



# ROADPAC'14

**PROGRAM RP72**

**Volumes of pavement layers**

***User Guide***

**Release date: 25. 2. 2014**

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## **1. Introduction**

Program RP72 - Volumes of pavement layers is part of ROADPAC system. It is designed for end-to-end processing of a road design as one of final programs of the system for determination of pavement's areas and volumes based on corridor cross sections calculated by RP51. Thus the program can be started only after the SPR file (CORRIDOR CROSS SECTIONS) is created.

### **1.1 Program features**

#### **Calculation of pavement areas and volumes**

The program performs calculation of areas of individual structure layers of pavement based on corridor cross sections saved in SPR file. Pavement structure is part of input data. Beside that the program calculates road subbase layer volume, fillings of unpaved shoulders and central reserve and total volumes of a pavement part of designed road. Areas of individual layers are calculated in a plane lying in the middle plane of each layer. The area also reflects a longitudinal slope of a road. Values are calculated between two adjacent cross sections and then they are summarised.

#### **Addition of particular volumes, sums and changes of items totals**

The program is designed for calculation of areas and values within cross sections so that you can add known data in specified chainage of cross section (identified as "the beginning of the first section of a road"), i.e. it allows addition of areas and volumes from previous segment of solution. This function can be also used in case that road is divided in several files and requires calculation of areas and volumes concurrently or if there is more engineering structures in a road segment than program capacity allows. It is possible to specify different thickness and structure of pavement layers for each specified segment. If only thickness are varying, it is not necessary to reset summaries of individual layers, which are marked by sequence numbers from 1 up to 10 (top-down) in the program. If in pavement structure is construction material of any layers differ, it is necessary neither to reset summaries at the beginning of a segment or the segment must be processed separately.

If a beginning of a segment is specified before the first cross section of a road, it is moved into this cross section; the section can be shortened at the end in similar manner. Segment of solution can start and end anywhere in the course of a road. If a beginning or end of road is not identical to a chainage of a cross section, the program takes data for road beginning and end from the nearest cross section with lower chainage (does not perform interpolation of widths, areas and volumes). For calculation of volumes the program considers specified chainage. To avoid confusions, it is recommended to match beginnings of segment with calculated corridor cross sections in SPR file. Program enables specification of up to 20 segments in a single run.

Program enables omission of volume and area calculations in segment, where there are defined so called "engineering structures" (Most often long bridges). Beginnings and ends of engineering structures do not have to match to chainage of

corridor cross sections. It is possible to specify up to 40 engineering structures in a single run.

Above that, it is possible to request subtotals of results in any specified chainage and change such subtotal by changes of totals of volumes and areas (e.g. from adjacent engineering structure, whose volumes and areas are known). The program enables up to 40 subtotals; chainage of subtotals may not match to chainage of cross sections.

**1.2 Processed data files**

Input files

- .V72 - input data file of program RP72
- .SPR - corridor cross sections file

Output files

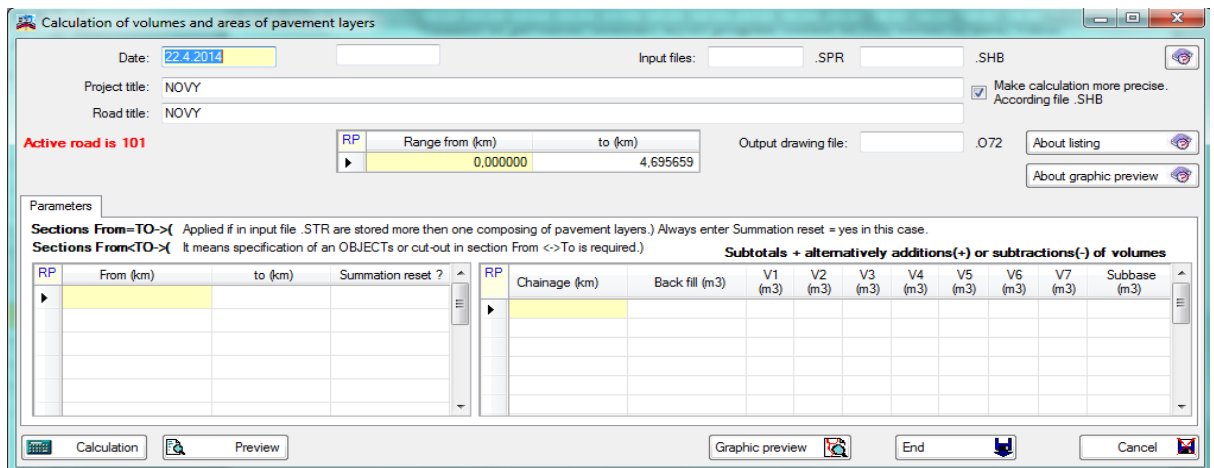
- .L72 - program output listing documenting progress and results of calculations

