

Volume II
Part 2 – Works Requirements

Section VII B - Particular Specifications

PARTICULAR SPECIFICATIONS

Table of Contents

PS01	GENERAL	4
PS01.1	Brief Description of Lao PDR and Xiengkhouang Province	4
PS01.2	Contract Status	4
PS01.3	Brief Description Of Works	5
PS02	SURPLUS MATERIALS DISPOSAL PLAN.....	6
PS03	SAFETY ORGANIZATION, ACTIVITIES AND MEASURES	6
PS03.1	Safety Organization, Safety Activities and Safety Measures	6
PS03.2	Temporary Roadworks	7
PS03.3	Temporary Traffic Ramps	7
PS03.4	Traffic Control of Public Roads	7
PS03.5	Number Lanes for Traffic Control	8
PS03.6	Extraordinary Traffic.....	8
PS03.7	Maintenance and Protection of Traffic.....	8
PS03.8	Measurement and Payment.....	9
PS04	ENVIRONMENTAL CODE OF PRACTICE (ECOP)	9
PS04.1	General	9
PS04.2	Part 1- General Provisions and Planning.....	9
PS04.2.1	Contractor's Responsibility	9
PS04.2.2	Non-compliance Reporting Procedures.....	10
PS04.2.3	Liaising with Local Authorities and the Public.....	10
PS04.2.4	Community Relations.....	10
PS04.2.5	Implementation of the Environmental Health and Safety (EHS) Guidelines	12
PS04.2.6	Implementation of "Chance Find" Procedures	12
PS04.2.7	Prohibitions.....	12
PS04.3	Part 2- Site Specific Requirements.....	13
PS04.3.1	General.....	14
PS04.4	Part 3- Works Management and Monitoring.....	14
PS04.4.1	Mitigation Measures.....	14
PS05	HIV/AIDS AWARENESS AND PREVENTION PROGRAMME.....	16
PS06	UNEXPLODED ORDNANCE (UXO)	17
PS07	PERFORMANCE BASED MAINTENANCE	17
PS07.1	General Provisions of the PBM.....	17
PS07.1.1	Principle of Performance Based Maintenance (PBM).....	17
PS07.1.2	Timeframe for the Works	18
PS07.2	Scope of the Works.....	18
PS07.2.1	Required Service Level.....	18
PS07.2.2	Road Assets to be Maintained	19
PS07.2.3	Service Level Criteria for Road Assets	20
PS07.2.3.1	Paved Section	20
PS07.2.3.2	Unpaved Section	24
PS07.3	Payment Reductions.....	25
PS07.3.1	Determination of Payment	25
PS07.3.2	Reduction Rate of Each Asset	25
PS07.4	Work Method	29
PS07.4.1	Contractor's Monitoring Unit	29
PS07.4.2	Inspection Procedures	30
PS07.4.3	Maintenance Works	31
PS07.5	Suggested Routine Maintenance Activities	34
PS07.5.1	Roadworks	34
PS07.5.2	Drainage and Erosion Control	37
PS07.5.3	Bridge Maintenance	38
PS07.5.4	Traffic Safety	38

Table of Contents cont:

PS07.6	Quality of Materials, Testing and Workmanship to be Employed	38
PS07.6.1	Gravel Pavement	39
PS07.7	Reporting	40
PS07.8	Measurement	47
PS07.9	Payment	47
PS08	INITIAL MAINTENANCE WORKS	47
PS09	EMERGENCY WORKS	49
PS09.1	Emergency Works	49
PS09.2	Identification of Emergency Works	49
PS09.2.1	Definition of "Unforeseen Natural Phenomena"	49
PS09.3	Procedure for Requesting Emergency Works	50
PS09.4	Remuneration for Emergency Works	50
PS09.5	Provision for Emergency Works	50
PS09.6	Obligations of Contractor during Emergencies and Emergency Works	50
PS09.7	Minor Repairs made necessary by "Unforeseen Natural Phenomena"	51

PS01 GENERAL

PS01.1 BRIEF DESCRIPTION OF LAO PDR AND XIENKHOANG OVINCE

- (1) Lao forms part of the Indo-China Peninsula. It is a land locked country having borders with China, Vietnam, Cambodia, Thailand and Myanmar. The Mekong River forms the border for much of the western side of the country, separating Laos from Myanmar and most of Thailand.
- (2) The country is sparsely populated (total population 6.49 million – NSC 2015) and essentially rural. The official language is Lao.
- (3) The climate is subequatorial to tropical, with some continental influences (large temperature variations), particularly in the north. Rainfall is predominantly monsoonal, falling in the period from May to October, with annual rainfall commonly in the range 1,200 mm to 3000 mm.
- (4) There are international airports at Vientiane, Luang Prabang and Paske with regular (approximately daily) flights connecting to Bangkok and Hanoi, and less frequently to other international destinations. There is an internal airline system, with a number of regional towns being served by Airbus and twin engine turboprop ATR aircraft.
- (5) The Mekong is navigable on some reaches; however ships cannot reach Lao from the sea: there are falls and rapids near the Cambodian border which prevent this. Land transport to Lao is limited, and principally occurs from Thailand and Vietnam. A rail link is under construction from China (Henan Province via Luang Namtha and Luang Prabang) to Vientiane.
- (6) Xiengkhouang Province is situated in the central-northern region of the country. The area of the province is 15,880 sq km and the population is 244,684 (2015). The main activities are agriculture. Access to the Vientiane is via Road NR 7 and Road NR13S. The Provincial Capital is Phonesavanh.

PS01.2 CONTRACT STATUS

- (1) The road sections subject to performance based maintenance are part of the Provincial and District Road network and are:

Province	District	Road No.	Work Lengths, (km)				Required Service levels
			Paved sections		Un-paved sections		
			Location	Length, (km)	Location	Length, (km)	
Xiengkhouang	Phoukoud (1)			4.50		51.00	GOOD/FIAR
		3909	Junc. Rd No. 7 - District Center	4.50	District Center - B. Vangtong	51.00	
		Total		4.50		51.00	

PS01.3 BRIEF DESCRIPTION OF WORKS

- (1) The Contract comprises:
 - (i) Maintenance Services¹ for the road sections of a total length of 55+500 kilometres – **the required Service Level is GOOD/FAIR²**, Formal inspections will be carried out by the

¹ Definitions of the categories of road maintenance considered in this Specification:

Project Manager and Contractor at monthly intervals and a report signed by both parties made of the compliance with the required service level – any non compliance will be recorded for correction by the Contractor. Informal inspections will be carried out by the Project Manager as part of general supervision at regular intervals – the Contractor will be directly informed in writing of any non compliance with the service level criteria;

(ii) Localised Improvement Works for which a BoQ is given;

(iii) A Provisional Sum has been allowed for Emergency Works for which an outline BoQ is given.

(iv) During the period of the Contract other roads which have been upgraded to Good/Fair condition may be added to the applicable road sections. A Variation to the Contract would be issued to cover payment for any such additional works.

- (2) The sections of road include paved carriageway in DBST and gravel sections which are generally 5.0m wide.
- (3) The Impact Corridor is 7.50m either side of the road centreline. This may be reduced through villages and other built up areas at the discretion of the Project Manager.
- (4) The locations and approximate extents of the works are shown on the Strip Plans.
- (5) No Resettlement is envisaged.
- (6) UXO is not expected to present a problem on this Contract.

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- (a) **Periodic Maintenance** - the resealing of paved roads, re-grading/ re-gravelling of unsealed roads, rehabilitation of damaged sections and minor bridge repairs on the selected sections of National and Provincial road networks at planned intervals;
 - (b) **Routine Maintenance** - the upkeep of roads in good to fair condition during the year irrespective of traffic volume or engineering characteristics, including clearing/upkeep of drains, ditches and culverts; grass cutting; upkeep of embankments, repairing potholes, repairing edges and minor washouts, landslips, etc. These activities should be carried out regularly and systematically;
 - (c) **Emergency Maintenance** - immediate maintenance actions needed to reopen a road or ensure safety, such as, the rehabilitation of localized sections of road damaged by flood or landslip, removal of landslides and slip related debris, reinstatement of bridges, repair of washouts, etc, which are unforeseen at the time of preparing the annual road maintenance program;
 - (d) **All-weather roads** - roads which are trafficable 365 days of the year.

²² Note: The most important criterion for setting the service level is can it be afforded and economically justified for the road in question. "GOOD/FAIR" has been assumed in these documents following the selection of the target roads.

