ЈАВНО ПРЕДУЗЕЋЕ
ПУТЕВИ СРБИЈЕ

REPUBLIC OF SERBIA

**TRANSPORT REHABILITATION PROJECT**

# SERBIAN ROAD CONSTRUCTION SPECIFICATIONS

## 2. SPECIAL TECHNICAL CONDITIONS

## 2.1 PREPARATORY WORKS

**BELGRADE, 2012**

**Publisher:** **Public Enterprise Roads of Serbia, Bulevar kralja Aleksandra 282, Belgrade**

**Edition:**

| No. | Date | Description of amendments |
|---|---|---|
| 1 | 30.04.2012 | First edition |
| | | |
| | | |
| | | |

## CONTENT

# 2.1 PREPARATORY WORKS

## 2.1.1 GEODETIC WORKS

### 2.1.1.1 Description

Geodetic works include:
- the alignment and facilities setting out ,
- all the surveying related to data transfer from the design documentation to the field or from the field to the appropriate documentation,
- progress surveying within geotechnical observations, and
- maintenance of set out marks in the field during the period from commencement of works up to taking over of all the works by the Employer.

Geodetic works also include taking over and maintaining all the basic geodetic surfaces and plans as well as setting out in the field which the Employer shall submit to the Contractor at the beginning of works.

The Contractor of geodetic works is to inform the Supervising Engineer of all the works in due time, as well as to provide him the participation in such works.

The extent of geodetic works is to be in full accordance with the requirements of the construction, work control, calculation and everything else related to the conditions for the execution of works.

Geodetic works also include preparation of technical documentation of finally set out and constructed road and/or facility. The technical documentation is to be prepared prior to technical inspection of the constructed road and/or facility.

### 2.1.1.2 Execution method

2.1.1.2.1 Alignment taking over

The Employer is to hand over to the Contractor the following:
- set out alignment and/or facility in the field with all the necessary information in written form. Only road centre line and/or facility is set out at spacing conditioned by the field properties, but not greater than 25 m. Access points are generally set out along the edge of decelerating or accelerating lanes or pavement, or along the edge of the access road itself.
- traverse points set out in the field. The traverse is to be linked to trigonometric points, calculated according to Gauss-Krüger system, with admitted deviations in compliance with the rulebook for first-order traverse network.
- levels (bench marks) determined in the field
- alignment design containing the following:
  - plan at scale 1:1000 with axis, mileage and indication of alignment elements; the plan is to include drawings indicating connection between main points and traverse with the necessary setting out information
  - calculation of main points; in case of electronic calculation, the coordinates of main points with the chainage
  - list of traverse points with coordinates and topography of such points
  - list of bench marks with levels and topography of bench marks.

For additional facilities of lower importance, such as deviations of less important roads, regulations etc. other measuring procedures may be applied, adapted to the type of facility and field so the Contractor is free to execute works with no disturbances.

After works on the formation level are completed and based on the traverse points setting out drawing, the Contractor is to renew the axis (plan and height). Soundness of the renewed axis is to be inspected by the Supervising Engineer. The axis is also to be renewed prior to incorporation of the road surface wearing course.

From the day of taking over onwards, the Contractor is to protect all the traverse points and bench marks. If any data is lost or shifted in the field (traverse points, bench marks), the Contractor is to renew them at his own expense. Soundness of the renewed points is to be inspected by the Supervising Engineer.

2.1.1.2.2 Protection of set out axis

When the Contractor takes over the set out road centre line or any other facility, each profile (regardless of the field configuration) is to be protected on both sides at such distance from the edge of embankment or excavation that he may freely remain at the distance until the works are completed. Each protection point is to be secured with triangle made of 2.5/5 cm laths. The protection point

(5/5 cm peg) is to be equipped with a pin, and painted with minium or other appropriate durable paint on the upper side. Each protection is to be levelled twice.

Next to the triangle, on the left and right sides of the axis, the board is to be set with number of profiles written in large figures with minium or other appropriate durable paint and the profile mileage (chainage) is to be written below.

2.1.1.2.3 Placement of cross-profiles

If dissatisfied with the profiles proposed in the main design, the Contractor is entitled to repeat the survey of cross-profiles himself, at the right angle to the road centre line, by levelling or tachometric surveying.

At embankments and excavation slopes, the construction profiles are to be graded, as specified in drawn cross-profiles. Section of slopes with the field is to be determined by calculation, taking into consideration the specified slope breaks.

