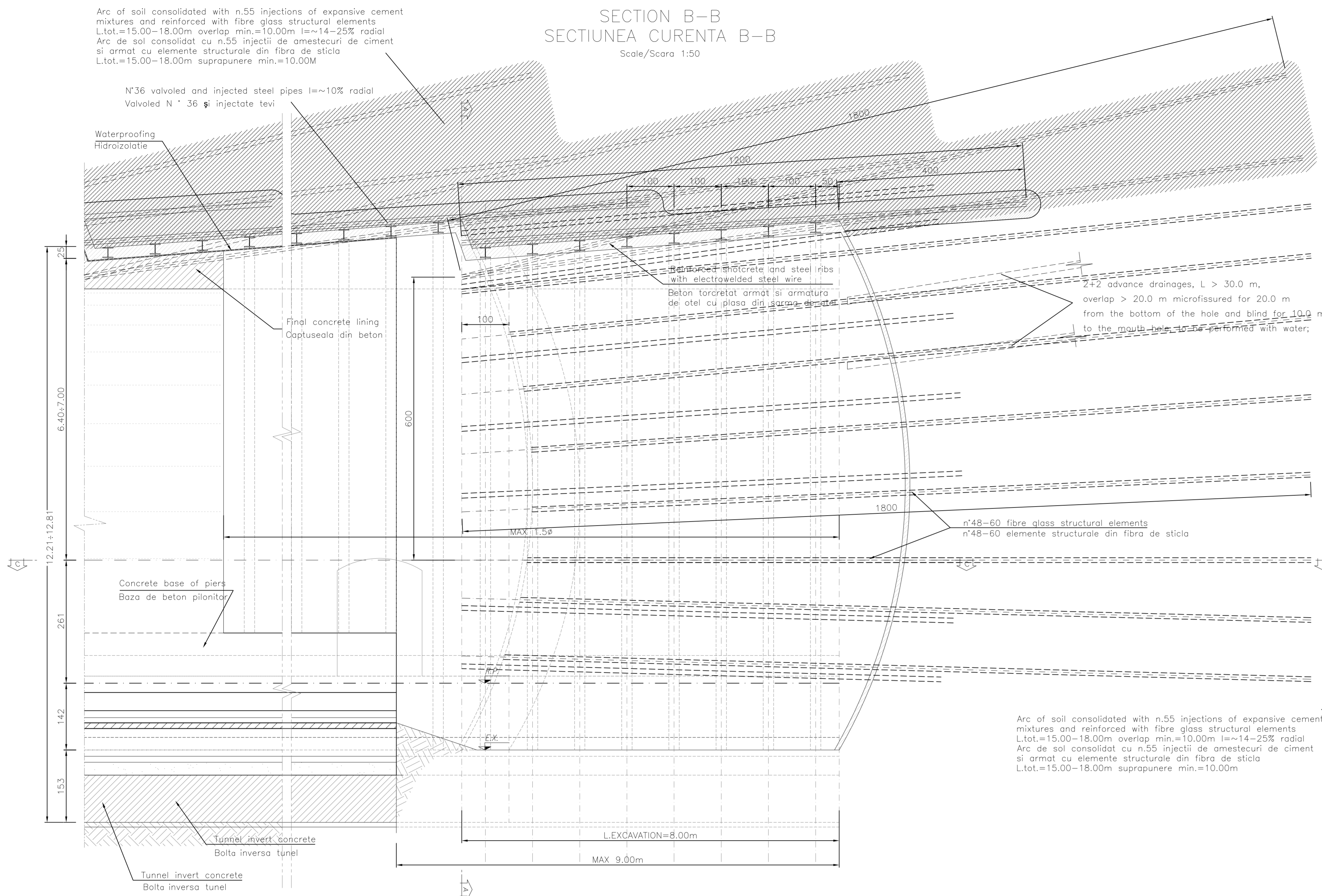