PS02 SURPLUS MATERIALS DISPOSAL PLAN

- 1) The Contractor shall prepare and submit for the approval of the Project Manager a Surplus Materials Disposal Plan itemizing in detail the Contractor's proposals for the disposal of all surplus materials arising from the Works including any temporary on-site storage prior to final disposal.
- 2) The Surplus Materials Disposal Plan shall contain details of the locations of disposal areas and access roads thereto, the preparation of such areas to receive the surplus material(s), environmental mitigation measures (paving of access roads, screening of disposal areas, watering for dust control, prevention of leeching of the deposited surplus materials into adjacent watercourses, etc.), final shaping and contouring of the disposal areas and all other factors relevant to his proposals. Note: the agreement of the local authorities may be required for any offsite disposal.
- 3) Where the Contractor proposes to utilize side tipping in erosion areas, the extents of such areas and volumes to be disposed of in each area by this method shall be clearly defined in the Disposal Plan.
- 4) The Plan may be submitted in sections corresponding to the Contractor's proposed programming of the Works, but no work shall commence on any earthworks (including clearing and grubbing) operations in any area until the Project Manager's written approval to the Plan for that area has been obtained.
- 5) The Contractor shall note that side tipping will only be allowed where the Project Manager considers that such a method will not result in any significant adverse short or long-term environmental or social impacts, or prejudice any future development works, and the Engineer's approval to the use of such a disposal method may be withdrawn at any time either in total or in such locations as the Engineer shall advise the Contractor in writing.
- 6) Refusal by the Project Manager to approve side tipping in any location or the withdrawal of approval shall not constitute a variation to the Contract and shall not be considered as due cause for a claim.

PS03 SAFETY ORGANIZATION, ACTIVITIES AND MEASURES

PS03.1 Safety Organization, Safety Activities and Safety Measures

- (1) The Contractor will be responsible for the safety of the public legitimately passing through the Site. All excavations, the Contractor's equipment or items of potential danger to the public must be barricaded and sign-posted to the satisfaction of the Project Manager and the Contractor must provide sufficient watchmen to ensure the safety of the public at all times. All existing pedestrian routes shall be maintained in a safe condition unless an alternative route is provided to the satisfaction of the Project Manager.
- (2) All work must be carried out in such a way as to minimize danger to the public or the workmen on the Site.
- (3) The Contractor shall provide a safety management organization and mobilize prior to the commencement of construction, then an emergency response flow chart shall be established.
- (4) The Contractor shall provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, due to the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.
- (5) Safety minimum requirement, cost allocation and measurement are as follows:

The Contractor shall satisfy all safety requirements specified in the table below and shall allocate all the costs of safety requirement into the unit prices of the relevant Pay Items.

No.	Description	Standard/Requirement	Quantity	Unit
1	Safety sign boards	Every 10m, Safety Attention Boards	Correspond to each work	Each
2	Safety Banners	Every 100m, Safety Slogan banners	Correspond to each work	Each
3	Personal Protection Equipment	Helmets, Safety shoes, Safety wear & gloves, Safety goggles (if any), Safety belt (if any), etc.	Every worker	

PS03.2 Temporary Roadworks

(1) The Contractor shall furnish, maintain, and remove on completion of the Work for which they are required, all temporary roads and road works such as sleeper tracks and staging over roads, access and service roads, temporary crossings or bridges over streams or unstable ground, and shall make them suitable in every respect for carrying the Contractor's equipment required for the work, for providing access for traffic for himself or others, or for any other purpose. Such temporary roadworks shall be constructed to the satisfaction of the Project Manager, but the Contractor shall nevertheless be responsible for any damage done to or caused by such temporary road works. Before constructing temporary road works, the Contractor shall make all necessary arrangements, including payment if required, with the public authorities or landowners concerned, for the use of the land and he shall obtain the approval of the Project Manager. Such approval will be dependent on the Project Manager being satisfied with the Contractor's proposals for items such as signing, lighting and riding quality of the temporary road together with the proposed maintenance arrangements. Such approval shall not relieve the Contractor of his responsibilities under the Contract. Upon completion of the Works, the Contractor shall clean up and restore the land to the satisfaction of the Project Manager.

(2) The Contractor, when required by the Project Manager, shall submit for the Project Manager's approval drawings giving full details of temporary roads. Such details shall include alignment, profile, pavement construction, signing, lighting and the duration of the temporary road. The work under this Section is deemed to be an auxiliary obligation of the Contractor. The work under this Section is deemed to be a subsidiary obligation of the Contractor.

PS03.3 Temporary Traffic Ramps

(1) In cases where it is necessary or required by the Project Manager, the Contractor shall construct and maintain temporary traffic ramps, and furnish all the labor and materials required therefore. The work under this Clause is deemed to be subsidiary obligation of the Contractor.

PS03.4 Traffic Control of Public Roads

(1) In order to facilitate traffic through or around the Works, or wherever instructed by the Project Manager, the Contractor shall erect and maintain at prescribed points on the work and at the approaches to the Work, a temporary fence made of corrugated sheet with hard posts and horizontal bars, traffic signs, lights, flares, barricades, rubber cones with traffic lamps and other facilities as indicated in the Drawings or required by the Project Manager for the direction and control of traffic.

(2) Where required, or where directed by the Project Manager, the Contractor shall furnish and station competent flagmen whose sole duties shall consist of directing the movement of traffic through or around the Work.

(3) In addition to the requirements of (1) and (2) above, the Contractor shall furnish and erect, within or near the project area, such warning and guide signs as may be ordered by the Project Manager.

(4) In order to minimize disruption to traffic flows the Contractor shall enclose the Site with a

temporary fence to provide a visual barrier between his work and adjacent traffic. The temporary fence shall be 2.0 m high and the movement of men, materials and the Contractor's equipment into and out of the enclosed area shall be controlled by flagmen

Item	Description	Standard/Requirement	Quantity	Unit
1	Traffic Control Flagmen	2 men x 12 months	24	man-month (mm)
2	Equipment		2	
	1) Regulatory Signs	Vehicle turnouts, Speed Limit, Speed Zone Ahead, One Way Lane, Give Way	2	number
	2) Warning Signs	Truck Tipping, Intersection Warning, Low Clearance, Stop, Single Lane Ahead, Transit Stop	2	number
	3) Misc. Signs	Stop Ahead, Limited Access, End of Road, Off Limits	2	number
	4) Delineator	Delineator for Project Working Area, Interchange Off Rump and Canalization, Guideposts, Barriers	2	number
	5) Other	Movable Barrier/ Barricade, Signal Flashing Operation, Illumination for Project Working Area in Night may be required. The Bidder shall propose the details in his proposed construction planning.	2	number

(5) The repairing and maintenance works of the existing road is deemed to be subsidiary obligation of the Contractor.

(6) Traffic control minimum requirement, cost allocation. The Contractor shall satisfy all traffic control requirement specified in the table below. The cost of this requirement of clause Section PS03.5 shall be allocated as Provisional Sum.

PS03.5 Number Lanes for Traffic Control

(1) The existing traffic on roads at the project site must be maintained at all times during the Works and if diversions are provided these must be of the same traffic capacity as the original road. Notwithstanding the above, the Project Manager may give approval to reductions in traffic capacity if the Contractor can show that these will not cause excessive delay to traffic. If such approval is given, the Project Manager may specify the hours during the day when the reduction in capacity may be applied and it should be anticipated that these hours might not include the peak period for the traffic movement under consideration.

(2) The Contractor shall cooperate with the relevant agencies regarding traffic control and all details will be subject to the Project Manager's approval. The work under this Clause is shall be deemed to be subsidiary obligation of the Contractor.

PS03.6 Extraordinary Traffic

(1) The Contractor shall observe the requirements of the Conditions of Contract and will cooperate with the Project Manager for carrying out any necessary investigations in order to obtain approvals, licenses, escorts and any other necessary facilities in order to enable extraordinary traffic to be moved on the roads in the project area. The work under this Clause is shall be deemed to be subsidiary obligation of the Contractor.

PS03.7 Maintenance and Protection of Traffic

(1) The Contractor shall keep open to traffic existing roads during the performance of the Works, provided that when required by the Engineer the Contractor shall arrange detours subject to the

approval of the Project Manager. The Contractor shall at all times keep roads and footpaths, affected by his operations, free from obstruction and nuisance.

(2) The Contractor shall take necessary care at all times during the execution of the Work to ensure the convenience and safety of residents along and adjacent to the road, and any public highway that may be affected by the Work. Street lighting shall be relocated as necessary to maintain the same standard of lighting during the course of the works until new lighting facilities are brought into operation.

(3) Any failure of the Contractor to meet these requirements will entitle the Project Manager to carry out such works as he deems to be necessary and to charge the Contractor with the full cost thereof plus ten percent of such cost, which sum will be deducted from any money due or which may become due to the Contractor under the Contract. The costs of the requirements of this Clause shall be allocated as a Provisional Sum.

PS03.8 Measurement and Payment

(1) Measurement will be as follows:

Item No.	Description	Unit
PS03-1	Provision of Safety Organization, Safety Activities and Safety Measures	Lump Sum

(2) Payment will be made at the rates entered in the Bill of Quantities, which rates shall include all work specified within this Section PS03.

