

Lecture at the technical seminar „**Green Facades**“

Václavské náměstí, Prague, October 6, 2011

Construction CABLETECH® - optimization of the Wire Structure for Green (WSG)

Introduction:

The topic of the talk is the rule of correct application of the WSG in architecture with special emphasis on area-wide greening of facades.

Our company, Cabletech LTD, has been developing and constructing WSG for more than 7 years. I'd like to share with you the results of our experience in cost optimization in particular.

Now, let's agree on used terminology:

1) Wire structure: a collection of wires used for organic fixation of plants

Structure wire: stainless wire Ø 2 -4 mm

Peripheral wire: stainless suspension wire Ø 4 - 8 mm

Coil wire: stainless wire Ø 1.5 - 4 mm to connect diagonal net with peripheral wire

Wire pole: pressed wire terminal with inner or outer thread

Wire set: the wire with terminals

Connector: connecting component between wire sets or between an anchor and a wire set

Compensator spring: a component inserted into wire structure to secure transfer of an unvarying force to supporting structure/anchors

Skid compensator: a component inserted into wire structure with maximum skid strength of the reserve wire pre-adjusted

Diagonal net Cabletech® WW: stainless wire net with stainless fixed connectors (nipples) made of wire Ø 1.5 - 4 mm. The size of the loop and the net is unlimited

Diagonal net Cabletech® WF: flexible stainless net specifically designed for WSG-2D Guaranteeing well-proportioned allocation of force into peripheral wire/anchors even in case of any deformation (shrinking) of wires inside the net

Knickers, loose nipples: peripheral trimming of diagonal net

Zeppelin: LSZ-3D mainly constant (circular) diameter

Twister: LSZ-3D mainly one directional, variable (revolving or non-revolving) diameter

2) Supporting structure: a set of supporting elements to secure transfer of force from wire structure to peripheral building shell

Corner/terminal anchor: asymmetrically loaded anchor for maximum load (mostly with reinforcing elements)

Peripheral anchor: asymmetrically loaded anchor for medium load (mostly with one reinforcing element)

Inner anchor: symmetrically (axially) loaded anchor

One-stepped anchor: Usually stainless steel for non-weatherized walls

Two-stepped anchor: unique Cabletech® KRD-3D product for weatherized facades with interrupted thermal bridge and 3D rectification

First step of the anchor: mostly steel zinc coated weld for inserting before façade weatherizing

Second step of the anchor: stainless steel component/console mounted for façade weatherizing

WSG Typology:

A) Categorization by location:

- A1) Buildings - exterior (attached to the main building)
- A2) Buildings - interior
- A3) **WSG** outdoors

B) Categorization by structure type:

- B1) LSZ-1D – linear structures
- B2) LSZ-2D – 2D structures
- B3) LSZ-3D – 3D structures

C) Categorization by technology:

C1) Wire structure:

- C1.1) GC – the system with parallel wires
- C1.2) GW – the system with diagonal net (application of diagonal nets Cabletech® WF or WW)

C2) Supporting structure (fixation of WSG):

- C2.1) anchoring of perimeter building shells (green facades)
- C2.2) other anchoring and a fixation systems

Analysis: the difficulties with WSG attached to the main building (GREEN FACADES)

- 1) **Lost battle**: there is no way to fight the plant – most species used for green facades are creepers, coiling woody plants being able to deform (shrink) the wire to lesser or greater extent. Subsequently (!!!), it generates significant forces that have to be captured in supporting structure anchors. It is happening during the lifetime of the building shell and we cannot assume regular maintenance of the green plants.

- 2) **Lost anchor:** WSG supporting structure anchor is, indeed, an invisible lost investment. An inappropriate concept of WSG could increase the cost of manufacturing and installing of anchors and reach up to 80% (!!!) of the overall cost.
- 3) **Lost time:** inappropriate selection of woody plants, skimping on seedling size and consequent maintenance, such circumstances can definitely discourage potential investors from including green facades in their projects.

