the cul-de-sac house

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research on the cul-de-sac

- as an urban event
- as an event in Almaty

the process of designing a cul-de-sac house

- a translation from an urban to an architectural concept
- RULE 0: form
- RULE 1: relation
- RULE 2: element
- RULE 3: context
- reflection
cul-de-sac
{functional definition}
an interrupted street, where the only way out, is the way back
“The functional definition of the cul-de-sac refers to a static state...The cul-de-sac, an interruption of a street, is a condition, whose emergence speaks inherently of change.”

constant >> change

“provide an alternative understanding of the cul-de-sacs, by approaching them as a change in event. To do so, there is a need to acknowledge the interruption as an event.

function: >> event

the reason
the consequences
the manifestation
moment the ending becomes visible
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moment the ending becomes visible

urban cul-de-sac

threshold

cul-de-sac house

house

a house as an inbetween

loop
form 0. the ground rule states the use of a base unit as a formal shape derived from the notion of cul-de-sac;

relation 1. the first rule defines the relation (arrangement) between the entangling units, and for each house it correlates with one of the terms derived from the case studies;

element 2. the second rule takes an element of a house, and transforms its presence as means of reinforcing the effect of the term from the 1st rule;

context 3. the situating of the design in the cul-de-sac in Almaty, and extracting a rule from the term associated with that context.
form

the ground rule states the use of a base unit as a formal shape derived from the notion of cul-de-sac
base unit - a shape representing the closure of a cul-de-sac
the cul-de-sac house arises with the threshold between the units
multiplication of the base unit
the first rule defines the relation (arrangement) between the entangling units, and for each house its parameters correlate with one of the case studies
canyon

plateau — housing
experience

the presence of two conditions, the cliffs as the large space, and the small individual space of a person in the canyon

relation

1. scale (big to small)
2. WW to 1 surface (dependence, lacking)
formal experimentation of relations

experiment 2

a compact arrangement around the wall
section

relation of small unit to the attached slab
relation of small unit to the attached slab
formal experimentation of relations

experiment 2

a base unit modified from preceding experiment

relation of small unit to the attached slab
formal outcome based on the relation between units with different scales of space and mass
formal outcome based on the relation between units with different scales of space and mass
verge

river valley --- housing
verge

river valley ─ housing

condition 1

condition 2
focus on the distance

split focus: additional concentration on the near surrounding
experience
an intense presence of both conditions
- uncertainty in the continuation of space

relation
1. interlocking
2. direction (opposite)
formal experimentation of relations
formal experimentation of relations

spatial translations
formation
element

due to the second rule takes an element of a house, and transforms its presence as means of reinforcing the effect of the term from the 1st rule.
what makes a door:

- **change of space**: penetration to another space
- **accessibility**: the opening touches a horizontal surface (otherwise: window)

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**transformation**

**interventions**

1. all openings (except the main ones of the units), are treated as doors and so continue the space by an added unit

2. openings are added through the rotation of existing ones, to enhance the relation between the units, and create instances of a double presence

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*instinctive openings for connecting the units*
context

the situating of the design in the cul-de-sac in Almaty, and extracting a rule from the term associated with that context.
contextual conditions

- slopes with steepness of more than 15%, landslides, clay kare, flooding
- clay soils sometimes with layers of sand (ground water under > 3 m)
- ground water
- bedrock

seismically unfavourable zone (possible magnitude -10)
slopes with steepness of more than 15%, landslides, clay karst, flooding
clay soils sometimes with layers of sand (ground water under ≥ 3 m)
ground water
bedrock

chosen materials
- CLT
- concrete

seismically unfavourable zone (possible magnitude -10)
rainwater routing

volumetric appearance of the exterior roofs

solution for small roof surfaces

drainage direction

solution for the central roof
thermal layering

allowed thermal conductivity values

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<tr>
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<th>max. U-values</th>
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<td>walls</td>
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<td>floors</td>
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<td>fenestration</td>
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<table>
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<tr>
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<th>( \lambda ) (W/mK)</th>
<th>thickness (m)</th>
<th>( R ) (m²K/W)</th>
<th>U-value (W/m²K)</th>
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<tbody>
<tr>
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<td>0.34</td>
<td>2.83</td>
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<td>0.2</td>
<td>1.67</td>
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wall layers

* unheated space to open air
* heated to unheated space
* heated space to open air
spatial implications of mass timber construction

a thickened doorstep
spatial implications of mass timber construction

joint solutions

A. freestanding wall
1. indented wall
   20 cm / 12 cm CLT slab
2. connection wall to floor
   straight screw

B. freestanding floor / ceiling
1. floor to wall spacing
   L-shaped metal sheet
2. embedded wall
   dark retaining metal sheet
3. drain
   black aluminium drain

C. formal freedom
1. meandering element
   copper gutter
2. water channel
   concrete base with metal side
3. CLT - accoya pine

D. continuous surface
1. twisted slab
   CLT - accoya pine
spatial implications of mass timber construction

joint solutions

A. invisible joint

1. roof cover
   2 cm acoya pine boarding
   6 cm battens
   liquid waterproofing
   15 cm insulation - fibre board
   20 cm GLT

2. glazing
   2.4 cm triple transparent polycarbonate sheet

3. hybrid CLT wall
   12 cm pine wood
   8 cm acoya pine wood

B. highlighted joint

1. horizontal glazing
   laminated safety glass

2. joint higher
   metal panel (ex glass frame)

3. freestanding floor
   20 cm CLT panel
   3 cm sound/impact insulation
   7 cm screed

C. ambiguous joint

1. hybrid CLT wall
   12 cm pine wood
   8 cm acoya pine wood

2. invisible fixing
   mechanical inclusion in CLT for glazing

3. window sill
   2.5 mm copper sheet

a thickened doorstep
a thickened threshold
continuous ambiguities
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