PS04 ENVIRONMENTAL CODE OF PRACTICE (ECOP)

PS04.1 General

(1) This Section presents a generic ECOP to be applied for all the maintenance works to be conducted under the Lao Road Sector Project 2 (LRSP2). The ECOP implementation cost will be part of the contract cost and will not be paid separately. The Employer will assign the Project Manager and/or field engineer to supervise and monitor Contractor's compliance with ECOP on a day-to-day basis while assigning the Environment and Social Unit (ESU/DWPT) to conduct monthly monitor and reporting. The Department of Roads (DoR), the Environment and Social Division of the Public Works and Transport Institute (ESD/PTRI), the local authorities (PONRE/DONRE), and local communities may also conduct periodic monitoring of contractor performance, as needed.

(2) Application of ECOP. The ECOP aims to mitigate the typical potential negative impacts of road maintenance works such as increased in air, noise, vibration, waste generation, safety risks, local traffic, etc. which could be mitigate through good environmental management and construction practices.

(3) The following guidelines will be implemented by the Contractor and is considered as part of contract documents of the subproject to be conducted by Contractor.

PS04.2 Part 1- General Provisions and Planning

PS04.2.1 Contractor's Responsibility

(1) The Contractor is responsible for making best effort to reduce and mitigate the potential negative impacts on local environment and local resident including making payment for all damages that may occur. Performance of the Contractor will be closely supervised and monitored by the Project Manager and/or qualified field engineer as well as periodic monitored by a qualified consultant to be assigned by the subproject owner (DPWT) and/or staff from the Environment and Social Unit of DWPT (ESU/DPWT). Results of the ECOP compliance monitoring will be included as part of the subproject progress report. Compliance with ECOP will be required throughout the construction period.

(2) For clarity, the term “Works” and/or “Construction” in this document includes all site preparation, demolition, spoil disposal, materials and waste removal and all related engineering and construction activities.

PS04.2.2 Non-compliance Reporting Procedures

(1) The Contractor and its subcontractors if any, must comply with the final ECOP. To ensure that necessary action has been undertaken and that steps to avoid adverse impacts and/or reoccurrence have been implemented, the Contractor shall promptly and within 24 hrs report to the Project Manager - DPWT any event or condition that cause or has the potential to cause serious/significant harm to the environment, affected persons, workers or community members, the type or extent of impact that would require an urgent response. These include all accidents involving death or serious injury to staff or workmen or community members and any serious environmental breach has occurred during construction e.g. clearing of sensitive areas, serious oil spills etc. In the event of working practices being deemed dangerous either by the Employer, the provincial and local authorities, or other concerned agencies, immediate remedial action must be taken by the Contractors. The Contractor must keep records of any incidents and any ameliorative action taken. The records of non-compliance that could be practically addressed (not cause serious impacts) will be reported to the Employer on a monthly basis.

(2) The Contractor will be responsible for dealing with any reports/grievance forwarded by the project investment owner, Police or other agencies (by following instruction from the project investment owner representative as appropriate) as soon as practicable, preferably within one hour but always within 24 hours of receipt by either the Contractor. The Project Manager/ESU will monitor and ensure that the Contractor has taken appropriate action. Where appropriate, approval remedial actions may require an agreement from the local authorities and/or other Government agencies. Procedures should be put in place to ensure, as far as is reasonably practical, that necessary actions can be undertaken to avoid recurrence and/or serious damage.

PS04.2.3 Liaising with Local Authorities and the Public

(1) Prior to the commencement of project activities and throughout the construction duration, the Contractor will work closely with the local authorities and other agencies to ensure full compliance with Government regulations and will also provide adequate information on the Project to the General Public, especially those that may cause public safety, nuisance, and sensitive areas and the locations of storage and special handling areas. The Contractor will provide information and reporting telephone “Hot Line” staffed at all times during working hours. Information on this facility shall be displayed on site hoardings.

PS04.2.4 Community Relations

(2) The Contractor will assign one community-relation personnel, who will be focused on engaging with the community to provide appropriate information and to be the first line of response to resolve issues of concern. Contractor will take reasonable steps to engage with residents of ethnic backgrounds and residents with disabilities (or other priority groups as appropriate), who may be differentially affected by construction impacts.

(3) The Contractor will ensure that local residents nearby the construction sites will be informed in advance of works taking place, including the estimated duration. In the case of work required in response to an emergency, local residents shall be advised as soon as reasonably practicable that emergency work is taking place. Potentially affected residents will also be notified of the ‘Hotline’ number, which will operate during working hours. The “Hotline” will be maintained to handle enquiries regarding construction activities from the general public as well as to act as a first point of contact and information in the case of any emergency. All calls will be logged, together with the responses given and the callers' concerns action and a response provided promptly. The helpline will be widely advertised and displayed on site signboards.

(4) The Contractor respond quickly to emergencies, complaints or other contacts made via the ‘Hotline’ or any other recognized means and liaise closely with the emergency services, local authority officers and other agencies (based on established contacts) who may be involved in incidents or emergency situations.

(5) The Contractor will manage the work sites, work camps, and workers in a way that is acceptable to local residents and will not create any social impacts due to workers. Any construction workers, office staff, Contractor's employees, or any other person related to the Project found violating the "prohibitions" activities listed in Section below may be subject to disciplinary actions that can range from a simple reprimand to termination of his/her employment depending on the seriousness of the violation.

PS04.2.5 Implementation of the Environmental Health and Safety (EHS) Guidelines

(1) In line with WB safeguards policy, the Contractor is required to comply with the Environmental Health and Safety Guidelines (EHSG) established for the project investment with financial support from the WB group (WBG). The EHSG provides general guidance on the pollution prevention and abatement measures and workplace and community health and safety guidelines that are normally acceptable in Bank-supported projects, particularly in cases where the borrowing country does not have standards, or when its standards fall significantly short of international or industry-wide norms. The EHSG are divided in two parts: general guidelines on health and safety and pollution prevention and abatement, including general standards for air and water quality, and a set of sector-specific guidelines for various types of development projects. For the Project, the Contractor will prepare an EHS Plan with an aim to identify the potential impacts and to develop a mechanism for a better management of the environmental health and safety of project activities during construction. The EHS Plan will be incorporated into the Contractor's own Standard Operating Procedures (SOPs). At a minimum the following EHS rules will be strictly followed:

Site EHS Rules:

- a. EHS orientation sessions before starting work;
- b. Wearing of personal protective equipment (gloves, helmets, safety shoes, dungarees, goggles etc) in accordance with construction practice in SE Asia;
- c. Follow the messages and instructions displayed on EHS notice boards installed on site;
- d. Promptly reporting all accidents to the concerned authority;
- e. Maintain appropriate barricades as required;
- f. Vehicles must be driven at a safe speed, observing speed limits of 30 Km/h and designated routes as mentioned in Contractor's Mobility Map;
- g. Drivers must have a valid driving license for the class of vehicle they are operating;
- h. UXO clearance of the affected project area.

Health and Hygiene: The measures should include:

- i. Provision of adequate medical facilities to the staff;
- j. Provision of hygienic food to the employees;
- k. Provision of cooling and heating facilities to the staff; and
- l. Provision of drainage, sewerage and septic tanks in camp area.

Security: Security measures should include:

- m. Regular attendance and a controlled time keeping of all employees;
- n. Restriction of un-authorized persons to the residential and work areas;
- o. Restriction of carrying weapons and control hunting by employees; and
- p. Provision of boundary walls/ fences with proper exits to the camp.

PS04.2.6 Implementation of “Chance Find” Procedures

- (2) If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor will carry out the following steps:
- a. Stop the construction activities in the area of the chance find;
 - b. Delineate the discovered site or area;
 - c. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the National Culture Administration take over;
 - d. Notify the Project Manager and/or the Employer (DPWT) who in turn will notify the responsible local authorities and the provincial Culture Department immediately (within 24 hours or less);
 - e. Responsible local authorities and the provincial Culture Department would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of National Culture Administration. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
 - f. Decisions on how to handle the finding shall be taken by the responsible authorities and the provincial Culture Department. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
 - g. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities; and
 - h. Construction work could resume only after permission is given from the responsible local authorities or the provincial Culture Department concerning safeguard of the heritage.

PS04.2.7 Prohibitions

- (3) The following activities are prohibited on or near the subproject sites:
- a. Cutting of trees for any reason outside the approved construction area; Hunting, fishing, wildlife capture, or plant collection; Buying of wild animals for food; Having caged wild animals (especially birds) in camps; Poaching of any description; explosive and chemical fishing; Disturbance to anything with architectural or historical value;
 - b. Building of fires; Use of unapproved toxic materials, including lead-based paints, asbestos, etc.; Use of firearms (except authorized security guards); Use of alcohol by workers in office hours; Driving in an unsafe manner in local roads; and
 - c. Washing cars or machinery in streams or creeks; Maintenance (change of oils and filters) of cars and equipment outside authorized areas; Creating nuisances and disturbances in or near communities; Disposing garbage in unauthorized places; Indiscriminate disposal of rubbish or construction wastes; Littering the site; Spillage of potential pollutants, such as petroleum products; Collection of firewood; Urinating or defecating outside the designated facilities; and Burning of wastes and/or cleared vegetation.

