Republic of Moldova
Ministry of Transport and Road Infrastructure
State Road Administration

European Bank for Reconstruction and Development

Road Sector Program Support Project

Rehabilitation of M2 Chisinau – Soroca Road, km 26+200 – km 54+850

VOLUME 2

TECHNICAL SPECIFICATIONS

ICB: RSPSP/2010/ICB02
Invitation for Bids no **RSPSP/2010/ICB02/W02**

Chisinau, 2010

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0. GENERAL REQUIREMENTS

CHAPTER 001. ACCEPTANCE OF WORKS

001.01. Conformity with Contract and Project Requirements.

Wherever reference is made in the Contract to specific standards and codes to be met by the materials, Plant, and other supplies to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards which ensure a substantially equal or higher performance than the standards and codes specified may be used in parallel with the specified standards and codes subject to the Engineer's prior review and written approval. Such parallel use is for the Contractor's convenience, and does not void the need to meet the requirements of Moldovan legislation and regulations with respect to work acceptance. Any testing, equipment and other costs associated with the use of other standards than those specified shall be borne by the Contractor. Differences between the standards specified and the proposed alternative standards must be fully described in writing by the Contractor and submitted to the Engineer at least 28 days prior to the date when the Contractor desires the Engineer's approval. In the event the Engineer determines that such proposed deviations do not ensure substantially equal performance or that the deviations run counter to the established legal requirements of the Employer's country, the Contractor shall comply with the standards specified in the documents.

The works shall be executed entirely in accordance with the requirements of the Contract, including the requirements of this Specification, and shall be to the satisfaction and approval of the Engineer. All works shall be executed in accordance with the required lines, grades, cross - sections, dimensions, processes and material requirements shown on the plans or specified in the contract or design documents.

Plan dimensions and contract specification values are to be complied with subject only to the variances and tolerances specifically allowed for in this Specification. Works and materials shall be uniform in character and meet the specified requirements.

The Engineer may inspect, sample or test all work at any time before final acceptance of the project. When the Engineer tests work, copies of test reports are furnished to the Contractor. Engineer's tests may or may not be performed at the work site.

Acceptable work conforming to the contract will be paid for at the contract unit bid price. Methods of determining conformity and accepting work are described in Subsection 001.02 to 001.04 inclusive. The primary method of acceptance is specified in each Section of work. Where appropriate, acceptance of work shall be in accordance with Sections 002.003 and 002.004 of Chapter 002.

Work shall be rejected at any time it is found not to comply with the specifications and drawings. The initial acceptance of work does not imply that the work necessarily complies with the Contract requirements. Work may be inspected and rechecked for conformity at any time and work found not to conform shall be rectified or removed and replaced by the Contractor at no cost to the Employer.

Work that does not conform to the project and contract requirements or to prevailing industry standards where no specific contract requirements are noted, shall be removed and replaced at no cost to the Employer.

001.02. Technical Inspection.

Acceptance is based on technical inspection of executed works to confirm compliance with the contract documents and prevailing relevant technical standards. Payment for work

during the course of the project will be made as the work progresses providing that it meets the conditions of the plans and specifications.

001.03. Certification of Compliance.

Where the Contractor provides materials, fabricated products and structures (hereinafter "materials") from a manufacturer; that manufacturer must have an effective testing and inspection system. The Contractor shall require the manufacturer to furnish documentation from the testing and inspection system comprising a Certificate of Compliance that certifies the materials comply with all contract requirements.

The testing and inspection system shall conform to a quality assurance management system as described in chapter 006.01.

The Contractor shall require the manufacturer to furnish a "*product certificate*" for material commercially produced to a standard specification. The manufacturer shall clearly mark the material or package with a unique product identification.

Require the manufacturer to furnish a "*product certificate*" for material that:

(a) Is custom made for the project, or

(b) Is produced or shipped in bulk and therefore not readily identifiable as to manufacturer and product, or

(c) Has a specific contract requirement.

A unique "*product certificate*" shall accompany each shipment of material and shall identify the date and place of manufacture as well as the lot number or other means of cross referencing to the inspection and testing system. Furnish specific test results on material from the same lot upon request.

Material or assemblies accepted on the basis of a Certificate of Compliance may be sampled and tested at any time. If found not to be in conformity with the contract requirements, all the materials or assemblies will be rejected whether in place or not until the items in place have been individually tested and have been approved by the Engineer. Material or assemblies supplied without a Certificate of Compliance will be rejected without further argument or discussion and shall be removed from the site forthwith.

001.04. Measured or Tested Conformance.

The Contractor shall provide all necessary control of the production, processing and performance of the work to ensure that all of the work complies with all the contract requirements.

Results from inspection or/and testing used to support acceptance of the work incorporated into the project shall have values within the specified tolerances or specification limits. When no tolerance values are identified in the contract, the work will be accepted based on customary manufacturing and construction tolerances.

Chapter 002. MEASUREMENT AND PAYMENT

002.01. Measurement Methods.

Accepted work will be measured according to the metric (SI) system. Unless otherwise specified, measurement will be made when the work is in place, complete, and accepted. Measurements will be made for the actual quantity of work performed. Structures will be measured to the neat lines shown on the plans or to approved lines that have adjusted to fit field conditions.

The *"measurement"* subsections detailing specifics and exceptions for measuring work are described under each Section.

002.02. Measurement Terms and Definitions.

Unless otherwise specified, the meanings of the following terms are as follows:

(a) Provisional sum.

Perform the work only when authorized by written order. The work will be measured and paid for at agreed unit prices, or lump sum price,as established in the order authorizing the work. When the unit bid price is designated *"provisional sum"*, the quantity is designated as *"All"*.

(b) Contract quantity.

The Contract quantity is the quantity shown in the Bill of Quantities. The Contract quantity will be adjusted for authorised changes that affect the quantity or for errors made in computing this quantity. If there is evidence that a quantity specified as a contract quantity is incorrect, the Contractor should submit calculations, drawings or other evidence indicating why the quantity is in error and request, in writing, that the quantity shall be adjusted.

(c) Cubic metre of Earthworks.

Unless the Engineer directs that other means are to be used the volume will be measured by the average end area method as follows:

(1) Take cross sections of the original ground and use with design or staked templates or take other comparable measurements to determine the end areas. Work outside of the established lines or slopes will not be measured.

(2) If any portion of the work is acceptable but is not completed to the established lines and slopes, take remeasure cross sections or comparable measurements of that portion of the work. Use these measurements to calculate new end areas.

(3) Compute the quantity using the average end areas multiplied by the horizontal distance along a centreline or reference line between the end areas. Deduct any quantity determined outside the designed or stakes slope limits. Where it is impractical to measure by the average end area method, other methods involving three

dimensional measurements may be used.

(d) Cubic metre in the hauling vehicle.

The cubic metre volume will be measured in the hauling vehicle using three dimensional measurements at the point of delivery. Use vehicles bearing a legible identification mark with the body shaped so the actual contents may be readily and accurately determined. Before use, mutually agree in writing on the volume of material to be hauled by each vehicle. Vehicles carrying less than the agreed volume may be rejected or accepted at the reduced volume.

Level selected loads. If levelling reveals the vehicle has been hauling less than the approved volume, all material received since the last levelled load will be reduced by the same ratio as the current levelled load volume is to the agreed volume.

Material measured in the hauling vehicle may be weighed and converted to cubic metres for payment purposes if the conversion factors are mutually agreed to in writing.

(e) Number.

One entire unit. The quantity is the actual number of units completed and accepted.

(f) Litre.

The quantity may be measured by any of the following methods:

(1) Measured volume container.

(2) Metered volume. Use approved metering system.

(3) Commercially packaged volumes.

When asphalt material is measured by the litre, the volume will be measured at 15^0 C or will be corrected to a volume at $15\ ^0$ C using recognized standard correction factors.

(g) Hour.

Measurement will be for the actual number of hours ordered and performed by the Contractor.

(h). Linear metre.

Measurement will be from end to end parallel to the base or foundation upon the item is placed.

(I) Lump sum.

No direct measurement will be made. The bid amount is complete payment for all work describe in the contract and necessary to complete the work for that item. The quantity is designated as *"All"*. The estimate quantities of lump sum work shown in the contract are approximate.

(j) Kilometre.

1000 linear metres. Measurement will be horizontal along the centreline of each roadway, approach road, or ramp.

(k) Kilogram.

The weight measured according to Subsection 002.03. If sacked or packaged material is furnished, the net weight as packed by the manufacturer may be used.

(l) Square metre.

Longitudinal and transverse measurements for area computation will be made horizontally. Where a pavement structure course is measured by square metre, the width of measurement will be the top design width of the course plus allowable curve widening, not including side slopes. The length will be the distance measured horizontally along the centreline of each roadway, approach road, or ramp.

(m) Station.

100 linear metres. Measurement will be horizontal along the centreline of each roadway, approach road, or ramp

(n) Tonne.

1000 kilograms. Measurement will be according to Subsection 002.03.

No adjustment in contract unit price will be made for variations in quantity due to differences in the specific gravity or moisture content.

Net certified scale weights, or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement subject to correction when asphalt material is lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When asphalt material is shipped by truck or transport, net certified weights, subject to correction for loss or foaming, may be used for computing quantities.

When asphalt cement for concrete pavement is stored in tanks devoted exclusively to the project, quantities will be based on invoices. When asphalt cement for asphalt concrete pavement is not stored in tanks devoted exclusively to the project, quantities will be based on the tank measurements, converted to volumes.

002.03. Weighing Procedures and Devices.

Furnish, erect and maintain scales or use permanently installed and certified commercial scales for weighing material that are proportioned or measured and paid for by weight.

If bulk material is shipped by truck or rail and is not passed through a mixing plant, the supplier’s invoice with net weights or volumes converted to weights may be accepted. Periodic check-weighing may be required.

Batch weights may be acceptable for determination of pay quantities when an approved automatic weighing, cycling, and monitoring system is included as part of the batching equipment.

Before use at a new site, have the scale checked, adjusted, and certified by an approved testing firm, a laboratory of the State responsible for weights and measures, or a qualified manufacturer's representative. Maintain the scale accuracy to within 0,5% of the correct weight throughout the range of use. Do not use spring balances.

Install and maintain platform scales with the platform level with rigid bulkheads at each end. Make the platform of sufficient length to permit simultaneous weighing all axle loads of the hauling vehicle. Coupled vehicles may be weighed separately or together.

When a weighing device is determined to indicate less than true weight, no additional payment will be made for material previously weighed and recorded. When a weighing device is determined to indicate more than true weight, all material received after the last previously correct weighing accuracy test will be reduced by the percentage of error in excess of 0,5%.

Furnish competent scale operators to weigh and record the gross, tare, and net weights of all material measured by weight. Read and record weights to the nearest 50 kilograms. Increments smaller than 50 kilograms are permitted for automatic weighing systems.

Weigh the empty haulage vehicles on platform scales with full fuel tanks at least twice per shift.

Documents that support weighed pay quantities shall contain the following information, as applicable, to the type of scales and recording system used:

(a) Project identification

(b) Contract item number

(c) Material source/plant identification

(d) Date

(e) Load number

(f) Truck identification

(g) Time of weighing

(h) Applicable empty and loaded weights

(i) Scale operator‘s signature

Use an approved pre-printed format for the weigh records; furnish the original record(s) and a written certification as to the accuracy of the weights at end of each shift.

002.04. Acceptance Procedures.

When the method of measurement requires weighing or volume measurement in the hauling vehicle, furnish a person to direct the spreading and distribution of material and to record the location and placement of material on the project. During the placement, maintain a record of each delivery and document it in an acceptable manner. The document shall include the following information as applicable:

(a) Project identification

(b) Contact pay item number and description

(c) Location where placed

(d) Date

(e) Load number

(f) truck identification

(g) Time of arrival

(h) Weight or volume

(i) Site supervisor's signature

Use an approved format for the delivery record(s). Furnish the original record(s) and a written certification of the delivery of the material at the end of each shift.

002.05. Scope of payment.

Compensation provided for in the contract is full payment for performing all contract work in a complete and acceptable manner. All risk, loss damage, or expense arising out of the nature or prosecution of the work is included in the compensation provided by the contract.

If the contract requires work to be executed and there is no provision for the direct measurement of the work by the payment Section or no pay item specifically established for the work, there will be no direct payment for the work. The cost of the work is considered included under the other contract pay items.

Work measured and paid for under one pay item will not be paid for under any other pay item.

The quantities shown in the bid schedule are approximate. Pay quantities will be limited to the quantities actually ordered, or otherwise authorized before performing the work. Payment will be made for work performed and accepted or material furnished according to the contract on the basis of the authorised quantities or for the actual quantities of work executed and accepted where such quantities are less than those authorised. No payment will be made for work performed in excess of that staked, ordered, or otherwise authorized.

CHAPTER 003. MOBILISATION

003.01 Contractor's Site Facilities.

The Contractor shall find his own site or sites for setting up one or more compounds in which to locate his offices, workshops, stores, plant, etc. The sites shall include space for the Engineer's offices and the laboratory, as described below, or shall be close to the location of these facilities. The Contractor is required to have definite plans for the necessary sites at an early stage and must show that he has guaranteed access to suitable sites and outline permission to occupy and use such sites before the Commencement Date can be set.

The Contractor shall at all times keep the compounds in good order and shall maintain all facilities. He shall take measures to ensure that his operations do not cause pollution of watercourses or ground water. These measures shall include, but shall not be limited to, bunds round storage areas for hazardous materials and hard standings with fuel traps for vehicle washing areas and fuel stations.

On completion of the Works the Contractor shall remove his offices, workshops, stores, plant, fencing, hard-standing, etc, clear the site and carry out any other works necessary to return the site(s) to the same condition in which it was found.

The Contractor shall locate his own areas for the disposal of waste and unwanted materials, complying with local regulations and procedures for transport and disposal.

Contractor’s Equipment shall be operated and maintained in accordance with the manufacturer’s instructions. Equipment shall be fitted with noise suppression and emission control devices in accordance with current technologies and which satisfy local regulations.

003.02 Provision of Services

The Contractor shall make his own arrangements for and provide and distribute to all points where they are required such supplies of water, fuel, light and power as may be needed for the construction of the Works. He shall ensure that adequate supplies of water, light and power are available in offices and other buildings requiring them. He shall also ensure that sufficient supplies of drinking water are available on site for the workforce. The Contractor shall be entirely responsible for entering into any necessary agreements with the suppliers of services and paying all fees, dues, rents and other costs incurred thereby. As in the case of any other supplier, a failure on the part of a supplier of services will not relieve the Contractor of any of his duties and responsibilities under the Contract, nor in respect of such failure shall the Contractor have any claim under the Contract.

The Contractor shall, if necessary, provide generators, substations, switchgear, transformers, cabling, pumping plant, tanks, piping, filters and other things needed to maintain services to the Works.

003.03 Temporary Works

The Contractor shall design, arrange and provide at his own cost all temporary works needed in order to carry out the permanent works. The temporary works shall include the provision of road diversions where considered necessary. All temporary works shall be to the satisfaction of the Engineer, but this shall not relieve the Contractor of his responsibility for their design, maintenance and adequacy. The Contractor shall obtain the approval of Ministries, service owners, local authorities and other third parties for the temporary works where required.

Temporary road diversions shall be designed and constructed to ensure that they perform satisfactorily in use and that there is no significant settlement, rutting or distortion of the running surface. They shall be surfaced and maintained to the satisfaction of the Engineer.

The designers may have prepared for the Contractor's information outline designs for temporary road diversions at new bridges and bridges requiring significant rehabilitation works. The Employer has obtained general approval from land owners for the temporary use of the additional land which will be needed for the diversions as shown on the design drawings. The Contractor may, however, design and construct any approved temporary diversion road and bridge scheme, provided the construction does not extend outside the boundaries of the land arranged by the Employer. If the Contractor chooses to use any outline design provided he shall make his own arrangements to locate, procure and transport on and off site the elements required. The Employer accepts no responsibility for the non-availability of elements shown in any outline design. If the Contractor elects to design and construct his own scheme then he shall arrange for all necessary approvals from local authorities, river authorities, etc. and shall obtain the approval of the Engineer for the detailed scheme including traffic management arrangements.

On completion of the Works the Contractor shall remove all temporary road diversions and other temporary works and reinstate the ground on which they have been located to its original condition or to the satisfaction of the Engineer.

Measurement

No direct payment will be made for Mobilisation; in accordance with the Contract the Employer will make an Advance Payment against a suitable Guarantee which shall be used to cover immediate mobilisation costs.

The conditions governing payment and repayment of the Advance are given in the Contract Data attached to the Conditions of Contract

CHAPTER 004. ENGINEER'S FACILITIES

The Engineer is supervising two works contracts on the M2 road as follows:

- RSPSP/W2/02 Rehabilitation of M2 Chisinau – Soroca road km 26+200 to 54+850
- RSPSP/W2/03 Rehabilitation of M2 Chisinau – Soroca road km 54+850 to 71+165.

The Contractor shall provide facilities for the Engineer for all facilities for Contract RSPSP/W2/02 and part of the facilities required for Contract RSRSP/W2/03 as decribed below.

004.01 Project Office.

Not Used.

004.02 Contract Office.

Contract RSPSP/W2/02

The Contractor shall provide, furnish, equip and maintain a contract office for use by the Engineer and his staff on the site of the Works. The contract office shall be at a location provided by the Contractor and approved by the Engineer.

The required floor area and number of rooms for each office are indicated in paragraph 004.04 below.

Basic required details of the office buildings together with details of the site arrangements are given in paragraph 04.05 below.

The office shall be provided with new furnishings, fittings and equipment as specified in paragraph 004.07 below.

The office building shall be completed and ready for occupation and use by the Engineer within 16 weeks from the Commencement Date. On completion of the Contract, the office shall be demolished and removed from the site and the office location wholly restored to its original condition or, in the case of a brownfield site, shall be landscaped and revegetated to an acceptable standard.

Contract RSPSP/W2/03

The Contractor shall equip and maintain supplies for a contract office for use by the Engineer and his staff on the site of the Works. The office, furniture and general maintenance shall be provided by others.

The list given in Appendix A of this General Items part of the specifications is indicative of the requirements but the Engineer reserves the right to make minor alterations to the list when the Contractor's organizational arrangements are known.

004.03. Laboratory Office.

Contract RSPSP/W2/02

The Contractor shall an office for use by the Engineer within the site laboratory specified in Section 005.

The office shall have a minimum floor area as specified in paragraph 004.04 and shall comply with the requirements of paragraph 004.05.

The office shall be provided with new furnishings, fittings and equipment as specified in paragraph 004.07.

The rooms shall be available for use by the Engineer at the same time as the laboratory becomes operational.

004.04. Layout of Engineer's Contract and Laboratory Offices.

The Contractor shall submit details of all works necessary for the completion of the offices to the Engineer for approval based on the requirements of the whole of Section 004 and Appendix A to this General Items part of the specifications defining floor areas and number of rooms. The details of each office shall be submitted for the Engineer's approval within 28 days of the Letter of Acceptance. Construction shall begin as soon as practicable after the Commencement Date and the buildings shall be completed and ready for occupation by the Engineer as specified. The Contractor shall be responsible for obtaining any necessary permits, licences, etc. for the work involved in providing the offices.

004.05. General Requirements for Engineer's Offices.

A paved access road from the highway shall be provided to each office and a covered hardstanding shall be constructed to accommodate the number of vehicles specified in the Bill of Quantities. Each building and its covered hardstanding shall be surrounded by a 1.8 metre high security fence at least four metres from any external wall of the office. A lockable gate, sufficient for vehicle entry, shall be provided in the fence The area within the fencing shall be well lit.

Throughout the construction period and for as long thereafter during the Defects Liability Period as the Engineer may require, the offices shall be maintained, repaired and serviced by the Contractor.

All buildings shall be insulated and weatherproof suitable for the climate. All windows shall be double glazed and have opening sashes. Entrances shall be provided with two sets of doors. Natural lighting and ventilation shall be provided to each room but adequate electric lighting shall be provided for working during periods of darkness. Every room shall be provided with at least three earthed electric power points with a total supply of 4 kilowatt per room.

Each room shall be provided with a split unit heating/cooling air conditioning unit suitable to maintain an internal temperature of about 24^0 C whatever the external temperature.

Ceiling heights shall be at least 2.6 metres.

Each building shall have an enclosed entrance lobby overlooked by one of the rooms.

Each kitchenette shall contain a sink, two base and two wall cupboards, a 150 litre refrigerator and a two-ring electric hotplate.

Wash-hand basins, showers and kitchenette sinks shall be provided with constant hot and cold water.

The layout, design, materials, workmanship, finishes, fittings and furnishings shall all be to the satisfaction on the Engineer.

The offices shall be properly cleaned by the Contractor daily for as long as they are required by the Engineer. Repairs to the buildings, contents and equipment, together with all services, shall be carried out by the Contractor immediately the need arises.

The Contractor shall make all arrangements for, and pay for, all necessary charges for installation and the continuous provision and maintenance of the following services to the offices:

(a) electricity for lighting and power,

(b) air-conditioning and heating,

(c) fresh potable water,

(d) hot water,

(e) disposal of sewage and waste water,

(f) disposal of solid waste,

(g) international and local telephone and facsimile lines.

004.06. Temporary Offices.

Pending completion of the Contract Office specified above, the Contractor shall provide temporary office accommodation at or near the site at a location to be approved by the Engineer for the use of the Engineer. This temporary office accommodation shall be provided within 21 days of the Commencement Date and before the Contractor commences the Permanent Works on site. The temporary office accommodation shall have at least 60% of the required floor area of the permanent office, shall be furnished and equipped to the Engineer's requirements to a level not exceeding that specified for the permanent office, shall have adequate washing and sanitary, and heating and cooling facilities and shall be maintained by the Contractor. Furnishings for the temporary office may be new furnishings and equipment which will subsequently form part of the furnishings of the permanent office.

004.07. Furniture for the Engineer's Offices.

The Contractor shall supply new furniture and equipment as required by the Engineer of good quality suitable for hard and prolonged use. The list given in Appendix A of this General Items part of the specifications is indicative of the requirements but the Engineer reserves the right to make minor alterations to the list when the Contractor's organizational arrangements and the detailed layout of the offices are known. The Contractor shall obtain the approval of the Engineer for all items before purchase.

All computers shall be equipped with the current Microsoft operating system and with full versions of MS office including MS Project. In addition, at least two of the computers supplied shall be equipped with licensed copies of any other proprietary software which the Contractor utilises for the design, control, planning and operation of the works. The computer software shall be in the English language and shall be licenced for use by the Engineer. The Contractor shall supply a complete set of operating manuals, in English, for all hardware and software.

The Contractor shall also provide the Engineer with two digital camers, each minimum 7 Mpixels with 1 Gb memory cards for the Contract office.

All furniture and equipment procured for the offices, including the laboratory, shall be handed over to the Employer in good condition at the end of the Contract or at such time that the offices are no longer required by the Engineer.

004.08. Vehicles for the Engineer.

Contracts RSPSP/W2/02 and RSPSP/W2/03

The Contractor shall provide for the Engineer new vehicles, of the types detailed below and in the numbers given in the Bill of Quantities, for the exclusive use at all times of the Engineer and other persons authorized by the Engineer. These vehicles will be used for purposes in connection with this Contract and for the general transport requirements of the Engineer and his staff.

The Contractor shall supply a driver for each vehicle who will be required to work normal working hours with an additional time at start and finish of the day for travel to and from work and who will also be required to work at any time outside normal hours when the Contractor has work in progress outside those hours. The services of the driver during these hours will be included in the cost of vehicle supply. These drivers shall also carry out general duties as required by the Engineer. Vehicles shall be available for the use of the Engineer and his staff at all times

The Engineer's vehicles shall be licenced and insured comprehensively for use on the public highway by any licenced driver authorized by the Engineer together with authorized passengers. The Contractor shall provide fuel, oil and maintenance (including the replacement of defective parts, tyres, etc. whenever required) for the vehicles and shall arrange servicing in conformity with the manufacturer's recommendations and any technical checks required under local legislation. All vehicles shall have full tool kits and any safety devices and first aid kits required under local legislation.

The Contractor shall provide a replacement for any of the Engineer's vehicles out of service for more than 4 hours. The Contractor shall provide a permanent replacement of similar specification and in good condition for any vehicle which, in the opinion of the Engineer, is not being, or can no longer be maintained in a satisfactory condition to give reliable service. The Contractor shall undertake any breakdown or accident recovery or transport of the Engineer's vehicles.

The Contractor shall fuel the Engineer's vehicles without withdrawing their availability to the Engineer or shall provide a sufficient supply of fuel on site.

The Contractor shall pay all costs, fees, premiums, charges, etc. resulting from the provision and maintenance of the Engineer's vehicles.

The vehicles for the Engineer shall be new and similar in size, quality and performance to:

Type 1	Saloon passenger car
Type 2	4 Wheel drive double cab utility vehicle.

Specifications for each type are provided in the Appendix 4 to the General Requirements. The number of each type of vehicle is stated in the Bill of Quantities.

The vehicles shall be supplied within 8 weeks of the Commencement Date or such later date as instructed by the Engineer.

The Contractor shall provide within 7 days of the Commencement Date for any of the Engineer's staff on site a temporary vehicle with driver and shall fuel and maintain the vehicle(s) until the arrival of the permanent Engineer's vehicles specified above.

When no longer required by the Engineer, but no later than the end of the Defects Liability Period, the ownership of the vehicles shall be transferred to the Employer. The Contractor shall arrange the necessary documentation, payments, etc. to transfer ownership and shall ensure that the vehicles are in good condition and recently serviced at the time of handover.

004.09. Communication Facilities for the Engineer.

Contract RSPSP/W2/02

The Contractor shall provide separate, direct international and local telephone lines and broadband internet access at the laboratory and contract offices. The Contractor shall allow for the purchase of the equipment and for rental, servicing and subscription costs and fees. The charges for international calls will be borne by the Engineer. The communication facilities shall be available at the same time as the offices in which they are located. Temporary offices shall be provided with at least local telephone and internet access services.

The Contractor shall provide 4 mobile telephones for the exclusive use of the Engineer and his staff as a part of the communications equipment for the Contract office. The system used shall be that which provides the best coverage of the area of the contract. The Contractor shall pay all charges in connection with the use of these mobile phones which shall be on postpaid accounts for non-international calls only.

Mobile telephones and other telephone equipment provided under the Contract shall remain in the ownership or responsibility of the Contractor at the end of the Contract.

004.10. Miscellaneous Services for the Engineer.

The Contractor shall supply all necessary stationary for the Engineer's staff in all offices for Contracts RSPSP/W2/02 and RSPSP/W2/03. This will include A3 and A4 sized paper, toner and ink for photocopiers and printers, notebooks and notepads, file holders, lever-arch files, ball pens, pencils, erasers, punches, staplers, clips, adhesive tape, marking pens, report binding equipment and materials, etc. etc.

Black and white and colour photographs showing the progress of the RSPSP/W2/02 Works shall be taken every month or as required by the Engineer at positions selected by the Engineer. Photographs shall be not less than 200mm x 150mm, four prints off each of up to 20 negatives will probably be required each month. All negatives shall be properly identified and retained on site. On completion of the Works the negatives shall become the property of the Employer.

The Contractor shall provide the Engineer with safety helmets, rubber boots, reflective jackets and any other necessary protective clothing. Sufficient items shall be provided for the Engineer's staff and visitors.

The Contractor shall provide and maintain for the use of the Engineer all necessary survey equipment for use in checking the Works for Contracts RSPSP/W2/02 and RSPSP/W2/03. This equipment for each contract shall comprise:

2 Electronic Total Stations with six tripods and tribrach bases, four triple prism targets, 8 single prism targets with mounting poles, additional data logger.

Four automatic levels with tripods. 4 x 4 metre staffs and 8 x 3 metre staffs.

Ranging rods (24), tapes (2 x 100m.; 8 x 50m.; 12 x 10 m.) and other survey accessories appropriate for the checking of the Works.

2 Straightedges and wedges for checking surface tolerances.

The survey equipment shall be supplied within 4 weeks of the Commencement Date or such later date as instructed by the Engineer, and shall be in fully operational condition. The Contractor shall maintain the survey equipment in working condition throughout the duration of the Contract as necessary and to the Engineer’s satisfaction.

The Contractor shall provide temporary survey equipment to the permanent Engineer in the event that the supplied equipment is unavailable for use for any reason.

Survey equipment provided under the Contract shall remain in the ownership or responsibility of the Contractor at the end of the Contract.

Referring to Contract RSPSP/W2/02, the Contractor shall provide the Engineer with such assistance as he may require at all times including weekends as assistance to the Engineer in the control and supervision of the works. Such assistance shall include, but not be limited to, assistance with sampling, laboratory testing and surveying. The Contractor shall provide men equal to the tasks required and shall maintain continuity of employment wherever possible.

004.11. Housing for Engineer

The Contractor is not required to provide housing for the Engineer.

004.12. Work Acceptance

The work shall be accepted in accordance with the Technical Specifications including Chapter 001.

Measurement

The Engineer’s Contract office will be paid for as a lump sum to include all specified furnishing and equipment including communications systems and equipment.

The lump sum for the Contract Office will be paid when the offices are handed over for use to the Engineer, complete and furnished, with all services connected and operational. A part payment may be made in respect of furnishings and if these are supplied for use in temporary offices as foreseen in paragraph 004.06 above. Any such payment shall be not more than 75% of the demonstrated invoiced net cost of the items supplied.

If the office is to be removed at the conclusion of the works then the lump sum shall be split into 70% and 30% elements with 70% to be paid when the office is handed over to the Engineer and the remaining 30% to be paid only when the building has been demolished and the site restored to its original condition, or, in the case of a brownfield site, when the site has been landscaped and revegetated to an acceptable standard.

There will be no separate pay item for the Engineer's Laboratory office. The provision of this office including all specified furnishing and equipment will be deemed to be included in the pay item for the Laboratory.

Maintenance of the Engineer's offices and the general services to the Engineer as required under Chapters 004.05 and 004.10 will be paid for monthly from the date that the offices become available. No separate payment will be made for the maintenance and provision of services to the laboratory office.

Vehicles for the Engineer as required under Chapter 004.08 will be paid for under the appropriate items when the vehicles are handed over to the Engineer's staff complete, fully licenced and insured.

Operation and maintenance of the Engineer's vehicles as required under Chapter 004.08 will be paid for under the appropriate items, monthly from the date that the vehicles are handed over to the Engineer's staff. Operation and maintenance of temporary vehicles at the start of the project will be paid for monthly under the most appropriate of these vehicle operation items according to the type(s) of vehicle(s) supplied.

There will be no separate pay item for survey equipment and monthly progress photographs. The provision of these items will be deemed to be included in other contract pay items.

In the event that the Contractor fails to complete the works by the due date, no payment will be made for maintenance of offices or vehicles, or for the provision of services for the period between the scheduled completion date and the actual date of taking over. During this period the Contractor will be required to provide all maintenance and services to the Engineer at his own cost. In the event that any office or vehicle is required to be retained during the Defects Liability Period, payment for maintenance and services will be made for the required period at the quoted monthly rates.

In the event that the Contractor fails to provide any of the items or services required under the contract for the Engineer, the Engineer shall provide such items or services and shall be reimbursed for them by the Employer. The cost of such provision by the Engineer shall be deducted from payments due to the Contractor and such deductions shall not be limited to the amounts calculated on the basis of the rates and prices in the Bill of Quantities but shall be the full cost of such provision as notified by the Engineer to the Employer.

Payment

	Item	**Unit of Measure**
00403	Provide, Furnish and Equip Contract Office	lump sum
00404	Maintain Contract Office	months
00405	Provide vehicle Type 1 for use of the Engineer	number
00406	Provide vehicle Type 2 for use of the Engineer	number

00410	Operate and maintain Vehicle Type 1	months
00412	Operate and maintain Vehicle Type 2	months

CHAPTER 005. LABORATORY

The Contractor shall construct, to his own design approved by the Engineer, a new building or a prefabricated building or shall refurbish a part of or the whole of an existing building to form the main laboratory for carrying out sampling and testing as required by the Specifications. The laboratory shall be on the site of, or close to the Contractor's main offices and convenient for the Engineer's contract office. The Laboratory shall be for the joint use of the Contractor and the Engineer.

The laboratory shall be of robust construction with smooth cleanable internal surfaces. It shall be insulated, heated, cooled and weatherproof suitable for the climate. The size and layout of the laboratory shall be appropriate for carrying out all sampling and testing of materials and workmanship. It shall contain special storage rooms for samples of materials etc. to the satisfaction of the Engineer. The building shall be provided with adequate ventilation and heating, with special ventilation and fume extraction provisions as necessary. A paved access road from the highway shall be provided and a hardstanding shall be constructed of sufficient area to permit the parking and manoeuvring of four vehicles belonging to the Engineer together with such additional space as may be required by the Contractor for his own vehicles. The building shall be within the Contractor's compound security area or shall have its own security fencing with lockable gate. The building shall contain an office for the Engineer as specified in Chapter 004 and Appendix A

On completion of the Contract the Laboratory building shall be demolished and the materials removed from the site which shall be wholly restored to its original condition or, in the case of a brownfield site, shall be landscaped and revegetated to an acceptable standard

The laboratory shall be set up in accordance with any requirements of the Department for Measurements and Standards and with the requirements of this Contract. The Contractor shall provide the equipment and consumables necessary for carrying out all the sampling, testing and recording required by the Specifications and any additional testing instructed by or undertaken by the Engineer. The stock of equipment and consumables shall allow for usage, breakage, deterioration and replacement. All testing equipment, apparatus, etc. shall be new and maintained in a clean and serviceable state and shall be checked and/or calibrated at required intervals.

The Contractor shall also provide mobile facilities for sampling and testing which should or can be carried out in the field at the location of the Works.

The Contractor shall staff the laboratory with a qualified engineer and technicians fully experienced in all sampling and testing procedures relevant to the Works. The engineer and technicians shall be supported by an adequate number of laboratory and field labourers.

The building shall be maintained, repaired and serviced by the Contractor whilst in use under the Contract and shall at all times be kept in a clean and tidy state.

The Contractor shall allow the Engineer unrestricted access to the laboratory so that he can witness any testing , inspect equipment, samples, records, etc. The Contractor shall undertake any additional tests required by the Engineer under the Contract and shall allow the Engineer to carry out his own tests for the Contract, using the Contractor’s technical personnel as necessary.

The laboratory shall be completed and ready for use within 12 weeks of the Commencement Date. If the Contractor commences any selection or testing of materials for submission to the Engineer for approval or commences any Permanent Works before the laboratory is operational then approved alternative facilities must be available to carry out all tests required for the works in progress or the approval of materials submitted to the full requirements of the Specifications.

All office equipment and furniture supplied for the use of the Engineer in the Laboratory shall be handed over to the Employer in good condition at the end of the Contract or at a time when the laboratory is no longer required under the Contract but not later than the end of the Defects Liability Period.

Laboratory equipment and apparatus shall remain the property of the Contractor and shall be removed from the site of the Works when no longer required by the Engineer and in any case no later than the end of the Defects Liability Period, unless directed otherwise in the Particular Specification.

Measurement

The provision and equipping of the laboratory as described above will be paid for as a Lump Sum. The sum quoted shall include for any temporary alternative testing facilities.

The Contractor shall provide with his bid a list of all necessary testing equipment for approval by the Engineer and the provision of all equipment, installed and in working order, on the approved list shall qualify as the provision of laboratory equipment for payment purposes. The provision of such a list and its approval by the Engineer and the delivery of the equipment on the list shall not relieve the Contractor of his responsibility to provide ALL necessary equipment for carrying out all tests which may be required for the approval of the works and the Contractor shall remain liable to supply any and all additional equipment which may be found necessary under the terms of the Contract during the execution of the Works..

Payment

The Lump Sum for the provision, equipping and operation of the laboratory will be paid as follows:

40% upon delivery of fully operational laboratory.

40% payable in instalments with each monthly certificate on a pro rata basis to the value of the work done excluding the General Items.

20% payable when the building has been demolished and the site restored to to its original condition, or, in the case of a brownfield site, when the site has been landscaped and revegetated to an acceptable standard.

	Item	**Unit of measure**
000501	Provide Site Laboratory including office for Engineer	lump sum

CHAPTER 006. MISCELLANEOUS REQUIREMENTS

006.01. Quality Assurance Management System.

The Contractor shall be wholly responsible for ensuring that the quality of materials and workmanship is in accordance with the requirements of this Specification and of the Conditions of Contract. The Contractor shall carry out his own inspection of materials and workmanship and satisfy himself that they meet the Specifications before offering them to the Engineer for acceptance or payment.

The Contractor shall prepare and submit to the Engineer within 56 days of the Commencement Date a written quality assurance management system similar to that described in the ISO 9000 series of standards. This shall show the Contractor's site organization in respect of quality assurance and shall demonstrate the Contractor's commitment to checking and reporting on the quality of materials and workmanship. It shall also show how the system will be extended to suppliers and sub-contractors and how all elements of the system will be documented.

The Contractor shall, before placing any order for materials for incorporation in the Works, submit for the information of the Engineer the names of the firms from whom he proposes to obtain such materials. He shall give descriptions, manufacturer's specifications, the quality, weight, strength and origin of the materials, as applicable, and confirm the quantities to be procured. The Contractor shall provide the Engineer with samples of materials when requested, details of the supplier's quality assurance system and, where appropriate, manufacturer's certificates of recent tests carried out on similar materials. In accordance with Clause 7.3 of the Conditions of the Contract the Engineer may require to visit the facilities of any manufacturer or supplier.

