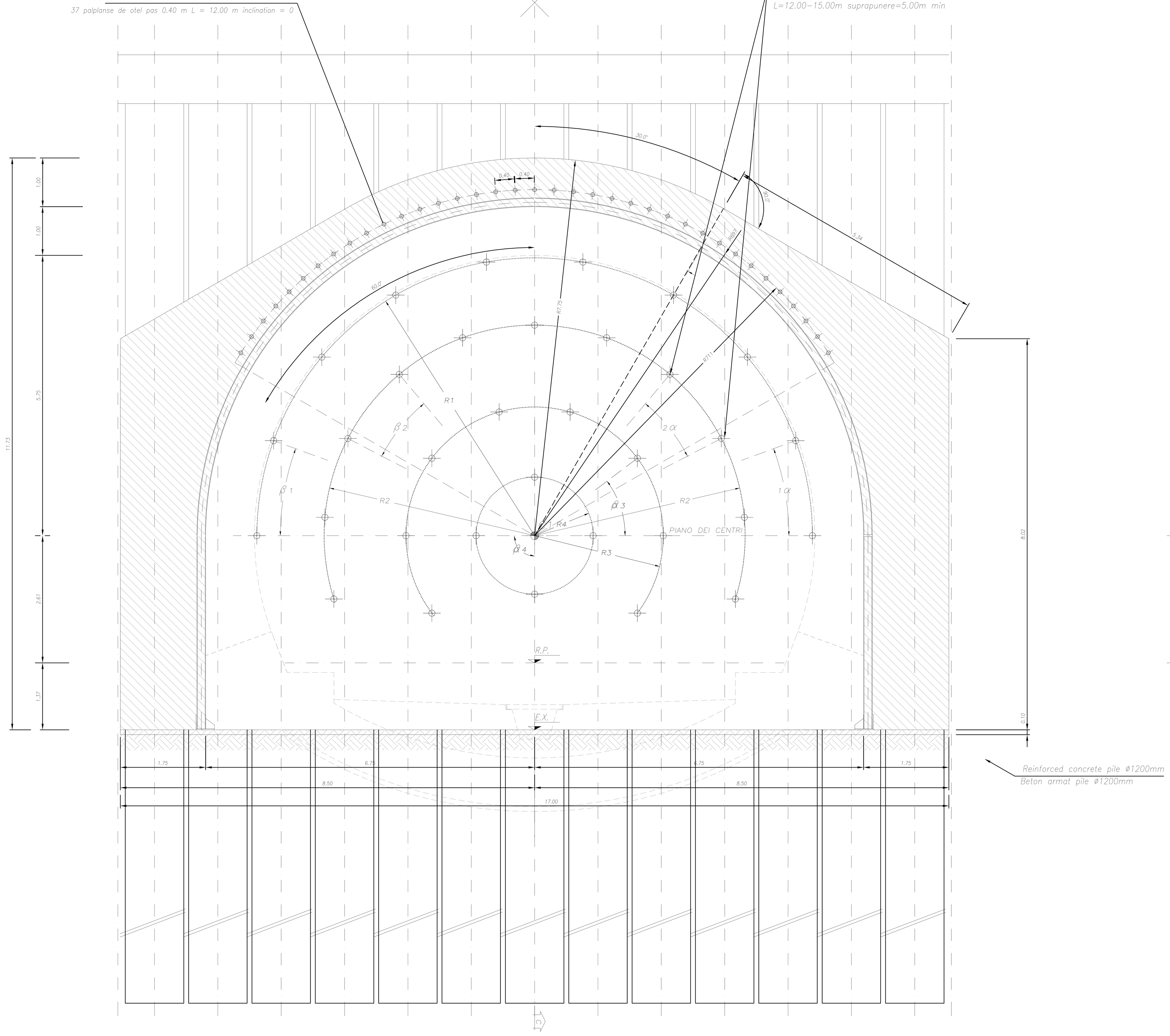