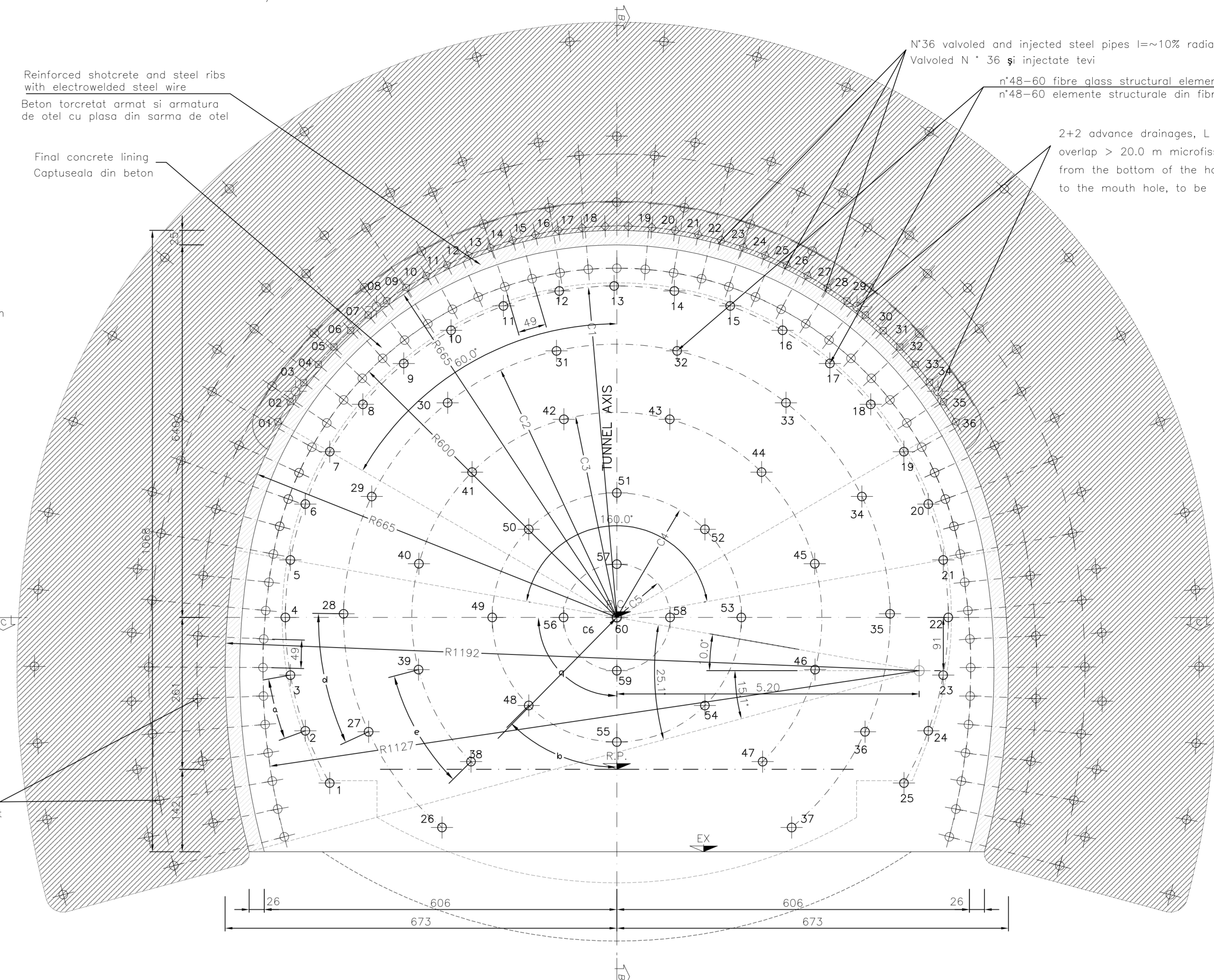


