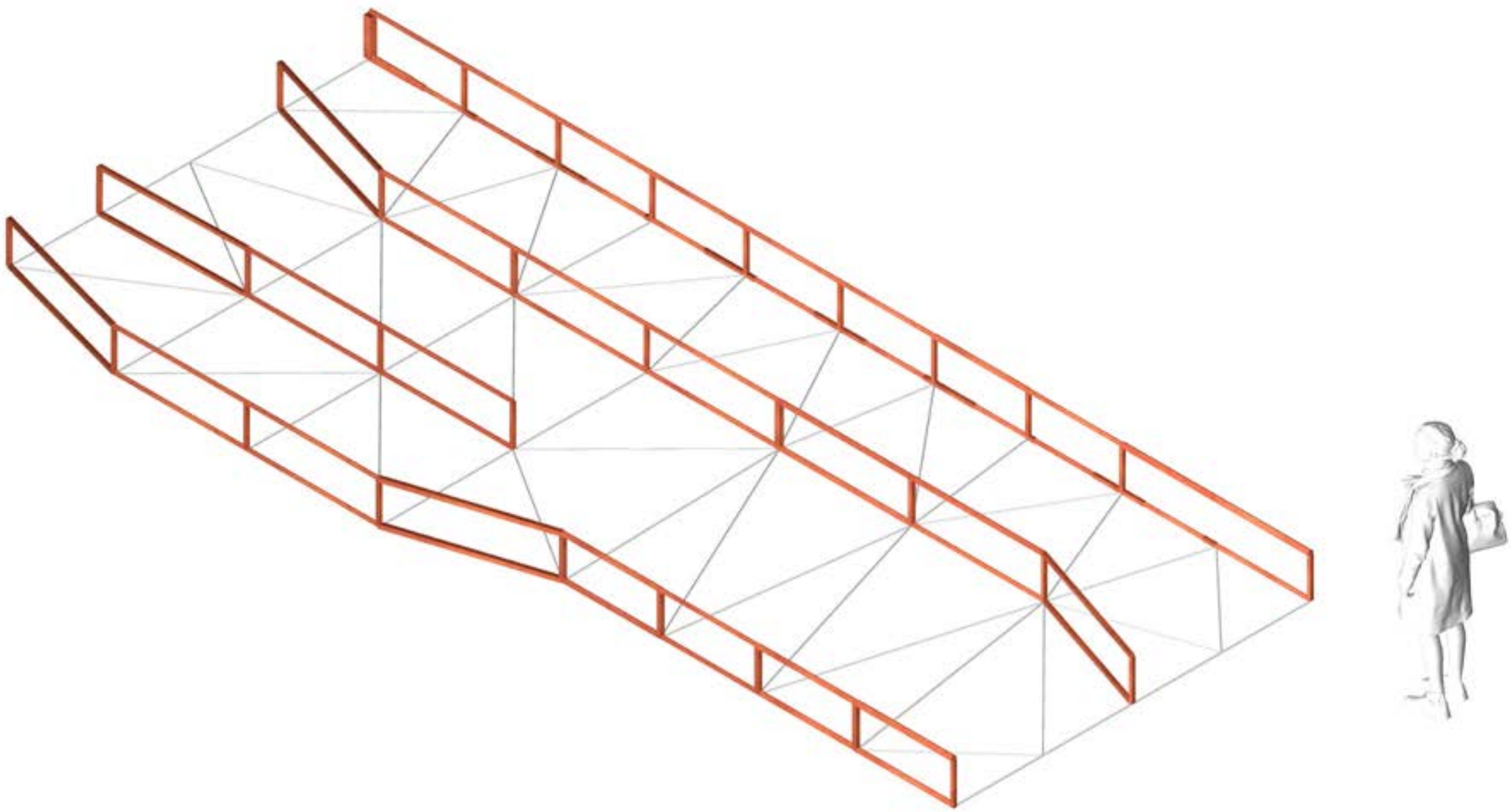
Step 2: assembling 1st ‘ladder’ structure



