



# ROADPAC'14

**PROGRAM RP83**

**Drawing of perspective views**

***User guide***

**Release: 25.02.2014**

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## 1. Introduction

Program RP83 DRAWING Of PERSPECTIVE VIEWS is part of ROADPAC system. It is used as the final program of the road design process.

### 1.1 Program features

Program evaluates sight distances on a road and draws selected parts of road in perspective representation. Evaluated road must be first processed by program for horizontal alignment (e.g. RP12, VIAAXI) with creation of SHB (main points of horizontal alignment) file and also by program corridor cross sections (RP51) with creation of SPR file (corridor cross sections). Program RP83 creates O83 plotfile type file, which can be plotted on various devices for graphical output.

Comment:

Program RP83 can perform another 2 functions that can not be submitted via dialogue forms of ROADPAC input data program.

Those are:

- 1) Specification of barriers in sign distance range on a road (objects, billboards, etc.)
- 2) Specification of camera localization and target localization along a centreline in absolute coordinates (free sights, etc.)

### 1.2 Processed data files

#### Input files:

- .V83 - input data
- .SHB - main points of centreline
- .SPR - cross sections

Two temporary files WORK1 WORK2

#### Output files:

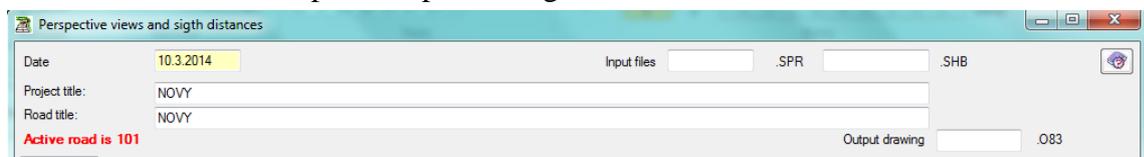
- .L83 - program output listing and computed results.
- .O83 - PLOTFILE file, which includes a generated drawing

## 2. Input data

Input data are collected by direct completing table in a form or by clicking on individual controls situated on form displayed on computer screen. Forms handling is described in detail in chapter "Introduction". If an item box or cell contains a value then the value will be automatically used by program, in case an input value is not specified (or if 0 is entered) so called default value will be used.

### 2.1 Control data

Control data are displayed after selection of input data in previous menu, data includes basic information for input data processing.



Meaning of individual items:

<b>Date</b>	date of entering input data.
<b>Project title</b>	text that is displayed in headings of reports
<b>Road title</b>	ditto
<b>Name of SHB input file</b>	if not specified, the program will use a six-character name of active road from the main menu.
<b>Name of SPR input file</b>	if not specified, the program will use a six-character name of active road from the main menu.
<b>Output drawing</b>	If the name is not specified, the program will use name of active road from the main menu.

If there is no input data file (V83), program fill form automatically. Program will start by existence check of SHB and SPR files; if there are existed, the program will write correct usual data in tables: road range, standard chainage step by 100 m, commonly used drawing dimensions and parameters of sight distances calculation. So completed tables can be then modified. It is always necessary to choose required task type.

## 2.2 Drawing description data

This block consists of two tables - table of GENERAL PARAMETERS and table of camera position, chainage and parameters of individual views specification. General parameters are entered in one row table.

In From /to (km) cells is specified segment of road that will be further processed by the program. Other data may not be situated out of this road segment. If entered data exceed range of a SHB file (horizontal alignment), then it cause termination of program.

RP	From chainage (km)	To chainage (km)	Slide width (cm)	Slide height (cm)	Trim offset (mm)	Tolerance (mm)	Distance of screen (mm)	Factor of superelevation	Design speed (km/hour)	Length of processed section (m)
	0.000000	4.695650	42.00	29.70	2.00	0.005	42.00	1.00	80.00	4.695650

Towards increasing chainage
  Backwards increasing chainage
  Draw perspective views
  Sight distances evaluation

RP	Camera offset above carriageway (m)	Start position of camera (km)	Last camera position (km)	Step of camera positions (m)	Camera offset from CL(+/-m)	Distance camera->target (m)
	1.20	0.000000	4.395650	20.00	3.50	250.000

About parameters

Meaning of individual items:

<b>From chainage</b>	range of task beginning in km
<b>To chainage</b>	range of task end in km

Following 3 cells describe dimensions of a sheet in mm. Parts of a sheet that exceeds dimensions reduced by frame will be omitted. See fig.no.3 on page 6.