The profiles are to be placed in the course of the entire incorporation of embankment and/or excavation and are to be extended simultaneously with the work progress.

The construction profiles are generally to be made of 2.5/5 cm laths and 5/5 cm wooden pegs. At high embankments or excavations, they may be set at the spacing of not more than 50 m. If necessary, the Supervising Engineer may order the placement of additional construction interprofiles.

At slope grades, line of embankment or excavation without top soil and without rounding off at the bottom or top of the excavation or at the heel of embankment is to be considered.

2.1.1.2.4 Setting out of facilities

Based on the information under sub-clause 2.1.1.4.1, the Contractor is to set out all the facilities to his opinion and need, but is previously to propose the setting out layout to the Supervising Engineer including all the information according to sub-clauses 2.1.1.4.2 and 2.1.1.4.3. Placement of cross-profiles, protection of set out axis and inspection are to be performed in the same manner as alignment marking, but adjusted to the needs of the facility construction.

Setting out of the facility is to be provided with concrete posts set at each side of the facility. The setting out layout for large facilities is to include calculation of elements for plan inspection of setting out and construction of posts with sections.

2.1.1.2.5 Displacement measurement

In the course of construction, the Contractor is to survey displacement determined in the design documentation within the geotechnical observations and affecting the course of construction and calculation measures. The Supervising Engineer is to be immediately informed of surveying results.

### 2.1.1.3 Construction quality

The accuracy of measurements is to be in accordance with geodetic norms for the appropriate types of measuring as well as in accordance with the required quality of certain works according to the special technical conditions.

If the Supervising Engineer determines that the results of measuring do not guarantee the execution of works according to the design documentation, he is entitled to halt the measurement works. The Contractor is then to take measures for more accurate surveying or obtaining measuring results as requested by the Supervising Engineer.

### 2.1.1.4 Quality control

In the course of construction, the Contractor is to inspect set out alignment and regularly renew all the marks in the field, regardless of the cause of the damages. In case of alteration to the project, the Contractor is again to execute works specified in the sub-clauses 2.1.1.4.2 to 2.1.1.4.4. The Contractor is to submit all the information on setting out to the Supervising Engineer and provide him with the undisturbed use of all the marks he may need. If, by surveying and information check, the Contractor determines that surveying conducted by the Contractor is not accurate, he is entitled to appoint third-party professional institution to perform surveying at the actual expenses which are to be borne by the Contractor.

#### 2.1.1.5 Measuring and taking over of works

2.1.1.5.1 Measuring

Geodetic works are to be measured in the following manner:
- alignment setting out in kilometres of the set out alignment
- placement of profiles in pieces of profiles placed on both sides
- level and displacement surveys in pieces.

2.1.1.5.2 Taking over

After completion of works, the Contractor is obliged to provide the Employer with the technical documentation of set out constructed road and/or facility in three copies and prior to technical inspection. The technical documentation is also to contain the information on traverse points and bench marks in accordance with the sub-clause 2.1.1.4.1. Take-over record is to be made.

Prior to technical inspection, the Contractor is again to set out the axis or the road surface edge, and to mark the construction profiles with durable paint.

#### 2.1.1.6 Calculation of works

Works are to be calculated in terms of unit price or lump sum, based on the agreed bill of quantities. The unit prices include all the works described in this chapter with all the materials and internal and external transports. The cost also includes all additional surveying and setting out, along with surveys performed at borrow pits and in similar cases, necessary for the completion of works. The Contractor is not entitled to claim any additional payment for such works. The basis for lump sum calculation is determined as a percentage of values of the completed contracted works.

The cost also includes:
- preparation of technical documentation of set out and constructed road and/or facility, which is to be submitted to the Employer by the Contractor prior to or with the claim for technical inspection of the constructed road and/or facility,
- setting out of the axis or the road surface edge, and
- marking construction profiles at the road surface.

The costs of measurement and information check, performed by the Employer, are to be borne by the Contractor, if the surveying results and information provided by the Contractor are determined to be inaccurate.

### 2.1.2 SITE CLEARING

#### 2.1.2.1 Description

Site clearing includes:
- removal of shrubs, trees, branches and stumps
- removal of traffic signs and equipment
- demolition and removal of road facilities
- demolition and removal of facilities.