The Contractor shall carry out trials of all concrete mixes, bituminous mixes and mixtures of others materials to demonstrate that, not only are the constituents in compliance with the Specifications, but that the resultant mixtures also comply. He shall show as part of the quality assurance system the relationship between trial and job mixes and his proposals for maintaining the quality of all mixes on site.

The Contractor shall keep a Non-conformity register and a Concession Request register that shall be copied to the Engineer each month. Concession requests for materials or work that does not meet the requirements of the Specifications (as recorded in the non-conformity register) shall be forwarded to the Engineer as a part of the routine Quality Assurance inspection system (Request for Inspection System). Requests for Inspection of the works shall generally be forwarded to the Engineer not later than 17:00 for works to be carried out on the following day, to enable the Engineer to allocate personnel to do the independent checking.

006.02. Survey Beacons and Benchmarks; Setting Out

Main beacons and benchmarks for defining the Works have been established on or near the road during the preparation of this project. Details will be given to the Contractor in writing by the Engineer before commencement of permanent works. In order to carry out his duties under Clause 4.7 of the Conditions of Contract, the Contractor shall establish from the beacons and benchmarks an adequate system of secondary benchmarks and control points for the execution of the Works which shall be clearly marked, adequately referenced and carefully recorded. The Contractor shall be solely responsible for carrying out this work and for the protection and re-establishment, if necessary, of all primary and secondary setting-out points.

Should the Contractor find any discrepancies in the survey information provided, he must at once inform the Engineer.

The Engineer may check the Contractor's system of secondary benchmarks and control points for the purpose of agreeing the setting out and measurement of the Works. The Contractor shall do everything necessary to facilitate any checking which may be carried out by the Engineer and shall safeguard any marks established by the Engineer during checking. The checking of any setting-out or of any line or level by the Engineer shall not in any way relieve the Contractor of his responsibility for the accuracy thereof.

In the case of foundations, earthworks or where the Engineer considers it necessary, the Contractor shall, in conjunction with the Engineer, take such original ground levels or other measurements as may be necessary to define the conditions prior to the start of work. Agreed levels and dimensions shall be recorded in writing, signed by the Contractor and Engineer, and shall form the basis of the measurement of such works.

The Contractor shall prepare Construction Drawings of all works to be undertaken, and shall submit these for the Engineer's approval in sufficient time for the review and approval of the Engineer. This shall be prior to the commencement of works in any section, and in any event not less than 7 days prior to commencing works related to the particular Drawings.

In the case of Construction Drawings for road pavement works, the Contractor shall, in conjunction with the Engineer, take existing levels of the road cross sections at intervals agreed with the Engineer, but in any case at a maximum interval of 10 metres. The Contractor shall prepare a revised longitudinal profile if necessary, for the Engineer's approval. The pavement cross-section drawings produced by the Contractor shall indicate both existing and finished levels, including different pavement layers as appropriate. The Contractor shall prepare Construction Drawings based on the design implicit in the contract drawings in sufficient detail to allow the works to constructed and measured accordingly. For this, the Contractor shall provide relevant quantities and surface areas when the Construction Drawings are provided to the Engineer for approval.

006.03. Protection and Diversion of Services.

Wherever an existing overhead or underground installation carrying live services (gas, water, electric power, telephone, etc.) is to be diverted in order to perform the Works, the Contractor shall arrange for this work to be carried out by the owner of the installation. The Employer will have obtained prior approvals from the owners regarding diversion/removal of services shown on the Drawings but the Contractor shall be responsible for agreeing the programme for the work and for paying any necessary costs and fees through the Contract as instructed by the Engineer. The Contractor shall provide attendance as necessary and shall have general responsibilities for protecting the installation before, during and after diversion/removal.

Whenever during the execution of the Works the Contractor locates service installations which require diversion/removal and which are not shown on the drawings, he shall immediately notify the Engineer. The Engineer will liaise will the Employer and owner of the service to obtain the necessary actions.

In the case of service installations within or close to the Site but which do not require diversion/removal, the Contractor shall be wholly responsible for the support and protection of the service during adjacent permanent works to the satisfaction of the Engineer and the owner of the service.

The Contractor shall inform the relevant office of the owner of any service which is damaged during the course of the Works and shall, at his own cost, repair the damage or arrange for the service owner to do the repairs or arrange for a third party acceptable to the service owner to do the repairs.

006.04. Sequence of Key Contract Activities.

Within the 28 day period from receiving the Letter of Acceptance the Contractor is required to have:

- executed the Contract Agreement (Sub-Clause 1.6, Conditions of Contract);
- submitted an acceptable Performance Security (Sub-Clause 4.2, Conditions of Contract);

A notice to commence the works shall be issued by the Engineer in accordance with Sub-Clause 8.1 of the Conditions of Contract. However permanent works shall not commence until the Contractor has satisfied the Engineer regarding the following:

- arranged all insurances (Clause 18 of the Conditions of Contract);
- provided permanent or temporary offices for the Engineer as specified;
- provided permanent or temporary vehicles for the Engineer as specified;
- provided a functioning laboratory or made approved alternative arrangements;
- submission of the names and details of key personnel;
- in the case of roadworks, provided a traffic management plan acceptable to the Road Traffic Police.

The Contractor shall provide a detailed programme according to Sub-Clause 8.3 of the Conditions of Contract within 28 days of receiving the notice to commence the works. This shall include the following:

- a detailed time schedule including allowance for the Contractor's Documents (Construction Drawings), materials approval and procurement, manufacture of permanent Plant for the works (if any), delivery to Site, construction and testing;
- a time schedule that identifies the sequence, frequency and timing of tests required in the Contract in conjunction with the item above;
- a general method statement for the Works
- an estimate of the number and class of Contractor's Personnel and Contractor's Equipment required for each activity.
- A cash flow in conjunction with the first item above.

In accordance with Sub-Clause 2.1 of the Conditions of Contract, the Employer shall give the Contractor right of access to, and possession of, all parts of the Site immediately after the Commencement Date.

At the time that possession of site is given, a site inspection shall take place , attended by representatives of the Engineer, the Contractor and the Employer, to record the general conditions and locations of road signs, street furniture and any other items, and to determine the measures necessary to safeguard such facilities.

006.05. As Built Drawings

The Contractor shall prepare and provide to the Engineer accurate As Built Drawings to the same general scales as the contract drawings, showing Works as executed complete with original and finished levels. The As Built Drawings shall show all significant features of the rehabilitation works so as to form a complete pictorial record of the finished Works. The As Built Drawings are part of the Contractor's Documents, and shall be based on the Construction Drawings referred to in Clause 006.02 above, modified according to any instructions received from the Engineer during construction. The Drawings shall show details of all utilities affected by the Works.

During the course of the work, the Engineer shall have the right to call for records drawings so that he may check them for accuracy and completeness. The record drawings shall be reproducible and the original and two prints shall be submitted to the Engineer as soon as possible after the work is complete but no later than the end of the Defects Liability Period.

Payment

Payment for the requirements set out in Chapter 6 shall be deemed to be included elsewhere within the cost items of the Bill of Quantities, except as hereinafter specified, and where no payment is clearly specified elsewhere in this document the costs of actions necessary to fulfil these requirements shall be deemed to be included within the existing cost items of the Bill of Quantities.

Payment for the diversion of specific services are included in Chapter 104.

CHAPTER 007. TRAFFIC MANAGEMENT.

The Contractor shall take note of the fact that the rehabilitation works are to be carried out while maintaining traffic flows and that the works will, in general, have to be undertaken on half-widths of the road. Road closures will not generally be permitted.

The Contractor shall, throughout the execution of the Works and the Defects Liability Period, have full regard for the safety of all persons, whether entitled to be on the Site or otherwise, and keep the Site (so far as the same is under his control) and the Works in an orderly state appropriate to the avoidance of danger to such persons. The Contractor shall provide and maintain all lights, barriers and warning signs, when and where necessary as hereinafter specified for the protection of the Works and for the safety and convenience of the public.

The Contractor shall use all appropriate means to avoid traffic disturbance during the Works. Before the Commencement Date he shall submit for the Engineer's approval an outline traffic management scheme. The scheme shall accompany and shall be coordinated with the construction programme required under Sub-Clause 8.3 of the Conditions of Contract.

Traffic management schemes with their signs, markings, signalling and lighting shall be in accordance with Moldovan standards, as set out in VSN 37-84, for every road restriction or diversion. A detailed scheme shall be submitted for the Engineer's approval before any road restriction or diversion is implemented. Management schemes shall include;

(I) A detailed diagram showing the location of all traffic control devices, including advance warning and speed limit signs; arrangements for lane closure, including lengths to be closed and duration of closures; location of flagmen or traffic control signals; means of communication between flagmen.

(II) A tabulation of all traffic control devices shown on the diagram.

(III) An access maintenance plan for all properties along the road length subject to restriction/ diversion.

(IV) Provision for pedestrians.

Schemes shall be submitted sufficiently early for the Road Traffic Police, the Engineer and the State Road Administration to give their approval, and in any event not less than 7 days before the commencement of road works is planned. The Contractor shall take all necessary measures to direct traffic at diversions and on bridges under repair during both daytime and night time. No work on a section of road shall commence unless the Engineer has satisfied himself that the approved scheme is operating satisfactorily.

Individual one-way traffic restrictions shall not be longer than 500m unless agreed otherwise by the Engineer. The objective is to avoid unnecessary traffic waiting time or long queues. The Contractor must demonstrate that he has considered traffic transit times at restrictions, queuing times, safe stopping distances and overtaking distances when proposing lengths of one-way working and the distance between such lengths.

All diversion roads and road lengths subject to traffic restrictions shall be maintained in a good condition at all times. The width of traffic lanes shall be at least 3.5 metres. The Contractor shall introduce measures to minimize irregularities and steps on the pavement surface during repairs and overlay operations. Where phased construction results in low shoulders, these shall be clearly signed throughout the length involved. The Contractor shall ensure that his operations do not impede snow clearing work in any way and that equipment and materials are kept clear of roadways outside working hours.

The Contractor shall appoint and give the necessary authority to a suitably experienced and qualified person to supervise all traffic management and safety matters relating to the Contract, and notify the Engineer accordingly.

Measurement

Traffic management measures of all kinds as outlined above or as necessitated by any other requirement of the Contract will be measured as a Lump Sum.

Payment

The Lump Sum for traffic management will be paid monthly in proportion to the value of work completed during the month compared to the total value of work under the contract. The value of General Items, Dayworks and Provisional sums will not be considered in these calculations. In the event of persistently inadequate traffic safety measures during construction, the Engineer may reduce the monthly amount payable accordingly. Any such amounts deducted shall not be recoverable later.

	Item	**Unit of measure**
00701	Manage and maintain traffic throughout the period of the Works	lump sum

CHAPTER 008. INSURANCES AND PERFORMANCE GUARANTEE

The Contractor shall provide insurance in accordance with Clause 18 of the Conditions of Contract and of the Contract Data and shall provide a Performance Guarantee in accordance with the requirements of Sub-Clause 4.2 of the Conditions of Contract and of the Contract Data.

The Employer's Personnel shall be included in the insurance coverage.

The pay item for insurance will be full compensation for all insurances required to be provided by the Contractor under the Contract. Payment will be made after all insurances have been taken out to the satisfaction of the Employer and the Engineer and copies of the policies and evidence that all initial premiums have been paid have been presented to the Employer. Payment will be made in two parts; 50% payable in the first Interim Payment Certificate for works done and 50% payable in the first Interim Payment Certificate 12 months after the Commencement Date.

The pay item for provision of the Performance Guarantee shall be full compensation for the provision of the guarantee in conformance with the requirements of the Contract. Payment will be made after the Performance Guarantee, in a form conforming to the requirements of the contract, both as to terms and to duration, shall have been submitted to and approved by the Employer. Payment will be made in three equal parts; one third payable in the first Interim Payment Certificate for works done following acceptance of the guarantee, one third payable in the first Interim Payment Certificate 12 months after the Commencement Date and one third payable after the issue of the Taking Over Certificate.

	Item	**Unit of measure**
00801	Provide Insurances	lump sum
00802	Provide Performance Guarantee	lump sum

CHAPTER 009. CONTROL OF MATERIAL

009.01. Source of Supply and Quality Requirements.

The Contractor shall select sources and provide materials that meet the requirements of the Contract and Specifications, to the satisfaction of the Engineer. The Contractor shall notify the Engineer of all proposed sources before delivery to the Site, and shall expedite material inspection and testing according to the requirements of his programme. The Contractor undertakes that he will not incorporate any materials requiring submittal testing into the Works until they are approved.

Material must be approved at the source of supply before delivery to the Site. This approval does not constitute acceptance of material. If an approved source does not continue to supply acceptable material during the Contract period, the source may be subsequently rejected.

The Contractor shall take note of the requirements of Chapter 006.01 regarding Quality Assurance during the process of selecting and providing materials to the Works.

009.02. Local Material Sources.

Sources of rock, sand, gravel, earth, or other natural material located by the Employer in the project are identified in the documents.

These identified sources listed may be used by Contractor. The decision to use an identified source is solely that of the Contractor.

a) Employer listed sources.

The Employer may provide lists of possible material sources if requested by the Contractor. The Employer makes no representation about quality or quantity of material, or rights to the availability of material from these sources. These sources are considered to be Contractor - located sources under (b) below.

b) Contractor - located sources.

The Contractor is responsible for these sources, including existing commercial sources. Use of any sources shall fulfil all contract requirements, and sufficiency of quantities is the sole responsibility of the Contractor. The Contractor shall determine the quantity and types of equipment and work necessary to select and produce acceptable material, shall secure all clearances for use of the source and provide copies of the relevant documents to the Engineer.

The Contractor shall provide laboratory test reports and available historical performance data indicating that acceptable material is available from the source. The Contractor shall not use material from a source that is unacceptable to either the Engineer or the Employer, shall dispose of unacceptable material and locate another source at no cost to the Employer.

009.03. Storing and Handling Material.

The Contractor shall store and handle material to preserve its quality and fitness for the Works. Stored material approved before storage may again be inspected before use in the Works. The Contractor shall locate material stores to facilitate prompt inspection.

The Contractor shall use only approved portions of the right of way for storing material and

placing plant and equipment, and shall ensure that the requirements of the Environmental Management Plan are met in so doing (refer to Chapter 016).

The Contractor shall provide all additional space needed, and shall not use private property for storage without written permission of the owner or lessee. The Contractor shall furnish copies of all such agreements to the Engineer, and shall restore all Employer-provided storage sites to their original condition.

The Contractor is responsible for the security of all stored material.

009.04. Use of Material Found in the Work.

The right to use and process material found during the work does not include the use and processing of material for other work except for the disposal of waste material. Waste material may be disposed of on site if approved by the Engineer, or off-site at approved locations. The Contractor shall be responsible for locating and securing off-site waste areas if required, at no additional cost to the Employer.

Milled material from the existing road pavement shall be disposed of at road maintenance locations to be advised by the Engineer.

If the Contractor produces or processes material from the Employer's lands in excess of the quantities required by the contract, the Employer may:

a) Take possession of the excess material and direct its use, paying the Contractor only for the cost of production, or

b) Require removal, replacement with suitable fill material and restoration of the over-excavated area to a satisfactory condition at no additional cost to the Employer.

CHAPTER 010. CEMENT

010.01. Portland and masonry cement.

The cement will be provided according to SM GOST 10178-85** and SNiP 3.06.04-91 annex 3

010.02. Cement for mortar

Cement for mortar shall be to SM GOST 25328-82 and different types or marks of cement or the same mark or types of cement from different consignments shall not be mixed without the Engineer's approval.

010.03. Storage

The right conditions for cement storage and protection against dampness are to be provided. Cement shall be stored in cool, dry, closed sheds. Cement shall not be stored in the open, on the ground, or under plastic sheeting.

Under no circumstances shall cement showing any signs of the following damage or mistreatment be used in the Works:

a) partially hardened cement

b) adulterated cement

c) cement from bags opened previously.

d) cement from damaged bags.

CHAPTER 011. BITUMEN

011.01. Bitumen.

Bitumen will be provided according to SM GOST 22245-90* for the grade indicated in drawings or technical specifications.

In addition to the SM GOST requirements, bitumen used in asphalt mixes shall comply with the following requirements:

Grade		40-60	50-70	70-100
Either	Max. Wax Content (DIN Method)	0.325%	0.295%	0.23%
or	Dynamic Viscosity at 60 degC Pa.s minimum	325	295	230

No test method is given for viscosity. Kinematic viscosity at 60 and 135 ^{0}C can, in theory, be measured using Capillary viscometers, AASHTO test method T201. However, in practice only T 202 (dynamic viscosity by vacuum capillary) is suitable for penetration grade bitumens at 60 ^{0}C. More conveniently, dynamic viscosity can be measured using a rotating spindle type mechanical viscometer; eg Brookfield viscometer.

For bitumens where penetration is specified with limits different to those quoted above the viscosity requirements shall be determined by the Engineer based on a pro rata interpolation from the above table.

Note that for bitumen acceptance purposes dynamic and kinematic viscosity may be equated on the basis of 1Pa.s = 1000 sqmm/s

Bitumen shall be tested using the Thin Film Oven test to AASHTO T179, and the residue shall be tested for penetration to AASHTO T49 and viscosity to AASHTO T201. The requirements for these tests are as follows:

Thin Film Oven < 0.5% loss on heating after the test

Penetration of residue at 25$_0$C min. 52% (60/90 grade bitumen), min. 47% (90/130 grade bitumen)

Viscosity at 60$_0$C <4000.

011.02. Bituminous emulsion.

Bituminous emulsion will be provided according to SNiP 3.06.03-85 and SM GOST 18659-81.

011.03. Working temperature.

The binder will used at the temperatures indicated in SNiP 3.06.03-85.

CHAPTER 012. AGGREGATE , FILLER

012.01. Aggregates and sand for cement mortar and Portland cement concrete.

The aggregates, ballast, and sand used for concrete works, bridges and viaducts will be in accordance with SM GOST 26633-91** and SNiP 3.06.04-91 annex 3.

The aggregate size distribution in the concrete will be between the limits indicated into the Table 1 of SM GOST 8267-93***.

Crushed stone aggregates will be according to SM GOST 8267-93***.

The sand for mortar and concrete will be in accordance to SM GOST 8736-93**.

012.02. Crushed stones for the road base, binder course and wearing course.

a) Generalities. The aggregates will result from durable crushed stones in accordance to SNiP 2.05.02-85, SM GOST 25607-94**. Will be used only stones without organic additions or clay. Do not use stones susceptible to freezing-thaw cycle or liable to be blistered in moisture.

The right size distribution of the aggregates will be provided under crushing, sizing and mixing system. Small size aggregates, passing 4.75 mm screen will be natural or crushed sand.

012.03. Bituminous mixtures.

The aggregates for hot mixtures will be hard stones, crushed slag or crushed gravel. The size, quality and structure of the aggregates will be in accordance to SM STB 1033:2008.

The mixture will not have organic additions. The percentage of clay and soft particle will be less than 1%.

012.04. Sand.

The sand used for bituminous mixtures will be in accordance to SM GOST 8736-93**.

The sand for the road base will be in accordance to SNiP 2.05.02-85.

012.05. Filler.

The filler used for hot bituminous mixture will be in accordance to SM GOST 16557-78.

012.06. Additives for cement mortar and concrete.

May not be used without the express permission of the Engineer. If used tgey will be in accordance to SNiP 3.06.04-91 annex 3

Use of additives may be considered for:

-improving concrete's workability and reducing of cement quantity.
-improving frost resistance
-improving the impermeability of concrete
-assisting setting of concrete in negative air temperature

CHAPTER 013. REINFORCEMENT STEEL

013.01. Reinforcement steel.

Reinforcement steel for reinforced concrete shall comply with the following standards:

SM GOST 5781-82*****

SM GOST 6727-80****

SM GOST 7348-81****

SM GOST 23279-85

SM GOST 13840-68***

SM GOST 103-76**

SM GOST 82-70*

CHAPTER 014. OTHER MATERIALS

014.01. Water.

The water used for cement concrete and mortar, aggregates washing and concrete maintenance will be in accordance to SM GOST 23732-79.

014.02. Paints

Unless otherwise indicated the protection of metallic elements will be done using paints in accordance to SNiP 2.03.11-85.

CHAPTER 015. OCCUPATIONAL HEALTH AND SAFETY

Before commencing construction, the Contractor shall prepare and submit to the Engineer his "Safety and Health Plan". This Plan shall clearly describe the measures which the Contractor will be taking to obtain a good health and safety standard throughout the Site during the construction of the Works.

The Plan must include, but is not limited to, provisions to deal with the following problems, hazards and requirements:

- Welfare measures at the site, including at the accommodation. The Plan should include access to fresh drinking water, washing facilities, toilets, shelters for use on breaks, etc.

- Means of separation of working and traffic areas (Speed restrictions, marking, fencing, etc.) and safety from traffic for personnel by the use of reflective clothing etc.

- Demolishing existing structures can entail exposure to high noise levels, vibration, dust and falling debris. The Plan should explain how machinery is noise and vibration damped and what personal protection measures will be taken. (Hearing protectors, dust masks, protective clothing, etc.)

- Handling raw materials (soils, aggregates, gravels, rock, etc.) and construction of Embankment, subgrade and pavement layers all entail exposure to dust, noise, vibration and heavy manual handling. The Plan must describe measures which will be taken to minimise exposure to dust (watering, provision of masks), reduce noise and vibration the practicable minimum (defining what that minimum is) and what mechanical equipment will be used to reduce manual handling. The Plan should also define what level of manual handling will be required after all mitigating measures.

- Working with bituminous materials, especially when hot, entails exposure to the risk of severe burns and to fumes which, if inhaled will cause severe respiratory organ irritation and which are believed to be carcinogenous. Bitumen itself is a suspected carcinogen and skin contact should be avoided even when cold. The Plan should describe how contact will be minimised (protective clothing), how fumes will be avoided (masks, working practices such as keeping upwind of hot bitumen), general safety equipment (numbers and locations of fire extinguishers) and the level of first aid provision at the sites of bitumen preparation (dedrumming) and application (spraying) including presence of trained personnel, first aid supplies, first aid equipment and easy access to clean water.

- Similar consideration must be given to the problems of working with more flammable materials, especially fuels. In addition to first aid, etc. the Plan must detail safe refuelling procedures to be employed for all static, and mobile plant and for vehicles.

- Handling of lime (especially quick lime), cement and other activators and additives is potentially hazardous. The Plan must describe adequate measures which will be taken to avoid eye and skin contact and inhalation (goggles, protective clothing and masks) and to minimise manual handling.

- Maintenance of vehicles and machinery frequently involves contact with solvents. The Plan should describe how skin and eye contact with and inhalation of solvents will be minimised through the provision of protective clothing and good working practices.

- Wherever dust masks are to be provided these should preferably be of the type with exhaust valves, making them easier to use. Rubber masks with removable filters are preferable to paper masks as they generally fit better and they can be used with different filters for different purposes (dust, solvents, etc.)

- To ensure that workers understand the occupational health and safety risks on the work site, and that they are aware of the measures available to minimise these risks, instruction and training must be given. The Plan must describe the instruction and training to be given and explain how it will actually be delivered to the workforce.

- As a minimum, of direct relevance to operations on the site, instruction and training must include the dangers of noise, vibration, dust, fumes, traffic, heavy equipment and heavy manual handling and must explain what measures are available to minimise these dangers, including masks, protective clothing, protective footwear, ear defenders and good working practices.

In addition to the direct dangers resulting from working on a construction site, the other dangers arising from living on the site must also be covered in the Plan which must explain how information relating to everyday health matters will be comprehensively conveyed to the workforce. Information to be disseminated must include, but is not necessarily limited to, warnings concerning the health risks of malaria, bilharzias, yellow fever, hepatitis, meningitis, hook worms, tape worms, intestinal worms, giardia, amoebae, venereal diseases, HIV-AIDS, scorpions, snakes and stinging insects.

The Plan will acknowledge the Contractor’s responsibility for the health and safety of his workforce and describe these responsibilities in detail.

As well as preparing the Plan for Safety and Health the Contractor shall provide, equip and maintain adequate first aid stations throughout the Works, shall erect conspicuous notice boards giving directions to where these are situated and shall provide all requisite first aid transport. The Contractor shall comply with the government medical or labour requirements at all times and provide equip and maintain base dressing stations in easy reach of all his operational areas and wherever else directed and shall at all times have experienced first-aid men and dressers available throughout the Works for attending minor injuries.

CHAPTER 016. COMPLIANCE WITH ENVIRONMENTAL MANAGEMENT PLAN REQUIREMENTS

In accordance with the environmental policies of both the Employer and the donor an Environmental Management Plan (EMP) has been drawn up which the Contractor is required to implement throughout the construction process. The essential requirements of the EMP are given below. Many of these requirements are incorporated directly into items of this Specification, however, the Contractor is warned that every point identified below must be scrupulously observed throughout the execution of the project and that all costs of meeting all the environmental requirements are deemed to be included in the Contractor's quoted rates and prices whether or not a specific pay item exists.

Independent monitoring of the environment will be taking place throughout the period of the Works. The Monitors will report any breaches of environmental requirements to the Employer and the Engineer; the staff of the Engineer will also monitor for compliance with environmental requirements on a day to day basis. Failure to adhere to any environmental requirements which are related to a pay item will result in payment for such item being withheld until the faults have been rectified and any resulting environmental damage has been fully remedied.

016.01. Revegetation

All cutting and embankment slopes, spoil heap and borrow pit slopes and areas of camps and other temporary works must be revegetated with plants, shrubs and grasses approved by the Engineer. At the Completion of the Works there shall be no exposed, unvegetated soils remaining on either the permanent or the temporary works, including the sites of camps, work stations, etc. On embankments in excess of 3 metres in height the revegetation measures shall include provision of continuous screening using shrubs and bushes at the back of the soft shoulder to a height of at least 1.5 metres.

016.02. Unnecessary compaction of soil

Every effort shall be made to avoid unnecessary compaction of soil. Where such compaction is unavoidable, eg. In temporary accesses or camp areas, the Contractor shall take all necessary steps to ensure that soil is loosened and aerated over the full depth of compaction prior to the revegetation process.

016.03. Contamination of Watercourses

Contamination of water courses must be prevented. The Contractor shall schedule works adjacent to waterways to take place strictly within the dry season.

016.04. Waste Oils, Fuel and Bituminous Materials

Waste oils, fuels, bituminous materials shall only be disposed of in a manner approved by the environmental authorities. Such materials shall in no case be discarded or abandoned.

016.05. Dust

Unpaved roads shall be regularly watered to restrict dust caused by construction traffic. Regular watering means watering at a sufficient frequency to ensure that the running surface is always damp while the roads are in use by construction traffic.

016.06. Covering Loads

All trucks carrying fine material, or materials likely to shed dust shall have their loads tightly sheeted.

016.07. Emissions

Construction equipment shall be properly maintained to ensure that emissions are within the manufacturers published tolerances. Asphalt plants shall be fitted with dust filtering equipment and no significant emissions of dust will be permitted.

016.08. Noise Levels

Equipment with high noise levels shall be restricted to working during the hours of 0800 to 1800 and shall only be operated on normal working days. Noise level restrictions may be eased by the Engineer if he is satisfied that the affected location is entirely out of earshot of any potentially affected community. High noise level equipment shall be defined as equipment which generates a noise level in excess of 90db at a distance of 10 metres under normal working conditions.

016.09. Noise Barriers

If so directed the Contractor shall utilise noise barriers to protect critical areas (schools, hospitals, etc) from the effects of high noise level equipment.

016.10. Siting of Camps, etc, disposal of camp waste

The Contractor's temporary works (Camps, quarries, borrow pits, spoil heaps, haul roads, etc.) shall be sited only with the approval of the competent authorities and the agreement of local officials. All necessary permits for the construction of temporary and permanent works shall be obtained and copies lodged with the Engineer before ground is broken. Camps in particular shall have every aspect of service provision and waste disposal clearly defined and approved, including the approval of the Engineer, before any aspect of construction commences. Throughout the operation of the temporary works the Contractor shall ensure that waste material of all types is contained and disposed of only by approved means. Comprehensive sanitary facilities shall be provided at all times in all areas where work is in progress.

016.11. Opening and Operating Quarries and Borrow Pits

No quarry, borrow or spoil area shall be opened without the prior approval of the Engineer. Prior to seeking formal approval for such an area the Contractor shall prepare a detailed working plan setting out the location, area, proposed depth/height and the proposed sequence of working. The plan shall also include full details of the proposed restoration measures, including details of grading and shaping, drainage, sediment control, soiling and revegetation measures. All quarries, borrow and spoil areas shall be adequately fenced to prevent unauthorised entry by the public during the Works. The extent and nature of any permanent fencing (if any) to be left in place at the end of the Works shall be clearly defined in the approvals of the competent authorities and shall be clearly indicated in the working and restoration plans submitted. Permanent fencing shall be of a nature, type and durability of construction approved by the Engineer and by the competent authorities and shall be in as new condition at the time of taking over. Fencing of quarry, borrow or spoil areas, whether permanent or temporary, shall be deemed a part of the cost of operating such facilities and shall be borne by the Contractor.

016.12. Undesirable Habitats

Vector ecology shall be assessed and controlled in all areas of the works and the creation of undesirable habitats (eg. Stagnant water) shall not be permitted to occur.

016.13. Hazardous Materials

All hazardous, or potential hazardous materials (including but not limited to fuels, oils, bituminous materials, cement) shall be stored in dedicated compounds or buildings with full protection from possible effects of leakage or spillage. All waste or surplus materials shall be disposed of using approved processes guaranteed to cause no environmental ill effects.

016.14. Access Routes

All access routes to areas temporarily occupied by the Contractor shall be routed to avoid environmental damage. Such routes shall be approved by the Engineer before being created. If he sees fit the Engineer shall take advice from the environmental monitors before approving such routes.

016.15. Cutting Trees

The Contractor shall at all times take necessary steps to minimise destruction of trees and vegetation. He shall ensure that his personnel do not, at any time, undertake unauthorised tree cutting or clearance.

016.16. Hunting, etc.

The Contractor shall forbid his personnel to fish, hunt, kill, injure or poach any fauna.

016.17. Access to Properties

All existing property accesses to the road shall be respected throughout the execution of the Works. Wherever a property has an existing access the Contractor shall ensure, through the provision of suitable temporary works, that such access remains available to the property occupier during the Works to substantially the same extent as previously.

016.18. Public Meetings

The Contractor shall take necessary measures, including public meetings, to ensure that the public is kept fully aware about the extent and scheduling of the proposed works. He shall ensure that at least one member of his staff is available during working hours to deal with queries and complaints from the public in respect of his operations.

016.19. Environmental Health and Safety Officer

The Contractor is responsible for Environmental, Health and Safety (EHS) matters across the whole site of the Works. He shall appoint one of his staff as a full time EHS officer and shall ensure that all personnel receive appropriate EHS training.

Measurement

Measures to ensure compliance with the Environmental Management Plan Requirements of all kinds as outlined above or as necessitated by any other requirement of the Contract will be measured as a Lump Sum.

Payment

The Lump Sum for compliance with the Environmental Management Plan Requirements will be paid monthly in proportion to the value of work completed during the month compared to the total value of work under the contract. The value of General Items, Dayworks and Provisional sums will not be considered in these calculations. In the event of persistently inadequate measures under this item during construction, the Engineer may reduce the monthly amount payable accordingly. Any such amounts deducted shall not later be recoverable.

	Item	**Unit of measure**
00701	Compliance with Environmental Management Plan Requirements	lump sum

APPENDIX TO GENERAL REQUIREMENTS SPECIFICATIONS

1.List of standards incorporated by reference

2.Layout of Engineer’s Offices

3.Furniture and Equipment for Engineer’s Offices

4. Vehicles for the Engineer

1. List Of Standards Incorporated By Reference

N	GOST Nr Nr STAS	Title. Denumirea
1.	SNiP 2.02.02 – 85	Foundations of water retaining structures. Fundatii hidrotehnice
2.	SNiP 2.03.11 - 85	Protection of structures against corrosion Protectia constructiilor impotriva coroziunii
3.	SNiP 2.05.02 - 85	Highways. (Design standards) Drumuri auto (Norme de proiectare)
4.	SNiP 2.05.03 - 84*	Bridges and pipes (culverts). (Design standards). Poduri si podete (Norme de proiectare)
5.	SNIP 3.01.03-84	Survey and setting out works in construction Ridicări de teren in construcție
6.	SNIP 3.01.04-87	Acceptance of completed projects. General provisins. Recepția lucrarilor finalizate. Prevederi generale
7.	SNiP 3.02.01 - 87	Earthwork Structures, Understructures and Foundations Constructii terasamente, fundatii
8.	SNIP 3.03.01-87	Bearing and Fencing Structures Elemente portante si de imprejmuire
9.	SNiP 3.04.03 – 85 (CPE.04.03-2005)	Protection of erected constructions and structures against corrosion Protectia edificarilor si constructiilor impotriva coroziunii
10.	SNiP 3.05.05 - 84	Technological equipment and technological pipes. Utilaj tehnologic si conducte tehnologice.
11.	SNiP 3.06.03 - 85	Highways (Construction and acceptance of works. Regulations). Drumuri auto(Prescriptii la efectuarea lucrarilor si receptia lor)
12.	SNiP 3.06.04 - 91	Bridges and pipes (culverts). Poduri si podete
13.	SNiP 3.06.06 - 88	Road and aerodrome asphalt pavement construction.Regulations Prescriptii pentru constructia imbracamintei din beton asfaltic la drumuri si aerodromuri
14.	SNiP 3.07.03 - 85*	Land-impovement systems and structures. Sisteme si instalații meliorative.
15.	SNiP 3.09.01 - 85	Manifacturing of precast concrete units Fabricarea elementelor si articolelor prefabricate din beton armat
16.	SNiP III -18 - 75	Metal structures Constructii metalice
17.	VSN 8-89	Environmental Protection when constructing, repairing and maintaing the highways. Instructions. Instructiuni de protectie a mediului la lucrarile de constructie, reparatie si exploatare a drumurilor auto
18.	VSN 32 - 81	Waterproofing to bridges and culverts on railways, highways and urban roads. Instruction Instructiuni de executare a hidroizolarii elementelor de poduri si podete pe drumuri auto, strazi si cai ferate.
19.	VSN 37 - 84	Traffic Management and Security of Road Sectors under Works.Instructions Instructiuni pentru dirijarea circulatiei rutiere si securitatea sectoarelor in executie

N	GOST Nr Nr STAS	Title. Denumirea
20.	VSN 38 - 90	Road pavement work son top of uneven surfaces. Technical standards. Normele tehnice pentru executarea imbracamintilor rutiere cu suprafata rugoasa
21.	VSN 46 - 83	Designing of flexible roads. Instructions Instructiuni pentru proiectarea sistemelor rutiere nerigide
22.		
23.	VSN 86 - 83	Designing and Mounting of Rubber Bearing Pads. Instructions Instructiune pentru proiectarea si asezarea aparatelor de reazem din polimeri la poduri
24.	VSN 139-80	Cement Concrete Pavements. Instructions Construictia imbracamintei din beton cu ciment. Instructii
25.	SM GOST 9.032 - 74*	USCAP. Lacquer and Paint Coating. Groups, Technical Requirements. SUPCI. Acoperirea cu lac si vopsea.Tipuri, conditii tehnice si marcari.
26.	SM GOST 82-70	Universal hot-rolled wide strip steel Laminarea universala a fisiilor late de otel la temperaturi inalte
27.	SM GOST 103-76**	Hot-rolled steel strip. Dimensions. Benzi de oțel laminate la cald. Categorie.
28.	SM GOST 310.1 - 76*	Cements. Test Methods. General provisins. Cimenturi. Metode de testare.Prevederi Generale
29.	SM GOST 310.2 - 76	Cements. Method for Coarseness Determination. Cimenturi. Metode de determinare a finetei de macinarie
30.	SM GOST 310.3 - 76	Cements. Methods for Determination of Standard Consistency, of setting time and of Sound Cement. Cimenturi. Metode de determinare a consistentei normale, termenilor de priza si schimbarii uniforme a volumului
31.	SM GOST 310.4 - 81**	Cements. Methods for Determination of bending and compression strength. Cimenturi. Metode de determinare a rezistentei la incovoiere si compresiune
32.	SM GOST 380-94	Ordinary carbon steel. Grades. Otel-carbon obisnuit. Marca de otel
33.	SM GOST 931 - 90	Brass sheets and strips. Technical conditions. Table si fasii din cupru. Conditii tehnice.
34.	SM GOST 1839 - 80***	Asbestos cement pipes and couplings for non-pressure pipe lines. Specifications Țevi si cuplaj din azbesto-cement pentru conducte fără presiune. Condiții tehnice.
35.	SM GOST 3634 - 99	Access manhole covers and storm-flow receivers for manholes. Technical requirements. Licuri pentru cămine de vizitare si fântâni pentru evacuarea apelor de suprafata. Condiții tehnice.
36.	SM GOST 4245 - 72	Drinking water. Methods for determination of chloride content Apa potabila. Metode de determinare a continutului de cloruri
37.	SM GOST 4389 - 72	Drinking water. Methods for determination of sulphate content Apa potabila. Metode de determinare a continutului de sulfati
38.	SM GOST 5180 - 84	Soils. Laboratory methods for determination of physical