**W-picture (Image width)** DX is a width of sheet in mm. Default = 420 mm.

<b>H-picture (Image height)</b>	<b>DY</b> is a height of image in mm. Default = 300 mm.
<b>Edges</b>	<b>DR</b> is a value of a frame offset from width and height dimensions that define sheet area. Default = 0 mm.
<b>Tolerance</b>	is tolerance in mm. If any line should be plotted in a distance smaller than specified tolerance from already plotted line such line will be omitted. It means that resulting drawing will be well readable. Default = 0.5 mm.
<b>Distance of screen</b>	is a distance of projection screen <b>UKH</b> in mm (see Fig. 2 on page 6) from camera. Default = value of specified sheet width.
<b>Factor of superelevation</b>	this value specify multiplicity factor of camber in image vs. image scale. Default = 1.
<b>Design speed (Velocity)</b>	is design speed of a road in km/hr. This item should be specified only if an evaluation of sight distances is required. Default = 70 km/hr (minimum 20 km/hr, maximum 120 km/hr).
<b>Length of processed section</b>	specified in meters. This item specifies part of road that will be plotted from a position of camera in given direction and also range of road, in which sight distance for stopping and overtaking is being evaluated. Default = 1200 m (Value of sight distance for overtaking at velocity 100 km/hr times two).

**View in direction of ascending chainage /✓**

✓ means that the program will perform Views evaluation according to ascending chainage.

**View against direction of ascending chainage. /✓**

✓ means that the program will perform Views evaluation according to descending chainage.

**Drawing of perspective view /✓**

✓ means that the program will generate Drawing Plotfile type file.

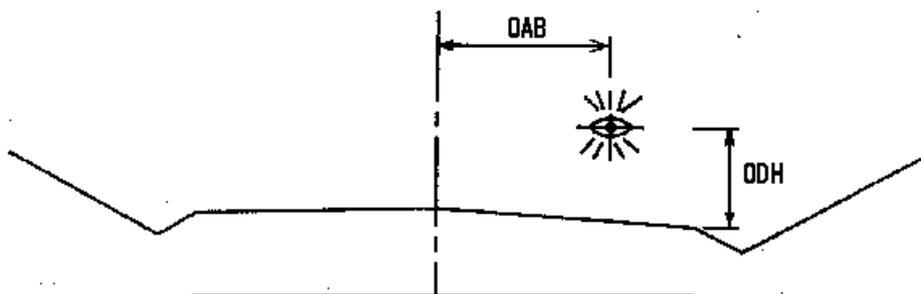
**Evaluation of a sight distances /✓**

✓ means that the program will perform evaluation of sight distances for stopping and overtaking. Specified directions will be also valid for evaluation of sight distances

In table “Parameters of individual views or series of views” neither specification of each camera position or group of camera positions specified in steps along alignment is needed. A camera does not need to be situated exactly in chainages that correspond to corridor cross sections stored in SPR file. Number of those positions in one job is virtually unlimited; in case of greater number the program will create next PLOTFILE files subsequently.

