

# **Modul BRIDGE**

# **CABLE PRESSTRESSING**

### **CABLE PRESSTRESSING**

- 1. Define cable axis files in cross sections in draft/sketch ground floor and longitudinal section
  - 1.1 Draw cross axis horizontal with command Civil -> Cross axis -> Draw cross axis.

Cross axis file					
Curent file *.pro					
C:\Primeri Moduli\Example1\Exam	ple1.pro				
Replace file >>					
Marks and axis lines					
Mark insertion side					
● Left	C	Right			
☑ Draw axis horizontal					
Step:					1
Number prefix Prefix:					P
Number prefix Prefix:					P
Number prefix Prefix: Axis line length [m]:					P 30.0
Number prefix Prefix: Axis line length [m]: Mark and station distance from axis	s lines [m]:				P 30.0 1.0
Number prefix Prefix: Axis line length [m]: Mark and station distance from axis Line color	s lines [m]:				P 30.0 1.0
Number prefix Prefix: Axis line length [m]: Mark and station distance from axis Line color	s lines [m]: Select color >	>>			P 30.0 1.0
Number prefix Prefix: Axis line length [m]: Mark and station distance from axis Line color Text	s lines [m]: Select color >	>>			P 30.0 1.0
Number prefix Prefix: Axis line length [m]: Mark and station distance from axis Line color Text Style	s lines [m]: Select color >	>>	ım]		P 30.0 1.0
Number prefix Prefix: Axis line length [m]: Mark and station distance from axis Line color Fext Style MOD_Arial	s lines [m]: Select color >	>> Height [m ○6.0	ım] • 5.0	○3.5	P 30.0 1.0
Number prefix Prefix: Axis line length [m]: Mark and station distance from axis Line color Text Style MOD_Arial Color	s lines [m]: Select color > ~	++++++++++++++++++++++++++++++++++++++	m]	03.5	P 30.0 1.0
Number prefix Prefix: Axis line length [m]: Mark and station distance from axis Line color Text Style MOD_Arial Color	s lines [m]: Select color > ~ Select color >	>> Height [n 0 6.0	m]	3.5	P 30.0 1.0 () 3.0
Number prefix Prefix: Axis line length [m]: Mark and station distance from axis Line color Text Style MOD_Arial Color	s lines [m]: Select color > Select color >	>> Height [n 0 6.0	im] ④ 5.0	○3.5	P 30.0 1.0 0 3.0

1.2 Draw cable axis in draft/sketch ground floor and longitudinal section. (see examples in appendix 12)

### Longitudinal section and ground floor











# 1.3 Define cable file Cable1.kal. Multiple cable drawing files must have the same cahracters to cable numbers in names! (Cable2.kal, Cable3.kal ...)

Define presstressing cable axis files in cross s	sections from	ground floor and longitudinal section	×
Cross axis file Current file *.pro C:\Primeri Moduli\Example1\Example1.pro			
Replace file >>			
Deltha stations [m]:			0.000
Fi cables [cm]:			10.8
Protecting concrete layer [cm]:			4.5
Delthafi [cm]:			3.2
	ОК	Cancel	

2. Draw cables in draft/sketch ground floor and longitudinal section

### Multiple – longitudinal and ground floor cables

Colors, blocks and secti	on numbers		×	
Cross section file				
Current file *.pro				
C: \Primeri Moduli \Exam	nple1\Example1.pro			
Replace file >>				
Drawing option in ground	l floor			
Oraw axis and cable		🔿 Draw axis	○ None	
Drawing option in longitu	dinal section			
Oraw axis and cable		🔘 Draw axis	○ None	
Colors				
Cable axis				
0	:	Select color >>		
6.11				Table lines and text colors X
Cables	10	50 L L L 1808		Cable avis
		Select color >>		
Cable marks				Select color >>
	1	Select color >>		
				Text
Blocks				Select color >>
On cable startpoint				
Head		O Ancoring	○ None	Lines
On cable endpoint				
Head	◯ Clutch	Ancoring	○ None	Select color >>
Drawing option				
⊖ Single   Multiple	Cable numbers fi	om file 🛛 🖓 Draw table	Draw vertical assistance lines	Vertical inner lines
				Select color >>
Mark prefix:		Draw suffix for s	side	
				OK Cancel
		OK Cancel		Caricer

