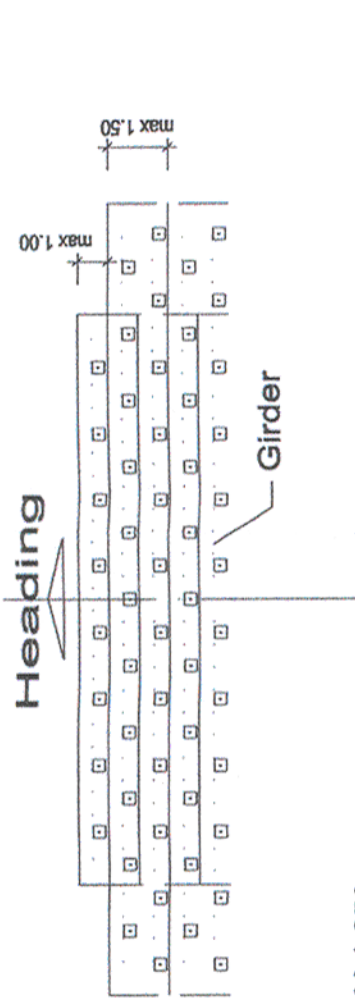
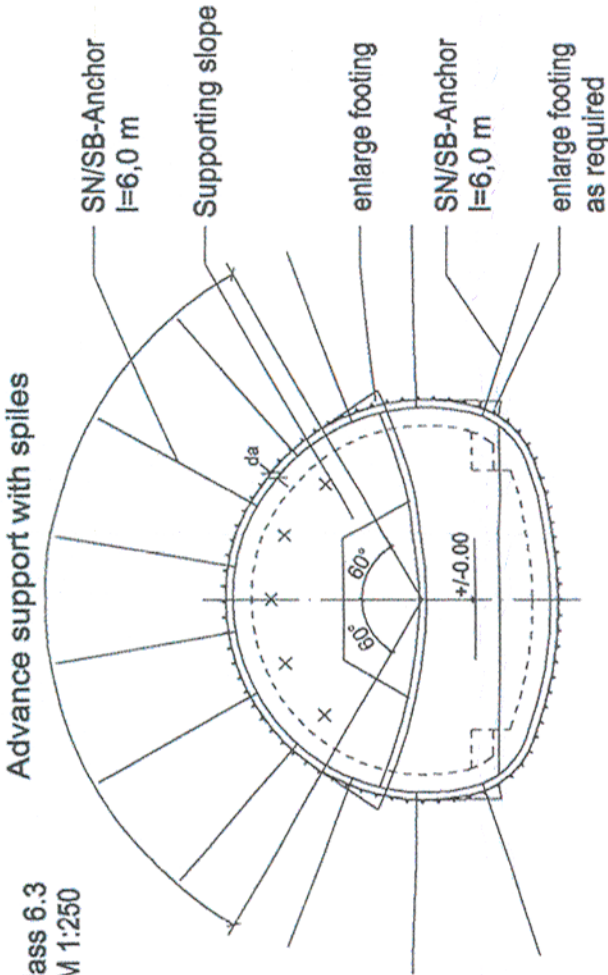
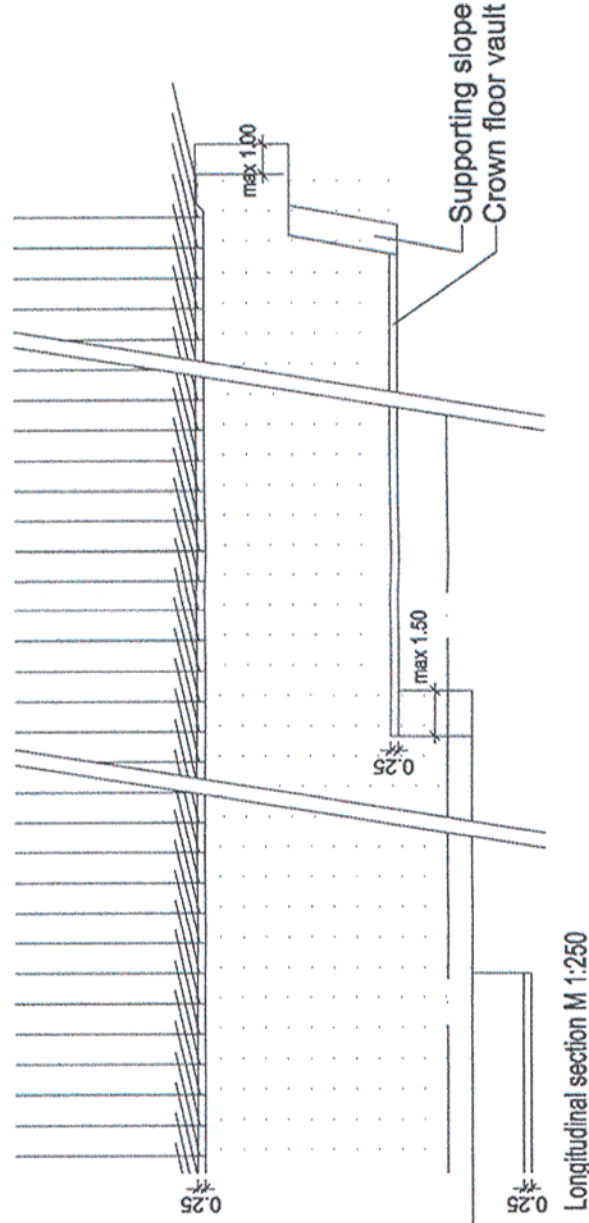


