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case study

from the point of view of the planning engineer

Seismic strengthening of masonry walls with re-bar

Overview

The building of the primary school in Sembrancher VS is being completely renovated and, among other things, strengthened in accordance with the applicable earthquake standards. The expected vertical and horizontal seismic forces will be transferred via various concrete and masonry walls and conducted into the foundation.

For this purpose, new concrete walls have to be built or existing walls will have to be extended.

Problem

The existing masonry is also considered to be transferring seismic forces. However, the existing vertical loads on the masonry are low. Accordingly, not all the shear strength can be activated and used for the earthquake case.

Project:	Ecole Sembrancher
Location:	Sembrancher VS, Switzerland
Engineering:	THETAZ Ingénieurs Civils SA
Contractor:	MF Manenti Farquet SA
Year:	2022
Installation time:	5 working days

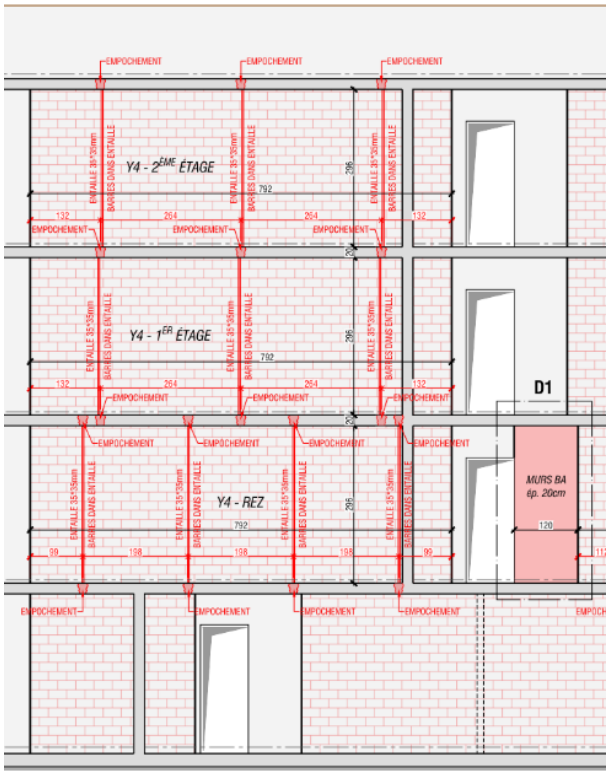
Solution

Thanks to an active, vertical over-pressing of the masonry, its shear capacity can be increased. This makes it possible to transfer higher seismic horizontal loads into the subsoil. For this purpose, the re-bar system is used.

In advance, grooves were made at 24 positions on both sides of the masonry walls. The ceiling and floor slabs were drilled and re-bar 16 were then positioned. The anchoring was done by embedding with SikaGrout®-314 N or by gluing with Sika® AnchorFix®-3030.

The activation of the prestressing was done with a gas burner, with the temperature being controlled at regular intervals. After completion of the work, the milled grooves could be filled over the free length with Sika MonoTop®-422 PCC mortar.

Cut grooves with anchored re-bars



Section of plan with the seismic strengthening

Mortar anchoring of re-bar in floor slab

re-bar is very interesting for this kind of structural reinforcement. It offers the possibility of a simple and targeted prestressing. There is no need for hydraulic equipment or major construction preparations. Everything was completed within five working days.

Moreover, the reinforcement is completely embedded in the wall and the ceiling slabs. So, there is no loss of space.

Roland Troillet, on behalf of THETAZ Ingénieurs Civils SA

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Heating/prestressing of re-bar 16

Heating of the bars and temperature control

Final, mortared grooves

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