Block CABLE\_HEAD\_LEFT

Block CABLE\_HEAD\_RIGHT



Selected cross section file: C:\Primeri Moduli\Example1\Example1.pro Checking dates in file finished. Select basic BLOCK for LEFT head: Select basic BLOCK for RIGHT head:
Pick AXIS position in ground floor:
Starting cable files text <k>: Cable</k>
STARTING cable number <1>:
ENDING cable number <1>: 10
File C:\Primeri Moduli\Example1\Cable1.kal not found. Cable line file:
C:\Primeri Moduli\Example1\Cable1.kal.
Longitudinal section processing
Section processing in ground floor finished.
Pick table X0Y origin point of cable. 1:
Draw table of 1. cable

### Longitudinal section and ground floor draft/sketch



3. Draw cables in real ground floor 2d or 3d

2d draw

-				1.01
Draw	cable	In	real	around floor

Draw cable in real grou	nd floor		×
Files			
3d roadway level file			
Current file *.03d			
C: \Primeri Moduli \Exa	ample1\Example1.o3d		
Replace file >>			
Roadway file			
Current file *.voz			
C: \Primeri Moduli \Exa	ample1\Example1.voz		
Replace file >>			
Drawing option			
O Single  Multiple			
Draw 3d Y- coordinat	res horizontal	Dra	w as sketch
Mark prefix:		Writte suffix for side	
	Colors and blocks Drawing option in gro  Draw axis and ca Colors Cable axis Cables Cables Select Sel	t color >>	
	Cable marks		
	Selec	ct color >>	
	Blocks On cable startpoint Head O Clut On cable endpoint Head O Clut	t ch () Ancoring () None ch () Ancoring () None	

Selected file *.o3d: C:\Primeri moduli\Example1\Example1.o3d Selected file *.voz:C:\Primeri moduli\Example1\Example1.voz Checking dates in files finished. Section checking finished. Select basic BLOCK for LEFT head: Select basic BLOCK for RIGHT head: Starting text of cable files <k>: CABLE Number of STARTING cable &lt;1&gt;: Number of ENDING cable &lt;1&gt;: 10</k>
Cable line drawing file:C:\Primeri moduli\Example1\CABLE1.kal. Section processing finished. Draw 1. cable finished.
Cable line drawing file:C:\Primeri moduli\Example1\CABLE2.kal. Section processing finished. Draw 2. cable finished.
Cable line drawing file:C:\Primeri moduli\Example1\CABLE3.kal.





	Colors and blocks
Draw cable in real ground floor	Drawing option in ground floor     Oraw axis and cable O Draw axis None
Files 3d roadway level file Current file *.o3d C:\Primeri moduli\Example1\Example1.o3d Replace file >> Roadway file Current file *.voz C:\Primeri moduli\Example1\Example1.voz Replace file >>	Colors Cable axis Select color >> Cables Cable marks Select color >>
Drawing option Single Multiple 2d 33	Blocks On cable startpoint Head Clutch Ancoring None On cable endpoint
Draw 3d Y- coordinates horizontal Draw as sketch	Head O Clutch O Ancoring O None
Mark prefix: Writte suffix for side	Mark prefix: Draw suffix for side
OK Canter	

Selected file \*.o3d: C:\Primeri moduli\Example1\Example1.o3d Selected file \*.voz:C:\Primeri moduli\Example1\Example1.voz Checking dates in files ... finished. Section checking ... finished. Select basic BLOCK for LEFT head: Select basic BLOCK for RIGHT head: Starting text of cable files <cable>: Number of STARTING cable <1>: Number of STARTING cable <1>: Cable line drawing file:C:\Primeri moduli\Example1\cable1.kal. Section processing ... finished. Draw 1. cable ... finished.