Possible solutions (see attachments 1a, 1b):

- 1) **Wire structures GC - systems with parallel wires:** a wire (mostly Ø 4 mm) requires min. 2 terminal anchors, interjacent in case the wire length is more than 5 m. In general, these structures are always anchored regarding the height of individual floor level. Certain "optimization" can be attained by inserting vertical spreading elements (rods). Thus, one line of anchors can "control" 4 parallel wires i.e. a strip of green approximately 1 m wide. In the best case it is one anchor for approximately 3 m². Material usage of anchors and a necessity of compensators inserted into each wire and each structure anchoring is a big disadvantage of these structures.
- 2) **Wire structures GW - systems with diagonal nets:** diagonal nets Cabletech® WF-made of wire Ø 1.5 - 3 mm, recommended size of loops 150 x 150 -500 x 500, unlimited dimension of the net. Flexible stainless net specifically designed for LSZ-2D guarantees well-proportioned allocation of force into peripheral wire/anchors even in case of any deformation (shrinking) of wires inside the net. For a grid of anchors 6 x 6 m and area-wide net 12 m high, it is ideally 1 anchor for approximately 24 m² (!!!) of green facade as verified in our implementations. It is easily possible to create oval openings of random size (for example around the windows) and combine them at random. See attachment 2a – FEATURED PROJECTS: Skladová hala Hranipex, Komorovice!!!). This ideal model is necessary to modify, for example when the architect requires exact trimming of openings in the façade. The above mentioned ratio can be lowered as much as to 1 anchor for 4.5 m². Appropriately dimensioned compensatory elements (up to 25kN) are inserted into the system of peripheral wires the terminal anchors to safeguard against the damage or destruction of the WSG supporting system.

Conclusion:

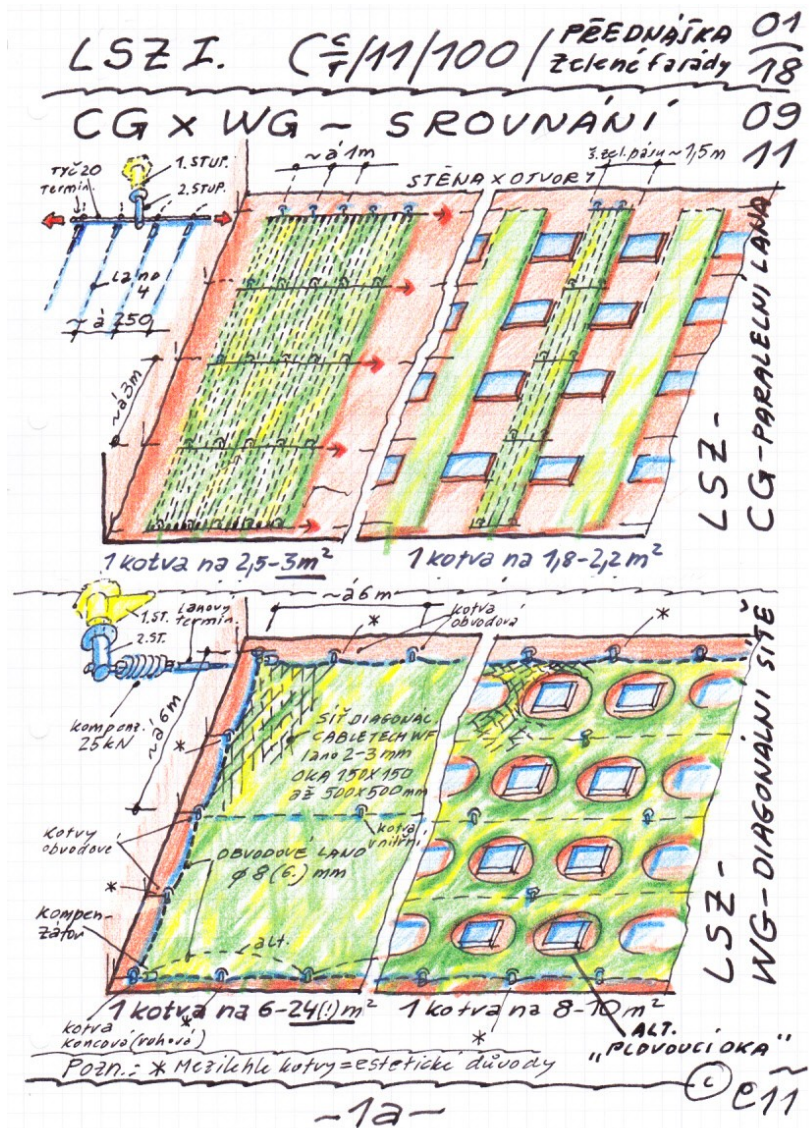
Comparing above mentioned solutions gives an evident response to the question of searching for optimal model of Wire Structure for Green Frontages.

