APPLICATION OF MICROPILES TO THE STABILIZATION OF A DEFLECTED OLD TENEMENT HOUSE

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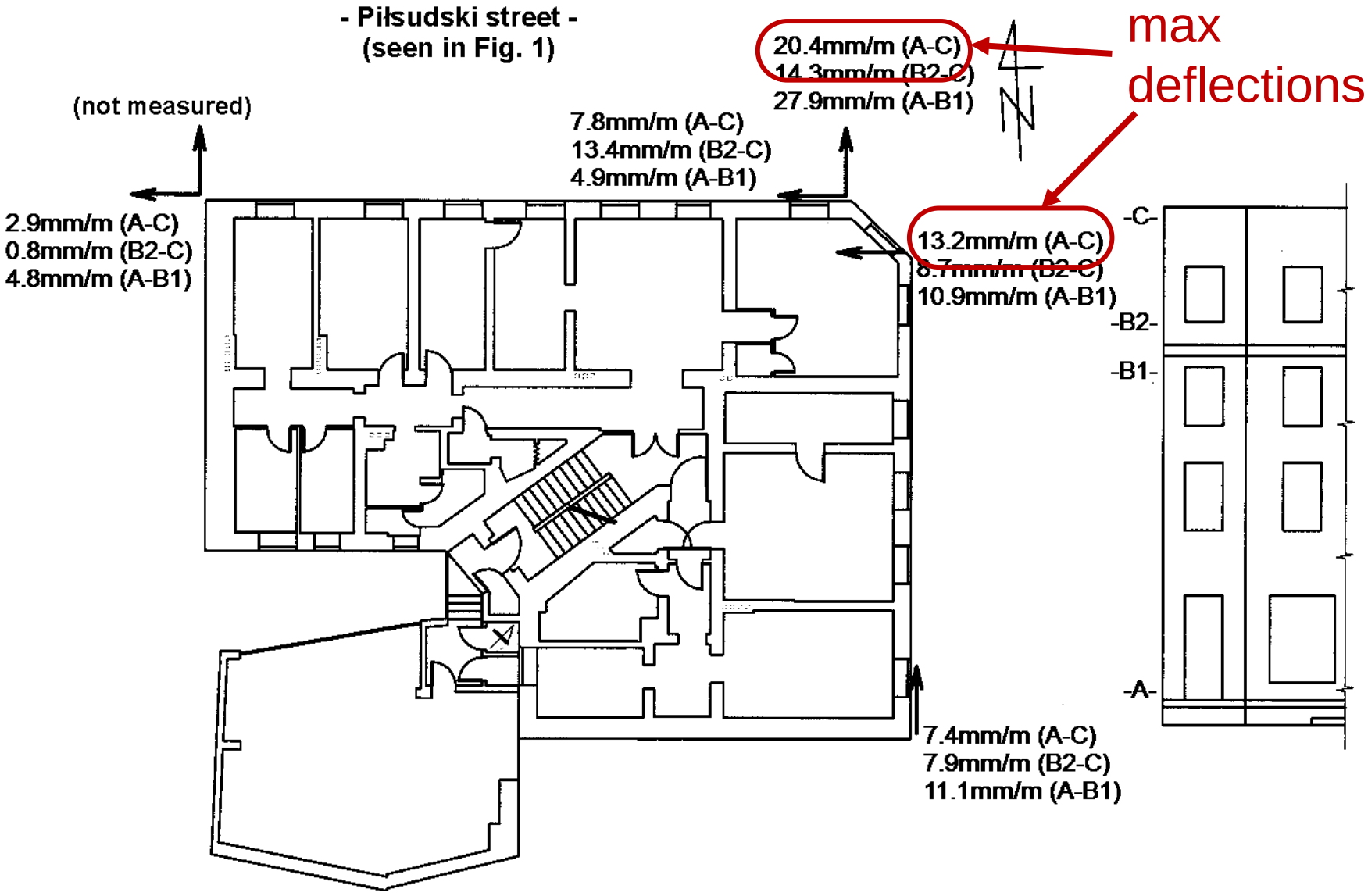
Old Tenement House

