



UNICEF tent school in Port-au-Prince, Haiti, February 2010.
<http://www.unmultimedia.org/photo/detail.jsp?key=9&query=subject%22Haiti%20Earthquake%22>



Shigeru Ban - Temporary Paper Tube Schools, Sichuan, China, 2008.
<http://www.treehugger.com/files/2009/01/shigeru-ban-paper-tube-schools.php>



Concrete-integrated school building. Pingzhi Primary School Reconstruction Project, Sichuan, China, 2008.
<http://www.globalgiving.org/projects/china-earthquake-relief/>



Gando School in Burkina Faso by architect Diébédo Francis Kéré, 2000.
<http://www.afritecture.org/architecture/gando-primary-school>



Floating School - Chong Khneas Elementary School, Cambodia.
 photo by Kari Salonen, January 2009



RISK AREAS OF NATURAL DISASTERS:

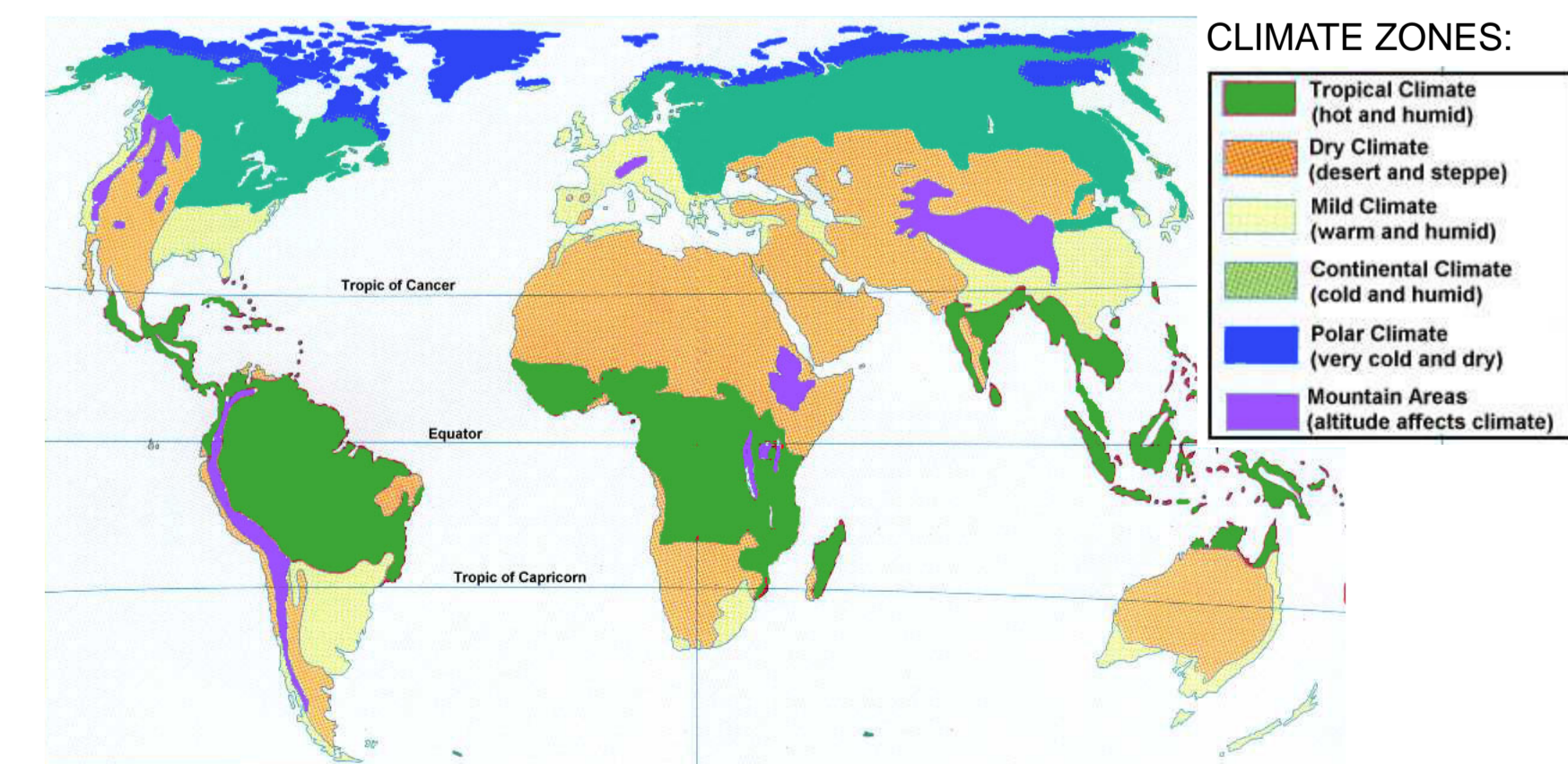
- ▲ Volcanic activity
- ↻ Tropical cyclones
- Earthquake area
- Severe earthquakes
- F Famine caused by drought