PS04.3 Part 2- Site Specific Requirements

PS04.3.1 General

(4) To be responsive to concerns observed and/or expressed by local authorities and communities, specifically, the Contractor will be responsible to comply with, but not limited to, the followings:

- a. The Contractor will install the Work Camp on areas far enough from water points, houses and sensitive areas in consultation with the community and the subproject owner. Good quality sanitary equipment should be selected and installed in the Work Camp.
- b. The Contractor will manage all activities in compliance with laws, rules and other permits related to site construction regulations (what is allowed and not allowed on work sites), and will protect public properties. Degradation and demolition of private properties will be avoided. Paying compensation to damage to the public facilities and/or private property will be required. The Contractor will inform the subproject owner on issue and/or damages that may unexpectedly occur.
- c. The Contractor is responsible for protection of local environment against dust, air, noise, vibration, exhaust fuels and oils, and other solid residues generated from the work sites. The Contractor will manage waste properly and do not burn them on site and will also provide proper storage for construction materials, organize parking and displacements of machines in the site. Used oil and construction waste materials must be appropriately disposed off and adequate waste disposal and sanitation services will be provided at the construction site next to the generated areas. In order to protect soil, surface and ground water the Contractor will avoid any wastewater discharge, oil spill and discharge of any type of pollutants on soils, in surface or ground waters, in sewers and drainage ditches. Compensation measures may be required.
- d. The Contractor will be responsible for maintaining good hygiene, safety, and security of the work sites, including protection of and health and safety of staff and workers. The Contractor will prevent standing water in open construction pits, quarries or fill areas to avoid potential contamination of the water table and the development of a habitat for disease-carrying vectors and insects. Safe and sustainable construction materials and construction method should be used.
- e. The Contractor will use a quarry of materials according to the regulations and compensate by planting of trees in case of deforestation or tree felling. When possible, the Contractor should develop maintenance and reclamation plans, protect soil surfaces during construction and re-vegetate or physically stabilize eligible surfaces, preserve existing fauna and flora and preserve natural habitats along streams, steep slopes, and ecologically sensitive areas.
- f. During construction, the Contractor will take serious actions to control dust by using water or through other means and the construction site will be cleaned on a daily basis.
- g. The Contractor will work with local authority and management local traffic effectively and ensure traffic access of road safety of local residents and road users during the works. Speed limit at work sites and community area will be applied to all vehicles and cars. All vehicles and their drivers must be identified and registered and the drivers are properly trained.
- h. The Contractor will install signalling of works, ensure no blockage of access to households during construction and/or provide alternative access, provide footbridges and access of neighbours and endure construction of proper drainage on the site.
- i. The Contractor will respect the cultural sites, ensure security and privacy of women and households in close proximity to the camps and safely dispose asbestos.

PS04.4 Part 3- Works Management and Monitoring

PS04.4.1 Mitigation Measures

Table below provides guidelines for the mitigation measures to be carried out by the Contractor during implementation of works including key monitoring indicators for supervision by Project Manager/ESU.

No.	Activities Causing Impacts	Mitigation measures	Monitoring indicators
1	Establishment and operation of worker camps,	<ul style="list-style-type: none"> • Ensure that the sites for campsite are approved by the Project and local authority; Selection of the camp sites should be made through tripartite consultation including community, Contractor, and the subproject representative. • Ensure that basic camp facilities are provided including security, septic tanks, latrines, safe water supply, light and power grid connection (where available) mosquito net, blanket, safe paths, fire prevention equipment, etc. • Ensure that (a) washing areas, demarcated and water from washing areas and kitchen is released in sumps, (b) septic tanks of appropriate design have been used for sewage treatment and outlets are released into sumps and must not create a pond of stagnant water, and (c) the latrines, septic tanks, and sumps are built at a safe distance from water body, stream, or dry streambed, and the sump bottom is above the groundwater level. 	<p>Location of the work camp should be shown in the alignment sheet.</p> <p>No complaints from local authorities and local residents due to location and activities of the worker camps.</p> <p>Safe and comfortable living of staff and workers</p>
2	Establishment and operation of construction materials and equipment yards and access roads	<ul style="list-style-type: none"> • Ensure that the locations are far away from residential areas and take actions to mitigate dust, noise, vibration, water pollution, waste, etc. 	Proper management of the site and no complaints from local authorities and residents
3	Disposal of waste generated from the camp	<ul style="list-style-type: none"> • Recycle metallic, glass waste; bury organic waste in impervious pit covered with soil. • Ensure that waste material is properly disposed off in a manner that does not affect the natural drainage. 	No health issue occurred
4	Access tracks/haulage routs	<ul style="list-style-type: none"> • The moving machinery should remain within the subproject boundary. • Ensure that the access tracks, which are prone to dust emissions and disturbance to local resident are managed by water spraying daily and the areas sensitive to noise and vibration are managed through enforcement of speed limit control. • After completion of construction work all the damaged roads / tracks will be restored by the Contractor, as it is Contractor's obligations. Ensure that surface run-off controls are installed and maintained to minimize erosion. • Restriction on movement of Contractor's vehicles on designation routes; deploy traffic man at the village to control the traffic as needed. 	No complaints from local residents regarding dust, noise, vibration, road safety, and the usage of the tracks/access roads

5	Hiring skilled workers from outside of the locality	<ul style="list-style-type: none"> Hiring of workers from the local communities as many as possible. 	Number of local workers at the worksite.
6	Workers safety and hygienic conditions	<ul style="list-style-type: none"> Provide protective clothing and equipment for workers especially those handling hazardous materials, (helmets, adequate footwear) for concrete works (long boots, gloves), for welders (protective screen, gloves dungaree), etc. 	Safe working conditions
7	Water for staff and workers consumption and construction	<ul style="list-style-type: none"> Provide adequate and safe water for consumption at sites and work camp. 	Water tanker and pump by the Contractor
8	Interruption of water supply	<ul style="list-style-type: none"> Inform residents and provide water supply as needed. 	No complaint from residents
9	Social issues	<ul style="list-style-type: none"> Ensure that conflicts with local power holders and local communities are avoided. Where land acquisition and resettlement of are required and inevitable, civil work will not start until compensation and necessary support has been provided to the project affected households. Implement the contract or civil work in a way that fully respects ethnic group's dignity, human rights, and cultural uniqueness and so that they do not suffer adverse effects during the construction. Ensure that project stakeholders especially project affected people are adequately consulted and, where necessary focus group meetings are conducted with both men and women to identify any project-related and other issues related to the subproject implementation. 	<ul style="list-style-type: none"> No social conflicts due to the subproject activities and/or workers. Community broad support is established maintained. Project affected people or households particularly those of ethnic groups do not suffer adverse effects and their livelihood are not worse off than the pre-project level as a result of the road sub-project project implementation.
10	Storage of hazardous material (including waste)	<ul style="list-style-type: none"> Provide hard compacted, impervious and bounded flooring to hazardous material storage areas; Label each container indicating what is stored within; Train staff in safe handling techniques. 	No health hazard and water contamination occurred.
11	Construction activities; handling of fuels, oil spill and lubricants	<ul style="list-style-type: none"> Ensure that no contaminated effluent is released in to the environment. Ensure that fuels, oils, and other hazardous substances handled and stored according to standard safety practices such as secondary containment. Fuel tanks should be labeled and stored in impervious lining and dykes etc. Ensure that vehicle refueling to be planned on need basis to minimize travel and chance spills. Ensure that operating vehicles are checked regularly for any fuel, oil, or battery fluid leakage. 	No oil spill observed
12	Cutting of trees in the right of way where required	<ul style="list-style-type: none"> To get agreement of the local community and community 	No complaints from local authority and/or residents.
13	Excavation of channels	<ul style="list-style-type: none"> Proper compaction and water sprinkling 	Erosion and dust emission minimized
14	Disposal of excavated material	<ul style="list-style-type: none"> Stockpile the excavated material to non-agriculture and in a minimum area and away from storm water 	Minimum loss of habitat

15	Loss of fertile soil and vegetation; impacts on natural vegetation and embankment erosion along the watercourse.	<ul style="list-style-type: none"> Remove surface soil of the location, stocked in a proper place and once the construction is finished, put the soil back on that place. The left-over spoil soil should be collected and kept aside for rehabilitation of the site at later stage of the work; re-vegetate the embankments with indigenous plant species 	River banks stabilized and re-vegetated
16	Dust and smoke emissions	<ul style="list-style-type: none"> All truckloads of loose materials are covered during transportation. Water spraying or any other methods are used by the Contractor to maintain the works areas, adjacent areas, and roads, in a dustless condition, as well the vehicle speed not to be exceeded from 30Km/h. Vehicles will be tuned regularly to minimize the smoke emissions. 	Dust and smoke controlled
17	Noise pollution	<ul style="list-style-type: none"> Vehicles and equipment used to be fitted, as applicable, and with properly maintained silencers. Restriction on loudly playing radio/tape recorders etc. 	Excessive noise generation controlled
18	Excavation of borrow areas	<ul style="list-style-type: none"> Excavate borrow soil up to maximum depth of 0.5m; with slope boundaries 	Borrow area rehabilitated as per specification
19	Rehabilitation of borrow pits	<ul style="list-style-type: none"> Proper rehabilitation of borrow pits; Removal and storage of top 15 cm top soil having organic materials and spreading it back during restoration of borrow area 	Borrow areas rehabilitated
20	Encountering archaeological sites during earth works	<ul style="list-style-type: none"> The Project Manager or his Representative will halt the work at the site and inform to the regional team leader and Archaeological Department immediately. 	The report from the Project Manager or field supervisor, community, and contractor
21	Aesthetic/ scenic quality	<ul style="list-style-type: none"> Carry out complete restoration of the construction sites. Remove all waste, debris, unused construction material, and spoil from the worksites. 	Cleanliness and tidiness of works sites and work camp

PS05 HIV/AIDS AWARENESS AND PREVENTION PROGRAMME

(1) The Contract requires the Contractor to implement an HIV/AIDS Awareness and Prevention programme for the Contractor's Employees for the duration of the Contract. The GoL and UNDP have developed a Toolkit to help guide the design and implementation of the programme which is to be implemented by a Service Provider nominated by the Employer. The Contractor will be compensated for the cost of these services through a Provisional Sum in the Bill of Quantities.

