



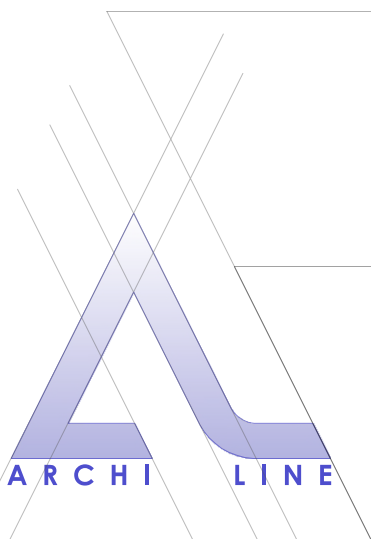
PRODUCER MOBILE HOUSES

www.tinyhouseskibbild.dk



HOUSE
3,00x8,17

DOCUMENTATION TECHNICAL



Tiny House Skibbild

Gefionsvej 41, 7480 Vildbjerg, Denmark
+ 45 50 36 79 92 | kontakt@tinyhouseskibbild.dk

TECHNICAL DESCRIPTION:

ANG

OBJECT: MOBILE HOME WITH HOMOLOGATION

Tiny House Skibbild
Gefionsvej 41, 7480 Vildbjerg, Denmark
phone: + 45 50 36 79 92
e-mail: kontakt@tinyhouseskibbild.dk

Scope of study:

The study includes an architectural design of a mobile home, performing a residential and leisure function .

Spatial layout and architectural form:

The mobile home was made in a compact body layout based on a rectangular projection, made in a modern form that easily fits into the surroundings. The structure of the house is based on a trailer of appropriate dimensions and weight, with homologation, approved for road use.

Trailer - steel frame with zinc coating, it is light and durable, resistant to rust. It has all the necessary security features and an easy-to-use car hitch, designed for the construction of houses.

The foundation of the house with the trailer before each use should be on a stable, level area with the use of supports enabling stable arrangement of the house.

Exterior façade - Seam panel sheet cladding. Easy to maintain, in various colours, aesthetic and durable.

Supporting structure - Certified C24 construction timber □ ideal for making a durable mobile home structure. It is obtained from selected conifers, dried in chambers to 12% moisture. It undergoes a treatment that makes the beams more resistant to deformation and pests.

The entire frame is made in timber frame technology with finishing layers.

Interior finish - The interior is finished with natural wood. Natural wood finishing for walls, ceilings and other elements inside, painted or raw.

Roof shape - part of the house is covered with a gable roof, part is flat, raised due to the mezzanine. Together, they form a custom design shape.

Entrance - separate or glazed door.

Windows - **smaller ones illuminate** the rooms and let in fresh air. Large glazing creates an unusual atmosphere. They enlarge the room and invite greenery from the surroundings into the interiors

Necessary installations - the house is equipped with the following installations:

- electrical (contacts, sockets, lighting),
- plumbing (water in the kitchen, sink, in the bathroom: washbasin, shower, water heater, water tank)
- sewage system (toilet, drains, toilet insert).

installations: electrical, plumbing, sewage ready for use or connection to the network.

Photovoltaics - a great solution if you want to save money and use electricity without restrictions. You don't have to join the general network, which means more independence.

Air conditioning - this is actually standard in our trailers on wheels.

It increases the comfort of use. Cools or heats depending on your settings.

Underfloor heating has been designed in the building, and the insulation of the walls ensures that the temperature is maintained and protects against excessive heating or cooling of the house.

Functional division:

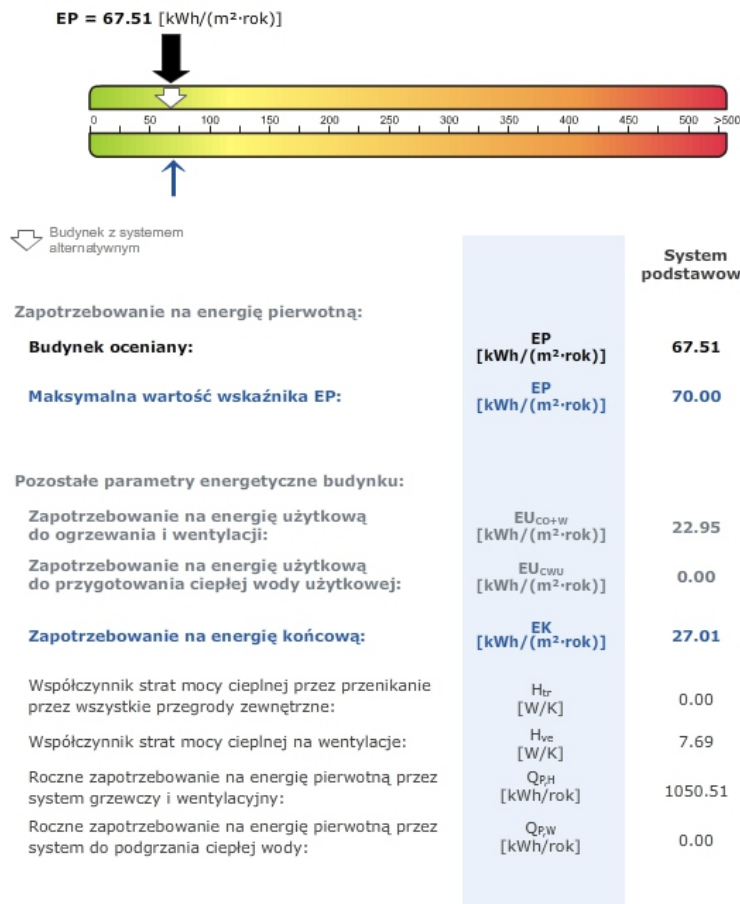
Living area - It occupies the largest area of the house, in this part you can relax or spend time actively, equipped with furniture, storage, a fireplace and a kitchenette consisting of furniture, sink, cooking plate.

Sanitary part - The bathroom is located behind the kitchenette equipped with a shower, toilet, sink and optionally with a place for a washing machine

Mezzanine #1 - Stairs with cabinets lead to the mezzanine above the bathroom and kitchenette. There is a place to sleep on the mezzanine. A railing mounted to the mezzanine, transmitting horizontal forces, protects against falling from a height.

Mezzanine #2 - An exit ladder leads to the mezzanine above the living area located in the opposite part of the house. There may be an additional sleeping place on the mezzanine. A railing mounted to the mezzanine, transmitting horizontal forces, protects against falling from a height.

DETERMINATION OF THE ENERGY PERFORMANCE OF THE HOUSE:



Structural layout:

The house was made in frame technology:

- Wooden posts and beams
- Timber roof
- Boards and paneling as finishing materials