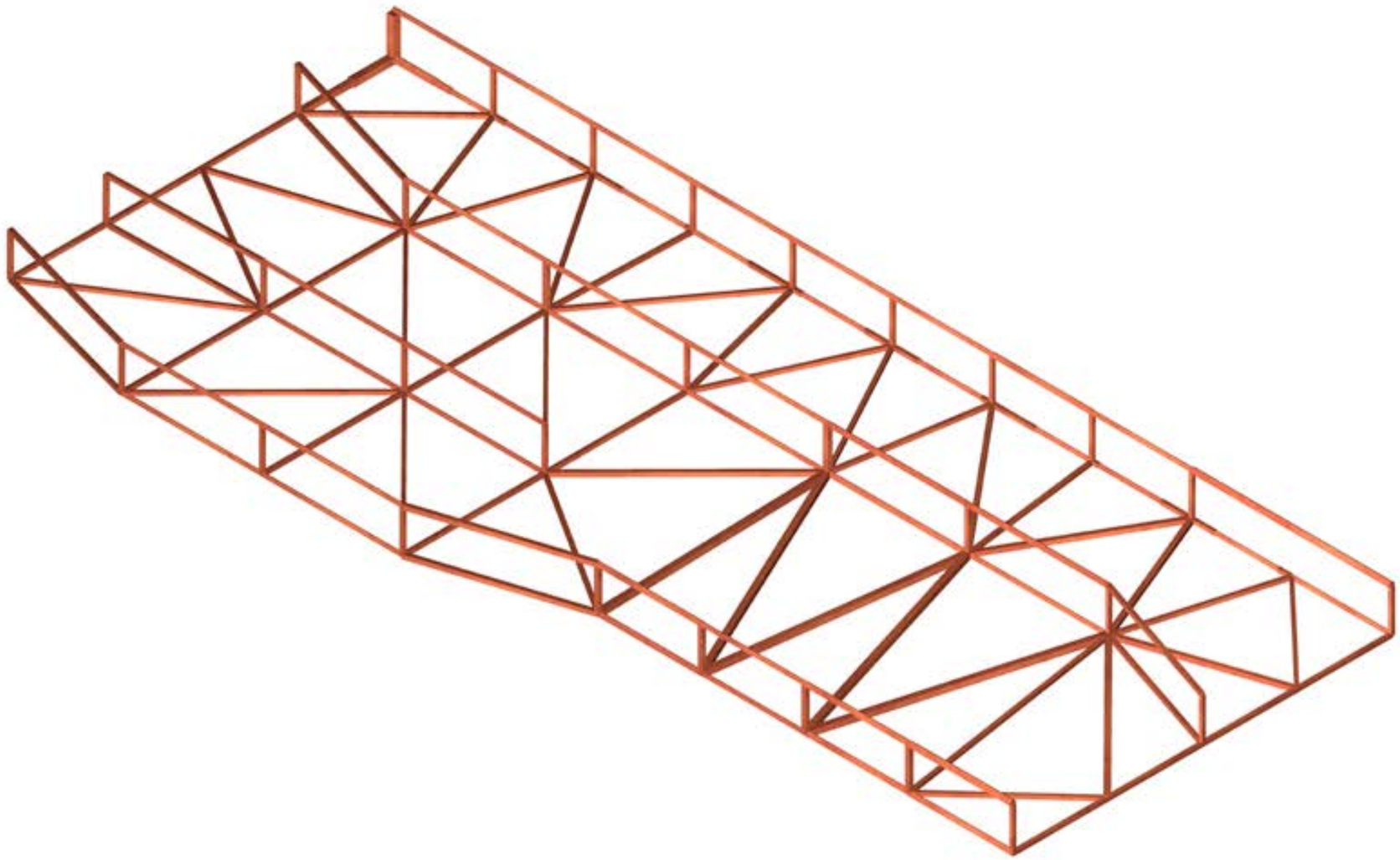
Step 3: assembling 2nd ‘ladder’ structure