(2) The Programme has the objective of ensuring construction workers receive support for behavioural change to reduce the incidence of HIV infection. The programme will be designed so construction workers will:

- be informed about HIV transmission
- have access to condoms
- have access to services for HIV counselling and testing
- have access to services for STI diagnosis and treatment
- have changed their behaviour to avoid HIV transmission.

(3) The contractor is required to ensure that all construction workers have access to the programme, whether they shall be the contractor's own personnel or those of sub-contractors.

- (4) Payment for the HIV/AIDS programme service provider will be made in accordance with the Conditions of Contract.

Item No.	Description	Unit
PS05-1	HIV/AIDS Programme Service Provider (Nominated Sub-contractor)	Provisional Sum

PS06 UNEXPLODED ORDNANCE (UXO)

- (1) The Employer will be responsible for the removal and disposal of any UXO discovered on the Site or in areas utilised by the Contractor for Temporary Works, etc.
- (2) As the Site does not lay within an area considered to be contaminated by UXO, the Employer does not propose to undertake any general UXO search and location exercise. The Contractor shall, however, exercise due diligence in carrying out the Works and activities related thereto and shall immediately report to the Project Manager any UXO or suspected UXO discovered within or in the vicinity of the Site or Temporary Works areas.
- (3) Immediately upon discovery of UXO or suspected UXO, the Contractor shall cease construction activities in the area and shall ensure that no member of the public, of his workforce or that of his sub-contractors or any other person or persons approaches such UXO or suspected UXO until such time as the Employer's UXO contractor has examined the same and removed it, rendered it safe or declared it harmless.
- (4) On no account shall any piece of UXO or suspected UXO be moved or in any way disturbed by the Contractor subsequent to discovery.
- (5) The Contractor shall immediately report to the Project Manager any accidents/explosive incidents attributed to UXO, whether on the Site or land areas used for Temporary Works or adjacent thereto and whether or not such accidents/incidents are related to the construction activities.
- (6) Any UXO discovered on the Site shall be disposed of (rendered harmless) by the (Employer's) UXO contractor by whatever methods are deemed appropriate. This may involve suspension of the Contractor's works in the vicinity of any discovered UXO whilst removal or disposal of the UXO is undertaken. The Contractor shall allow for such eventuality in his programming.
- (7) The Contractor shall ensure that his staff and that of his sub-contractors are advised, on a frequent basis, of the dangers of UXO and of the procedures to be adopted in the event of the discovery of UXO or suspected UXO.
- (8) Failure to observe the specified procedures may result in the Project Manager requiring the party responsible for such a breach to be removed from Site.

PS07 PERFORMANCE BASED MAINTENANCE (PBM)

PS07.1 General Provisions of the PBM

PS07.1.1 Principle of Performance Based Maintenance (PBM)

- (1) **Performance Based Maintenance (PBM)** is an alternative to the traditional methods of procuring road reconstruction, rehabilitation and maintenance. It is designed to increase the efficiency and effectiveness of road asset management and maintenance and should ensure a specified road condition over the Contract period.

The PBM differs substantially from traditional contracts for civil works. The basic difference is that under the Performance-Based Contract, most of the payments to be made to the contractor are not based on quantities of works measured by unit prices for works inputs, but on measured "outputs" reflecting the target conditions of the roads under contract (in other words: "what the roads are supposed to look like"), expressed through "**Service Levels.**" These Service Levels are defined herein. Another major difference is that the Contractor is fully responsible for the design of the works which are necessary to reach the required Service Levels, and the durability and performance of the

roads over a longer period. However whatever the nature of the works the Contractor must follow the requirements of **Volume II - Part 2 - Works Requirements - Section VII A - General Specification and Volume II - Part 2 - Works Requirements - Section VII B - Particular Specification.**

(2) Under Performance Based Maintenance it is important to note that the Contractor is not paid directly for physical works carried out by multiplying the quantities and the unit rates, but for achieving the **GOOD/FAIR SERVICE LEVELS** which are as specified in these Bidding Documents.

(3) The Contractor is paid for unit rate of **kilometre-month** for maintaining the road condition to satisfy the **Service Levels** throughout the Contract period.

(4) A monthly km-month amount paid to the Contractor covers all physical and non-physical maintenance services provided by the Contractor, except in the case of predefined **Localized Improvement** and a provision for **Emergency Works** comprising those activities needed to reinstate the road(s) after damage resulting from unforeseen natural phenomena, both of which are remunerated separately under an itemized BoQ.

(5) In order to be entitled to the monthly payment for the PBM work, the Contractor must ensure that the road(s) under the Contract comply with the Service Levels. It is envisaged that during some months the Contractor may need to carry out a large amount of work in order to comply with the Service Levels but little work during other months. However, the monthly payment remains the same as long as the required Service Levels are complied with.

(6) Under PBM, the Contractor is responsible for managing, planning and carrying out the works, services and whatever other actions he believes are **necessary** in order to maintain the Service Levels. The Contractor is entitled to independently decide: **(i) what to do, (ii) where to do it, (iii) how to do it, and (iv) when to do it, always provided he meets the required performance standard during the contract period.** The role of the Employer is to verify compliance status with the Service Levels. Payment amounts will be reduced according to the reduction process, as specified herein, if lengths of non-compliance are found.

(7) The Contractor is required to carry out **Routine** maintenance work (i.e. inspection and minor repair) to sustain the required Good/Fair Service Levels as specified in these Specifications.

(8) In some cases, when instructed by the Project Manager, the Contractor may be required to implement limited **Initial Maintenance Works** on any candidate road prior to the start of Performance Based Maintenance in order to repair short sections of the road that are not currently meeting required the service levels. This work, includes heavy grading, spot-filling with gravel materials, ditch clearing, etc. and shall be carried out in accordance with the Specification. The completed works will be measured, certified and paid for against unit rates in a separate Bill of Quantities.

(9) The Contractor shall when instructed by the Project Manager remedy any damages by applying the Emergency Works provision of the contract, in case that the Project Manager judges the damage is more severe than what could be treated by the PBM Work and it is not caused by the Contractor's fault.

PS07.1.2 Timeframe of the Works

(1) The Start Date for the Works is 28 days after contract award, as stated in the PCC.

(2) The Contract Period is 1095 days (36 months), as stated in the PCC.

PS07.2 Scope of the Works

PS07.2.1 Required Service Level

(1) The Contractor shall ensure that the following roads are maintained to satisfy required Service Levels during the whole duration of the Contract.

(2) For all work under this contract the sections of MPWT Specification as given in Volume II - Part 2 - Works Requirements - Section VIIA - General Specification shall take precedence.

3) The Roads under this contract are:

Province	District	Road No.	Work Lengths, (km)				Required Service levels
			Paved sections		Un-paved sections		
			Location	Length, (km)	Location	Length, (km)	
Xiengkhouang	Phoukoud (1)			4.50		51.00	GOOD/FIAR
		3909	Junc. Rd No. 7 - District Center	4.50	District Center - B. Vangtong	51.00	
		Total		4.50		51.00	

(4) Contractor can carry out the **Initial Maintenance Works** on Roads, No. 3909 in parallel with the implementation of the Performance-Based Contract. The work, as described in a separate Bills of Quantities shall be carried out in accordance with the Specifications. The completed works will be measured and paid against unit rates as quoted for each work item.

(5) The required **Initial Maintenance Works** are to be carried out at the locations shown in the Strip Maps given in **Volume II – Part 2 - Works Requirements – Section VIIC - Drawings**.