<b>Code</b>	Specification method of camera level.
space	followed by elevation value.
R	followed by vert. distance (m) related to elevation of road alignment in place of camera location. ( <b>ODH</b> see fig. no. 1)
<b>Vertical position of camera</b>	is elevation of camera in meters (the meaning is given by aforementioned code. Default = 1.2 m relatively from pavement.
<b>Offset of camera</b>	is a transverse offset from centreline in meters. Positive value means right offset, negative left offset from a centreline oriented from sight direction. Default = 0 m. If sight distance evaluation is required, it is necessary to specify value corresponding to position of vehicle in the right traffic lane. ( <b>OAB</b> see fig. no. 1)
<b>Chainage of camera from</b>	is chainage of the first camera location in km.
<b>Chainage of camera to</b>	is chainage of the last camera location in sequence of camera stations with fixed step in km. If not specified or if zero is specified, then it means specification of a single camera only.
<b>Step of camera move</b>	is a distance of adjacent camera location in case that a group of camera stations in fixed step was specified. Otherwise the step value is not required or zero is specified.
<b>Distance camera to target</b>	<b>SOR</b> is a distance in view direction along horizontal alignment (in meters). This value defines a basic direction of sight for perspective view. Horizontal alignment is located in a 3D road centreline. Default length = 150 m (Value of sight distance for stopping for speed 100 km/hr).

**Fig. no. 1**



**Fig. no. 2**

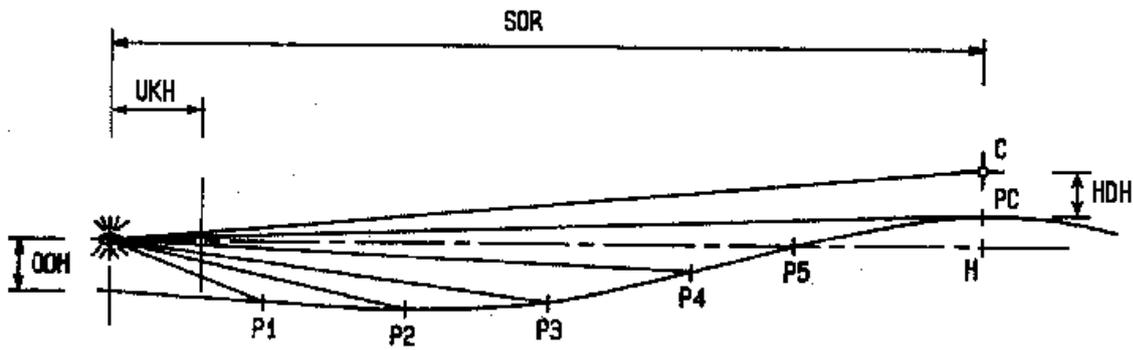
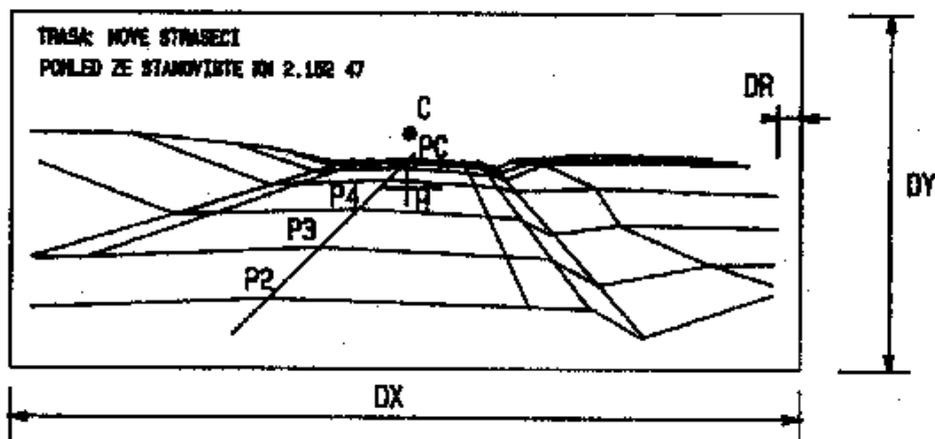


Fig. no. 3



H = main point in centre of image in direction of Camera->Target ray trace.

C = direction of camera-target ray trace point

PC = point on a carriageway surface, under point C

### 3. Description of output listing

Output listing is generated during the program run in file 'road'.L83. . Printing and visualization can be controlled from the main menu of the RoadPAC.

Output listings includes, besides program protocol and list of used files, following information.

