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POSSIBILITIES OF STRENGTHENING THE OLD LOAD-BEARING FLOOR STRUCTURES AT REVITALIZATION OF BUILDINGS ALONG WITH THE APPLICATION OF WELDED STEEL GIRDERS

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ABSTRACT
The work presented in this paper, concerning the revitalization of the building, is one of the solutions for the future prefabricated walls, partitions and gallery floors without any impact on the existing wooden floor construction. With this solution, existing wooden inter-floors structure strengthens and at the same time it does not receive any additional load. Any additional load from the gallery floor and prefabricated wall partitions is taken by the existing vertical bearing floor structure which is, by trimming its height due to building of floor gallery, considerably strengthened in terms of slimness. Bearing structure of the floors' galleries, strengthening of the existing wooden ceiling constructions and strengthening of masonry load-bearing vertical structures are made of rolled steel profiles and steel square boxes.
At inter-floors structure, steel girders should be mounted so that they do not interfere with paths of vertical installation. Around the existing load-bearing walls, steel carriers should be connected to each other in order to provide additional stiffness to an old building. All connections between steel sections are to be created by welding technology.
Keywords: Inter-floors construction;Vertical bearing masonry structure;Revitalization adaptation;Carriers; Steel beams ;Profile pillars; Welding

1. INTRODUCTION
This work represents one of the possibilities of partial reinforcement of an old wooden inter-floor and vertical masonry structures in the revitalization of the facility. A task would be to introduce constructional solution with steel carriers. The new solution is to set steel pillars that will get the role of carrier for floor galleries. Steel beams will be set so that they do not interfere with paths of existing installations, and they will also stiffen the old facility, which will get a new function.
This paper covered the problems of setting up new structures of steel sections in the old building for two reasons:

1. functional, which included specifics (gallery apartments)
2. strengthening of the existing wooden inter-floor structures
3. strengthening of the existing vertical load bearing masonry structures

2. LOCATION AND TYPE OF PROPERTY

To be considered a solution of this task, it is necessary to determine the type of object and its location, as well as reasons to access the revitalization.

This property is located in the center of Oslo. The facility is in pretty good shape, in the constructive sense of meaning. But, its further existence would require certain types of changes i.e. revitalization and strengthening of existing structures, which occurred when purpose of the object was changed. These two tasks are integrated through a solution for gallery apartments with steel profiles. Some of the walls have already been taken down during years when the facility was adapted for different purposes.

3. PROPOSAL FOR THE NEW SOLUTION

After getting an idea of the current state of construction of the building and new requirements that are conditional by the new purpose of the facility it was decided to do the following:

a.) Establish a new system of steel sections in order to strengthen the existing construction, which would allow obtaining gallery apartments with new floor and wall coverings of custom types regarding the object as a whole and each room separately.

b.) Preliminary need is to determine the type and size of the profile. Figure 1. shows the layout and dimensions of the profile that would be used .

By static calculations we set a size of the profiles, which would meet the requirements of capacity and safety.

Marking lines represent the main profiles 2U160 which are put at the height of existing inter-floor wooden structure, to strengthen the existing construction and they lean on the two main existing bearing walls.

These two profiles are set at the spacing of 200 mm and along the length they must be connected at every 2000 mm.

Across them a metal plate would be mounted on which the pillar with dimensions 80x80x3 is fixed. Metal plate is mounted by the welding technology to the U profile, which also additionaly stiffenes it. A pillar that is placed on a metal plate is box profile mounted again by the welding technology.

Typical construction details and pictures are shown on the figure 2. A suitable place is used for staircase which are also strengthened by steel profiles. As edge profiles, depending on the range were used U80 to U120 for maximum range. Perpendicular to the edge girder are profiles U80, with spacing 70 to 80 cm.

The existing walls are covered by a combination of two profiles L80 and U80. For better contact of these profiles with the existing walls, connecting screws M12 were used. Spacing between screws is maximum 800 mm. To these profiles, U80 profiles are leaned on and the same are extended to the edges of the new galleries.

The following on Figures 2. and 3. shows the connections between steel beams by the carrier wall and their inter-connections. Existing walls are rounded by the combination of two profiles L80 and U80.L - profile is cut into the wall and it goes along the entire length where the galeries are placed.