Cabletech LTD is offering an individual solution "cut to order" for each project. Our goal is above all to minimize a number of supporting structures/anchors and consequently the economic and technical advantages. Our company dedicates 90% of time to the new concept development of anchoring systems. We are offering special one-stepped and two-stepped anchors with interrupted thermal bridge and without interrupted thermal bridge. It is implemented before weatherization or additionally after that. We are offering anchors for wood, concrete, gabions, bricks, **light-weight (concrete blocks, material)** and glass.

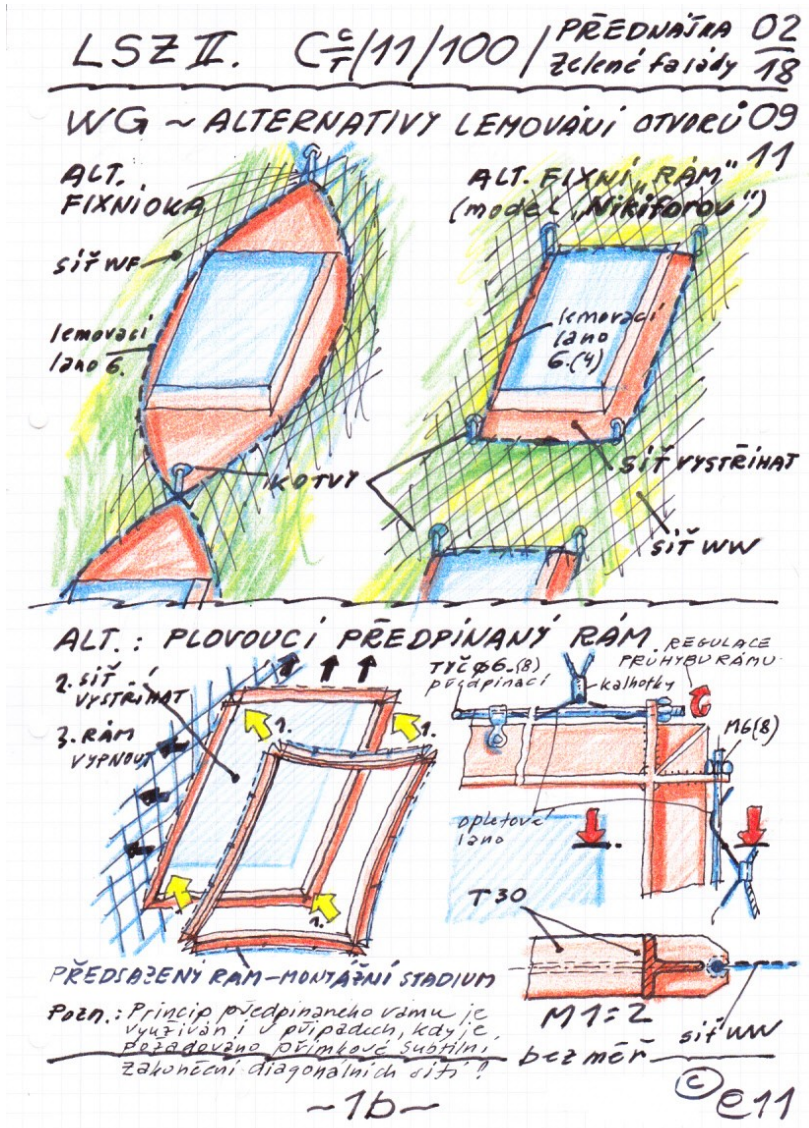
Those are the arguments why we are capable of saving the customer up to 50% of originally calculated expense!!!