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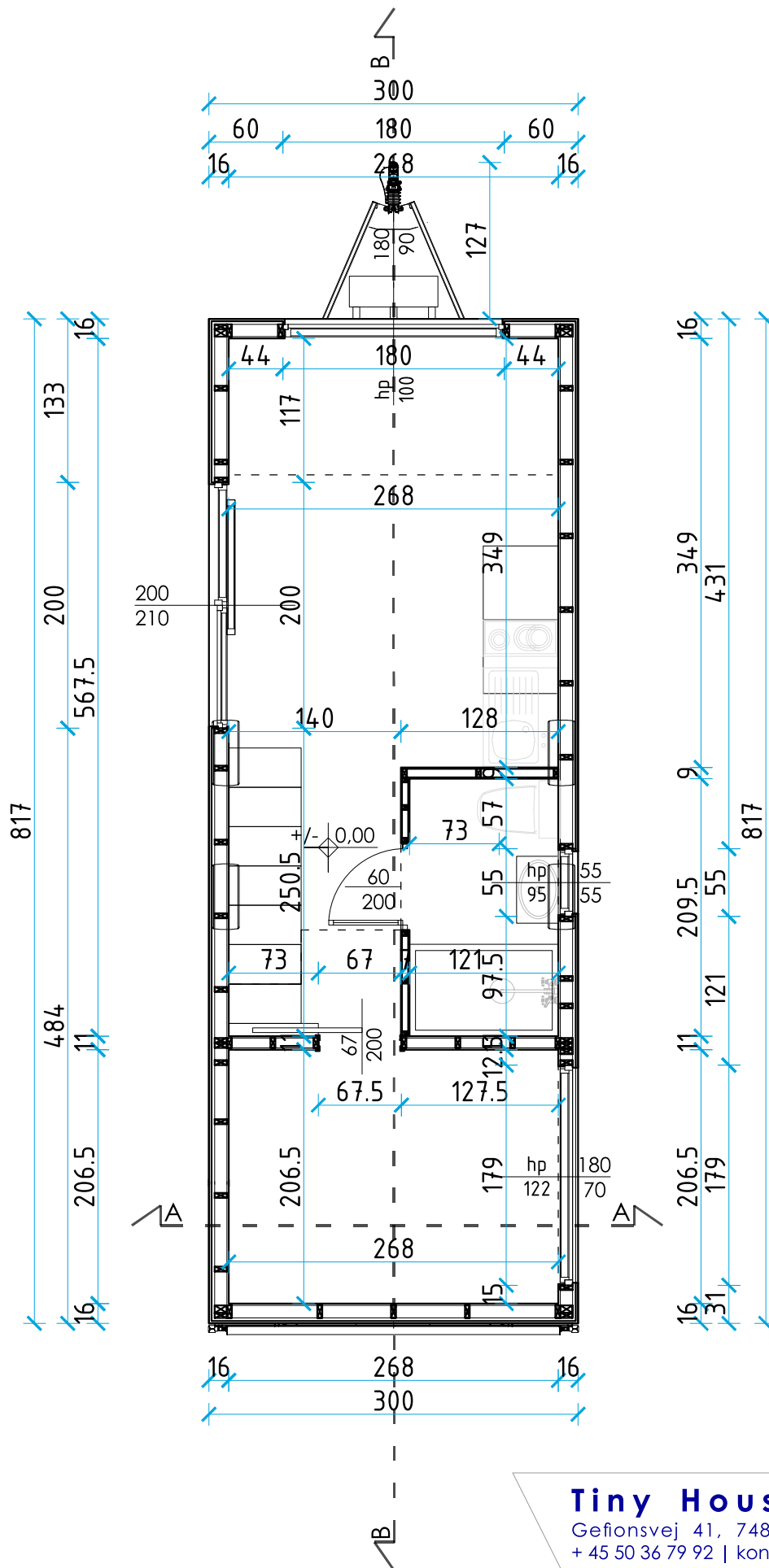
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Due to the possibility of making changes and modernization, the appearance of the house will change depending on:

- Dimensions
- layout, number and size of planned glazing,
- interior layout

This documentation is an information form for a given cottage

This printout is the basis for the implementation of the mobile home, any possible printing errors may occur or information can be clarified after prior contact with the manufacturer



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TOUCHDOWN THROW

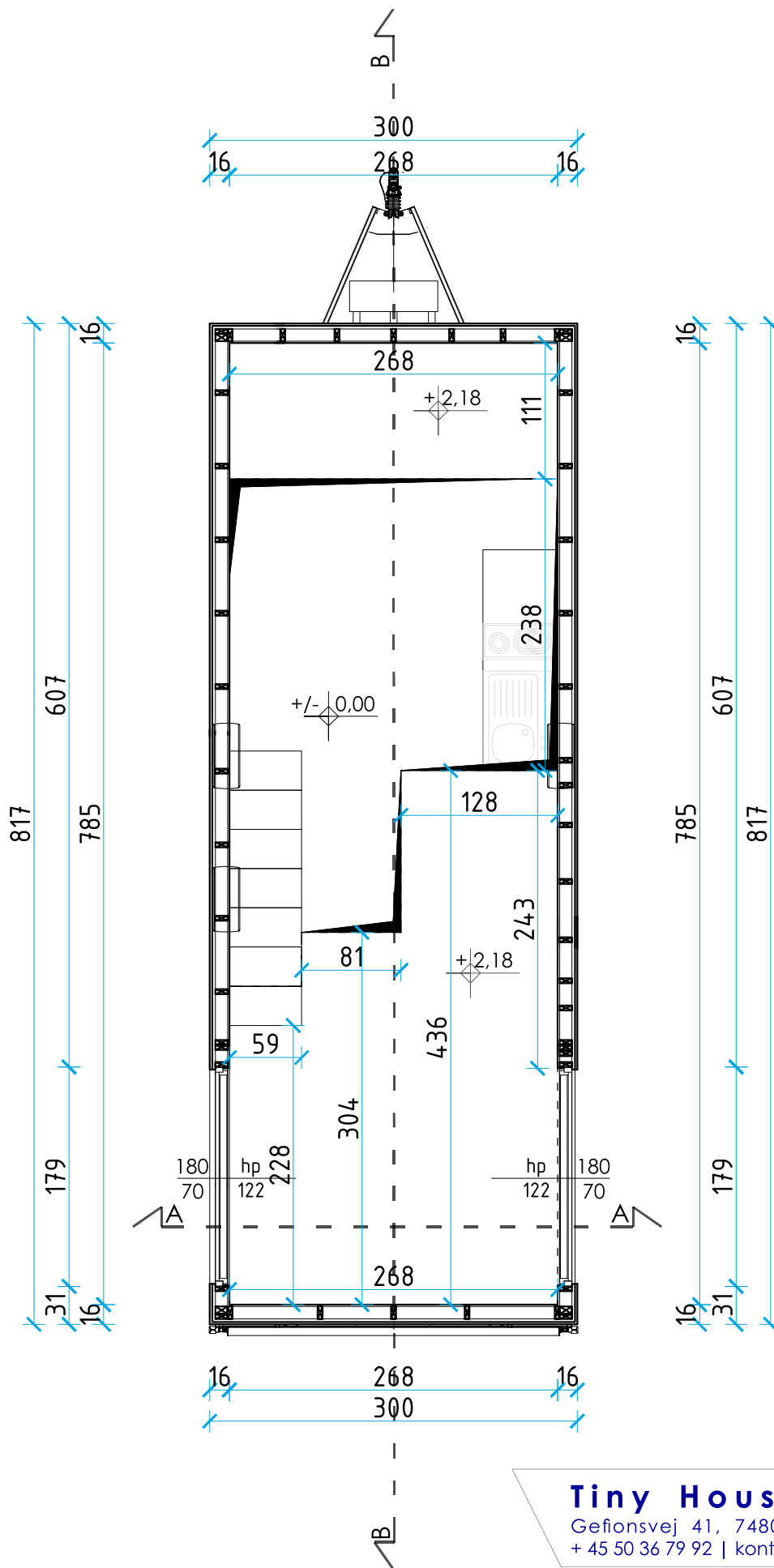
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MEZZANINE

