Lifelong Learning Programme

NAEP
Národní agentura pro evropské vzdělávací programy

Timber structures

Case studies

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Leonardo da Vinci
Assessment of existing structures
Project number: CZ/08/LLP-LdV/TOI/134005

Structural reassessment

Inadequate reliability;

Structural modifications;

Changes in category of use and design working life;

Damage or deterioration (environmental, chemical or biological, attack);

Damages due to accidental loads (earthquake, impact or explosion), settlements or other unintentional events

Preliminary investigations

Acquisition of original information (design and structural conception of the building, reference structural codes, if any);

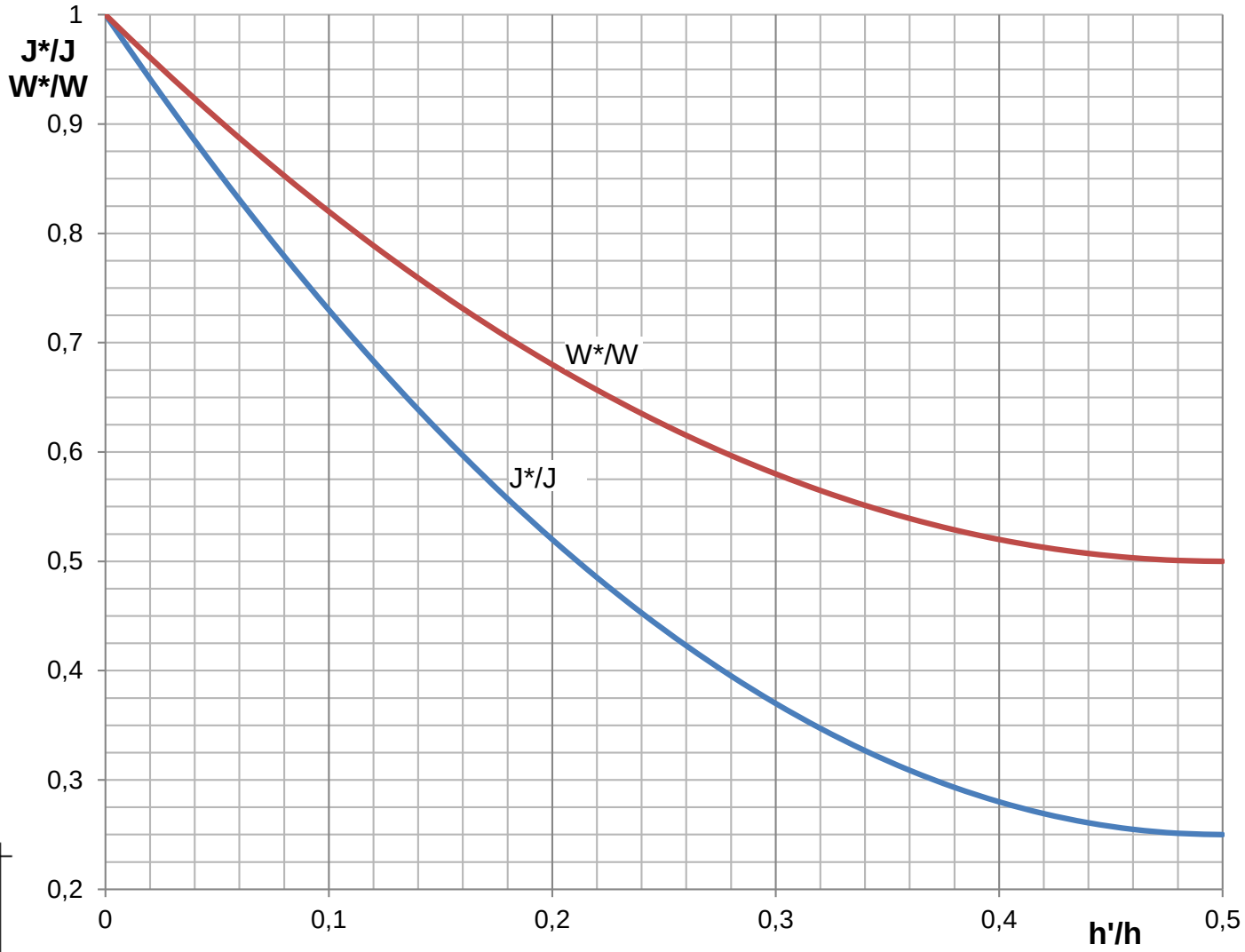
History of structural modifications (addition or demolition, and/or deep maintenance interventions);

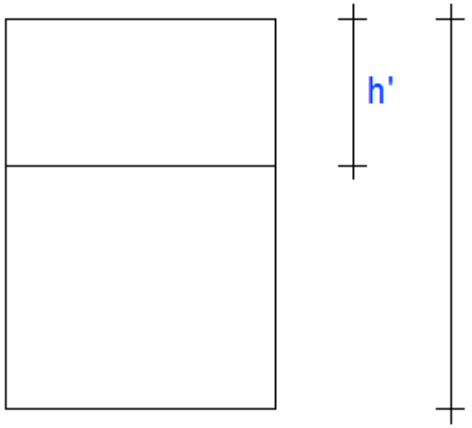
actual damage and/or crack patterns;

actual material properties;

required performance level.

