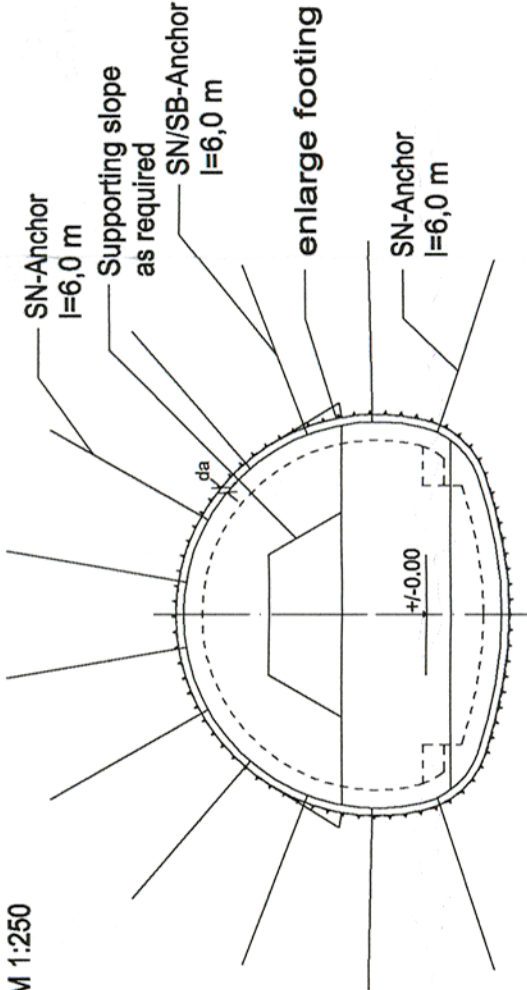
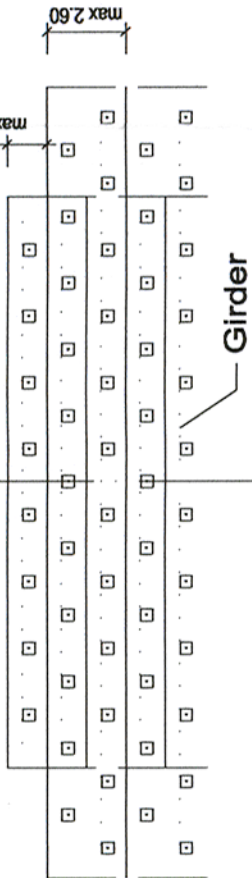
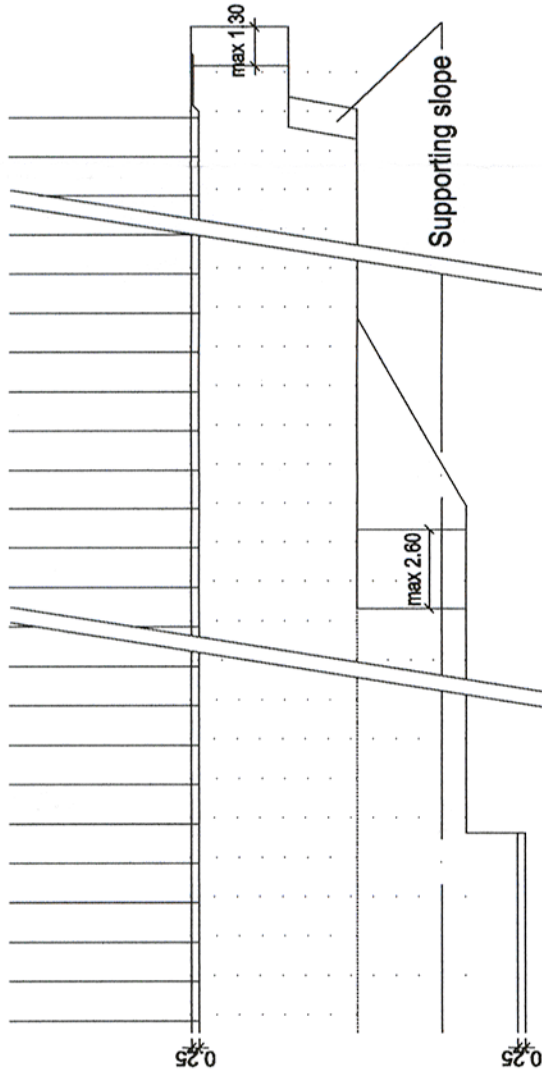




Heading



Execution M 1:250



Longitudinal section M 1:250

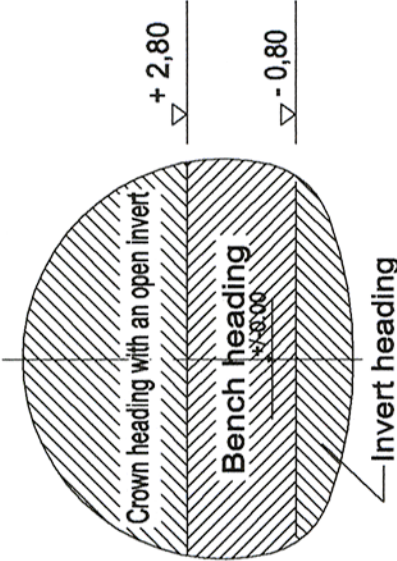
1. Crown
Excavation:
- Length of round max. 1,3 m
Reinforcement:
- Shotcrete sealing of the tunnel face after every tee
- Shotcrete after each round
- Steel fabric mats, steel sets, girder, shotcrete after each round
- Systematic anchoring at second round behind heading after each round
2. Bench:
- Trailing 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 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 Q 257, 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=6,0 m, SN/SB, 200 kN	St	6.54
Kf	Sealing shotcrete face 6 cm	m²	30.00
	Spiles with injection drill bolt l=3,5 m	St	as required
	Excavation section	m³	0.5
	Shotcrete da=15 cm	m³	0.5
	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=6,0 m, SN/SB, 200 kN	St	17.75
Invert	Excavation section	m³	17.55
	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
x ... 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
CHIRICA C. ANTON INGINIER PROIECTANT	MINISTERUL TRANSPORTURILOR		
European Investment Bank	BENEFICIAR / BENEFICIARY :		
	COMPANIA NAȚIONALĂ DE CĂI FERATE "CFR" SA		
PROIECTANT / DESIGNER:		Data Date	Semnatura Signature
Aprobat Approved	Sef de echipa Team leader	06/2013	
Verificat Checked	Expert Cheie Key Expert	06/2013	
Aprobat Approved	Adjunct Sef de echipa Deputy Team leader	06/2013	
Proiectat Designed	Inginier Engineer	06/2013	
"Reabilitarea liniei c.f. Frontieră - Simeria, parte componentă a coridorului IV Pan - European pentru circulația trenurilor cu viteză maximă de 160 km/h" Tronsoanel 2: km 614-Gurasada		Project 9i 35311.1	
"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			

Denumire desen / Drawing name:
EXCAVATION CLASS 4.3