Block CABLE\_HEAD\_LEFT\_3D

#### Block CABLE\_HEAD\_RIGHT\_3D





4. Draw cables in cross sections

Draw cables in cross sections	×
Leva stran 🛛 Desna stran	
	Draw cables in cross sections
Files 3d roadway level file Current file *.o3d C:\Primeri moduli\Example1\Example1.o3d	Mark prefix:
Replace file >>	Writte suffix for side
Roadway file	
Current file *.voz C:\Primeri moduli\Example1\Example1.voz	Mark insertion side
Replace file >>	○Left ○Center ○Right ○Top ●Bottom
Slope console file	Colors
Current file *.ppk C:\Primeri moduli\Example1\Example1.ppk	Cables
Replace file >>	Select color >>
Section type	
Drawing option	Cable marks
O Single  Multiple Axis number:	Select color >>
Distance from LEET border to break point of LEET console A [cm]:	
Distance from RIGHT border to break point of RIGHT console R [chi]: 25.0	
	OK Cancel
OK Cancel	
<pre>Selected file *.o3d: C:\Razno\!Projekti Selected file *.voz:C:\Razno\!Projekti\ Selected file *.ppk: C:\Razno\!Projekti Preverjanje PREREZOV finished. Starting text of cable files <kabeleng> Number of STARTING cable &lt;1&gt;: Number of ENDING cable &lt;10&gt;: Cable line drawing file:C:\Razno\!Proje Section processing Draw cable finished.</kabeleng></pre>	\\Ponting\Nadvoz Ormož\OrmožENG.o3D \Ponting\Nadvoz Ormož\OrmožENG.voz \\Ponting\Nadvoz Ormož\OrmožENG.ppk >: ≳kti\Ponting\Nadvoz Ormož\kabeleng1.kal.



5. Insert YOZ basis points in cross sections

Draw cable table in cross sect	tions X			
Section type Monolith O Holle	ow			
Drawing type O Sketch	al			
Y0Z Origin of coordinate system	n axis point			
Axis number:	1			
Section views Width [m]: Height [m]:	10.0	PP 5 km 0+1.300		Ĵ.
Colors		i% = 2.500 > 100.039	i% = -2.500 >	99.968
Texst:     Select color >:       Lines:     Select color >:	>		0 0 0 8 9 10	
OK Canc	el			

6. Draw table of cable coordinates in cross sections

### 6.1 Left side

Section type     Monolith     Hollow	Views Width [m]: 10.0
Drawing type	Height [m]: 10.0
O Sketch   Normal	Colors
Coordinate system Y0Z origin	Title text
○ Top axis point	Select color >>
Cable position for draw Left   Axis  Right	Text Select color >>
Axis number:	Outer lines Select color >>
Mark prefix:	Inner lines
Writte suffix for side	Select color >>



### 6.2 Right side

Section type ● Monolith ○ Hollow	Views Width [m]: 10.0
Drawing type O Sketch   Normal	Height [m]: 10.0
Coordinate system YOZ origin O Top axis point  Bottom axis point	Title text Select color >>
Cable position for draw O Left O Axis O Right	Text Select color >>
Axis number: 1	Outer lines Select color >>
Mark prefix:	Inner lines Select color >>