#### 1) Data about processed sheets in file

In the course of processing of each image from individual camera position the program prints a table containing following data about perspective view:

Information about sight direction

Specification of camera location (chainage, offset, superelevation)

Specification of the sheet centre (chainage, offset from centreline)

Chainage of end of task range

Sheet dimensions (width, height)

Overview of drawing designs:								
dirrection	Camera:			Target point		Segment end	Image size	
	km offset	elevation		km offset		km	width	height
* THERE	.000000	.00	1.20 ( 572.910)	.050000	.00	.953000	42.00	29.70
* THERE	.010000	.00	1.20 ( 573.007)	.060000	.00	.953017	42.00	29.70
* THERE	.020000	.00	1.20 ( 573.104)	.070000	.00	.953017	42.00	29.70
* THERE	.030000	.00	1.20 ( 573.202)	.080000	.00	.953017	42.00	29.70
* THERE	.040000	.00	1.20 ( 573.299)	.090000	.00	.953017	42.00	29.70
* THERE	.050000	.00	1.20 ( 573.396)	.100000	.00	.953017	42.00	29.70
* THERE	.060000	.00	1.20 ( 573.493)	.110000	.00	.953017	42.00	29.70
* THERE	.070000	.00	1.20 ( 573.591)	.120000	.00	.953017	42.00	29.70
* THERE	.080000	.00	1.20 ( 573.688)	.130000	.00	.953017	42.00	29.70
* THERE	.090000	.00	1.20 ( 573.785)	.140000	.00	.953017	42.00	29.70
* THERE	.100000	.00	1.20 ( 573.882)	.150000	.00	.953017	42.00	29.70
* THERE	.110000	.00	1.20 ( 573.991)	.160000	.00	.953017	42.00	29.70
* THERE	.120000	.00	1.20 ( 574.099)	.170000	.00	.953017	42.00	29.70
* THERE	.130000	.00	1.20 ( 574.255)	.180000	.00	.953017	42.00	29.70
* THERE	.140000	.00	1.20 ( 574.410)	.190000	.00	.953017	42.00	29.70

## 2) Table of sight distances

Closing table of sight distances, if it is required by control data, will be printed after generation of sheets. It includes two parts:

Perspective views in direction in ascending chainage

Perspective views in direction in descending chainage

Values for individual camera location in each image are sorted in ascending order according to their chainage. Two lines describe single perspective and include following information:

- Chainage of a camera station
- offset from centreline \*)
- superelevation of camera horizon (relative and absolute) \*)
- design speed
- Length of designed segment
- offset of target from CL
- Relative superelevation of target
- Average falling gradient between camera and target
- computed sight distance. Inconvenient ones are marked by asterisk.
- required sight distance according to the Czech National Standard (CSN) 736101 (1963)
- Reason for sight distance limitation
- Chainage of cross section that caused sight distance limitation

\*) In following sample are 3 columns marked by asterisk omitted for the lack of space

Superelevation of target and offset of target need not be specified. The program will use for automatic evaluation of sight distance following values: offset of target = 0. superelevation of target for stopping = 0.01 m, superelevation of target for overtaking = 1.20 m.

Listing of sight distances:

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 Perspective in direction of chainage