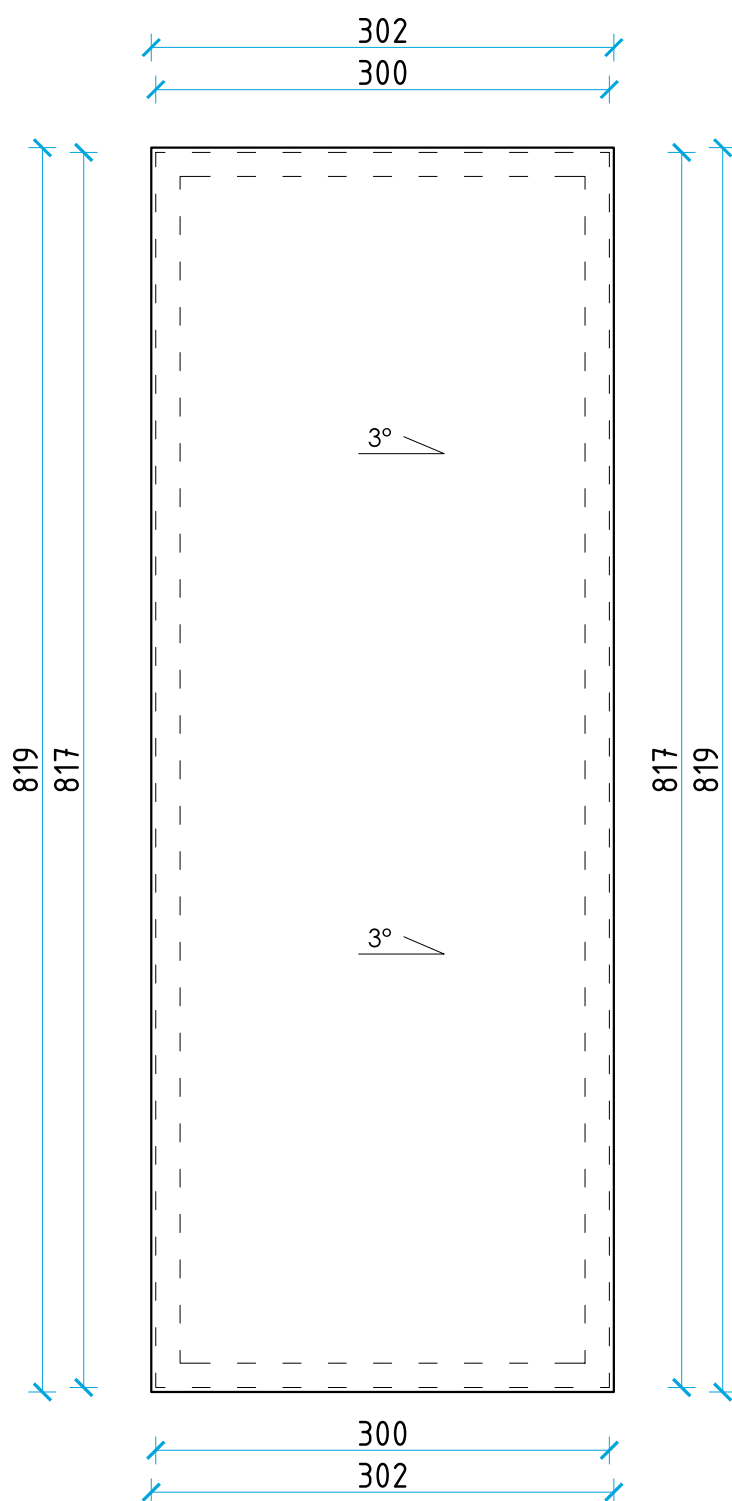
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ROOF PLAN

SCALE:

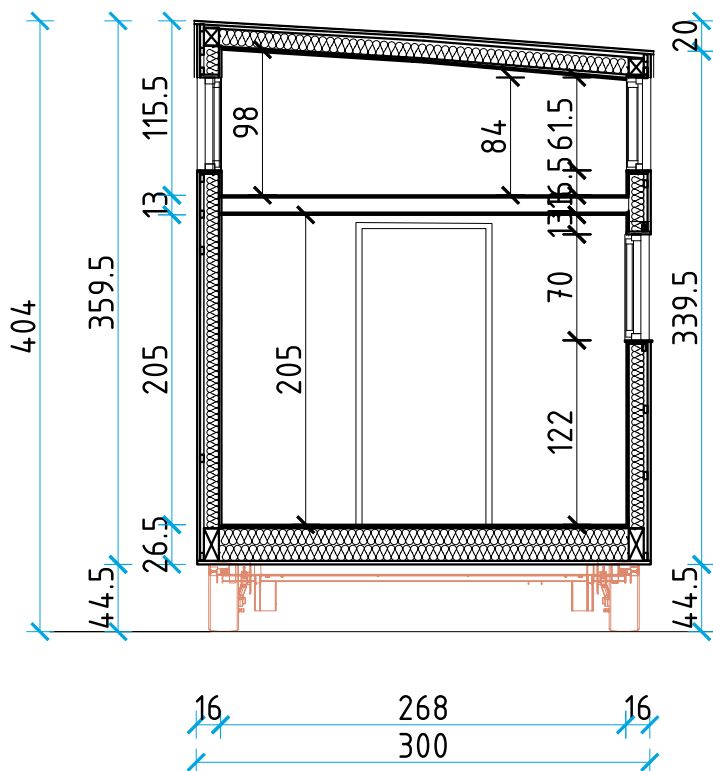
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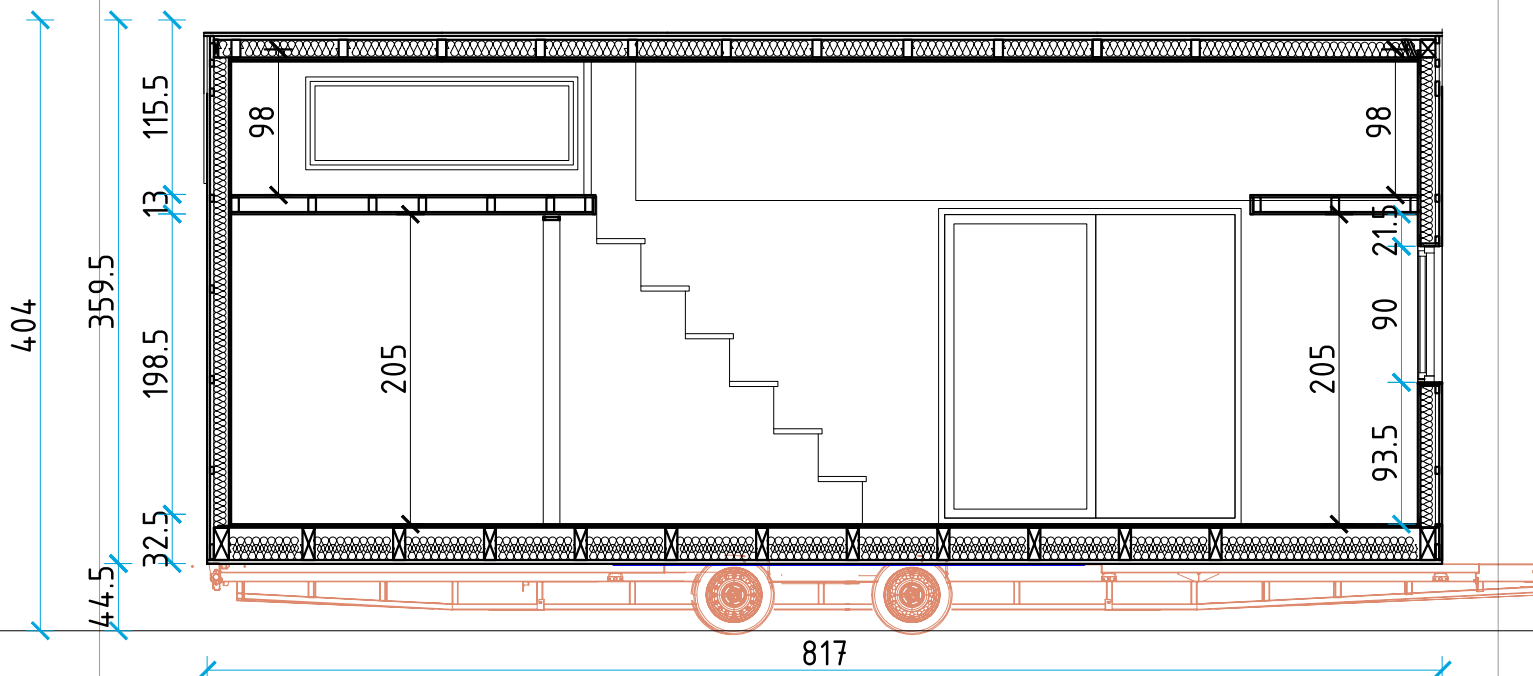
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CROSS-SECTION A-A



