



# Rehabilitation of Schools in Syria



# Specific situation

- Influx of Iraqi refugees in to Syria
- Accumulation of refugees in Damascus area
- Approx. 20% more students in Syrian schools
- SDC (BFM) supports Syria in handling the situation



# **Rehabilitation of 9 Schools**

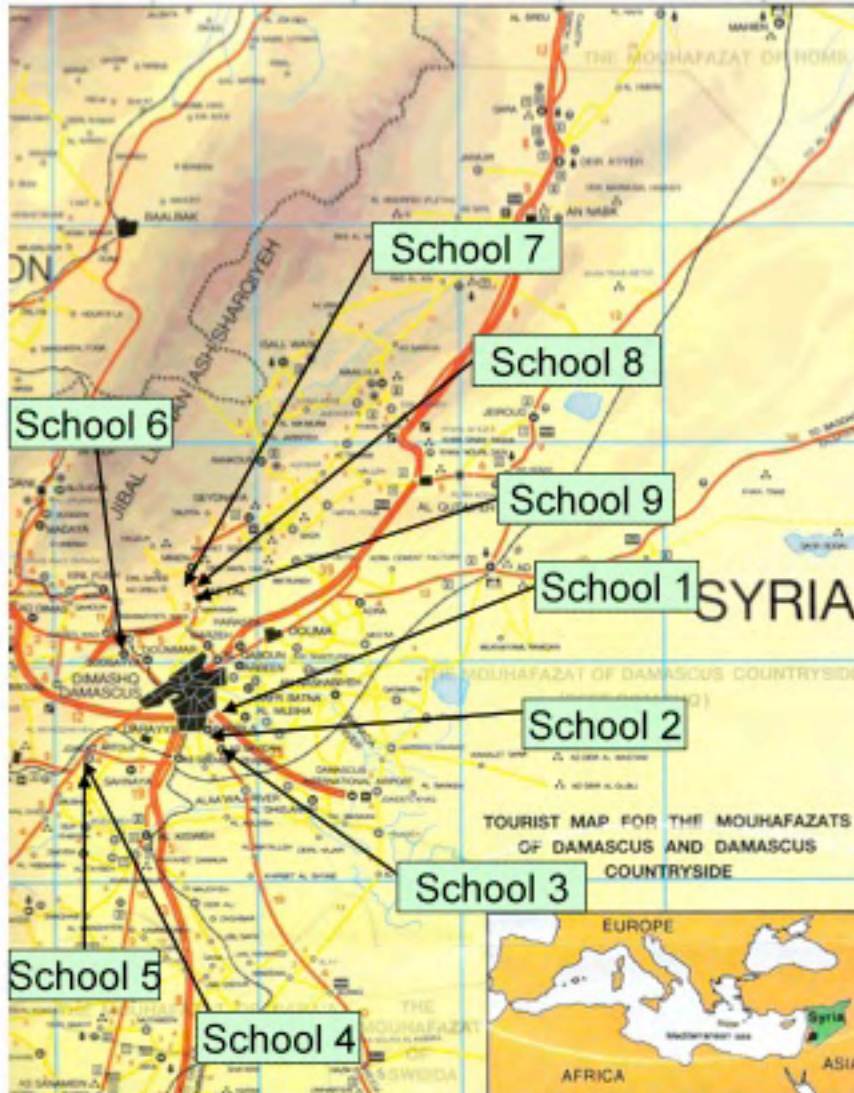
through cooperation between

**SDC and the Syrian  
Ministry of Education**

**February – October 2008**

**March – October 2009**

# Location of schools



All schools are located in the suburbs of Damascus

## **Project focused on two priorities:**

- Maintenance and Rehabilitation
- Improvements on construction/structural elements