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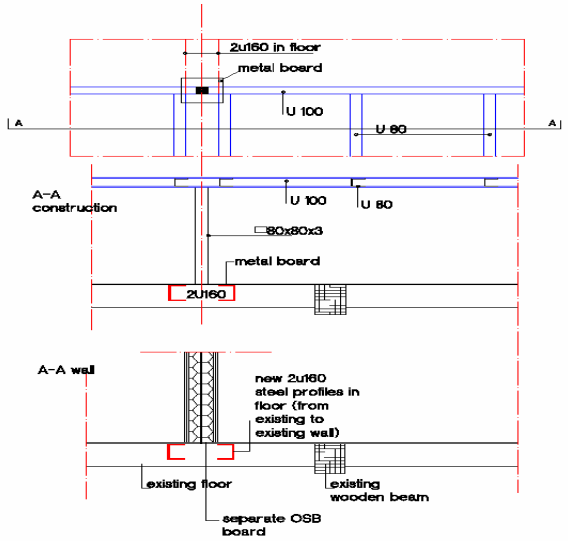
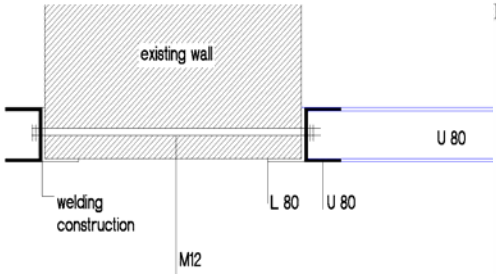


Figure 1. U-profiles placed in the construction

Considering that the thickness of welded sections is 8 (mm), the welding parameters are as follows: Overview of welding parameters for the profiles 80x80x8 (mm)

Welding position	Profile thickness (mm)	Φ wire (VAC)	Fig.Nr.	Voltage el. l. (V)	Strength of current (A)	Welding speed (m/h)	Required CO_2 (l/min)
1	2	3	4	5	6	7	8
Profile position ba y-axis	8	1,2	5	22	140	20	I0
Welding	8	1,2	5	22	140	20	I0

Review parameters of welding profile 80x80x8 (mm)



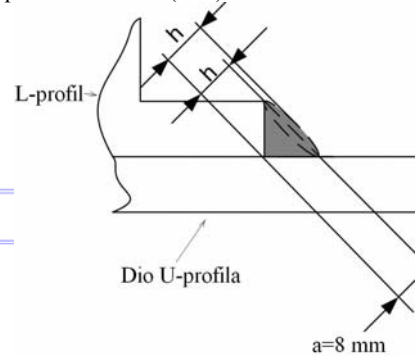


Figure 2. Display of U and L profile connections *Figure 3 Detail of welded joint*

In the end, the new structure would look like this, shown on Figure 4.

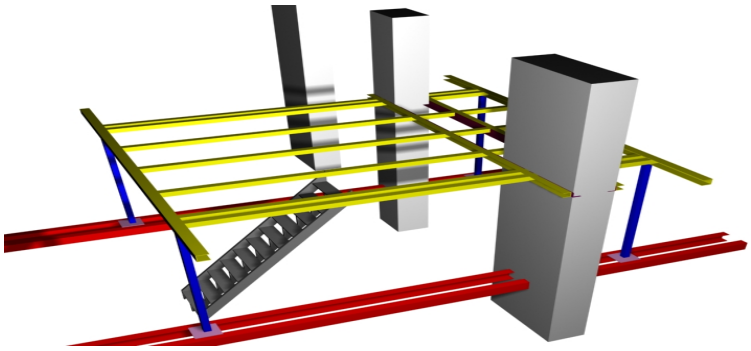


Figure 4. The final spatial structure made of the steel profile

4. CONCLUSION;

From the above mentioned work, it can be seen that there is a constructive solution in a very non-defined construction from the point of view of structure construction and static capacity. When it comes to the structure it can be concluded that the structural base is masonry, and the materials are concrete and wood, and given the new solution it is reinforced with a steel construction.

When it comes to static bearing, structure is provided with the new setting of the load-bearing structures.

In this paper, a new solution is shown for the constructional work (reconstruction) in case of absolutely undefined construction regarding both its structure and its capacity.

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