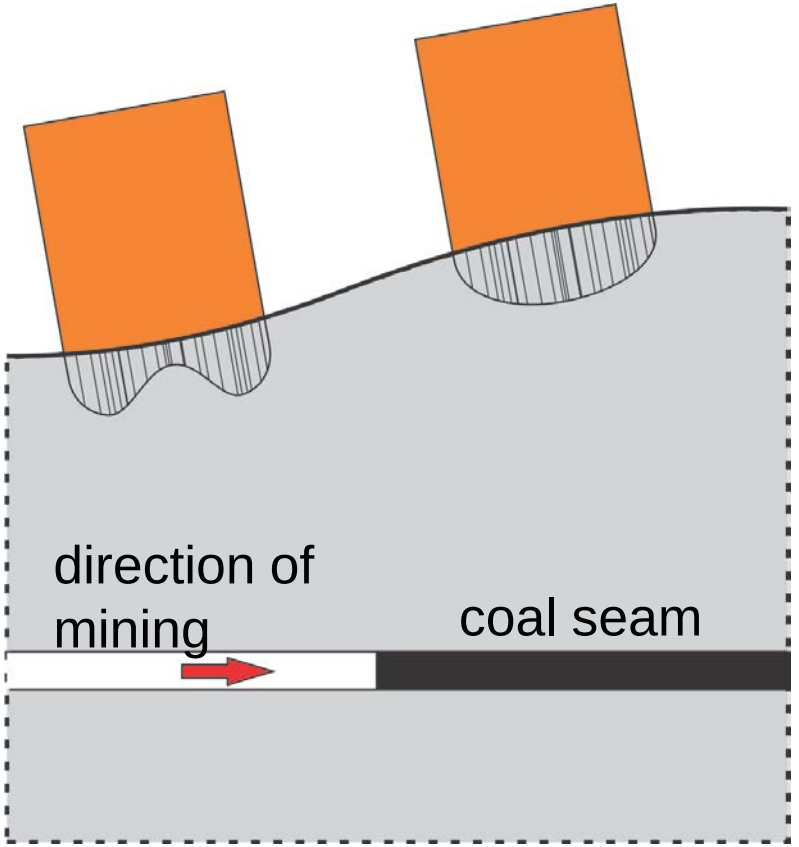
- In densely built city centre there is located four-storey old tenement house, which over the years has a tendency to lean out
- Reasons for deflection:
  - increased bearing pressure due to constructing the additional storey
  - weak soils of non-uniform thickness
  - subsidence due to mining

