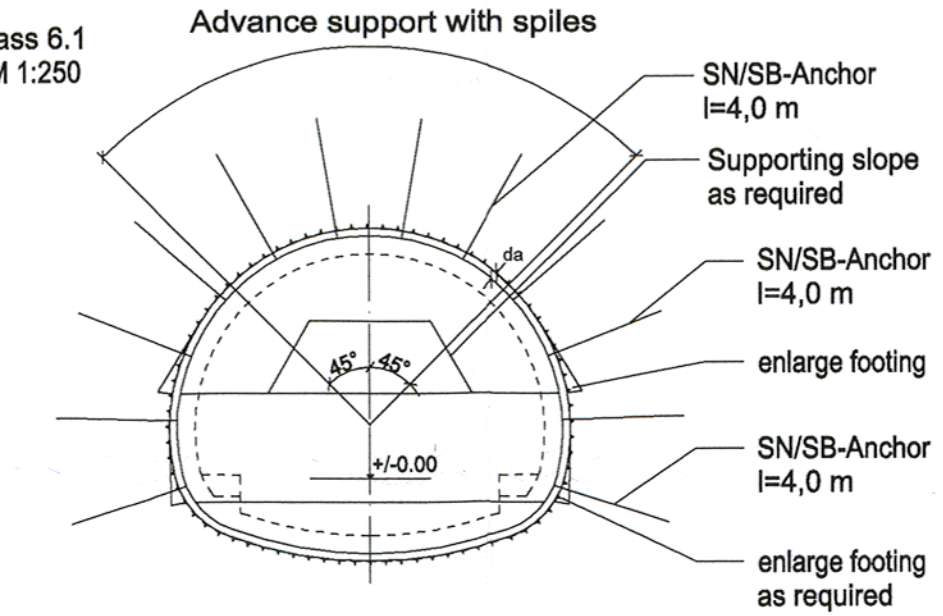
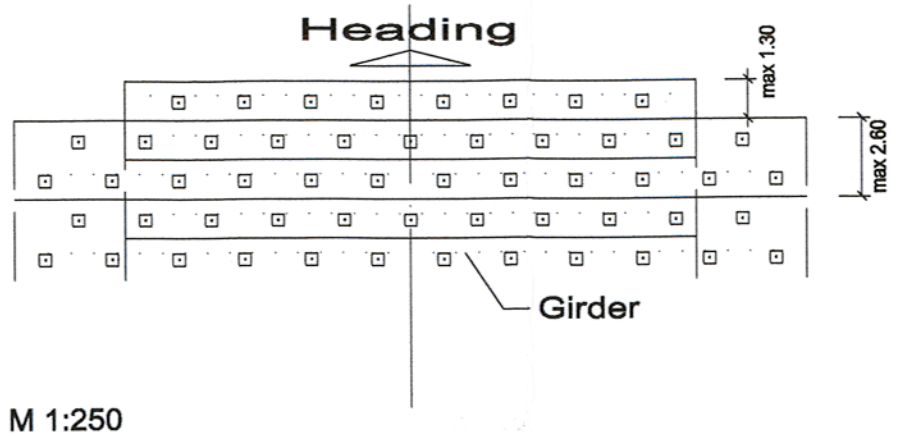
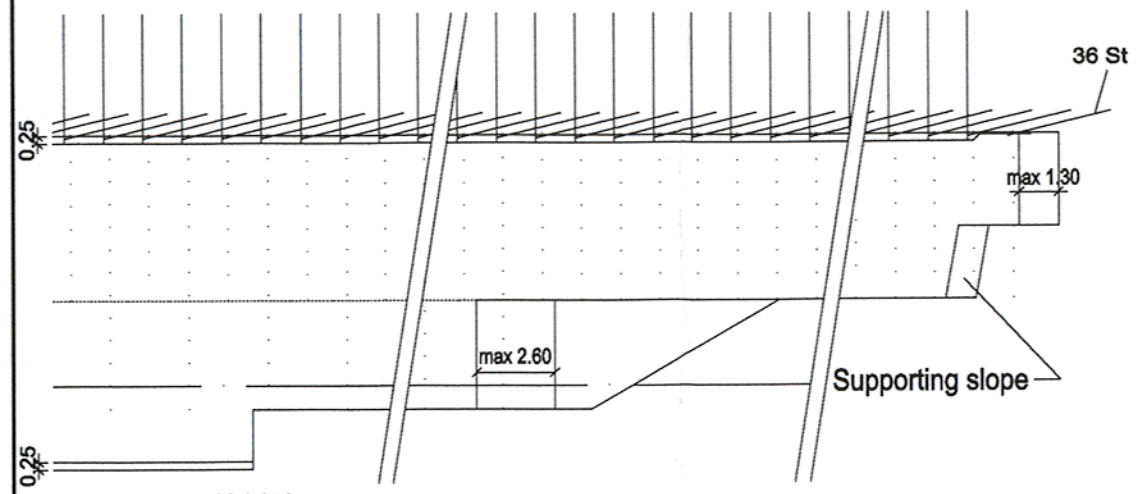
Excavation Class 6.1
Cross Section M 1:250