### 7. Draw table of cable specifications

### 7.1 Left side

Draw table of cable specifications

X

Drawing area	۲	3d	
Cable positio	n O Axis		ht
Textual date	s		
Titele text:	Cable specificat	tion	
Mark prefix:			
Writte su	Iffix for side		
whice se			
Cable type:		19 x 150 m	nm2
Cable type:	ka]:	19 x 150 m	1m2
Cable type: Cable weight ( Colors	kg]:	19 x 150 m	1m2 22.700
Cable type: Cable weight [ Colors Title text	kg]:	19 x 150 m	1m2 22.700
Cable type: Cable weight   Colors Title text	kg]: Select color >>	19 x 150 m	1m2 22.700
Cable type: Cable weight [ Colors Title text	kg]: Select color >: 25	19 x 150 m	1m2 22.700
Cable type: Cable weight [ Colors Title text	kg]: Select color >: es Select color >:	19 x 150 m	1m2 22.700
Cable type: Cable weight [ Colors Title text Text in line Outer tabl	kg]: Select color >: ss Select color >: e lines	19 x 150 m	1m2 22.700
Cable type: Cable weight [ Colors Title text Text in line Outer tabl	kg]: Select color >: Select color >: e lines Select color >:	19 x 150 m	1m2 22.700
Cable type: Cable weight [ Colors Title text Text in line Outer table	kg]: Select color >: Select color >: e lines Select color >: e lines	19 x 150 m	1m2 22.700

## 7.2 Right side

Drawing area			
◯ 2d	۲	3d	
Cable position	0.04	(a piat	
ULER	Axis		t
Textual dates			
Titele text:	Cable specifika	tion	
Mark prefix:			
Writte suf	fix for side		
Cable type:		19 x 150 m	m2
Cable weight [k	al:		22,700
Colora	.91.		
Title text			
Hoe text			
	Select color >	>	
Text in lines	5		
	Select color >	>	
Outer table	lines		
	Select color >	>	
Inner table	lines		
	Select color >	>	
	F		

Cable specifikation					
Mark	pcs	TYPE	L [m]	Wght [kg]	
1	1	19 x 150 mm2	79.2	1797.8	
2	1	19 x 150 mm2	79.2	1797.8	
3	1	19 x 150 mm2	79.2	1797.8	
4	1	19 x 150 mm2	79.2	1797.8	
5	1	19 x 150 mm2	79.2	1797.8	
Sum			396.0	8989.0	

Cable specifikation				
Mark	pcs	TYPE	L [m]	Wght [kg]
1	1	19 x 150 mm2	79.2	1797.8
2	1	19 x 150 mm2	79.2	1797.8
3	1	19 x 150 mm2	79.2	1797.8
4	1	19 x 150 mm2	79.2	1797.8
5	1	19 x 150 mm2	79.2	1797.8
Sum			396.0	8989.0



# Module DRAINING

1. Draw 3d and 2d longitudinal draining axis

iles				
3d axis file				
Current file *.o3d				
C:\Primeri moduli\Examp	e1\Example1.o3d			
Replace file >>				
Pavement file				
Current file *.voz				
C:\Primeri moduli\Examp	e1\Example1.voz			
Replace file >>				
Section slope file				
Current file *.ppk				
C:\Primeri moduli\Examp	e1\Example1.ppk			
Replace file >>				
istance from LEFT vertex t	k l %	onsole A [cm]:	pkd %	25.0
istance from RIGHT vertex	to vertex of RIGHT breaking	g console B [cm]:		25.0
orawing side				
		Right		
Left				
Left				
Left			Color	







2. Draw flowing parts layout - in longitudinal profile





- 3. Parts dimension in longitudinal profile
  - 3.1 Dimension distances between polyline vertexes flowing parts layout





3.2 Gradient dimension between polyline vertexes - flowing parts

	Dimension on linear polyline $$
	Dimension way Single separated Single continued Multiple
Draining parts dimension $X$	Dimension type
Dimension type On linear polyline horizontal On polyline	<ul> <li>○ Distances</li> <li>● Slopes</li> <li>✓ Dimension segment values dH</li> </ul>
OK Cancel	OK Cancel
† † 2 600 †	< /b = 3 000 dH = 4.5 0 cm 15 000
99301 80 97 7	

4. Insertion of draining elements

Element insertion is from basis of blocks. User can define new basis of blocks, with the same names as current blocks.