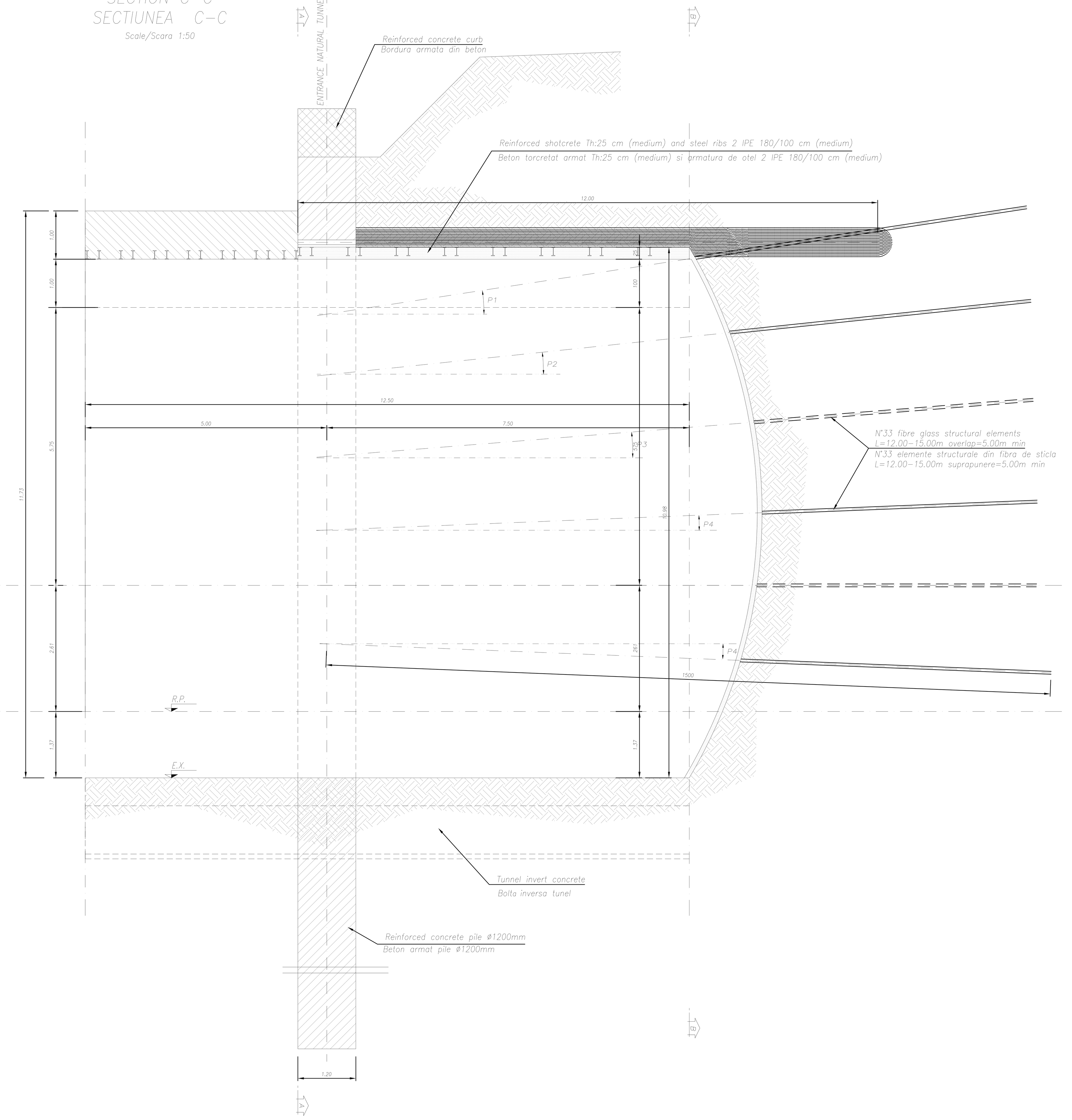
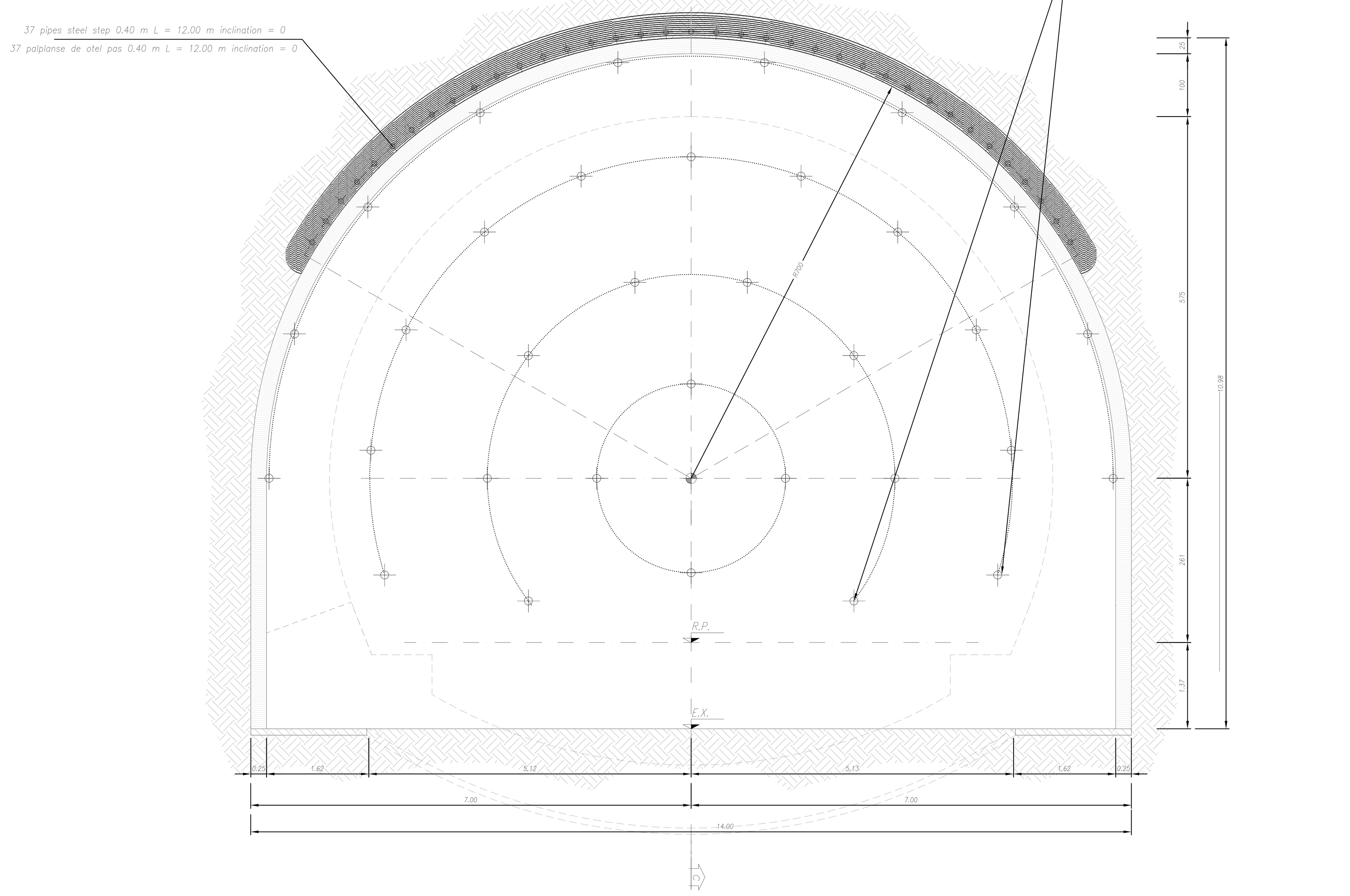
SECTION A–A
SECTIUNEA CURENTA A–A
Scale/Scara 1:50



