A community center in a Kop-hals-romp Boerderij

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Design Tutor: Job Schroen
Building Technology Tutor: Maarten Meijs
Research Tutor: Frank Koopman
Overview
Context
Landscape Design
Architecture Design
Structure Design
Joints Design
Materialization
Climate Design
Gas & Earthquake

Technical: Cracking Houses
Social: Losing Confidence

http://www.nrcreader.nl/artikel/6724/gaswinning-dan-krijg-je-dt
Challenges

Earthquake Damage
Heritage Value
Function Change
Technical Fascination

Anti-Seismic Structural Improvement for Heritage Building
Kop-hals-romp Boerderij

1 KOP
The head, residential 4.5 - 6m span

2 Hals
The neck, residential or for milk work

3 Romp
The barn, livestocks and harvest

Overview

Architecture Fascination

http://graafwerk1.rssing.com/chan-15978872/all-p2.html
Context
Landscape
Orientation
Orientation
Kop-hals-romp Boerderij I Horizontal Spreading
Kop-hals-romp Boerderij I Vertical Anchoring
House Typology | Triangular Shape
Two Scales
Two Scales
“Visualization, complementation and symbolization are aspects of the general process of settling; and dwelling, in the existential sense of the word, depends on these functions.”

“The two psychological functions involved, may be called ‘orientation’ and ‘identification’. To gain an existential foothold man has to be able to orientate himself; he has to know where he is. But he also has to identify himself with the environment, that is, he has to know how he is a certain place.”

Christian Norberg-Schulz

Genius Loci: Towards a Phenomenology of Architecture
The character of the landscape in the rural area of Groningen is a combination of distance and intimacy, lost and orientation, wandering and settling.
Onderdendamsterweg 8

Build in 1900

Expansion in 1950
Heritage Value
Heritage Value
Heritage Value
Heritage Value
Heritage Value
A transformation with respect to the value of the old building, and respond to the strong character of the local landscape.
Landscape Design
Architecture Design
External roof:
- Metal sheet 3mm
- Waterproof layer
- Timberboard 24mm
- Batten, diameter 100mm
- Ceramic expansion cavity 120mm
- Waterproof layer
- Insulation 60mm2
- Counter battens 100x60mm
- Timberboard 24mm
- Beam, sandwich, 60x130mm, 80 cavity

Internal roof:
- Metal sheet 3mm
- Waterproof layer
- Timberboard 24mm
- Ventilation cavity 100mm
- Counter battens 50x100mm
- Insulation 60mm2
- Counter battens 100x60mm
- Steambreather layer
- Timberboard 24mm
- Beam, sandwich, 60x130mm, 80 cavity

External Wall:
- Old masonry wall 210mm
- CFRP
- Ventilation cavity 40mm
- Waterproof layer
- Insulation 60mm2
- Steamproof layer
- CLT wall panel: 3 layers 130mm
- Insulation layer 50mm
- Counter battens 100x60mm
- Interior finishing, timberboard 18mm

Interior Wall:
- Timberstrip, 50x60mm, overlap 10mm
- Ventilation cavity 60mm
- Counter battens 90x60mm
- Waterproof layer
- Insulation 60mm2
- Steamproof layer
- CLT wall panel: 3 layers 130mm
- Insulation layer 50mm
- Counter battens 100x60mm
- Interior finishing, timberboard 18mm

Floor:
- Timber floor board, 30mm
- Sand layer: 50mm
- Counter battens 100x60mm
- Concrete foundation, 300mm
- Steamproof layer
- Insulation 130mm
- Waterproof layer
Enfilade
1. Market Hall/drop market /local craft
2. Informal Performance Area
3. Craft Workshop
4. Foyer to the Activity Rooms
5. Chess Room
6. Chatting Room
7. Casual Area
8. Office
9. Painting Room
10. Foyer to the Gardens
11. Cafe
12. Foyer to the Library/Smack Room
13. Reading Area
14. Lockers
15. Reception
16. Library
17. Bar
18. Concert Hall
19. Stage
20. Artists’ Room
21. Backstage
22. Storage

- Activity Rooms
- Cafe
- Service
- Library
- Market Hall
- Concert Hall
Structure Design
Earthquake Damage I Kop & Hals
3 Scales