Station km	overtaking velocity limitation: km/h	length tested * section m	* shift * of target	sight distance elevation of target	for stopping / slope of target	sight distance for real %	requested length	reason for length
.000000	70.00	4000.00	* .00	.01	-3.48	320.00	74.48	st.pás .260000
			* .00	1.20		1620.00	370.00	1.620000
.100000	70.00	4000.00	* .00	.01	-2.84	260.00	73.81	voz. .360000
			* .00	1.20		1480.00	370.00	1.580000
.200000	70.00	4000.00	* .00	.01	.05	1380.00	71.01	1.580000
			* .00	1.20		1380.00	370.00	1.580000
.300000	70.00	4000.00	* .00	.01	.29	1260.00	70.79	1.560000
			* .00	1.20		1260.00	370.00	1.560000
.400000	70.00	4000.00	* .00	.01	-1.42	360.00	72.39	kraj. .500000
			* .00	1.20		* 360.00	370.00	shoulder
.500000	70.00	4000.00	* .00	.01	.68	1040.00	70.44	1.540000
			* .00	1.20		1040.00	370.00	1.540000
.600000	70.00	4000.00	* .00	.01	.95	920.00	70.21	1.520000
			* .00	1.20		920.00	370.00	1.520000
.700000	70.00	4000.00	* .00	.01	1.24	820.00	69.95	1.520000
			* .00	1.20		820.00	370.00	1.520000
.800000	70.00	4000.00	* .00	.01	1.58	700.00	69.66	1.500000
			* .00	1.20		700.00	370.00	1.500000
.900000	70.00	4000.00	* .00	.01	1.99	540.00	69.31	voz. 1.460000
			* .00	1.20		580.00	370.00	1.480000
1.000000	70.00	4000.00	* .00	.01	2.31	420.00	69.05	voz. 1.420000
			* .00	1.20		480.00	370.00	1.480000

**Comment 1** Last values are presented in two lines:

- Sight distance for stopping
- Sight distance for overtaking

**Comment 2** Reason for sight distance limitation is stated as a code word:

Code word	Meaning
st.pas	central reserve or an edge of central reserve
voz.	pavement or edge of pavement
kraj.	shoulder
koruna	roadway edge
svah	embankment or cut slope or slope edge
teren	terrain
*teren	extended terrain or cross section
prek.	barrier of sight
*prek.	extended barrier of sight

If a sight distance can not be evaluated (target is out of drawing), then there will be an error message in place of this perspective processing and the item in table of sight distances will remain empty.

#### 4. **Graphical output**

All images are plotted within an oblong frame of specified dimensions with appropriate inner border. Images include in its upper left corner following information: name of road, chainage of a camera location and direction of sight.

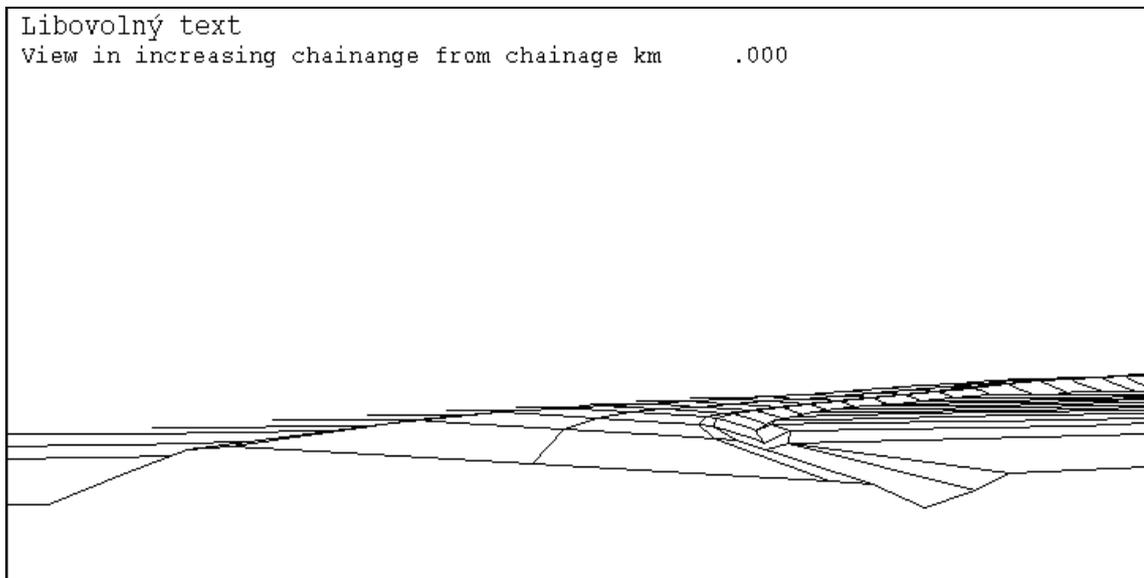
Drawings are made of two line types: cross sections and longitudinal edges that connect corresponding points of individual cross sections with following meaning:

- centre line or and edge of central reserve
- Outer edge of hard shoulder
- Roadway edge
- Bottom of ditch or foot ditch of embankment
- Intersection point of cut slope or embankment with terrain

Some of those edges may be missing. Lines of both types (cross sections, edges) are plotted with respect to visibility, which is also true in locations of obstructions. For remote profiles, where drawings of adjacent cross sections would blend, there is a test in program that eliminates such blending (it uses an tolerance specified above).