PRELIMINARY REMARKS

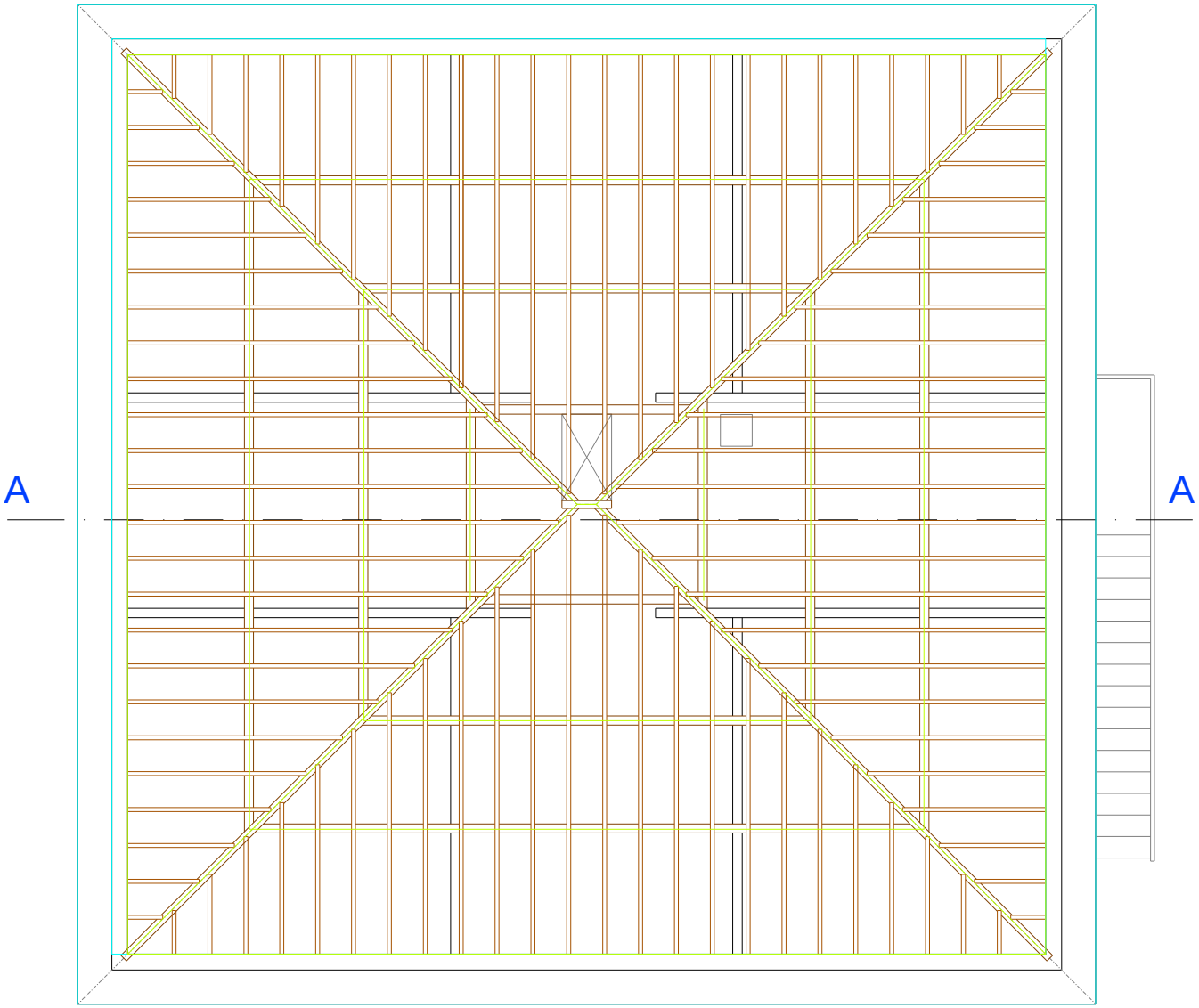




Effect of height of fibre splitting

CASE STUDY N. 1

STRENGTHENING OF A TIMBER ROOF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Cracked beam