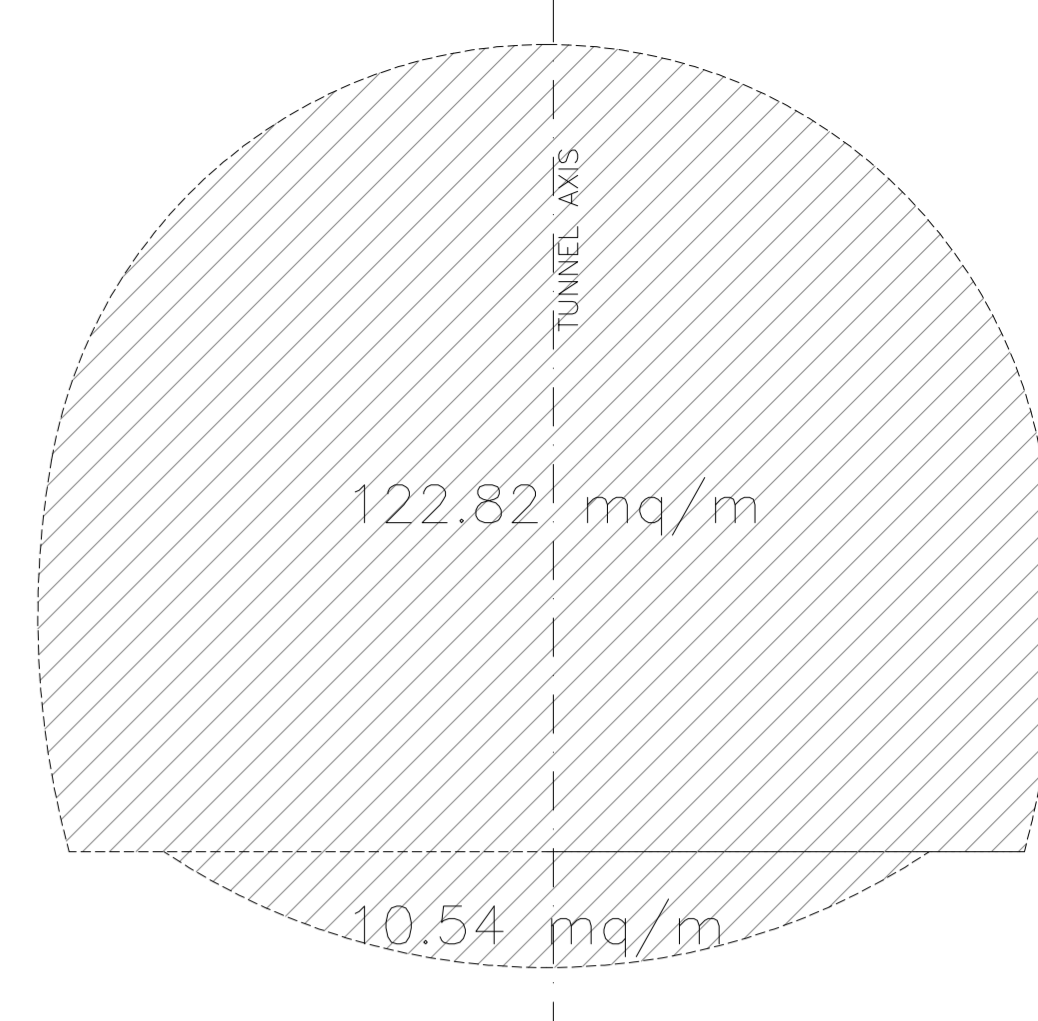
SECTION B-B
SECTIUNEA CURENTA B-B
Scale/Scara 1:50