N	GOST Nr Nr STAS	Title. Denumirea
		characteristics. Soluri. Metode de determinare a caracteristicilor fizice in laborator
39.	SM GOST 5336-80***	Single bar steel grids. Technical Conditions. Plase de otel ordinare. Conditii tehnice.
40.	SM GOST 5781 - 82*****	Hot – rolled steel for reinforcement of concrete structures. Specifications. Otel laminat la temperaturi inalte pentru armarea constructiilor din beton armat. Conditii tehnice.
41.	SM GOST 5802 - 86	Mortars. Test methods. Mortare de constructii. Metode de testare
42.	SM GOST 6665-91	Concrete and reinfirced concrete kerbs. Specifications. Elemente prefabricate din beton si beton armat pentru borduri
43.	SM GOST 6727-80****	Cold-drawn low-carbon steel wire for concrete structures reinforcement. Technical Conditions. Sirma trasa din otel cu continut jos de carbon la temperaturi joase. Conditii tehnice
44.	SM GOST 6713-91	Low-alloyed structural rolled steel for bridge construction. Specifications. Laminarea otelului cu continut jos de carbon pentru constructia podurilor
45.	SM GOST 7348 - 81****	Carbon sleel wire for reinforcement of preslressed concrete constructions.Specifications. Sârmă din oțel-carbonat pentru armarea structurilor de beton precomprimat. Condiții tehnice.
46.	SM GOST 7473 - 94	Ready-mixed concrete. Technical Conditions. Amestecuri de beton.Conditii tehnice
47.	SM GOST 8267 – 93***	Crushed dense aggregates and gravel for construction. TEchnical Conditions. Piatra concasata din roca densa de munte pentru constructie. Conduitii tehnice.
48.	SM GOST 8269.0-97*	Crushed dense aggregates and gravel of natural rock, industrial wates for construction. Physical-mechanical testing methods. Piatra concasata si prundis din roca densa de munte, resturi de materiale industriale pentru constructie. Metode fizico-mecanice de testare.
49.	SM GOST 8269.1-97	Crushed aggregate and gravel of natural rock, and of production residue for construction works. Chemical analysis testing methods. Piatra concasata si prundis din roca densa de munte, resturi de materiale industriale pentru constructie. Metode de analiza chimica de testare
50.	SM GOST 8735 – 88**	Sand for construction. Testing methods. Nisip pentru lucrari in constructie. Metode de testare
51.	SM GOST 8736 -93**	Sand for construction. Technical Conditions. Nisip pentru constructie. Conditii tehnice
52.	SM STB 1033:2008	Asphalt concrete mixtires for roads and aerodromes and asphalt

N	GOST Nr Nr STAS	Title. Denumirea
		concrete. Technical Conditions. Mixturi asfaltice pentru drumuri si piste, si beton asfaltic (Conditii tehnice)
53.	SM GOST 9812-74****	Petroleum bitumen. Technical Conditions. Bitumul petrolier de izolare. Conditii tehnice
54.	SM GOST 9825 -73***	Lacquer-painting materials. Terms, definitions and designation. Materialele din vopsea cu lac.Termeni, definitii, marcare.
55.	SM GOST 10060.0-95****-10060.4 - 95****	Concrete types. Frost Resistance Test Method. Tipiri de beton. Metode de determinare a rezistentei la inghet-dezghet
56.	SM GOST 10178 – 85**	Portland cement and Portland blast furnace slag cement. Technical Conditions. Ciment portland si ciment portland cu adaos de zgura (Conditii tehnice)
57.	SM GOST 10180 - 90	Concrete Types. Test Methods for strength of specimens. Tipuri de beton. Metode de determinare a rezistentei probelor de control
58.	SM GOST 10181-2000	Concrete mixtures. Test Methods. Amestecuri de beton. Metodele de testare
59.	SM GOST 10704-91	Longitudinal (electric) welded steel pipes (tubes). Assortment. Tevi de otel electric sudate longitudinal. Sortiment
60.	SM GOST 10807-78******	Road signs. General technical conditions. Indicatoare rutiere. Conditii tehnice generale
61.	SM GOST 11501 - 78****	Petroleum Bitumen. Penetration Test Method. Bitumul petrolier. Metode de determinare a penetratiei
62.	SM GOST 11503 - 74****	Petroleum Bitumen. Viscosity Test Method. Bitumul petrolier. Metode de determinare a viscozitatii
63.	SM GOST 11955-82***	Cutback Road bitumen. Technical Conditions Bitumul lichid pentru drumuri. Conditii tehnice
64.	SM GOST 12071 - 2000	Soils. Sampling, handling and sample storage. Soluri. Selectarea, ambalajul, transportarea si pastrarea probelor
65.	SM GOST 12248 - 96	Soils. Laboratory methods for strength and shear strength. Soluri. Metode de determinare a rezistentei si rezistentei la deformare
66.	SM GOST 12536 - 79	Soils. Laboratory Grading Analysis Method. Soluri. Metode de determinare a compozitiei granulometrice in laborator
67.	SM GOST 12586.0 - 83*	Reinforced-concrete vibrohydropressed pressure pipes. Specifications. Țevi din beton armat de presiune compactate prin vibrare. Condiții tehnice.
68.	SM GOST 12586.1 - 83*	Reinforced-concrete vibrohydropressed pressure pipes. Structure and dimensions. Țevi din beton armat de presiune compactate prin vibrare. Construcție si dimensiuni.
69.	SM GOST 12730.0 - 78÷12730.4-78	Concrete Types. General requierements for density, moisture content, water absorption, porosity and impermeability to water Test Methods. Tipuri de beton. Conditii generale pentru metodele de

N	GOST Nr Nr STAS	Title. Denumirea
		determinare a densitatii, umiditatii, absorbtiei de apa,.porozitatii si impermeabilitatii
70.	SM GOST 12730.5-84*	Concrete Types. Impermeability to water Test Methods. Tipuri de beton. Metode de determinare a impermeabilitatii
71.	SM GOST 13508 - 74*****	Road Marking Marcaj rutier.
72.	SM GOST 13840 - 68*****	Reinforced stell ropes 1×7. Specifications. Corzi de armare din oțel 1x7. Condiții tehnice.
73.	SM GOST 14098-91	Welded joints of reinforcement and of embedded elements of reinforced-concrete constructions. Types, structure and dimensions. Sudarea armaturii si a pieselor inglobate pentru constructiile de beton armat. Tipuri, structura si dimensiuni
74.	SM GOST 15836 -79	Bituminous rubber insulating mastic. Technical conditions. Mastic bituminos cu cauciuc izolant.Conditii tehnice
75.	SM GOST 16557 - 78	Filler for asphaltic-concrete mixtures. Technical requirements. Filer pentru beton asfaltic (Conditii tehnice)
76.	SM GOST 18105 - 86*	Concrete Types. Strength Test Methods. Tipuri de beton. Reguli de control a rezistentei betonului
77.	SM GOST 18164 -72	Drinking water. Test Method for Solid Residue Content. Apa potabila. Metoda de determinare a continutului de rezidii solide
78.	SM GOST 18599-2001*	Polythene pressure pipes. Technical Conditions Tevi de presiune din polietilen. Conditii tehnice.
79.	SM GOST 18659 - 81	Road Bitumen Emulsions. Technical requierements. Emulsii bituminoase pentru drumuri. Conditii tehnice
80.	SM GOST 20522 - 96	Soils. Statistical processing method of test results. Soluri. Metoda statica de prelucrare a rezultatelor testarilor
81.	SM GOST 22245 -90*	Viscous Road Petroleum Bitumen. Technical Conditions. Bitumul viscos pentru drumuri. Conditii tehnice
82.	SM GOST 22733 - 77	Soils. Laboratory method for maximum density Soluri. Metode de laborator de determinare a densitatii maxime
83.	SM GOST 23279 - 85	Welded reinforcment grids for precast reinforced concrete structures and units. General Technical Conditions. Plase sudate metalice pentru construcrii si articole din beton armat.Conditii generale tehnice
84.	SM GOST 23457 – 86**	Traffic control equipment. Application. Mijloace tehnice de dirijare a circulatiei rutiere. Reguli de aplicare.
85.	SM GOST 23558 – 94**	Crushed stone-gravel-sand mixtures and soils, treated by inorganic binder for road and aerodome construction. Technical conditions. Amestecuri de piatra concasata – prundis-nisip si soluri, prelucrate cu lianti anorganici pentru constructia drumurilor si aerodromurilor. Conditii tehnice
86.	SM GOST 23732 - 79	Water for concrete and mortar. Technical Conditions. Apa pentru beton si mortar. Conditii tehnice
87.	SM GOST 23735 - 79*	Sandy-gravel mixtures for construction work.

N	GOST Nr Nr STAS	Title. Denumirea
		Specifications. Amestecuri din nisip şi pietriş pentru lucrările de construcţii. Condiţii tehnice.
88.	SM GOST 24143 - 80	Soils. Laboratory methods for swelling and subsidence Soluri. Metode de determinare a caracteristicilor la umflare si tasare
89.	SM GOST 25192 – 82*	Classification of Concrete and general technical requirements. Clasificarea betonului. Conditii tehnice generale.
90.	SM GOST 25328 - 82	Building mortar cement. Technical conditions. Ciment pentru mortare de constructii. Conditii tehnice
91.	SM GOST 25458 - 82	Wooden (timber) posts for road signs. Specifications Suport din lemn pentru indicatoare rutiere. Condiţii tehnice.
92.	SM GOST 25459 - 82	Concrete posts for road signs. Specifications. Suport din beton armat pentru indicatoare rutiere. Condiţii tehnice.
93.	SM GOST 25584 - 90*	Soils. Laboratory method for permeability coefficient. Soluri. Metode de determinare a coeficientului de filtratie in laborator
94.	SM GOST 25607 – 94**	Crushed stone-gravel-sandy mixtures for road and aerodrome base and pavement. Technical Conditions Amestecuri de piatra concasata - prundis - nisip pentru sisteme rutiere si aerodromurilor. Conditii tehnice
95.	SM GOST 26633 - 91**	Heavy and fine grained concrete. Technical Conditions. Beton greu cu granulatie marunta (Conditii tehnice)
96.	SM GOST 26804 -86	Metal road safety barriers. Technical Conditions. Parapeti metalici de securitate. Conditii tehnice.
97.	SM GOST 28013 – 98**	Mortar Types. General Technical Conditions. Mortare de constructie. Conditii tehnice generale
98.	SM GOST 30055-93*	Ropes of polymeric materials and combined ropes. Technical Conditions. Odgoane din materiale polimerice si odgoane combinate. Conditii tehnice
99.	SM GOST 30515-97	Cement Types. General Technical Conditions. Tipuri de ciment. Conditii generale tehnice
100.	SM GOST R 51256-99	Road marking. Types and basic parameters. General technical requirements. Marcajul rutier. Tipuri si parametri de baza. Conditii tehnice generale
101.	OST 35 - 27.0 - 85	Reinforced concrete units for rectangular and pipe culverts for railway and road culverts. Technical conditions. Elemente din beton armat pentru podete tubulare si podete cadru la caile ferate si drumuri auto. Conditii tehnice
102.	OST 35 - 27.2 - 85	Reinforced concrete units for rectangular drainage pipes for railway and road culverts. Structure and dimensions. Elemente din beton armat pentru podete cadru folosite la drumuri auto si cai ferate. Constructia si dimensiunele
103.	ENiR, pc E 2 - 1 - 45	Mechanical and Manual Earthwarks.

N	GOST Nr Nr STAS	Title. Denumirea
		Lucrari de terasamente mecanizate si manuale
104.	ENiR, pc E 18 - 24	Revegetation. Lucrari de inverzire
105.	TU 1-51-75	Waterproofing layer Strat izolant
106.	TU 400-1/55-16-76	Waterproofing layer Strat izolant
107.	Typical design 3.501-86	Reinforced concrete piles for the bridge infrastructure Piloti dn beton armat pentru infrastructuri de pod
108.	Typical design 3.503-41	Bridge and overpasses approaches Racordarea podurilor si pasajelor de autostrada cu rampa de acces
109.	Typical design 3.503.1-75	Road Bridges of Precast RC Units with spans of 6 and 9m on piles Poduri de autostrada din elemente prefabricate din beton armat cu deschideri de 6.00 si 9.00 m pe infrastructuri cu piloti
110.	Typical design 3.503.1-79	Reinforced concrete piles for road bridge infrastructure with a span up to 24.m Infrastructuri cu piloti din beton armat pentru poduri de autostrada cu deschideri de pana la 24.00 m
111.	Typical design 3.503.1-81	Precast Reinforced Concrete I-Type beam bridge and overpass decks with spans of 12. 15. 18. 21. 24 and 33m length. Suprastructuri din beton armat cu lungimea de 12.00,15.00,18.00,21.00,24.00 si 33.00 m din grinzi dublu T cu armare precomprimata pentru poduri si pasaje
112.	Typical design 3.503.1-101	Waterproofing to carriageway, coverage of the expansion joints of precast reinforced concrete road bridge and overpass decks of 33m length. Izolatia partii carosabile, acoperirea rosturilor de dilatatie a suprastructurilor din beton armat cu lungimea de pana la 33.00 m pentru poduri si pasaje de autostrada
113.	Typical design 503.09-7.84	Drainage structures for roads. Constructii pentru evacuarea apelor de pe drumuri auto
114.	Typical design 3.501-86	Reinforced concrete prismatic piles for bridge piers. Piloti prizma din beton armat pentru elevatie la poduri

Note: An asterisk denotes a standard that has been subject to later modifications. The most recent modifications at the 28 days before tender submission are considered to be inclusive in applying the standard.

2. Engineer's Offices.

Item	Contract Office	Lab.Office
Office 1	20 sq.m.	
Office 2	15 sq.m	15 Sq.m.
Office 2	15 sq.m	
Office 2	15 sq.m	
Conference Room	30 sq.m.	
Toilet Room with:		
Flush toilet cubicles	3	1
Wash hand basin	2	1
Shower		1
Kitchenette	10 sq.m.	5 sq.m.
Store room	10 sq.m.	5 sq.m.
Car parking space		
Covered area for cars	4 cars	2 cars

Note that the Laboratory accommodation (including covered car parking) is for the exclusive use of the Engineer. The Contractor must allow for such additional space as he requires for his own staff.

3.Furniture and Equipment for Engineer's Offices.

The following list is indicative of the items required (Contract RSPSP/W2/02):

ITEM	CONTRACT OFFICE	LABORATORY OFFICE
Air conditioning/heating units	4	1
Desks with four lockable drawers (1.8m x 0.9m)	4	1
Padded, high back swivel chairs	4	1
Table (1.8m x 0.9m)	2	
Chairs with padded seats	12	3
Meeting room table (2.6m x 1.6m)	1	
Meeting room chairs	12	
Drawing board with parallel motion	1	
Drawing stools	1	
Plan chest – 8 drawers	1	
Drawing rack with suspension arms	1	
Filing cabinets with file suspension system (4 draws)	2	
Shelf units (stack of 5, 1.8m x 0.3m)	2	
Cupboards (1.7m x 0.9m x 0.3m) with 3 shelves and lock	2	
Latest Specification IBM type desktop computers. Minimum, 3 GHzprocessor, 1 Gb ram, 80 Gb Hard Drive, 4 USB ports, CD/DVD Read Write, 19 inch flat screen color monitor, modem(s) for Dial up and Broadband. Software as specified.	4	1
Laptop Computer. Minimum 1.6 GHzprocessor, 1 Gb ram, 40 Gb Hard Drive, 3 USB ports, CD/DVD Read Write, 14 inch screen, modem(s) for Dial up and Broadband. Software as specified.	1	
HP Laser printer(A4 size) 25 pp/min. or approved equal with "T" switch	2	1
Budget A4 printer/scanner/copier units	2	1
A3 laser printer	1	
A3 scanner	1	
Photocopier, black/white, A3 size with collator and autofeed and zoom 50%-200% . Minimum 20pp/min	1	
Telephone system with 5 extensions	1	
Single Telephone Installation		1
Comb binder and punch	1	

ITEM	CONTRACT OFFICE	LABORATORY OFFICE
Crockery and cutlery	For 15 people	For 6 people
Electric kettle 1 litre	1	1
Electric kettle 2 litre	1	
Coffee maker 1 litre	1	1
Saucepans	2	2
Clothes stand	3	1
12 digit printing calculator	2	1
Hand/pocket 10 digit calculator	3	1
Refrigerator (150 Litres)	1	
Refrigerator (50 Litres)		1

4. Vehicles for the Engineer.

Specifications for Type 1 and Type 2 vehicles are provided below:

Type 1: Saloon passenger car

The vehicle should conform to the technical specifications stipulated below.

Description	***Specifications***
Vehicle Type	
1. Body Type	Saloon
2. No of doors	4
3. No of seats	5
Engine	
4. Fuel	Gasoline
5. Min Power (hp)	140
6. Transmission	min 5 speed; automatic
7. Fuel consumption	
Extra urban l/100 km	Not more than 8
Urban cycle l/100 km	Not more than 14
8. Emission Control	Euro 4 compliant
Dimensions & Weight (see pictures above)	
9. Length (mm)	4600-4800
10. Width (mm)	1750-1850
11. Height (mm)	1400-1500
12. Wheelbase (mm)	2700-2800
13. Kerb Weight (kg)	Not more 2000
14. Wheels	16” or 17”
15. Boot Capacity (litre)	Not less than 500
Safety & Security	
16. Driver, Passenger, Side And Head Curtain Airbags	
17. ABS Anti lock brakes	
18. Disk front and rear brakes	
19. Electronic Stabilization Programme	
20. Engine Immobiliser	
The following features should be included as standard	
21. Air Conditioning	
22. Power Steering	
23. Steering wheel – left side	
24. Axial And Vertical Adjustable Steering Column	
25. Asymmetrically Folding Rear Seat With Armrest	
26. Electrically Adjustable and Heated Mirrors	
27. Four Electric Windows	
28. Front Fog Lights	
29. Front & Rear Floor Mats	
30. Height Adjustable Driver’s Seat	
31. On-board Computer	
32. Radio receiver with CD player	
33. Remote Central Locking	
34. First Aid Kit	
35. Spare Wheel	

36. Warning Triangle Mounted in boot lid

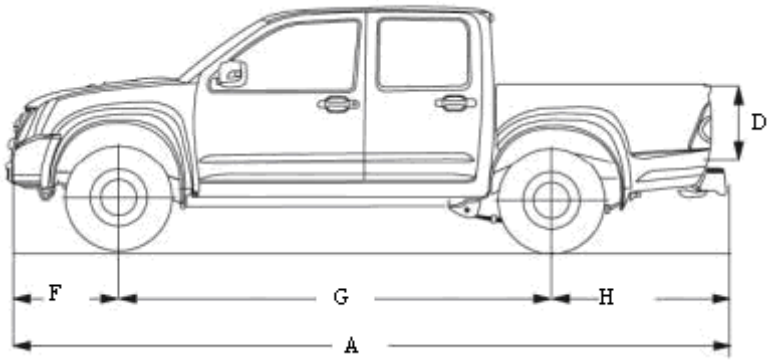
Type 2: 4 Wheel drive double cab utility vehicle

The vehicle type is light motor vehicle with an open-top rear cargo area. The vehicle should be suitable for carrying a team of 5 workers in the double cabin and a load in rear cargo minimum 1000 kg area as stipulated below. The vehicle should also be suitable for towing trailer with a weight of minimum 2000 kg. The vehicle will be used in all terrain conditions and should be designed as an off-road type.

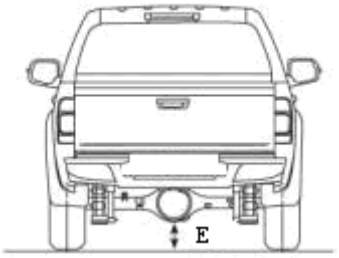
Body Type and Dimensions

Picture 1

Picture 2



Picture 3



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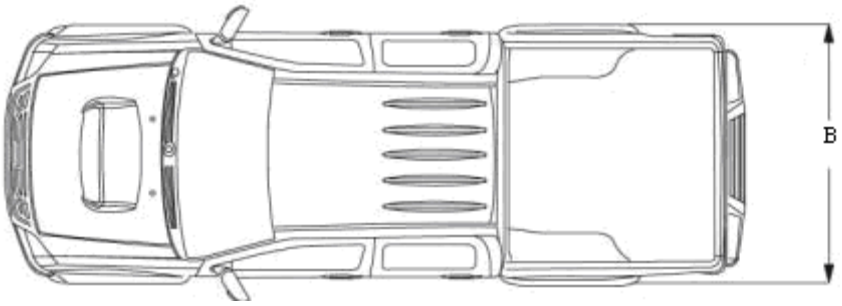
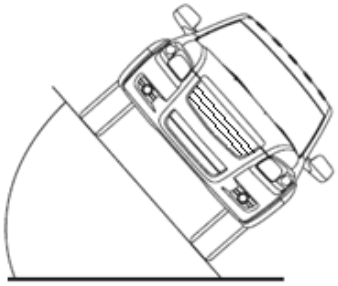
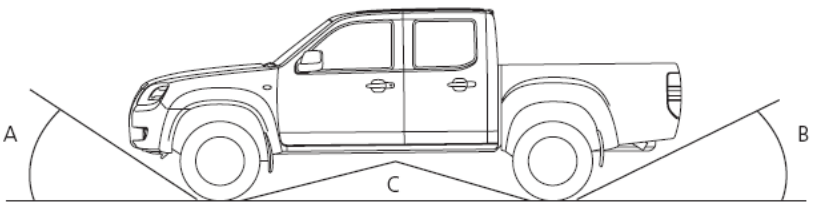


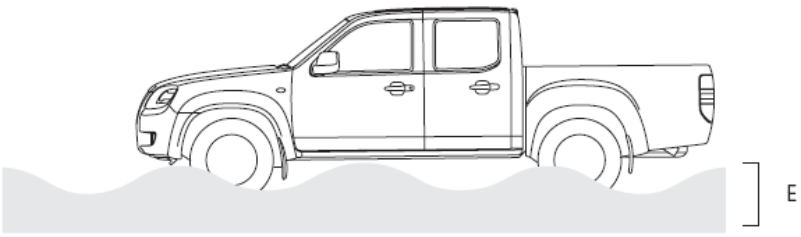
Picture 5



Picture 6



Picture 7



The vehicle should conform to the technical specifications stipulated below.

Description	**Specifications**
Engine	
1. Fuel	diesel
2. Induction	Turbo Charged
3. Min Power (hp)	170
4. Transmission	min 5 speed
5. Fuel consumption	
Extra urban l/100 km	Approximate 9
Urban cycle l/100 km	Approximate 12
6. Emission Control	Euro 4 compliant
7. Brakes Front	Ventilated disc
Dimensions & Weight (see pictures above)	
8. Ground Clearance (mm) (pic.3)	Not less than 225
9. Approach angle (pic.6 - A)	28º
10. Break over angle (pic.6 – C)	18º
11. Departure angle (pic.6 – B)	22º
12. Minimal tilting angle (unladen) (pic.5)	40º
13. Minimal wading depth (mm) (pic.7)	450
14. Payload (kg)	Not less than 1000
15. Minimal Towing Capacity (kg) with trailer Brake	Not less than 2000
16. Minimal Towing Capacity (kg) without trailer Brake	Not less than 700
17. Wheelbase (mm) (pic.2 G)	3000-3200
18. Max. Gross Weight (kg)	3500
19. Wheels	16” or 17”
20. Max. Front Overhang (mm) (pic.2 F)	800
21. No of doors	4
22. No of seats	2 -1st row; 3 – 2nd row
Safety & Security	
23. Driver's and front Passenger Airbag	
24. ABS Anti lock brakes	
25. Engine Immobiliser	
26. Air Conditioning	
27. Power Steering	
28. Steering wheel – left side	
Exterior	
29. Full Size Spare Wheel with Tire	

30. The rear load area should be provided with removable **Rear Hardtop Cab.** The cab should be fitted with clamping system allowing canopy to be fitted without any additional drilling of the vehicle body. Canopy should remain all weather proof. The cab should be equipped as follows:
31. **Side Access Door** – it should provide access to the loads (tools, equipment, etc.) stored in the rear load area
32. **Pop Up Roof Vent** – for effective ventilation of the rear load area
33. **Security Grill Tailgate** – for the protection during transportation of the rear window glass from the loads stored in the rear load area
34. **Interior Light** – assurance of visibility inside the rear load area.
35. The height of the canopy should exceed the height of the cabin with 150-200 mm in order to give better access inside and much storing space.

36. The rear load area should be equipped with heavy duty under rail bed liner kit made from aluminum.
37. It should protect the cargo area floors and walls during loading and unloading of tools, equipment, cargos, etc. and to resist to chemicals such as Ethanol, Petrol and Diesel, and should be designed to ensure that it can be kept clean without too much effort.

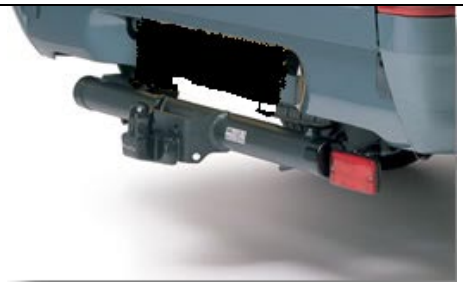
38. The vehicles should be equipped with winch for pulling, loading and lifting of equipment and auto recovery of the vehicle.
39. The winch should be driven by an electrical motor with a power of at least 4.5 HP able to pool at least 4000 kg.
40. The motor should be powered by the vehicle's or additional battery.
41. The direction of winch rotation should change.
42. The wire rope should be of at least 30 m in length and minimum 8 mm diameter and shall be of steel. At the end of the rope a hook should be fitted.
43. In order to minimize the damage of the wire rope during using of the winch at angle, the winch should be equipped with a fairlead for guiding the wire onto the spooling drum.
44. For the converting of the motor power in a larger pulling force a gear train should be included in the winch.
45. The winch should be fitted with a breaking system to be applied automatically to the winch drum when the winch is stopped and there is a load on the wire rope. The break should prevent the winch from paying out line, which turn the vehicle in place.
46. The winch should be fitted with a clutch allowing the operator to manually disengage the spooling drum from the gear train, enabling the drum to rotate freely. Engaging the clutch

should ‘lock’ the winch drum back onto the gear train.

47. The winch should be operated through a control box which will switch power to the motor, enabling the operator to change the direction of the drum rotation. The winch should be operated at a distance of at least 3-4 m through cable or radio frequency, thus keeping the operator at a safe distance.

48. The accessories to the winch should be also supplied, such as **gloves** for protecting the operator’s skin during the operating the winch or handling the wire rope; **hook strap** used to hold the hook and keep fingers away from the fairlead as the wire rope is being spooled in; **snatch block** for changing the pulling direction without damaging the wire rope and increasing winch’s pulling direction; **clevis/D-shackles** providing a safe means for connecting the looped end of cables, straps and snatch blocks. The shackle’s pin should be threaded to allow easy removal and a **towing hook** secured properly to vehicle’s frame providing an attachment point for wire hooks, straps and chains.

49. The vehicle should be equipped with a rear Towbar for towing trailers along with necessary accessories such as safety chains, cables, plugs, lights, etc.).
50. The tow bar should be rated in excess of the towed vehicle and its contents which will be at least 3000 kg.



The following list is indicative of the items required (Contract RSPSP/W2/03):

ITEM	CONTRACT OFFICE	LABORATORY OFFICE
Desktop computers. Minimum, 3 GHzprocessor, 2 Gb ram, 200 Gb Hard Drive, 4 USB ports, CD/DVD Read Write, 19 inch flat screen color monitor, modem(s) for Dial up and Broadband. Software as specified.	4	1
Laptop Computer. Minimum 1.6 GHzprocessor, 1 Gb ram, 40 Gb Hard Drive, 3 USB ports, CD/DVD Read Write, 14 inch screen, modem(s) for Dial up and Broadband. Software as specified.	1	
Laser printer(A4 size)	1	1
Budget A4 printer/scanner/copier units	1	1
A3 laser printer	1	
A3 scanner	1	
Photocopier, black/white, A3 size with collator and autofeed and zoom 50%-200% . Minimum 20pp/min	1	
Comb binder and punch	1	
12 digit printing calculator	2	1
Hand/pocket 10 digit calculator	3	1

1. PREPARATORY WORKS

CHAPTER 101. SITE PREPARATION

Description

101.01. Introduction

The chapter describes the surveying and setting out required to be carried out by the Contractor for the purposes of executing the Works.

Execution

101.02. General .

The Contractor is required to carry out all survey works required for the execution oif the Works. Basic data in respect of key setting out points and levels will be provided by the Engineer. All further setting out is the responsibility of the Contractor.

101.03. Works description.

The surveying and setting out works will be done according to SNiP 3.01.03-84.

At the commencement of the Works the Contractor must immediately undertake a complete resurvey of the works using, and at the same time verifying the base data provided by the Engineer. Any suspected error or discrepancy in the base data must be reported immediately to the Engineer who will make whatever corrections may be required and inform the Contractor. This work must be carried out well in advance of the permanent works. No claim for delay or extra cost, other than changes in cost arising from consequent changes in quantities, will be entertained as a result of errors in the base data, although Sub-Clause 1.9 of the Conditions of Contract (Delayed Drawings or Instructions) remains applicable.

The Contractor will establish clear centre line references and benchmarks at intervals of not more than 250 metres throughout the length of the project together with additional centreline references for all curve and spiral start and end points, curve midpoints and, if appropriate, tangent intersection points (IPs).

The complete list of centreline references and benchmark values shall be reported to the Engineer who shall carry out such checks as he sees fit and shall approve the list which shall then become the basis for the line and level control of the Works from then on. The approval of the Engineer notwithstanding, the Contractor remains wholly responsible for the completeness and accuracy of the list and for the continued preservation of all references and benchmarks until the completion of the Works.

101.04. Works Acceptance

Measurements

1) The surveying and setting out works shall be measured in kilometres or parts of a kilometre.
2) Preparing Construction and As Built Drawings shall be measured in kilometres or parts of a kilometre.

Payment

Surveying and Setting Out

The works measured as indicated above and confirmed by the Engineer shall be paid according to the unit price per kilometre provided in the contract.

Payment for the work of survey and setting out shall be made in accordance with the progress of the work.

30% of the cost shall be payable on acceptance by the Engineer of the list of references and benchmarks

50% shall be payable on acceptance of the milling and regulating and/or the construction of new pavement to top of crushed base by the Engineer as ready for laying of asphalt paving courses.

20% shall be payable on completion and acceptance of the finished wearing course.

Construction and As Built Drawings

The Construction Drawings prepared and accepted by the Engineer shall be paid according to the unit price per kilometre provided in the contract.

70% of the cost shall be payable on acceptance by the Engineer of the Construction Drawings.

30% of the cost shall be payable on acceptance by the Engineer of the As Built Drawings.

The payment shall be made under the following items:

	Item	**Unit of Measure**
10101	Surveying and setting out works	kilometre
10102	Preparing of Construction and As Built Drawings	kilometre

CHAPTER 102. SITE CLEARING

Description

102.01. Introduction

This chapter deals with terrain clearing, the removal of topsoil, root extraction.

Executing Conditions

102. 02. Generalities.

Wherever the Works require terrain clearing, including removal of shrubs and bushes, removal of topsoil, root extraction, other than living trees with a diameter exceeding 200m at a height of 1 metre above the ground, such works shall be executed under this Chapter. Existing trees and their roots are dealt with in Chapter 103 below.

Topsoil shall be removed at locations and to a depth to be indicated by the Engineer.

Roots shall be removed to a depth of at least 1 metre below finished ground or subgrade level.

Topsoil shall be set aside in areas selected by the Contractor and approved by the Engineer for reuse in soiling areas of cut and embankment slopes. It shall be carefully preserved and shall not be mixed with other material. The material must not contain harmful impurities, hard particles, clay, garbage, stones etc, and shall be used according to SNiP 3.06.03-85 and SNiP2.05.02-85.

Roots, bush and other matter unsuitable for reuse shall be burnt or otherwise disposed of in a manner acceptable to the local authorities and to the Engineer. Burning shall be in accordance with the requirements of Chapter 103 below.

102. 03. Works acceptance.

The works shall be accepted in accordance with the Technical Specifications including Chapetr 001.

Measurement

The works for terrain clearing, removal of topsoil, and root extraction will be measured in sguare meters of topsoil removed and stored for reuse; the clearance of shrubs, brush and roots shall be ancillary to the removal of topsoil and no separate payment shall be made.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid according to the unit price provided in the Contract. The payment made under this item shall be the full and complete payment for the completed works indicated in the present chapter.

Payment will be made under the following item:

	Item	**Unit of measure**
10201	Clearing brush, undergrowth and vegetation and removal of topsoil	square metre

CHAPTER 103. DEMOLITION AND SITE CLEARANCE

Description

103. 01. Introduction

This chapter deals with the removal of traffic signs, trees, service poles, fences, kerbs, guard rails, kilometre posts and suchlike items and their storage for future use and/or their burning or disposal by other means.

Materials

103. 02. Backfill Materials

Where backfill materials are required they shall be and shall be used in accordance with the provisions of Chapter 203.07.

Executing conditions

103. 03. The use of materials.

Where directed by the Engineer all recoverable materials will be saved. Recoverable items shall be salvaged in readily transportable sections or pieces.

Recovered items shall either be for reuse in the Works or for reuse by the Employer; for each item or group of items the Engineer will indicate which. In the event that items are for reuse by the Employer the Contractor shall deliver them to a yard or storage area indicated by the Engineer. Items for reuse will generally comprise signs, including posts and all fittings, and guardrails.

All reusable items for the Works are to be carefully stored on site by the Contractor who shall repair or change all sign and guard rail components and fixing systems, lost or damaged.

103.04. Removing Material.

Concrete or stone kerb shall be removed entirely, including any backing concrete and shall be disposed of..

After the removal of poles or posts all holes will be filled and compacted, in layers not greater than 20cm, in accordance with the requirements of Chapter 203.

Trees will be removed only where specifically directed by the Engineer. Where trees are removed the roots and stumps will be extracted to a depth of at least 1.00m below finished ground level or below subgrade level as appropriate. The holes will be filled and compacted, in layers not greater than 20cm, in accordance with the requirements of Chapter 203.

All filling material will be compacted using a mechanical or vibratory compactor.

103. 05. Disposal of materials

The disposal of materials indicated for disposal will be made as follows:

a) Transportation off-site.

The contractor will be responsible for the transportation of waste materials to disposal areas/tips agreed with the local authorities and approved by the Engineer where materials will be disposed of in accordance with the requirements of the specification.

One copy of all documentation proving the agreement of the local authority to the site(s) used for disposal of the waste material will be given to the Engineer

b) Burning of Debris.

Burnable materials that are to not to be reused may be disposed of by burning. The contractor shall obtain the approval of the competent local authority for disposal by burning before any action is taken. A copy of the document approving both the burning process and the site at which it is to be carried out shall be given to the Engineer for his agreement before any burning is carried out. No items shall be burnt without the approval of the Engineer.

When the burning process is finished the fire will be extinguished. All materials remaining, ash or incompletely burned items shall be removed and disposed of in accordance with the provisions of paragraph (a) above.

103. 06. Works acceptance.

The works shall be accepted in accordance with the Technical Specifications including Chapter 001.

Measurement

The movement of the traffic signs, poles, marker posts, kilometre posts, trees and suchlike will be measured by number and the removal of guard rail and kerb by linear metre. Measurement under these items will include all ancillary works including backfilling holes and removal and disposal of debris.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below

	Item	**Unit of measure**
10301	Traffic signs removal and deliver to Employer	number
10302	Tree clearance and dispose	number
10303	Remove marker posts and dispose	number
10304	Remove cable type Guard Rail and deliver to Employer	linear metre
10305	Remove steel W-beam type guard rail and deliver to Employer	linear metre

10306	Removal of concrete kerb and dispose	linear metre
10307	Removal of kilometre posts and dispose	number

CHAPTER 105. TEMPORARY ROADS AND SIGNING

Description

105.01. Introduction

This Chapter deals with the construction and demolition of temporary diversion roads at new structures or road works, together with assembly and dismantling of temporary traffic direction signs required for the security of traffic whilst works are in progress.

The traffic control installations on temporary roads or carriageway diversions required for working shall be in accordance with VSN 37-84 and SM GOST 23457-86**. Temporary sign installation shall be made in accordance with the requirements of these specifications and of the drawings.

Materials

105.02. Materials

Materials for temporary signs shall comply with the following requirements

Dimensions of traffic signs for the construction period	SM GOST 10807-78******
Reflective foils	SM GOST 10807-78******
Signposts made of reinforced concrete	SM GOST 25459-82

Working conditions

105.03. Generalities.

Directing and diverting traffic, and separation of the working area shall be carried out in accordance with the requirements of chapter 007 and of the traffic regulations in VSN 37-84.

During the working period the following requirements shall be observed:

a) The positioning of signposts, barriers, cones and other marking devices will be proposed by the Contractor and approved by the Engineer before the work starts.

b) Signs, diversions, barriers and other markings shall be limited to those required for the works actually in progress.

c) The location of temporary signposts, diversions, barriers and other markings will be changed as needed.

d) The signs, diversions, barriers and other markings which are not suitable for the current stage of work will be dismantled or covered.

e) The contractor will repair or replace any damaged or defective signs, diversions, barriers and other markings at his own cost immediately upon receipt of a request from the Engineer to rectify them.

f) All sign installations will be kept clean.

h) The reflective foils on signs, cones and barriers will be changed or replaced as necessary or as directed in case of deterioration.

i) All temporary traffic signs, diversions, barriers and other markings shall be dismantled or obliterated after finishing the works.

