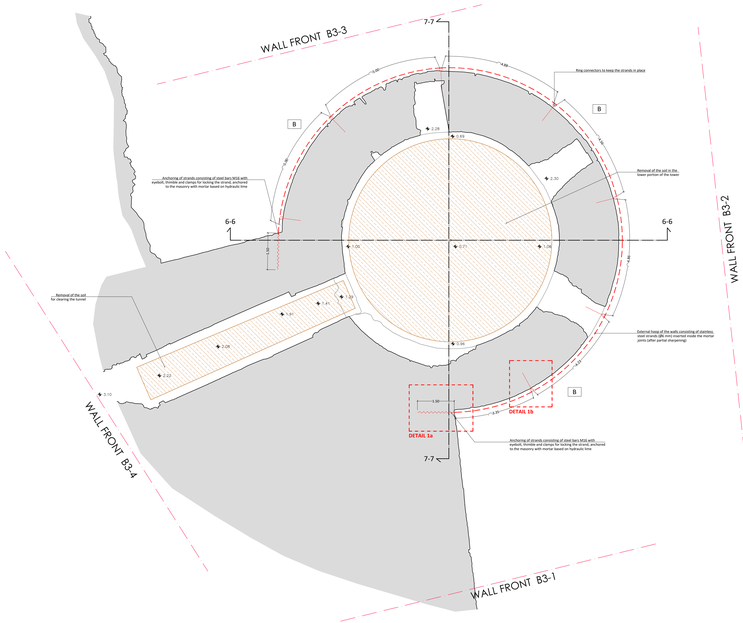
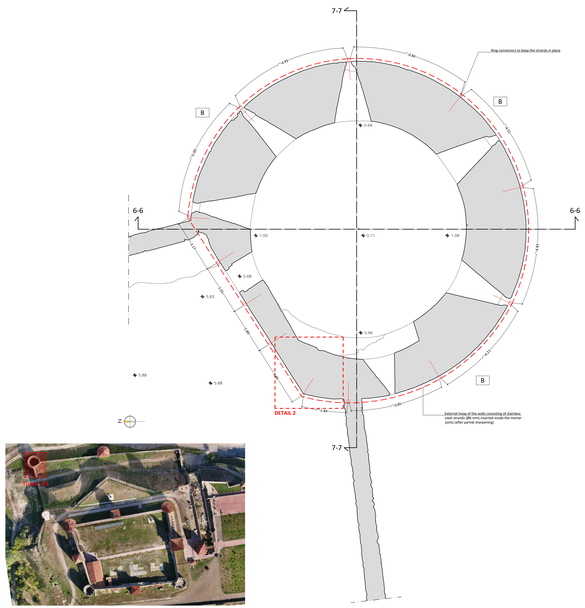
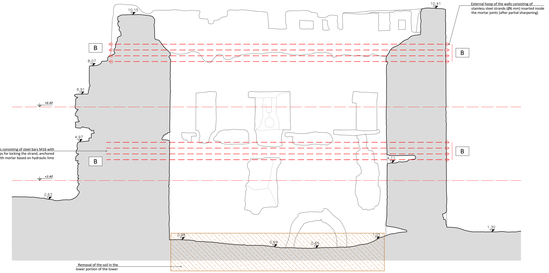
PLAN Q3.40 WITH INDICATION OF THE STRUCTURAL WORKS - 1:50



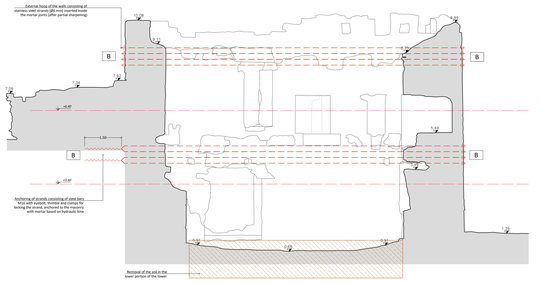
PLAN Q6.40 WITH INDICATION OF THE STRUCTURAL WORKS - 1:50