PS07.2.2 Road Assets to be Maintained

(1) Notwithstanding the provisions of Clause 9 of the General Conditions of Contract, the Works to be provided by the Contractor shall include all activities, physical, administrative, etc., which the Contractor needs to, carry out, in order to comply with the Service Levels and other output and performance criteria indicated under the contract, or with any other requirements of the contract. In particular, they include management tasks and physical works associated with the following road-related assets and items:

PS07.2.2.1 Paved Section

- 1) Road usability
- 2) Pavement
- 3) Signaling and Road Safety
- 4) Drainage
- 5) Vegetation control
- 6) Structures
- 7) Slopes

PS07.2.2.2 Unpaved Section

- 1) Road usability
- 2) Road surface
- 3) Signaling and Road Safety
- 4) Drainage
- 5) Vegetation control
- 6) Structures
- 7) Slopes

PS07.2.3 Service Level Criteria for Road Assets

(1) This Section specifies the Service Levels to be complied by the Contractor for each road asset as follows.

PS07.2.3.1 PAVED SECTION

A. Road Usability

- (1) The Contractor shall ensure that the road is open to traffic and free of interruptions at all times. An approved exception is in case that the Project Manager considers the road blockage had occurred due to "Unforeseen Natural Phenomena" covered by Emergency Work.
- (2) The Service Level criteria are defined as follows:

Item	Required Service Level
(1) Road usability	Road is always open to traffic and free of interruptions

B. Pavement

- (1) The Contractor shall ensure condition of pavement satisfies the required Service Level.
- (2) The Service Level criteria are defined as follows:

Item	Required Service Level	Time allowed for repairs	
1	Usability of the road	There shall not be interruption of motorized traffic	No tolerance allowed
2	Average operational traffic speed, calculated per 1000m section	70km/hr based on a 4WD pick-up - Toyota Hi-Lux or similar	
3	Minimum drivable speed at any point on the road section	40km/hr	
4	Potholes (maximum diameter of any single pothole)	300mm	14 days
5	Potholes maximum number in any 1000m with diameter greater than 100mm	Maximum = 8	14 days
5	Cracks and multiple cracking	Crack width: <3mm Multiple crack area: 2.0m ² /1000m	28 days
6	Rutting	Max rut depth: 40mm	56 days
7	Ravelling	Ravelled areas must not exist	56 days
8	Loose pavement edges	There shall be no loose pavement edges, or pieces of pavement breaking off at the edges	56 days
9	Cleanliness of road surface for safety related matters	Response time	Within one day
10	Cleanliness of road surface for all other matters	The roads surface must be clean and free of extraneous materials and debris	7 days
11	Pavement width	Pavement must be at least as wide as specified	No tolerance allowed

C. Signaling and Road Safety

- (1) The Contractor shall ensure functions of all signaling and road safety devices as indicated in the completion statement of the rehabilitation work.
- (2) The Service Level criteria are defined as follows:

Item		Required Service Level
1	Traffic signs	Existing traffic signs have to be present, complete, clean, legible and structurally sound
2	Horizontal demarcation and/or traffic markings	Existing horizontal demarcation / traffic markings to be present, legible and firmly attached to the road pavement
3	Km posts and guide posts	Existing Km posts and guide posts have to be present, complete, clean, legible and structurally sound, surface to be painted or otherwise treated.
4	Guiderails	Existing guide rails have to be present, clean, without any significant damage and without corrosion

D. Drainage

- (1) In general, the Contractor shall ensure that all drainage elements and structures are without any structural damages which may hinder smooth water flow.
- (2) The Service Level criteria are defined as follows:

Item		Required Service Level
1	Ditches and vertical drains with lining	Existing ditches have to be clean and clear of debris / or a maximum of 10% of the ditch capacity is allowed to be blocked in any section. No significant damage must exist.
2	Ditches and vertical drains unlined	The depth of the ditch from the road edge (level of road surface) to the bottom of the ditch must be a minimum of 500mm / or maximum of 10% of the ditch capacity is allowed to be blocked in any section. No significant damage must exist.
3	Collectors	There must be no significant damage.
4	Culverts	A maximum of 10% blockage by capacity at any point in the culvert is allowed. No significant damage must exist.

E. Vegetation Control

- (1) The Contractor shall ensure that the specified performance criteria on vegetation control is adhered to, thus ensuring the traffic safety and efficient function of drainage.
- (2) The Service Level criteria are defined as follows:

Type	Item	Required Service Levels
2	Large vegetated areas including surface water channels with longitudinal gradient $\geq 3\%$	Less than 400mm (less than knee height)
3	Branches of trees, shrubs and bushes	Branches of trees, shrubs and bushes shall not overhang nearer than 0.5m from the edge of the shoulder (or marker posts) and shall not be lower than 5.0m above the pavement and shoulder. Vegetation must be fully cleared in zone shown.
4	Shoulders Edge marker posts Verges Side ditches Surface water channels with longitudinal gradient $\leq 3\%$ Bridge abutments and culvert markers Km posts Traffic signs Guardrails	Near Vegetation Free = less than 100mm (ankle high)
5	Culvert headwalls Pipe culverts Lined channels Sealed surfaces Kerbs	Vegetation Free or Near Vegetation Free

F. Structures

(1) The Contractor shall be responsible for the routine maintenance of all bridges and similar structures along the road sections included in the Contract. In particular, the Contractor shall be responsible for the correct functioning of the structures (paint of metallic structures, road surface on structures, condition and presence of guardrails) and the safety and comfort of road users while using the structures at normal speed. Nevertheless, the reconstruction and improvement of bridges and similar structures is excluded from the Contractor's obligations, unless specified elsewhere in the Specifications.

(2) The Service Level criteria are defined as follows:

Item		Required Service Level
1	Steel or other metal structures	All metal parts of the structure shall be painted or otherwise protected and free from corrosion. Drainage system to be in good condition and fully functional.
2	Concrete structures	All concrete parts must be in good condition. functional. Drainage system to be in good condition and fully functional.
3	Expansion joints	Clean and in good condition
4	Bridge deck	Deck to be clean and the deck materials fully intact and fixed.
5	Retaining walls	Retaining walls and associated drainage shall be in adequate condition
6	River channels	The contractor must ensure free flow of water under bridge and up to 100m upstream. The contractor must maintain the design clearance under bridge. The contractor shall take all reasonable measures to control erosion around abutments and piers.

G. SLOPES

(1) The Contractor shall be responsible for the routine maintenance of all embankment and cut slopes along the roads sections included in the Contract. In particular the Contractor shall be responsible for ensuring their stability, without deformations and erosions.

(2) The Service Level criteria are defined as follows:

Item		Required Service Level	
1	Embankment Slopes	(i) Performance based Maintenance	Without erosion and deformations
		(ii) Emergency Work	To be instructed by the Project Manager
2	Slopes in cuts	(i) Performance based Maintenance	Slopes must be stable and/or adequate retaining walls and slope stabilization measures in place.
		(ii) Emergency Work	To be instructed by the Project Manager
3	Removal of landslips/slides	(i) Performance based Maintenance	Removal of slope slips of <50m ³ of material on the road is considered normal performance based routine maintenance work.
		(ii) Emergency Work	To be instructed by the Project Manager and considered as slides of material onto the road >200m ³ or slides of material >50m ³ onto the road that completely block the passage of traffic.

PS07.2.3.2 UNPAVED SECTION

A. Road Usability

- (1) The Work to be executed and required Service Level shall comply with Section 7.2.1.
- (2) The Service Level criteria are defined as follows:

Item	Required Service Level
(1) Road usability	Road is always open to traffic and free from interruptions

B. Road Surface

- (1) The Contractor shall ensure suitable condition of road surface for enabling safe and comfortable traffic of the road users.
- (2) The Service Level criteria are defined as follows:

Item	Required Service Level	Time allowed for repairs	
1	Usability of the road	There shall not be interruption of motorized traffic	No tolerance allowed
2	Average operational traffic speed, calculated per 1000m section	50km/hr based on a 4WD pick-up - Toyota Hi-Lux or similar	
3	Minimum drivable speed at any point on the road section	30km/hr	
4	Camber	Not less than 4%	56 days
5	Potholes (maximum diameter of any single pothole in any 1000m section)	400mm	14 days
6	Potholes maximum number in any 1000m with diameter greater than 100mm	Maximum = 10	14 days
7	Road corrugation altitude	350mm	28 days
8	Rutting	Max rut depth: 50mm	56 days
9	Cleanliness of road surface for safety related matters	Response time	Within one day
10	Cleanliness of road surface for all other matters	The roads surface must be clean and free of extraneous materials and debris	14 days
11	Pavement width	Pavement must be at least as wide as specified	No tolerance allowed

C. Signaling and Road Safety

- (1) The Contractor shall ensure functions of all signaling and road safety devices as indicated in the completion statement of the rehabilitation work.
- (2) The Service Level criteria are defined as follows:

Item	Required Service Level	
1	Traffic signs	Existing traffic signs have to be present, complete, clean, legible and structurally sound
2	Horizontal demarcation and/or traffic markings	Existing horizontal demarcation / traffic markings to be present, legible and firmly attached to the road pavement
3	Km posts and guide posts	Existing Km posts and guide posts have to be present, complete, clean, legible and structurally sound, surface to be painted or otherwise treated.
4	Guardrails	Existing guardrails have to be present, clean, without any significant damage and without corrosion

D. Drainage

- (1) The Work to be executed and required Service Level shall comply with Section 7.2.3.1 - D.