SECTION A-A
SECTIUNEA CURENTA A-A
Scale/Scara 1:50



EXCAVATION VOLUME
total volume= 133.36 mc/m



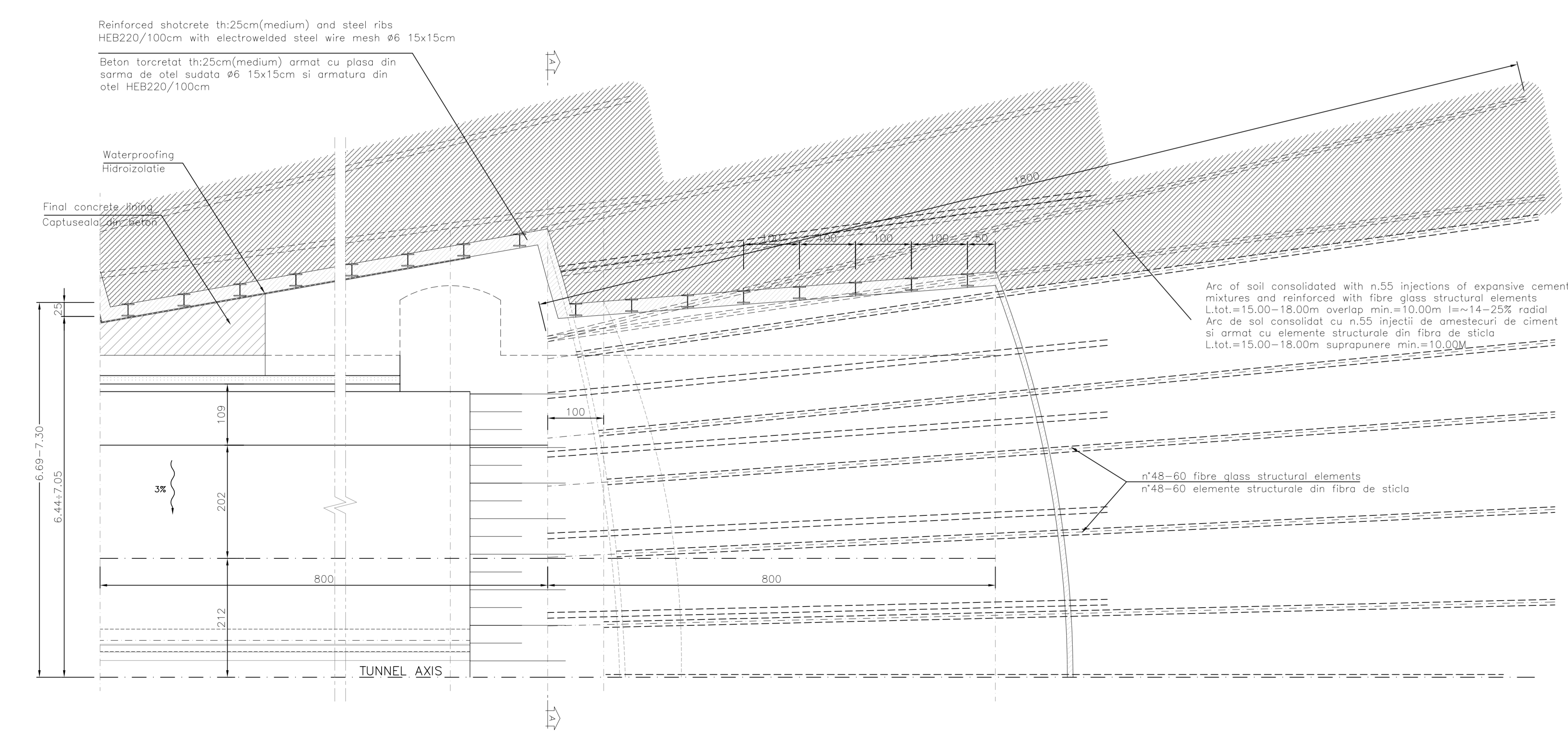
NOTE/NOTA
- ROUTES TO THE TYPE OF APPLICATION OF SECTIONS SEE THE PROFILE GEOMECHANICS
- TOLERANCES FOR THE CONSTRUCTION OF THE EXECUTIVE PROJECT SEE DOCUMENT "NATURAL TUNNEL - CONSTRUCTION SPECIFICATIONS AND TOLERANCES"
- ANY DIFFERENCES BETWEEN THE TOTAL AND MEASURES SPECIAL PARTIAL MEASURES ARE DUE TO ROUNDING OF AUTOMATIC AUTOMATED
- FOR THE SYSTEM OF DRAINAGE WATER SEW SUBMISSIONS: SPECIAL SECTION TYPE OF WATERPROOFING AND DRAINAGE TO BE USED
- DETAILED AND FREQUENT CONTROL AFTER EXCAVATION OPERATIONS WILL SUGGEST THE CONSOLIDATION OF ACTIONS EXPECTED OF DISTANCES FROM BOW FRONT AND TUNNEL INVERT AND BASE OF PIERS COVERING THE FINAL, AS OUTLINED IN THIS DOCUMENT
- RUTILE SPIRE TIP DE APLICARE A SECTIUNILOR VEDE GEOMECHANICAPROFILUL
- TOLERANTE PERMIS CONSTRUCTIEI DE EXECUTIE PROIECTULUI VEZI DOCUMENTUL "TUNELUL NATURAL - SPECIFICATIILE DE CONSTRUCTIE SI TOLERANTE"
- ORICE DEVIETARE ENTRE TOTAL SI MASURI DE MASURA TOTALE PARTIALE SUNT, CAZUTIA ROTUNDIRII AUTOMATE AUTOMATE
- PENTRU SISTEMUL DE SCURSERI A APELOR RASCOARILE VOARE TR SECURIE SPECIALLA HIDROIZOLATII SI DRENAJ SAPE UTILIZATI
- CONTROLUL COMPLEMENTAR VA DE TENDINTEA DE REPERIETARE - VANARI DE INTENSITATE PROPUNE CONSOLIDAREA ACTIUNILOR CERUTE DE DISTANTELE DIN FATASOBI SI A INVERSA SI PLACARE A PERIETULUI FINAL, CUM SA SUBIAT IN ACEST DEZVOLTAT.