Cracked beam

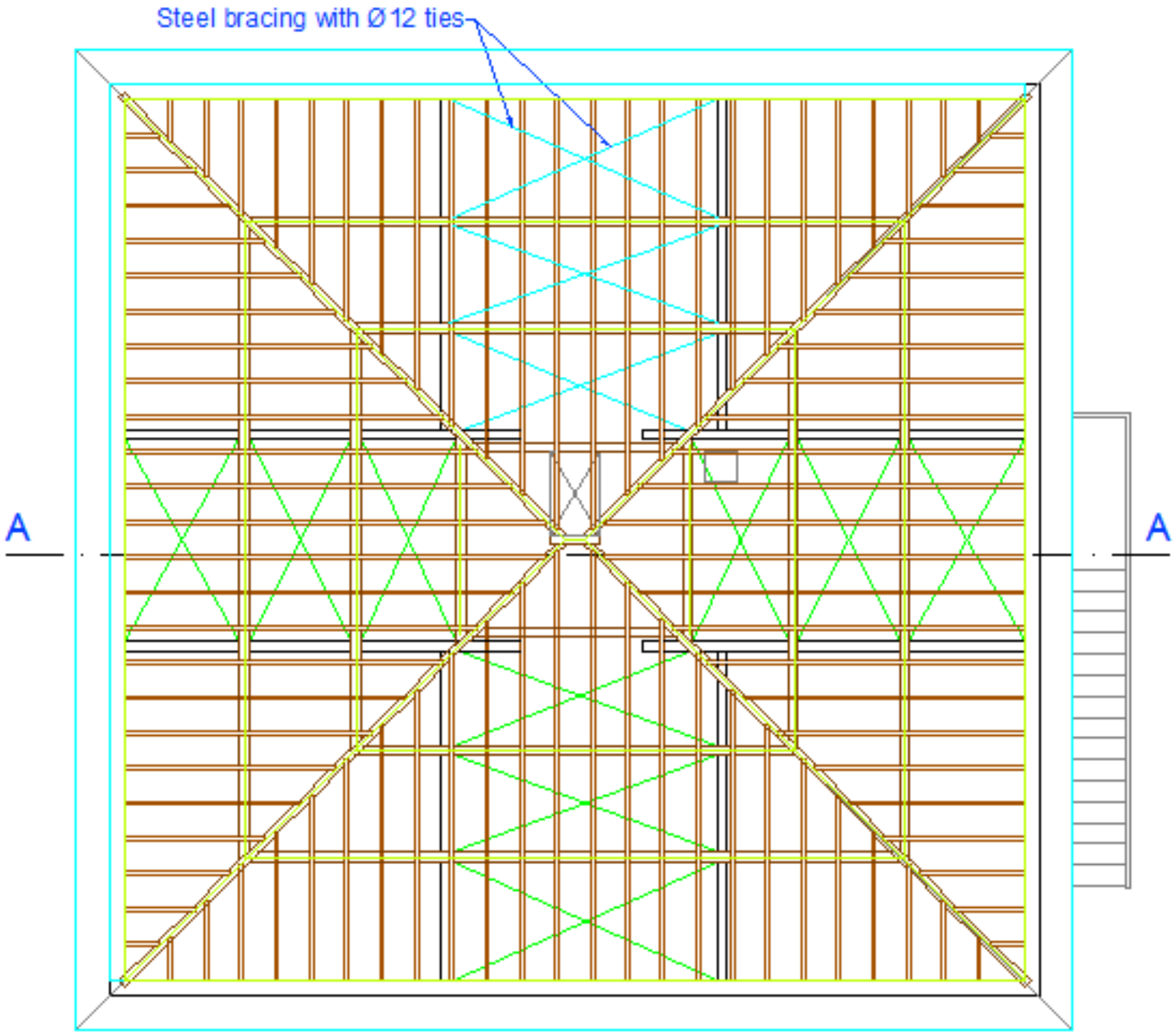
Damaged columns

Damaged columns

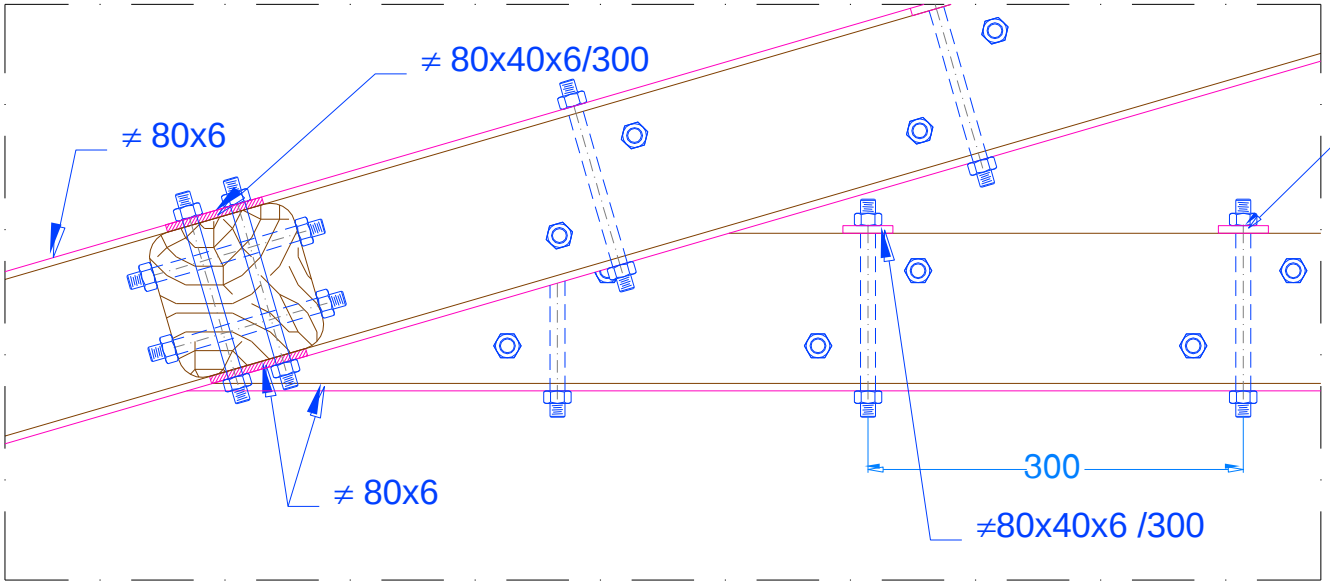
Cracked beam

Crack pattern in a beam

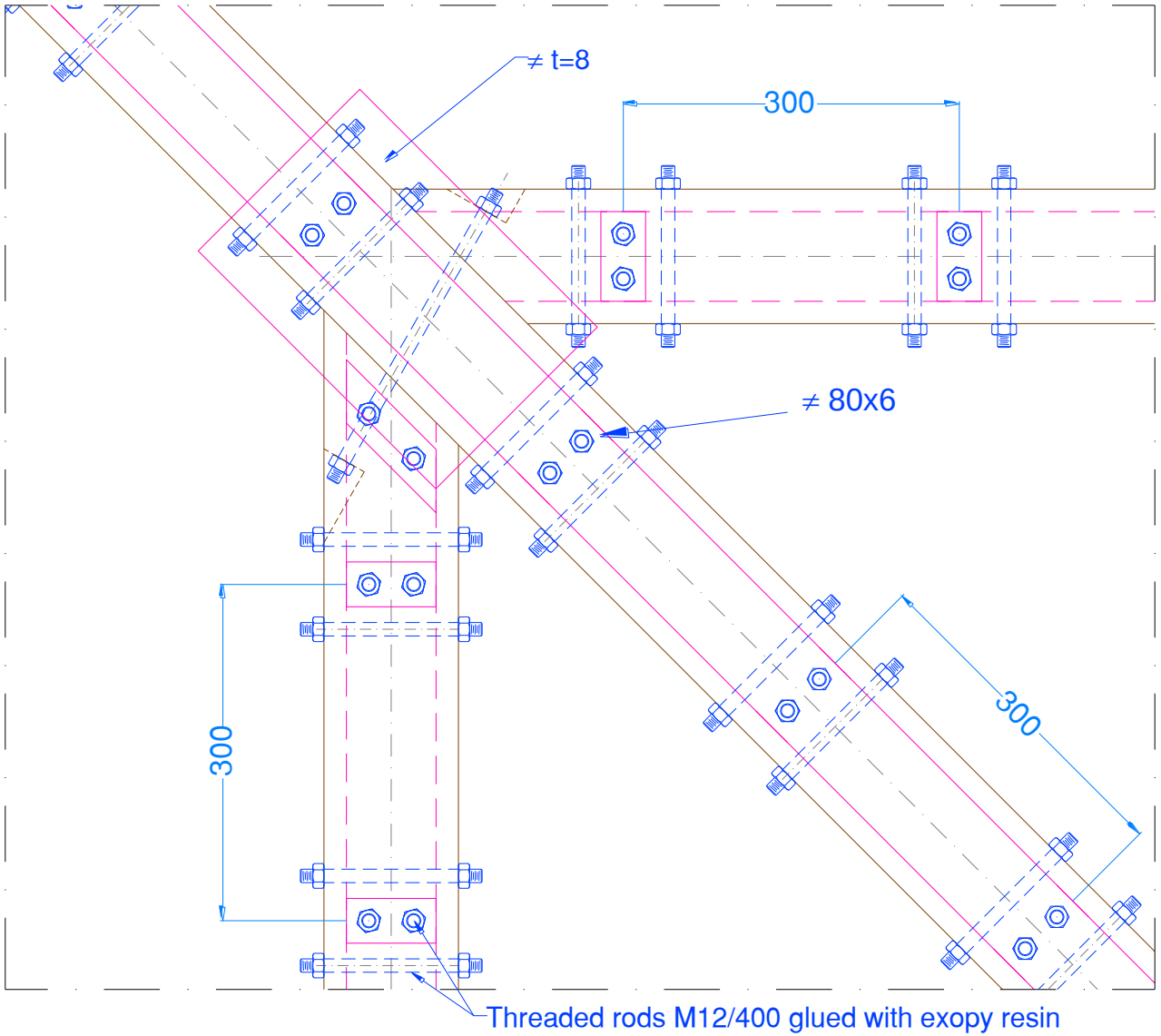
Cracked beam



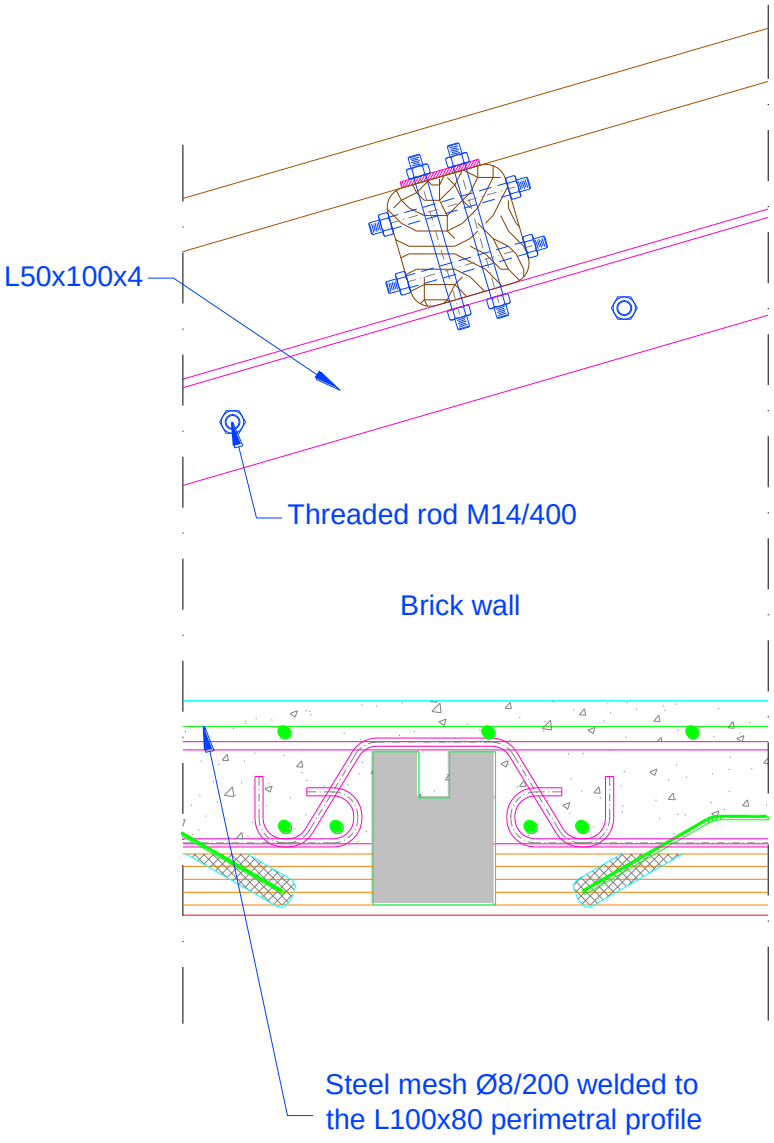
Roof plan

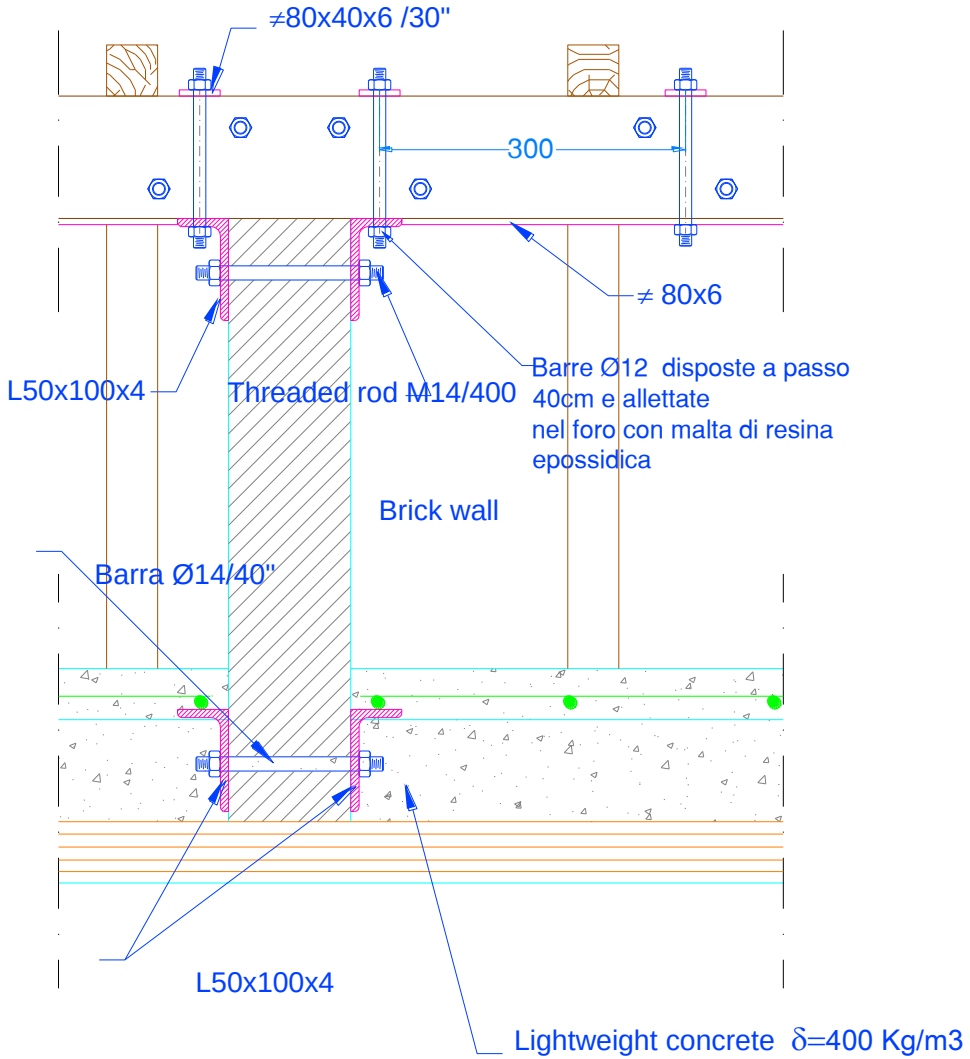


Strengthening of the beams