Population growth, amount of out-of-school-children and challenges due to climate change put pressure on education system in many countries and create challenges for it in future. In addition to these facts, natural catastrophes and armed conflicts destroy existing school buildings and leave children without education, which would be important for development of both individuals, and for development of all society. Education, would also help getting back on track after catastrophe and mitigating damages of forthcoming disasters.

Especially children in developing countries are in difficult situation, because these countries are most vulnerable to natural phenomenon. Poverty increases social and physical vulnerability in catastrophes, but on the other hand catastrophes increase poverty by damaging the infrastructure and causing massive social and economical losses. According to UNEP (United Nations Environment Programme) between 1980 and 2000 75% of the world population lived in areas affected by some natural disaster, and more than 90% of the deaths caused by natural phenomenon occurred in developing countries.

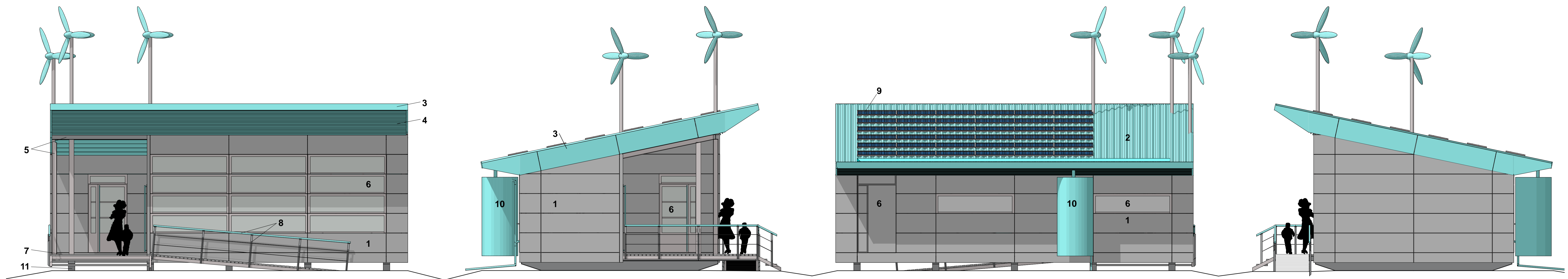
Climatic circumstances are very diverse in these areas of high natural catastrophe risk, but mainly these areas belong to tropical (hot and humid) or dry climate (desert and steppe). Mountain areas, like Andes and Himalaya, are on seismic active areas, where climate can be very cold and snow is common.

Designed modular teaching unit is one alternative of providing education in these areas, that have suffered losses in natural disaster or in armed conflict. It could serve for example as temporary school during reconstruction of destroyed school, or in refugee camp.



EDUCATIONAL BUILDINGS IN CATASTROPHE AREAS - STUDY AND DESIGN

JENNI LAAKSONEN, May 2010
 Master's Thesis, Degree Programme of Architecture
 Tampere University of Technology
 Instructor: professor Kari Salonen