Ing.arch. Jan Louda

Cabletech LTD.





1a- Srovnání LSZ-GC (systémy s paralelními lany) a LSZ-GW (systémy s diagonálními sítěmi)



1b- LSZ-GW - alternativy lemování otvorů, předpínaný rám plovoucí předpínaný

CABLETECH®
NEREZOVÉ LANKOVÉ SYSTÉMY


 Prostorové struktury **WW-TECH®**



Síťová treláž skladu
Humpolec - Komorovice

Projektant: OKplan s.r.o.
Ing. arch. Luděk Rýzner

Realizace: 10/2010





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2a- Realizace LSZ-GW - Skladová hala Hranipex, Komorovice

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 Ochranné sítě **WW-TECH®**

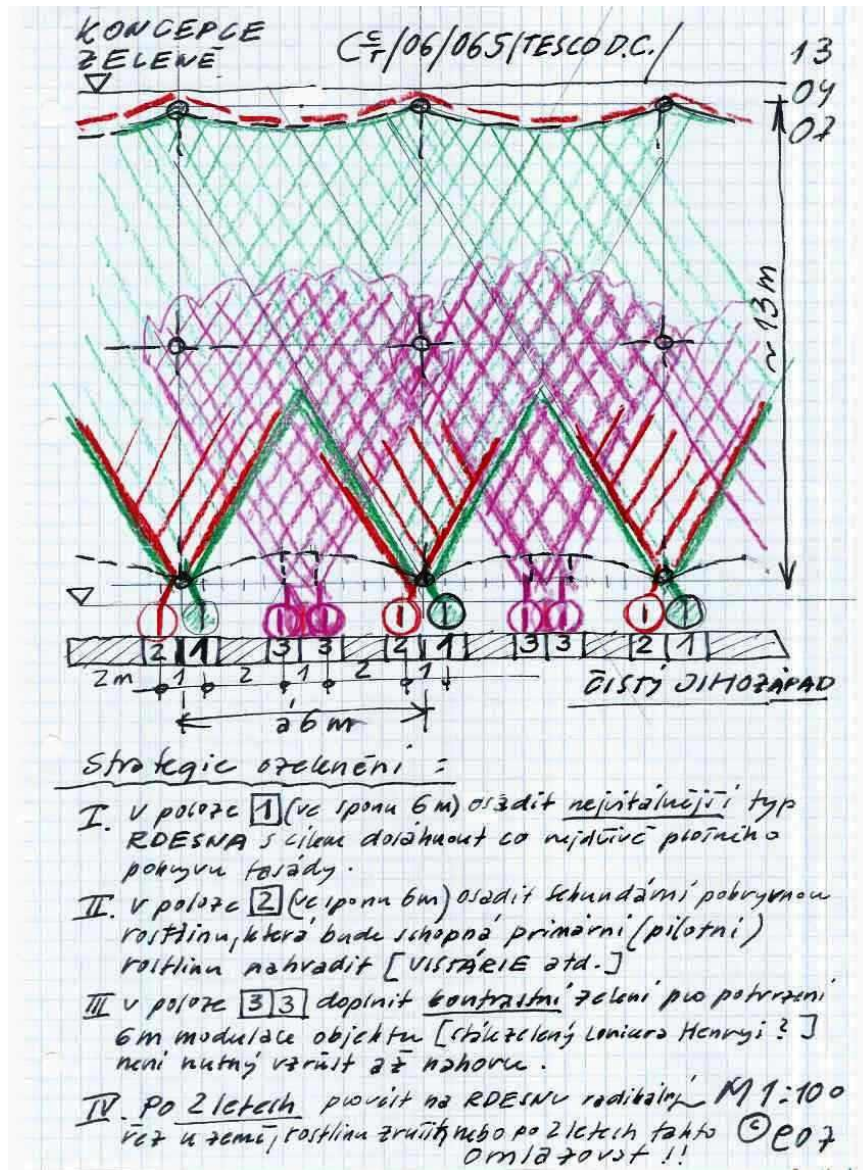


RD Popice
Vysočina

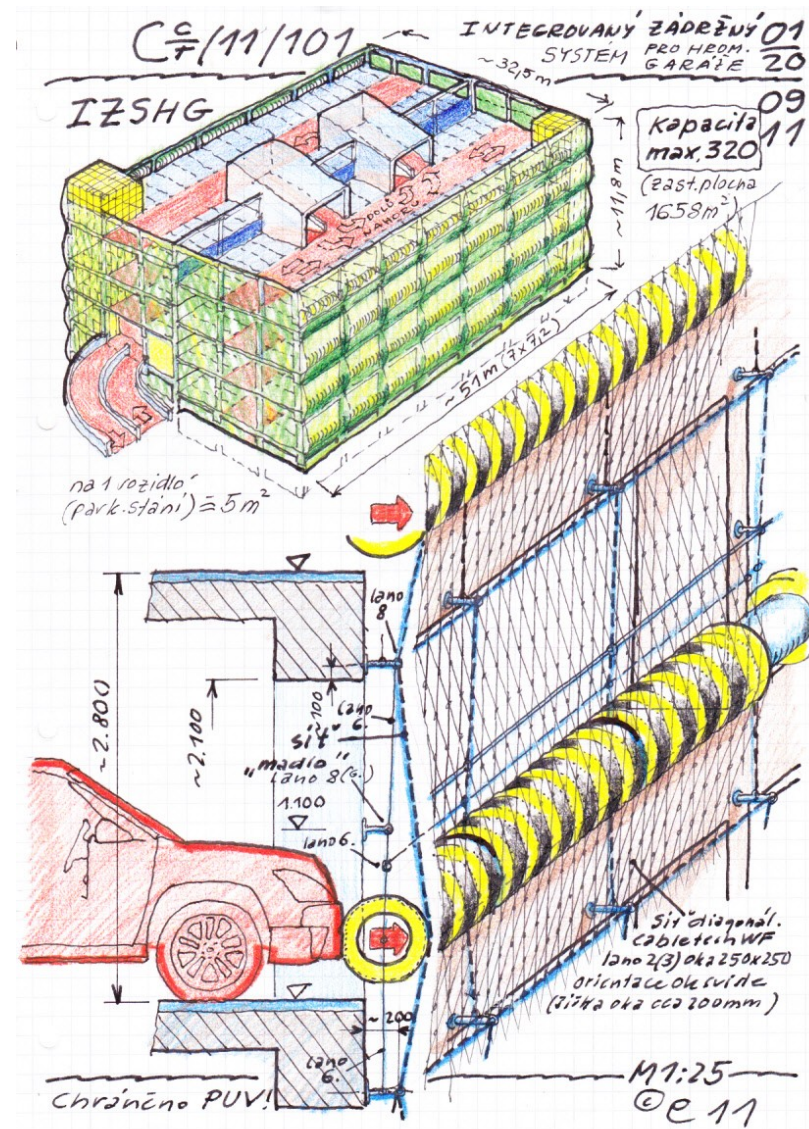
Projektant: Ing. arch. Vladimír Nikiforov
Realizace: 02/2010 ?