## **Improvements related to functionality**

# Doors, door frames, and accessories



# Stair railings





# Dysfunctional windows



# Water on roofs



# Improvements related to classroom



# Damage to paint from heaters



# Providing new lighting & furniture



# Improvements Related to Safety



# Improvements related to sanitation



# Flooded playground after rain





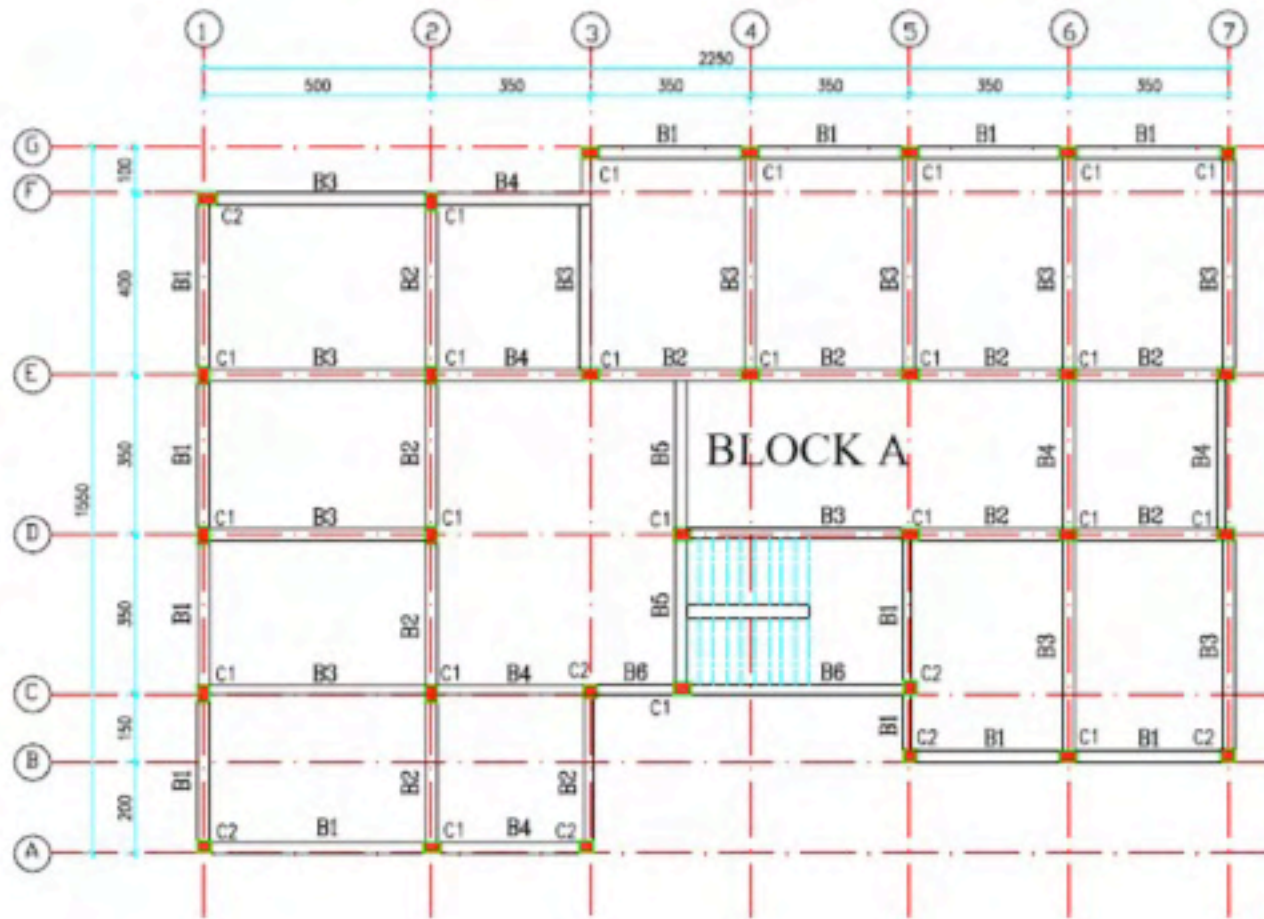
# Improvements for disabled children



# Improvements related to disaster risk reduction



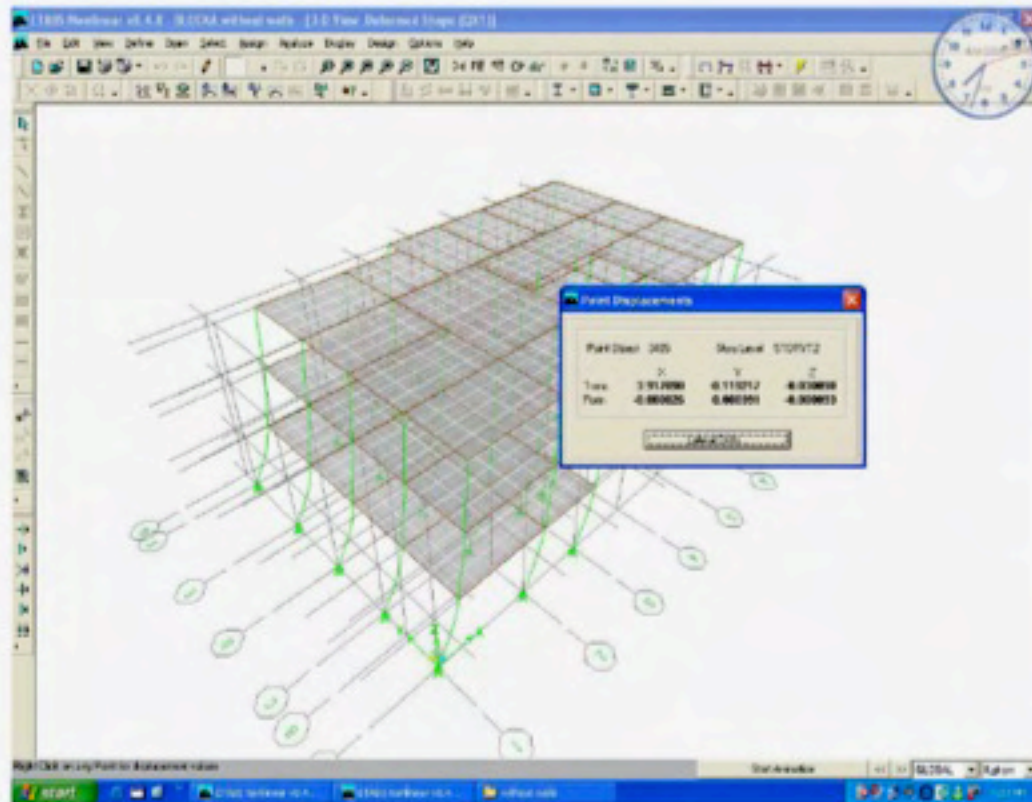
# Earthquake resilience (retro-fitting)