Excavation Class 6.3
Cross Section M 1:250



Execution M 1:250



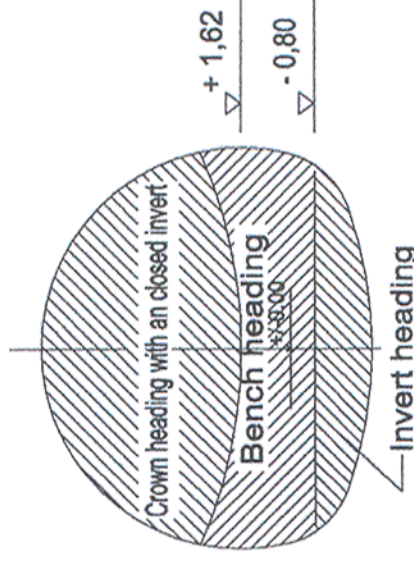
- 1. Crown**
 - Protruding fuse with spears before each round
- Excavation:**
 - Length of round max. 1,0 m
 - with supporting slope and enlarged footing - invert arch
- Reinforcement:**
 - temporary crown face with shotcrete after each round
 - Tunnel face anchors of 8 m
 - Shotcrete after each round
 - Steel fabric mats, steel sets, girder, shotcrete after each round
 - Systematic anchoring at second round behind heading after each round
 - Arch of shotcrete in invert of crown after each excavation section
- 2. Bench:**
 - Trailing max. 20 m behind Crown
- Excavation:**
 - Length of round max. 1,50 m
 - in full width with excavation section of shotcrete arch in invert of crown
- Reinforcement:**
 - Steel fabric mats, shotcrete after each round
 - Systematic anchoring at second round behind heading after each round
- 3. Invert:**
 - Trailing distance up to 20 m from the face of the bench
- Excavation:**
 - Unsupported round length max. 3 m
- Reinforcement:**
 - Steel fabric mats, shotcrete after each round

ORT	Term	UNIT	QUANTITY PER LPM TUNNEL
Crown	Excavation section	m ³	63,30
	Steel fabric mats Q 335, 2 Layers, A	m ²	35,64
	Steel sets, girder Typ 2, e=1,0 m, FS	m	17,82
	Shotcrete da=25 cm	m ²	17,82
	Anchor l=6,0 m, SN/SB, 200 kN	St	8,50
	Reinforced shotcrete face 10 cm	m ²	38,50
	Tunnel face anchor l=12 m, e=8,0 m	St	0,625
	Spiles with injection drill bolt l=3,5 m, a=0,3 m, e=1,0 m	St	47,00
	Shotcrete da=25 cm	m ²	13,40
	Steel fabric mats 2 x Q 257, 2 Layer	m ²	26,80
Crown	Excavation section	m ³	0,50
	Shotcrete=15 cm	m ³	0,50
Kf	Steel (fabric mats, horizontal bars)	kg	35,00
	Excavation section	m ³	37,58
Bench	Steel fabric mats Q 257, 2 Layer	m ²	15,44
	Steel sets, girder Type 1, e=1,0 m	m	7,72
	Shotcrete da=25 cm	m ²	7,72
	Anchor l=6,0 m, SN/SB, 200 kN	St	4,00
	Excavation section	m ³	17,75
Invert	Steel fabric mats Q 257, 2 Layer	m ²	25,20
	Shotcrete da=25 cm	m ²	12,85

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	Semnatuura / Signature	Referat / Expertiza / Report / Expertise
European Investment Bank	MINISTERUL TRANSPORTURILOR	
BENEFICIAR / BENEFICIARY :		
COMPANIA NATIONALA DE CAI FERATE "CFR" SA		
PROIECTANT / DESIGNER:		
Aprobat / Approved	Sef de echipa / Team leader	C. Teodorescu
Verificat / Checked	Expert Cheie / Key Expert	M. Diegmann
Aprobat / Approved	Adjunct Sef de echipa / Deputy Team leader	J. Werfling
Proiectat / Designed	Inginer / Engineer	D. Ciotarnel
		06/2013
		06/2013
		06/2013
		06/2013

Project 9i
35311.1

"Reabilitarea liniei c.f. Frontiera - 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

Denumire desen / Drawing name:
EXCAVATION CLASS 6.2

Scara / Scale	Cod desen / Drawing Code	Nr / No
1:250	EC 7	EC 7