4. 1 Insert flowing parts in longitudinal profile

Draining	×	
Parts Fixed length tubes Optional length tubes Joints		Flowing parts ×
<ul> <li>Single branches</li> <li>Double branches</li> <li>Hangers</li> <li>Transitional parts</li> <li>Thimbles</li> <li>Final caps</li> <li>Flowing parts</li> <li>Leaking tubes</li> <li>Blocks from drawing</li> </ul>		TYPE: LONGITUDINAL ~ Colors Tube Select color >> Axis Select color >>
OK Cancel	]	OK Cancel

### 4.2 Insert thimble

Parts Fixed length tubes Optional length tubes Joints	Thimbles	×
<ul> <li>Single branches</li> <li>Double branches</li> <li>Hangers</li> <li>Transitional parts</li> <li>Thimbles</li> <li>Final caps</li> <li>Flowing parts</li> <li>Leaking tubes</li> <li>Blocks from drawing</li> </ul>	FI: 150 Colors Tube Select color >> Axis Select color >>	

### 4.3 Insert joint



4.4 Insert thimble

Parts <ul> <li>Fixed length tubes</li> <li>Optional length tubes</li> <li>Joints</li> <li>Single branches</li> <li>Double branches</li> <li>Hangers</li> <li>Transitional parts</li> <li>Final caps</li> <li>Flowing parts</li> <li>Leaking tubes</li> <li>Blocks from drawing</li> </ul>	Thimbles × FI: 150 × Colors Tube Select color >>
<ul> <li>Final caps</li> <li>Flowing parts</li> <li>Leaking tubes</li> <li>Blocks from drawing</li> </ul>	Axis Select color >>

### 4.5 Insert single branch

Draining Parts Fixed length tubes Optional length tubes Joints Single branches Double branches	Single branches X
<ul> <li>Hangers</li> <li>Transitional parts</li> <li>Thimbles</li> <li>Final caps</li> <li>Flowing parts</li> <li>Leaking tubes</li> <li>Blocks from drawing</li> </ul>	Colors Tube Select color >>
OK Cancel	OK Cancel

4.6 Insert thimble



4.7 Insert final cap

Parts OFixed length tubes Optional length tubes OJoints	Final caps		×	
<ul> <li>Single branches</li> <li>Double branches</li> <li>Hangers</li> <li>Transitional parts</li> <li>Thimbles</li> <li>Final caps</li> <li>Flowing parts</li> <li>Leaking tubes</li> <li>Blocks from drawing</li> </ul>	FI: 200 Colors Tube Select of Axis Select of	olor >> olor >>		

4.7.1 With command Text -> Multileader settings in module BASICS define multileader form and positioning single elements. Define blocks DRAINING1 and DRAINING2.

Multileader settings	×
Text	
Style	
MOD_Arial	~
Height [mm]:	3.0
Color	
Select color >>	
Frames	
Туре	
○ None	
Oircle	
ORectangle	
O Polygon	
Color	
Select color >>	
Arrowheads	
Start point	
ONone	
() Dot	
Arrow	
Oblique	
Color	
Select color >>	
OK Cancel	1





4.8 Insert leaking tube

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### 4.9 Insert thimble

Draining	×	
Parts Fixed length tubes Optional length tubes Joints Single branches Double branches Hangers Transitional parts Final caps Flowing parts		Thimbles X FI: 50 Colors Tube Select color >>
<ul> <li>Leaking tubes</li> <li>Blocks from drawing</li> </ul>		Select color >>
OK Cancel		OK Cancel

4.10 Insert joint



4.11	Insert	single	branch	



4.11.1 Positioning single elements. Define block DRAINING3.



- 5. Draw longitudinal blocks in polyline vertexes
  - 5.1 Insert block DRAINING1



Change block in last vertex with block DRAINING2



- 6. Draw longitudinal blocks between polyline vertexes
  - 6.1 Insert block DRAINING3 number between vertexes is 2.