SECTION 7-7 WITH INDICATION OF THE STRUCTURAL WORKS - 1:50



SECTION 6-6 WITH INDICATION OF THE STRUCTURAL WORKS - 1:50



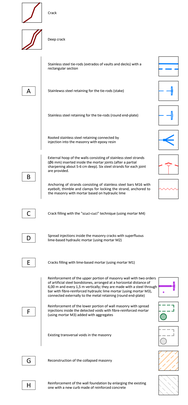
01 - Steel bars in fabric socks for the anchoring system

02 - Insertion in the masonry of a steel bar inserted in the fabric sock with the injection tube

03 - Injection of the hydraulic lime mortar into the sock

04 - Detail of the anchoring system after the injection

KEY LEGEND FOR PROPOSED STRUCTURAL INTERVENTIONS



MATERIALS TECHNICAL REQUIREMENTS:

CONCRETE: concrete shall comply with the requirements set out in CP 65.06.2018 standard and complying with the requirements set out in NCM F 02.01-2005 standard, with quality C 16/20 Annex 5. The slow concrete used for foundations shall be at least 4,5 cm thick. The concrete shall be classified in the following categories:
- Concrete class C20 (or concrete mark M400 according to GOST 26633; table 5.1 from CP 65.06.2018)
- Consistency class S3 according to CP P.04.06.2018 table 4)
- Exposure class XC1 (according to CP P.04.06.2018 table 1)

CONCRETE REINFORCING STEEL (Ø8 - Ø16mm and stirrups): concrete reinforcing steel shall comply with the requirements set out in NCM F 02.03-2006 standard. Reinforced steel class A-I for stirrups and class A-III for Ø10 mm and reinforced steel class A-II for bars
- for Ø6 - Ø8 bars: R_s = 225 MPa;
- for Ø10 - Ø40 bars: R_s = 365 MPa.

The reinforcing steel bars shall have minimum length of 50Ø. Any metal element inserted in the masonry or in contact with it shall be made of stainless steel.

CARPENTRY STEEL (bars, metal plates and strands): carpentry steel shall comply with the requirements set out in NCM F 02.03-2006 standard. Steel class A-I for stirrups and class A-III. Threaded bars and bolt shall be classified in the category 4.8 (R_{yn} = 400 MPa) according to TSCT 1759.4-87 standard. Any metal element inserted in the masonry or in contact with it shall be made of stainless steel. Stainless steel shall have mechanical and mechanical characteristics similar to that of category 12Cr17Ni9 provided by EN 10025-5 standard.

WELDINGS: all weldings shall be MIG type and are intended for complete repair of the sections. The characteristics of the filler materials used (rod wires, bands, strength, elongation at break, etc.) shall be similar to those of the base metal (the welding shall be carried out by qualified welders (CQB).

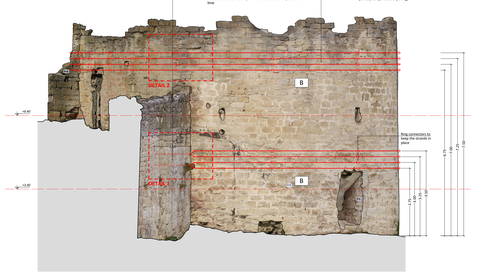
SOLID TIMBER WOOD: all wooden structural components shall be made with solid timber of hi-size and comply with the requirements set out NCM F 05.01-2007 standard, with wood quality II. Wood screws shall have resistance values and dimensions in accordance with EN 1995-1-1:2014 standard.