Strengthening of the connection





Connection with the upper part of the shear walls

Strengthening of the main beams

Strengthening of the secondary beams

Strengthening of the roof during the works

Strengthening of the roof during the works

Strengthening of the joints

Beams and joint after the strengthening

Strengthening of the beams - Detail

Details of the connections with intermediate brick walls

View of the roof during the work

Strengthening of brick wall

CASE STUDY N. 2

ANALYSIS AND REPAIR OF TIMBER BEAMS

Insufficient cross section – Uncorrect wood fibre pattern

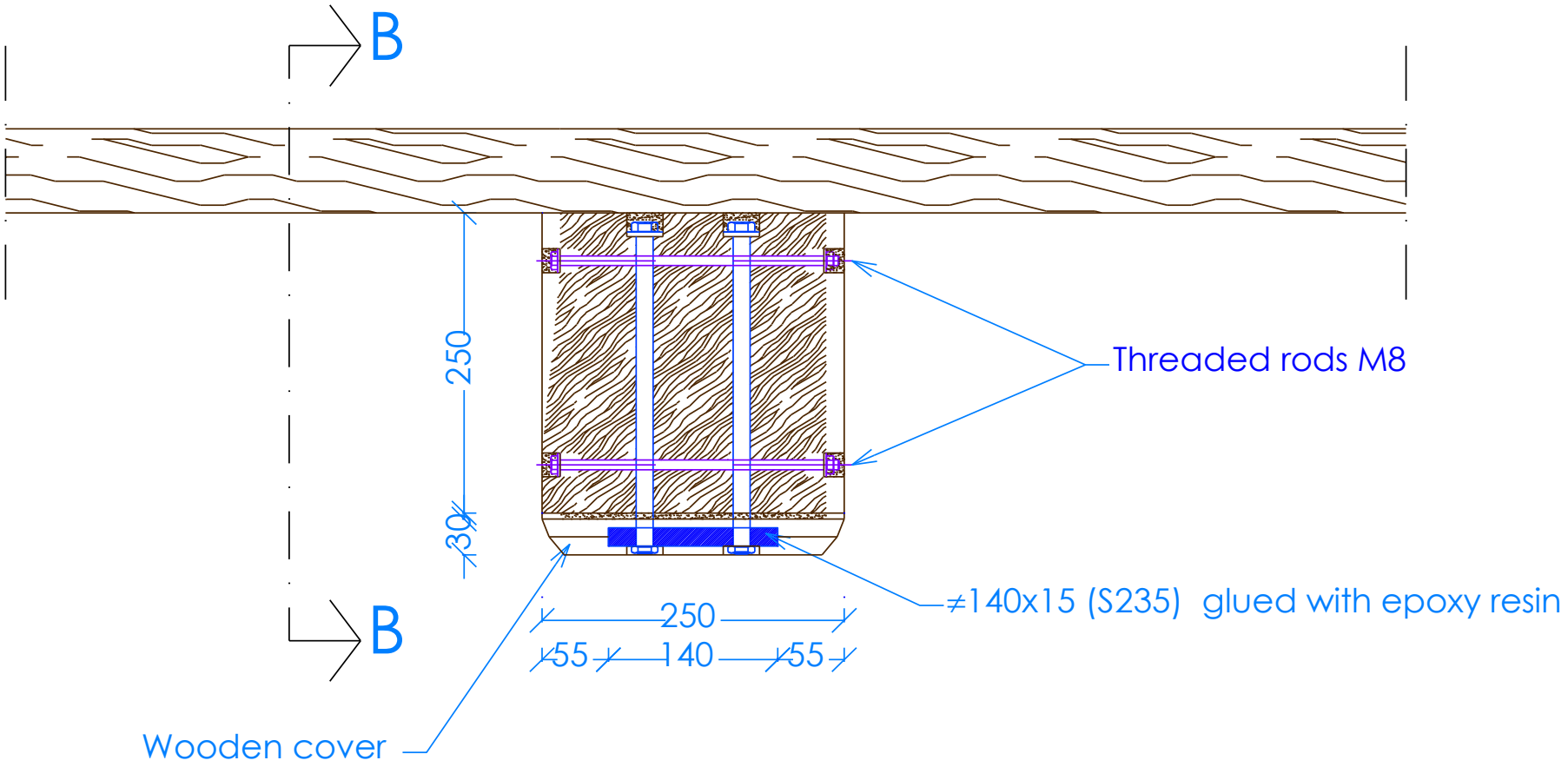
Insufficient cross section – Uncorrect wood fibre pattern

