

## **TERMS OF REFERENCE (TOR) FOR ADDITIONAL CONSTRUCTION DESIGN**

**Reference:** HEMUS” motorway /A2/Section: from km 0+000 to km 8+460

**Part:** Road

**Stage:** DETAILED WORK PROJECT

**Location:** district of Sofia

**Nature of the terrain:** plain

### **I. PROJECT GROUNDS AND TARGET**

The additional design work is required primarily by the requirement for a stage construction of the site, as well as due to events related to environmental protection and compatibility assessment as well as with changes in the terrain conditions after the elaboration of the technical project.

### **II. GUIDELINES FOR THE TECHNICAL SOLUTION**

#### **1. Basic requirements**

The design work should provide all project materials necessary for the successful completion of the construction site. Developed project materials and details should not call forth hesitation or misunderstanding with the contractor.

- ”Large facilities” part

Statistic check of facilities construction components for seismic impact resistance shall be accomplished in accordance with Ordinance № 2, dated 23.07.2007 for design of buildings and facilities in earthquake affected regions. If the check proves necessity of construction drawings revisions, the latter shall be agreed with the Contracting Authority and following its approval the amendments shall be reflected on the drawings. The expenses for statistic check and drawings revisions shall be at the Contractor’s account.

Details and solutions regarding lateral slopes, dilatation joints and construction elevation shall be précised.

#### **A. General requirements for the road section**

In drafting the design projects the requirements included in the Decision under the updated Environmental Impact Assessment (EIA) Report and the Decision under the Compatibility Assessment Report should be taken into account

#### **B. Specific requirements for the road section**

The additional design works shall cover all parts of construction and assembly works that have not been presented in the investment project.

These are:

## **I. RING ROAD UNDERPASS UNDERNEATH HEMUS MOTORWAY AT KM 0+832 AND ROAD JUNCTIONS SERVICING THE CONTIGUOUS TERRITORIES**

Due to the quick urbanization of territories, contiguous to “Hemus” motorway and Sofia ring road and aiming to ease the traffic at the junctions, an underground pass has to be designed under the motorway, at km 0+833.

“Construction schemes” and “Technical project” shall be made.

The “Technical project” shall have the following scope:

### 1. “Geology and hydrology” Part

The scope of surveys and project contents shall meet the requirements for design of transportation facilities.

### 2. “Geodesy” Part

Detailed tachometric photo in the necessary scope shall be made with accuracy, needed for the road design.

### 3. “Road” Part

The project shall contain detailed geometry solution of

- South local deviation of Hemus Motorway, starting at about 130 m. before the SHELL petrol station and connected to the motorway approximately at km. 0+730,
- Junction from this deviation to the ring road,
- The ring road itself
- Road connection in North under the motorway,
- about 150 m of Road I-6,
- North local deviation, providing two entries to and an exit from the commercial area, located North from the motorway,
- detailed cross sections, typical lateral sections, vertical planning, drainage plan, traffic organization – permanent and during the construction period.

### 4. “Tunnel and road junctions drainage” Part

Drainage alternatives shall be looked for. Fire hydrants shall be provided at the entry and exit of the underground pass. They shall be water supplied by the water pipeline at Shell gas station. Collector shall be provided for drainage of road junctions under the road connection near to the pump station, within the frame of the ring road and under I-6 road, taking into consideration the further extension of the collector along the route of I-6 road.

**The building of the collector under I-6 road East from the ring road is the subject of another investor. The pump station and the supporting walls from the North part of the underpass will be built by the investors of the respective terrains.**

### 5. “Lighting” Part

Lighting project for the underground pass, as well as a project for the supply nets shall be worked out.

### 6. “Telecommunication” Part

All communication cables’ routes, crossing the project range shall be investigated and in case of need, measures for their fixing shall be taken.

### 7. “Construction” Part

- the underpass shall be wide enough, it shall have slab or beam-and-slab structure;
- the structure shall be chosen by the designer;
- the clear height under the facility shall be 2.80 m – for passing of cars and minivans only;
- foundation – in accordance with the engineer and geology surveys;
- embankment wall or flanges shall have lengths, sufficient to hold the embankment and protect the adjacent estates.

A conceptual project is enclosed to the documentation of the approaches to the underpass going underneath Hemus Motorway and the ring road, which shall serve as a basis for designing.