FACADE 1 1:50

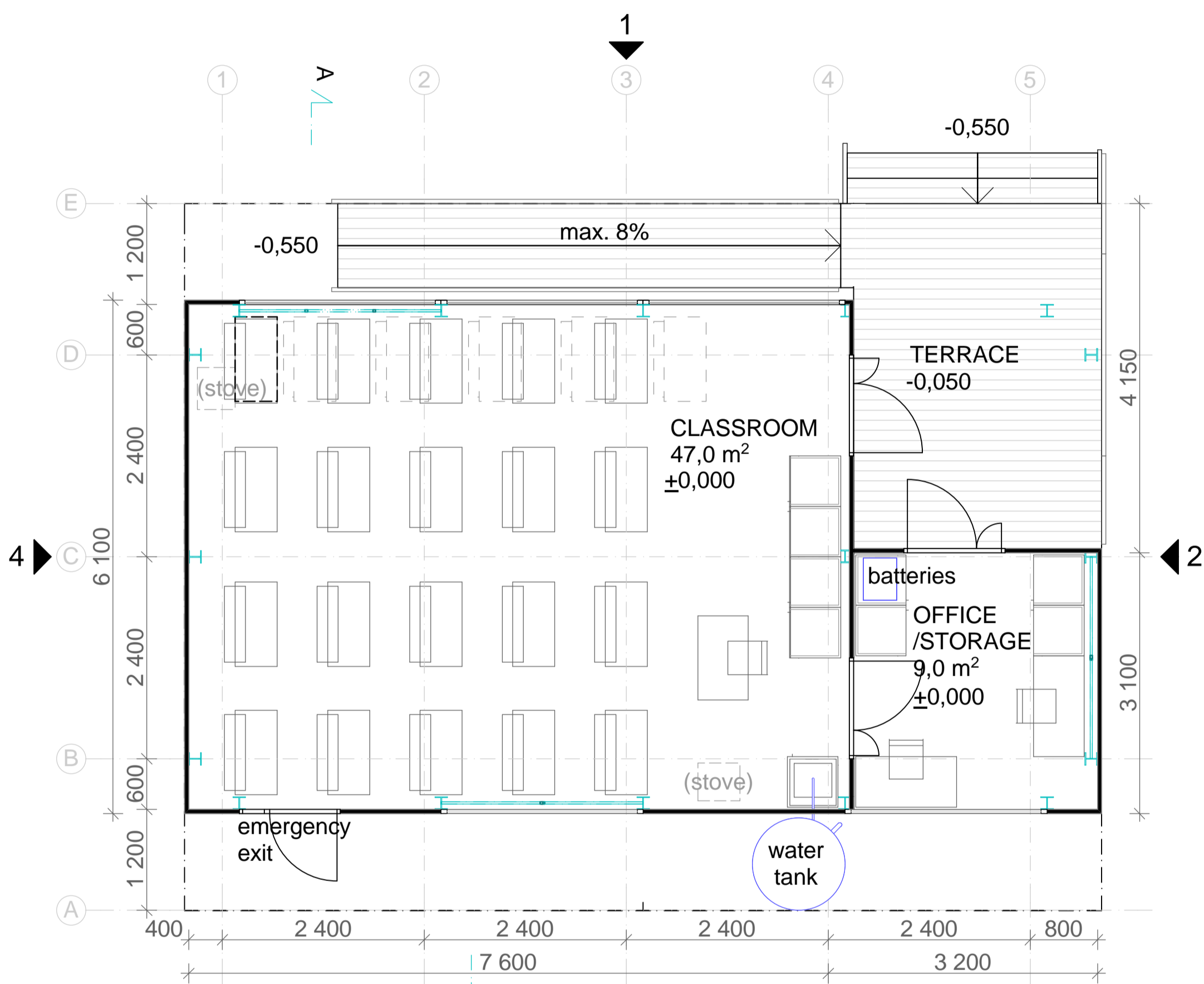
FACADE 2 1:50

FACADE 3 1:50

FACADE 4 1:50

FACADE MATERIALS AND COLOURS

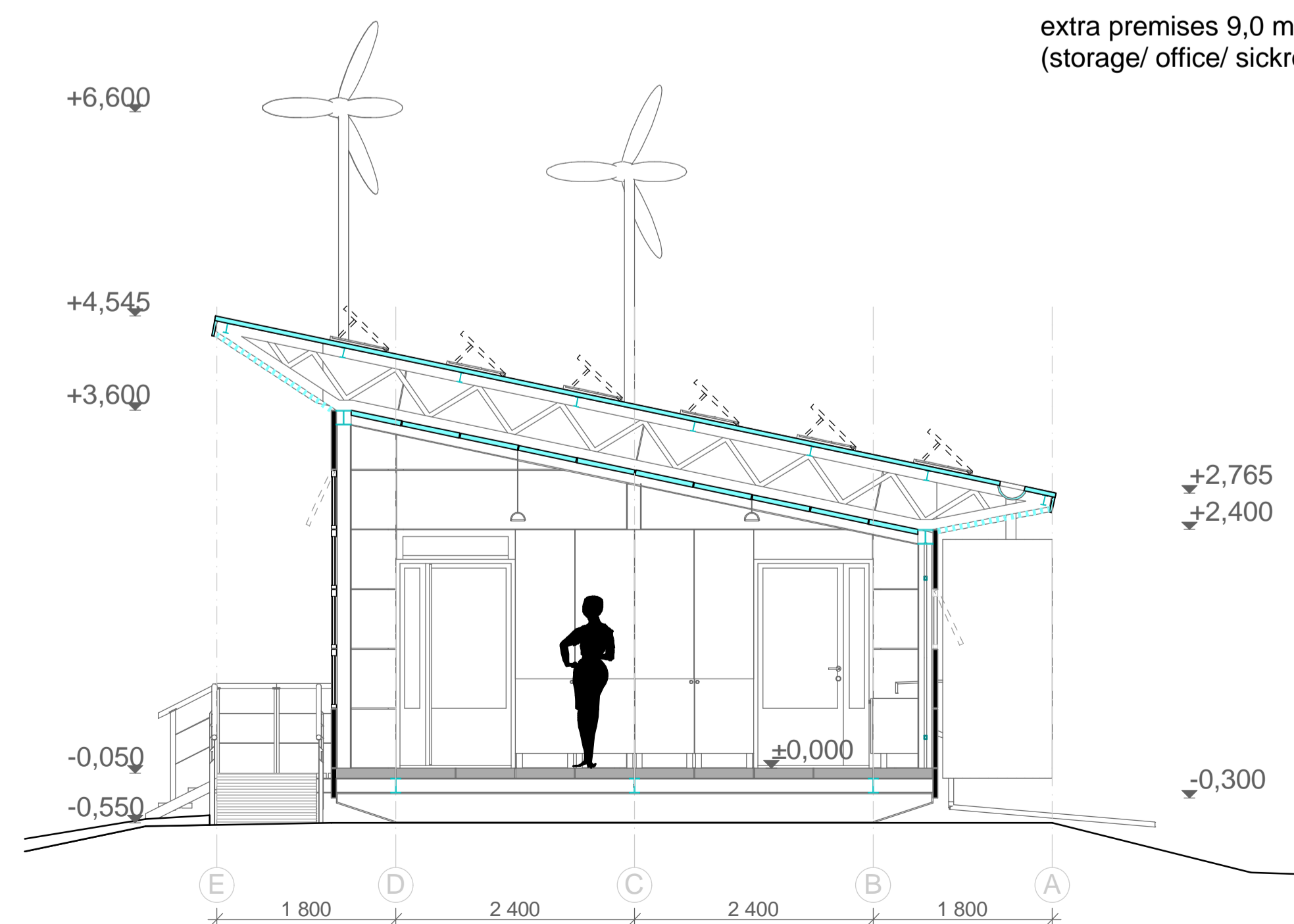
1 facade panel	steel sheet-pur, pvdf-coated	aluminium grey	
2 roof panel	profile steel sheet, pvdf-coated	turquoise	
3 eave panel	steel sheet, pvdf-coated	turquoise	
4 trellis	pvdf-coated steel	turquoise	
5 columns and beams	galvanized steel		
6 windows doors	glass + aluminium	aluminium grey	
	glass + aluminium	aluminium grey	
7 deck and ramp		galvanized steel, recycled plastic	light grey
8 fence			
- handrail	pvdf-coated steel		turquoise
- posts	galvanized steel		
- wire	stainless steel		
9 solar panels			
10 water tank	plastic (PE)		turquoise
11 basement skids	galvanized steel		



FLOOR PLAN 1:50

CLASSROOM 47,0 m²
40 students
1,18 m²/ student

extra premises 9,0 m²
(storage/ office/ sickroom/...)



SECTION A-A 1:50



Architectural Solution

Floor plan of modular teaching unit is designed to be as simple as possible. In basic solution classroom size is 47 m², serving 40 students, with supporting premises of 9 m² that can be used as teacher's room, storage or for example sickroom. In front of entrance, there is terrace, which is covered with roof and equipped with ramp to ensure access for disabled students.

Medium height in classroom is 2,4 m, but the ceiling is inclined and height on window wall is 3,6 m to ensure maximum natural light. When locating and orientating the teaching unit, the direction of roof and windows should be chosen to create comfortable amount of light and heat according to prevailing conditions. Roof is shed roof with long overhangs on sides of long facades.

Colours of teaching unit are chosen to be neutral according to their symbolic meanings and associations, but to give an image of a public building. Exterior walls are aluminium grey from the outside and white on the inside. Roof colour is light turquoise. Light colours are chosen to maximize the reflection of too much sunshine and make the interior light level comfortable with natural lighting.



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