Ing. arch. Jan Louda, Videňská 405/1, 148 00 Praha 4, Tel: +420 602 220 068, info@cabletech.cz, www.cabletech.cz
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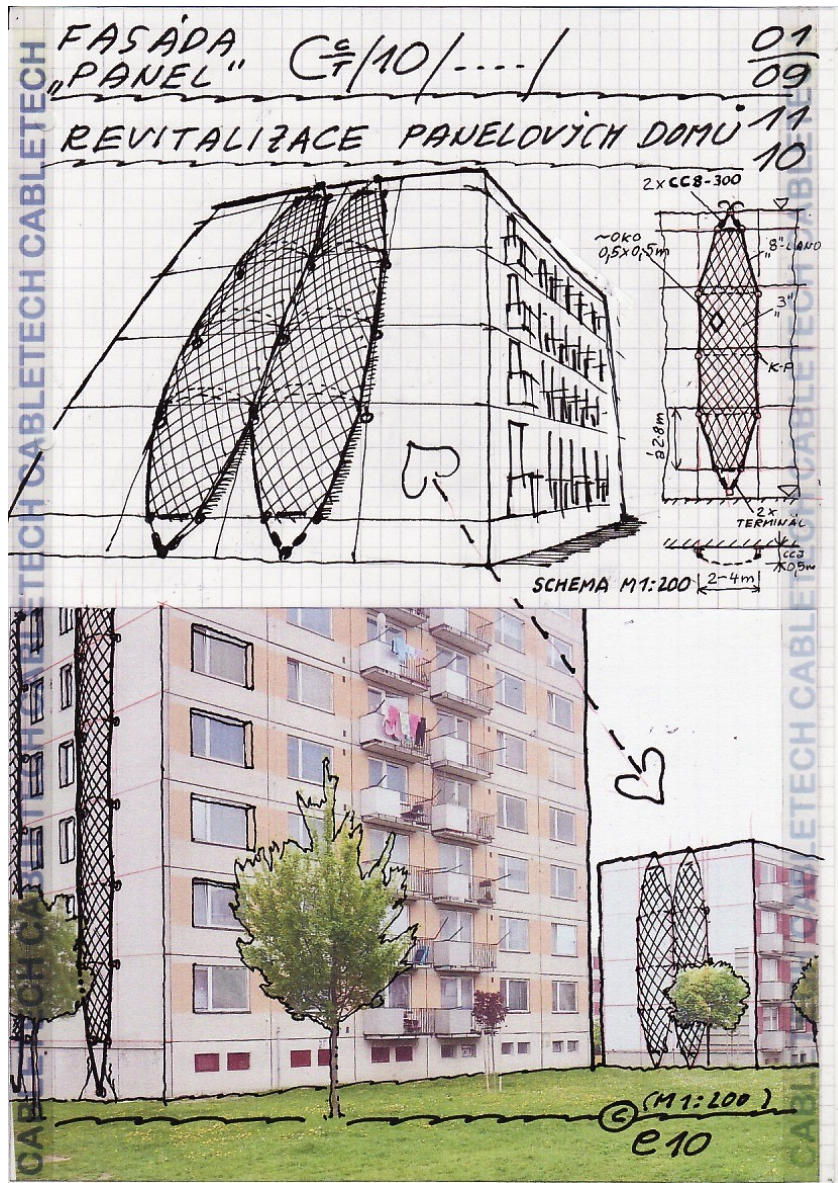
2b- Realizace LSZ-GW - RD Nikiforov, Kosov u Jihlavy