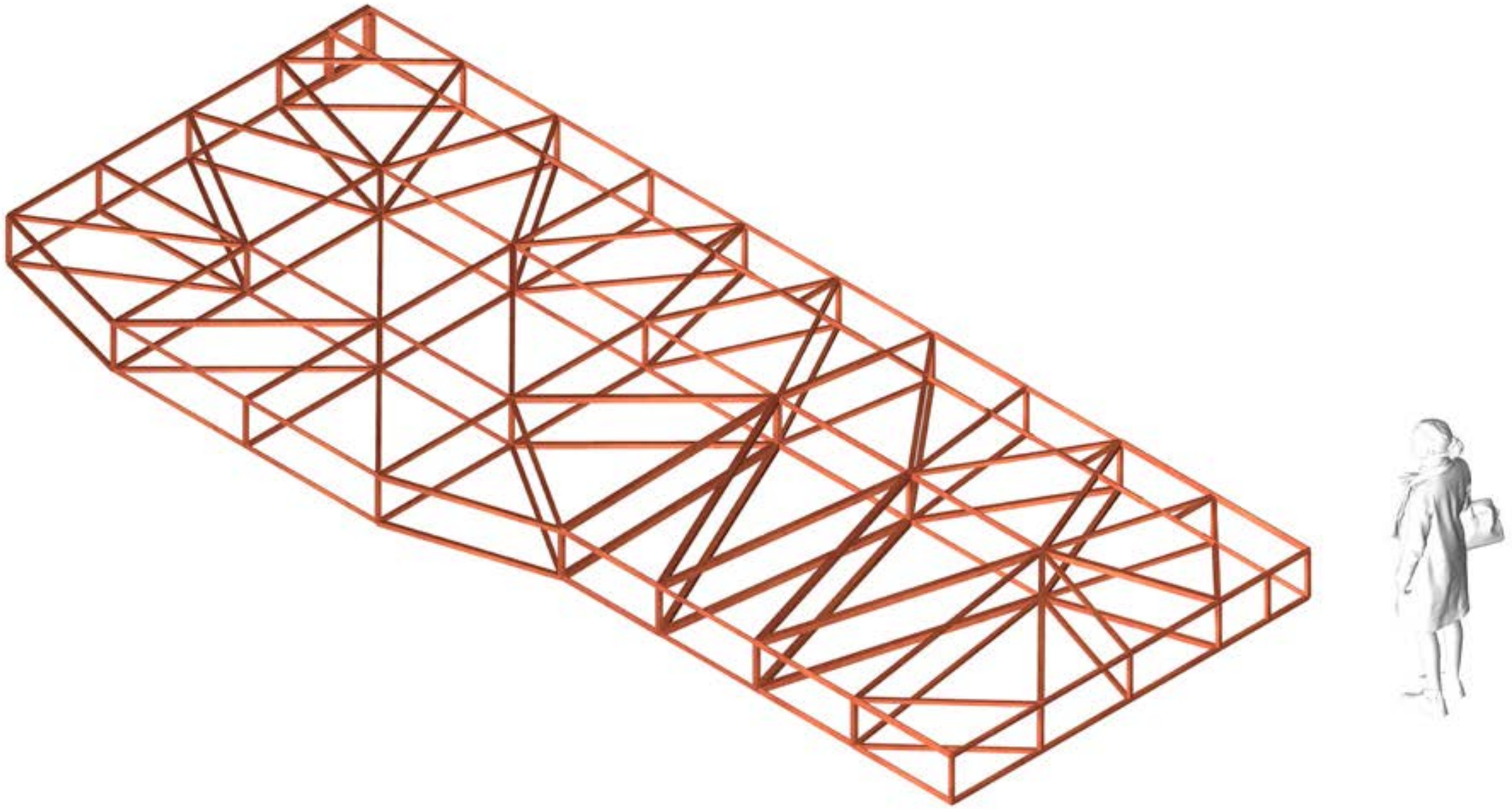
Step 4: assembling 3rd ‘ladder’ structure