FIBRE GLASS STRUCTURAL ELEMENT LAYOUT

CIRC	RADIUS (m)	NUMBER	LENGTH	OVERLAP (m)	RADIAL INCLIN.	ANGLE
C1	5.70	25	>=18.00	>=10.00	10.0%	α=120.0 g
C2	4.70	12	>=18.00	>=10.00	9.0%	α=28.3 g
C3	3.52	10	>=18.00	>=10.00	8.0%	α=33.2 g
C4	2.14	8	>=18.00	>=10.00	6.0%	α=50.0 g
C5	0.91	4	>=18.00	>=10.00	5.0%	α=100.0 g
C6	0.00	1	>=18.00	>=10.00	0.0%	/

ELEMENT # 48/60

SECTION C-C
SECTIUNEA CURENTA C-C
Scale/Scara 1:50



MATERIAL TABLE

Shotcrete C20/25
- Average compressive strength after 48h > 13N/mm²
- The shotcrete must be reinforced with electro-welded steel mesh #6 15x15cm in 8x500 steel or steel fibers with low carbon content.
- Energy Consumption: 500 joules (From punching tests performed on fiber-reinforced concrete plates).
- The tunnel face will be armed only with fiber.

Reinforcing steel
- B450C, controlled by establishment.
- f_{nom} = 450 N/mm²
- f_{lim} = 540 N/mm²
- f_k > f_{lim}, fracture 5%
- f_k > f_{lim}, fracture 5%
- 1.15 x (R_{yk}/f_k) ≤ 1.35 fracture 10%
- (R_{yk}/f_{lim}) ≤ 1.25, fracture 10%
- Compression (R_{yk}) > 7.25, fracture 10%
- Weldable.
- Concrete cover: c=4cm ±20%

Steel ribs
- Steel ribs consisting of two coupled sections HER220 in S275 steel and stiffening brackets step 1.0m tolerance. Steel plates S275 and steel angles 60x60x10 for attaching chairs.
- Microfissured PVC Pipeline
- at base of waterproofing #125mm, Th.>3mm (see DIN 1187)
- for waste water, #125mm, Th.>3mm (see DIN 1187)
- Drainage PVC Pipeline
- for waste water, #125mm, Th.>3mm (see DIN 1187)
- Waterproofing
- Geotextil: polypropylene nonwoven fabric in continuous wire P=400g/mg
- PVC: thermoplastic PVC waterproofing membrane, Th.>2mm, tensile strength >=15 N/mm²

Fibre Glass Structural Elements
- Consolidation with fibre glass structural elements #60/40 and valves hardened cement mortars (1valv./1.00m);
- Density >= 19 kN/m³
- Tensile strength >= 1000 MPa;
- Shear strength >= 200 MPa;
- Modulus of elasticity >= 40'000 MPa;
- Glass content >= 60%
- External diameter for fibre glass pipes #60;
- Joint (eventual): better seamless bars, if joint are present must be made for bonding with epoxy resins and screwing with steel sleeves;
- Fast bars: 40 th=6mm connected to the boundary of a 20mm PVC pipe; high adherence achieved with quartz sand

Expansive cement mixtures
- Typical composition:
Water: 1000 lt
Cement: 42.5 Pk 1340 kg
Densitate: 40 kg
Sodium silicate: 10 kg
Aluminium paste: 1.5 kg
- Minimum requirements:
Free expansion ratio > 30%
Confined expansion pressure > 1.5 MPa
Semi-confined expansion pressure > 1.0 MPa
Minimum compressive strength (at 48 hours) and confined expansion > 5.0 MPa

Consolidare cu otel
- Densitate > 19 kN/m³
- Rezistenta la rupere > 250 MPa
- Rezistenta la forfecare > 140 MPa
- Modulul de elasticitate > 15000 MPa
- Continutul > 60% sticla
- n3 placii L=40mm th=7mm conectate prin distanteri la o consola PVC cu 40mm pentru filtre de injectie.
- Aderenta spornii cu nisip de cuarț rasina de nisip

Nervura de otel
- Nervurile de otel constau in doua sectiuni cuplate HER220 in S275 otel si cadre de otel rigidizate cu toleranta de 1.0m±20% Placi de otel S275 unghiuri de otel 60x60x10 pentru atasarea lanturilor.