1. Architecture Composition: Geometry

2. Structure: Material change in load bearing structure: Masonry - Kop & Hals Timber - Romp

3. Connections: Timber roof Timber floor Masonry wall
Crack Formation

- Restrains of the floor slab
- Movement of external wall
- Tension

- Movement of the internal wall
- Tension
- Movement of the external wall

- Tension
- Movement of the external wall
- Compression

- Movement of the floor slab
- Tension
Principles

- Reinforcement of single components
- Reduce deformation restraints at connections
- Adjust the stiffness differences
- Adjust load paths and load distribution
Transformation Scheme
Material
Loadbearing Structure
Roof
Ductility
Unit
New & Old
Joints Design
Joints Design

Wall-Foundation Connection
1. Connection joint wall end
2. Screw
3. Steel cable, replaceable
4. Steel rubber mat
5. Connection joint:
tension cable
6. Connection Joint:
foundation end
precast in concrete
7. CFRP
8. L-shape steel plate
9. Timber box, for joint
maintenance
10. Opening board
11. Rubber mat
12. Steel anchor precasted
in concrete

Wall-Foundation Connection
1:5
70
Seismic Reaction
Maintenance
Construction
1. Connection joint, wall end
2. Screw
3. Rubber mat
4. C-shape steel plate, expansion joint
5. CFRP
6. Wall anchor

Wall-Wall
1:5
Seismic Reaction
Maintenance & Construction
Materialization
Climate Design
Climate Design

Winter
Mechanical Inlet
Mechanical Outlet

GHP
EXTRACTING INTERIOR HEAT

HR
HEATING THE FLOOR
PREHEATING FRESH AIR
THANK YOU

Student: Xinming Li
Design Tutor: Job Schroen
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Others
Construction Features I Kop
Construction Features | Hals
Construction Features | Romp
## Evaluation of Onderdendamsterweg 8

<table>
<thead>
<tr>
<th></th>
<th>Artistic</th>
<th>Historic</th>
<th>Social</th>
<th>Scientific</th>
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<tbody>
<tr>
<td><strong>Form &amp; Design</strong></td>
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<td><strong>Material &amp; Substance</strong></td>
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<tr>
<td><strong>Use &amp; Function</strong></td>
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<tr>
<td><strong>Traditions, Technique &amp; Workmanship</strong></td>
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<tr>
<td><strong>Location &amp; Setting</strong></td>
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<tr>
<td><strong>Spirit &amp; Feeling</strong></td>
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Intervention I
Intervention I
Intervention I
Intervention I
Assessment

Categorization: Architectural composition

Methods: Reduce deformation restraints at connections

Purpose: Prevent the influence of different volumes on each other

Heritage: Keep the composition; Compatibility; Retreatability
Intervention II
Intervention II
Intervention II
Intervention II
### Assessment

<table>
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<tr>
<th>Categorization:</th>
<th>Methods:</th>
<th>Purpose:</th>
<th>Heritage:</th>
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<tbody>
<tr>
<td>Structural scheme</td>
<td>Adjust load paths and distribution; Adjust stiffness difference; Bracing single components</td>
<td>Prevent floor deformation; Act as a diaphragm to help resist horizontal movement deformation of the structure</td>
<td>Timber material; Traditional pattern</td>
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Intervention III
Intervention III
Intervention III
Intervention III
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<th>Categorization:</th>
<th>Methods:</th>
<th>Purpose:</th>
<th>Heritage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection restraints</td>
<td>Adjust load paths and distribution</td>
<td>Prevent the detachment of the outer leaf; Effectively distribute the horizontal load to the load bearing walls</td>
<td>Little damage to the facade; Hidden details</td>
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</tbody>
</table>
Intervention IV

Window
Insulation
Concrete Wall
CFRP
Original Masonry Wall
Layering

Carlo Scarpa
Castelvecchio

Intervention IV
Intervention V
Intervention V.1
Intervention V.II
Intervention V.III

Seismic Colorseal
Emseal

http://www.emseal.com/Products/Architectural/Colorseal_SeismicColorseal/
Intervention V.III

University of Pennsylvania Hospital

http://www.emseal.com/Projects/COLORSEAL_PROJECTS/UPennHospCOLORSEAL600.jpg