SECTION C–C
SECTIUNEA C–C
Scale/Scara 1:50



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



TUNNEL FACE CONSOLIDATION LAYOUT OF FIBERGLASS BARS

CIRCUMFERENCE	RADIUS (m.)	NUMBER	ANGLE (g)	RADIAL INCL.	LENGHT (m.)
R.1	5.70	10	α1=22.2222	P1=13.50%	15.00
R.2	4.32	11	α2=25.0000	P2=10.50%	15.00
R.3	2.64	8	α3=41.1111	P3=8.00%	15.00
R.4	1.20	4	α4=100.0000	P4=4.00%	15.00

NOTE: Type, number and arrangement of preconsolidamenti may be varied, on recommendation of the designer, depending on the actual behavior of cable deformativo, detected in terms of convergence of cable and extrusion of the front

CONSOLIDATION OF PIPES STEEL DISPOSITION AROUND THE EXCAVATION BOUNDARY
DISPOSITIA A PALPLANSE DE OTEL JURUL EXCAVARE

- N. 37 pipes steel step 0.40 m L = 12.00 m inclination = 0
- N. 37 palplanse de otel pas 0.40 m L = 12.00 m inclination = 0

LEGEND

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

TABELUL DE MATERIALE

Beton torcretat
C20/25
- Rezistenta medie la compresiune dupa 48h > 13N/mm²;
- Betonul torcretat trebuie armat sudat cu plasa de sarma Ø6 15x15cm in B450C otel sau fibre de otel cu continut scazut de carbon.
Consumul de energie > 500 Jouli (De la testul de perforare efectuat pe placi din beton armat).
Fata tunelului va fi armat numai cu fibre.

Consolidarea cu otel
- B450C controlat de catre unitate:
fymom = 450 N/mm2
ftnom = 540 N/mm2
fyk > fymom, fractile 5%
ftk > ftnom, fractile 5%
1.5 ≤ (ft/fy)k ≤ 1.35 fractile 10%
(fy/fynom)k ≤ 1.25, fractile 10%
Elongatie (Agt)k > 7.5%, fractile 10%
- Sudabil;
- Beton de acoperire: c=4cm ±20%.

Nervurile din otel
- Nervurile de otel constau in doua sectiuni cuplate IPE 180 in S275 otel si cadre de otel rigidizate cu toleranta de 1.0m Placi de otel S275 unghiuri de otel pentru atasarea lanturilor.

Conducta PVC microcrapata
- la baza hidroizolatiei Ø125mm, Th.>3mm (vezi DIN 1187)

Conducta PVC de drenaj
- pentru apa irosita Ø125mm, Th.>3mm (vezi DIN 1187)

Hidroizolatia
- Geotextil: polipropilena din material netesut in fir continuu P>400g/mq
- PVC: Membrana termoplastic PVC rezistenta la apa Th.>2mm. Rezistenta la rupere >=15 N/mm²

Elemente structurale din fibra de sticla
Consolidarea cu elemente structurale din fibra de sticla Ø60/40 si valve amestec din ciment intarit (1valv./1.00m):
- Densitate > 19 KN/mc;
- Rezistenta la rupere> 1000 MPa
- Rezistenta la forfecare > 200MPa
- Modulul de elasticitate > 40000 MPa
- Continutul > 60% sticla
diametrul exten al conductei din fibra de sticla Ø60;
Imbinarea (eventual): mai bine fara sudura; daca imbinarile sunt prezente trebuiesc realizate pentru lipirea cu rasini epoxidice si racodat cu manson de otel.
Bare plate: 40 th.=6mm conectat la limita a 20mm din conducta PVC; aderenta ridicata o obtinem cu qart din nisip.
Amestecuri in ciment expansiv
- Compozitie tipica:
apa 1000 lt
Ciment: 42.5 PL 1340 kg
Bentonite: 40 kg
Sodium silicate: 10 kg
Aluminum paste: 1.5 kg
- Cerinte minime:
raportul liber de expansiune > 50%
presiunea confirmata de expansiune > 1.5 MPa
Semi-confined expantion pressure > 1.0 MPa
rezistenta minima la rupere (at 48 hours) and confined expantion > 5.0 MPa

MATERIAL TABLE

Shotcrete
C20/25
- Average compressive strength after 48h > 13N/mm²;
- The shotcrete must be reinforced with electrowelded wire mesh Ø6 15x15cm in B450C 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:
fymom = 450 N/mm2
ftnom = 540 N/mm2
fyk > fymom, fractile 5%
ftk > ftnom, fractile 5%
1.5 ≤ (ft/fy)k ≤ 1.35 fractile 10%
(fy/fynom)k ≤ 1.25, fractile 10%
Elongation (Agt)k > 7.5%, fractile 10%
- Weldable;
- Concrete cover: c=4cm ±20%.