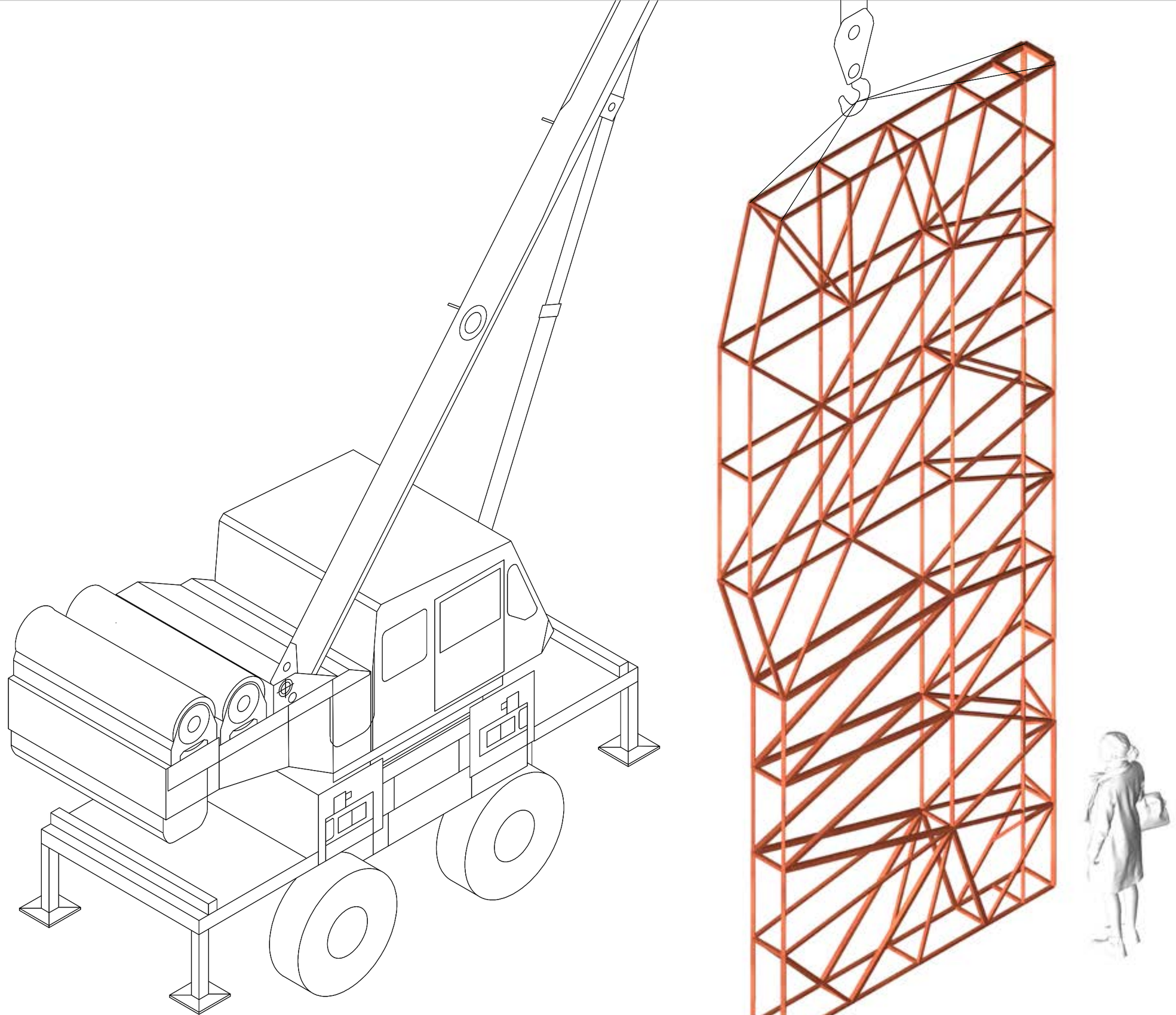
Step 5: assembling 4th ‘ladder’ structure