Insufficient cross section – Uncorrect wood fibre pattern

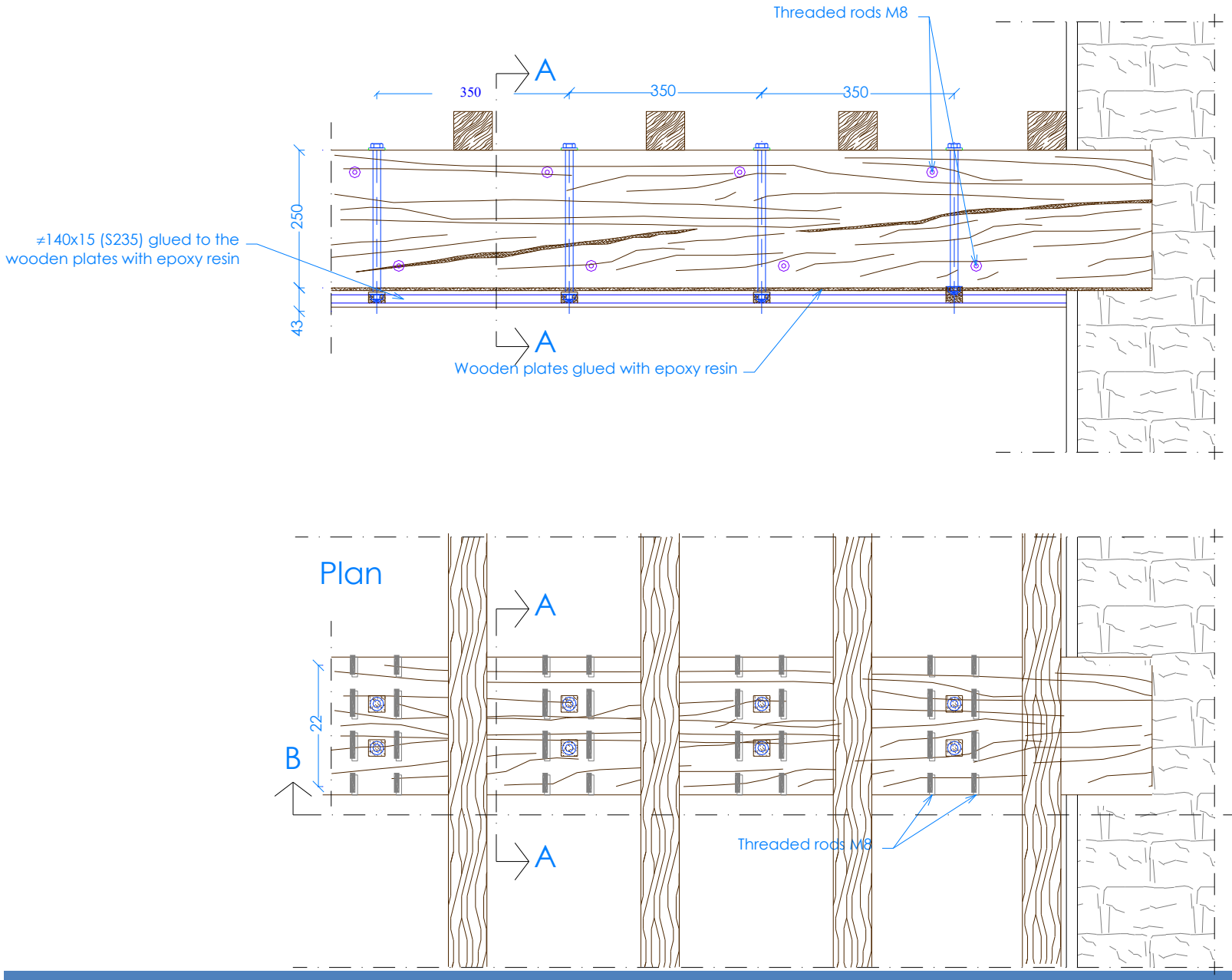
Beam supported with a pack prop

Beams supported with pack props

Support and crack



Strengthening of timber beam preserving the exterior aspect



Strengthening of timber beam preserving the exterior aspect

Crack pattern in a beam

Beam covered with wood plates

General view of the floor

Detail of the cover

A surprising arrangement of the cover

Detail of the supports

Typical crack pattern

Covered beams

Painted vault

CASE STUDY N. 3

SUBSTITUTION OF TIMBER BEAMS