105.04. Barriers.

Barriers shall be erected in accordance with article 105.03. Barriers may be of metal, wood or plastic and shall be erected wherever traffic is required to be diverted from its normal location on the road. They shall be used in conjunction with cones to separate traffic moving in opposite directions and to separate work areas from moving traffic.

105.05. Cones.

Cones shall be erected in accordance with article 105.03 and shall be used in conjunction with barriers for the purposes stated in 105.04 above.

105.06. Temporary signs.

All temporary signs for traffic organization will be formed using approved reflective material. The signs used will be made of wood, metal, or other approved material.

105.07. Flagmen and traffic lights

Where flagmen are used for directing traffic they shall be adequately trained and shall be equipped with distinctive flags or batons. Where traffic lights are provided , if they are under automatic control the sequence of operations shall be carefully programmed to provide intervals suitable for the traffic density and distance between lights.

105.08. Provision of Diversion Roads.

Where it is not possible or, in the Contractor's view less economical, to maintain the traffic on part of the existing paved road, the Contractor shall construct diversion roads. Every effort shall be made to accommodate such diversions within the existing right of way. If this is not possible, any area of land required shall be acquired or leased by the Contractor from the adjacent landowners/proprietors. The Contractor shall be entirely responsible for the provision of any land required for diversions and shall ensure that any such land is returned to its original condition as soon as the works which necessitated the diversion are complete.

105.09. Construction of Diversion Roads.

For each diversion road, the Contractor shall prepare a design which shall be submitted to the Engineer for approval. The required width of the diversion shall be instructed by the Engineer. In no case shall diversion roads comprise less than 2 lanes, each of 2.8 metres width. Diversion roads construction shall be, as a minimum, 200mm subbase, 150 mm base, 50mm asphalt concrete, all constructed on a thoroughly compacted subgrade having a CBR not less than 6% for a depth of 300mm.

Diversion roads shall only be eligible for payment when constructed at locations where the Engineer is satisfied that maintenance of traffic on the existing pavement during the works is impossible. Such circumstances will only be considered where the works to be executed involve the raising of the existing road on embankment or the construction or heavy reconstruction of a bridge or major drainage structure. The need to reconstruct the full width of the road or to apply waterproofing or carry out individual beam replacement to a

bridgedeck will not be a cause for provision of paid diversion roads and such works must be executed in half widths whilst maintaining traffic on the other half. Locations where diversion roads are accepted as being necessary are indicated on the drawings.

Where diversion roads are required in respect of bridgeworks or in other cases where provision must be made for water to pass under the diversion, the Contractor shall design the necessary structure and shall provide necessary hydrological calculations to demonstrate that the proposed temporary waterway is adequate. The Engineer's approval of a diversion road notwithstanding, the Contractor shall be entirely responsible for the adequacy of the design and shall accept full responsibility for maintenance of traffic over the diversion at all times.

Before construction of any diversion road, preparatory works shall be executed in accordance with chapters 101, 102, 103 and 104.

The Contractor shall divert traffic onto diversion roads under the provisions of this chapter and shall ensure that diverted traffic is completely separated from the area of the Works. After finishing the works, the diversion road is to be dismantled and the terrain restored to its original state.

The Contractor shall maintain all diversion roads in a satisfactory condition, free from ruts potholes, standing water or any other inconvenience to traffic, complete with all approved signing and lighting, from the time when they are opened to traffic until such time as they are no longer required.

All materials resulting from the clearance of diversion roads shall be removed from the site and disposed of in accordance with the requirements of paragraph 103.05 unless the Engineer gives permission for their reuse in the Works. Materials arising from the clearance of diversion roads shall not be used in any layer of new pavement other than as subbase or improved subgrade and then only with the approval of the Engineer.

105.10. Illumination of Signs.

All key signs, as indicated by the Engineer, shall be illuminated at night..

105.11. Barriers, cones, temporary signs.

The Contractor shall locate, operate, maintain and dismantle after finishing the works, or at Engineer's order, all the barriers, cones, markings, signs, lights and suchlike concerning traffic control and diversion. During the progress of the Works, the Contractor shall change the position of these control items as required. Barriers shall have amber warning lights if instructed and such shall be located correctly so as to be clearly visible.

105.12. Operation of Temporary Installations

The operation of the temporary installation, executed according to the Contract, will include the maintenance of the reflective surfaces of signs, cones and barriers.

105.13. Acceptance

The works shall be accepted in accordance with the Technical Specifications including Chapetr 001. The execution of the temporary roads and traffic directing installations will be accepted only when the work is done according to the drawings and to the specifications and has been approved by the Engineer.

Measurements

Measurement of the works required for the provision of authorised diversion roads will be made in linear metres of diversion authorised to be constructed.

No separate payment will be made for temporary traffic signs, barriers or any other measures for traffic required for the temporary roads or for traffic diversions or for one-way traffic systems required for the Works. All such traffic management provisions are deemed to be included in the payment described in Chapter 007 or in the payment for diversion roads described below.

Payment

The provision of approved, authorised diversion roads for the execution of road or bridge works will be paid by the linear metre of diversion road provided at the rate or price per metre in the Bill of Quantities. Payment will be made only for those locations and lengths of diversion road that are specifically indicated in the Drawings. Any other diversion road which the Contractor decides to construct shall be entirely at his own cost.

	Item	**Unit of measure**
10501	Provide Diversion Road	linear metre

Payment for diversion roads will be in three parts:

40% of the amount will be paid upon completion of the diversion road

40% of the amount will be paid in equal monthly instalments over the anticipated period in which the diversion will be in use. This period will be informed to the Engineer by the Contractor. If it becomes apparent to the Engineer that the period of use will be longer than informed he shall reduce the payments accordingly such that payment is equally distributed over the extended period. Payment shall be reduced by the Engineer for any month in which the Contractor fails to maintain the diversion in accordance with the requirements of the Specification and the total amount payable in respect of the diversion shall be reduced accordingly. Any such deductions shall not be later recoverable.

20% of the amount will be paid when the diversion has been removed and the terrain returned to its original condition.

2. EARTHWORKS

CHAPTER 201. THE EXECUTION OF EARTHWORKS

201.01. Introduction

This chapter deals with the excavation, provision and placing of materials for the earthworks. It includes the excavation, transportation, storing, movement, laying, levelling, compacting and the complete finishing of the earthworks.

Description

201.02. Earthworks.

Earthworks consist of the following

a) **Excavation** along the length of the road to the full construction profile, excluding the removal of the topsoil which is stored and reused and which is described in chapter 102 and 203. Excavation includes the excavation, forming and enlargement of roadside drains.

b) **The operation of borrow pits.** If the volume of suitable material arising from the works of excavation is insufficient to meet the requirements for construction of embankments, additional material shall be provided from borrow pits.

c) **Storage of suitable material.** Under some circumstances during the rectification of slip areas it will be impossible for the Contractor to reuse material immediately in the embankment. In these cases material shall be stored and reused at a later date.

d) **Embankment construction.** The embankments will be executed according to SNiP2.05.02-85, SNiP 3.02.01-87, SNiP 3.06.03-85

The material

201.03. Material

The material must comply with SNiP 2.05.02-85.

The materials for the embankment construction. The classification of the soil which is used for the execution of the embankments is the following:

1 Free-draining material

2 Sand

3 Clay

Select fill for shoulders shall have a Plasticity Index not greater than 8 and a soaked CBR value not less than 15%.

Execution

201.04. Preparatory work.

Prior to commencing earthworks all required survey and setting out must be completed and the cleaning of the vegetation and other materials and the removal of topsoil from the

surface must have been done in compliance with chapters 102 and 103.

201.05. The storage of topsoil.

Topsoil must be stored in locations separated from the earthworks and apart from any other type of soil or materials.

201.06. Construction works

The construction will be executed according to SNiP 3.06.03-85 - requirements.

General directions:

a) It is forbidden to damage the ground, or the topsoil, the crops, the buildings and installations outside the precise area delineated for the execution of earthworks. Haul roads, where required, must be set out beforehand and approved by the Engineer. Haul road provision will be entirely at the cost of the Contractor who must abide by all local regulations and requirements as well as all the requirements of this specification.

201.07. The operation of borrow pits.

Where the Contractor finds it necessary to import material for earthworks onto the site from borrow pits he shall be entirely responsible for the location and operation of such pits and for obtaining all necessary permits and authorisations as well as for all acquisition of pit areas and meeting all claims for compensation resulting from the operation of such pits. The operation of borrow pits shall comply in all respects with all requirements of this specification.

Borrow pits will be executed in a neat and regular manner so as measurements can be made when the work is finished.

The borrow pits will be restored according to the national norms and standards and in accordance with the requirements of this Specification.

201.08. The storage of material

Where the Contractor finds it necessary to store material arising from the excavations contingent upon slip remedial works he shall be entirely responsible for the location and operation of suitable storage areas and for obtaining all necessary permits and authorisations as well as for all acquisition of storage areas and meeting all claims for compensation resulting from the operation of such areas. The operation of storage areas shall comply in all respects with all requirements of this specification. The areas used for storage will be restored according to the national norms and standards and in accordance with the requirements of this Specification as set out in relation to Borrow and Spoil areas.

201.09. Embankment Seat

The preparation of the ground beneath the embankment. The preparing of the ground below the embankments will be executed as follows:

a) **Embankments on slopes less than 3:1.** The cleared area will be scarified or loosened to a 15cm depth with a plough or a scarifier. The surface of the soil will be compacted to the requirements of chapter 201.

b) **Embankment on an existing slope steeper than 3:1.**Cut horizontal

benches in the existing slope to a sufficient width to accomodate placing and compacting operations and necessary equipment. Bench the slope as the embankment is placed and compacted in layers. Begin each bench at the intersection of the original ground and the vertical cut of the previous bench. Benches need be no deeper than two lifts of fill material; they may be cut as the work of filling proceeds and the material arising from benches may be blended in with the fill material as work progresses. No measurement or payment will be made for the work of benching which shall be considered as an ancillary work to the construction of embankments.

201.10. Construction of Embankments.

The embankments will be executed according to SNiP 3.06.03-85, SNiP 2.05.02-85, requirements.

The material for construction of embankment shall be obtained to the maximum extent possible from the general works of excavation on the site of the Works. Shortages of material shall be made up by excavation in borrow areas.

In constructing embankments, soil shall be placed and compacted in layers of optimum thicknesses determined below, but not exceeding 200mm in thickness. Compaction shall be as required in paragraph 201.10 below.

201.11. Compaction.

Compaction will be executed using heavy rollers. Rubber tyred rollers shall be operated at a speed of less than 6 km/h and vibratory rollers with speed of less than 2.5km/h.

a) Backfill made of clayey soil.

The moisture of the compacted backfill must not vary from the optimum moisture content by more than 2%. The optimum moisture content for compaction (OMC) and density shall be determined by testing according to SM GOST 22733-77 and approved by the Engineer. Following approval moisture content of material for compaction shall not deviate from the approved value by more than +/- 2%. In the event that soil conditions/type render the approved OMC invalid a revised OMC shall be determined by fresh tests and approved .

The particle size distribution is determined according to SM GOST 12536-79. Having the Engineer’s approval the rate of compaction is determined according to SM GOST 5180-84 using Kovaliov’s equipment.

To determine the optimum compaction thickness of the soil course and to establish the number of passes of the roller it is necessary that compaction samples of the soil be made before starting to work at earthworks.

201.12. Cutting and Finishing of Slopes.

The cutting, the levelling and the finishing of the slopes will be executed according to SNiP 3.06.03-85, SNiP 2.05.02-85 stipulations.

201.13. Formation of Subgrades

Where pavement is to be placed on the completed earthworks the upper surface of the

earthworks shall be finished as subgrade.

Subgrade layers shall occupy the upper 200mm of the earthworks construction and shall be of material with a minimum soaked CBR of 10%, compacted at OMC to 100% of their maximum dry density. Subgrade surfaces shall be true to line and level to a tolerance of 0 / -100mm. Where the surface is within this tolerance but lower than the design level the Contractor may either raise the level by scarifying, adding extra material and recompacting or may make good the defect by the use of extra material in the next course at his own cost. If the surface is out of tolerance it shall be made good by either grading material off or by scarifying and adding material as appropriate; recompaction shall be carried out in either case.

201.14. Construction and Shaping of Shoulders

Where shoulders are to be constructed or reconstructed they shall be formed using select fill from the underlying drainage layer upwards. Select fill for shoulders shall have a Plasticity Index not greater than 8 and a soaked CBR value not less than 15%.

Existing shoulders shall be reshaped and regraded to conform to the required cross sections. Excess material shall be removed from the site and run to spoil and additional, approved, material provided as necessary.

201.15. Excavation of Benches

Where the construction of benches having a vertical height greater than 75 cms and is specifically called for in the drawings or instructed by the Engineer, the excavation of such benches shall be measured and included in the volume of general excavation and the required volume for filling these benches shall be included in the measured volume of embankment construction.

No measurement shall be made of the volume of benches required to be cut in the normal course of embankment construction as described in 201.09 above and such work shall be considered ancillary to the general work of excavation and forming embankment.

201.16. Acceptance of work.

The works shall be accepted in accordance with the Technical Specifications including Chapetr 001., and with the condition of carrying them out according SNiP 2.05.02-85, SNiP 3.06.03-85, project stipulations and to Engineer's directions and approval.

Measurements

The measurements will be done as follows:

a) **Embankment Construction using material from General Excavation or from Borrow:** measurement will be in cubic metres in final position to the lines and levels shown on the drawings measured to the nominal ground level after removal of any topsoil to the depth instructed less any volume to be paid as embankment using material from store. The item includes the preparation of the ground below new embankment. The Contractor will make any necessary adjustments to levels to allow for settlement of the embankment or of the foundation on which the embankment is placed. Fill to any areas where unsuitable material has been removed to the instructions of the Engineer will be measured under this item.

b) **Excavation**: Excavation to existing shoulders, embankments or cutting slopes will be measured in cubic metres. The item will include for the excavation of any materials found with the exception of rock. Suitable material from the

excavation, approved by the Engineer for such use, shall be incorporated in embankments, or if of suitable quality used as select fill to shoulders, and all other material, unsuitable or surplus, shall be taken off-site and disposed of in spoil areas in accordance with the Specification. (The removal of paved areas and foundations to paved areas is covered in Chapter 310). The item includes for the loading and transport of material from areas of cut to the site of embankment, to shoulders or to spoil. Excavation of benches is included under general excavation but will only be measured and paid for when the benches are greater than 75 cms. in vertical height and are specifically called for in the drawings or are instructed by the Engineer.

c) Borrow Materials: Materials obtained from borrow pits will be measured in cubic metres as the volume of material calculated as being required for incorporation into the Works. The item includes for incidental work as detailed in Chapter 201.07. The volume of material eligible for payment as Borrow shall be the volume required to make good the required volume of Embankment construction after deducting the volume of material available from Excavation and from all other excavation works where excavated material is approved by the Engineer for use in Embankments. The item includes for the loading and transport of material from borrow pits to the site of embankment.

d) Shoulders: Select fill for shoulders shall be measured in cubic metres of material required to conform to the standard cross sections. The rate shall include for sourcing the material, loading, transporting, unloading, placing shaping and compacting. The regrading of shoulders shall be measured in square metres of shoulder regraded and the price shall include for the costs of running surplus material to spoil and for the supply of additional surface material where required to make up to level.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of Measure**
20101	Regrade Shoulders	square metre
20102	Embankment construction using materials supplied from Common Excavation or Borrow	cubic metre
20103	Select Fill to Shoulders	cubic metre
20104	Excavation in all materials including slipped soil and benches with material transported to embankment or to spoil.	cubic metre
20105	Excavate materials in Borrow pit and transport to site of embankment	cubic metre

20106	Shape and compact subgrade	square metre

Payment for the formation of embankment will be made in full when the embankment has been placed, compacted to Specification and trimmed to shape.

Payment for excavation will be made in full for excavated materials to be placed in Embankment when the compacted embankment is approved by the Engineer.

For excavated materials directed to be run to spoil, either as unsuitable material or as surplus to requirements, or to be otherwise disposed of, payment will be in two parts: one half of the payment due will be made when the material is removed from site and the other half of the payment due will be made when the spoil areas or other disposal sites have been completely made good in accordance with the requirements of this Specification.

Payment for excavation in Borrow areas will be in two parts: one half of the payment due will be made when the borrowed material is placed in Embankment and the other half of the payment due will be made when the borrow areas or pits have been completely made good in accordance with the requirements of this Specification

CHAPTER 202. THE EXECUTION OF DITCHES

Description

202.01. Introduction

The given class of work includes the execution of all ditches and channels other than roadside drains already included in the item for general excavation.

Working conditions

202.02. Preparatory work.

The ground will be cleared before the commencement of works according to chapter 102.

202.03. General.

The ditches will be executed according to the Project design and, if necessary, any detail design required on site and the additional instructions of the Engineer, specifying the ditch dimensions, the bottom grade and the horizontal location.

The ditches and the channels will be cleaned periodically and kept in such conditions that water flow in the ditches is wholly unobstructed.

Where directed by the Engineer or called for in the drawings the material arising from ditch excavation shall be placed on the downhill side of the ditch as a bund to increase capacity and provide additional protection to downhill areas. Such bunds shall be constructed with a constant level difference between crest of bund and invert of ditch. Material will be transported along the line of the ditch as necessary to meet this requirement. Bunds shall be compacted to 95% of the theoretical maximum requirement determined by SM GOST 22733-77.

At the end of the execution and before the issue of the Taking-over certificate, all ditches and channels will be completely cleaned of tree branches, debris, silt and any other obstructions of whatsoever nature.

Materials arising from the excavation of ditches shall be used in the construction of Embankment unless utilised in bunds or unsuitable or surplus to requirements.

202.04. Works acceptance.

The works shall be accepted in accordance with the Technical Specifications including Chapetr 001.

Measurements

The work for execution of the ditches and channels will be measured in cubic metres of material required to be excavated.

Payment

The measured volume, as above indicated, will be paid at the contract price per unit of measurement indicated as follows:

Item to be paid	**Measure unit**

20201	Excavation of Channels and drains outside the road cross section	cubic metre

Payment for the excavation of ditches shall include for the transportation of material to embankment sites or to approved spoil areas and for the incorporation of the material into the embankment or for the making good of spoil areas as appropriate and for the construction of bunds as described above. Payment shall be made in full for excavated materials placed in Embankment or in bunds when the compacted embankment is approved by the Engineer. For excavated materials directed to be run to spoil or to be otherwise disposed of, payment will be in two parts: one half of the payment due will be made when the material is removed from site and the ditch properly shaped and accepted and the other half of the payment due will be made when the spoil areas or other disposal sites have been completely made good in accordance with the requirements of this Specification.

CHAPTER 203. STRUCTURAL EXCAVATION AND BACKFILL

Description

203.01. Introduction

The Chapter deals with excavations for all kinds of structures.

The works include: the excavation for foundation pits and foundation works and their backfilling using appropriate soil taken from the original excavation or borrow pit and the transportation of the surplus soil to the site of Embankment or to spoil.

Materials

203.02.. Materials for Backfill

The soil used for backfilling works will not incorporate vegetation, roots, pieces of wood, big stones, clay or soil susceptible to moisture movements.

Executing Conditions.

203.03. Preparation

Preparing works for the excavation in foundation pits.

The ground will be without vegetation and remaining materials in accordance to Chapters 101, 102, 103 and SNiP 3.02.01-87.

203.04. Generalities.

The excavation works for trenches, or foundation pits shall be carried out to the level indicated in the drawings. This excavation shall include for any bedding required for the structure.

The Contractor is responsible for the design, supply, mounting and movement of any revetment or supporting structure required. Such revetment or support shall be supplied whenever the depth of excavation exceeds 1.5 metres or whenever the Contractor considers it necessary at any lesser depth. Without in any way relieving the Contractor of his responsibility for the provision of temporary works and for the safety of his workers the Engineer may, if he considers circumstances warrant, direct the Contractor to modify his working methods to provide greater protection for his workers and the Contractor shall thereupon provide such greater protection at his own cost.

The Contractor is responsible for, and must provide, such temporary works, including items such as temporary bridges for pedestrians and vehicles, as may be necessary to permit the general public free and unobstructed use of the roads throughout the execution of the works wherever the works intersect with any public facility

All excavation will be provided with barriers, lighting, water pumping and drainage as needed for the work security.

Soil compaction.

When backfilling with soil, material will be compacted at +/- 2% of the optimum moisture content determined according to SM GOST 22733-77.

Backfill materials will be compacted for each course, until the homogenous density will be no less than 95% out of the maximum density, according to SM GOST 22733-77.

Any excavation and filling of the foundation pits will be approved by the Engineer.

203.05. Preparation of Foundation works.

The excavation will be carried down to the level indicated in the drawings and technical specifications without disturbing the underlying materials.

Any topsoil, roots, stumps, big stones, or soil liable to deterioration or plastic soil below the required excavation level will be taken out and replaced with approved material compacted to 95% of SM GOST 22733-77.

203.06. Bedding.

Where shown on the drawings or directed by the Engineer bedding material shall be placed beneath the structures. Depth of excavation shall take into account the required thickness of any bedding. Bedding shall be a granular, free draining material conforming to SNiP 2.05.02-85.

a) Structures other than culverts.

Place, shape, and compact bedding material in layers not exceeding 20 cm in depth.

b) Culverts.

Bed culverts on a prepared foundation. Bed culverts in a 10 cm thick layer of bedding material below the bottom of the culvert. Before placing the culvert, shape and compact the bed to fit at least 10% of the height of the culvert. Beds are according to SNiP 2.05.03-84* and typical Album 3.501.1-144. Where applicable, recess the shaped bedding to receive the joints according to SNiP 2.05.03-84*.

203.07. Backfill General.

All backfill shall conform to and typical Album 3.501.1-144. The largest stone shall not exceed 75 mm in its longest dimension.

a) General.

Place backfill in horizontal layers not exceeding 20 cm in depth. Compact each layer according to Subsection 203.08.

Bring backfill up evenly on all sides of the structure, and extend each layer to the limits of the excavation or to natural ground.

b) Culvert.

Place and compact backfill material under the exposed portion of the haunch. The Contractor shall take all necessary steps as directed by the Engineer to prevent frost susceptibility of soils around and under culverts. Extend each layer to the sides of the excavation, the natural groundline, or 3,5 metres beyond the edge of the structure, whichever is less. Repeat the layering process to a minimum of 30cm above the pipe top.

Material for ditch backfill to be suitable soil taken from cuts or borrow areas. Materials are to be placed in layers of not more than 20cm thick layers and shall be compacted in accordance with subsection 201.10

203.08. Compaction.

Compaction shall be obtained through the use of mechanical equipment such as rubber tired rollers, vibrating rollers (steel wheeled), sheepsfoot rollers, hand operated plate vibratory machines, and mechanical or hand tamping in very restricted areas.

Compaction Requirements are as follows:

1.Under structures	95% of maximum density (according to SNiP2.05.02-85)
2.Structures and trenches in roadway or beside roadway	93% of maximum density
3.Structures and trenches in right of way but not part of travelled way	90% of maximum density
4.Trenches off right of way. As required by owners but	Not less than 90% of maximum density

Only materials meeting the backfill requirements standard shall be used.

203.09. Acceptance.

The works shall be accepted in accordance with the Technical Specifications including Chapetr 001.

Measurement and Payment.

Structural excavation, bedding, foundation fill, backfill and temporary support of excavation will not be measured for payment. Payment shall be deemed to be included in other items for structures.

CHAPTER 204. SHAPING AND PLANTING OF SLOPES AND EXCAVATED SURFACES

Description

204.01. Introduction

The chapter deals with the finishing of earthworks comprising the spreading and shaping of topsoil, seeding and other forms of vegetating and watering as necessary throughout the period of germination and first growth until a viable, self sustaining, vegetative layer has been established..

Materials

204.02. Materials

Depending on the method adopted, materials shall conform to the requirements of:

Hydroseeding	ENIR E2-1-45
Seeding	ENIR E18-24
Bushes	Bushes and shrubs shall be selected from locally available stock ad approved by the Engineer. Approved bushes shall have a height, when fully grown, of from 1.5 to 3 metres and shall be of species which exhibit a strong and extensive root system with dense foliage.

Conditions for execution

204.03. Seeding Season.

Seeding will be carried out at the start of the growing season. Seeding shall not be carried out during strong winds, in very wet soil, in frozen soil, or under other unsuitable conditions.

204.04. Ground preparation for seeding.

The selected ground will be graded to final shape and lightly scarified, topsoil spread to a depth of not less than 150mm and vegetation, stones bigger than 50mm, etc. will be taken out. The topsoil will be lightly compacted and then scarified to a depth of 100mm. Planting and seeding will take place immediately after scarification.

Bushes shall be planted by excavating a hole not less than 50 cm. diameter by 50 cm. deep. The bush shall be securely rooted in the prepared hole using a growing medium of black soil, peat moss and sand approved by the Engineer. The hole shall be filled to within 5 cms. of the original ground level leaving a depression around the plant which will hold water during watering. If bush vegetating is carried out using cuttings rather than young bushes, they shall be planted in “nests” of 5-6 cuttings of a length of 0.5 to 0.8 m. planted at a depth of 0.45 to 0.6 m. using a prepared hole as above.

204.05. Watering

The planted area will be lightly watered 10 days after seeding, or earlier if required in exceptionally dry weather. Watering procedures and equipment shall be so designed that adequate water is provided for germination and growth at all times and that no erosion of

the topsoil takes place. Watering shall preferably be carried out in the late afternoon or evening.

204.06. Fertilization.

According to ENIR E2-1-45 or ENIR E18-24.

204.07. Seeding and Planting

The seeds shall be spread in accordance to ENIR E2-1-45 or ENIR E18-24.

Bushes of approved, selected species will be planted on all embankment and cutting slopes at the rate of approximately one young bush or one “nest” of cuttings per 5 sq.m. Bushes or nests will be planted in irregular patterns with a bias towards contour planting.

204.08. Preparation of Seeds

Preparation of the seeds will be done in accordance to ENIR E2-1-45 and/or ENIR E18-24.

204.09. Protection and maintenance of the plants.

Protection and maintenance for growing plants will be provided on the seeding sectors, including watering as needed until the works acceptance.

In any areas where seeding has failed the Contractor will repeat the seeding exercise with the use of additional fertiliser, lime or ammonium nitrate as necessary and using supplementary or alternative seeds as appropriate.

Three months after bushes have been planted an inspection will be made and any bushes which are not growing properly shall be removed, the planting location reprepared and fertilised and a new specimen planted.

204.10. Works acceptance.

The works shall be accepted in accordance with the Technical Specifications including Chapetr 001. The works will be paid 50% on completion of the seeding exercise and 50% when the Engineer is satisfied that a complete, vigorous and viable growth of grass and bushes has been satisfactorily established over the whole area under consideration which shall not be less than 2000 sq.m.

Measurements

Water to establish and maintain germination will not be measured but will be included in the seeding cost per square metre.

The works measured as indicated above and confirmed by the Engineer will be paid according to the Unit Price of the Contract indicated in the tender. The payment is made for the completed works indicated into the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
20401	Placing of topsoil in nominal 150mm layer	cubic metre

20402	Planting with approved grasses and bushes	square metre
20403	Trimming and shaping of slopes	square metre

CHAPTER 205. PLANTING OF TREES

Description

205.01. Introduction

The chapter deals with the planting of trees, both at the roadside and on embankment slopes or other areas as directed.

Materials

205.02. Materials

Materials shall be deciduous trees and large shrubs conforming to the which experience has shown will be suitable for the locations in which they are to be planted. Poplar and Willow trees are likely candidates for this purpose.

Conditions for execution

205.03. Planting Season.

Planting will be carried out at the start of the growing season. Seeding shall not be carried out during strong winds, in very wet soil, in frozen soil, or under other unsuitable conditions.

205.04. Planting.

Trees shall be planted out in pits suitable for the seedlings dimensions and species. Pits shall be dug by excavators or by earth augur machines; in cases where the sites are inaccessible to equipment, pits shall be dug by hand. Edges of machine pits will normally require hand trimming.

Each pit shall be partially filled with fertile soil with added compost, humus and fertiliser as required and appropriate for the species being planted. For plants with bare or spreading roots the initially charge of soil shall be formed into a hillock at about half the hole depth and for plants with root balls into a pillow. Pits shall then be filled in layers with further fertile soil, each layer being carefully and firmly compacted. Before planting the tree roots shall be trimmed and the crown pruned as appropriate for the species. Trees shall be planted at spots indicated by the Engineer or, for general tree cover at about 8 m. spacing or such other spacing as may be suitable for the species.

205.05. Watering

Immediately after planting, the tree shall thoroughly watered with about 25 litres of water soaked into the planting soil. Thereafter the newly planted trees shall be carefully monitored for signs of wilting or drying out and additional watering carried out as necessary depending on the climatic conditions and the condition of the plants. Watering shall preferably be carried out in the late afternoon or evening.

205.06. Fertilization.

According to ENIR E2-1-45 or ENIR E18-24.

205.07. Protection and maintenance of the plants.

Protection and maintenance for growing plants will be provided throughout the planted sectors, including watering as needed until the works acceptance.

Three months after trees have been planted an inspection will be made and any trees which are not growing properly shall be removed, the planting location reprepared and fertilised and a new specimen planted.

205.8. Works acceptance.

The works shall be accepted in accordance with the Technical Specifications including Chapetr 001. The works will be paid 50% on completion of the planting exercise and 50% when the Engineer is satisfied that a complete, vigorous and viable tree growth has been satisfactorily established. Payment will be per tree finally accepted. Payments on completion of planting will be deducted in the event that no tree is finally established.

Measurements

Water to establish and maintain germination will not be measured but will be included in the planting cost per tree.

The works measured as indicated above and confirmed by the Engineer will be paid according to the Unit Price of the Contract indicated in the tender. The payment is made for the completed works indicated into the present chapter.

The payment will be made under the following item.

	Item	**Unit of measure**
20501	Planting of trees	number

3. PAVEMENT

CHAPTER 301. NOT USED

CHAPTER 302. NOT USED

CHAPTER 303. PAVEMENT PATCHING

Description

303.01. Introduction

The chapter deals with the repair of potholes and other areas of damaged pavement using asphalt mixture

Materials

303.02. Materials

The materials to used will be in accordance to the following specifications:

Bitumen Tack Coat	Chapter 307
Asphalt concrete	Chapter 308 and SM STB 1033:2008

Executing condition

303.03. Equipment

The following equipment is likely to be required:

a) **Electric or gasoline saw** able to cut up to 10 cm pavement depth in one operation.

b) **Air compressor.** Complete with tools for pavement cutting and movement of debris

c) **Compacting equipment.** Vibrator plate or other suitable equipment for small areas. Steel wheel or pneumatic tyred roller for substantial patches.

d) **Bitumen heater** Equipment capable of safely heating bitumen tack coat in a controlled manner and applying by pressure spray will be provided according to the article 304.03(c)

303.04. The cutting and removal of degraded materials

Areas of potholes and otherwise degraded or damaged surface material shall be marked out either by the Engineer or by the Contractor for the Engineer's approval.

Marked areas shall be well defined rectangles with sides parallel and perpendicular to the axis of the road.

The edges of marked areas shall be cut to such a depth as is required for removal of damaged material or to match the depth of potholes and the entire material within the marked boundary of the patch shall be removed to the full depth. The sides of the cut out area shall be clean vertical faces and the base of the cut area shall be reasonably flat and level such as to require a uniform thickness layer of asphalt to make good.

Material removed shall be taken off the site and disposed of in accordance with the requirements of this Specification.

303.05. Tack-coating of the surface

Before patching the surface of the patch area will be tack-coated according to Chapter 307. Tack coating shall be applied carefully to the base area of the patch and to the vertical sides. Care shall be taken not to spray excess tack coat material outside the boundaries of the patch area.

303.06. Pothole patching

The patch area shall be made good with hot asphalt mix compacted in layers or courses not exceeding 50 mm after compaction. The compaction shall be carefully made. The degree of compaction shall be in accordance with the requirements of Chapter 311.

The asphalt mixture used shall conform to and be compatible with the adjacent pavement structure.

The thickness of the last course shall be a minimum 25 mm. The level after compaction will be no more than 5 mm higher than the existing surface.

303.07. Acceptance

The works will be accepted according to the Technical Specification including Chapter 001.

Measurements

The work volume of work will be measured in tonnes of asphalt placed. The Contractor will be required to maintain careful records of the tonnage of asphalt used and to have those records confirmed and signed by the Engineer's representative on the site on a daily basis. No payment will be made without satisfactory signed records and no payment will be made for asphalt material spoiled or wasted for whatever reason.

Payment

Payment shall be made for the accepted tonnage of asphalt placed in patches at the rate quoted in the Contract for the works under the appropriate Bill item which will include all works required for the successful completion of patches including, but not limited to, preparatory works, cutting out, tackcoating, supply and compaction of asphalt.

	Item	**Unit of measure**
30301	Pothole patching with asphalt	tonne

CHAPTER 304. MAKING GOOD CRACKS AND JOINTS IN THE EXISTING PAVEMENT

Description

304.01. Introduction

These works include the repair of coarse cracks and joints of the existing bituminous pavements and the provision of stress absorbing membrane (SAMI) to finely cracked areas before placing new asphalt layers. These works will be required wherever new asphalt is to be placed over existing cracked asphalt layers unless otherwise directed by the Engineer.

Materials

304.02. Materials

The materials will be in accordance to the following standards:

Bitumen	SM GOST 22245-90*
Grouting materials (Bituminous mastic)	Shall be based upon the provisions of Table 5.3 VSN 24-88 for Bitumen 60/90 climate zone III,IV. The bitumen and mineral filler contents shall be varied in laboratory tests to yield a material having an E value (Young's Modulus) in the range 1500-3000 MPa. The mix having been determined and approved by the Engineer shall not thereafter be changed without the approval of the Engineer.
Bituminous emulsion	SNiP 3.06.03-85
Geotextile for SAMI	Shall comply with the requirements of Section 602 of this Specification

Execution

304.03. Equipment.

a) Compressed Air

Equipment used for the blowing out of cracks and joints, before sealing with bituminous mastic. Minimum requirement for one set of cleaning equipment: 500 cfm compressor delivering air heated to range 140 – 170 deg C at the road surface through blast nozzle. Equipment to be demonstrated and approved by Engineer before use.

b) Equipment used to inject the asphalt mastic.

A crack sealant applicator attached to a heated hose that is attached to an indirectly heated sealant chamber is required. The sealant chamber may require pressurisation to assist mastic injection. The mastic heater is to be equipped with a thermo-control system to keep the mastic temperature within the limits indicated by the supplier or directed by the Engineer. Application temperatures are likely to be in the region of 150 deg.C.

c) Bitumen Heater/Distributor

An approved bitumen heater using indirect heating, comprising heater unit supplying oil filled heating coils or other approved system. Automatic temperature control of bitumen at any point in the range 100 – 200 deg C. Clearly visible thermometer for checking bitumen temperature, operating range 100 -250°C and graduations of 5°C. Pump supplying hand sprayer for detail work and adjustable spray bar for bulk work. Fully adjustable delivery rates.

304.04. Cleaning and sealing of major cracks.

Before commencing pavement works, the Engineer and Contractor shall jointly inspect and record the location of existing defects in the surface of any parts of the pavement to be overlaid. This record should be sufficiently accurate to allow SAMI layers, if required, to be correctly placed on subsequent overlay layers.

The Engineer will indicate those cracks which are to be cleaned and sealed. In principle all cracks with a visible width of 4mm or greater shall be cleaned and sealed

The surface in the area of the cracks to be treated shall first be thoroughly cleaned by air blast and brushing.

Cleaning and sealing shall be done using a hot air blast and Bituminous Mastic infill. The hot air blast nozzle shall be kept moving at all times to avoid burning of the existing asphalt. Cracks shall be opened out to a depth of at least 80mm or such other depth as may be directed. Greater depths will only normally be directed if there is visible crack penetration greater than 80mm after the initial cleaning. The bituminous mastic, at the temperature indicated by the supplier or directed by the Engineer, will be injected as soon as possible after hot air blast cleaning and in no circumstances more than 5 minutes later than the hot air was used. Mastic must be injected whilst the cleaned asphalt crack is still hot from the cleaning process.

If the Contractor desires, a preliminary cleaning and routing of cracks may be carried out using high pressure water jetting. Cracks cleaned in this manner shall be left until they are free of water and the area surface dry and shall then be subject to secondary cleaning and drying using heated compressed air as above. It is important that cracks be both hot and dry when mastic is injected.

Bituminous mastic will be injected working along the crack to the full depth cleaned and in such a manner that the finished surface of the injected mastic is clearly above the existing surface level. Immediately after injection, the mastic will be screeded and smoothed to the same level as the existing pavement. Excess mastic shall be spread on the surface of the adjacent asphalt to form a band of sealed material along the line of the crack about 100mm in width.

304.05. Defective cracks and joints.

Clean and reseal any sealed cracks which exhibit signs of renewed cracking.

304.06. Works acceptance.

The works will be accepted on completion, subject to compliance with the Specifications in respect of materials and workmanship.

304.07. Application of SAMI layer.

SAMI layer shall comprise an intermediate layer between the new overlay and the old asphalt consisting of a layer of geotextile complying with Type 3 requirements of chapter 602 of this Specification laid into a heavy bituminous tack coat.