**2. Input data**

Input data are collected by direct entering in table on a form or by clicking on individual controls that are situated on form tabs displayed on computer screen. Forms handling is described in detail in chapter "Introduction". Input data of volumes of pavement structure layers program consist of two blocks of data, which are successively displayed on the computer screen.

**2.1 Control data**

Data are displayed after selection of input data in previous menu. It includes basic information for input data processing. Tables are placed on form see next picture.



Meaning of items:

**Date** date of input data entry

**Project title** text that is displayed in headings of reports

**Road title** ditto

**Name of input cross section file** if not specified, the program will insert a six-character **active road** name from the main menu.

**Task range**

From (km) start chainage

To (km) end chainage

**Output drawing file** if not specified, the program will insert a six-character **active road** .O72 name from the main menu.

**2.2 Parameters of construction layers**

The parameters are completely read from corridor cross section file.

**2.3 Sections of computation**

| RP | From (km) | to (km) | Summation reset ? |
|----|-----------|---------|-------------------|
| ▶  |           |         | no<br>yes         |
|    |           |         |                   |
|    |           |         |                   |
|    |           |         |                   |

**From** chainage (km)

**To** chainage (km)

**Summarization reset** 0 – reset of values is not required,  
1 - – reset of values is required.

If is task range composed of sections with different compositions structural layers of the pavement thus is always specified one row in above table in this case.

From-value (km) equal To-value (km) and summarization reset is always set to yes.

If From value is specified smaller than To-value that means specification of an object and reset value is optional.

**2.4 Subtotals and changes of totals**

ction From <->To is required.)

| Subtotals + alternatively additions(+) or subtractions(-) of volumes |               |                |         |         |         |         |         |         |         |              |
|--|---------------|----------------|---------|---------|---------|---------|---------|---------|---------|--------------|
| RP   | Chainage (km) | Back fill (m3) | V1 (m3) | V2 (m3) | V3 (m3) | V4 (m3) | V5 (m3) | V6 (m3) | V7 (m3) | Subbase (m3) |
| ▶  |               |                |         |         |         |         |         |         |         |              |
|  |               |                |         |         |         |         |         |         |         |              |
|  |               |                |         |         |         |         |         |         |         |              |

Meaning of items in SUBTOTALS ... table:

|                     |  |
|---------------------|--|
| <b>Chainage</b>     | Chainage, in which we require listing of subtotals (km)  |
| <b>Backfill</b>     | Change of total volume of unpaved shoulder or central reserve filling (m <sup>3</sup> )        |
| <b>V1 to V9</b>     | Changes of totals of individual layers - top-down except road subbase course (m <sup>3</sup> ) |
| <b>Road subbase</b> | Change of total of road subbase (m <sup>3</sup> ) - it is the final lower layer                |

### 3. *Description of output listing*

Output listing is generated during the program run in file 'road'.L72. . Its printing can be controlled from the main menu of the RoadPAC.

It includes name of used input file (SPR) and a commented listing of all input data. Listing of input data was formally modified, compared to the old version, and adjusted to a new data structure. The report includes name of action and active road, full name of SPR (cross section) file.

It is followed by result tables for every specified section including:

CONFIGURATION OF AREAS AND VOLUMES OF STRUCTURE OF PAVEMENTS

**Chainage** chainage of cross sections, beginnings of segment, beginnings and ends of engineering structures, subtotals in km

**Interval** distance of adjacent cross sections (m, measured obliquely with sloping effect)

Column headings include:

**Backfill** (m<sup>2</sup> / m<sup>3</sup>) fillings of unpaved shoulder and central reserve if exist, area and volume.

**Layers 1 to 9** (m / m<sup>2</sup>) names of material, width and area of layers

**Road subbase** (m<sup>2</sup> / m<sup>3</sup>) name of material, area and volume

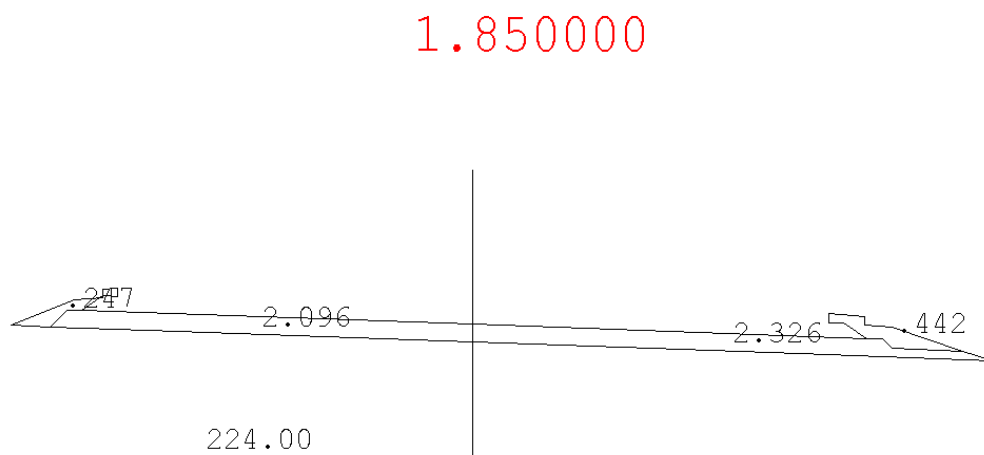
**Total volume of construction** (m<sup>2</sup> / m<sup>3</sup>) areas and volume of part of cross section from formation up.

In case of engineering structures and requested subtotals there are subtotals situated in corresponding columns. Result tables were made concisely, header with title remains only at beginning of each section, section number was added. Subtotal table in engineering structure was formally modified; engineering structure length is no more displayed but chainage of the beginning and the end. In case of resetting (can be initiated both in case of null or not null length) a separate information line will be printed.

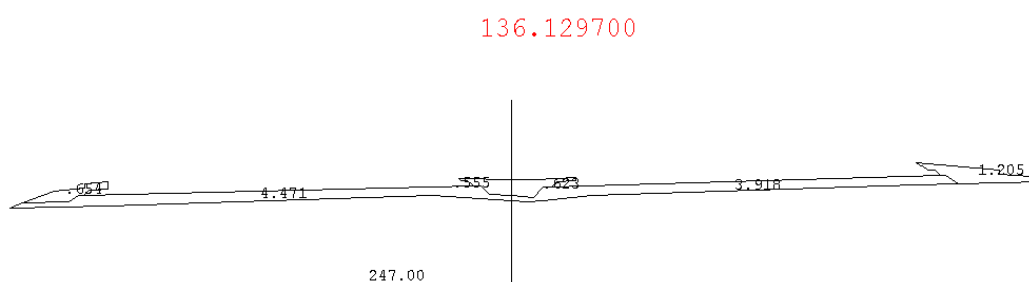
### 3.1 Graphical output file of backfill and sub-base layer

Plotfile type file is also created. It contains number of images. Each image contains contour surfaces of the sub-base and backfill in verge and in central reserve. In the center of each figure is listed sub-area figure, the sum will appear in the print report in the tables in the row labeled chainage of cross section.

Sample of a cross section of single carriageway road:



Sample of a cross section of dual carriageway road:



## 4. 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 warning messages and comments to alternate solution:

| <b>Error message text</b>                                  | <b>Alternate solution</b> |
|--|---------------------------|
| *** Leading line is missing * 72                           |                           |
| *** Inaccessible type of leading line: nnn                 |                           |
| ** First line ignored                                      |                           |
| *** Unmarked line encountered in control data *            |                           |
| *** Premature data end                                     |                           |
| *** Line 721 is missing                                    |                           |
| *** Allowed number nnn of segments exceeded                |                           |
| *** Descending chainage in segment: n.nnn n.nnnn           |                           |
| *** Specified more than 10. constr. layers, remain.ignored |                           |
| *** Allowed number nnn of objects exceeded                 |                           |
| *** Allowed number nnn subtotals exceeded                  |                           |
| ** In segment No nnn do not lay even one cross section     |                           |
| *** Chainage of beginning is greater than chainage of end  |                           |