E. Vegetation control

- (1) The Work to be executed and required Service Level shall comply with Section 7.2.3.1 - E.

F. Structures

- (1) The Work to be executed and required Service Level shall comply with Section 7.2.3.1 - F.

G. Slopes

- (1) The Work to be executed and required Service Level shall comply with Section 7.2.3.1 - G.

PS07.3 Payment Reductions

- (1) In accordance with the relevant clauses of the GCC, payment reductions are applied in case of non-compliance with Service Level requirements.

PS07.3.1 Determination of Payment Reductions

(1) The results of each formal inspection of the Service Levels and other performance criteria will be recorded by the Project Manager in the form of a Memorandum. The Memorandum will state the type and location of any non-compliance detected, in particular those non-compliances already shown in the standard tables provided by the Contractor as part of their Monthly Statement. For each individual case of non-compliance, the Project Manager will determine a date by which the Contractor must have completed the necessary measures in order to remedy the cause of the non-compliance. A follow-up site visit is therefore necessary at the date fixed by the Project Manager, or soon thereafter, in order to verify that the Contractor has indeed remedied the cause of non-compliance.

(2) If at the date indicated in the Memorandum, the Contractor has not remedied the cause for non-compliance, independent of the reason given for their failure to do so, the Contractor is subject to payment reductions in accordance with the following manners.

(3) The Employer will reduce the monthly payment by the percentage of non-complying length in kilometers as determined by the Project Manager each month. The payment will therefore be the basic price (km-month) multiplied by the ratio of length of complying road to the total length of the network.

(4) Note that payment reductions are variable over time. If the Contractor fails to remedy a cause of non-compliance for which a payment reduction has already been applied, the amount of the payment reduction increases month by month for that particular cause of non-compliance, without a ceiling being applied, until compliance is established.

PS07.3.2 Reduction Rate of Each Asset

- (1) The following tables indicate tolerance periods of the remedy works and reduction rates in case of non-compliance for each of the road assets.

A. Paved Section

1) Road Usability

Item		Tolerance period	Rate of reduction for non-compliance
Road usability	(i) Performance based maintenance	No tolerance allowed	20% of the monthly lump sum for 1km, applied to each 1km section which does not comply
	(ii) Emergency Work	Period for recovery work will be set by the Project Manager	Payment will be according to the conditions for Emergency Work.

2) Pavement

Item		Tolerance period	Rate of reduction for non-compliance
1	Average operational traffic speed, calculated per 1000m section	Must be rectified within 14 No days after detection.	20% of the monthly lump sum for 1km, applied to each 1km section which does not comply
2	Minimum drivable speed at any point on the road section		
3	Potholes <8 number in any 1000m section with diameter greater than 100mm	Repair work must be completed within 14 days after detection	50% of the monthly lump sum for 1km, applied to each 1km section which does not comply
4	Patching and potholes >300mm	Must be repaired within 14 days after detection	25% of the monthly lump sum for 1km, applied to each 1km section which does not comply
5	Cracks and multiple cracking	Cracks more than 3mm wide (and areas >2.0m ² per 1000m) must be sealed within 28 days after detection	50% of the monthly lump sum for 1km, applied to each 1km section which does not comply
6	Rutting	Rutting above threshold value of 40mm must be eliminated within 56 days after detection	33% of the monthly lump sum for 1km, applied to each 1km section which does not comply
7	Ravelling	Raveled areas must be sealed within 56 days after detection	50% of the monthly lump sum for 1km, applied to each 1km section which does not comply
8	Loose pavement edges	Repair work must be completed within 56 days after detection	
9	Height of shoulder vv height of pavement	Repair work must be completed within 14 days after detection	
10	Cleanliness of pavement surface and shoulders	The road surface must be clean and free of extraneous materials and debris within 7 days	20% of the monthly lump sum for 1km, applied to each 1km section which does not comply

3) Signaling and Road Safety

Item		Tolerance Period	Rate of reduction for non-compliance
1	Traffic signs	Should be absent or defects rectified within 14 days	25% of the monthly lump sum for 1km, applied to each 1km section which does not comply. Emergency Work only on instruction from the Project Manager.
2	Horizontal demarcation and/or traffic markings		
3	Km posts and guide posts		
4	Guardrails		

4) Drainage

Item		Tolerance Period	Rate of reduction for non-compliance
1	Ditches and vertical drains with lining	Damage must be repaired within 14 days after detection	50% of the monthly lump sum for 1km, applied to each 1km section which does not comply. Emergency Work only on instruction from the Project Manager.
2	Ditches and vertical drains unlined	Damage must be repaired within 14 days after detection	
3	Collectors	Damage must be repaired within 14 days after detection	
4	Culverts and similar	Damage must be repaired within 14 days after detection	

5) Vegetation control

Type	Item	Tolerance Period	Rate of reduction for non-compliance
2	Large vegetated areas including surface water channels with longitudinal gradient $\geq 3\%$	Vegetation control work must be completed within 14 days after detection	20% of the monthly lump sum for 1km, applied to each 1km section which does not comply.
3	Branches of trees, shrubs and bushes		
4	Shoulders Edge marker posts Verges Side ditches Surface water channels with longitudinal gradient $\leq 3\%$ Bridge abutments and culvert markers Km posts Traffic signs Guardrails		
5	Culvert headwalls Pipe culverts Lined channels Sealed surfaces Kerbs		

6) Structures

Item		Tolerance Period	Rate of reduction for non-compliance
1	Steel or other metal structures	Contractor must immediately notify the Project Manager in any case where the condition of the structure threatens its integrity. Repair work will be undertaken as Emergency Work if so instructed by the Project Manager	50% of the monthly lump sum for 1km, applied to each 1km section which does not comply. Emergency Work only on instruction from the Project Manager.
2	Concrete structures		
3	Expansion joints	Damage must be repaired within 14 days after detection	
4	Bridge deck		
5	Retaining walls	Contractor must immediately notify the Project Manager in any case where the condition of the structure threatens its integrity. Repair work will be undertaken as Emergency Work if so instructed by the Project Manager	
6	River channels	Damage must be repaired within 14 days after detection	

7) Slopes

Item			Tolerance Period	Rate of reduction for non-compliance
1	Embankment slopes	(i) Performance based Maintenance	Repair must be completed within 14 days after detection	20% of the monthly lump sum for 1km, applied to each 1km section which does not comply.
		(ii) Emergency Work	Period for recovery work will be set by the Project Manager	Payment will be according to the conditions for Emergency Work.
2	Slopes in cuts	(i) Performance based Maintenance	Defects must be repaired within 14 days after detection	20% of the monthly lump sum for 1km, applied to each 1km section which does not comply.
		(ii) Emergency Work	Period for recovery work will be set by the Project Manager	Payment will be according to the conditions for Emergency Work.
3	Removal of landslips/ slides	(i) Performance based Maintenance	Quantities <50m ³ onto road or ditches must be removed within 2 days after detection.	20% of the monthly lump sum for 1km, applied to each 1km section which does not comply.
		(ii) Emergency Work	Slides of material >50m ³ onto the road that completely block the passage of traffic to be removed within 24 hours of detection. Slides of material onto the road >200m ³ to be removed within 5 days of detection.	Payment will be according to the conditions for Emergency Work.

B. Unpaved Section

1) Road Usability

(1) The tolerance period and the reduction rate shall comply with Section 7.3.2 A - 1)

2) Road Surface

Item		Tolerance period	Rate of reduction for non-compliance
1	Average operational traffic speed, calculated per 1000m section	Must be rectified within 14 days after detection.	20% of the monthly lump sum for 1km, applied to each 1km section which does not comply.
2	Minimum drivable speed at any point on the road section		
3	Camber	Must be rectified within 56 days after detection.	25% of the monthly lump sum for 1km, applied to each 1km section which does not comply.
4	Wearing Course	Must be rectified within 28 days after detection.	25% of the monthly lump sum for 1km, applied to each 1km section which does not comply.
5	Potholes <10 number in any 1000m section with diameter greater than 100mm	Repair work must be completed within 14 days after detection	50% of the monthly lump sum for 1km, applied to each 1km section which does not comply
6	Patching and potholes >400mm max diameter in a 1000m section	Must be repaired within 14 days after detection	25% of the monthly lump sum for 1km, applied to each 1km section which does not comply.
7	Corrugation	Repair work must be completed within 28 days after detection.	25% of the monthly lump sum for 1km, applied to each 1km section which does not comply

8	Rutting	Rutting above threshold value of 50mm must be eliminated within 56 days after detection	33% of the monthly lump sum for 1km, applied to each 1km section which does not comply
9	Cleanliness of pavement surface and shoulders	The road surface must be clean and free of extraneous materials and debris within 14 days	20% of the monthly lump sum for 1km, applied to each 1km section which does not comply

3) Signaling and Road Safety

Item		Tolerance Period	Rate of reduction for non-compliance
1	Traffic signs	Should be absent or defects rectified within 14 days	25% of the monthly lump sum for 1km, applied to each 1km section which does not comply. Emergency Work only on instruction from the Project Manager.
2	Horizontal demarcation and/or traffic markings		
3	Km posts and guide posts		
4	Guardrails		

4) Drainage

- (1) The tolerance period and the reduction rate shall comply with Section 7.3.2 A - 4).