Teava microcracata PVC
- la baza hidroizolatiei #125mm, Th.>3mm (vezi DIN 1187)
- Teava PVC pentru drenaj
- Teava PVC pentru drenaj #125mm, Th.>3mm (vezi DIN 1187)
- Hidroizolatie
- Geotextil: polypropylene din material netesut in fir continuu P=400g/mg
- PVC: PVC termoplastice cu membrana impermeabila, Th.>2mm, Rezistenta la rupere >=15 N/mm²

Elemente structurale din fibra de sticla
Consolidarea cu elemente structurale din fibra de sticla #60/40 si valve amestecate din ciment intarit (1valv./1.00m);
- Densitate > 19 kN/m³
- Rezistenta la rupere > 1000 MPa
- Rezistenta la forfecare > 200MPa
- Modulul de elasticitate > 40000 MPa
- Continutul > 60% sticla
- diametrul exterior al conductei din fibra de sticla #60;
- Imbinarea (eventual): mai bine fara sudura, daca imbinarile sunt prezente trebuie realizate pentru lipirea cu rasina epoxidica si rasolat cu manson de otel.
- Bare plate: 40 th=6mm conectat la limita a 20mm din conducta PVC; aderenta ridicata o abinarii cu quart din nisip.
- Amestecuri in ciment expansiv
- Compozitie tipica:
apa 1000 lt
Ciment: 42.5 Pk 1340 kg
Densitate: 40 kg
Sodium silicate: 10 kg
Aluminium paste: 1.5 kg
- Cerinte minime:
raportul liber de expansiune > 30%
presiunea confinata de expansiune > 1.5 MPa
Semi-confined expansion pressure > 1.0 MPa
rezistenta minima la rupere (at 48 hours) and confined expansion > 5.0 MPa

TABELUL DE MATERIALE

CONSTRUCTION PHASES

FAZA 1: implementing pre-consolidation with structural fiberglass elements to the tunnel face
FAZA 2: implementing pre-consolidation of tunnel excavation boundaries and base of steel ribs
FAZA 3: implementing long drainage in progress
FAZA 4: perform excavation
FAZA 5: laying steel ribs and shotcrete
FAZA 6: cast in place of tunnel invert, base of piers and concrete filling
FAZA 7: waterproofing
FAZA 8: cast in place of piers and tunnel crown

FAZELE DE CONSTRUCTIE

FAZA 1: implementarea de pre-consolidare la fata tunelului cu elemente structurale de fibra de sticla
FAZA 2: implementarea de pre-consolidare la excavarea tunelului boundaries and base of steel ribs
FAZA 3: implementarea drenaj lung
FAZA 4: efectuarea excavatiei
FAZA 5: stabilirea nervurilor de otel si beton torcerat
FAZA 6: cast in place of tunnel invert, baza pilonilor si umplerea cu beton
FAZA 7: impermeabilizatie
FAZA 8: cast in place pilonilor si carosaj tunelului

LEGEND
RP = REFERENCE PLANE
EX = EXCAVATIONS PLANE
PC = CENTERS PLANE

CLIENT / CLIENT

GUVERNUL ROMANIEI
ROMANIAN GOVERNMENT

PROIECT FINANAT DE UNIUNEA EUROPEANA
EUROPEAN UNION FINANCED PROJECT

C.N.C.F. "C.F.R." - S.A.

CONSULTANT / CONSULTANT

ITALFERR
Scop
Wison
OBERMEYER
PLANEN - BEUTEN GmbH
TECNIC
Consulting Engineers

REABILITAREA LINEI DE CALE FERATA Brasov - Simeria, parte componenta a coridorului IV Pan European, pentru circulatia trenurilor cu viteza maxima de 160 km/h. Sectiunea 1 Brasov - Sighisoara

Project/Project
2004/RO16/PP/PA003

Rehabilitation of the railway line Brasov - Simeria, component Part of the IV Pan-European Corridor, for the trains circulation with maximum speed of 160 km/h. Section 1 Brasov - Sighisoara

Faza / Phase:
P,Th. / T.D.

Denumire desen / Drawing Title :
ARCHITA 2 TUNNEL
NATURAL TUNNEL
Section type "C3" with and without niches - Excavation and consolidation sections
Sectiunea tip "C3" cu si fara nise - Sectiuni de excavatie si consolidare

Scale / Scara
variat / various

LOT

Modificari / Modification System

Scale / Scara
variat / various

LOT

Modificari / Modification System

EA 5 1 0 1 C 1 4 B B G N 0 4 0 0 0 0 1 0