The SAMI layer shall be applied immediately before the first layer of asphalt overlay is put down. No traffic shall be allowed on the surface of the SAMI layer other than essential construction traffic.

The paver to be used for spreading overlay over areas with SAMI layer shall be a track type paver, not a wheeled paver.

Prior to the application of a SAMI layer, the area(s) to which the layer is to be applied shall be indicated by the Engineer.

The surface on which the paving fabric is to be placed shall be free of dirt, water, vegetation and other foreign materials. Any crack sealing procedure for cracks in excess of 4mm (as described above) within the area of the SAMI layer shall have been completed before application of SAMI Layer. The use of a levelling course may be required prior to placing the paving fabric in severe cases.

The bitumen distributor must be suitably metered and capable of spraying the bitumen uniformly and at the prescribed application rate. No drilling or skipping shall be permitted.

The fabric handling equipment shall comprise a tractor or similar mechanical device, with mounted lay-down equipment that is capable of handling full rolls of fabric. The equipment shall be capable of laying the paving fabric smoothly without excessive wrinkles and/or folds.

Stiff bristle brooms used to smooth, and scissors (or blades) used to cut the paving fabric shall be provided by the Installer. A pneumatic-tired roller may be needed in some cases to smooth paving fabric into the asphalt cement.

The asphalt cement and binder must be uniformly spray-applied at the specified rate. The quantity required may vary with the surface condition of the existing pavement (i.e. degree of porosity), but shall be applied at a nominal rate of 1.2 l/m² of residual bitumen. Application of asphalt cement will be performed by truck-mounted distribution equipment whenever possible, with hand spraying kept to a minimum. The temperature of the bitumen must be sufficiently high to permit a uniform spray pattern. The minimum recommended temperature for asphalt cement is 140ºC, and should not exceed 160ºC at the contact surface.

The paving fabric shall be placed onto the asphalt cement with a minimum of wrinkles before the asphalt can cool or lose its tackiness. The paving fabric shall be placed so that the non-heat treated (bearded or fuzzy) side is placed downward, into the sealant, thus providing optimum bond between fabric and pavement during the construction process. As directed by the Engineer, wrinkles severe enough to cause “folds” shall be slit and laid flat in the direction of paving operations. Brooming the paving fabric will assist it in making intimate contact with the pavement surface. Any overlap of the paving fabric should be minimized, although an overlap of 3 to 10 cm is recommended to insure full closure of overlapping layers. Transverse joints should be shingled (overlapped) in the direction of paving operations to prevent edge pick-up by the paver. In the event that asphalt cement should bleed through the paving fabric before the hot mix asphalt is placed, it may be necessary to absorb any visible sealant by spreading sand or hot mix asphalt over those areas. This should minimize the tendency for construction equipment tires to lift the paving fabric when driving over it. Turning of paving equipment and other vehicles on the paving fabric must be kept to a minimum to avoid movement or damage to the fabric.

Laying of the overlay shall take place not more than 4 hours after the SAMI layer is put down.

304.08. Defective application.

In the event that any area of SAMI layer is found to be defective, by failure to adhere, or because of excess of bitumen, or for any other reason, that area shall be condemned and the Contractor shall remove it and replace with a satisfactory SAMI application at his own cost. Removal shall be by careful heating and scraping to remove the defective layer and thoroughly expose the old asphalt surface. As far as possible all traces of the fresh bitumen application shall be removed before recommencing the SAMI application.

304.09. Works acceptance.

The works will be accepted according to the Technical Specification including Chapter 001.

Measurement

The sealing of Cracks >4mm is measured in linear metres.

The application of SAMI layer is measured in square metres of surface directed to be covered and actually covered..

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under the items below:

	Item	**Unit of measure**
30401	Cleaning and sealing of cracks >4mm	linear metre
30402	Provide Sami Layer to cracked areas of existing asphalt pavement	square metre.

CHAPTER 305. REGULATING COURSES AND MILLING

Description

305.01. Introduction

This type of works includes the execution of the regulating course and the milling of high areas, to correct the original asphalt surface before the new courses are laid.

Materials

305.02. Materials

The materials will be in accordance to the following chapters;

Tack coat	Chapter 307
Hot asphalt mixture	Chapter 308 and SM STB 1033:2008
Bitumen	SM GOST 22245-90* supplemented by the additional requirements of chapter 011.

Execution

305.03. General.

The Contractor shall, in conjunction with the Engineer, carry out a detailed level survey of the existing pavement surface prior to the commencement of regulating course and milling work. Finished road levels will be confirmed after the results of the survey have been analysed.

The survey will be used to determine the extent of milling and regulating course work and any areas needing more than one regulating layer. The aim shall be to strike a balance between low areas to be regulated and high areas to be milled such that the overall cost of regulating/milling shall be minimised. The balance will depend on a final analysis of surface irregularity and on the accepted bid prices for regulating asphalt and for milling. A minimum practical thickness of regulating course shall be determined based on the approved job mix formula and laying and compaction conditions.

Regulating Courses

The mix design, placing, and the equipment used will meet requirements of Subsection 308.03. Smoothness of the levelling layer after compaction should meet Subsection 308.15 requirements. However if the Engineer approves, regulated sections with deviations of more than 5mm (between any two contacts of the 3m metal straightedge and surface) or which fail to comply with the +5mm/-15mm level tolerances can be accepted as satisfactory with no correction being required provided that the thickness of overlay remaining to be applied is considered by the Engineer to be sufficient to allow this correction to be applied in the overlay course(s). The Engineer’s decision on whether to allow such derogation from the specified requirements shall be absolute.

Within the limits of the indicated total overlay thicknesses, every effort shall be made to minimise the total volume of asphalt surfacing materials required and where extensive regulating is needed to restore road shape, particularly in raising low areas and in providing superelevation, finished surface levels shall be adjusted where possible to take advantage of the thickness of regulating to reduce the required thickness of overlay.

Milling

Milling shall be carried out with purpose designed asphalt milling equipment capable of milling a minimum of 2 metres width in a single pass. Milling equipment shall be equipped with automatic line and level control. All trucks containing milled material shall be weighed before leaving the site and weight certificates of a design approved by the Engineer shall be signed by Contrctor and Engineer staff. These weight certificates shall be the basis for payment for milling and without approved certificates no payment will be made.

Milled material shall be disposed of by the Contractor either by recycling as asphalt regulating to the satisfaction of the Engineer or at road maintenance locations to be advised by the Engineer. All requirements of this Specification and of the competent local authorities are to be met.

305.04. Mixing and Spreading

Prior to placing regulating course(s), the existing asphalt surface shall be prepared according to chapters 306 and 307. Measure the aggregate and asphalt into the mixer according to the approved job mix formula, mix until all the particles are completely and uniformly coated with asphalt. Maintain the discharge temperature within the approved range. Spread the mixture on the prepared surface in a uniform layer. Do not place the mixture in a layer exceeding 100mm in compacted thickness. When more than one layer is necessary, shape and compact each layer before the succeeding layer is placed. Approved asphalt paving equipment is to be used for laying levelling layers. Dumping and spreading with a grader will not be allowed. Shape the final layer to line, grade, and cross-section. Tack-coat between layers will be applied according to chapter 307 (if required by the Engineer in accordance with the requirements of chapter 308). Any such interlayer tackcoat shall be at the expense of the Contractor.

Regulating asphalt may make use of milled material in the mix provided that the mixing plant is properly designed to accept milled asphalt material as input and that the resulting mix complies with these Specifications in all respects.

305.05. Compacting.

At least two rollers shall be provided at all times: one self-propelled pneumatic-tired and one steel-wheeled roller. As many additional rollers shall be used by the Contractor as necessary to provide specified asphalt density and surface characteristics in an orderly, efficient and continuous manner.

Immediately after the asphalt mix has been spread the surface shall be checked and any irregularities adjusted

To prevent adhesion of the mix to steel wheeled rollers or to roller tyres, the rolls or wheels shall be kept properly moistened; excess water will not be permitted and rollers must be fitted with purpose built water tanks and distributing systems for proper control of water..

Rolling shall start longitudinally at the sides of the road and shall gradually progress towards the centre. On superelevated sections, rolling shall begin on the low side and progress to the high side. The operating speed shall be approved by the Engineer. The line of rolling shall always be roughly parallel to the axis of the road and shall not be changed suddenly or the direction reversed suddenly.

305.06. Surface Tolerance

The finished surface of the completed regulating course(s) shall comply with the requirements for finished road level determined in Clause 305.03 above, within a tolerance of +5mm/-15mm and subject to any derogations permitted by the Engineer under Clause 305.03 above. Levels shall be checked using a grid stipulated by the Engineer comprising

not less than 6 points per 100 sq.m. and spaced at intervals which ensure that no more than 30% of the grid points coincide with locations used by the Contractor for setting out the initial surface level control.

Use a 3m straight edge to check the final surface after initial rolling and while the material is still hot enough for corrections to be made. Checks shall be made at regular intervals specified by the Engineer, not exceeding 10 metre intervals, and at any location where the Engineer's staff considers that there appears to be excess irregularity. Checks shall be made both parallel to and at right angles to the axis of the road. A defective area is an area with surface deviations under the straightedge in excess of 5mm. Correct all defective areas by loosening the material, adding or removing material, reshaping, and compacting.

305.07. Works acceptance.

The works acceptance for the regulating course shall be in accordance according to the Technical Specification including Chapter 001.

Measurements

Regulating courses made from hot asphaltic mixture or coated materials are measured in tonnes. Milled material removed from high areas shall be measured in tonnes.

All trucks containing regulating material shall be weighed before leaving the asphalt plant and weight certificates of a design and in the number of copies approved by the Engineer shall be signed by Contractor and Engineer staff. These weight certificates shall be collected at the site of laying by the Engineer's staff and shall be the basis for payment for regulating and without approved certificates no payment will be made.

Where the finished regulating material has been found to be higher than the required levels by any amount and the Engineer has permitted such over level regulating to remain in place, the volume and corresponding tonnage, of the over level material shall be calculated and the volume of tolerated over level material shall be deducted from the volume of the succeeding course of overlay work. Where regulating which is below the required level has been permitted to remain by the Engineer, the required additional thickness shall be made good in the succeeding course of overlay work without any additional measurement or payment.

The Engineer will carry check weighings of trucks arriving at the laying site on a random basis and the Contractor shall supply approved portable weigh scales for the use of the Engineer for this purpose and for the initial weighing of trucks containing milled material.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
30701	Tack Coat using cutback bitumen, 0.25 to 0.4 l/sq. m.	square metre
30501	Regulating course of asphalt mixture	tonne
30502	Milling of existing asphalt pavement	tonne

CHAPTER 306. WIDENING AND RECONSTRUCTION OF THE EXISTING CARRIAGEWAY AND PROVISION OF NEW PAVEMENT

Description

306.01. Introduction

This type of work consists of the construction of new full depth pavement. It applies where existing pavement is to be reconstructed and where completely new pavement is to be constructed. New construction may take the form of climbing lanes, of widening of the existing pavement or of wholly new pavement made necessary by a significant change in horizontal or vertical alignment.

Materials

306.02. Materials

The materials used for the construction or reconstruction of pavemnts have to meet the following requirements:

Asphalt mixture	Chapter 308 and SM STB 1033:2008
Bituminous primer	SM GOST 11955-82***
Crushed stone	SM GOST 8267-93***
Ballast	SM GOST 25607-94**
Or Crushed Limestone	Grading as 306.04 below
Sand	SM GOST 8736-93**

Execution

306.03. General information.

The construction of sections of new pavement in widening, reconstruction or new road shall comprise excavation to the designated subgrade level, compaction of subgrade, sand drainage layer, subbase layer(s), of gravel or crushed limestone, base layer(s) of graded, crushed granite, prime coat and asphalt binder course(s) and wearing course. The thicknesses of the various layers are indicated in the Drawings. In conjunction with new pavement works shoulder reconstruction will be required as detailed in chapter 310 of this Specification.

306.04. Construction Procedure

The whole area of new pavement construction shall be be excavated to the required subgrade level and the subgrade compacted to a minimum of 100% of the density determined according to SM GOST 22733-77. Subgrade level after compaction shall be correct for level in all areas within a tolerance of +00 to -75 mm.

Following acceptance of the subgrade a drainage layer of approved sand material shall be placed and compacted using vibratory rollers or vibrating plate compactors. Top of sand layer after compaction shall be correct for level in all areas within a tolerance of +00 to -60 mm.

The sand layer shall be extended beyond the limits of the carriageway beneath the shoulder to meet the side drain or the embankment face as described in chapter 310.

Following acceptance of the sand layer, M300 subbase of approved material shall be executed to the thicknesses shown on the drawings. The material shal be either ballast meeting the requirements of SM GOST 25607-94** or crushed limestone complying with the following grading requirements:

Sieve size (mm)	Percentage passing by weight
63.0	100
40.0	70 – 100
20.0	50 -85
10.0	40 – 75
4.75	30 – 60
2.36	20 – 45
1.18	15 – 37
0.075	4 – 15

Compaction shall be by vibrating roller and the degree of compaction shall be not less than 97%. On completion of the subbase layer the upper surface of the final course shall be accurate to line and level within a tolerance of +.00 to – 40mm

Following acceptance of the subbase layer a base of approved, graded crushed granite aggregate shall be laid to the overall thickness shown in the drawings. The material shall meet the requirements of SM GOST 8267-93*** and shall be executed in accordance with SNiP 3.06.03-85.

The compacted thickness of any layer of either base or subbase laid, processed and compacted at one time shall not exceed 150 mm and when a greater compacted thickness is required, the material shall be laid and processed in two or more layers. The minimum layer thickness shall be 100 mm.

Asphaltic binder and wearing courses shall be laid to the levels indicated in the drawings. Asphalt mixtures will be designed, produced and laid in accordance with the requirements of chapter 308 and SNiP 3.06.03-85.

Wherever new asphalt is laid abutting existing asphalt pavement, the edges of the old pavement shall be carefully cut to expose clean fresh vertical joint faces which will be tack coated with bituminous material meeting the requirements of chapter 307 and in compliance with the requirements of chapter 308 immediately before the fresh adjoining asphalt is laid.

Surface Tolerance

Surfaces shall be checked for tolerance and shall meet tolerances in accordance with the requirements of chapter 308.

306.05. Work Acceptance

The work of new pavement construction will be accepted according to the technical

specification including Chapter 001.

Measurements

The whole work of new pavement construction shall be measured under the items below in square metres of subgrade, cubic metres of sand, subbase and base and in tonnes of asphaltic concrete. The volumes shall be measured strictly net based on the design levels. Tonnes of asphaltic concrete shall be derived from the net volume converted to tons on the basis of the compacted density.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
20106	Shape and compact subgrade	square metre
30601	Sand drainage layer	cubic metre
20103	Select Fill to Shoulders	cubic metre
30602	Subbase courses of ballast or crushed limestone M 300	cubic metre
30603	Base courses of crushed granite M 1000	cubic metre
30604	Excavation and disposal or reuse of existing pavement material	cubic metre
30702	Prime-coat using cutback bitumen or bituminous emulsion, 0.8 to 1.0 l/sq. m.	square metre
30801	Wearing course of asphalt concrete from fine grained dense asphalt Type A M1 Thickness 40mm	square metre
30802	Wearing course of asphalt concrete from fine grained dense asphalt Type A M1 Thickness 60mm	square metre
30806	Base course made of coarse grained porous asphalt concrete e M1 Thickness 85 mm	square metre
30807	Base course made of coarse grained porous asphalt concrete e M1 Thickness 90 mm	square metre

CHAPTER 307. PRIME AND TACK COATS FOR SUPPORTING SURFACE

Description

307.01. Introduction

This chapter deals with the provision and application of prime and tack coats. Prime coat is a layer of cutback bitumen applied to the completed surface of the granular base course as a preliminary to asphalting. Tack coat shall be applied wherever new asphalt is laid over or adjacent to old asphalt. In the case of major asphalt operations tack coat shall also be use between overlying courses where the underlying course is more than 72 hours old at the time of laying the next course.

Materials

307.02. Materials

The materials used have to be in accordance to the following standards:

Cut-back bitumen	SM GOST 11955-82***
Bituminous emulsion	SM GOST 18659-81

Working conditions

307.03. Equipment.

Self- propelled bitumen distributor

Mechanical rotary brush

Compressor (for particularly dusty base layers)

307.04. Surface Preparation

Before any prime or tack-coat operation is done the surface will be prepared by brushing. Care shall be taken during brushing of base course that the structure of the base is not disturbed. If there is any trace of adherent clay or dust on existing asphalt which is not properly removed by the brushing operation then the brushing shall be supplemented by a pressure spraying with water before brushing. Water shall not be used in the cleaning of bases, however, one to two hours before the application of prime coat and after all brushing is complete, bases should be lightly watered to help promote the penetration of the prime.

After cleaning and before application of Prime or Tack coats the surface shall be inspected and approved by the Engineer who may require further cleaning.

307.05. Weather conditions.

If cutback bitumen is to be used for prime or tack coat the work shall only be carried out in settled, dry weather. Tack-coat in particular shall only be sprayed on clean dry surfaces. Prime coat may be applied when surfaces are just slightly damp.

If bituminous emulsion is to be used for prime or tack coat then completely dry surfaces are not necessary. However, even when emulsion is being used, coatings shall not be applied in the rain or when there is the likelihood of rain within 12 hours of spraying nor when there is free water on the surface to which the coating is to be applied.

307.06. Application of Prime and Tack Coats.

Prime and tack coats shall only be laid using an approved pressure distributor.

Distributors shall be of constant pressure type, self-propelled, and have a minimum binder capacity of 4000 litres.

Distributors shall be equipped with low range speedometer (fifth wheel) in good working condition, so located to be visible to the driver to enable him to maintain accurately the constant speed for spraying at the uniform specified rate. They shall be fitted with a calibrated pressure gauge which accurately records the pressure of the bitumen at the spray bar. Binder pumps shall be capable of maintaining constant pressure during spray runs.

Distributors for cutback shall be fitted with burners in combination with a circulating pump capable of maintaining the bitumen without overheating within the specified temperature range and an accurately calibrated thermometer for indicating the spraying temperature of the bitumen.

The spray bar shall be capable of applying bitumen binder to a minimum width of 2.30 meters with provision for application of lesser widths by closing jets. The spray bar shall have the capability of being raised and lowered to specified heights above the road and of being adjusted so that it is parallel with the road surface. The distributors shall be so designed to allow the circulation of hot binder through the spray bar when not spraying.

Spray bars shall be fitted with either slotted spray jets or preferably whirling spray jets, whose essential features are the ability to spray binder uniformly at the specified rate of spray. If whirling spray jets are fitted the spray bar shall be protected by a hood to reduce wind interference. Distributors shall be fitted with hand-lances with nozzle spray attachments for spraying small, inaccessible areas and to correct deficiencies in the spray rate.

Calibrate the asphalt distributor spray bar height, nozzle angle, and pump pressure and check longitudinal and transverse spread rates weekly.

Protect the surfaces of nearby objects to prevent spattering or marring. Ensure even distribution with no areas missed nor with overlap. Spraying will commence with areas adjacent to the edge of the road and then on the centre section to minimize run-off. Similarly spraying will commence at the low end of gradients and inside of superelevated curves.

Prime coat application is to be at the rate directed by the Engineer and will normally be in the range of 0.8 to 1.0 l/m^2. The Engineer will approve the exact application rate, temperature, and area to be treated before application and may make adjustments for variations in field conditions.

Tack coat application is to be at the rate directed by the Engineer and will normally be in the range of 0.25 to 0.4 l/m^2, The Engineer will approve the exact application rate, temperature, and area to be treated before application and may make adjustments for variations in field conditions.

If excess asphalt material is applied, squeegee the excess from the surface. Allow the tacked surfaces to completely cure before placing the covering course. Place the covering course within 4 hours of placing the tack coat. No traffic should be allowed on the tack coat, other than unavoidable construction traffic.

Prime coat applications shall be in accordance with the rate directed to a tolerance of +/- 0.1 l/sq.m. and tack coat applications within a tolerance of +/- 0.05 kg/sq.m. Actual application rates will be checked in the field.

307.07. Works acceptance.

The surface where the prime and tack coats have been laid will be accepted according to the technical specification including Chapter 001.

Measurements

The quantity of prime coat work will be measured in square metres of binder applied to the road based on the lesser of the recorded rates of spread and the instructed rates of spread.

Tack coat will be measured for payment where it is applied to the original asphalt surface immediately prior to the laying of regulating or new asphalt and to new asphalt layers before a subsequent layer is placed.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
30701	Tack Coat using cutback bitumen, 0.25 to 0.4 l/sq. m.	square metre
30702	Prime-coat using cutback bitumen or bituminous emulsion, 0.8 to 1.0 l/sq. m.	square metre

CHAPTER 308. ASPHALT CONCRETE FOR PAVEMENTS

Description

308.01. Introduction

This chapter gives the requirements for the execution of one or more courses made from hot asphalt concrete according to SM STB 1033:2008

Materials

308.02. Materials

The materials will be in accordance to the following standards:

Asphalt concrete	SM STB 1033:2008
Road bitumen from crude oil	SM GOST 22245-90* supplemented by the additional requirements of chapter 011.
Crushed stone	SM GOST 8267-93**
Sand	SM GOST 8736-93**
Filler	SM GOST 16557-78

General Working Requirements

308.03. General Requirements

Asphalt concrete road pavement(the preparation, the equipment, the transport, the laying, the compaction) will be according to Chapter 10 SNiP 3.06.03-85.

Asphalt will be produced in various types according to the job requirements and shall be either fine or coarse grained and either porous or dense.

308.04. Mixing equipment.

The asphalt plant shall be capable of producing a consistent product conforming to these specifications. It shall be of the batch mix type and shall have a rated output of at least 120 tons per hour. Smaller plants of lower output acting in combination are not acceptable.

The proportioning, mixing, and discharging will be automatic. The equipment will be approved by the Engineer.

The plant shall be fitted with a modern system of emission control for exhaust gases and particles. The system shall collect All fine particle discharge and shall be so equipped that collected fines are available for re-use as filler in the mixes.

308.05. Asphalt finishers.

Bituminous materials shall be laid by a self propelled spreader finisher equipped with a hopper, delivery augers and a heated adjustable vibrating screed. It shall be capable of laying bituminous materials with no segregation, dragging, burning or other defects and within the specified level and surface regularity tolerances. Delivery augers shall terminate not more than 200 mm from the edge plates.

Only asphalt finishers having automatic system for level and cross section control, approved by the Engineer will be used for the placing of asphalt courses.

308.06. The preparation of the supporting surface

Tack coat shall be provided wherever new asphaltic concrete is laid over existing pavement and wherever a first course of new asphaltic concrete has been exposed to traffic or left to weather to such an extent that the Engineer considers it necessary to provide tack coat in the interests of satisfactory adhesion between the courses. In general tack coat will definitely be required wherever a period of more than 10 days is allowed between successive courses; this period may be substantially reduced if the surface of the underlying course is exposed to excessive traffic.

Before laying of asphalt and after any tack coating, the surface shall be inspected and approved by the Engineer who may require further cleaning, tacking or other preparation.

Where the edges of the course to be laid are bounded by or adjacent to kerbs, islands, or other upstands, the area of the upstand which will come into contact with the completed asphalt course shall be carefully primed with cutback bitumen to provide an adhesive key for the fresh asphalt, sealing it to the upstand. Areas of upstands above the asphalt course design level or which will be left exposed for any reason shall be carefully protected during this priming operation with either heavy paper or plastic film carefully taped in place. Kerbs and upstands which remain exposed after completion of the asphalt work must not be stained or marked with bitumen spray/splash. Such marking may lead to condemnation of the work area affected with a requirement that the contractor make good the damage at his own cost; in extreme cases such making good is likely to require the removal and replacement of concrete kerbs.

308.07. Weather conditions.

The laying of asphalt concrete courses has to be done at an air and surface temperature not less than 10°C.

Asphalt concrete shall not be laid when rain is falling or when there is a reasonable likelihood of rainfall occurring. Asphalt concrete shall not be laid on wet surfaces.

To the extent practicable, the Engineer and the Contractor shall jointly agree a shutdown date, and subsequently a start up date, for asphalt laying operations such that operations are stopped for the whole of the winter period before any extensive periods of rain/snow are to be expected and do not recommence before there is reasonable expectation of prolonged periods of suitable weather.

In the absence of any agreement on the shutdown period the Engineer shall be entitled to order that no asphalt be laid during the period 15th October to 31st March and the Contractor shall lay no asphalt at all during this period.

308.08. Asphalt Mix Design and Testing

Asphalt mixes to be used in the Works shall be designed by the Contractor in accordance with the requirements and procedures of SM STB 1033:2008. The Contractor shall invite the Engineer to participate in the mix design process and shall keep him fully informed throughout the procedure. When a satisfactory mix design has been prepared it shall be forwarded to the Engineer with all supporting test documentation for approval. Before approving a mix the Engineer shall confer with the Employer’s laboratory who shall be satisfied that the mix is appropriate for conditions in Moldova.

Asphalt mixes shall be tested for refusal density according to BS 598-104 (or similar international standard) and only mixes achieving a minimum of 2% air voids at refusal density shall be considered for approval.

The mix submitted for approval shall be precisely defined with no variables or tolerances. Following approval, the mix as used in the field shall comply with the requirements of SM STB 1033:2008 and the with the tolerances given below.

Throughout the course of the Works, asphalt shall be sampled and tested on a regular basis. Samples will be drawn from the mixing plant and/or from the finisher as directed by the Engineer at a frequency of not less than:

- At least one sample for each 400 tons of mixture for regulating and binder course materials and
- At least one sample for each 200 tons of mixture for wearing course materials.

These samples will be tested for aggregate grading and bitumen content and for the properties of compacted specimens including, density, air voids (porosity), and strength. In addition to the permitted limits on variation in strength and porosity specified in SM STB 1033:2008 the following maximum deviations from the approved mix design will be permitted:

The percentages of aggregate grading as determined by testing shall not vary from the approved mix design values by more than:

+/- 2% aggregate sizes > 15mm

+/- 1% aggregate sizes > 5mm

+/- 0.5% aggregate sizes < 5mm

Bitumen content as determined by testing shall not vary from the approved design mix in binder courses and regulating asphalt by more than +/-0.3% and in wearing courses by more than +/-0.2%.

(Eg. 20mm Aggregate design value 80% passing 20mm sieve, permitted limits 78-82%. Binder course bitumen content design value 5.15% permitted limits 4.85-5.45%)

If tests show that the mix being produced does not comply with these requirements all asphalt work will cease immediately the problem is noted and no further asphalt will be laid until, either the causes of the fault with the existing mix have been found and rectified or until a new mix design has been prepared and approved following the procedures above.

The thickness and the density of the asphalt course being laid will be checked by coring. Cores will be taken at a minimum rate of 1 core for every 100 tonnes of asphalt laid with an absolute minimum of 3 cores being taken for any day's work. Cores will be checked for thickness of layer as the average of three uniformly spaced thickness measurements by calliper round the circumference of the core and for density by weight in air and in water. The compacted asphalt in the field shall achieve a density of at least 98% of the density of the corresponding control samples for the same day's laying in accordance with the requirements of Clause 308.14 below.

The density requirement shall only apply to regulating courses where the thickness of the laid material is not less than 30mm.

The grading and specific gravity of the cold aggregates will be tested as directed by the Engineer but normally not less than once per day.

308.09. Bitumen preparation.

The bitumen will be uniformly heated to permit a continuous introduction of bitumen from the storage tank into the mixer.

It is forbidden to heat bitumen to a temperature above 175°C. Bitumen heating shall be by indirect means using oil-filled heating coils or other approved systems. Any bitumen which has been heated above 180°C or has suffered carbonisation from prolonged heating shall be removed from the plant and disposed off.

308.10. Preparation of the aggregates.

Before introduction into the mixer, the aggregates have to be heated and dried to the correct temperature. Unless otherwise agreed with the Engineer aggregates shall be discharged from the heating process at such a temperature as will ensure their introduction to the mixer at a temperature of between 155 and 170 deg C. The aggregate moisture content at the moment of introduction to the mixer shall in no circumstances exceed 1%.

The burners to be used for heating and drying the aggregates shall be so adjusted as not to damage or contaminate the aggregates either by overheating or by the depostion of soot, oil or other residues.

The mixing plant shall be so designed as to separate the heated aggregate into not less than four sizes of aggregate which will then be recombined by weight to reproduce, within the specified tolerances, the design mix.

The mixing plant shall be designed to ensure the precise weighing of the bitumen to be added to each batch of asphalt being mixed.

308.11. Mixing.

The proportioning of bitumen and aggregates in the mixer shall be according to the approved mix design formula.

The mixing period shall be enough to achieve a complete coating of the aggregates with bitumen and the complete mixing of filler with bitumen and shall in no case be less than the mixing period recommended by the plant manufacturer.

308.12. Transport.

Mixed asphalt material shall be transported from the mixing plant to the laying site in tipping trucks specially reserved and designated for this purpose.

Trucks shall be metal bodies, insulated and equipped with insulated tarpaulin covers. Covers shall be deployed at all times when the truck is being used for the transport of asphalt.

Trucks for the transport of asphalt shall be equipped with ports in each side of the body for the measurement of load temperatures. The Contractor shall supply and maintain suitable heavy duty thermometers (Rototherm or similar or other approved type) at the delivery point, able to measure temperatures at 1 metre penetration into the load, for checking asphalt temperatures prior to discharge into the finisher.

Limited quantities of approved release agent may be used to prevent asphalt material hanging in, or adhering to the body during discharge. Release agents shall be subject to the approval of the Engineer both as regards type and rate of application. Under no circumstances will agents which react with or are miscible with the binder be permitted. Any members of the Contractors staff found applying such agents or conniving at the application of such agents will be subject to immediate and automatic removal from the site with an absolute prohibition on their re-employment on the project at any time in any capacity. The Contractor shall ensure that this provision is brought forcefully to the attention of all staff involved in asphalt work.

308.13. Supplying and laying.

The supplying and laying of the asphalt mixture will be done according to SNiP 3.06.03-85.

Materials shall be spread, levelled and tamped by an approved self-propelled paving machine. The mixed material shall be supplied continuously to the paver and laid without delay. The rate of delivery of material to the paver shall be so regulated as to enable the paver to be operated continuously and it shall be so operated whenever practicable.

The rate of travel of the paver and its method of operation shall be adjusted to ensure an even and uniform flow of material across the full laying width, freedom from dragging or tearing and without segregation of material.

In confined areas where irregularities or unavoidable obstacles make the use of mechanical laying wholly impracticable, the mixture may be spread by hand. Hand spreading shall be done by staff experienced in the work and the standard of finish of the completed hand spread asphalt shall not be noticeably inferior to the machine laid areas.

No asphalt shall be laid in courses of less than 40mm thickness unless specifically called for in the design. Asphalt wearing course shall not be laid in thicknesses greater than 60mm and asphalt binder course shall not be laid in thicknesses of more than 60mm without first obtaining the specific approval of the Engineer. Asphalt binder courses shall not be laid in thicknesses greater than 100mm under any circumstances.

308.14. Compaction.

The compaction of the mixture will be done according to SNiP 306.06-85.

The Contractor shall provide sufficient rollers of adequate size and weight to achieve the specified compaction. Prior to commencing the laying of bituminous mixes in the permanent works the Contractor shall carry out site trials to demonstrate the adequacy of his plant and to determine the optimum method of use and sequence of operation of the rollers.

Rolling shall be carried out parallel to the axis of the road with transverse movement of rollers being accomplished by gradual diagonal rolls not varying by more than 15 degrees from the axial direction. Sharp turning movements of rollers on fresh asphalt shall be avoided at all costs. The Contractor shall be responsible the repair of any and all damage which may result from the improper or careless use of rollers. The only exception to the use of rollers in an axial direction shall be when the need arises to compact transverse joints. In these cases the rollers shall be turned off the asphalt surface and shall be used at right angles to the axis of the road. All exposed edges of the lane/layer shall be adequately supported by the use of suitable timbers so that the roller(s) may move onto and off the asphalt without deforming the edges.

The compaction will be satisfactory if it reaches 98% of the average density of the three laboratory samples closest in time to the material being compacted prepared in accordance with the requirements of SM STB 1003:2008.

If the average density of all the samples of compacted material taken in any one day is less than 97% of the average density of the laboratory samples taken on the same day, the pavement laid in that day will not be accepted. It shall however, be open to the Contractor to institute an intense coring program of the affected work to demonstrate to the satisfaction of the Engineer that certain areas of the work meet the overall requirements whilst other areas fail. If the Engineer is so satisfied then only those areas which have not been shown to meet the required standards shall not be accepted and be removed, provided that no condemned area shall be less than the area represented by one truckload of asphalt and that any test result of less than 94% must result in at least one condemned area.

The target air voids for the laboratory mix design shall be 3%. Daily control of laboratory specimens shall have air voids within the range of 2-4 %. Should the 5-day running average of laboratory specimen air voids become lower than 2.5% or higher than 3.5% the mix design is to be revised.

308.15. Joints, shaping and edge cleaning.

In places where the laid mixture is contacting the old pavement or previously laid asphalt, joints will be formed. Such joints shall ensure a perfect and continuous transition between the old and the new surface.

The old or previous lane edge or ending shall be carefully cut to a neat coherent vertical face using an approved cutting device (roller mounted disc cutter or approved alternative); immediately before laying of new asphalt this face shall be covered by a cutback bitumen priming material in accordance with Chapter 307.

Laying new asphalt against an uncut edge of previously laid asphalt shall only be permitted when the previously laid edge is less than 6 hours old and in this case only with the express permission of the Engineer and using procedures approved by the Engineer.

The Contractor shall be wholly responsible for ensuring that the required degree of compaction is achieved throughout joint areas. The Engineer may direct that cores for compaction checks be carried out through joints.

The asphalt mixture shall be continuously and uniformly laid, to have the same thickness and surface texture as the previous lane. Great care shall be taken to avoid deforming the edge of the layer by over-rolling. If necessary the edge of the lane/layer shall be confined with timbers of suitable thickness fixed to the underlying layer to permit compaction of the edge.

All material removed during cutting and trimming processes shall be removed from the site and disposed of in accordance with Specification requirements in a manner approved by the Engineer.

308.16. Tolerances on finished work

As soon as possible after compaction is completed the surface will be checked for tolerance.

Completed asphalt overlay courses shall not be less than the thickness indicated in the drawings and the final levels of asphalt wearing course shall be within a tolerance of +15mm to 00mm. Levels shall be checked using a grid stipulated by the Engineer comprising not less than 6 points per 100 sq.m. and spaced at intervals which ensure that no more than 30% of the grid points coincide with locations used by the Contractor for setting out the initial surface level control.

A 3 metre straight edge shall be used to check the final surface for regularity after initial rolling and while the material is still hot enough for corrections to be made. Checks shall be made at regular intervals specified by the Engineer, but not less than two checks per lane at 10 metre intervals, and at any other location where the Engineer’s staff considers that there appears to be excess irregularity. Checks shall be made both parallel to and at right angles to the axis of the road. A defective area is an area with surface deviations in excess of 5mm relative to the straightedge. If it is shown to be an acceptable procedure, within the capabilities of the Contractor, and resulting in an acceptable surface at the specified degree of compaction, defective areas may be corrected by loosening the material, adding or removing material, reshaping, and compacting. If correction cannot be made in this manner, defective areas shall be removed to the full thickness of the layer and re-laid. Areas to be removed and re-laid shall be not less than one lane in width and 25 metres in length. All costs of rectification shall be borne by the Contractor.

308.17. Acceptance procedures.

Asphalt pavements it will be accepted according to the provisions of this specification including Chapter 001, and of SNiP 3.06.03-85.

Bitumen acceptance will be on the basis of Clauses 1.03 and 1.04

Bitumen supplied to the site shall be routinely tested for conformity with these Specifications. For bitumen delivered in bulk, tests shall be conducted at a minimum rate of one set of tests per tanker load. For bitumen delivered in drums tests shall be conducted at a minimum rate of one set of tests per 10 tonnes received. These test rates are intended to be used for routine testing when deliveries are confirmed as uniform and of acceptable quality. Initially, the Engineer will order tests at a substantially greater intensity. In addition to the site tests all shipments of bitumen must have a manufacturer's test certificate indicating compliance with all the requirements of the Specification. This test certificate must be presented to and approved by the Engineer BEFORE the relevant shipment of bitumen is permitted to enter the site.

Filler acceptance will be made according to the article 001.03 and or 001.04 as appropriate.

The material in the asphalt concrete pavements and mixtures will be accepted in accordance to the article 001.04.

The finished pavement courses will be accepted on the basis of articles 1.02 and 1.04

All aspects of asphalt work shall comply with the requirements of this chapter.

Measurements

The asphalt pavement works will be measured in tonnes or square metres of each type of asphalt provided as itemised in the Bills. The measurement and payment includes aggregates, bitumen, filler, etc, all mixing, transport, laying and compacting operations, and the treatment of joints as required or directed together with all testing and all other associated works of whatsoever nature. Where measurement is in tonnes, the payable tonnage shall be calculated as the square metres of asphalt laid and accepted multiplied by the lesser of (i) the average thickness as determined by coring (where results greater than the required thickness are treated as being of the required thickness) and (ii) the required thickness, to give the volume of asphalt. This shall then be transformed to tonnage using the average density of the asphalt as determined from density tests on the cores.