## I. MOTORWAY OVERPASSING ABOVE WATER HINDRANCE FROM KM 1+700 TO KM 2+500

### II.1 General

This assignment is integral part of the documentation for participation in tender procedure for construction of “HEMUS” Motorway – “SRR – Yana road junction” from km 0+000 to km 8+460.

The target of the present assignment is working out of project design in stages: “Construction schemes” and “Technical project” for dealing with water hindrance, obtained as a result from yielding of significant quantities of inert materials in a section of concession for inert material yielding, valid till 2010 along “Hemus” motorway route in the section between km 1+700 and 2+500.

### II.2 Project requirements

#### II.2.1. “Construction schemes” stage

1. Project solution shall be worked out, based on detailed terrain engineer and geologic survey. The main engineer-geologic reports for the site may be used, provided it is supplemented by investigation of the section, where inert material had been yielded and terrain’s level had significantly changed as a result of performed activities.
2. The project shall correspond in situation and leveling regard to the motorway route design.
3. Facilities width gauge shall correspond to A29 motorway gauge, comprising:
  - traffic lanes – 2x2x3.75m;
  - lanes for forced stop band - 2x2,50m;
  - guide lanes – 4x0.75m;
  - external pavements /next to the guard rails/ - 2x1.75m;
  - middle dividing strip – 3.50m;
4. Hydrologic and hydraulic study shall be carried out for a bridge.
5. The method of construction shall be determined on the basis of engineer and geologic and hydrologic conditions.

***The proposed project solutions shall include situation, longitudinal section, cross section, viewing the column/support in case the proposed project solution includes a facility.***

After review and approval of the proposed project solution by RIA expert and technical council, the project design shall continue with “Technical project” stage under the clauses of Section X – ORGANIZATION of Additional design and CAW from the draft contract.

### II.3 Technical solution requirements

1. The project design, approved by RIA expert and technical council shall be worked out on a tachometric photo, showing the detailed items of the terrain road axis as well.
2. Engineer-geologic report shall be presented in “Technical project” stage.

### II.4 Normative documents

1. Upon the project design the requirements of the Technical Order No 94-00-98/05.04.1999 shall be observed.

2. Upon designing the facility, the following rules and regulations shall be observed:

- Road Design Rules, 2000.
- Terms of reference of the Assignor
- Temporary Statute for designing of concrete and reinforced concrete road bridges, 1973.

• Pile Foundations, Design Regulations, Construction and Architecture Bulletin, issue 3, 1981 or DIN 4014

- Design Regulations for buildings and facilities in seismic regions, 2007.
- Design Regulations for supporting walls, 1986.
- Bulgarian State Standard 1050-76 - Mobile loads for calculating road bridges
- DIN 4227 for elements made of prestressed reinforced concrete
- Licensed software products.

3. FACILITIES FOR ADDITIONAL DESIGN, STIPULATED IN THE EIA REPORT AND DECISION UNDER EIA, DATED 29.11.2010 FOR ‘HEMUS’ MOTORWAY SITE FROM KM 0+000 TO KM 8+500

- In accordance with clause I.1 of the Decision under EIA, facilities, permitting free passing of people, animals and agricultural machines at both motorway sides in the section of the villages Gorni Bogrov and Yana shall be designed and built.
- In accordance with clause I.2 of the Decision under EIA a screening facility – noise protection barrier shall be designed and built in the section from km 6+750 to km 7+250 near the village of Dolni Bogrov, aiming to limit the atmospheric air pollution and noise load of the settlement area.
- In accordance with clause I.3 of the Decision under EIA additional facilities for drainage of the route shall be designed and built in the section from km 1+700 to km 1+910 upon passing abandoned ballast fields and boggy sections.
- In accordance with clause I.4 of the Decision under EIA the construction of the bridge over Lesnovska river (at km 3+040) shall technically conform with the basic parameters of the river flow at this section (river bed width – 22.5 m; river bed elevation in the crossing point – 519.30 m; longitudinal inclination of the river

in the section – 0.0007%) and shall take into consideration the water use permit No. 12170040/16.11.2007, possessed by Danube river Basin Directorate. Before, at the section and after the road crossing of Lesnovska river at both river banks along the stream, missing or destroyed dykes shall be rebuilt.