Displacements of the Building

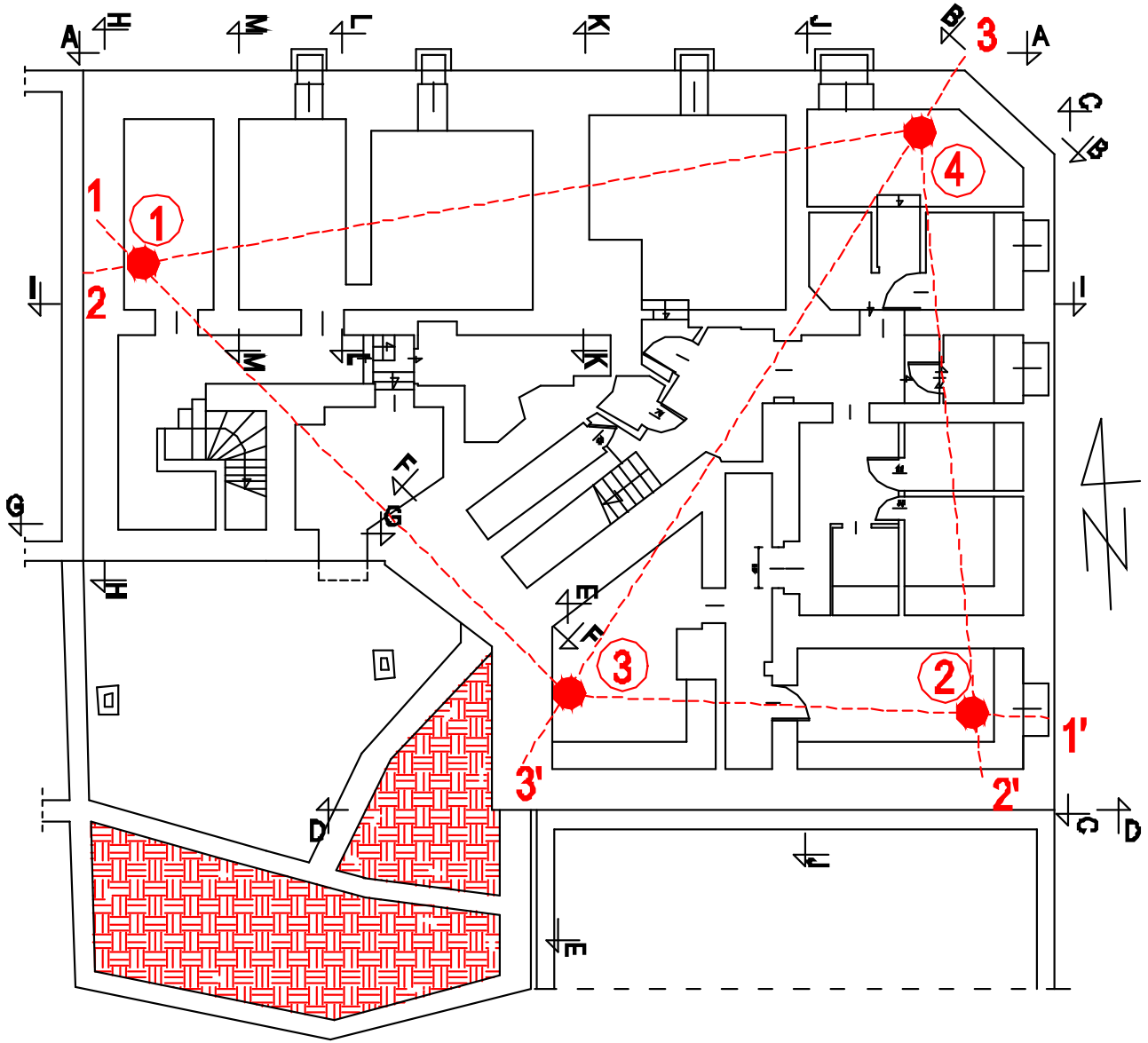


Deformations Due to Mining

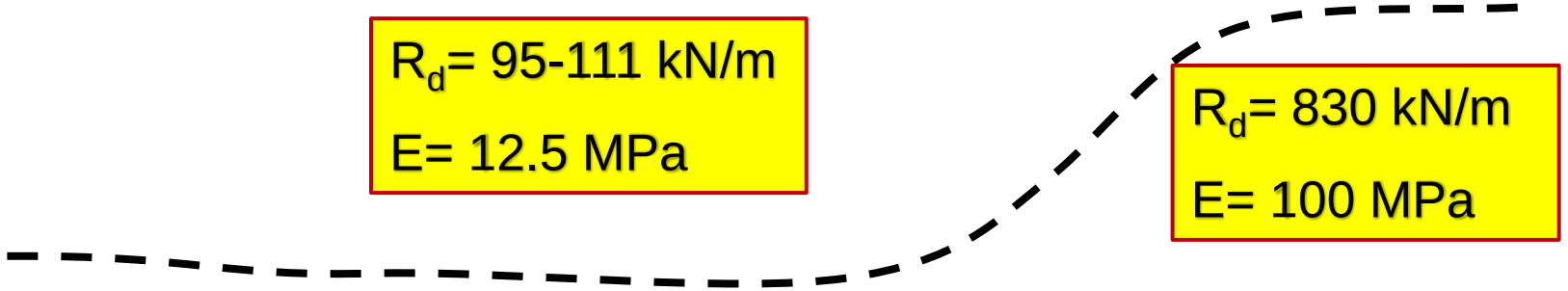
Deflections reach 122 mm/m



Subsurface Exploration

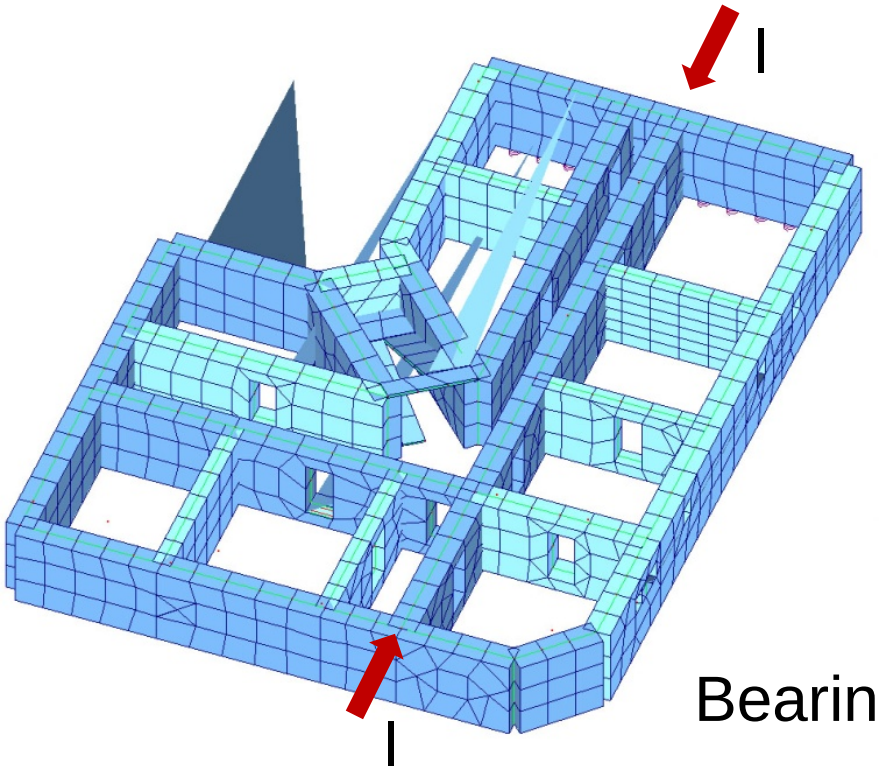


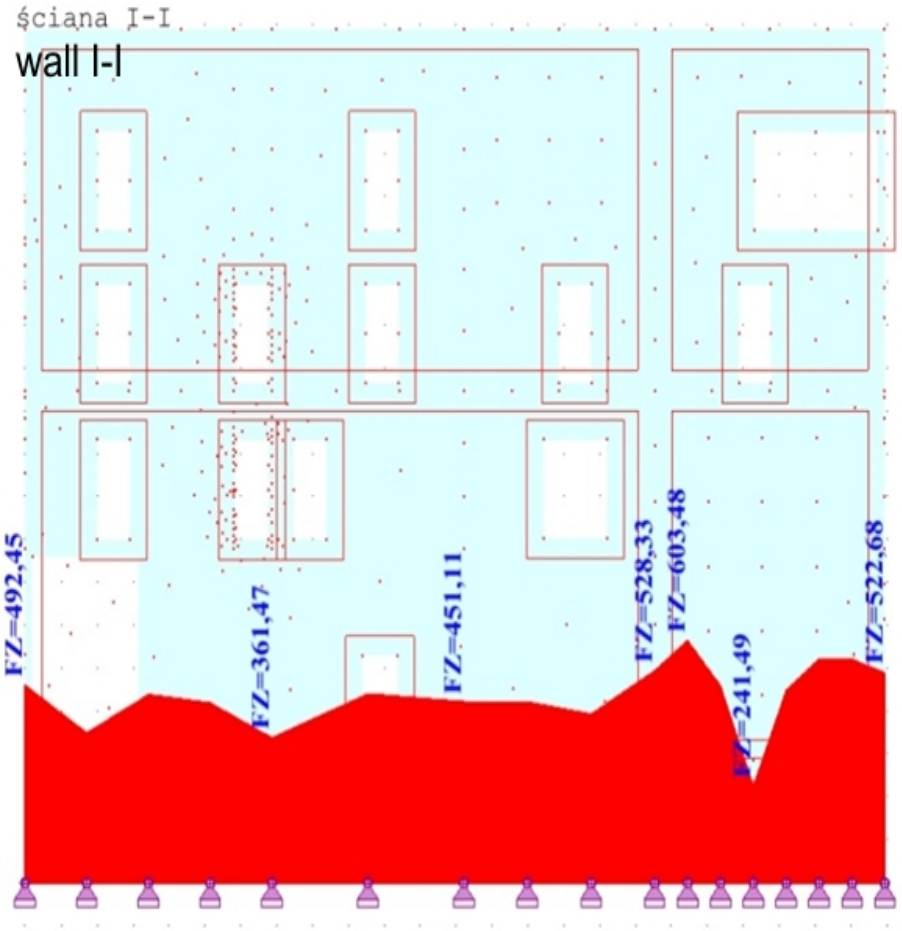
Subsurface Exploration



Bearing Pressure Calculations

FEM model
of the basement storey





Bearing pressure 100-600 kN/m

Locally 750 kN/m

Need for Stabilization

- Good condition of the building
- Steel anchors in walls embrace the building

- Further deformations due to mining may appear
- Weak soils may subside excessively
- Loads must be transferred to stronger strata by uderpinning