Where measurement is in square metres of a specified thickness of asphalt the asphalt shall be measured as the net square metres of asphalt required to be laid in accordance with the requirements of the Drawings and the instructions of the Engineer. Where for any reason the thickness of the asphalt course being measured is less than the thickness required by the Bill item and the Engineer permits such reduced thickness to remain, the payment for the area of reduced thickness shall be calculated as the nominal payment due multiplied by the square of the measured average thickness divided by the square of the required thickness. Average thickness shall be the average thickness as determined by coring (where results greater than the required thickness are treated as being of the required thickness). The area to be considered in any calculation of average thickness for the purpose of adjusting payment shall be as directed by the Engineer.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all

works indicated in the present chapter.

Payment will be made under some or all of the items below:

Payment will be made under the Bill of Quantity items set out below. The pavement bill will use **either** the series of items measured in square metres with the appropriate thicknesses inserted **or** the three items measured in Tonnes:

	Item	**Unit of measure**
30801	Wearing course of asphalt concrete from fine grained dense asphalt Type A M1 Thickness 40mm	square metre
30802	Wearing course of asphalt concrete from fine grained dense asphalt Type A M1 Thickness 60mm	square metre
30803	Base course made of fine grained porous asphalt concrete M1, Thickness 40mm	square metre
30804	Base course made of fine grained porous asphalt concrete M1 Thickness 60mm	square metre
30805	Base course made of coarse grained porous asphalt concrete M1 Thickness 70mm	square metre
30806	Base course made of coarse grained porous asphalt concrete e M1 Thickness 85 mm	square metre
30807	Base course made of coarse grained porous asphalt concrete M1 Thickness 90 mm	square metre
30808	Wearing course of asphalt concrete from fine grained dense asphalt Type A M1 Thickness 30mm	square metre

CHAPTER 309. SIMPLE BITUMINOUS TREATMENTS

Description

309.01. Introduction

This chapter covers the application of one or more coats of surface dressing, each coat consisting of a layer of bituminous binder sprayed on a base prepared previously, followed by a cover of stone chippings properly rolled to form a wearing course to the requirements of these Specifications.

A single surface dressing means an application of bituminous binder to the road surface followed immediately by a single layer of uniform sized chippings.

A multiple surface dressing means two or more surface dressings placed one on the other.

Surface dressings may be placed upon bases of asphalt, concrete or primed granular base material.

Materials

309.02. Materials

The materials used for bituminous surface treatments will meet the requirements of SNIP306.03-85. Bitumen shall also meet the requirements of chapter 011 of this Specification.

Execution

309.03. Execution of the works

The bituminous treatment will be executed on the surface of the support course, which is cleaned and dry and dust free. , Bitumen shall either be straight run penetration grade bitumen (80-100 or other approved) or cutback bitumen. Cutback shall either be purpose manufactured cutback or shall be prepared by blending penetration grade bitumen with diesel or a diesel/kerosene blend. The type of bitumen used and the spraying temperature shall depend on the surface temperature of the support surface at the time of application and shall be determined in accordance with the recommendations of British Transport & Road Research Laboratory Overseas Road Note 3 - " A Guide to Surface Dressing in Tropical and Sub-Tropical Countries" - hereinafter referred to as ORN 3.

Chippings for surface dressing shall be in accordance with the size(s) quoted in the Bill of Quantities and the gradings for those sizes and other required properties given in ORN 3.

Rates of spread of binder and chippings shall be in accordance with the recommendations of ORN 3. The rates of spread shall be determined by the Contractor and approved by the Engineer following acceptance tests as described in 309.04 below.

Chippings shall be applied to the sprayed binder immediately after spraying and before the binder has had the opportunity to cool.

Binder shall be applied using an approved pressure distributor complying with the requirements of chapter 307.

Chippings shall be applied using a self propelled chipping spreader having a metering system capable of delivering the design rate of spread of chippings at the same travel speed as required by the distributor for spraying the design spray rate of bitumen.

During the first 3 days after putting the newly constructed surface treatment into service, the Contractor will set traffic speed limits, at max. 40 km/h, on the full width of the carriageway and shall take such measures as may be required to ensure that this limit is obeyed. Measures to be taken may include the operation of vehicles within the traffic stream to slow the stream to the required limit.

309.04. Testing

Prior to undertaking permanent works the Contractor shall complete test stretches to satisfy the Engineer that the equipment proposed is capable of applying binder and chippings at the required rates of spread and of coordinating the application to produce an acceptable surface treatment.

During the course of the works regular tests will be made to confirm

- the quality of binder (all test specified and implied in this Specification and in ORN 3)

- the quality of chippings (hardness, grading, density, absorption, shape factors)

- rates of spread of bitumen and chippings every 300metres of lane length but not less than 4 sets of tests per working day.

309.05. Works acceptance.

The acceptance of the treatments will take according to the Chapter 001, under the condition of their execution in compliance with the provision of SNIP 306.03-85, Project Specifications and Engineer's approval.

Measurements

The simple bituminous treatments will be measured in litres of bitumen and tonnes of chippings required for the treatment of those areas directed to be surface dressed. Payable amounts will be based on the authorised rates of spread confirmed by the regular tests on rates of spread. If the tests show that the actual spread rates are less than those authorised but still acceptable then payment shall be based on the actual rates as determined by testing.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of Measure**
30901	Application of Bituminous Binder for surface dressing	litre
30902	Application of Chippings (state sizes) for surface dressing	tonne

CHAPTER 310. REMOVING, RESTORING AND REPAIRING THE SHOULDERS

Description

310.01. Introduction

This chapter deals with the work of excavating existing shoulders and rebuilding with drainage layer, approved backfill and gravel shoulder surface.

Materials

310.02. Materials

The materials to be used in the reconstruction of shoulders shall be:

Sand drainage layer	SM GOST 8736-93**
Select fill	Select fill with PI < 8 and CBR > 25%
Crushed stone, gravel, sand mixture for the shoulder surface	SM GOST 25607 – 94**

Execution

310.03. The demolition and reconstruction of the shoulders

Shoulders will be demolished and reconstructed/constructed wherever the pavement works require the existing shoulder to be disturbed (e.g. where the existing carriageway is to be widened, where a lane is to be added or where pavement is to be reconstructed) or where the Engineer or the Drawings indicate that shoulder reconstruction is required to improve subgrade drainage.

` Wherever the works of shoulder (re)construction require any of the existing asphalt to be removed, the final position of the required asphalt edge shall be carefully marked and the excess asphalt cut away with a saw (diamond or other abrasive disc cutter) to leave a clean edge against which shoulder construction shall proceed.

Shoulders will first be excavated to depth shown on the drawings or indicated by the Engineer. In general, excavation shall be carried down to the level of the underside of the sand drainage layer in the base of the carriageway pavement.

Shoulder subgrade will then be compacted to a density of not less that 95% of maximum dry density at OMC.

A 200mm sand drainage layer will be placed, contiguous with the drainage layer in the pavement and connecting that layer to the side drain or embankment face. Select fill will then be used to bring the shoulder up to the level of the underside of the shoulder surface layer. Select fill shall be placed and compacted in layers not exceeding 150 mm in thickness to a density of not less that 97% of maximum dry density at OMC.

Shoulders will be completed with a 150mm layer of shoulder surfacing material, crushed limestone, M400, compacted to a density of not less that 98% of maximum dry density at OMC adjacent to the carriageway and with topsoil at the back of this layer as shown on the drawings..

All layers of shoulder reconstruction shall be constructed simultaneously with the adjacent

layers of pavement construction.

The material resulted from the demolition of the shoulders may be used for earthworks if it meets the requirements of Chapter 201. If not suitable, material from shoulder excavation will be removed and disposed of as spoil in accordance with the requirements of this Specification.

The compaction of the select fill material in the shoulders must be executed at optimum moisture content. The Contractor will obtain the Engineer's agreement for the select fill sources for the shoulders.

310.04. Surfacing of the shoulders with asphalt concrete.

In the event that shoulders are to be surfaced or partially surfaced with asphalt concrete, those parts which are to be so surfaced shall be reconstructed in accordance with the requirements for pavement reconstruction given in chapter 306 except that the various layer thickness shall be revised as follows:

- 40 mm Asphalt concrete
- Prime coat
- 150mm crushed granite base
- Subbase of crushed limestone or approved ballast or gravel
- 200 mm sand drainage layer

The underside of the sand layer shall be continuous with the underside of the drainage layer under the pavement. The subbase thickness shall be adjusted as necessary to provide the required overall thickness and finished shoulder level.

310.05. Acceptance of Works.

Work stipulated in this chapter will be accepted according to Chapter 001.

Measurements

The excavation and disposal of shoulder material and the reconstruction of shoulders shall be measured in cubic metres of material removed or required to be placed except for prime coat which will be measured in square metres and asphalt which will be measured in tonnes.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter. If shoulders are to be asphalted the works of subbase, base, prime coat and asphalt concrete shall be paid under the items given for these works for the reconstruction of pavement in chapter 306. The select fill to shoulder construction will be paid under the Earthworks items for material from Borrow Pits and Formation of Embankment. The demolition (excavation) of the old shoulders shall be paid for under the Earthworks item for general excavation and the provision and spreading of topsoil will be paid under the Earthworks item for supply and spreading of topsoil.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
20104	Common excavation for shoulder construction, side drains and cuttings	cubic metre
20106	Shape and Compact Subgrade	square metre
30601	Sand drainage layer	cubic metre
20103	Select Fill to Shoulders	cubic metre
31001	M300 shoulder surfacing material 150mm thickness	square metre
30602	Subbase courses of ballast or crushed limestone	cubic metre
30603	Base courses of crushed granite	cubic metre
30701	Prime Coat using cutback bitumen	litres
30801	Wearing course of asphalt concrete from fine grained dense asphalt Type A M1 Thickness 40mm	square metre

CHAPTER 311. VARIOUS ASPHALT WORKS

Description

311.01. Introduction

This chapter deal with the execution of small asphalt works for sidewalks, kerbs, and pavements at bus stops, etc. The works in this chapter are areas of asphalt which it is not possible to lay with a paving machine and which are not adjacent to, contiguous with or ancillary to areas of bulk asphalt laying carried out with a paver.

Working conditions

311.02. Asphalt mixture formula.

The asphalt used shall be identical with the mixes used for the main works of asphalt paving and the mix and quality of asphalt shall comply in all respects with the requirements of chapter 308. The procedures for checking quality and testing set out in chapter 8 shall be followed in full, except that the requirements the numbers of tests shall be revised by the Engineer having regard to the volumes of asphalt being produced and placed at any one time.

311.03. Preparation of suporting surface.

The supporting surface will be prepared in accordance with articles 307.04 and 308.06 as appropriate. The contact surfaces of the kerbs, ditches, etc. will be coated with a bituminous tack-coat in accordance with the requirements of chapter 307. When the binder is spread, all adjacent surfaces must be protected in accordance with the requirements of chapter 307 and 308.06.

311.04. Weather limits.

Asphalting shall be limited to suitable weather conditions as defined in chapter 308.

311.05. Transport.

Asphalt shall be transported in dedicated trucks complying with the requirements of chapter 308.11.

311.06. Mixture laying.

Asphalt for small works shall be laid by hand. Laying shall be done by experienced crews, fully equipped with suitable hand tools, shovels, barrows, rakes, screeds, etc. Care shall be taken that asphalt residue does not build up on tools and suitable means shall be provided for heating tools and maintaining them hot throughout the laying and spreading process to facilitate this.

311.07. The compaction.

The asphalt mixture will be compacted to at least 94% of the density of test samples compacted with 75 blows on each face. The compaction will be made using a vibrating roller having minimum 1350kg weight.

311.08. Surface tolerance

The longitudinal and transverse uniformity will be verified using a 3 meter long metallic straightedge. Areas with deviations of more than 10mm from the straightedge will be rejected. They will be repaired using approved methods or removed and re-laid if repair is not possible.

311.09. Works acceptance.

The works will be accepted for payment if there are in accordance with drawings, technical specifications and approved by the Engineer.

Measurements

The volume of work is measured in tons.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under the item below:

	Item	**Unit measurement**
31101	Hand laid asphalt concrete to small works small size particle; type A MI H	tonne

4. BRIDGES AND OVERPASSES

CHAPTER 401. REPAIRS TO THE INFRASTRUCTURE AND SUPERSTRUCTURE

Description

401.01. Introduction

The works described in this chapter cover the minor repair and restoration of elements of the infrastructure and superstructures and comprise:

- consolidation of piers with major deteriorations,

- execution of works on the superstructure beam joints,

- repair works of the infrastructure elevation,

- execution of the slope for water run of on the collar beams and

- painting works of the visible surfaces of the infrastructure and superstructures.

The minor repair works include the restoration of sections of the abutments, piers and superstructures to comply with the design requirements by repairing major faillors of the concrete, of cracks, of exposed reinforcing bars and of spalling in the concrete, by filling in the cracks and fissures of the elements.

Materials

401.02. Materials

The materials used for the works described in this chapter shall be in accordance with the following requirements:

Mortar with polymer	SNiP 3.06.04-91
Concrete with polymer	SNiP 3.06.04-91
Concrete	SM GOST 26633-91**,Drawings and SNiP 3.06.04-91
Sand cement mortar with additives	SM GOST 26804-86
Reinforcement and built in elements.	Project, SM GOST 5781-82*****
Bituminous Mastic	VSN 32-81

Working conditions

401.03. Equipment

The following items of equipment and special auxiliary installation are likely to be needed:

1 Motocrane for assembly and dismantling of the auxiliary installation;

2 Compressor for pneumatic hammer, cleaning /drying cracks;

3 Concrete pumping equipment

4 Deep vibrator for concrete compaction;

5 Injection concrete equipment, metallic brush or sanding equipment for the concrete and reinforcement steel cleaning;

6 Temporary scaffoldings, auxiliary piers, lifting equipment for repair works.

401.04. Repair Works (Plaster), Run of Slope, Beam Joints.

The repair works will be executed with mortar of cement and sand of 2-3 cm thickness on the piers elevation and on the abutment, acording to SNiP 3.06.04-91. A drainage slope with a gradient of 1%, will be executed with sand cement mortar on the collar beam and on the abutment, acording to SNiP 3.06.04-91. The jointing of deck beams and the consolidation of pier piles will be executed with reinforced concrete after abrading and cleaning concrete and reinforcing bars acording to the Project, and SNiP 3.06.04-91. On completion of the works under this section, surfaces of the piers, elevation, of the abutment and faces of the outer deck beams will be painted with a liqhuid suspension of cement with polymers, to obtain an improved, uniform appearance.

The works will be carried out only in dry and reasonably warm weather, the temperature being higher than 5° C at all times.

401.05. Cleaning and filling of cracks

Cracks will be cleaned and dried using water jets and blowing equipment the cracks.

401.06. Consolidation of reinforced concrete piles.

The works shall be executed after cleaning the river bed beneath the bridge and shall include excavation of the soil around the pile to the required depth, the placing of consolidation works of reinforced concrete cast-in-situ, waterproofing works by applying of two layers of mastic with a brush, soil back-filling and compaction works in layers of 15 cm thickness. The excavation and waterproofing works are described in the relevant sections. Reinforcement and concrete work shall be executed in accordance with the requirements of SNiP 3.06.04-91.

401.07. Work acceptance

Works acceptance will be in accordance with paragraph 001, provided they are executed in compliance with SNiP 3.06.04-91, Project, with these Technical Specification and approved by the Engineer.

Measurement

The minor repair, consolidation, jointing and slope execution works described in this chapter will be measured in cubic metres of reinforced concrete or reinforced concrete with polymers, or mortar with polymers, or sand cement mortar. Repair works and painting works will be measured in square metres of the surface covered with sand cement mortar or with liquid suspension of cement with polymers .

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
40101	Minor repair of the infrastructure and superstructures using reinforced concrete	cubic metre
40102	Minor repair of the infrastructure and superstructure elements using concrete with polymers	cubic metre
40103	Minor repair of the infrastructure and superstructure using mortar with polymer	cubic metre
40104	Repairs to the pier and abutment elevation using cement and sand mortar	square metre
40105	Consolidation of piles with reinforced concrete	cubic metre
40106	Jointing of superstructure beams	cubic metre
40107	Provision of drainage slope on collar beam in sand cement mortar	cubic metre
40108	Painting of the visible surfaces of the infrastructure and superstructure elements using liquid Suspension of cement with polymers	square metre

CHAPTER 402. PILE ABUTMENT AND RETAINING WALL

Description

402.01. Introduction

The works include bridge abutments and abutment repair work to existing bridges. The abutment in question consists of driven reinforced concrete piles made rigid by connecting the pile tops with a collar beam of reinforced concrete. Behind the abutment there is a retaining wall of pre-cast reinforced concrete blocks which retains the road embanckment. The abutment is prolonged in the form of wings to retain the embanckment slopes. The works for the new abutment include: procurement of materials, piles manufacturing, transporting and driving, mounting of the collar beam blocks, provision of waterproofing to buried suprfaces. Abutment repairs will consist of rehabilitation of the retaining wall in the wing area which has disintegrated as a result of washout. The works will be executed according to the Project, Designs type 3.503.1-79 and 3.503.1-75.

Materials

402.02. Materials

The materials, pre-cast elements, and other items used in these works shall be in accordance with the following:

Concrete and components	Technical specifications SM GOST 26633-91** SNIP 3.06.04-91
Sand Cement Mortar	Technical specifications, SM GOST 28013-98**, SNIP 3.06 04-91
Pre-cast reinforced concrete with a cross-section of 0,35x0,35m	Technical specifications, Designs type 3.501-86
Reinforced Concrete Blocks for the collar beam	Technical specifications, SNiP 3.06.04-91
Reinforced Concrete blocls for the retaining wall	Technical specifications, SNiP 3.06.04-91
Reinforcing bars and built-in elements	Technical specifications, Designs type 3.501.1-79, SNiP 3.06.04-91
Crushed stone for the foundation of the retaining wall	SM GOST 8267-93***
Treatment with bitumen for waterproofing	VSN 32-81
Bitumunous Mastic for waterproofing	VSN 32-81

Working Conditions

402.03. General requirements.

The abutment works shall be in accordance to the technical specification and SNIP 3.06.04 - 91.

402.04. Equipment..

The following equipment is likely to be required

1 Pile driving machine, for piles with a length up to 12,0 m;

2 Motocrane, for servicing the pile driving machine and mounting the blocks of weight up to 5t.;

3. Welding Compressor, for welding works;

4 Equipment for injection in joints and cracks;

5 Vibrator for concrete compaction in joints between abutment elements;

402.05. Piles

Pile driving shall be done to the designed refusal, such that the end of the pile is no higher than the indicated level in the technical specification. Cutting the top of the pile to length shall be done according to the Technical Specification and the Design type 503.1-79.

402.06. Jointing of the abutment blocks and the retaining wall.

	Jointing of abutment blocks and retaining wall shall be carried out in accordance with the following:

1.	Blocks of the collar beam with the piles	According to Design type 3.503.1-79
2.	Blocks of the collar beam	According to Design type 3.503.1-79
3	The blocks of the new retaining wall and blocks of the exising wall	According to Design type 3.503.1-75
4.	Welding works are to be executed according to:	Technical Specification and SNiPs 3.03.01-87 and 3.06.04-91

402.07. The Retaining Wall

While erecting the retaining wall, the blocks are to be viably fixed with the piles. The joints between blocks of the retaining wall will be filled with sand cement mortar through the whole depth. The retaining wall repair works include excavation of the slope soil, backfilling and compaction works.

402.08. Casting and curing of Concrete and mortar

Casting and curing of concrete and mortar shall be carried out in accordance with SNiP 3.06.04-91, Design type 3.503.1-79 and 3.503.1-75

402.09. Waterproofing

Waterproofing shall be carried out in accordance with SNiP 3.04.03-85 CPE .04.03-2005 and VSN 32-81. The buried surfaces of the abutment shall be waterproofed with two layers of bitumen of binding waterprofing type. Waterproofing shall only be applied to surfaces which have been carefully cleaned and are dry and free from grease, mud and dust

Waterproofing shall only be carried out whilst air temperatures are above 5°C.

402.10. Works acceptance

The works for the abutments on piles and for the supporting walls will be accepted when shown to be in accordance to the technical specification, SNiP 3.06.04-91, VSN 32-81 and when approved by the Engineer.

Measurement

The works will be measured in cubic metres of reinforced concrete for each type of element as listed in the schedule of pay items below. No other measurements shall be made for the opurposes of payment.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of Measure**
40201	Execution of the abutment of pre-cast reinforced concrete piles	cubic metre
40202	Execution of the retaining wall of pre-cast reinforced concrete elements	cubic metre
40203	Repair works to reinforced concrete retaining wall	cubic metre

CHAPTER 403. REPAIR OF ABUTMENT WING WALLS

Description

403.01. Introduction

The works described in this chapter cover the repair and overbuilding of reinforced concrete wings on a direct foundation at the existing bridges, with extension of the abutment in the embankment slope area, as well as reinforced concrete wings to the safety walls on the collar beams of the abutment. The wings are to be executed according to the Technical Specification and to SNiP 3.06.04-91.

Materials

403.02. Materials

Materials and the pre-cast elements must comply with the follwing requirements.

Concrete and components	Technical Specification, SM GOST 26633-91** SNiP 3.06.04-91
Crushed stone for the fioundation bed of the abutment wing wall	SM GOST 8267-93***
Reinforcement and buit-in elements	Technical Specification, SM GOST 5781-82*****, SNiP 3.06.04-91
Bitument treatment for waterproofing	VSN 32-81
Bitumunous Mastic for waterproofing	VSN 32-81

Working conditions

403.03. General conditions.

The execution of these works at the abutment shall be executed in compliance with SNiP 3.06.04-91.

403.04. Equipment.

The following equipment is likely to be required:

1 Crane for the assembly and dismantling of formwork, installation of the reinforcing grid and supply of concrete using a bucket ;

2 Excavator, for the excavation of the foundation;

3 Welding equipment for welding works;

4 Vibrators for compaction of the concrete cast-in-situ;

5 Pump, for pumping the water from the foundation excavation

403.05. Excavation works for the execution of the abutment wing walls

The excavation works for the foundation of the abutment wing walls and the removal of soil to repair and overbuild the wing walls and execution of the wing wall, as well as backfilling after execution and waterproofing of the wing walls shall be executed in accordance with the

provisions of Chapter 203.

403.06. Formwork

Formwork shall comply with the requirements of SNiP 3.06.04-91.

403.07. Steel Reinforcement

Reinforcing works are to be carried out according to SNiP 3.06.04-91. No reinforcement shall be brought on to the site or used without a manufacture certificate certifying that it complies with requirements. Any change or substitution in the category class, diameter, or type of the steel, required by the Technical Specification must be agreed by the Engineer.

Before use, all reinforcement must be cleaned of rust, mud, dust and grease, Lap joints of reinforcing bars are to be executed by overlapping by a length of at least 30 bar diameters and in compliance with requirements of the Technical Specification.

Where the welding of reinforcement and built-in elements is unavoidable the work shall be executed in accordance with the requirements of SM GOST 14098-91. Welding of reinforcement shall be avoided wherever possible and shall not be carried out without the explicit permission of the Engineer.

403.08. Concrete Casting Works

Concrete mixing, transportation and casting, as well as concrete curing works are to be carried out in accordance with the requirements of this Specification, SM GOST 26633-91** and SNiP 3.06.04-91.

No concrete mixture which has lost its required workability shall be used. It is not permissable to improve the concrete workability by adding additional water into the mixed concrete.

Any defects on exposed surfaces after removing formwork will be made good by smoothing with sand cement mortar if the Engineer approves. If the defect is too serious for such approval the Contractor shall remove the defective work and .replace it at his own cost.

403.09. Waterproofing

Waterproofing works are to be carried out in accordance with the provisions of paragraph 402.09

403.10. Acceptance of works

The works will be accepted in accordance with the provisions of chapter 001 provided they are in accordance with this Specification, SNiP 3.06.04-91 and are to the satisfaction of the Engineer.

Measurement

The works will be measured in cubic metres of reinforced concrete for each type of element as listed in the schedule of pay items below. No other measurements shall be made for the purposes of payment.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
40301	Execution of the slope wing wall at the abutment	cubic metre
40302	Consolidation of the slope wing wall at the abutment	cubic metre
40303	Overbuilding of the slope wing wall at the abutment	cubic metre
40304	Execution of the wing wall on the reinforced concrete collar beam	cubic metre
40305	Repair works of the reinforced concrete wing wall at the abutment	cubic metre

CHAPTER 404. SUPERSTRUCTURE: SPAN 6,00 M

Description

404.01. Introduction

The works described in this chapter cover the provision of bridge deck, 6,00 m span at new bridges and replacement of deteriorated reinforced concrete slabs at existing bridges with a span of 6,00 m. The works consist of manufacturing, transporting, handling, execution of the bearing parts, erection of deck slabs and their jointing. The work of demolishing bridge elements and dismantling of the existing reinforced concrete slab decks of 6,00 m span do not not form part of this chapter and are included in chapter 418. The work of waterproofing new brudge decks ad repaired bridge decks is covered in chapter 408.

Materials

404.02. Materials

All materials and pre-cast elements used for the works of this chapter must comply with:

Concrete and components	Technical Specification, SM GOST 26633-91** and SNiP 3.06.04-91
Sand Cement Mortar	Technical Specification, SM GOST 28013-98** and SNiP 3.06.04-91
Reinforcing bars and built-in elements	Technical Specification ,SNiP 3.06.04-91
Reinforced concrete slabs with ribbed bars for the superstructurei	Technical Specification SNiP 3.06.04-91
Bituminous felt în rolls	SNiP 3.06.04-91

Working conditions

404.03. Equipment

The following equipment will be required:

1 Crane for the mounting of deck slabs, weight p to 3 tons. ;

2 Welding equipment for welding works;

3 Vibrators for compaction of the concrete cast-in-situ;

404.04. Mounting the deck slabs

Execution of the pre-cast reinforced concrete slabs, acceptance of the executed items, and their transporting and erection are to be carried out in compliance with the requirements of the Technical Specification and SNiP 3.06.04-91. The slabs for the superstructure are to be mounted on a bearing platform, consisting of a layer of sand cement mortar 2-3cm in thickness placed on top of bituminous felt layer, Slabs shall be placed while the mortar is still soft,. Slabs jointing has to be done in compliance with the Technical Specification.

Traffic shall not be permitted on new bridge decks or bridge deck elements until the jointing concrete has reached 70% of its design strength.

404.05. Concrete Casting and Curing of joints

Concrete Casting and Curing at the joints will be done as described in the paragraphs 403.08.

404.06. Works acceptance

Acceptance of the works of this chapter shall be in compliance with chapter 001 provided the works have been executed in accordance with the requirements of SNiP 3.06.04-91 and the Specifications and are approved by the Engineer.

Measurement

The works for constructing new bridge decks and replacing slabs of existing bridge decks will be measured as the total cubic metres of precast reinforced concrete and of cast-in situ concrete required to be placed in the works. The work of actually placing the new slabs in position will be measured by the number of slabs placed.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter and shall be the full payment due in respect of all works required to provide the new bridge deck elements in place, mounted and jointed.

Payment will be made under the following items:

	Item	**Unit of measure**
40401	Execution of complete or partial brdge deck of 6,00 m span	cubic metre
40402	Bridge deck slabs for deck widening in reinforced concrete, 6,00 m span, including cross beams	number

CHAPTER 405. CONSTRUCTION AND REPAIR OF APPROACH SLABS

Description

405.01. Introduction

The work in this chapter covers the construction of approach slabs to new bridges and to existing bridges where there are no slabs and the repair/replacement of damaged or incorrect approach slabs. Works will be carried out on the basis of the Technical Specification and the Design type 3.501-41 and include the demolition and removal of existing slabs and bearing beams, provision of crushed stone bed to the new bearing beam, the provision and placement of new bearing beams and approach slab elements and waterproofing.

The repair works envisage the removal of 4 metre length precast approach slab and bearing beam elements and the demolition of associated in situ concrete works together with the demolition of 8 metre length in situ approach slabs and removal of PC bearing beam elements. When the area has been cleared, the damaged/eroded embankment will be made good with approved backfill material and the bearing beams and approach slabs reconstructed and waterproofed. Wherever possible, the recovered PC approach slab and bearing beam units will be re-used. Where recoverd PC units are not available the missing sections will be made good either with approved new PC sections or with in situ construction.

Materials

405.02. Materials

Materials, precast units and elements for the works of this chapter must comply with the following requirements:

Concrete and components	Technical Specification, SM GOST 26633-91**, SNiP 3.06.04-91
Crushed stone for the bed of the bearing beam	SM GOST 8267-93***
Reinforcement	Proiect-tip 3.503.-41
Bitumen treatment for waterproofing	VSN 32-81
Bituminous mastic for waterproofing	VSN 32-81
Reinforced concrete slabs of the bearing beam	Design type 3.503.-41
Reinforced concrete approach slab	Technical Specification, Proiect-tip 3.503-41
Approved Backfill	SM GOST 23735-79* and Chapter 406

Working conditions

405.03. General

The works in this chapter will not be executed until completion of any works required under the provision sof chapter 406. Execution and repair works to bridge approach slabs shall be carried out in compliance with SNiP 3.06.04-91 and Design type 3.503-41.

405.04. Equipment

The following equipment will be required:

1 Crane for the mounting of PC units, weight up to 4 tons. ;

2 Vibrators for compaction of the concrete cast-in-situ;

405.05. Crushed stone bed for the bearing beam

The bed will be executed of graded crushed stone to achieve an interlock according to SNiP 3.06.03-85, and the Design type 3.503-41.

405.06. Installation of Bearing Beams and Approach slabs

The installation of the approach slabs on to the bearing beam and the abutment shall be done in compliance with Drawing 3.503-41. Trafficking on top of the approach slab after execution of these works is allowable only when the strength of insitu concrete achieves 70 percent of the designed strength.

405.07. Casting and curing of concrete at the approach to bridges

Casting and curing of concrete at the approach to bridges shall be in compliance with paragraph 403.08 and 403.09.

405.08. Waterproofing

The surface of the approach slabs and of the bearing beams on their conjunction with the embankment must be waterproofed. The wiorks must be executed as described in the paragraphs 402.09.

405.09. Acceptance of work

The acceptance and repair works of the approach to the bridge shall be in accordance with the requirements of chapter 001. The works shall comply with the Technical Specification, Design type 3.503-41, SNiP 3.06.04-91 and 3.09.01-85.

Measurements

The Works under this chapter shall be measured for payment only as the square metres of approach slab affected, measured on the surface of the approach slabs. No separate payment shall be made for the works of excavation and backfilling but the work of replacing road pavement shall be paid under the appropriate items of Chapter 3 based on the area derived by multiplying the road pavement width by a length equal to the distance from the rear of the abutment wall to the back face of the bearing beam plus the depth from the underside of the crushed stone pad to the finished road level.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
40501	Provision of approach slabs at new bridges, length 4 metres	square metre
40502	Provision of approach slabs at existing bridges, length 4 metres, where there is no existing approach slab	square metre
40503	Repair of existing approach slabs at existing bridges, length 4 metres	square metre
40504	Repair of existing approach slabs at existing bridges, length 8 metres	square metre

CHAPTER 406. REPAIRS TO ABUTMENT EARTHWORKS (CONES)

Description

406.01. Description

The work in this chapter includes providing backfill to gaps behind abutments and wingwalls and reinstating the correct shape of the conical and semiconical slopes at open abutments using selected, granular, approved free draining soil.

Additionally works include the reshaping of washed out stream and waterway banks by excavation and by placing and compacting fill of normal soil.

These works include exacavation of soil, transporting, stockpiling, unloading, spreading, grading, compction and finishing works. The width of the fill of draining material behind the abutment will be calculated according to the SNiP 3.06.04-91.

406.02. Materials

The free draining granular soil, used for the works of this chapter shall have a filtration coefficient not less than 2.00 m in 24 hours and must comply with Technical Specification, SNiP 3.06.04-91. The filtration coefficient will be determined according to SM GOST 25584-90*. Washed out stream and river banks will be reinstated using normal soil of sandy clay.

Working conditions

406.03. General requirements

The free draining and normal material for fill may only be used after the quality of the material has been tested and verified according to the Technical Specification and approved by the Engineer.

The requirements for the fill and the testing methods are indicated in the SNiP 3.06.04-91. The soil will be spread in layers of 10-15cm thickness and compacted by rammers or vigrating plate compactors and by hand where mechanical compaction is not possible at the optimum moisture content. The coefficient of compaction of the soil 98%. The moisture content and the properties of the soil shall be determined according to the paragraph 201.11. For repairs to sloping surfaces, benches shall be cut in the existing surfaces.

406.06 Acceptance of work

Acceptance of the work will be in accordance with chapter 001. Work shall comply with SNIP 3.06.04-91, technical specifications and be approved by the Engineer.

Measurement.

The work executed under this chapter shall be measured as the cubic metres of compacted soil placed under the appropriate location in one of the three fill items below. Excavation in river beds shall be measured in cubic metres of material excavated and removed.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
40601	Filling the gaps behind the abutment with free draining soil	cubic metre
40602	Reinstatement of the slope semicones and of the embankment slopes on the approaches to the bridges using free draining soil	cubic metre
40603	Reinstatement of the slopes of the river bed with normal soil	cubic metre
40604	Excavation in river beds	cubic metre

CHAPTER 407. EXPANSION JOINTS

Description

407.01. Introduction

The present works consist of the replacement of the damaged elements of the expansion joints using new elements for the existing bridges without any expansion joints and for the newly executed bridges. For bridge decks with length up to 12 m joints will be executed using brass sheet according to the Design type 3.503.1-101 and Technical Specification, and for those with length greater than 12 m. joints will be executed using an approved proprietary expansion joint, appropriate to the size of deck and incorporating a waterproof, elasticated rubber coverling sealed on top of the joint.

Materials

407.02. Materials

The materials and devices used in this chapter must be in accordance to:

Brass sheet of 1.5 mm thickness	SM GOST 931-90
Expansion joint set with a reinforced rubber elasticator covering device	The manufacture's standards
Reinforcement	Technical Specification, SM GOST 5781-82*****
Bituminous mastic	SM GOST 15836-79
Concrete and components	Technical Specification, SNiP 3.06.04-91, Design type 3.503.1-101
Asphalt concrete	Technical Specification, SM STB 1033:2008

The hemp rope has to be impregnated with oil mixture. The brass sheet will be fashioned as a drain or inverted "top-hat" having depth at least two times the width of the expansion joint of the superstructure.

Prprietary joints for spans equal to or greater than 12m. Shall be fixed to the deck by drilling and using bolts of approved material set in epoxy.

Working conditions

407.03. General Requirements

For the existing bridges and overpasses, in the new expansion joints area, the pavement of the carriageway will be taken out, to expose the surface of spans and abutment end walls.

The mounting and installation of joints for less than 12m spans shall be executed according to the Design type 3.503.1-101 and shall be fixed on the concrete surface prior to any new asphalt being placed.

Proprietary joints for spans of 12 m. or more shall be installed in compliance with the Manufacturer's Specifications and instructions.

Expansion joints shall be assembled and fitted only when air temperatures are above $+5^0$C.

407.04. Works acceptance.

The repairing of the expansion joints for the existing bridges and the construction of the expansion joints for the new bridges will be accepted on the basis of chapter 001 provided they are in accordance to the project requirements, technical specifications and are approved by the Engineer.

Measurements.

The works for the construction and repair of expansion joints will be measured in linear metres, along the joint for each of the three item descriptions given below. This measurement shall be the only measurement for works under this chapter and shall include for all operations necessary to provide the completed expansion joints in place inlcuding the proper reinstatment of the pavement, if applicable.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
40701	Repair/replacement of expansion joints (Deck length less than 12 metres)	linear metre
40702	Construction of expansion joints to new decks (Deck length less than 12 metres)	linear metre
40703	Repair/replacement using Proprietary expansion joints (Deck length equal to or greater than 12 metres)	linear metre

CHAPTER 408. WATERPROOFING

Description

408.01. Introduction

The works under this chapter include the repairing/replacement of the waterproofing to the carriageway and walkways of existing bridge decks and the waterproofing of the decks on new bridges. The works of waterproofing on new bridges includes the application of a regulating layer of concrete 30 mm thickness, the waterproofing layer and a protection layer of reinforced concrete of 40 mm thickness. During the repair of waterproofing works on existing bridges it will be necessary to remove the protection layer of reinforced concrete. If the regulating layer has deteriorated or is damaged then such damaged areas shall be removed and reinstated for the full layer thickness. The reinstatement of the asphalt pavement over these works is not included în the repair and execution work of waterproofing.and is payable under the appropriate items of Chapter 3.

The works of this chapter also include waterproofing works on the reinforced concrete walkways of bridge decks.

The works of this chapter also include waterproofing works to buried infrastructure elements. These consist of two layers of bituminous mastic being applied by brush in compliance with VSN 32-81.

Materials

408.02. Materials

The materials used in waterproofing shall be in accordance with the following requirements

Treatment with bituminous mastic	VSN 32-81
Bituminous mastic	VSN 32-81
Rolls of reinforced waterproofing membrane of 4 mm to 6mm thick	VSN 32-81
Concrete for the levelling and protection course	Technical Specification, Proiect-tip 3.503.1 - 101
Asphalt concrete	SM STB 1033:2008, Chapter 3 this Specification
Metallic mesh for the protection course	SM GOST 23279-85

Working conditions

408.03. General requirements.

The levelling course, waterproofing and the protection layer shall be executed in accordance with the project drawings, Design type 3.503.1 – 101, VSN 32-81 and SNiP 3.06.04 – 91.

If the existing levelling course is damaged on the carriageway, this will be taken out down to the structural deck level. The levelling course will be kept if it is in good condition.