Step 6: assembling first layer of wall plane horizontally

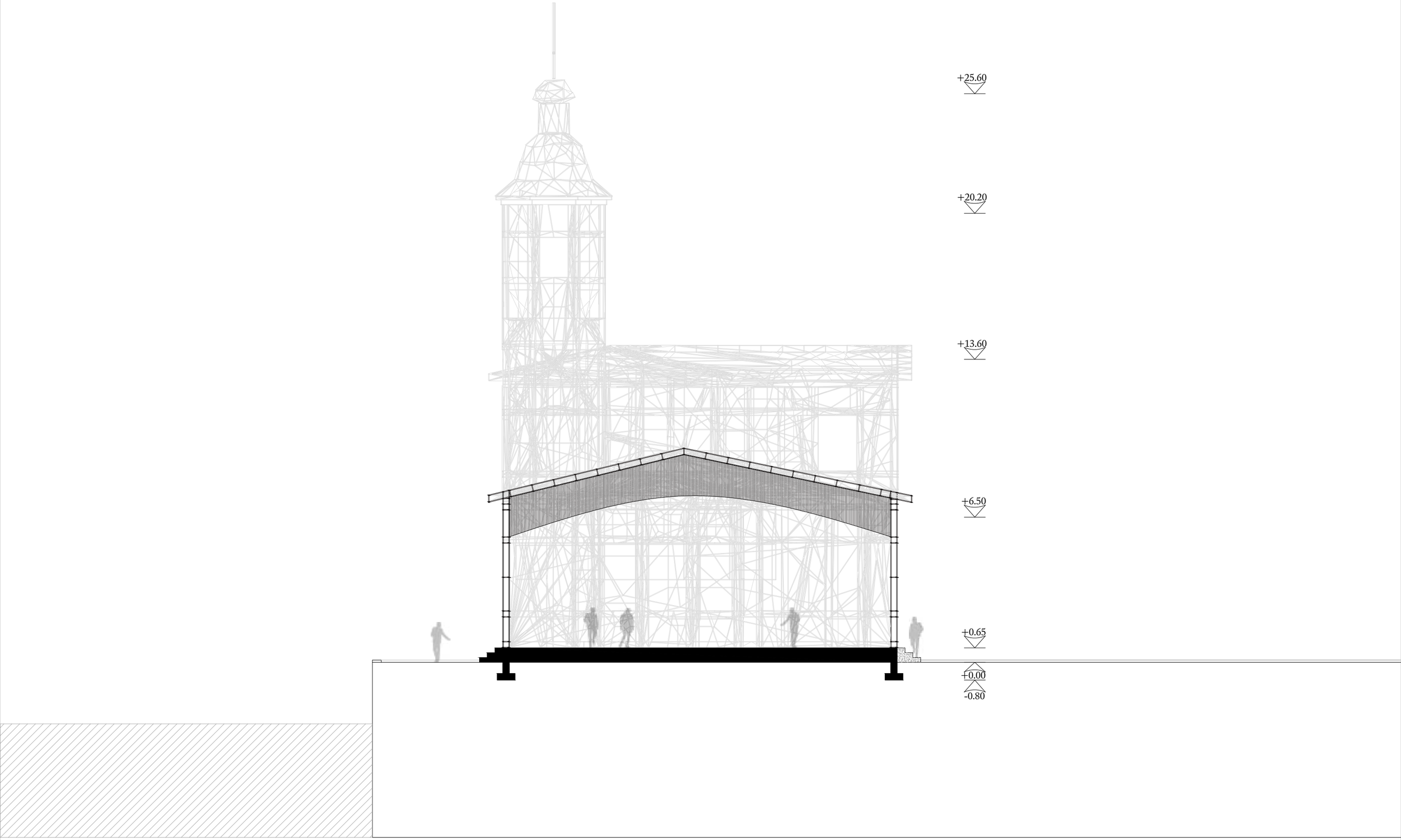


Step 7: assembling second layer of wall plane horizontally on top

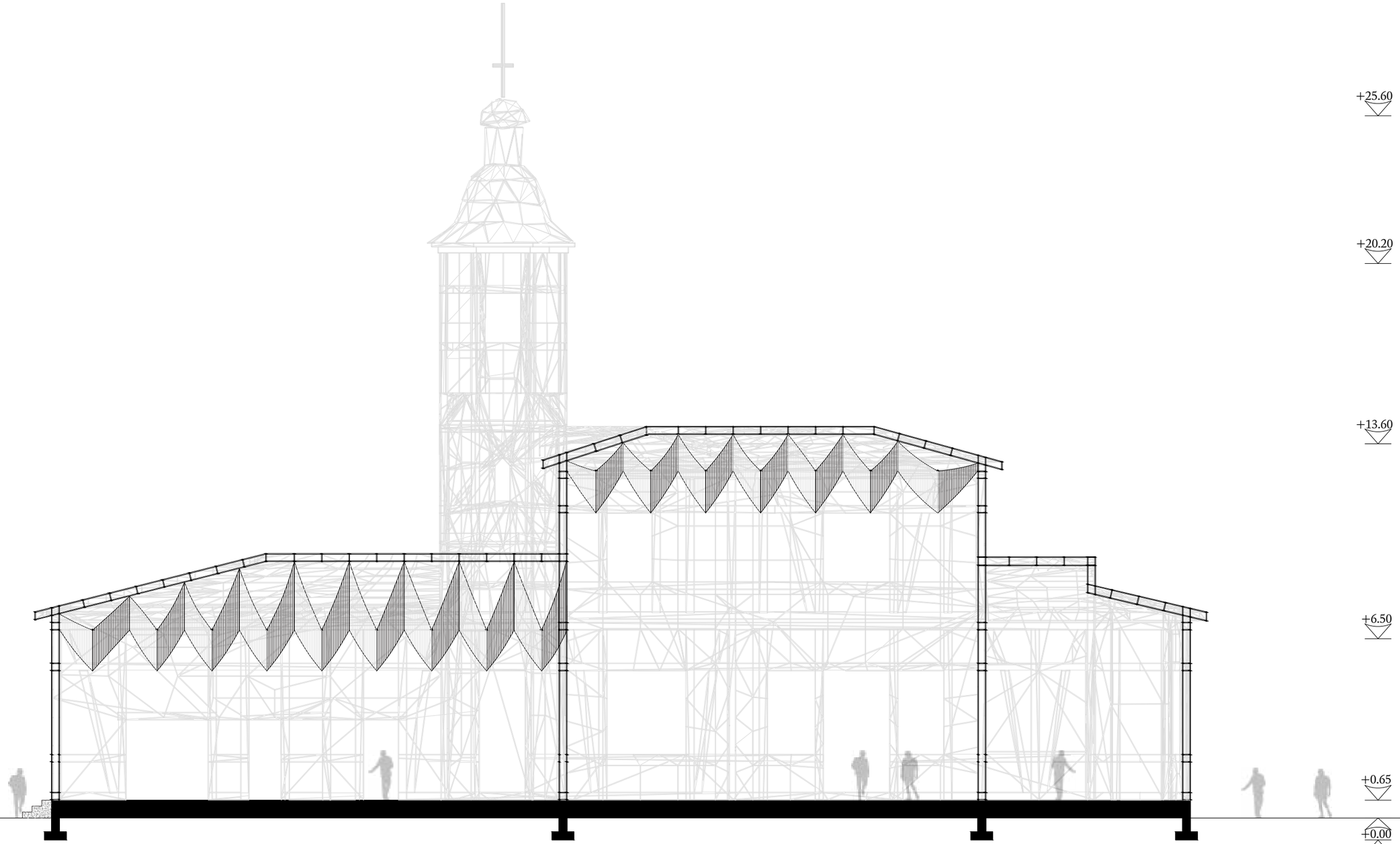


Step 8: with a crane, position assembled structure vertically on site

07.2 Roof fabric



Project Stege Harbour Castle
Tekening Cross section
Datum 20/12/2021
Schaal 1:150 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen



Project Stege Harbour Castle
Tekening Elevation
Datum 20/12/2021
Schaal 1:150 - op A3
Architect Gijs Van Vaerenbergh
Opdrachtgever Steffen Steffensen