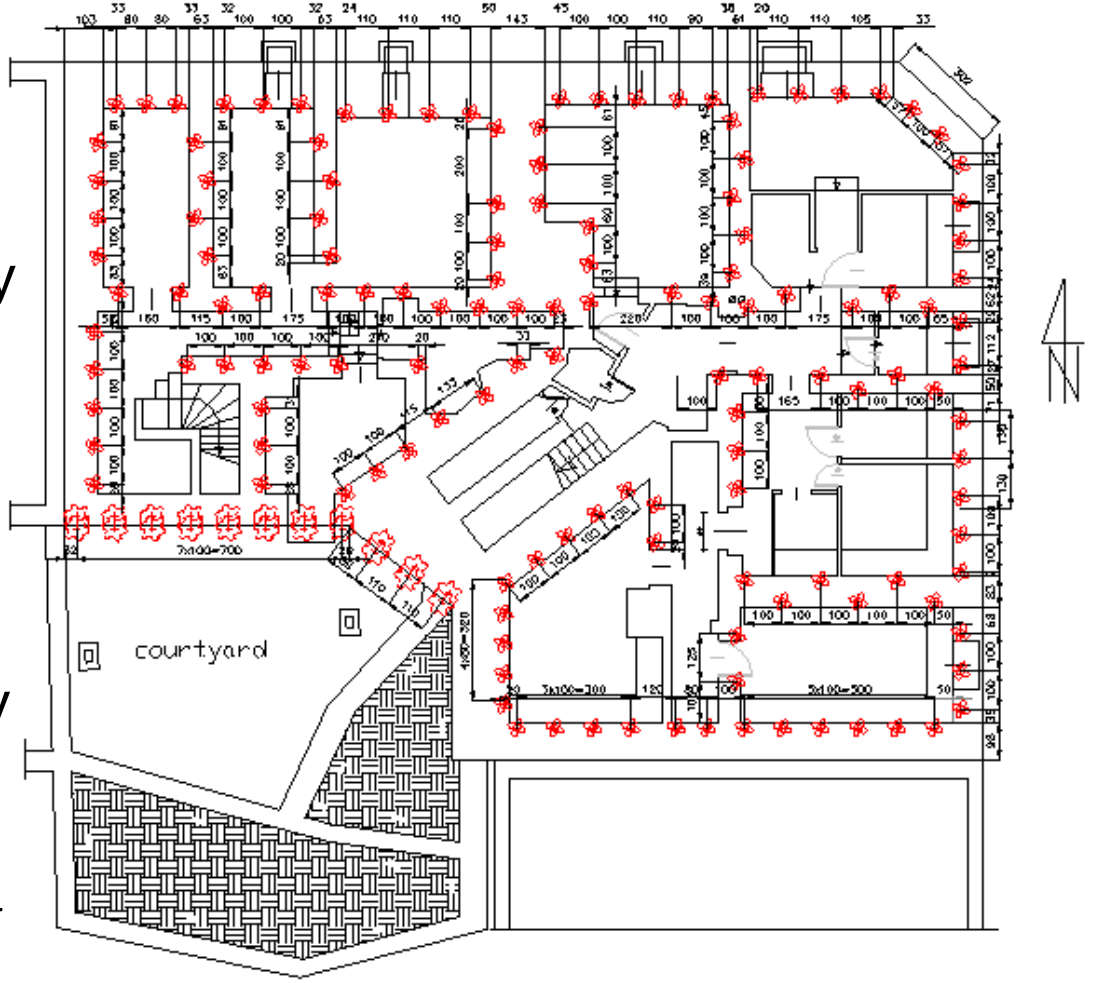
Underpinning

- Initially three technologies were considered:
  - jet-grouted columns
  - drilled micropiles with HPI-clay bits for jet-grouting
  - jacked micropiles

- Mining may cause concave or convex shape of the ground surface
- To ensure good stabilization underpinning must resist both compressive and pulling out forces
- Underpinning elements must be well anchored in the structure of the building
- Final solution: Titan micropiles drilled through foundation walls with high pressure grouting

Layout of underpinning

- 157 micropiles
- Spacing 1 m
- Inclination 2°-5°
- Diameter of the grout body D= 0.3 m
- Length 11-13 m
- Titan hollow bars 52/26
- Drill bits ϕ130mm HPI-clay bit for jet-grouting
- Injection pressure 15 MPa



Execution of underpinning

Thank you for your attention