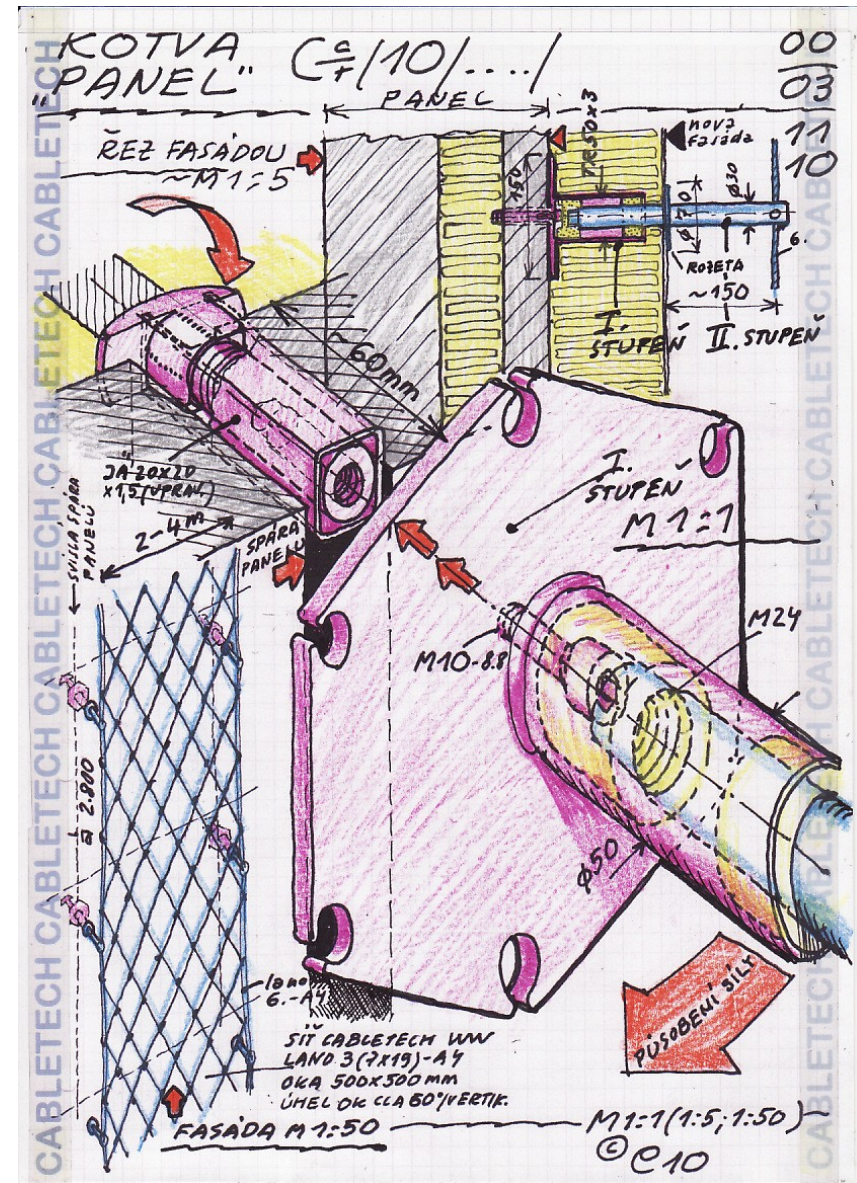
3a-Projekt LSZ-GW-koncepce výsadby dřevin



3b-Projekt LSZ-GW-Integrovaný zádržný systém



4a-Projekt LSZ-GW-Revitalizace panelových domů



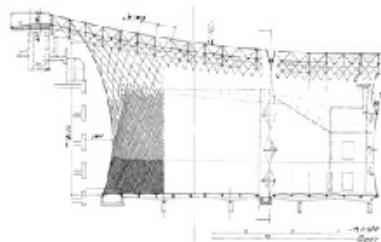
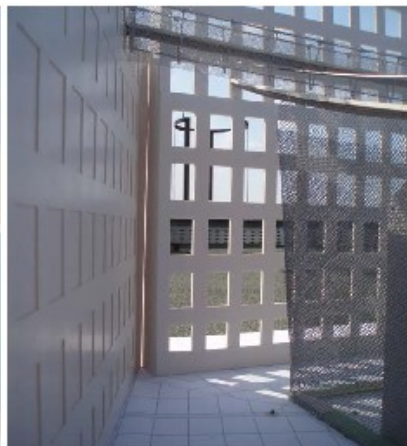
4b-Projekt LSZ-GW-Revit.panel.domů-kotvení do panelů

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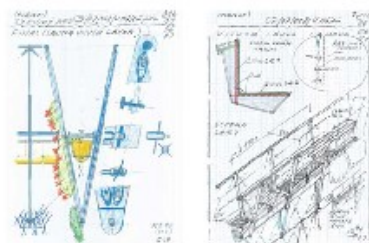