CASE STUDY N. 3

SUBSTITUTION OF TIMBER BEAMS

Substitution of the floor

CASE STUDY N. 3

SUBSTITUTION OF TIMBER BEAMS FROM BELOW

Removal of the beam supporting the floor

Insertion of the new beam

Preparation of the support

Beam substitutions completed

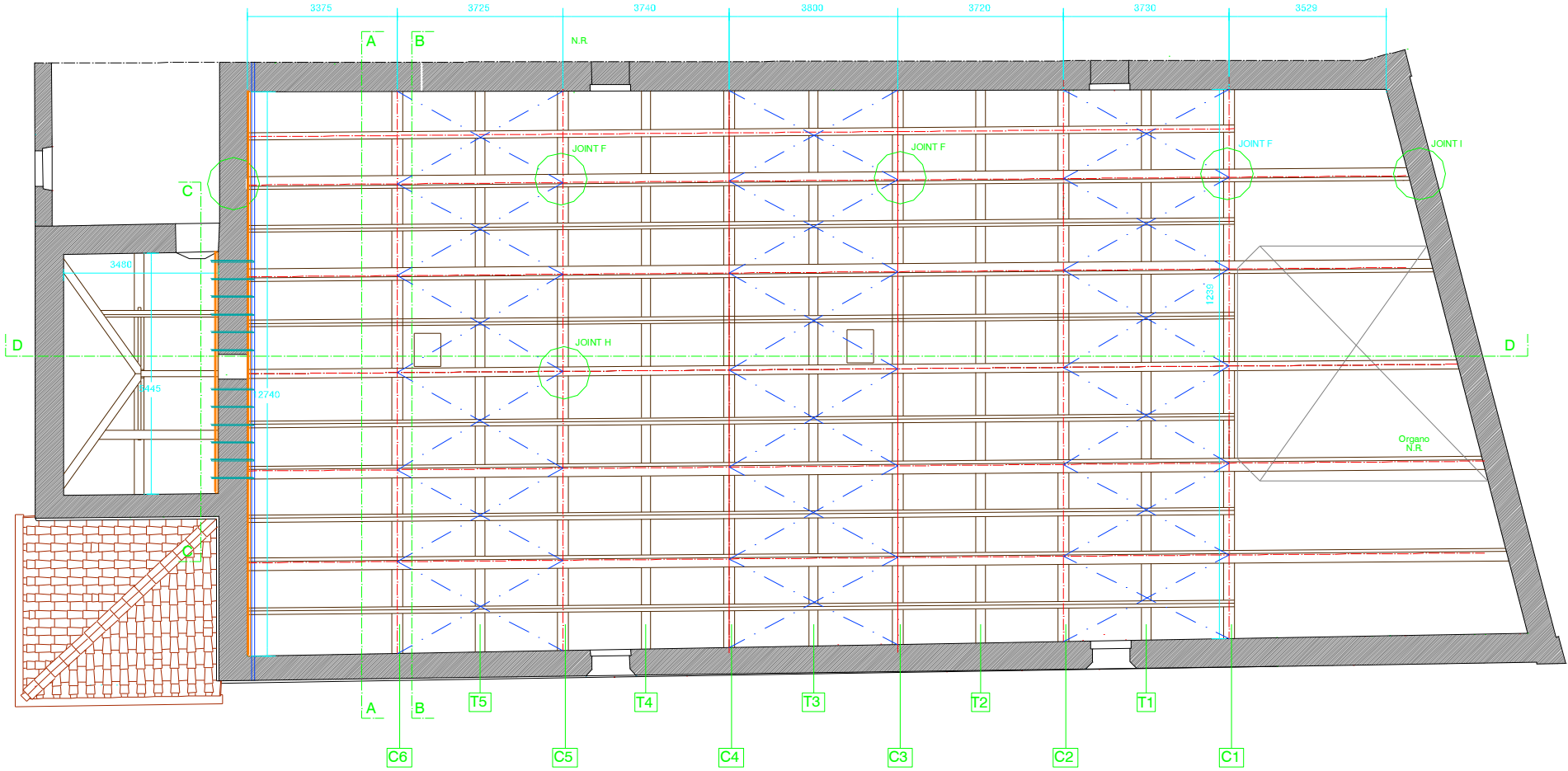
Arch to be strengthened

Arch strengthening

CASE STUDY N. 4

STRENGTHENING AND REPAIR OF A WOODEN TRUSS ROOF SUSTAINING A PAINTED CIELING

The interior of the Church



Plan of the roof structure

Typical strut-tie joint

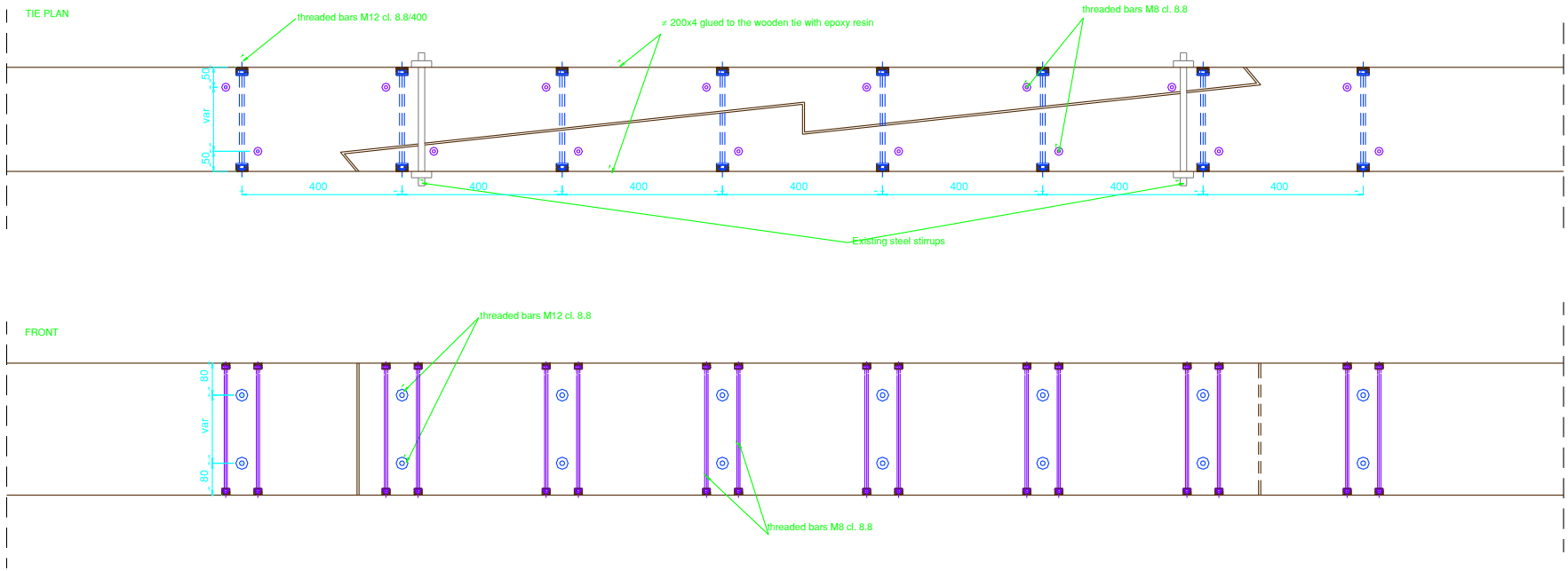
Suspension of the cieling