2.1.2.1.1 Removal of shrubs, trees, branches and stumps

The works include:
- cutting and removal of shrubs and trees
- removal of branches from the previously cut trees
- removal of stumps of old and newly cut trees
- clearing or excavating surfaces including cutting and removing shrubs, trees and branches, excavation of stumps and roots, excavation of top soil stumps, removal of organic material remained after removal of shrubs, trees, branches and stumps and transport to deposit areas outside the alignment.

The surfaces to be cleared and/or excavated are to be indicated in the plans or determined by the Supervising Engineer prior to commencement of works.

2.1.2.1.2 Removal of traffic signs and equipment

The works include:
- excavating, dismantling and dislocating traffic signs and information boards,
- excavating and dismantling crush barriers,
- excavating and dismantling direction posts,
- demolition and removal of safety fences.

Traffic equipment, which is to be used again, is to be indicated in the plans. The reuse of such equipment is to be determined by the Supervising Engineer.

2.1.2.1.3 Demolition and removal of road facilities

The works include:
- demolition and removal of road surface,

- scraping and transport of asphalt surfacing,
- cutting asphalt layers,
- demolition and removal of curbs.

All works within demolition and removal of the existing road facilities are to be specified in detail in plans. Each deviation is to be approved by the Supervising Engineer.

2.1.2.1.4 Demolition and removal of facilities

The works include:
- demolition and removal of culverts, sewage and shafts,
- demolition and removal of bridging facilities,
- demolition and removal of buildings and walls.

Demolition and removal are to include all the facilities that may disturb the execution of works in any way.

The works do not include various removals of installations that are used, such as electrical installations and high/low voltage cables, telecommunication installations and cables, water supply, gas pipelines and installations that are to be dislocated, and include only parts of the devices serving as foundations or as parts of mass-material facilities, which are to be demolished after the mentioned installations and devices are dislocated.

Treatment of waste caused by construction of works is to be in accordance with the provisions specified in the waste treatment rulebook.

### 2.1.2.2 Execution method

2.1.2.2.1 Removal of shrubs, trees, branches and stumps

Shrubs, trees, branches and stumps are to be removed from all surfaces specified in the plans as well as from places (for some trees and stumps) determined by the Supervising Engineer.

Some trees determined by the Supervising Engineer are to remain and must not be damaged. To prevent remaining trees from damages, other trees are to be carefully removed. When facilities, other trees or property are to be protected from damages or when the danger is to be reduced or the property disturbance prevented, the trees are to be carefully removed from top to bottom.

All stumps and roots are to be removed from the new alignment excavation surfaces, except for circled slope areas, where they may be cut at the field level. Stumps and roots are to be removed prior to excavation of humus, rolled turf and/or fertile soil.

On foundation soil surfaces where low bearing layers are to be removed from or which are to be compacted, all the stumps and roots are to be removed to the depth of 20 cm underneath the foundation soil formation and/or at least 50 cm underneath the formation level.

When excavating low bearing soil (of lightly mouldable to light-bodied consistency) all the roots and stumps are generally to be removed with excavation of earth.

2.1.2.2.2 Other removals

Removals specified in the sub-clauses 2.1.2.1.2 to 2.1.2.1.4 are to be performed on all surfaces where clearing is necessary due to construction works or esthetical arrangement of immediate road surroundings.

Traffic equipment is to be excavated and dismantled with no damages to any components so they may be used again. For this purpose, prior to dismantling and as agreed with the Supervising Engineer, such components are to be determined, stored and protected from decay, and other ones are to be removed. Storage area for dismantled traffic equipment and signs is to be determined by the Supervising Engineer, and the Contractor is to temporarily store the dismantled components in his storehouses which are accessible to vehicles, until they are taken over by the Supervising Engineer. The take-over date is to be determined by the Supervising Engineer.

All the works within demolition and removal of road and other facilities are to be executed with minimum damage to the adjacent facilities, vegetation and the remained roadway, while the demolition area is functional for purposes envisaged by the project and provisions specified by the Supervising Engineer.

Removal of curbs, dismantling of crossing facilities, buildings and similar obstacles is to be performed in the manner that such obstacles are completely removed so there are no obstacles remained to disturb proper execution of works, nor ones affecting the esthetical appearance of the road and

surroundings. In the course of removal, the Contractor is to be careful that components are not damaged and can be reused.

Parts of various installations that are to be dislocated due to road construction (such as foundations or parts of mass constructions) and which cannot be dismantled nor cut, are to be removed in the same manner as other devices within the site clearing.