6.2 Insert length tubes in longitudinal profile

Parts <ul> <li>Fixed length tubes</li> <li>Optional length tubes</li> <li>Joints</li> </ul>	Tubes	>
O Single branches	FI: 200	~
	Maximum tube length [mm]: 60	000
O Thimbles	Colors	
Flowing parts	Select color >>	
O Leaking tubes	Axis	
O Blocks from drawing	Select color >>	





7. Leaking tubes dimension in longitudinal profile

Type 2 for number of elements between vertexes

	Dimension on linear polyline X
	Dimension way Single separated Single continued Multiple
Draining parts dimension X	Dimension type Distances
Dimension type On linear polyline horizontal On polyline	O Slopes
OK Cancel	OK Cancel



### 8. Parts specification

### create file Example1.txt

First explode all blocks with including nested blocks, in and between polyline vertexes, and select single elements.

Select part/End:	
Select entities:	
Opposite Corner:	
Entities in set: 7	
Select entities:	
Position number <1>:	
Tip=IZ	
Vrsta = 1 IZLIVNIK 400_300 7	
Number of selected blocks IZLVP400_300 = 7	
Select part/End:	
Select entities:	
Entities in set: 1	
Select entities:	
Entities in set: 2	
Select entities:	
Opposite Corner:	
Entities in set: 12	
Select entities:	
Position number <2>:	
Tip=SP	
Vrsta = 2 SPOJKA 150 12	
Number of selected blocks SP150 = 12	
Select part/End:	
Select entities:	
Opposite Corner:	
Entities in set: 6	
Select entities:	
Position number <3>:	

### 9. Draw parts table

Draw draining parts table	×			
Draining file				
Current file *.txt:				
C:\Primeri Moduli\Example1\Examle1.txt				
Replace file >>				
Colors			Draining parts specifikation	
Outer lines		Mark	Element	Pcs
Select color >>		1	IZLIVNIK 400_300	7
-		2	SPOJKA 150	12
Inner lines		3	KOLENO 45_150	6
Select color >>		4	ENOJNI_ODCEP 45_200_150	6
Title text		5	SPOJKA 200	31
		6	ZAKLJUCNI_POKROV 200	1
Select color >>		7	CEVKA_PRONVODE 200_200	10
Table text		8	SPOJKA 50	20
Collect only a second		9	KOLENO 45_50	10
Select color >>		10	ENOJNI_ODCEP 45_200_50	10
		11	CEV 200_4760	10
OK Cancel		12	CEV 200_4620	5

10. Drawing ground floor and 3d vertical parts

10.1 Pick start point of basic polyline, and then select polyline in longitudinal section – draining axis on top of asphalt and elevation value in first vertex (99.923):



10.2 Select blocks in ground floor for 2d and 3d draining elements in vertexes of longitudinal polyline:



10.3 Select block for intermediate element in longitudinal section, and corresponding blocks in longitudinal section:



10.4 Select blocks for intermediate ground floor 2d element and intermediate 3d element:



10.5 Select basic 3d polyline in draining axis:



10.6 Drawing vertexes 2d elements in ground floor, 3d vertex elements, 2d intermediate elements in ground floor and 3d intermediate elements.





10.7 With 3d polylines connect start and endpoints elements centers in draining axis.



10.8 With command Utility -> Loft 2D polyline - profiles on 3D polyline draw 3d tubes.



### 11. Parts dimension in ground floor

Draining parts dimension X	Type Single Multiple
Dimension type O On linear polyline horizontal On polyline	Dimension side O Left
OK Cancel	OK Cancel

V

Dimension on mixed polyline



### 11.1 Dimension distances of leaking tubes



### 11.2 Dimension distances between flowing parts

Dimension on mixed polyline X





12. Appendix - draw presstressed cable axis in ground floor and longitudinal section

Use command BRIDGE -> Cable presstressing -> Draw cable axis in ground floor and longitudinal section

In dialog box we select drawing type:

Draw cable axis	×
Drawing options	
Line and parable in longitudinal section	
O Line and parable in ground floor	
Parable and contra parable in longitudinal     O Parable and contra parable in ground floor	section

12.1 Draw line and parable in longitudinal section





### Draw line and parable in ground floor



.181 <del>7 1.00 1.2</del> 0	0		
		9.00	
	· · · · · · · · · · · · · · · · · · ·	10.00	e

 $\times$ 



Draw parable and contra parable in longitudinal section



×







×