CROSS-SECTION B-B



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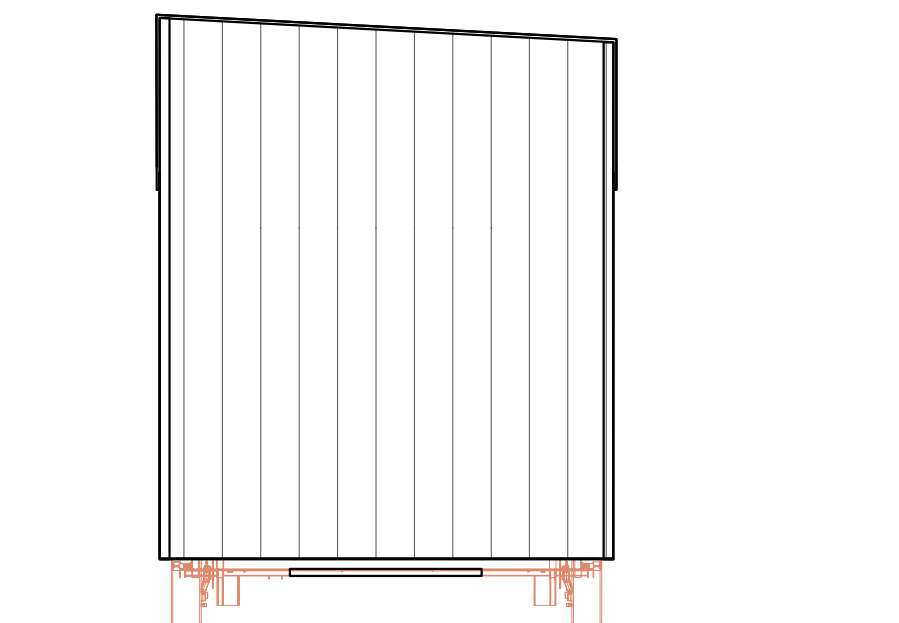
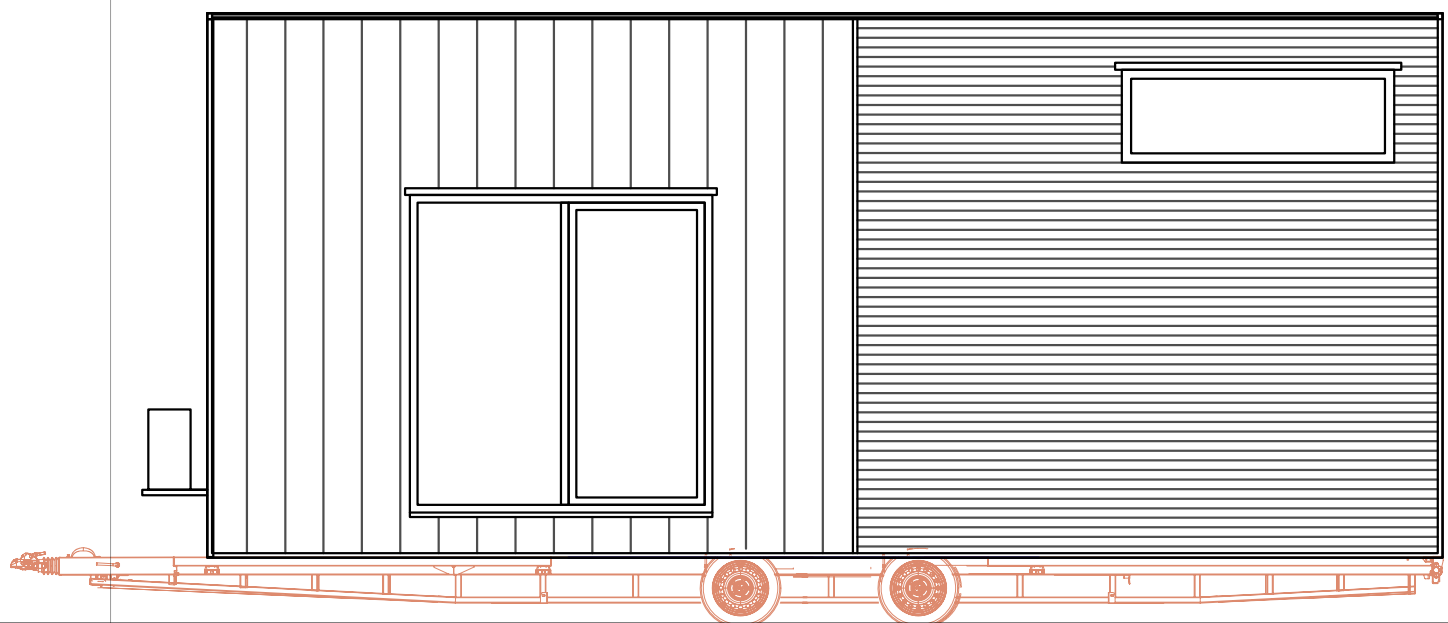
CROSS-SECTION A-A, B-B