The manner of removal and demolition is to be determined by the Contractor. He is to act in compliance with the occupational health and safety regulations and prevent any damage and disturbance of other properties. The Contractor is responsible for any damages in the course of works.

The Contractor is not entitled to claim any additional payment for the material. If it is in accordance with the contracted works, all the obtained material is to be reused.

### 2.1.2.3 Measuring and taking over of works

2.1.2.3.1 Measuring

The extent of removal of shrubs, branches and stumps, old and newly cut trees, with all the works, specified under sub-clauses 2.1.2.1.1 and 2.1.2.4.1, is to be determined after the work is completed.

The extent of other removals specified under sub-clauses 2.1.2.1.2 to 2.1.2.1.4 is to be measured after actually completed work and indicated in the appropriate unit of actual quantity.

2.1.2.3.2 Taking over

The completed works are to be taken over in accordance with the provisions stated in the general technical conditions and according to the provisions stated in these special technical conditions.

### 2.1.2.4 Calculation of works

All quantities of works, specified under sub-clause 2.1.2.7, are to be calculated and paid according to unit prices indicated in the contracted bill of quantities.

The unit price is a full compensation for all work procedures specified under sub-clause 2.1.2.1 and/or the ones necessary for the ultimate completion of works.

Works specified under sub-clause 2.1.2.4.1, item 5, are to be calculated in the course of excavation of low bearing soil.

## 2.1.3 OTHER PREPARATORY WORKS

### 2.1.3.1 Description

Other preparatory works include:
- restricting traffic,
- facility-related preparatory works,
- compensations.

2.1.3.1.1 Traffic restrictions

For all the works conditioning traffic restricting, the public road Contractor is bound to acquire permit from the authorized institution in due time.

Traffic and site protection in the course of works requires partial or complete traffic diverting or closing.

2.1.3.1.2 Facility-related preparatory works

The works include various temporary measures, such as:
- temporary facilities
- placement of temporary movable and fixed scaffolds and facilities
- placement of temporary fences
- construction pit protection
- temporary dislocation of various installations.

Works related to temporary facilities include placement, maintenance and removal of office premises for the Employer and site laboratory.

Placement of temporary facilities for the Contractor within the site organization is included in the preparatory works only if specified in the contract. Otherwise, the Contractor is to organize the site according to the technology he provides and at his own expense.

Preparatory works also include facility repairs in terms of the following procedures:
- removal of prefabricated elements
- demolition of monolithic elements
- removal of concrete and mortar
- removal of dilatation elements
- concrete cutting
- concrete holing
- removal of damaged facility parts and installations

All preparatory works related to facilities are to be specifies and executed according to the appropriate projects or are to be determined by the Supervising Engineer prior to the repair work and based on the current condition of the facility.

2.1.3.1.3 Compensations

Compensations required due to public road construction works are conditioned by
- excessive use of municipal roads, and
- disturbance, i.e. slowdown and temporary closing of railway traffic.

For all the works that are to cause the abovementioned consequences, the Contractor is to acquire consent/permit from the relevant or control authority.

### 2.1.3.2 Execution method

2.1.3.2.1 Traffic restrictions

Restricting public road traffic is to be performed in accordance with the Road Traffic Safety Act.

The site protection in the course of construction may be performed by complete or partial closing of traffic, which is to be regulated by traffic lights or manually in special cases.

Type and closure time are to be specified in detail in the traffic arrangement plan, and controlled all the time and, if necessary, supplemented or altered.

As soon as there is no more need to protect the site by traffic restriction, the Contractor is bound to remove all the equipment placed for the traffic closure.

Public area traffic may be restricted only for the shortest possible and professionally justified time and within the least possible extent.

2.1.3.2.2 Facility-related preparatory works

Within preparatory works for the facility, the Contractor is to arrange all temporary beltways, bypasses, water flow redirecting and traffic protection under and along the facility, necessary for undisturbed and safe execution of works and for traffic safety. All the above mentioned works are to be executed according to the appropriate projects.

For all temporary facilities for the construction of bridging facilities, the projects are to be adjusted to specific conditions of the subject facility.

In the course of facility construction, the construction pit is to be protected in the manner that ensures safe work. Water pumping is to provide execution of all the necessary work in dry construction pit.

All the temporary scaffolds necessary for preparatory works within the facility construction are to be made of appropriate materials so the proper stability and safety of the temporary scaffold are provided in the course of its usage.