Steel ribs
- Steel ribs consisting of two coupled sections IPE 180 in S275 steel and stiffening brackets step 1.0m tolerance. Steel plates S275 and steel angles for attaching chains.

Microfissured PVC Pipeline
- at base of waterproofing Ø125mm, Th.>3mm (see DIN 1187)

Drainage PVC Pipeline
- for waste water, Ø125mm, Th.>3mm (see DIN 1187)

Waterproofing
- Geotextile: polypropylene nonwoven fabric in continuos wire P>400g/mq
- PVC: thermoplastic PVC waterproof membrane, Th.>2mm. Tensile strength >=15 N/mm²

Fibre Glass Structural Elements
- Consolidation with fibre glass structural elements Ø60/40 and valves hardened cement mixtures (1valv./1.00m):
Density >= 19 kN/m;
Tensile strength >= 1000 MPa;
Shear strength >= 200 MPa;
Modulus of elasticity >= 40'000 MPa;
Glass content >= 60%;
External diameter fo fibre glass pipes Ø60;
Joint (eventual): better seamless bars; if joint are present must be made for bonding with epoxy resins and screwing with steel sleeve;
Flat bars: 40 th.=6mm connected to the boudary of a 20mm PVC pipe; high adherence achieved with qartz sand
Expansive cement mixtures
- Typical composition:
Water: 1000 lt
Cement: 42.5 PL 1340 kg
Bentonite: 40 kg
Sodium silicate: 10 kg
Aluminum paste: 1.5 kg
- Minimum requirements:
Free expantion ratio > 50%
Confined expantion pressure > 1.5 MPa
Semi-confined expantion pressure > 1.0 MPa
Minimum compressive strength (at 48 hours) and confined expantion > 5.0 MPa

Indice / Index	Data / Date	Modificare / Modification/Revision	Proiectant / Designer	Aprobat Consultant / Approved Consultant	Aprobat CFR / Approved CFR
D					
C					
B					
A					

GUVERNUL ROMANIEI
ROMANIAN GOVERNMENT

PROIECT FINANȚAT DE UNIUNEA EUROPEANĂ
EUROPEAN UNION FINANCED PROJECT

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

CLIENT / CLIENT

ITALFERR – Joint Venture leader; Scott Wilson; OBERMEYER PLANEN + BERATEN GmbH; TECNIC Consulting Engineers

CONSULTANT / CONSULTANT

			Data / Date	Semnătură / Signature
Aprobat / Approved	Şef proiect / Project manager	R. Liuzza		
Aprobat / Approved	Coordonator Secţiune 1 / Section 1 Coordinator	C.Gambelli		
Verificat / Checked	Tunel Expert / Tunnel Expert	C. Gambelli		
Întocmit / Elaborated	Proiectant / Designer	C.Gambelli		

SUBCONSULTANT / SUBCONSULTANT

Aprobat / Approved	Responsabil Subconsultant / Subconsultant Responsible	
Întocmit / Elaborated	Proiectant / Designer	

Reabilitarea liniei de cale ferata Braşov - Simeria, parte componentă a coridorului IV Pan European, pentru circulaţia trenurilor cu viteza maximă de 160 km/h. Sectiune 1 Brasov - Sighisoara

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

Proiect/Project: 2004/RO/16/P/PA/003

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

Denumire desen / Drawing Title: **ARCHITA 1 TUNNEL**
ENTRANCE ARCHITA SIDE
Starting framework: excavation and consolidation sections
Inceputul cadrului: sectiuni de excavatie si consolidare

Codificare / Codification System — Scara / Scale: variat / various — LOT — Nr. / No: -

E	A	5	1	0	1	C	1	4	B	B	G	A	0	7	0	0	0	0	1	0