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ELEVATIONS

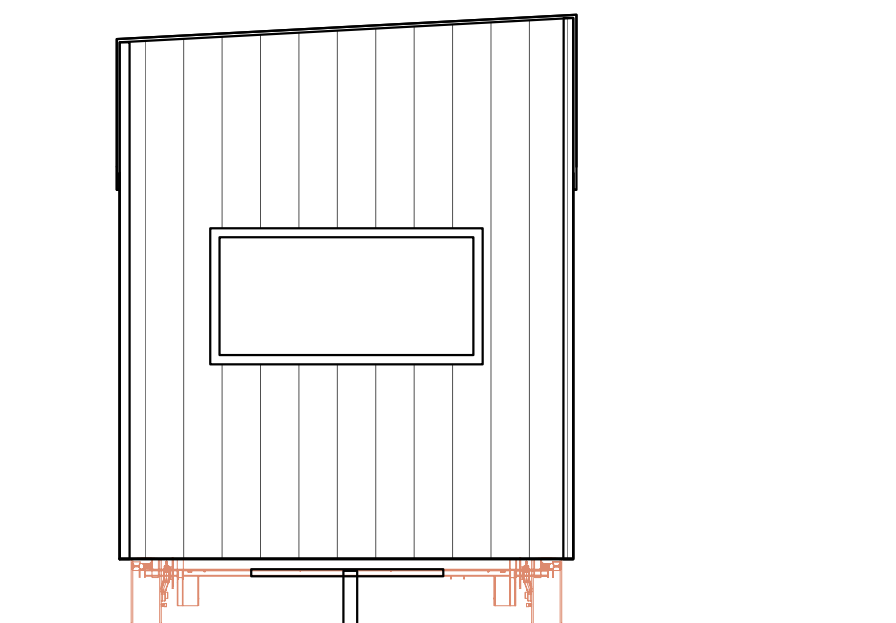
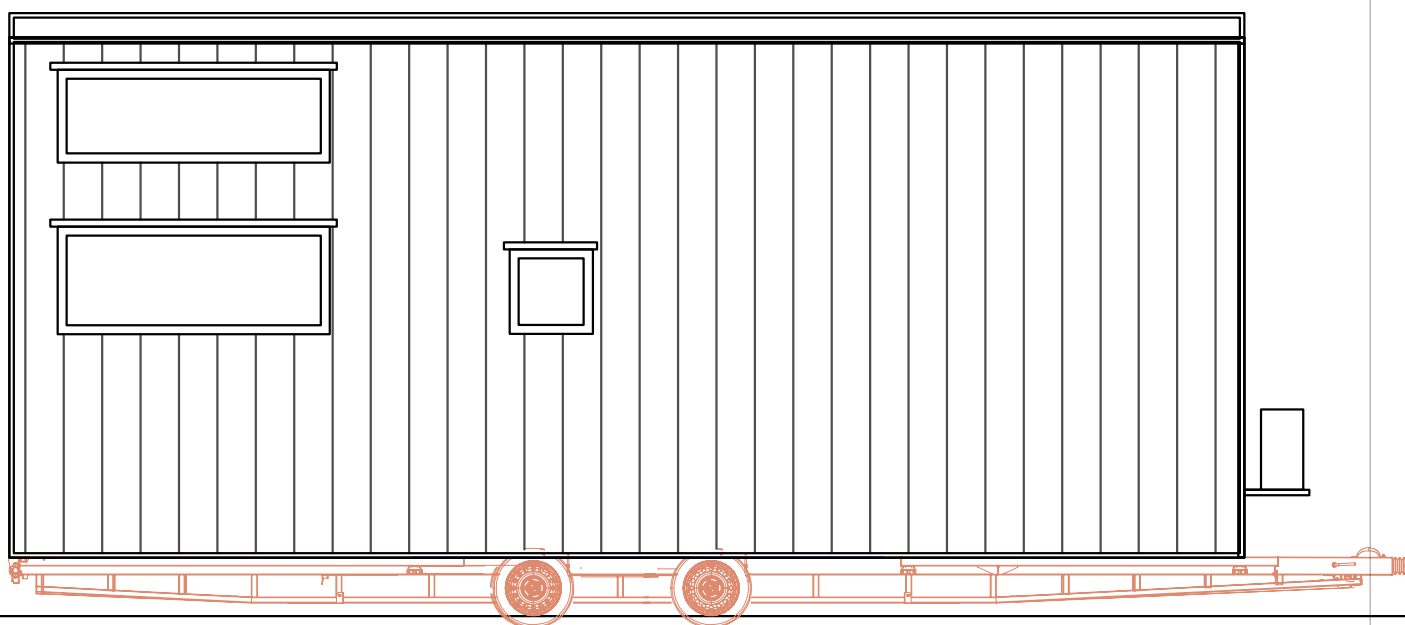
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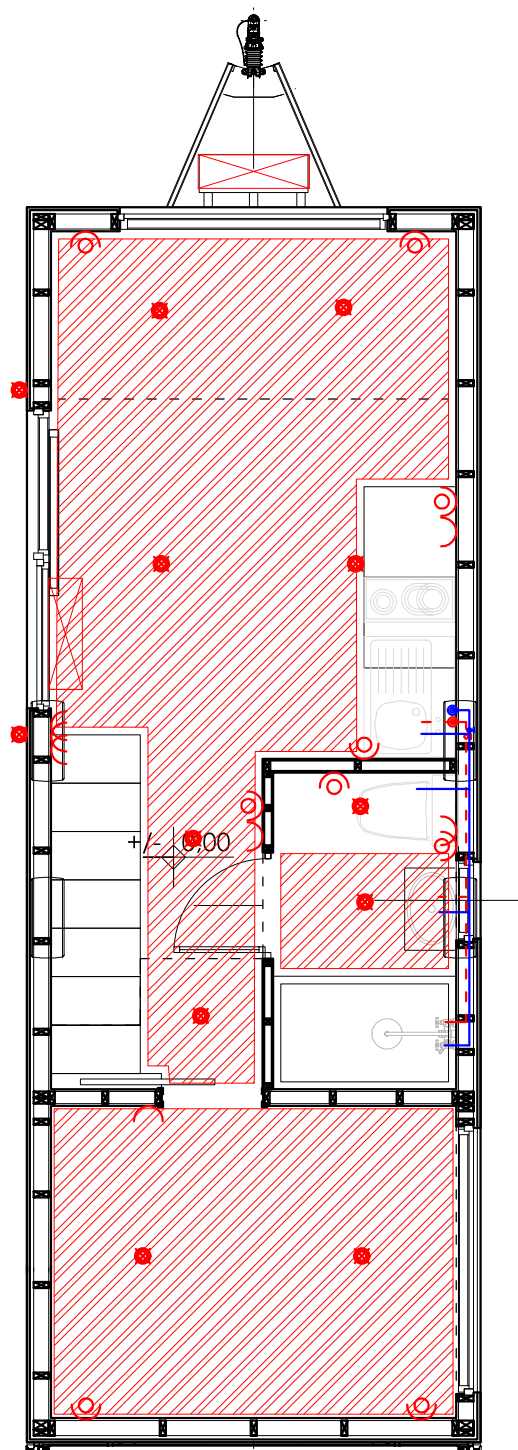
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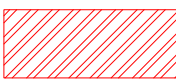
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AIR CONDITIONER


FLOOR HEATING


HOT/COLD WATER


SEWAGE PIPE


POINT OF LIGHT


SWITCH


SOCKET

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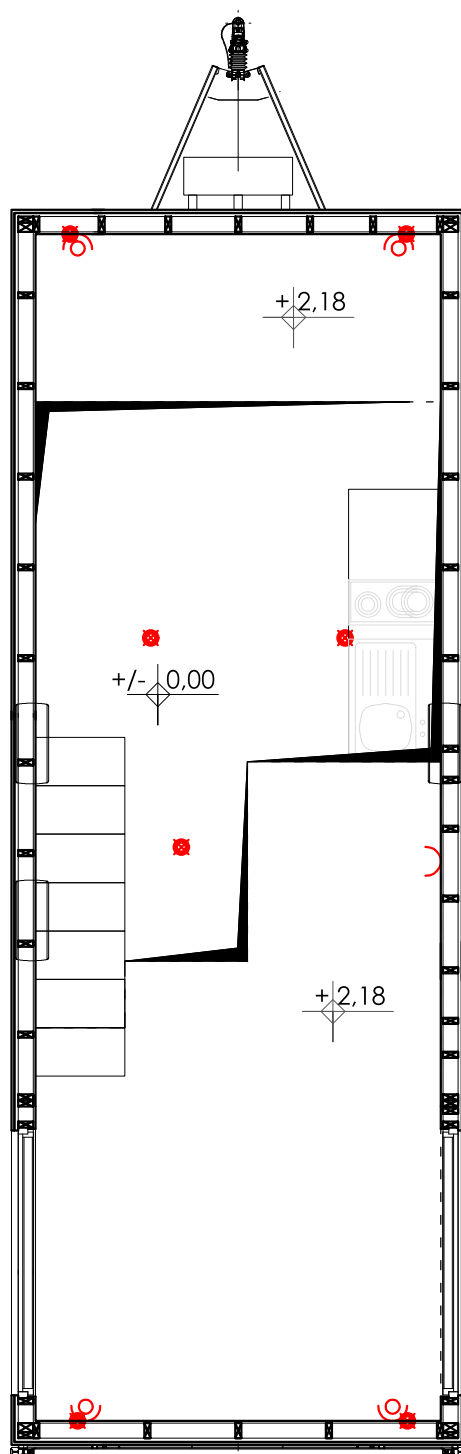
INSTALLATIONS

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POINT OF LIGHT
SWITCH
SOCKET

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INSTALLATIONS

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The entire frame is made in timber frame technology with finishing layers.