Resulting or modified drawing can be processes (view or plot) by PRAGOPLOT system directly from ROADPAC menu or after that. Part of the system is an export to AUTOCAD format DXF.

Sample of typical drawing:



## 5. Warning messages

The program differentiates between fatal errors, which usually cause program termination with unusable results and formal errors that are handled by alternate solution. Fatal errors are marked by \*\*\* in reports and formal errors are marked by \*\*.

The following table contains list of error messages and comments to alternate solution

<b>Error message text</b>	<b>Alternate solution</b>
*** Leading line is missing * 83	
*** Inaccessible type of leading line: aaa	
** First line ignored	
*** Between leading data read no marked line *	
*** Premature data end	
*** Inaccessible function code number x = nn	
** Specified beginning of segment km n.nnnnn starts before road beginning in km n.nnnnn	
** Specified end of segment km n.nnnnn out of road range in km n.nnnnn	
** Camera km n.nnnn located before road beginning n.nnnn ignored	
** Camera km n.nnnnn located behind road end n.nnnnn ignored	
*** No camera location was correctly specified calculation ends	
*** Camera km n.nnnnn and next can not be entered nnnn because of file WORK2 capacity exceeds	
** Inacceptable line type ignored:: (line description)	
** nacceptable values of drawing size nnn standard values was set	420 x 300 mm is set
** Inacceptable value of design speed, nnn standard value was set	70 km/hr is set
** Inacceptable value of frame offset, canceled	
** Segment beginning greater than segment end nnn all road range is thought	
** Camera chainage and target point chainage nnn identical in km n.nnnnn ,ignored	
** Chainage of first stand nn.nnnnnn is greater than last stand nn.nnnnnn, ignored	
** Chainage of the first camera nn greater than n.nnn chainage of the last camera nnn, ignored	
** Descending barriers chainage, ignored nnnn barrier in km n.nnnnn	
** Descending cross section chainage, ignored nnnn cross	

section in km n.nnnn	
** Incorrect specification of cross section arrangement n.nnn points, cross section ignored in km n.nnnn	
** Left half of cross section is missing in km n.nnnnn section ignored	
** Right half of cross section is missing in km n.nnnnn section ignored'	
** First edge of barrier in km n.nnnnn prolonged till IP with terrain on the left	
** First barrier edge in km n.nnnnn prolonged till IP with terrain on the right	
*** Cross section in km n.nnnn: error in assignment to file WORK1	
*** Barrier in km n.nnn error in assignment to file WORK1	
*** Incorrect code in assignment of cross section km nn.nnnnnn	
*** Incorrect code in assignment of barrier in km nn.nnnnnn	
** Section in km n.nnnn includes more than 35 points nnn shorted on the left	
** Section in km n.nnnn includes more than 35 points nnn shorted on the right	
*** In specified segment km n.nnnn up to km n.nnnnn are less than 2 cross sections, calculation ended	
** Formal error in line:: (line description)	
*** Iteration of perpendicular line in km n.nnnnnnn not exact, difference is n.nnnn m	
** More than 60 points in image on the left, chainage km nn.nnnnnn	
** ** More than 60 points in image on the right, chainage km nn.nnnnnn	
** Line ignored:: (Line description)	
** Camera in km n.nnnnn lays out of area	
** Omitted cross section km nn.nnnnnn	
** Target point out of image, chainage km nn.nnnnnn	
** Whole profile out of image, ignored km nn.nnnnnn	
** Part of profile before plane of camera km nn.nnnnnn	