Connection of the truss tie - Jupiter dart

Connection of the truss tie - Jupiter dart

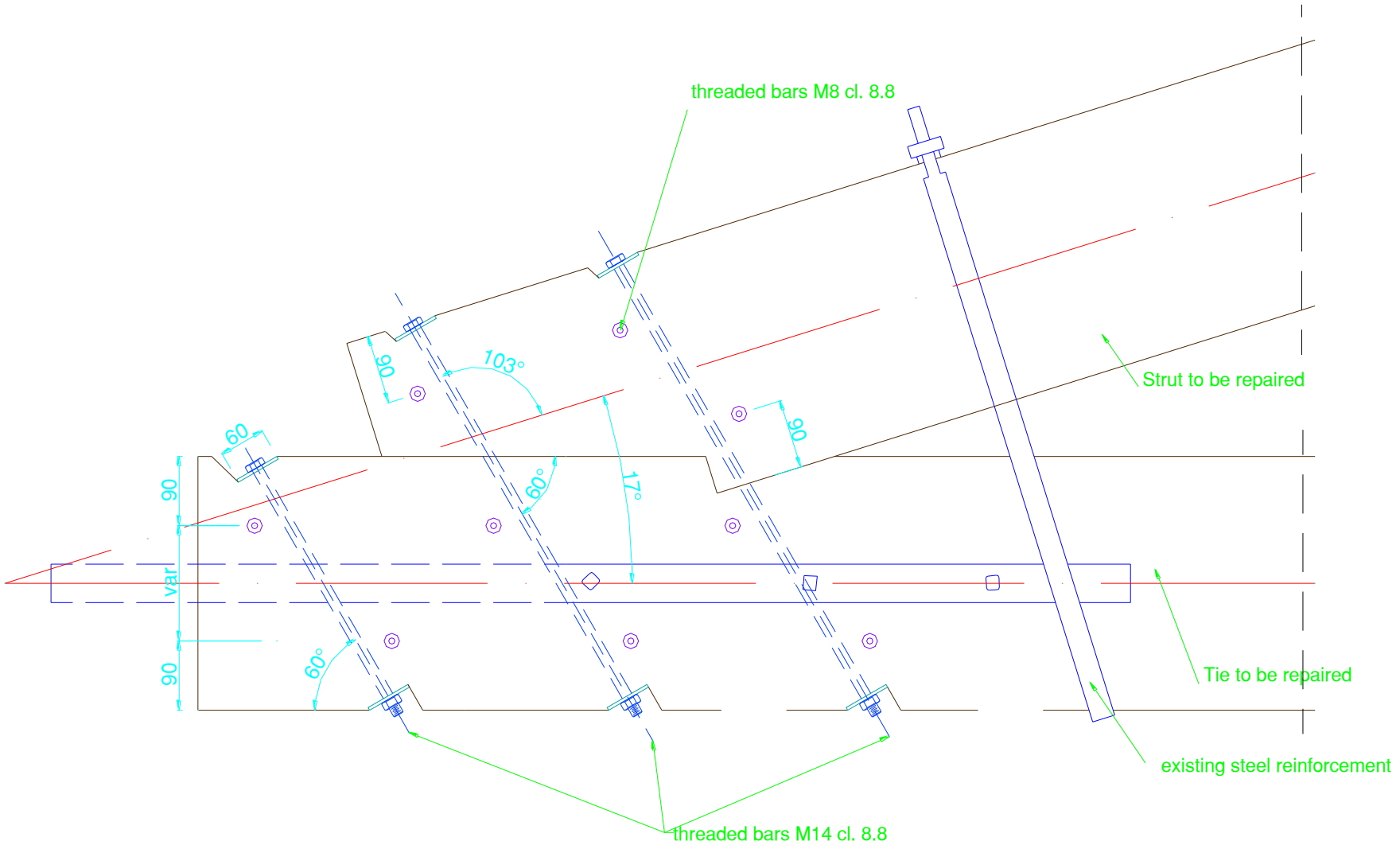
Repair of the strut

Repair of the truss and temporary chain

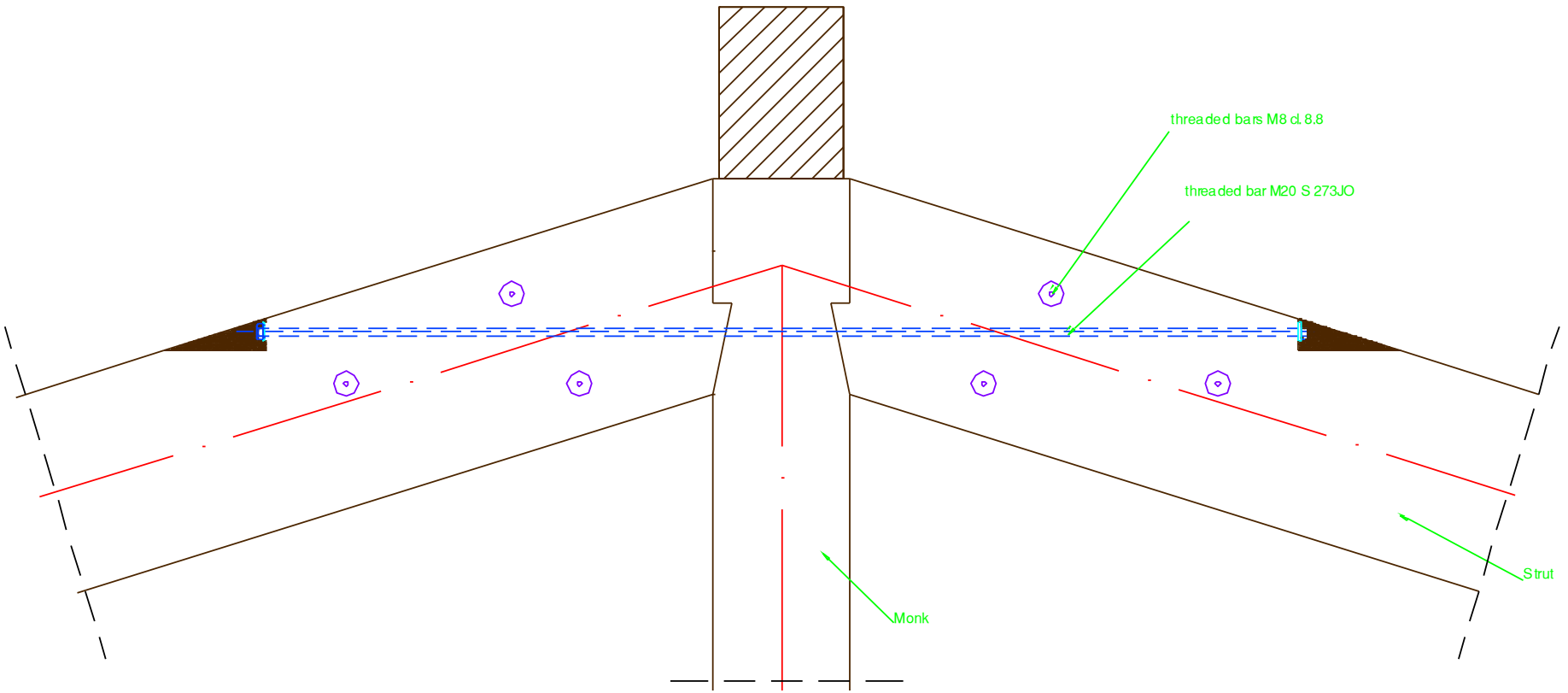


Repair of the Jupiter dart

Repair of the Jupiter dart



Repair of the strut-tie connection



Repair of the strut-monk connection

Repair of the strut-tie connection

Temporary suspension of the truss

Repair of a damaged head

Repair of a damaged head

Steel bracings

Strengthening of the facade wall

Thank you for your kind attention