Prostorové struktury WW-TECH®



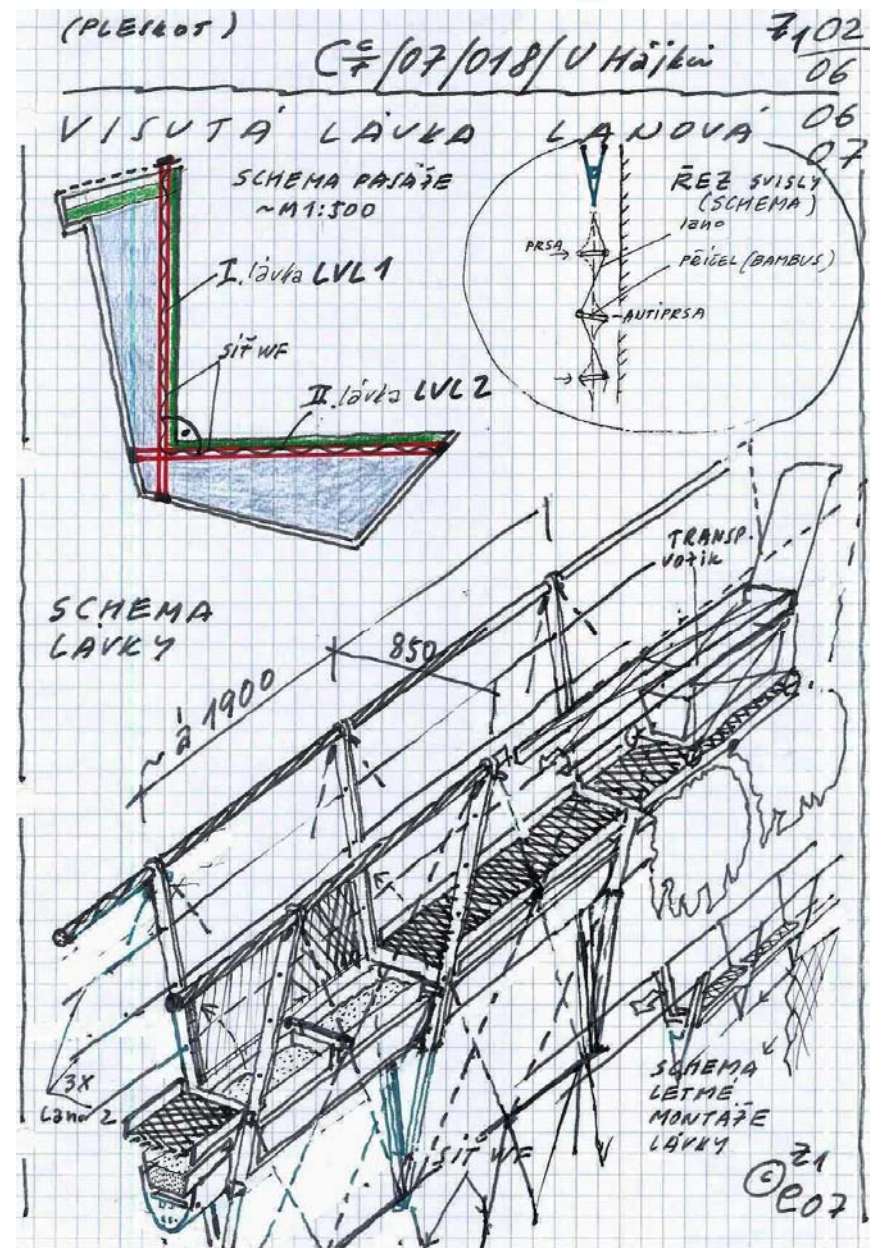
Zavěšená treláž v pasáži „U Hájků“
Praha 1 - Na Poříčí

Studie: AP Atelier
Ing. arch. Josef Pleskot



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5a-Projekt LSZ-GW-Pasáž U Hájků



5b-Projekt LSZ-GW-Pasáž U Hájků-schema visuté lávky