The waterproofing will be carried out on the smooth, clean, dry surface of the levelling course. The waterproofing will be done only after the expansion joint elements have been installed.

The waterproofing membrane will be laid on the levelling course of the deck, adhesion will be achieved by gas flame heating, Waterproofing materials will be overlapped by at least 10 cm

at all joints, laps will be arranged to lie in the direction of drainage flow; Any overlap for a subsequent layer will be offset at least 30 cm. From the preceding lap. The waterproofing shall to be smooth, continuous, without signs of swelling or bubbling on the surface and shall be firmly adherent throughout. The reinforced concrete protecting course must laid immediately after waterproofing. These works are followed by walkways and asphalt pavement works when the RC protection layer has cured. Waterproofing works must be carried out only when air and concrete deck temperatures are higher than 5°C.

Waterproofing to the existing walkways of reinforced concrete unitss will be carried out after execution of safety parapets indicated in chapter 417 using the same materials and process as for the decks. The works will be executed according to VSN 32-81 and the waterproofing will be covered with a layer of asphalt, as specified in chapter 413.

Waterproofing to the faces of buried elements of the abutments and wingwalls shall be made in accordance with the requirements of VSN 32-81 using and approved bituminous mastic applied by brush in at least two coats. Such waterproofing shall be fully dry before being buried.

408.04. Acceptance of works

Waterproofing to new and existing structures will be accepted according to chapter 001 provided it is in accordance with project requirements and Technical Specification and is approved by the Engineer.

Measurement

Waterproofing will be measured in square metres of surface waterproofed under the four different classes of waterproofing itemised below .

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
40801	Waterproofing to existing bridge decks	square metre
40802	Waterproofing to new bridge decks	square metre
40803	Waterproofing to walkways	square metre
40804	Waterproofing to buried elements of the abutments and wingwalls	square metre

CHAPTER 409. SAFETY BARRIERS

Description

409.01. Introduction

The works under this chapter include the provision and erection of metal safety barriers for the safety of vehicular traffic on bridges and on the approach to bridges. Barriers, posts and fittings shall be hot dip galvanised.

The removal of the old parapeţs on bridges and embankments are included in chapter 418.

Materials

409.02. Materials

Materials and prefabricated units used for the works of this chapter have to be in accordance with:

Concrete for foundations	Project Drawings, SM GOST 26633-91** and SNIP 3.06.04-91, This Specification
Metal Safety Barriers	Project Drawings, SM GOST 26804-86
Paint	SM GOST 26804-86 and SNiP 3.04.03-85 CPE.04.03-2005, SNiP 2.03.11-85

Execution

409.03. Working requirements

Execution of the works of metal safety barriers on emabankment shall be in accordance with the requirements of chapter 701 but with reference to the bridge drawings.

Execution of the works of metal safety barriers on structures shall generally conform to the requirements of chapter 701 except that the details of the structures shall conform to the appropriate project drawings and the erection shall be by bolting down to the deck. Two variants are foreseen: one variant with a short post mounted on an existing concrete stub footing and one variant with a longer post mounted directly to the deck. These variants are shown in the Drawings.

Galvanising of all elements shall conform to the requirements of chapter 701.

409.04. Acceptance of works

The works will be accepted under chapter 001 provided they are in accordance with the drawings, SM GOST 26804-86 and these Specifications and are approved by the Engineer.

Measurement

The provision and installation of metal safety parapets shall be measured in linear metres of each type of parapet installed measured along the face of the rail.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
40901	Execution of metal safety parapets on the bridge deck	linear metre
40902	Execution of metal safety parapets with stub foundation on the bridge deck	linear metre
40903	Execution of metal safety parapets on the embankment	linear metre
40904	Painting of the poles of the metal safety parapets	linear metre

CHAPTER 410. SURFACE WATER DISPOSAL

Description

410.01. Introduction

This category of works includes the construction of water disposal chutes, located on the slopes, of embankments, and the repair of drainage gullies and outlets in bridge decks. The chutes will be constructed according to the project designs Design type 503-09-7.84. Chutes are made using precast reinforced concrete units.

Note that the repair of chutes is covered in chapter 502.

Repair of drainage gullies in bridge decks will require the provision of cast iron gratings to gully entries where these are missing and repair works to the extremities beneath the bridsge decks requiring the extension of the outlet pipe to a point below the lowest part of the adjacent deck structure. Extension shall be by means of plastic pipe. Where the existing extremity is of sufficient length the extension pipe shall be clamped in place. Where the remaining extremity is too short for this option alternative means of attachment shall be found; use of an epoxy adhesive is foreseen in these circumstances. Such repairs shall conform to Design type 3.503.1-81.

Materials

410.02. Materials

The materials and the precast reinforced concrete units used must be in accordance with the technical specification and the Design type 503-09-7.84.

The grid used on the outlets must comply with this specification and the Design type 3.503.1-81. The metal must be painted in accordance with SNiP 2.03.11-85 and 3.04.03-85 CPE .04.03-2005.

Working Conditions

410.03. General Requirements.

Any earthworksrequired in the repair of chutes will be executed according to Chapter203.

The foundation for chutes must be strictly parallel to the designed surface of the embankment and chutes.

Any parts of the PC chute units, that are in a contact with the soil, must be treated with a layer of bitumen according to SNiP 3.06.03-85.

The provision of metal grilles to bridge deck gully inlets shall include all necessary works, including reseating the surround frame if necessary, to provide a well fitting grille parallel with the finished surface of the bridge deck and set 20mm below the level of the final asphalt surface (tolerance +/- 5 mm).

The work on gully inlets shall be co-ordinated with any deck waterproofing work to ensure that neither item of work disrupts/damages the other.

410.04. Precast reinforced concrete units

Pre cast concrete chute units will preferably be supplied from a precast factory equipped for the production of such units. If units are precast on site the concrete works shall be in accordance with Chapter 504 and reinforcement will be in accordance with. SM GOST 23279-85 and SM GOST 5781-82*****. The detail design of any chutes, whether cast on site or provided from a precast factory shall be subject to the review and approval of the Engineer.

410.05. Concrete works

All in situ concrete works will be executed in compliance with the provisions of Chapter 504.

410.06. Acceptance of works

Works under this chapter will be accepted on the basis of compliance with the drawings of the Design type 503.09-7.84, the relevant specifications including Chapter 001, and their acceptance by the Engineer.

Measurement

The construction of chutes will be measured in linear metres along the centre line of the chute.
Repair works to gullies in bridge decks will be measured in units repaired with inlets (metal grilles) and outlets (extension pipes) measured separately.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
41001	Construction of chutes on the slope	linear metre
50204	Repair of chutes on the slope	linear metre
41002	Repairs and replacement grilles to bridge deck gully inlets	number
41003	Repairs and extensions to bridge deck gully outlets	number

CHAPTER 411. ACCESS STAIRS ON SLOPES

Description

411.01. Introduction

The works under this chapter comprise the construction of access stairs on the earthworks slopes at the approaches to the bridges and the repair works of existing stairs. Repair works consist in casting concrete in the deteriorated gaps and mounting of metal safety rails for pedestrians.

Materials

411.02. Materials

The materials, precast units and prefabricated items for use in this work shall be in accordance to the following requirements:

Crushed stone for the bed underneath the stairs	SM GOST 8267-93***
Concrete and components	Project Design, GOST 26633-91**and SNIP 3.06.04-91
Reinforcing bars and build-in elements	Project Design, SM GOST 5781-82*****
Metallic handrails for the stairs	Project Design

The materials used for reinforced concrete stairs shall comply with the requirements of chapter 403.

The handrails and all fixings and fittings shall be hot dip galvanised after fabrication in accordance with the standards for guard rals in chapter 701.

The paints used shall comply with the requirements of SNiP 2.03.11-85 and design drawings 3.04.03-85 CPE.04.03-2005.

Working conditions

411.03. General conditions

The construction of the stairs will be made after the earthworks on the approaches are completed

For the construction of the stairs precast units will be used. The units shall be fabricated in accordance with the requirements of chapter 504 to a detail design in accordance with the project drawings and approved by the Engineer. Any in situ concrete requied for the positioning and fixing of the PC stair units shall be in accordance with the requirements of chapter 504.

The required eathworks for the stairs will be in accordance with chapter 203.

411.04. Work acceptance

Acceptance of the works will be on the basis of chapter 001. Works shall be in compliance with Technical Specification and with the drawings and shall have the approval of the Engineer.

Measurement

The execution of access stairs and repair works will be measured in linear metres along the slope stairs, starting at the top and finishing at the bottom of the embankment.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
41101	Construction of new slope access stairs	linear metre
41102	Repair works to existing slope access stairs	linear metre

CHAPTER 412. PROTECTION OF SURFACES

Description

412.01. Introduction

The works under this chapter include the provision of hard protection to semicone slopes and approach embankment slopes, the repair of existing protection of this nature and the provision of protection to the river bed beneath bridges.

Materials

412.02. Materials

The materials used for these works must comply with the following requirements:

Concrete and components	SM GOST 26633-91**, SNIP 3.06.04-91 and Chapter 504
Reinforcement	SM GOST 5781-82*****
Crushed stone	SM GOST 8267-93***
Stone of 25 cm size	SM GOST 8267-93***

Working conditions

412.03. General requirements

Protection works shall be executed in accordance with project Design type 3.503.1-156. The protection must be executed on a smooth and compacted surface, which has been divided into strips according to the Design type 3.503.1-156.

Reinforcing works must be executed in compliance with the requirements of SNIP 3.06.04-91.

All concrete protection shall be reinforced with a single layer of 200x200mm mesh of 6mm diameter wires complying with SM GOST 5781-82*****.

Any filling required to make good cone surfaces and embankment slopes prior to applying protection shall be executed in accordance with the requirements of chapter 406.

The demolition, removal and cleaning work required to prepare damaged or deteriorated protection for repair with reinforced concrete, are included in chapter 418.

412.04. Protection of the conical surfaces at bridge abutments.

The protection of conical surfaces will be executed of reinforced concrete cast-in-situ of 8 cm thickness on a layer of crushed stone of 10 cm thickness.

412.05. Protection to embankment slopes at bridge approaches.

The protection of embankment slopes adjacent to the abutment will be formed using a 12 cm. Thickness of concrete cast-in-situ with 12 cm thickness over a layer of crushed stone 10 cm. in thickness. The protection of the embankment slopes of the approaches will carried out for a length not less than 1.00 m.

412.06. Protection to river beds beneath bridges

The protection of river beds beneath bridges will comprise a layer of boulder rock of 50 cm thickness over a layer of crushed stone of 10 cm thickness and will be carried out in conformity with the project Design type 3.501.1-156

412.07. Acceptance of works

Acceptance of the works will be on the basis of chapters 001. Works shall be in compliance with Technical Specification, the drawings, SNIP 3.06.04-91, Design type 3.501.1-156, and shall have the approval of the Engineer.

Measurement

The slope protection and repair works with reinforced concrete cast-in-situ and the river bed protection with boulder rock will be measured in square metres of the protected or repaired surface.

The work of filling and making good the cone slopes with free draining material will be accepted and measured in accordance with chapter 406.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
41201	Protection of the semicone slopes with reinforced concrete of 8 cm thickness over a layer of crushed stone of 10 cm thickness	square metre
41202	Repair works to existing protection of semicone slopes with reinforced concrete of 8 cm thickness over a layer of crushed stone of 10 cm thickness	square metre
41203	Protection to approach embankment slopes with reinforced concrete of 12 cm thickness over a layer of crushed stone of 10 cm thickness	square metre
41204	Protection to the river bed with boulder rock of 50 cm thickness over a layer of crushed stone of 10 cm thickness	square metre

CHAPTER 413. ASPHALT CONCRETE TO PAVEMENT AND SHOULDERS

Description

413.01. Introduction

The works in this chapter cover the application of asphalt concrete surfacing to the completed bridge deck and bridge walkways and as protection to the shoulders on the approaches.

The work of demolishing and removing asphalt pavement on bridge decks is covered in chapter 418.

Materials

413.02. Materials

The materials for use in the works of this chapter shall conform to the following requirements::

Asphalt concrete	Chapter 308 and SM STB 1033:2008
Bituminous prime coat	Chapter 307 and SNIP 2.05.02-85
Crushed stone	SNIP 2.05.02-85, SM GOST 8267-93***

Working conditions

413.03. Carriageways and walkways

After completion of all waterproofing and waterproofing protection and of all works to bridge deck gullies, carriageways on bridges will be covered with 70mm of asphalt wearing course material of fine aggregate type A MI H. Asphalt will be laid in two layers; a first layer of 40mm and a final layer of 30mm. Laying will be in accordance with the requirements of chapter 308 for machine laid asphalt. Before the asphalt is laid, the supporting surface will be tack-coated using bituminous emulsion according to the requirements of chapter 307. The finished asphalt layer shall meet the surface tolerances given in chapter 308.

A 40mm layer of asphalt will be laid on the precast unit walkways of the existing bridges. The 40mm asphalt layer walkways will be laid on the waterproofing after completion of waterproofing works. Asphalt to walkways will be laid in compliance with the requirements of chapter 311.

413.04. Shoulders

Where indicated on the Drawings or directed by the Engineer, shoulders to bridge embankment approaches shall be protected with a 50mm. layer of asphalt on a base of crushed stone of 100mm thickness.

Base and asphalt to shoulders shall be in compliance with the requirements of chapters 306, 308 and 311. Asphalt protection to shoulders shall be laid after the execution of the safety guardrails and the drainage chutes.

413.05. Work acceptance

Acceptance of the works of asphalt to bridge decks and walkways and shoulder protection will be under chapter 001, The works shall be in accordance with SNIP 3.06.03-85, the Drawings and Specification and shall be to the satisfaction of the Engineer.

Measurement

The pavement works on the carriageway, existing walkways and the shoulder protection works shall be measured in square metres of the finished surfacing laid of the specified thickness or in tons of asphalt used. The measurement of the shoulder protection shall include within this asphalt measurement the provision of crushed stone base layer and any excavation and disposal of material required to perform the works of shoulkder protection.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
41301	Laying of 70 mm of fine asphalt Type A, M-I, on the carriageway of the bridge deck in two layers	square metre
41302	Laying of 40mm of fine asphalt Type A, M-I, on the walkways	square metre
41303	Shoulder protection of fine asphalt Type A, M-I, of 50mm thickness, over a subbase of crushed stone of 100mm thickness	square metre

CHAPTER 414. PEDESTRIAN SAFETY PARAPETS

Description

414.01. Introduction

The works consist of the provision of new metal pedestrian safety parapets, the repair of existing parapets and cleaning and painting of all the parapets.

Materials

414.02. Materials

The materials and elements shall comply with the following requirements:

Standard sections of metal pedestrian parapets	Technical Specification, Design type 3.503.1-81
Paints	SNIP 2.03.11-85, SniP3.04.03-85 CPE.04.03-2005, SM GOST 9.032-74*

Working Conditions

414.03. General Requirements.

Metal pedestrian safety parapets shall meet the requirements of the Design tip 3.503.1-81

The bent and damaged elements of the existing parapets shall be straightened, rewelded where necessary and reused, those elements which are too badly rusted to permit repair shall be replaced by new ones. The work of repair shall include all necessary dismantling and re-erection of prapet elements.

Painting of parapets shall to be executed according to the SNIP 3.04.03-85 CPE.04.03-2005 and 3.06.04-91. Before painting, all old paint, rust, grease and oil and any other contaminants shall be removed and the parapet elements cleaned to bright metal. Immediately after cleaning, the parapet elements shall be given a full coat of zinc rich, epoxy based, cold galvanising compound followed by two coats of calcium plumbate primer applied to dry film thickness of at least 0.025 mm. The undercoat and balance of the approved paint system shall follow within one week of the primer. The colour and quality of the paints to be applied shall be approved by the Engineer.

414.04. Work Acceptance

Acceptance of the works of pedestrian parapets to bridge walkways will be under chapter 001. The works shall be in accordance with Design tip 3.503.1-81, the Drawings and specification and shall be to the satisfaction of the Engineer.

Measurement

The works related be the assembly and repair of the pedestrian parapets are measured in linear metres, on the total length of parapet provided, repaired and painted..

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
41401	Repair of metal pedestrian parapets	linear metre
41402	Provide and erect new metal pedestrian parapets	linear metre
41403	Painting of metallic pedestrian parapets	linear metre

CHAPTER 415. BRIDGE BEARINGS

Description

415.01. Introduction

The works of this chapter include the provision of bearing pads of reinforced rubber to existing bridge decks where no bearings currently exist. The works include the necessary temporary works to enable jacking of bridge decks to allow preparation of seating, repair of concrete and insertion of rubber bearings.

The works also include the cleaning and painting of existing steel rocker bearings.

Materials

415.02. Materials

The materials used for the works described in this chapter shall be in accordance with the following requirements:

Priming and painting	SM GOST 9.032-74*, SNiP 2.03.11-85, 3.04.03-85 CPE.04.03-2005
Reinforced rubber bearings pads	VSN 86-83
Concrete with polymer	SNiP 3.06.04-91
Reinforcement	SM GOST 5781-82*****
Mortar	SM GOST 28013-89**

Working conditions

415.03. Equipment

The following items of equipment are likely to be required:

1 Jacking capacity adequate to lift the estimated superstructure weight with a factor of safety of 1.3 (See Special Specifications for bridge details)

2 Temporary works for installing and controlling jacking, providing support and load distribution

3 grit blasting equipment for rust cleaning surfaces of steel rocker bearings.

4 Motocrane for assembly and dismantling of the temporary works

415.04. Lifting bridge decks for mounting of rubber bearings

The handling of bridge decks during rubber bearing installation must be done in accordance with VSN 86-83 and SNiP 3.06.04-91. The temporary works must be in accordance with the SNiP III-18-75 and 3.06.04-91. The jacking arrangements shall be such as to ensure that the whole of the span is lifted uniformly with no distortion or applied stresses from the lifting operation. Lifting of the span at one end only is not permissable.

Bridge decks shall not be lowered onto the new bearings until at least 7 days after all concrete

and mortar works in the vicinity of the bearing pads have been completed.

415.05. Bearing painting

Steel rocker bearings with substantial areas of exposed steel work require to be cleaned and painted.

The steel elements of such bearings shall be sand or grit blasted to bright metal. Care shall be taken during the cleaning operation that no damage is caused to reinforced concrete elements of the bearings or to surrounding concrete. Such cioncrete shall be shrouded or otherwise protected throughout the cleaning process.

Immediately after cleaning the bearings shall be examined for defects. If serious defects are found the Engineer will direct what steps are to be taken.

Painting shall be carried out using pneumatic or approved airless spray and shall only be be carried out during calm, dry weather at a temperature over +5°C.

415.06. Trafficking on the bridge deck

Passage of vehicular traffic on the deck will be permitted immediately after mounting the deck on the reinforced rubber bearinng pads and removal of the jacking equipment but not before all concrete used in repairs in the area of the bearings has reached at least 75% of the designed strength.

415.07. Works acceptance

The installation of rubber bearing pads and the painting of bearings will be accepted under the provisions of Chapter 001 provided all work complies with the drawings and Specifications and meets with the approval of the Engineer.

Measurement

The installation of rubber bearing pads shall be measured by the number of bearings. All ancillary repair works to beam ends, bearing areas, collar beams, etc. shall be measured and paid under the provisions of chapter 401, paragraphs 401.01 and 401.02.
Cleaning and painting of bearings shall be measured by the number of bearings cleaned and painted

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
41501	Provision and installation of rubber bearing pads	number
41502	Painting of steel and reinforced concrete rocker bearings	number

CHAPTER 416. REHABILITATION OF COMPOSITE BRIDGE DECK

Description

416.01. Introduction

The works of this chapter include cleaning and painting the steel beams of the composite deck and adding flange stiffeners to the beams.

Materials

416.02. Materials

The materials used in these works have to be in accordance with:

Primer and paint	SM GOST 9.032-74*, SNiP 2.03.11-85, 3.04.03-85 CPE.04.03-2005
Steel Plate	Technical Specification

Working Conditions

416.03. Equipment

The following equipment is likely to be required for the works under this chapter.:

1 Welding equipment;

2 Grit or sand blasting equipment for cleaning

416.04. Strengthening to steel beams of the deck

Strengthening consists of adding flange stuffenrs to the existing steel beams in accordance with the details shown in the Drawings. The works shall be executed in accordance with the requirements of SniP 3.06.04-91.

416.05. Painting of steel beams

All exposed steel work of the steel beams in the deck shall be cleaned and painted.

The steel shall be sand or grit blasted to bright metal. Care shall be taken during the cleaning operation that no damage is caused to bearings or to reinforced concrete elements of the deck or to surrounding concrete. Such items and concrete shall be shrouded or otherwise protected throughout the cleaning process.

Within 4 hours of completion of blast cleaning, the bright steel shall be treated with two coats of epoxy based, zinc rich primer. Thereafter the normal painting schedule of primer and topcoats shall be carried out using pneumatic or approved airless spray. Painting shall only be be carried out during calm, dry weather at a temperature over +5°C.

416.06. Traffic on the deck

Traffic should not be allowed to travel on the deck while welding is in progress.

416.07. Works acceptance

The strengthening and painting of steel beams will be accepted under chapter 001 provided that the works have been executed in accordance with the drawings and Specifications and they are approved by the Engineer.

Measurement

The strengthening of the beams shall be measured as the tonnes of steel plate incorporatd into the strengthening. The painting of he beams shall be measured as the square metres of surface painted.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
41601	Strengthening steel beams in composite construction decks beams.	tonne
41602	Painting steel beams in composite construction decks beams.	square metre

CHAPTER 417. SLABS TO BRIDGE DECKS, BRIDGE WALKWAYS, PARAPETS AND MIDDLE LANE SLAB.

Description

417.01. Introduction

The works covered in this chapter inlude cast in situ reinforced concrete slabs forming parts of the bridge deck, the parapet foundation and the middle lane slab on existing bridges and forming reinforced concrete walkways on both existing and new briidges. The works shall be executed in accordance with the requirements of the drawings and specifications and of SNiP 3.06.04-91.

Materials

417.02. Materials

Materials used for the works of this chapter shall be in accordance with the following requirements:

Concrete	Technical specification, SM GOST 26633-91** SNiP 3.06.04-91
Reinforcement and built in elements	Technical specification, SM GOST 5781-82*****, SNiP 3.06.04-91
Epoxy glue	SNiP 3.06.04-91, Appendix 10

Working conditions

417.03. General conditions.

The works shall be executed in accordance with the requirements of these technical specification and of SNiP 3.06.04-91

417.04. Equipment..

The following equipment is likely to be required for the works under this chapter.:

1 Crane, for erection and dismantling of formwork, installation of reinforcing mesh and placing concrete;

2 Drill for making holes in the concrete of a diametre up to 20 mm, for connections;

3 Welding equipment;

4 Oxyacetylene/Airacetylene burner for bending reinforcement for the parapet foundation;

5 Vibrators for compaction of cast-in situ concrete.

417.05. Formwork

Formwork shall be in accordance with the requirements of SNiP 3.06.04-91.

417.06. Reinforcement

Reinforcing works are to be carried out according to SNiP 3.06.04-91. No reinforcement shall be brought on to the site or used without a manufacture certificate certifying that it complies with requirements. Any change or substitution in the category class, diameter, or type of the steel, required by the Drawings or Technical Specification must be agreed by the Engineer.

Before use, all reinforcement must be cleaned of rust, mud, dust and grease, Lap joints of reinforcing bars are to be executed by overlapping by a length of at least 30 bar diameters and in compliance with requirements of the Technical Specification.

Where the welding of reinforcement and built-in elements is unavoidable the work shall be executed in accordance with the requirements of SM GOST 14098-91. Welding of reinforcement shall be avoided wherever possible and shall not be carried out without the explicit permission of the Engineer.

417.07. Concrete Works

Concrete mixing, transportation and casting, as well as concrete curing works are to be carried out in accordance with the requirements of this Specification, SM GOST 26633-91** and SNiP 3.06.04-91.

No concrete mixture which has lost its required workability shall be used. It is not permissable to improve the concrete workability by adding additional water into the mixed concrete.

Any defects on exposed surfaces after removing formwork will be made good by smoothing with sand cement mortar if the Engineer approves. If the defect is too serious for such approval the Contractor shall remove the defective work and .replace it at his own cost.

417.08. Waterproofing

Waterproofing works will be executed in accordance with paragraph 402.09

417.09. Works Acceptance

The works will be accepted in accordance with the provisions of chapter 001 provided they re in accordance with this Specification, SNiP 3.06.04-91, VSN 32-81 and are to the satisfaction of the Engineer..

Measurement

The works of the bridge deck slab, the walkways and the middle lane **slab** shall be measured in cubic metres of reinforced concrete used in each of the type of work.

The works of the parapet foundation will be measured in linear metres of the length of the parapet foundation constructed.

No separate measurement will be made for any other connected item of work. Measurement under the items below shall be the full and complete measurement of all materials and works required for the works under this chapter, including concrete, reinforcement, any built in items, formwork and all other temporary works.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
41701	Bridge deck slabs of in situ reinforced concrete	cubic metre
41702	In situ reinforced concrete walkways to bridge decks	cubic metre
41703	In situ reinforced concrete parapet foundations to bridge decks	linear metre
41704	In situ reinforced concrete slabs to the middle lane of divided bridge decks	cubic metre

CHAPTER 418. WORKS OF DISMANTLING AND DEMOLITION

Description

418.01. Introduction

Works covered in this chapter cover the various types of demolition required in the execution of bridge works and include the following:

Demolition of reinforced concrete parapets;

Dismantling of metal pedestrian parapets;

Dismantling of of reinforced concrete walkways;

Removal and disposal of existing asphalt layer on bridges;

Removal and disposal of existing pavement on the approaches to bridges;

Demolition of the protection layer, the waterproofing, and the levelling layer on bridge decks;

Dismantling of bridge deck slabs of reinforced concrete; 6.0 m length;

Demolition of reinforced concrete in infrastructure and deck elements;

Demolition of the deteriorated elements of the reinforced concrete protection on river beds and bridge abutment slopes;

Demolition of reinforced concrete at deck beam joints;

Demolition of deteriorated reinforced concrete stairs on bridge abutment slopes

Removal of metal expansion joint elements

Cleaning the collar beams at piers and abutment of waste

Working conditions

418.02. Equipment.

The following equipment is likely to be required for the works under this chapter.

1 Crane for removal of bridge deck slabs length 6.0 m.; weight 5 tons;

2 Crane for removal of walkway elements; weight 2 tons;

3 Oxyacetylene cutting equipment;

4 Compressor(s) with tools for demolition of concrete and of asphalt surfacing;

418.03. Dismantling and demolition of elements

Dismantling and demolition of the various bridge elements must be executed so as not to deteriorate the structure of the concrete and waterproofing left in the remaining structure, and not to damage the existing reinforcement.

The waste material from demolition shall be transported and disposed of in accordance with the requirements of this specification and in accordance with the regulations of the local authorities. Complete prefabricated elements arising from the demolition and dismantling which are considered to have further utility shall be identified by the Engineer and transported by the Contractor to the Employer’s designated storage compound.

418.04. Works Acceptance

The works will be accepted in accordance with the provisions of chapter 001 provided they are in accordance with this Specification, Design type 3.503.1-81, SNiP 3.06.04-91, VSN 32-81 and are to the satisfaction of the Engineer

Measurement

The various works of dismantling and demolition will generally be measured in cubic metres of items dismantled and demolished. This volumetric measurement shall be strictly net. If appropriate, agreement may be reached with the Engineer on a case by case basis to measure the quantity of demolished material on a tonnage basis and then use typical densities to transform this measurement to Cu.m. for payment purposes.

Metal parapets dismantled and scrapped as unusable shall be measured in linear metres of parapet prior to demolition.

Demolition of metal expansion joint elements shall be measured by the linear metre.

Asphalt pavement to bridge decks shall be measured in square metres.

Cleaning of collar beams and pier heads shall be measured as a single item payable as a sum for each structure where cleaning is required.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
41801	Demolishing of reinforced concrete parapeţs of the bridge or embankment	cubic metre
41802	Dismantling of the metal pedestrian parapets	linear metre
41803	Dismantling of the walkways of reinforced concrete	cubic metre
41804	Removal of the asphalt pavement on the bridge deck	square metre
41805	Removal of the pavement on the approaches to the bridge	cubic metre
41806	Demolishing of superstructure waterproofing including protective and regulating layers	square metre
41807	Dismantling of PC reinforced concrete deck slabs of 6,0 m length	cubic metre
41808	Miscellaneous Demolition of reinforced concrete to bridge infrastructure and deck elements	cubic metre
41809	Demolition of the deteriorated elements of the reinforced concrete protection on river beds and abutment slopes	cubic metre
41810	Demolishing of reinforced concrete to deck beam joints.	cubic metre

41811	Demolition of deteriorated reinforced concrete stairs of on abutment slopes	cubic metre
41812	Cleaning of the collar beams of the piers and abutment of waste	lump sum
41813	Demolishing of metal expansion joint elements	linear metre

5. DRAINAGE STRUCTURES

CHAPTER 501. CULVERTS AND DRAINAGE FACILITIES

Description

501.01. Introduction

This work consists of constructing culverts, extending existing culverts and/or replacing culverts and other drainage facilities

Material

501.02. General.

Culvert units and materials used for the works should meet SNiP 2.05.02-85, OST 35-27.0-85, OST 35-27.1-85, OST 35-27.2-85, SM GOST 5781-82*****.

501.03. Joint sealing.

Joints shall be sealed with materials of a type and mix design accepted by the Engineer.

501.04. Pipes

Culvert pipes shall conform with SNiP2.05.03-84*, SM GOST 12586.0-83* and SM GOST 12586.1-83*. The length of culvert pipes shall be as stipulated in the Album of typical drawings unless otherwise specified. Concrete pipe shall be 2.5 m in length unless otherwise specified.

Working Conditions

501.05. Generalities.

The extension of the culverts shall be carried out using precast elements, indicated on the drawings, the dimensions and location will be in accordance with the drawings.

501.06. Extension of the existing culverts.

The extension of existing culverts shall commence with the removal of the existing culvert extremities. Starting at the lower end, lay the bell or groove end upgrade. Fully joint all sections. Surplus materials shall be removed from the site and disposed in accordance with the Specification. Extension of the existing culverts should be done according to the project drawings. Placing materials and structures shall be done only any preparatory or foundation works have been approved by the Engineer.

501.07. Replacement of existing culverts.

The Contractor shall prepare provisional schemes of traffic control during the Construction periods and obtain approval from the relevant agencies and the Engineer.

Before replacing existing culverts the existing pavement shall be scarified and all pavement and subgrade materials removed.

Dismantled culverts and culvert headwalls and inlet and outlet structures shall be removed from the site and disposed in accordance with the Specification by the Contractor, or, if so instructed by the Engineer, shall be transported to Employer’s premises indicated by the

Engineer and there stockpiled.

The work of replacement consist of excavation, placing crushed stone bed foundation, installation of culverts, making culvert joints, waterproofing new culvert, inlet and outlet structure installation and waterproofing, backfilling and soil compaction to culvert and inlet and outlet structures according to the chapter 203.

On completion of backfilling to subgrade level the final layers of backfill shall be compacted to the requirements of chapter 201.13. The laying and compacting of pavement layers shall conform to the requirements of Chapter 306.

501.08. Construction of new culverts.

The construction of new culverts shall be carried out in accordance with the requirements of paragraph 501.07 above with the exception of the requirements in relation to the removal of existing culverts.

501.09. Culverts to property entrances and side roads

Wherever the side drain intersects a property entrance or crosses a side road junction and there is a requirement for a culvert to carry the side drain past the property or side road a 600mm diameter pipe culvert in the line of the side drain shall be constructed to carry the side drain flow. Property entrance and side road culverts shall be bedded on 150mm crushed stone and backfilled with crushed stone. They shall be provided with headwalls and wingwalls to suit the dimensions of the side drain and ensure a smooth, unobstructed entrance and exit flow. Where shown on the drawings or directed by the Engineer, additional protection works shall be provided at inlet and outlet.

501.10. Additional protection

Where shown in the Drawings or instructed by the Engineer additional erosion protection shall be provided to side drains and waterways at the inlets and outlets of culverts. Such protection, unless shown otherwise, shall consist of a layer of reinforced concrete in situ or as PC units, having a minimum thickness of 70mm, laid over a compacted bed of at least 100mm of crushed rock. PC units shall be carefully locked together with mortar pointing and in situ ling shall be provided with expansion joint at not more than 7 metre intervals. Where lining extend over a length of more than 3 metres it shall be provided with weep holes, diameter 50mm, level with the base of the drain on the road side of the lining at 1 metre intervals.

Where additional protection to this standard is considered inadequate because of the unsupported height then a mass or reinforced concrete structure shall be provided in accordance with the design of the Engineer and paid under the provisions of chapter 504.

501.11. Acceptance of works.

The work of existing culvert extension, culvert replacement and new culvert construction will be accepted according to Chapters 001 and 002 and to compliance with the drawings and specifications and acceptance by the Engineer.

Measurement

Extension and replacement of existing culverts and construction of new culverts shall be measured in the following manner::

removing of existing culvert inlets and	By number of inlets and outlets

outlets	removed
removing of existing culvert barrels	By linear metres of culvert dismantled and removed
Constructing pipe culvert inlets and outlets (pipe diameter to be stated)	By number of inlets and outlets of each size constructed
Constructing box culvert inlets and outlets (box size to be stated)	By number of inlets and outlets of each size constructed
Constructing pipe culverts (pipe diameter to be stated)	By linear metres of each size of culvert constructed
Constructing box culverts (box size to be stated)	By linear metres of each size of culvert constructed
Extension pipe of culverts (pipe diameter to be stated)	By linear metres of each size of culvert constructed
Extension of box culverts (box size to be stated)	By linear metres of each size of culvert constructed
Protection works to inlets and outlets	By square metres of protection works constructed
Culverts (dia. 600mm) to property entrances and side roads	By the linear metres of culverts constructed

The linear metre measurement of culverts (dia. 600mm) to property entrances and side roads shall include in the cost per lin.m. for the cost of providing appropriate inlet and outlet structures of headwall and wingwalls. Any additional protection works required shall be measured in Sq.m. and paid under the item for protection works where such an item is listed in the Bills. If no item is listed then the costs of additional protection shall be included in the liner metre rate for provision of the culvert.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
50101	Removal of Culvert Inlet or Outlet	number
50102	Removal of existing culvert barrel	linear metre
50103A	Construction of culvert inlets and outlets to pipe culverts (pipe diameter to be stated) m	number
50104A	Construction of culvert inlets and outlets to box culverts (state size) m	number

50105A	Construction of new pipe culverts (pipe diameter to be stated)	linear metre
50106A	Construction of new box culverts (box size to be stated)	linear metre
50107A	Extension of pipe culverts (pipe diameter to be stated) m type TN	linear metre
50108A	Extension of box culverts (box size to be stated)	linear metre
50109	Additional protection works at inlets and outlets	square metre
50110	Construction of culverts (dia 600mm) at entrance to properties and side roads	linear metre
50111	Construction of drop inlets to pipe culverts of any diameter	number

CHAPTER 502. CLEANING, RECONDITIONING AND REPAIRING EXISTING INLETS, OUTLETS, DRAINS, SPILLWAYS AND CHUTES

Description

502.01. Introduction

This work consists of cleaning existing culverts in place, reconditioning existing inlets and outlets and repairing and cleaning existing drains, spillways and chutes.

Material

502.02. Materials

Concrete shall conform to Table 504-1. Before batching concrete submit the proposed concrete proportions for approval to the Engineer. As a minimum,submit the following:

(a) Type and source(s) of all material proposed for use.

(b) Material certification for all material proposed for use.

(c) Saturated surface dry weight of the fine coarse aggregate per cubic metre of concrete.

(d) Gradation of fine and coarse aggregate.

(e) Weight of mixing water per cubic metre of concrete.

(f) Weight of cement per cubic metre of concrete.

(g) Entrained air content of plastic concrete in percent by volume.

(h) Maximum slump of plastic concrete in cm.

Joint mortar use for concrete minor structure shall consist of the following:

a) One part hydraulic cement (see SM GOST 25192-82*)., SM GOST 26633-91**). The cement shall not contain lumps, be partially set, come from previously opened bag or be subject to hydration.

b) Two parts fine sand free of clay or other deleterious materials.

c) Water as required to obtain a freely working mix capable of being forced into small interstices.

Working conditions

502.03. Cleaning Culverts in Place.

Remove and dispose of all foreign material within the barrel and appurtenances of the culvert (including inlets and outlets) by any method that does not damage the culvert.

502.04. Repairing of the extremities of the culverts.

Remove all debris from inlets designated to be reconditioned. Repair all leaks and structural damage.

502.05. Repair of Drains, Spillways and Chutes

Lined side drains which are designated for repair shall be carefully rebuilt to provide the full original drain section in solid, uncracked well bedded concrete. Weep holes of 50mm dia at no more than 1 metre centres shall be provided at the base of the drain in both faces.

Chutes which are designated for repair shall be dismantled, rebedded, units replaced and all joints carefully mortared to provide a neat workmanlike chute, true to line and slope with upper edges flush with the embankment surface.

502.06. Cleaning lined side drains

Where directed by the Engineer, existing lined side drains shall be cleared of all accumulated rubbish, debris and earth. Drains shall e cleaned in the first three months of the contract and maintained clean throughout the duration of the works

502.07. Acceptance of works.

The work will be accepted for payment providing that it has been carried out in conformance to the plans and specifications pertaining to the segment involved and is accepted by the Engineer.