EXISTING ROOF STRUCTURAL PLAN

# Earthquake resilience (retro-fitting)

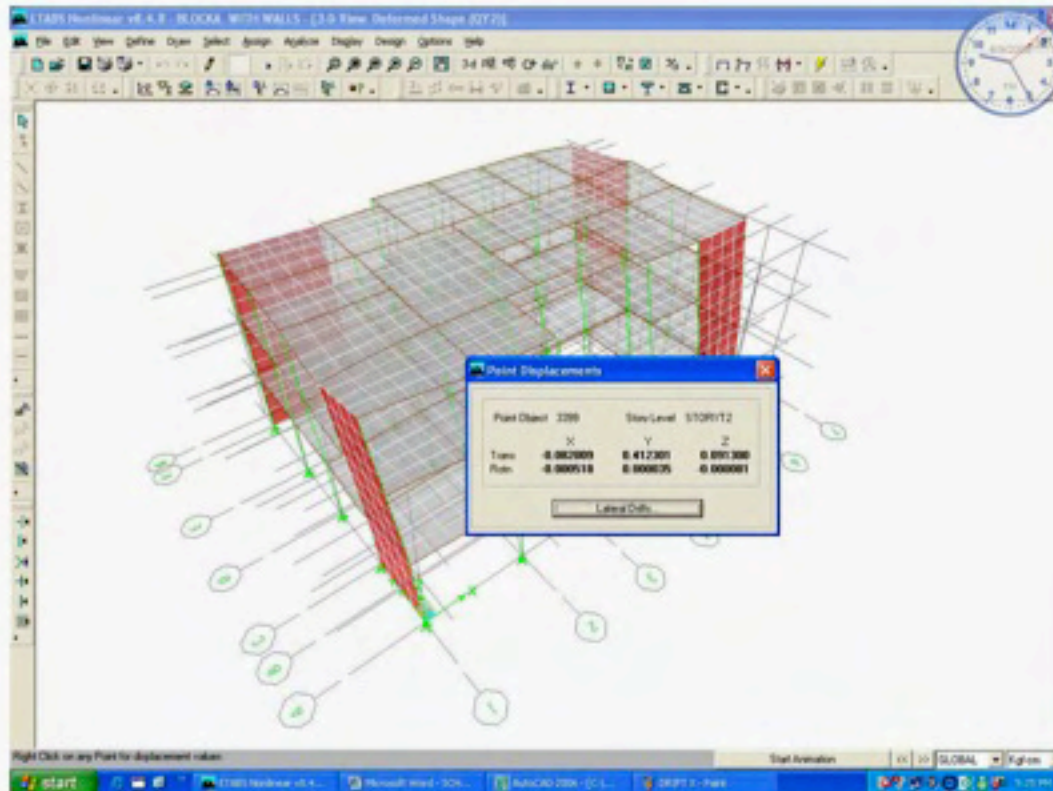
## 2-3 DRIFT CONTROL



THE MAXIMUM SCHOOL DISPLACEMENTS (AXIS X)  
(3.91CM)

# Earthquake resilience (retro-fitting)

## 3-2 ANALIZING



**THE MAXIMUM SCHOOL DISPLACEMENTS (AXIS X)**  
(0.31CM)

G + S AG  
Ueli Salzmann  
Stalderstrasse 5  
3401 Burgdorf

**Rehabilitation of 9 schools in Damascus to resist earthquake forces**

Dear Mr. Salzmann

You have asked us to examine the intended strengthening measures for earthquake loads and to hold on the results in a short report.

**Based:**

- Earthquake report Ref: 0804101, date 10/4/2008, author Eng. M. Rashad Alshoweky
- Calculation papers (35 pages)
- SIA codes 261 and 262, edition 2003

**Technical report and suggested strengthening:**

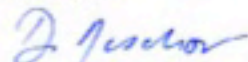
The received documentation shows a technical clear and understandable analysis of the structural system. The calculation papers and the results seem to be correct and correspond to our experiences.

The existing structural system with reinforced columns and beams is not made to resist earthquake loads. The proposed intervention with four walls (two in each direction) is a correct and appropriate solution to resist the horizontal loads of an earthquake. This intervention will substantially improve the resistance of the structure.

However, a careful planning of the intended strengthening measures is crucial for the success of the intervention. A proper working procedure must be guaranteed and a special attention has to be placed on correctly connecting the new concrete walls to the existing structure.

The quantity and placement of the shear connectors (steel bars with epoxy) has to be planned by a civil engineer. Also the existing columns must be verified to resist the supplementary load in case of an earthquake.

Burgdorf, 30. May 2008  
Buschor AG



Dipl.-Ing. ETH SIA D. Buschor

# Implementation of the project



Important issues:

- placing of the shear wall (external of outside wall)
- connection of the shear wall to the foundation !

# Implementation of the project



Important issues:

Connection of the shear wall to the main structural elements !



# Implementation of the project



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# After completion



# Schools more child friendly