Execution M 1:250



Longitudinal section M 1:250

1. Crown
   - Protruding fuse with spears before each round

Excavation:
   - Length of round max. 1,3 m

Reinforcement:
   - Shotcrete sealing of the tunnel face after each round
   - Shotcrete after each round
   - Pre-molded concrete steel mats, steel sets, girder, shotcrete after each knocking off the soffit after each round
   - Systematic anchoring at second round behind heading after each round

2. Bench:
   - Trailing max. 60 m behind Crown

Excavation:
   - Length of round max. 2.6 m
   - half side

Reinforcement:
   - Steel fabric mats, shotcrete after each round
   - Every second steel set, girder is extended
   - Systematic anchoring at second round behind heading after each round

3. Invert :
   - Trailing distance up to 100 m from the face of the bench or according to measurement results

Excavation:
   - Unsupported round length max. 10 m

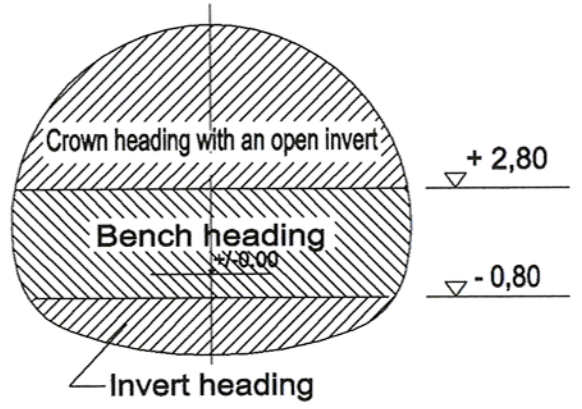
Reinforcement:
   - Steel fabric mats, shotcrete after each round

ORT	Term	UNIT	QUANTITY PER LFM TUNNEL
Crown	Excavation section	m³	53,86
	Steel fabric mats Q257, 2 Layers, A	m²	36,25
	Steel sets, girder Typ 1, e=1,3 m	m	13,94
	Shotcrete da=25 cm	m²	17,74
	Anchor l=4,0 m, SN/SB, 200 kN	St	6,54
	Sealing shotcrete face 6 cm	m²	30,00
	Spiles with injection drill bolt l=3,5 m, a=0,3 m, e=1,3 m	St	27,69
Kf Crown-	Excavation section	m³	0,70
	Shotcrete da=20 cm	m³	0,70
	Steel (fabric mats,horizontal bars)	kg	35,00
Bench	Excavation section	m³	47,03
	Steel fabric mats Q 257, 2 Layer	m²	14,83
	Steel sets, girder Type 1, e=2,6 m	m	2,85
	Shotcrete da=25 cm	m²	7,44
	Anchor l=4,0 m, SN/SB, 200 kN	St	2,31
	Enlarged foot bench		as required
Kf Bench	Excavation section	m³	0,50
	Shotcrete da=15 cm	m³	0,50
	Steel (fabric mats,horizontal bars)	kg	35,00
Invert	Excavation section	m³	17,10
	Steel fabric mats Q 257, 2 Layer	m²	25,70
	Shotcrete da=25 cm	m²	12,44

The quantity data are for cross section CS1 with inner shell thickness of 60 cm. In case of inner shell thickness of 40 cm (cross section CS2), the values to adjust.

Legend :

Kf ... Enlarged footing
l ... Length
a ... Distance in transverse direction
e ... Distance in longitudinal direction
A ... Connection of the reinforcement between the crown and bench
SN ... Rock anchor
SB ... Injection bore anchors
⊡ ... Length of anchor 4 m
⊡ ... Length of anchor 6 m
× ... Tunnel face anchors with a length 12 m
Typ 1 ... Girder GI 100
Typ 2 ... Girder GI 120
FS ... Girder at the foot of the crown



Verificator / Expert Checker / Expert	Cerinta Requirement	Semnatura Signature	Referat / Expertiza Report / Expertise

European Investment Bank

MINISTERUL TRANSPORTURILOR

BENEFICIAR / BENEFICIARY :

COMPANIA NAȚIONALĂ DE CĂI FERATE "CFR" SA

PROIECTANT / DESIGNER: PÖYRY

			Data Date	Semnatura Signature
Aprobat Approved	Sef de echipa Team leader	C. Teodorescu	06/2013	
Verificat Checked	Expert Cheie Key Expert	M. Diegmann	06/2013	
Aprobat Approved	Adjunct Sef de echipa Deputy Team leader	J. Werfling	06/2013	
Proiectat Designed	Inginer Engineer	D. Ciotarnel	06/2013	

"Reabilitarea liniei c.f. Frontieră - Curtici - Simeria, parte componentă a coridorului IV Pan - European pentru circulația trenurilor cu viteză maximă de 160 km/h"
Tronsonul 2: km 614-Gurasada
"Rehabilitation of the Railway Line Border - Curtici - Simeria, component Part of the IV Pan - European Corridor for the Trains Circulation with maximum speed of 160 km/h"
Section 2 :km 614-Gurasada

Project 9i
35311.1

Denumire desen / Drawing name:
EXCAVATION CLASS 6.1

Scara / Scale	Cod desen / Drawing Code	Nr / No
1:250	EC 5	EC 5