Structural layout:

The house was made in frame technology:

- Wooden posts and beams
- Timber roof
- Boards and paneling as finishing materials

Structure calculations:

TRUSS:

Geometry of the system:

Roof slope angle $\alpha = 3.0^\circ$

Truss span $l = 3.00$ m

Truss spacing $a = 0.65$ m

Lateral stiffeners of the rafters - along the entire length of the element

Material data:

- rafter 4/10 cm (notches: wall plate - 3 cm) made of C24 wood
- wall plate 8/10 cm made of C24 wood

Loads (characteristic values):

- roof covering: $g_k = 0.20$ kN/m²
- the self-weight of the truss is taken into account
- snow load (according to PN-80/B-02010/Az1/Z1-1: more loaded slope, zone 5, $A = 800$ m a.s.l., slope 3.0 degrees, object lower than the surrounding area or surrounded by tall trees or higher objects):
- snow load is treated as a medium-term load
- wind load (according to PN-B-02011:1977/Az1:2009/Z1-3: zone III, area B, building height from ≈ 3.5 m):
- insulation load along the entire length of the rafters $g_{kk} = 0.55$ kN/m²

Wall plate 8/10 cm

The part of the wall plate lying on the wall

Extreme compute workloads

$q_{z,max} = 7.74$ kN/m, $q_{y,max} = -5.43$ kN/m

$q_{z,min} = -0.09 \text{ kN/m}$ (tear-off)

Maximum Forces and Stresses

the combination decides: **K4** constant-max+snow+0.90·wind from the left-variant II

$M_z = 0.21 \text{ kNm}$

$f_{m,z,d} = 14.77 \text{ MPa}$

$\sigma_{m,z,d} = 1.961 \text{ MPa}$

$\sigma_{m,z,d}/f_{m,z,d} = 0.133 < 1$

The cantilevered part of the wall plate

Extreme compute workloads

$q_{z,max} = 6.77 \text{ kN/m}$, $q_{y,max} = -4.68 \text{ kN/m}$

Maximum Forces and Stresses

the combination decides: **K4** constant-max+snow+0.90·wind from the left-variant II

$M_y = 0.03 \text{ kNm}$, $M_z = 0.02 \text{ kNm}$

$f_{m,y,d} = 14.77 \text{ MPa}$, $f_{m,z,d} = 14.77 \text{ MPa}$

$\sigma_{m,y,d} = 0.25 \text{ MPa}$, $\sigma_{m,z,d} = 0.22 \text{ MPa}$

$k_m = 0.7$

$\sigma_{m,y,d}/f_{m,y,d} + k_m \cdot \sigma_{m,z,d}/f_{m,z,d} = 0.028 < 1$

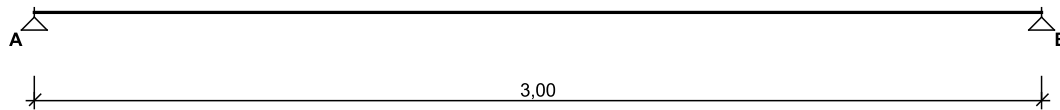
$k_m \cdot \sigma_{m,y,d}/f_{m,y,d} + \sigma_{m,z,d}/f_{m,z,d} = 0.027 < 1$

Maximum Deflection:

the combination decides: **K2** fixed-max+snow

$U_{fin} = 0.00 \text{ mm}$ $< U_{net,fin} = 2 \cdot l / 200 = 2 \cdot 100 / 200 = 1.00 \text{ mm}$ (0.1%)

BEAM DIAGRAM

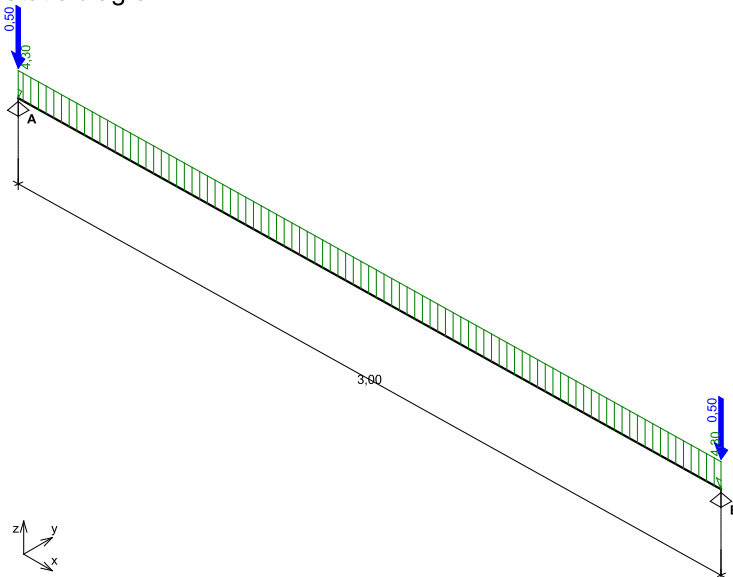


Beam parameters:

CHARACTERISTIC LOADS OF THE BEAM

Case **P1: Case 1** ($\gamma_f = 1.15$, duration class - constant)

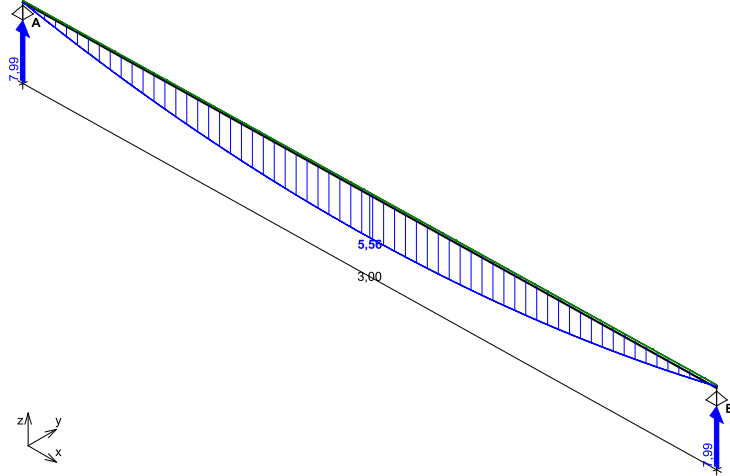
Static diagram:



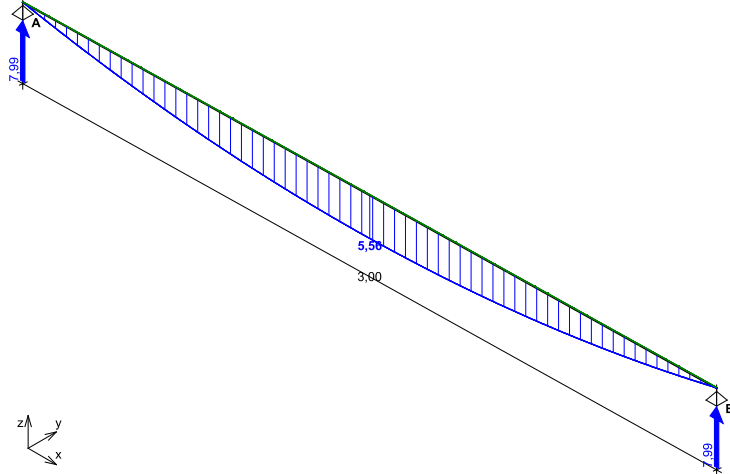
INTERNAL FORCE DIAGRAMS

Case P1: Case 1

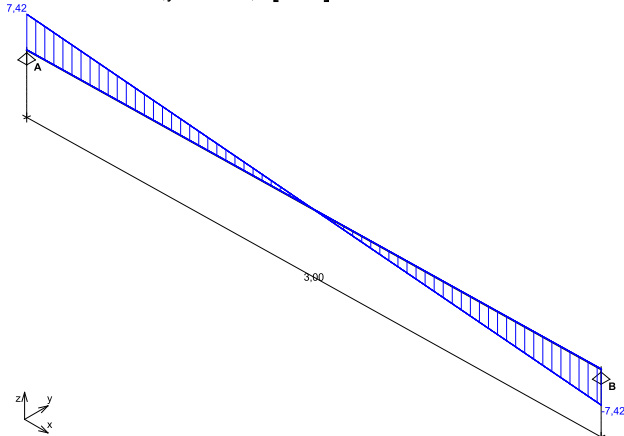
Bending moments M_x and M_y [kNm]:



Transverse forces V_y and V_x [kN]:



Deflections $f_{k,y}$ and $f_{k,x}$ [mm]:



CALCULATION ASSUMPTIONS FOR DIMENSIONING

Construction use class - 1

Bidirectional bending beam

Lateral-torsional buckling analysis parameters:

- Beam protected against torsional buckling

Beam in an old, renovated building

Limit deflection of span $u_{net,fin} = l_o / 250$

RESULTS OF STRENGTH CALCULATIONS

Rectangular cross-section

8 / 15 cm

$W_y = 600 \text{ cm}^3$, $W_z = 160 \text{ cm}^3$, $J_y = 4500 \text{ cm}^4$, $J_z = 640 \text{ cm}^4$, $m = 8.40 \text{ kg/m}$

solid coniferous wood according to PN-EN 338:2004, strength class **C24**

→ $f_{m,k} = 24 \text{ MPa}$, $f_{t,0,k} = 14 \text{ MPa}$, $f_{c,0,k} = 21 \text{ MPa}$, $f_{v,k} = 2.5 \text{ MPa}$, $E_{0,mean} = 11 \text{ GPa}$, $\rho_k = 350 \text{ kg/m}^3$

Bending

Section $x = 1.50 \text{ m}$

Maximum torques $M_{y,max} = 5.56 \text{ kNm}$, $M_{z,max} = 0.00 \text{ kNm}$

$\sigma_{m,y,d} = 9.27 \text{ MPa}$, $\sigma_{m,z,d} = 0.00 \text{ MPa}$

$f_{m,y,d} = 11.08 \text{ MPa}$, $f_{m,z,d} = 12.56 \text{ MPa}$

$k_m = 0.7$

$\sigma_{m,y,d}/f_{m,y,d} + k_m \cdot \sigma_{m,z,d}/f_{m,z,d} = 0.84 + 0.00 = 0.84 < 1$

$k_m \cdot \sigma_{m,y,d}/f_{m,y,d} + \sigma_{m,z,d}/f_{m,z,d} = 0.59 + 0.00 = 0.59 < 1$

Stability condition:

Section $x = 1.50 \text{ m}$

$M_y = 5.56 \text{ kNm}$, $\sigma_{m,y,d} = 9.27 \text{ MPa}$, $f_{m,y,d} = 11.08 \text{ MPa}$

$k_{crit,y} = 1,000$

$\sigma_{m,y,d} = 9.27 \text{ MPa} < k_{crit,y} \cdot f_{m,y,d} = 11.08 \text{ MPa} (83.7\%)$

Section $x = 0.00 \text{ m}$

$M_z = 0.00 \text{ kNm}$, $\sigma_{m,z,d} = 0.00 \text{ MPa}$, $f_{m,z,d} = 12.56 \text{ MPa}$

$k_{crit,z} = 1,000$

$\sigma_{m,z,d} = 0.00 \text{ MPa} < k_{crit,z} \cdot f_{m,z,d} = 12.56 \text{ MPa} (0.0\%)$

Shear

Section $x = 0.00 \text{ m}$

Maximum transverse force $V_{z,max} = 7.42 \text{ kN}$

$\tau_{d,z} = 0.46 \text{ MPa} < f_{v,d} = 1.15 \text{ MPa} (40.2\%)$

Maximum transverse force $V_{y,max} = 0.00 \text{ kN}$

$\tau_{d,y} = 0.00 \text{ MPa} < f_{v,d} = 1.15 \text{ MPa} (0.0\%)$

Clamp on support

Support reaction $R_{A,z} = 7.99 \text{ kN}$

$a_p = 8.0 \text{ cm}$, $k_{c,90} = 1.00$

$\sigma_{c,90,z,d} = 0.62 \text{ MPa} < k_{c,90} \cdot f_{c,90,d} = 1.15 \text{ MPa} (54.1\%)$

Serviceability limit state

Section $x = 1.50 \text{ m}$

Component deflections $u_{fin,z} = 14.66 \text{ mm}$, $u_{fin,y} = 0.00 \text{ mm}$

Maximum deflection $u_{fin} = (u_{fin,z}^2 + u_{fin,y}^2)^{0.5} = 14.66 \text{ mm}$

Limit deflection $u_{net,fin} = 1.5 \cdot l_o / 250 = 1.5 \cdot 3000 / 250 = 18.00 \text{ mm}$

$u_{fin} = 14.66 \text{ mm} < u_{net,fin} = 18.00 \text{ mm} (81.4\%)$

END OF CALCULATIONS

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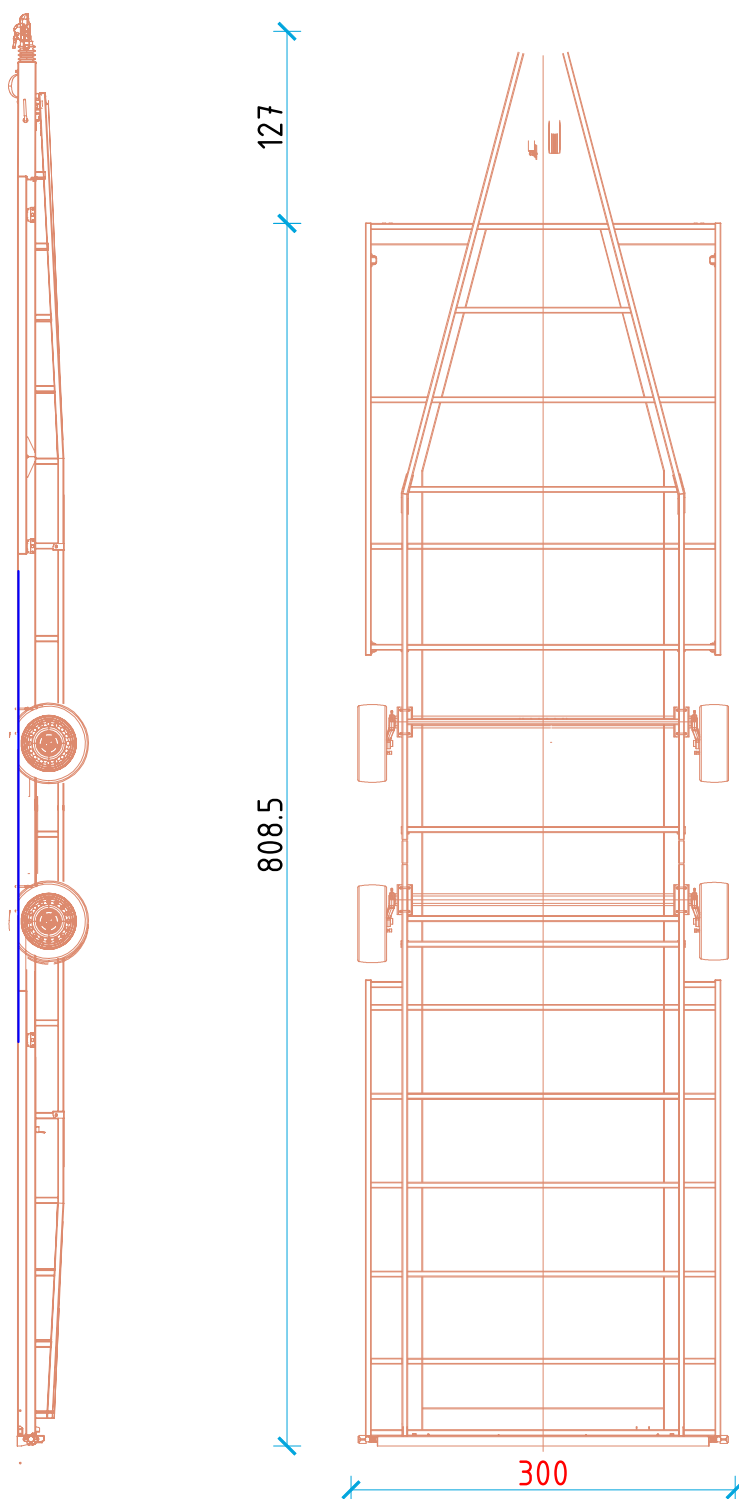
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DMC: 3500KG
Axle: 3xVGB13
Chassis: GALVANIZED