Measurement

Repair of culvert joints and cleaning culvert in place will be measured in lin.m. of culvert repaired or cleaned. Cleaning will only be measured and paid where no other work is required to the section cleaned. Where other or additional works are required the act of cleaning shall be considered ancillary to such works and shall be included in the cost of those works. The rate for cleaning shall include the cost of maintaining the cleaned drain or structure in a clean condition throughout the duration of the contract. Repair of inlet and outlet structures shall be measured by the number of inlets and outlets instructed to be repaired regardless of the extent of the repairs. Repair of chutes and spillways and lined side drains will be by the lin.m. of structure instructed to be repaired..

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
50201	Repairing culvert joints	linear metre
50202	Cleaning of existing culverts	linear metre
50203	Repairing of plain culvert inlet and outlet structures	number

50204	Repair of Chutes and spillways on embankment slopes	linear metre
50205	Repair of lined side drain	linear metre
50206	Repairing of culvert drop inlet structures	number
50207	Cleaning lined side drain	linear metre

CHAPTER 503. PAVED WATERWAYS

Description

503.01. Introduction

This work consists of constructing paved chutes on the slopes, lined side drains and lined waterways not contiguous to the travelled way together with the associated inlet and outlet works.

Paved chutes and gullies on the slope are required to transport water from the pavement on embankment to the foot of the slope without erosion,

Paved waterways will be constructed according to the requirements of the Drawings and Schedules.

Material

503.02. Materials

Material shall conform to the requirements of this specification and to the materials stipulated in the Drawings. Paved waterways of all types shall be constructed using concrete having a maximum aggregate size of 20mm and a minimum compressive strength at 28 days of 25 N/mm^2. Where mesh reinforcement is required it shall comply with the relevant GOST standard.

Working Conditions

503.03. Generalities.

Excavation shall be performed accurately to line and level. The bed of the excavation shall be parallel to the required finished surface of the waterway. Concrete mixes shall be designed and approved in accordance with the requirements of Chapter 504.

503.04. Concrete Chutes and gullies.

Perform the work according to Section 504.,utilizing commercially available precast units or purpose made units for chutes. Entry gullies shall be of two types, one type for single direction entry and a second type, to be used at low points, for double direction entry. Where indicated on the Drawings or instructed by the Engineer, chutes shall terminate in a basin constructed as shown in the Drawings. All gullies and chutes shall be in accordance with the details on the Drawings and to the satisfaction of the Engineer.

503.05. Lined Side Drains and Waterway.

Lined side drains and lined waterways shall be constructed in accordance with the Drawings including filter materials and crushed stone bedding. Where indicated on the Drawings or instructed by the Engineer, lined side drains shall terminate in a basin constructed as shown in the Drawings. Four types of lined drain are foreseen:

Type 1: a plain lining of standard size for slopes $< 5^o$

Type 2: A lining of standard size incorporating regularly spaced anchor blocks for use on slopes $> 5^o$

Type 3: An oversized lining reinforced with mesh reinforcement for major non roadside

drains having a top width of 4 metres and a depth of 1 metre incorporating regularly spaced anchor blocks for use on slopes > 5^{o}

Type 4: A rectangular side drain of width 60cm and depth 45 cm constructed of in situ reinforced concrete.

503.06. Acceptance.

The work will be accepted for payment providing that it has been built in conformance to the Drawings and specifications pertaining to the segment involved and is accepted by the Engineer.

Measurement

Paved spillways/chutes on the slopes and paved side drains and waterways will be measured in linear metres. Entry gullies shall be measured by number of the two types specified and basins shall be measured by number. The cost of any necessary excavation, bedding, support of excavation and backfill shall be included in the costs and shall not be subject to separate measurement or payment with the exception of excavation to the net internal dimensions of side drains which will be measured and paid separately under the provisions of Chapter 201 as a part of common excavation and of waterways not contiguous to the road which will be measured to the net internal dimensions and this volume paid separately under the provisions of Chapter 202.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
50301	New construction of Triangular section chute or spillway on embankment slope 0,6 wide x0.3 deep or other approved section made of precast concrete units or cast in situ	linear metre
50302	New construction of Lined side drain or waterway Type 1 with precast concrete units and/or concrete cast in situ.	linear metre
50303	New construction of Lined side drain or waterway Type 2 with precast concrete units and/or concrete cast in situ including anchor blocks.	linear metre
50303A	New construction of Lined side drain or waterway Type 3 with precast concrete units and/or concrete cast in situ including anchor blocks.	linear metre
50304	Construct chute entry gully, double sided entry	number
50305	Construct chute entry gully, single sided entry	number
50306	Construct basin to lined side drain or waterway	number

50307	Construct basin to embankment chute. waterway	number
50308	New construction of Lined side drain Type 4 with precast concrete units and/or concrete cast in situ rectangular 0.60 x 0.60.	linear metre

CHAPTER 504. MINOR CONCRETE STRUCTURES

Description

504.01. Introduction

This chapter covers the basic requirements for the construction of minor concrete structures and shall be read in conjunction with other chapters as appropriate.

Material

504.02. Materials.

1. Aggregate shall conform to SM GOST 10268-84 and shall consist of hard durable particles of fragments of crushed stone, crushed slag or crashed gravel and shall be subjected to the following tests: Sieve analysis, Strength, Wearing and amount of dust particles.

2. Mortar - the joint filler used for concrete minor structures shall consist of the following:

a) One part hydraulic cement see 10178-85 and table 3.1 of SNIP 2.05.02-85

b) Two parts fine sand free of clay or other deleterious materials.

c) Water as required to obtain a freely working mix capable of being forced into small interstices.

3. Portland Cement Masonry Cement.

Portland Cement Masonry Cement shall meet the following specifications: SM GOST 10178-85**

Do not use cement which has lumps, become partially set or is salvaged from previously opened bags. Do not mix brands or types of cement from different mills without the Engineer's approval.

Concrete curbs can be cast-in-situ or prefabricated in unified block length.

504.03. Concrete Composition.

Concrete shall conform to Table 504-1. Before batching concrete submit the proposed concrete proportions for approval. As a minimum, the submission shall comprise the following:

(a) Strength of Concrete demonstrated by test cubes from design mix

(b) Type and source(s) of all material proposed for use.

(c) Material certification for all material proposed for use.

(d) Saturated surface dry weight of the fine and coarse aggregate per cubic metre of concrete.

(e) Gradation of fine and coarse aggregate and proportions to be used

(f) Weight of mixing water per cubic metre of concrete.

(g) Weight of cement per cubic metre of concrete.

(h) Entrained air content of plastic concrete in percent by volume.

(i) Maximum slump of plastic concrete in cm.

Table 504.1 Composition Concrete of Minor Structure

Properity	Specification SM GOST 26633-91
Maximum W/C ratio	0.49
Maximum slump,cm	10
Minimum air content, per cent	4
Size aggregate	Varies
Minimum 28-day compressive strength, MPa	20.7

Working conditions

504.04. Generalities.

Excavation and backfill shall be performed in accordance with the requirements of chapter 203.

Forms shall be so designed and of sufficient strength that there is no loss of shape, bulging or warping under site conditions or concrete pressure, and such that they permit of ready removal without causing damage to the concrete.

Forms shall be of wood, metal, or other suitable material. They shall be kept clean and coated with a form release agent or form oil before placing concrete.

504.05. Casting Concrete.

Moisten the forms and foundation immediately before casting concrete. Discharge concrete within one hour of mixing.

Cast concrete avoiding segregation of material. Do not use aluminium pipe for transporting or casting concrete. The intervals between delivery of batches for a single pour on a structure shall not exceed 30 minutes.

All work must occur at an air temperature not below 5^0C.

Do not apply water to plastic concrete surfaces during finishing operations.

504.06. Curing Concrete.

Cure concrete a minimum of 7 days by closely covering with burlap sacking or other approved material and keeping wet at all times. Finish exposed concrete surfaces according to the following:

Remove and replace or repair, as approved, all rock pockets or honeycombed concrete.

Clean and point all form tie cavities, holes, broken corners and edges, and other defects. Saturate the area to be repaired with water. Finish the area with mortar that is less than one hour old. After the mortar is set rub it down with burlap sacking or other approved material until a reasonable blend of the fresh exposed surfaces to surrounding concrete is achieved.

Carefully tool and remove free mortar and concrete from construction joints.

504.07. Acceptance of works.

The work will be accepted for payment providing that it has been built in conformance to the plans and specifications pertaining to the segment involved and is approved by the Engineer.

Measurement

Where minor structures are to be paid under this item they will be measured in cubic metres of concrete required for the structures specified or shown on the drawings. The single measurement of cubic metres shall include for all necessary works to provide the complete structures as designed/shown on the Drawings, including excavation and backfilling, formwork, concrete, reinforcement, curing and finishing.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
50401	Miscellaneous minor concrete structures	cubic metre

CHAPTER 505. KERBS

Description

505.01. Introduction

This chapter covers the requirements for the construction of kerbing. Two types of kerb are foreseen and shown in the drawings. A high type kerb for urban areas and a low kerb for rural areas. The low kerb is intended for use primarily as a drainage kerb to prevent uncontrolled discharges of surface water across shoulders and embankments.

Material

505.02. Materials.

1. Precast concrete kerb units of the quality and dimensions shown in the Drawings. Where kerbing is required to follow a curve having a radius of less than 10 metres then purpose made radiused kerbs shall be fabricated. Kerbs shall be made from concrete having a maximum aggregate size of 20mm and a minimum compressive strength at 28 days of 35 N/mm^2

2. Portland cement mortar in accordance with 504.02 above, if required

3. Backing concrete having a maximum aggregate size of 40mm and a minimum compressive strength at 28 days of 20 N/mm^2.

Working conditions

505.03. Generalities.

Any necessary excavation and backfill shall be performed in accordance with the requirements of chapter 203.

Forms shall be so designed and of sufficient strength that there is no loss of shape, bulging or warping under site conditions or concrete pressure, and such that they permit of ready removal without causing damage to the concrete.

Forms shall be of wood, metal, or other suitable material. They shall be kept clean and coated with a form release agent or form oil before placing concrete.

505.04. Placing kerbs.

Backing concrete shall be placed in situ in two casts. The initial concrete shall be cast to provide a bed at least 150mm in thickness with its upper surface between 5 and 15mm below the required level for the base of the PC kerb units. The bed shall be wide enough to project at least 50mm in front of the kerb units and 200mm behind the kerb units. The upper surface of this bed shall be left rough in order to provide an adequate key for subsequent operations.

Kerbs shall be placed on this foundation with a cement mortar bedding to bring them precisely to design line and level. Kerbs shall be jointed with cement mortar.

When the mortar bed has hardened, backing concrete shall be poured behind the kerbs to a level not less than 50mm below the top of the kerb and not less than 150mm in thickness behind the kerb. These dimensions for backing concrete shall take precedence over any backing concrete dimensions indicated in the drawings. The rear face of this backing concrete shall be contained with formwork.

The correct type of kerb for the location shall be used as scheduled on the drawings or directed by the Engineer.

505.05. Curing Concrete.

The precast kerbs shall be carefully cured during production to ensure that the full strength of the concrete is reached. PC concrete kerbs shall not be allowed to dry out at all until 28 days after casting. These requirements may be reviewed if the units are produced in a dedicated PC plant with approved steam curing facilities.

Backing concrete shall be cured with wet burlap for 7 days after placing. Alternatively, by agreement with the Engineer, backing concrete may be cured by burying and watering.

505.06. Acceptance of works.

The work will be accepted for payment providing that they have been constructed entirely in conformance to the plans and specifications pertaining to the segment involved and are approved by the Engineer.

Measurement

Kerbs of both types will be measured under a single head in linear metres. The linear metre measurement will cover all works necessary, including any excavation, trimming or backfilling, to place the kerbs and backing complete, as specified.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
50501	Precast concrete kerbing and backing	linear metre

6. MISCELLANEOUS WORKS

CHAPTER 601. NOT USED

CHAPTER 602. GEOTEXTILE FABRICS

Description

602.01. Introduction

The works under this chapter comprise the provision and placing of geotextile fabric for the reinforcement of embankment soils and for use as filter media in drainage works.

Materials

602.02. Materials

Type 1 Geotextile for embankment reinforcement

Shall be an approved mechanically bonded continuous filament nonwoven fabric of 100% UV stabilised polypropylene or polyester incorporating a mesh of high strength filaments of approved inert material furnished by an ISO approved manufacturer of polypropylene or polyester geosynthetics and providing properties meeting the following requirements:

Property	Units	Requirement
Tensile strength both axes	kN/m	95 minimum
Tensile strength at 5%	kN/m	45 minimum
Elongation at Nominal strength	%	10% maximum
Normal permeability	l/m^2	55 minimum
Characteristic opening	microns	100 maximum

The fabric shall be one recommended by the manufacturer for the reinforcement of fine grained soils. Samples and test results of proposed material shall be submitted to the Engineer for approval before any embankment reinforcement material is purchased or brought onto the site.

Type 2 Geotextile filter membrane

Shall be an approved mechanically bonded continuous filament nonwoven fabric of 100% UV stabilised polypropylene. It shall have a minimum strength in any direction of 15 kN/m, a minimum static puncture resistance of 2350 N, Crop drop test maximum 22mm. It shall have a maximum opening size of 100 microns, a maximum permeability of 90 litres/m^2/sec, a minimum thickness of 1.9mm and minimum density of 200 gm/m^2. Samples and test results of proposed material shall be submitted to the Engineer for approval before any filter fabric material is purchased or brought onto the site.

Type 3 Geotextile for SAMI Layer

Shall be an approved high-strength **geocomposite** material consisting of a mechanically bonded continuous filament nonwoven made of 100 % UV stabilized polypropylene, reinforced with high-strength glass filaments, furnished by an ISO approved manufacturer of polypropylene or polyester geosynthetics.
Geocomposite is an asphalt-reinforcement element, as a stress-relieving interlayer, creating a membrane effect (SAMI-stress absorbing membrane interlayer).

The paving geocomposite fabric shall conform to the following physical and mechanical properties:

Property	**Units**	**Test Method**	**Minimum Value**

Mass Per Unit Area	g/m²	EN ISO 9864	minimum 300
Tensile Strength	kN/m	EN ISO 3341	minimum 50/50
Strength at 2% strain	kN/m	EN ISO 3341	minimum 30/30
Elongation	%	EN ISO 3341	max 3%
Melting point	oC	ASTM D276	up to 400 oC
Asphalt Retention	kg/m²	ASTM D6140	1.10

A Certificate of Compliance for the paving geocomposit used on the project shall be furnished by the manufacturer to the engineer. The paving fabric shall be supplied in protective a cover or wrap that is capable protecting the fabric from ultraviolet rays, abrasion, and water.

Samples and test results of proposed material shall be submitted to the Engineer for approval before any SAMI Layer material is purchased or brought onto the site.

Execution

602.03. Handling and Installation.

Materials shall be handled and stored in accordance with the manufacturers instructions.

Geotextile Type 1 used in embankment reinforcement shall be laid with direction of lay across the embankment. Adjacent strips of reinforcement shall be joined together using manufacturers approved jointing systems to provide the full strength of the reinforcing mesh. Tensioning of the mesh across the embankment shall be in accordance with the manufacturers instructions. Prior to laying reinforcing mesh in place, the working surface of the embankment shall have been completed to a smooth flat compacted surface and then lightly scarified to a depth of 50-100mm. On completion of the mesh layer the succeeding layer of fill, approximately 150mm in thickness shall be laid and compacted. The fill shall be at the OMC for compaction prior to placing; fill placed in proximity to a reinforcing layer may not be scarified.

Geotextile Type 2 used as filter material shall be laid in the positions indicated over lightly rammed surfaces of natural earth which have been carefully trimmed to the correct lines, levels and shapes. Where fabric must join, the joint shall be made with an overlap of at least 100mm carefully pinned or stapled in place to ensure that the fabric surfaces remain pressed close together after completion of the supervening works, where three dimensional shapes have to be formed, rather than cutting and joining fabric, use should be made of pleats or darts pressed flat and clipped or stapled in place where possible.

The use of Geotextile Type 3 is dealt with in chapter 304.

602.04. Acceptance of work.

Measurement

Geotextile fabrics shall be measured by the net square metres placed. No allowance will be made for overlaps, cutting, wastage, etc. and no additional payment will be made for any special handling, storage or transport requirements; all such shall be included in the basic rate.

No specific measurement or payment will be made for Geotextile Type for use in SAMI layers. This material will be included in the general measurement of SAMI layer made under Chapter 304.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under the items below:

	Item	**Unit of measure**
60201	Geotextile fabric Type 1 in reinforcement to Embankment	square metre
60202	Geotextile fabric Type 2 as a filter membrane .	square metre

CHAPTER 603. NOT USED

CHAPTER 604. NOT USED

CHAPTER 605. NOT USED

CHAPTER 606. NOT USED

CHAPTER 607. NOT USED

7. INCIDENTAL CONSTRUCTION

CHAPTER 701. GUARDRAIL

Description

701.01. Introduction

This work comprises the provision and erection of W-beam galvanised steel guard rail.

Materials

701.02. Materials

Material shall conform to the following Section and Subsections:

Concrete	Section 504
Galvanized steel rail	SM GOST 26804-86, and provisions of this Chapter

Paint for guardrail. If required on the drawings or indicated elsewhere in this specification Guardrail shall be painted as shown. Paint shall conform to the requirements of paragraph 014.02 of this Specification, however the following preliminary treatment shall be applied:

Surface Preparation

Galvanised surfaces shall be thoroughly scrubbed down using an approved galvanised iron cleaner to remove all traces of any resin protective coating or other protection.

The surface shall be washed down and scrubbed to remove all traces of grease, oil, dirt, etc.

Priming

Two coats of calcium plumbate primer shall be applied to dry film thickness of at least 0.025 mm.

The undercoat and balance of the approved paint system shall follow within one week of the primer.

Guardrail installation shall conform to SM GOST 23457-86** and SNIP 2.05.02-85.

Guardrail Supplementary Requirements

All guard rail posts shall be metal. All guard rail installation shall include spacer blocks which ensure that the face of the guard rail is held at least 250 mm clear of the face of the post.

All metal guard rails, spacers, posts and fixings shall be galvanised. A hot-dip (galvanised) zinc coating that complies with the requirements of AASHTO M232 for coatings on Type A articles shall be applied to all rails, posts and spacers. All bolts, nuts and washers shall have a hot-dip (galvanised) zinc coating that complies with the requirements of AASHTO M232 for coatings on Type C articles. Galvanised guard rails shall not be nested when stacked for storage.

Guard rails and posts shall be supplied together with all bolts, nuts, washers and fixing materials required including bolts for fixing to posts and for fixing spacer blocks.

Dimensions of guard rails and terminal sections shall be as shown on the Drawings. If the Contractor’s preferred guard rail supplier is unable to provide items precisely in accord with

the requirements he shall propose an alternative to the Engineer for approval. The Engineer's approval shall be conditional on being satisfied that the proposal is at least the equal of the specified detail in terms of both function and quality.

Working conditions

701.03. Posts.

When the edge of the pavement is within 1 metre of the guardrail post locations the posts shall be set before placing the pavement.

Guardrail posts shall be maintained at the length shown in the drawings as a minimum. If the Drawings show guardrail posts set into concrete they shall be so set. If no direction is given, guard rail posts may driven directly into the ground. If direct driving is impossible due to hard ground, posts may be set using pilot holes that are punched or drilled. The dimensions of the pilot hole shall not exceed the dimensions of the post.

The recommended method of erection to meet the tolerance requirements set out below is to set out and excavate holes, place posts in position, attach spacers and rails and block the whole assembly into its final position. This procedure allows precise positioning of the elements. When the assembly is set up true to line and level with no visible deformities, place concrete in the hole, being careful not to disturb the prealigned rail.

701.04. Rail Elements.

The rail elements may be installed before or after the pavement adjacent to the guardrail is complete. Do not modify specified hole diameters or slot dimensions.

(a) Steel rail.

Shop bend all curved guardrails with a radius of 45 metres or less. The overlap of the elements shall be made in the direction of the traffic. Use bolts which extend beyond the nut not less than 6 mm but no more than 25 mm. Tighten all bolts.

701.05. Removing and Re-installing Guardrail.

The work of removal of the existing guardrail, posts, and appurtenances and delivery to the designated storage area of the Employer or, if designated for re-use, to the Contractor's store is covered in the provisions of Chapter 103.

For rail that is to be re-used the Contractor shall replace all guardrail, posts, and hardware damaged during removal, storage, or re-installing.

Guard rail for reuse shall be refurbished prior to reuse. Refurbishment shall comprise:

- Taking designated elements from storage
- Transport to the site of refurbishment
- Straightening and reshaping
- Building up and redrilling of all deformed or damaged bolt holes to provide standard 8 bolt coupling
- Grit blasting to bare metal
- Painting as directed

Resetting shall comprise:

- Transport to site
- Erection at site in accordance with all the requirements of the foregoing clauses.

Immediately after grit blasting all exposed steel surfaces shall be given a full coat of zinc rich, epoxy based cold galvanising compound followed by two coats of calcium plumbate primer applied to dry film thickness of at least 0.025 mm. The undercoat and balance of the approved paint system shall follow within one week of the primer. Re-erection shall be done using all new bolts and nuts, hot dip galvanised to the same specification as that for new guardrail fastenings.

Where the Engineer considers that existing guardrail which must be dismantled for the execution of the works is sufficiently new and in good enough condition that it does not require refurbishment he may instruct that the rail be re-installed without refurbishment.

701.06. Guard rail finished alignment

Finished guard rail shall be true to line and level within +/- 10mm at all points. However, in addition, when viewed from any position there shall be no visible irregularity in the horizontal or vertical alignment of the guard rail; the rail must flow in straight lines or smooth continuous curves. If there are visible deficiencies in this respect the guard rail shall be adjusted to correct, even if the rail is within the nominal tolerances.

701.07. Acceptance of works.

The work will be accepted for payment providing that it has been built in conformance to the plans and specifications pertaining to the segment involved and is approved by the Engineer.

Measurement

Guardrail will be measured in linear metres along the face of the rail including terminal sections.

Refurbishing and re-installing guardrail and raising guardrail will be measured in linear metre along the face of the rail. Replacement posts (except replacement posts for posts damaged by construction operations) used in the re-installing of guardrail, will be measured by number.

Separate measurements shall be made for guardrail which is refurbished and re-installed and for guard rail which is reinstalled without refurbishment.

The dismantling of guard rail is measured under chapter 103.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

Payment will be made under some or all of the items below:

	Item	**Unit of measure**
70101	Install new galvanised steel guardrail, type 11 DOMJ.	linear metre
70103	Re-install existing steel W beam guard rail without refurbishment	linear metre
70104	Refurbish and re-install existing steel W-	linear metre

	beam guard rail	
70105	Provide new posts for re-set Guardrail	number

CHAPTER 702. NOT USED

CHAPTER 703. NOT USED

CHAPTER 704. PERMANENT TRAFFIC CONTROL

Description

704.01. Introduction

The works include constructing of new permanent traffic control signs, supports, kilometre and marker posts, any other required markers and renewal (repair) of existing sign supports.

Material

704.02. Materials

Material shall conform to the following:
All sign panels shall be manufactured according to Corrections # 3 to SM GOST 10807-78.
All hardware and sign posts shall be manufactured according to SM GOST 25458-82
SM GOST 25459-82 and Typical Album Serial #3.503.9-80.
Posts are to be manufactured according to Typical Album Serial # 3.503.1-89.
Concrete to be according to Section 504.

704.03. Generalities

Furnish traffic control devices according to GOST 23457-79, *Technical Methods of Organizing Traffic Movement*, and Corrections #3 to GOST 10807-78. Submit the sign list, details of non-standard signs and details of all marker posts for approval to the Engineer before ordering. The design of traffic signs and their installation shall be approved by the Road Police.

704.04. Sign Supports

Sign locations and marker post locations shown on the plans may be changed in agreement with the Engineer to fit the field conditions. Determine the lengths of posts at time of staking.

Drive new supports (posts) with a suitable driving head or set supports (posts) in drilled or punched holes on foundation according to type Proiect 3.503.9-80. Existing supports (posts) have to be thoroughly cleaned and painted with an approved zinc rich epoxy primed followed by two coats undercoat and one coat topcoat of approved finish paint system. Construct concrete footing according to Section 504.

704.05. Sign Panels

Road sign panels to be installed on supports (posts) in accordance to Album # 3.503.9-80.

Mounting of individual signs consisting of prefabricated panels may be made at the place of installations.

If a sign message is not applicable at the time of erection, completely cover the face of the sign with an opaque material

Maintain the covering in good condition until the message becomes applicable. Do not use adhesive tape on the face of a sign.

Repair or replace damaged parts including reflective sheeting

704.06. Marker Posts and Kilometre Posts

Marker posts and kilometre posts shall be constructed and installed at the correct locations in accordance with the standard drawings and appropriate national standards.

704.07. Acceptance of works

The work will be accepted for payment providing that it has been built in conformance to the plans and specifications pertaining to the segment involved and is approved by the Engineer.

Measurement

Sign installations will be measured by number. A sign installation includes the support. Different items will be used for significantly different signs.

Each sign in a multiple configuration will be measured.

Road side marker posts and kilometre posts will be measured by number.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.
Payment will be made under some or all of the items below:

	Item	**Unit of measure**
70401	Install new signs on existing metallic gantry	number
70402	Install new signs on existing supports (posts)	number
70403	Install new kilometre posts	number
70404	Install new marker posts	number
70405	Install new signs on new supports (posts), including installation of posts	number

SECTION 705. PERMANENT ROAD MARKINGS

Description

705.01. Introduction

This Section covers the application of centreline, edge and lane markings together with stop lines and various symbols (e.g. pedestrian crossings) and messaging (e.g. in school zones) on the pavement surface, for the guidance of traffic.

Material

705.02. Materials

a) General

The material to be used for road marking and striping shall be an approved road marking paint applied to the pavement by mechanical means and reflectorised by the application of glass beads (ballotini) spryed onto the wet paint during the application process.

Following application and drying the material shall produce an adherent reflectorised stripe of specified thickness and width capable of resisting wear by traffic.

b) Road Paint

Paint shall meet the requirements of SM GOST R 51256-2009 for Ready-Mixed White and Yellow Traffic Paints. The drying time shall not be more than 30 minutes.

All paint shall be shipped in strong containers plainly marked with the weight per gallon, the volume of paint content in gallons, the colour, lot, batch and code number. A true Statement of the % composition of the pigment, the proportion of pigment to vehicle, and the name and address of the manufacturer also shall be shown.

Any paint which, although inspected and approved at the point of manufacture, hardens or livers in the containers so that it cannot be readily broken up with a paddle to a smooth, uniform painting consistency, will be rejected. Any paint too thick for proper brush application will be rejected, even though it conforms to these Specifications in all other respect. Paint shall be used as supplied; under no circumstances will thinning of paint be permitted.

All paints shall be delivered to the project completely mixed, and ready to be used without additional oil or thinner.

c) Test Certificates

The Contractor shall submit, for each consignment of paint and of ballotini delivered to site, the Manufacturer's certificate to show that the materials comply in all respects with the relevant product specifications.

At least 21 days before starting pavement marking application, the Contractor shall furnish a written copy to the Engineer of the marking manufacturer′s recommendations for use. A field demonstration may be required to verify the adequacy of recommendations.

Marking material shall be transported in appropriate containers plainly marked with the following information as appropriate for the material being furnished :

(a) Manufacturer′s name and address

(b) Name of product

(c) Lot/batch numbers

(d) Color

(e) Net weight and volume of contents

(f) Date of manufacture

(g) Date of expiration

(h) Statement of contents,

(i) Mixing proportions and instructions if mixing of components is required.

(j) Safety information

Working conditions

705.03. Application of Road Markings

(e) Preservation of Existing Marking Patterns

Where existing and final pavement marking locations are identical, stake the limits of all existing pavement markings (no-passing zones, edge stripes, etc.) before any pavement work. Upon completion of the final surface course, establish line limits for the new pavement for approval before marking. Establish markings according to SM GOST 13508-74*****.

(b) Weather Limitations

Road marking material shall not be applied to a damp surface or when the relative humidity exceeds 80%, or at temperatures lower than 10^{o} C, or when in the opinion of the Engineer, wind strength is such that it may adversely affect the application operations.

(c) Mechanical Equipment for Application

The equipment shall consist of an apparatus to clean the surfaces, a mechanical road painting machine and all additional hand-operated equipment necessary to complete the work. The mechanical road marking machine shall be capable of painting at least two lines simultaneously and shall apply the paint to a uniform film thickness at the rate of application specified. The machine shall be so designed that it will be capable of painting the traffic markings to a uniform width with sides within the tolerances specified hereinafter, without the paint running or splashing. The machine shall further be capable of painting lines of different widths by adjustment of the spray jets on the machine or by means of additional equipment attached to the machine. The machine shall be equipped to spray ballotini onto the wet paint during the laying operation at the required rate as agreed with the Engineer.

The machine shall be capable of spraying at a speed of not less than 5.0 km/h..

(d) Surface Preparation

Traffic markings shall be applied to bituminous surfaces only after sufficient time has elapsed to ensure that damage will not be caused to the surface by volatile substances evaporating from the bituminous surfacing and after the surface has been sufficiently trafficked to expose an appreciable proportion of aggregate in the surface. In no case shall traffic paint markings be applied until at least 2 weeks after the completion of the bituminous surfacing or any

longer period required by the Engineer.

Before the material is applied, the surface shall be clean and dry and completely free from soil, grease, oil, acid or any other material which will be detrimental to the bond between the marking material and the surface. The portions of the surface where the marking is to be applied shall be properly cleaned by means of watering, brooming or compressed air if required.

Where road markings are to be applied on a concrete pavement, all laitance and loose curing compound shall be removed. Particular care shall be taken to expose a surface of fresh concrete on all areas where road studs are to be fixed.

(e) Setting Out of Road Markings

The lines, symbols, figures or marks shall be set out by means of paint spots of the same colour as that of the proposed final lines and marks. These spot marks shall be at such intervals as will ensure that the traffic markings can be accurately applied, and in no case shall they be more than 1.5 m from each other. Normally, spots of approximately 10 mm in diameter should be sufficient.

The dimensions and positions of traffic marking shall be as shown on the Drawings or as specified in the national regulations for traffic signs and markings.

After spotting, the positions of the proposed road marking such as dotted lines and starting and finishing points of barrier lines are to be indicated on the road. These pre-markings must be approved by the Engineer prior to the commencement of any marking operations.

The positions and outlines of special markings are to be produced in chalk on the finished road and must be approved by the Engineer before they are applied. The use of approved templates will be permissible on condition that the positioning of the marking is approved by the Engineer before application is commenced.

The position of road studs shall be marked out on the road and shall be approved by the Engineer before they are fixed in position.

The Contractor shall be responsible for all setting out of road marking as agreed with the Engineer.

705.04. Construction Requirement

The road marking material shall be applied as figures, signs, letters, symbols, broken or unbroken lines or other marks, as shown on the Drawings or directed by the Engineer.

The marking material shall be applied by means of a machine, it shall be applied in one layer. Before the road marking machine is used on the permanent works, the satisfactory working of the machine shall be demonstrated on a suitable site which is not part of the permanent works. Adjustment to the machine shall be followed by further testing. Only when the machine has been correctly adjusted and approved by the Engineer may the machine be used on the permanent work. The operator shall be experienced in the use of the machine. The rate of application shall be checked and adjusted if necessary before application on a large scale is commenced and daily thereafter.

Where two or three lines are required next to each other, the lines shall be applied simultaneously by the same machine. Before and during application, in storage, preparation, mixing and application, the marking material shall be treated at all times in accordance with the manufacturers instructions. Paint shall be applied without the addition of thinners.

Where, under special circumstances, painting is done by hand, it shall be applied in two layers, and the second layer shall not be applied before the first layer has dried out sufficiently. As most road marking paint reacts with the bitumen surface of the road, the paint is to be applied with only one stroke of the brush or roller at any one point on the road.

Ordinary road marking paint shall be applied at a nominal rate of 0.42 l/m^2, or as directed by the Engineer, and proprietary brand paints shall be applied at the rates specified by the manufacturer subject to the approval of the Engineer who may require higher rates of application following field trials.

Retro-reflective glass beads shall be applied by means of a suitable machine forming a part of or attached to the road marking machine immediately after the application of the paint in one continuous operation. The rate of application of the beads shall be 0.8 kg/litre paint or such other rate as is specified in the contract or agreed with the Engineer. Machines which apply the beads by means of gravity only shall not be used. The beads shall be sprayed onto the paint layer.

Each layer of marking shall be continuous over the whole area being marked.

Apply pavement markings in the direction of traffic according to SM GOST 13508-74*****. Apply all markings to provide a clean – cut and workmanlike appearance by day or night.

705.05. Protection

After the application, the traffic markings shall be protected against damage by traffic or other causes. The Contractor is responsible for the erection, placing and removal of all warning boards, flags, cones, barricades and other protection measures which may be necessary.

Marked areas shall be protected from traffic until the markings are dried to no-tracking condition. The Contractor shall remove all tracking marks, spilled marking material, markings in unauthorized areas, and any defective markings.

705.06. Tolerances

Road traffic markings shall be applied with an accuracy complying with the tolerances given below:

(a) Width

The width of lines and other markings shall not deviate from the specified width by more than 5%.

(b) Position

The position of lines, letters, figures, arrows, retro-reflective road studs and other markings shall not deviate from the true position specified by more than 20 mm.

(c) Alignment of Markings

The alignment of any edge of a longitudinal line shall not deviate from the true alignment by more than 10 mm in 15 m.

(d) Broken Lines

The length of segments, both of line and of break of broken longitudinal lines shall not deviate from the specified length by more than 150 mm.

In broken lines, the length of segments and the gap between segments shall be as indicated on the Drawings or as directed by the Engineer.

Lines lying on curves, whether broken or unbroken, shall not consist of chords but

shall follow the correct radius.

705.07. Faulty Workmanship or Materials

If any materials not complying with the requirements are delivered to the Site or used in the Works, or if any sub-standard work is carried out, such material or work shall be removed, replaced or repaired as required by the Engineer, at the Contractor's own cost. Rejected traffic markings and paint or marking material that has been splashed or has dripped onto the surfacing, kerbs, structures or other such surfaces shall be removed by the Contractor at his own cost, in such a way that the markings or spilt paint will not show up again later and the underlying bituminous surfacing is not damaged in any way.

705.06. Acceptance of work.

The work will be accepted for payment providing that it has been executed in conformance to the plans and specifications pertaining to the segment involved and is approved by the Engineer.

Measurement

Road marking lines shall be measured by the linear metre for each width of line and words and symbols shall be measured by number or by the area of marking. Alternatively the complete road markings may be measured by the actual area of marking required to be applied expressed in square metres.

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter including the cost of any priming coat required to comply with the manufacturers specifications, paint, cleaning, application, ballotini, stencils, setting out, temporary signs, barriers, all traffic control and making good. .

Payment will be made under the item below:

	Item	**Unit of measure**
70501	Road markings (paint)	square metre

SECTION 706. SIDE WALKS

Description

706.01. Introduction

This type of works consists of constructing new side-walks and/or surfacing the existing side-walk with new asphalt concrete or cement concrete as directed.

Material

706.02. Materials

Materials, items, and structures used for the works under this Section should meet the following requirements.

Sand asphalt concrete mix and materials for its preparing	SM STB 1033:2008
Aggregate for side - walk foundations	SM GOST 8267 - 93***
Stairway structures	according to the project

Material for concrete sidewalk (if concrete is used for constructing sidewalks) should be in accordance with Section 504 and, where kerbs are used, they shall be in compliance with chapter 505.

Construction Requirements

706.03. Construction of side walk.

The works relating to constructing new side - walks and/or new asphalt concrete surfacing are to be performed at the same time as pavements of the main roadways are being installed. When kerbs are required between the side - walk and the roadways, placing kerbs should be performed before constructing the upper pavement layers and side - walks.

Earth works relating to side - walks should be in accordance with Section 201.

New side - walk pavement consisting of macadam foundation and sand asphalt concrete mix surface for side - walks should be carried out in accordance with Sections 306 for the macadam base and 311 for the asphalt surface.. The contractor’s equipment should be capable of constructing side - walk pavement of design width (1.00 - 1.50 m).

706.04. Repair of sidewalk

Where directed by the Engineer the Contractor shall repair existing sidewalks by removing loose asphalt material and resurfacing with a 40mm layer of new sand asphalt mix for sidewalks.

706.05. Acceptance.

The works under this Section are accepted in accordance with Chapter 001 and providing that they are carried out according to the Project requirements, Drawings and Specifications and receive the Engineer's approval.

Measurement

Works relevant to construction of new side - walks and asphalt concrete surfacing will be measured (at design thickness of pavement courses or by actual thickness accepted, whichever is the lower) by area or by volume in accordance with the units designated in the bill item. Works relating to construction of stairways will be measured by length of stairway

Payment

The works measured as indicated above and confirmed by the Engineer will be paid at the rates provided in the contract against those items that are shown in the bid schedule. The payment under these items shall be the whole of the payment due for the completion of all works indicated in the present chapter.

	Item	**Unit of measure**
70601	Repair of existing sidewalk with asphalt concrete	square metre
70602	Construction of new sidewalk with Asphalt concrete surface	square metre
70603	Construction of new sidewalk with Portland cement concrete surface	square metre