- In accordance with clause I.5 of the Decision under EIA emergency tanks for contaminants' depositing shall be designed and built in case of heavy spills and damages during the operations, which might lead to fuel or oil leakages.
- In accordance with clause I.6 of the Decision under EIA collectors – evaporators for rain water shall be designed and built in the section from km 3+000 to km 3+100 near Lesnovska river and the bigger quarry lakes, the motorway passes nearby. Their calculated capacity shall cover the surface flow at maximum rainfall (not less than the 30-years minimum).
- In accordance with clause I.8 of the Decision under EIA a service zone of 100 m shall be provided after the motorway end.
- In accordance with clause I.9 of the Decision under EIA special crossing facilities shall be designed and built, aiming to limit the barrier effect of the motorway on wildlife. Some classical facilities shall be further equipped in such way that they can be used by the wild animals as follows:
  - ✓ Drainage culverts shall be designed to permit their use for crossing of amphibian, reptiles and small mammals. Engineering requirements for the construction of 25 culverts are stated in i.1 of the Table for Measures under art. 96, para. 1 item 6 in chapter V of the Decision under EIA.
  - ✓ Water – collecting ditches, located parallel to the road lane shall be designed to hamper falling of animal species on the road.
  - ✓ The dry passage for small animals, located about 5 km from the beginning of the section shall have dimensions 2x2m and the requirements, stated in i.2 of the Table for Measures under art. 96, para. 1 item 6 in chapter V of the Decision under EIA shall be met during its construction.
  - ✓ Combined passages with wet and dry parts, located according to fig. 8.3.1, presented as appendix to this document shall be built according to the requirements, stated in i.3 of the Table for Measures under art. 96, para. 1 item 6 in chapter V of the Decision under EIA.
  - ✓ Passage for big mammals (modification of the bridge over Lesnovska river) shall be designed and built according to the requirements, stated in i.4 of the Table for Measures under art. 96, para. 1 item 6 in chapter V of the Decision under EIA
  - ✓ 2 meters high transparent screening barriers shall be designed and built at both sides of the motorway in the 1,5 meters long route section near BG 0002004 “Dolni Bogrov – Kazichene” protected zone according to i.5 of the Table for Measures under art. 96, para. 1 item 6 in chapter V of the Decision under EIA.
  - ✓ Bridges over the rivers and adjacent motorway sections shall be fences with 2-meters high wire mesh according to i.14 of the Table for Measures under art. 96, para. 1 item 6 in chapter V of the Decision under EIA.
  - ✓ Smooth vertical fences of fine wire mesh, facing the facilities in their upper end and located tightly to the steel barrier shall be built along the bridge over

Lesnovska river according to i.15 of the Table for Measures under art. 96, para. 1 item 6 in chapter V of the Decision under EIA. Their aim shall be to hamper the access of amphibian and reptiles to the road.

- ✓ In accordance with clause II.15 the landscape design shall be updated with local wood and bush vegetation.
- ✓ In accordance with clause III.17 the clay impermeable layer from km 3+100 to 4+600 shall be removed and replaced by rocky drainage material for better drainage.
- ✓ In accordance with clause III.19 of the Decision under EIA direct discharge of waste waters from construction sites in the near water basins shall not be permitted. If it is necessary, retention ponds and oil collectors for waste fuels and lubricating materials shall be constructed.
- ✓ In accordance with clause III.21 of the Decision under EIA, placing of appropriate protective fencing shall be anticipated for avoiding interference with the drainage channel, located in the “heel” of “Kremikovtsi” tailings pond, discharging the surface and infiltrated waters in Lesnovks river. This fencing shall be at a safe distance from the channel during the construction machines operation.

**4. A project for traffic organization during construction period shall be worked out and agreed.**

#### **V. Restrictions in project desing**

The candidate is obliged to comply with the requirements as set out in the Terms of Reference (TOR) for additional design, but in no case the following parts of the approved technical design should be re-worked:

1. Situational decisions of the direct alignment, cross roads, road junctions.
2. Leveling decisions.
3. Transverse profiles.
4. Road surface and road body structure
5. Pipe culverts with openings up to 1.5 m can be replaced with facilities of the same or larger opening and height. The materials to be used for building of these facilities shall meet or have longer exploitation life than the ones, proposed with the basic design
6. The materials for construction of the facilities as set out in the basic design may be replaced only with ones complying with the approved technical specifications, having the same or longer exploitation life and not requiring higher costs for maintenance during the operation thereof.
7. Structural components of facilities, guaranteeing the water streams hydraulic mode shall not be modified.
8. All project, which shall possibly lead to modification of the motorway and roads range and are subject of the technical project and consequently may require additional land expropriation.
9. Any additional project designs shall be authorized by the Contracting Authority and agreed thereof.