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**FRAME THROW
CONSTRUCTION**

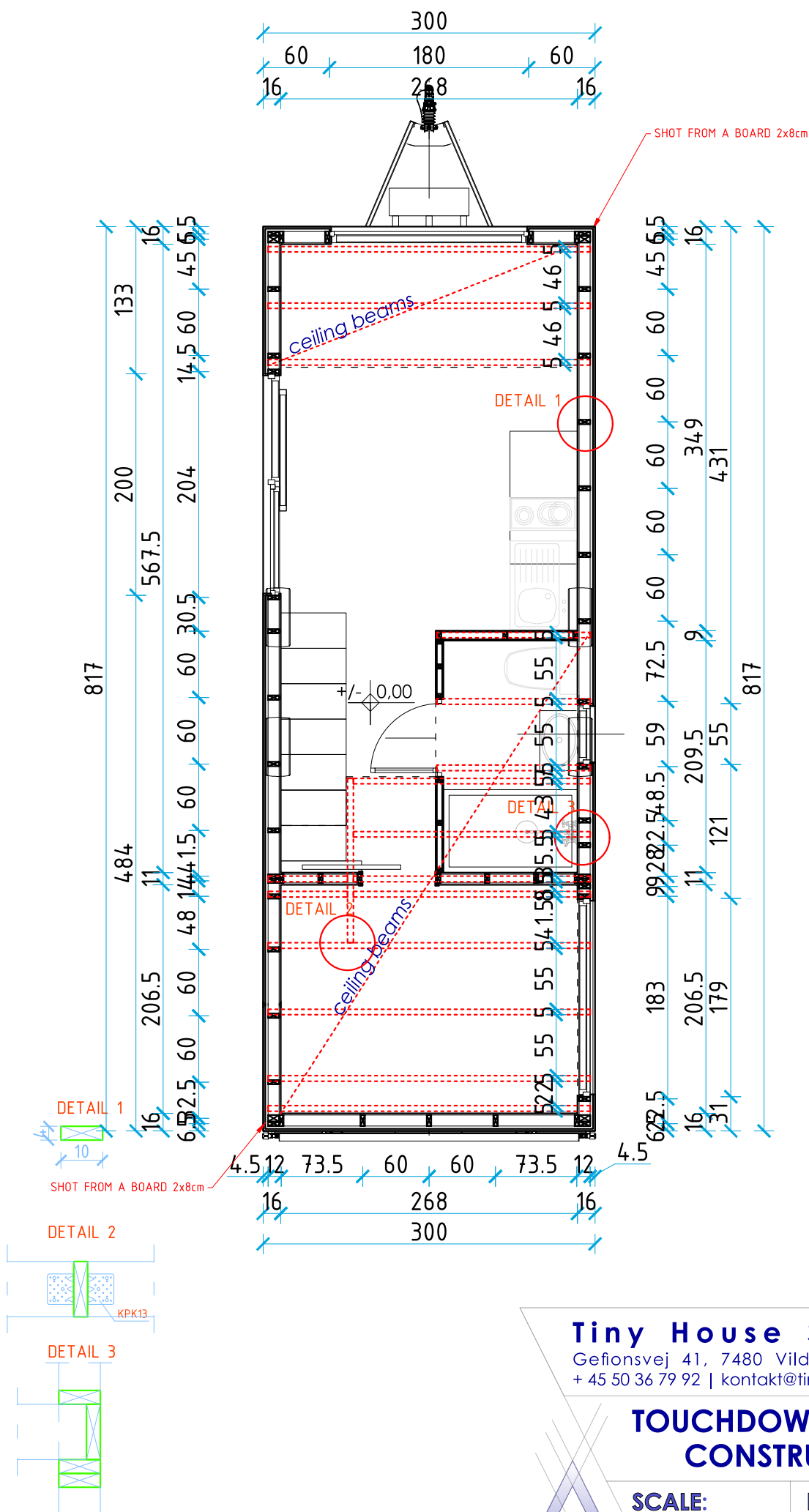
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**TOUCHDOWN THROW
CONSTRUCTION**

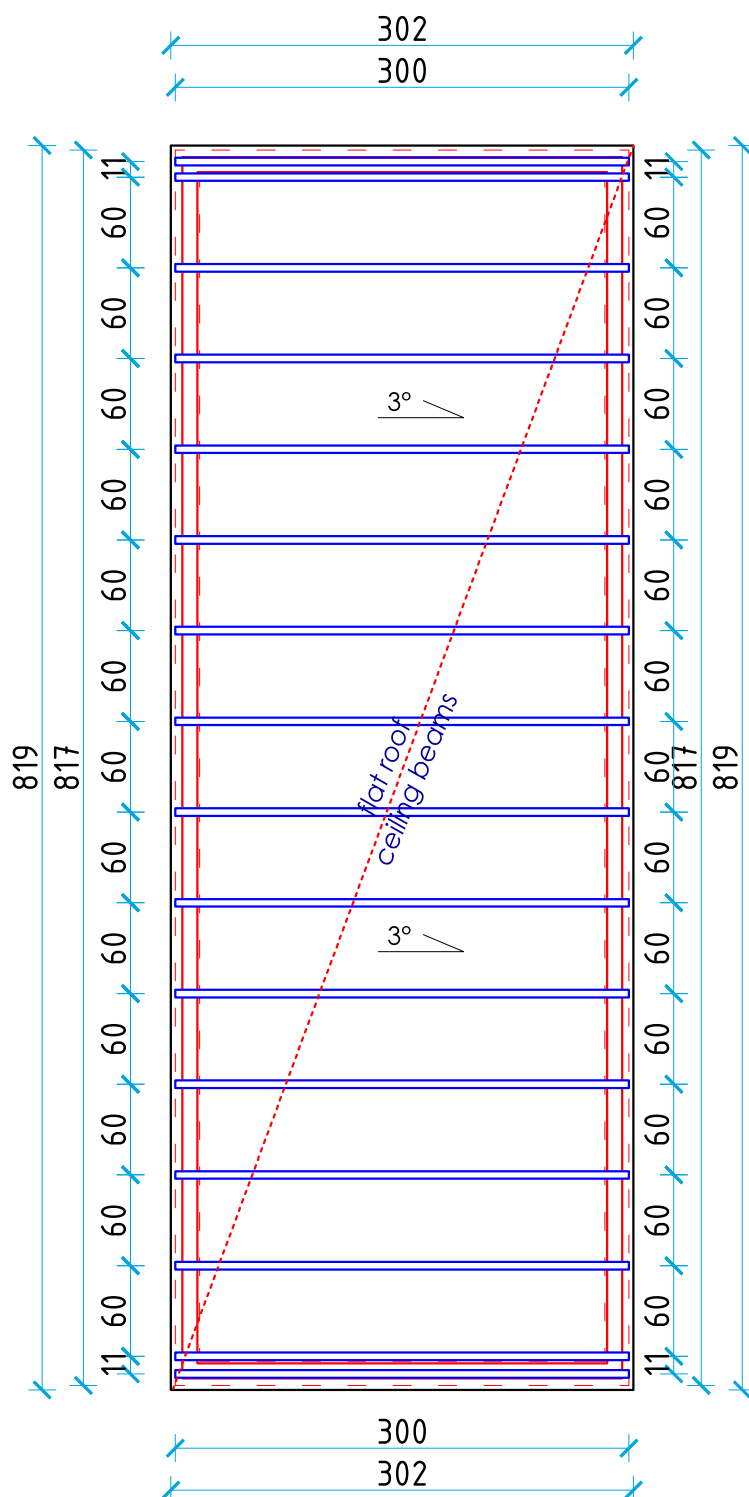
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MEZZANINE CONSTRUCTION

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