MORTARS: three main types of mortars are provided for structural interventions:
- M1 - for micro-cracks injection consolidation: superfluous grout composed of lime and pozzolana, natural sands, special additives and microfibers (type Mape-Antique Iniezione by MAPEI S.p.A. or another type with same technical characteristics and performances);
- M2 - for micro-cracks nucleus consolidation: superfluous grout composed of lime and pozzolana, natural sands, special additives and microfibers (type Mape-Antique Iniezione by MAPEI S.p.A. or another type with same technical characteristics and performances). Injections must be executed until refusal, from bottom to top, with mechanical or electronic pumps;
- M3 - for masonry, based on natural hydraulic lime (NHL 3.5 and NHL 5) and pozzolana (type Malta Sof - Eco Pozzolana, fine natural sands, special additives and microfibers, with very low amount of volatile organic substances (EMICODE EC 1 R Plus) (e.g. Mape-Antique Calalde type by MAPEI S.p.A. or another type with same technical characteristics and performances). Minimum thickness over 4 cm, the mortar must be added with aggregates from 30 to 50% on the weight of the dry mortar, with grain size from 2 to 5 mm (type Mape-Antique Calalde by MAPEI);
- M4 - grooved mortar for masonries, based on natural hydraulic lime (NHL 3.5 and NHL 5) and pozzolana, natural sands, special additives and microfibers, with very low amount of volatile organic emissions (EMICODE EC 1 R Plus) (e.g. type Mapewall Mortatura Armata or Mapei S.p.A. or another type with same technical characteristics and performances).

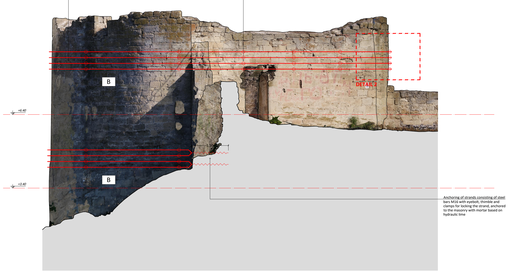
EPOXY RESIN: high performance bi-component epoxy resin (e.g. Eindurit EPOXY 178 STS-0719 type by KIWA S.p.A. or another type with same technical characteristics and performances).

IMPORTANT REQUIREMENTS FOR WORKS:

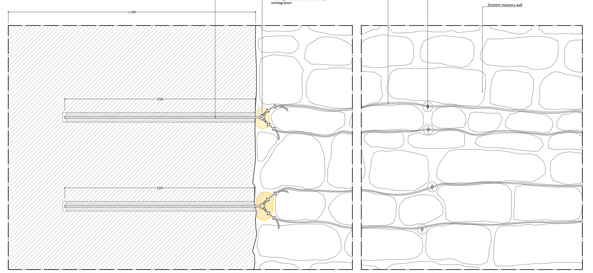
all the measures shall be controlled on the construction site by the executing company, as the formula is an existing building with variable measures;



EXTERNAL ELEVATION TOWER B3-1
Indication of the structural works - 1:50



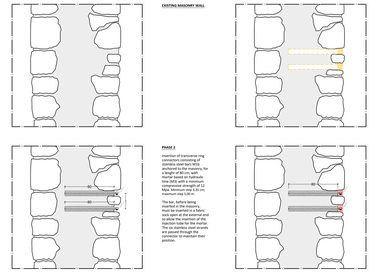
EXTERNAL ELEVATION TOWER B3-4
Indication of the structural works - 1:50



DETAIL 1a_THE ANCHORING SYSTEM OF THE STAINLESS STEEL STRANDS - 1:10

DETAIL 1b_THE TRANSVERSE RING CONNECTORS - 1:10

OPERATING SEQUENCES FOR THE REALIZATION OF THE STEEL STRAND EXTERNAL HOOP - 1:20



DETAIL 2_THE TRANSVERSE RING CONNECTORS - 1:10

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CLIENT: European Union Delegation to Moldova through its operational contractor UNDP

Technical Expertise and develop Detailed Technical Design for
CONSERVATION AND RESTORATION WORKS OF BENDER FORTRESS (Phase I)

DETAILED TECHNICAL DESIGN

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STRUCTURAL ANALYSIS AND INTERVENTIONS
Plans, elevations and sections | Tower B3

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REPRESENTATION SCALE: 1:50 - 1:20 - 1:10

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Implemented by the United Nations Development Programme