When power cable installations are to be dislocated within the preparatory works for the facility construction, such action is too performed in the manner that provides undisturbed power supply for the users in the course of preparatory works. Undisturbed usage and supply for the users is also to be provided in the course of dislocating all the other installations (PTT cable installation, water supply, sewage system, gas pipelines, and optical cable). All the necessary dislocations within the preparatory works for the facility construction are to be performed in accordance with the appropriate projects. Plans for the permanent rearrangement are to be followed to the highest possible extent.

Within the preparatory works for the construction, the Contractor is to prepare all the temporary facilities necessary for undisturbed execution of works on the site. All the facilities are to be executed according to the appropriate projects and in the manner that does not disturb completion of works on other facilities within the construction. After temporary facilities are removed, the Contractor is generally to restore prime condition of the damaged surfaces.

Detailed execution procedure for the mentioned repair works on the facilities is to be specified in the design documentation. In case that the Supervising Engineer determines that the actual condition of the damaged facilities deviates from the envisaged one, he is entitled to determine the appropriate alteration to the procedure within the contracted provisions.

All the previous repair works on the facility are to be executed in the manner that provides safe execution of works with no

damages to the adjacent facility surfaces or to the surroundings.

The Contractor is to remove the undamaged prefabricated elements and dilatation so they are not damaged and ready to be reused.

Machines are to be used as much as possible for demolition of monolithic elements and planned removal of damaged cement concrete. The Supervising Engineer is entitled to alter the planned procedure and extent of works within the approved bill of quantities, if it is determined that the planned procedure is not to reach the aim of works.

In case that exposing the reinforcement is necessary for the facility repair, sound middle third of the reinforcing bar must not be damaged.

Removal of mortar from the compositions in stone and brick walls is to be performed to such extent that provides necessary fitting of the new mortar in the composition with cleaned stone or brick.

Appropriate mechanical equipment (diamond saw or steel rope) enabling accurate execution of the planned works is to be used for cutting of plain or reinforced concrete and stone. The same is to be taken into consideration when holing.

All the other necessary removals of the existing facility elements (e.g. arches, dewatering equipment, waterproofing) are to be performed with care and to the planned extent.

2.1.3.2.3 Compensations

The Contractor is to provide appropriate compensation, based on the objective evaluation of damages to the existing roads due to overloading caused by heavy vehicles in the course of transports for needs of the construction works.

The appropriate compensation is also to be provided for all disturbances of railway traffic (slowdowns and standstills) caused by the national road construction.

The Contractor is entitled to claim compensation for standstill in the course of tunnel excavation due to inadmissible concentration of explosive gases, force majeure or the Supervising Engineer’s instruction.

### 2.1.3.3 Construction quality

All works within preparatory works specified in this chapter are to be executed in accordance with the required quality for certain elements in appropriate projects according to these special technical conditions and the Supervising Engineer's instructions.

In case that the Supervising Engineer determines that execution of preparatory works specified under sub-clause 2.1.3.4.2 in terms of quality is not in accordance with the projects, he is entitled to halt the works and demand remedy of defects.

The Contractor is to inform the Supervising Engineer of any problems that might occur in the course of execution of specified preparatory works and that might affect the quality of executed works. If the Contractor fails to do so, he is to take all the responsibility and possible repair expenses.

### 2.1.3.4 Quality control

The quality of all executed preparatory works within the design documentation is to be inspected by the Supervising Engineer. In case that the Supervising Engineer determines that execution of preparatory works specified under sub-clause 2.1.3.4.2 is not in accordance with the design documentation, he is entitled to halt the works and demand remedy of defects.

### 2.1.3.5 Measuring and taking over of works

2.1.3.5.1 Measuring

The extent of all the preparatory works described in the chapter is to be specified in detail in appropriate projects. The Supervising Engineer is to determine whether the planned works are actually executed and to determine the extent of actually executed works.

2.1.3.5.2 Taking over

Completed works within the extent specified under sub-clause 2.1.3.7.1 are to be taken over by the Supervising Engineer in accordance with provisions specified in the general and special technical conditions.

### 2.1.3.6 Calculation of works

All completed works, specified under sub-clause 2.1.3.7.1 and taken over according to the sub-clause 2.1.3.7.2, are to be calculated and paid according to the unit prices indicated in the contracted bill of quantities. Possible additional works are to be calculated according to provisions specified in the general technical conditions.