5) Vegetation control

- (1) The tolerance period and the reduction rate shall comply with Section 7.3.2 A - 5).

6) Structures

- (1) The tolerance period and the reduction rate shall comply with Section 7.3.2 A - 6).

7) Slopes

- (1) The tolerance period and the reduction rate shall comply with Section 7.3.2 A - 7).

PS07.4 Work Method

PS07.4.1 Contractor's Monitoring Unit

(1) The Contractor shall be obliged to establish, within his own organizational structure, a specific Monitoring Unit staffed with qualified personnel, whose principal task is to verify continually the degree of compliance by the Contractor with the required Service Levels. Furthermore, the Unit also shall undertake the quality control testing required for Initial Improvement Works as well as the Emergency Works.

(2) The Unit also shall be responsible for the documentation required for the Monthly Statement. In general terms, the Unit shall be responsible to maintain at all times a detailed and complete knowledge of the condition of the road sections and to provide to the management of the Contractor all the information needed in order to efficiently manage and maintain the roads. The Unit also shall be obliged to carry out, in close collaboration with the Project Manager, the formal and scheduled inspections of Service Levels which will take place regularly.

(3) The compliance (non-compliance) of the Contractor with required Service Level shall be reported by the Unit to the Project Manager in the form of tables as specified in Section 7.2.3.1 & 2.

(4) The Contractor shall be required to assign the following personnel for the inspection work.

Position	No.	Main Role
(i) Road Maintenance Engineer	1	Responsible for the whole work implementation.
(ii) Junior Engineer/ Inspector	Minimum: 1 Desirable: 2	Inspection work, reporting and arranging work force for repair work.

(5) Note the positions and numbers of workforce nor level of equipment for the repair works are not specified. The Contractor shall arrange them in order to comply with the Service Levels, especially responding to times given for the repair works which are under full responsibility of the Contractor.

PS07.4.2 Inspection Procedures

1. Formal Inspections of Service Levels

(A) Work Description

(1) Formal inspections are those scheduled in advance by the Project Manager and carried out by the Contractor (through his Control Unit) under the supervision of the Project Manager. The main purpose of the inspections is to enable the Project Manager to verify the information presented in the Contractor's monthly statement and to issue the Interim Payment Certificate.

(2) The Project Manager must inform the Contractor of his intention to carry out a formal inspection not less than 48 hours in advance, indicating the date, hour and location where the formal inspection is to begin. The Contractor is obliged to be present at the date, hour and location specified by the Project Manager, providing the physical means needed for the inspection as indicated further below.

(3) The inspections will normally, but not necessarily, be scheduled to begin within less than five (5) days after the presentation by the Contractor of the Monthly Statement to the Project Manager; and they should normally be completed within a maximum of three (3) days.

(4) The inspections allow the comparison of the information on compliance provided by the Contractor in the standard tables which are part of the Monthly Statement, with actual measurements taken in locations to be determined by the Project Manager.

(5) During the inspections, the Project Manager will prepare a brief Memorandum describing:

- (i) the general circumstances of the site visit, including date, road sections visited, persons present, etc;
- (ii) any non-compliance which may have been detected; and,
- (iii) the time granted by the Project Manager to the Contractor to rectify the detected non-compliances.

(6) Based on the outcome of the inspection, the Project Manager will correct any possible errors or misrepresentations in the Contractor's statement, countersign it and present it to the Employer for payment, and to the Contractor for information.

(7) Formal inspections will also be scheduled for the follow-up site visits, which purpose is to verify if the Contractor has remedied the causes of earlier non-compliance, within the time frame granted by the Project Manager and specified in the Memorandum.

(B) Work Procedures

(i) Road Usability

(a) There is no particular work method for the road usability, other than driving on the road in a normal manner. The condition is not complied with if the road is interrupted at any point. The

condition is however complied with if it is possible to continue to drive on the road, and without the vehicle suffering any damage caused by a bad condition of the road.

(ii) Pavement/Road Surface (Unpaved Section)

(a) Work method to measure service level, the Junior Engineer/Inspector will monitor the speedometer of the vehicle used for inspection. The vehicle shall travel on straight direction and shall not avoid any abnormalities on the road surface. The exception shall be only accepted to prevent hazards in traffic.

(iii) Other Road Assets

(a) The work procedures for other assets, such as: Signing and Road Safety, Drainage, Structures and Slopes, etc, comprises two activities, namely visual inspection and/or measurement of the works.

Procedure

- i) Visual inspection by vehicle;
- ii) Compare compliance status in the Monthly statement submitted by the Contractor and actual road condition;
- iii) Verify status on foot when the compliance looks doubtful **OR** any places indicated by the Project Manager;
- iv) Check/Measure/Count actual condition/dimension/number of the object(s).

(C) Means used for Inspection of the Works

(a) The Contractor shall provide all necessary equipment for the inspection of the works to the Project Manager, including vehicles, support staff, equipment, tools and instruments.

2. Informal Inspections of Service Levels by the Project Manager

(A) Works Description

(1) The Project Manager or the Project Manager's Representative may at their option carry out informal inspections of Service Levels at anytime and anywhere on the roads included in the Contract. If he finds that any road section where the Service Level criteria are not met, he shall inform the Contractor within 24 hours in writing, so that the Contractor can take remedial action as soon as possible. The results of informal inspections may not be used by the Project Manager for purposes of correcting the Contractor's monthly statements or applying penalties or liquidated damages, except for cases in which the road has been completely blocked.

3. Regular Inspection by the Contractor

(A) Description and Procedure of the Work

(1) The Contractor shall conduct inspection work to find and remedy any deviation from the Service Levels along the whole road length regularly (at least on a weekly basis). The Contractor shall comply with the work procedures as specified in Section .

PS07.4.3 Maintenance Works

(A) Recommended Works and Specifications

(1) The Contractor's work shall be evaluated based on his compliance with the required Service Levels on each road asset component, instead of quantities of physical work carried out by him during the implementation of the **Performance Based Maintenance (PBM)** works. Therefore, the works the Contractor is required to do for rectifying damages during the PBM contract period are not specified.

(2) Following tables give the Maintenance Activity Codes (MAC) and suggested work methods for rectifying typical damages – **THIS IS FOR REFERENCE ONLY and the final decision on work methods shall be made by the Contractor provided that he complies with the requirements of Volume II - Part 2 - Section VIIA - General Specification and this Section.**

(3) Other sources of work methods to which reference can be made are:

The International Road Maintenance Handbooks (PIARC/TRL) which are available in a Lao translation describe how specific maintenance tasks may be carried out.

These are in a method based format and are a guide to carrying out the difference tasks, however, the workmanship, quality of the materials, level of compaction, grades of concrete etc, must be as given in Volume II - Part 2 - Section VII A – General Specification.

Routine maintenance activities carried out to a lesser standard will be rejected and deductions made from the Monthly Lump Sum payment.

The handbooks are:

- Volume 1 – Maintenance of Road Side Areas and Drainage
- Volume 2 – Maintenance of Unpaved Roads
- Volume 3 – Maintenance of Paved Roads
- Volume 4 – Maintenance of Structures and Traffic Control

Suggested Work (Paved Section)

Item		Suggested work (for reference)	
Road Surface	(1) Road usability	111: Filling potholes with base material 112: Patching potholes 113: Filling along edges with gravel 114 Edge repairs, patching 115 & 116: Crack sealing and patching	
	(2) Average operational traffic speed, calculated per 1000m section		
	(3) Minimum drivable speed at any point on the road section		
	(4) Potholes <8 number in any 1000m section with diameter greater than 100mm		
	(5) Patching and potholes >300mm max diameter in a 1000m section		
	(6) Rutting		
	(7) Ravelling		
	(8) Loose pavement edges		
	(9) Height of shoulder vv height of carriageway		
	(10) Cleanliness of carriageway and shoulders		
Signage and road safety	(1) Traffic signs	151: Repair Signs	
	(2) Horizontal demarcation and /or traffic markings	604: Traffic Markings	
	(3) Km posts and guide posts	153: Repair of Guide Posts	
	(4) Guardrails	152: Repair of Guardrails	
Drainage	(1) Ditches and lined drains	137: Repair of ditch lining 131: Clearing of ditches by hand tools 133: Clearing of culverts 134: Repair of culverts 135: Repair of erosion damage	
	(2) Ditches and unlined drains		
	(3) Collectors		
	(4) Culverts and similar		
Vegetation Control	(2) Large vegetated areas including surface water channels with longitudinal gradient $\geq 3\%$	161: Grass cutting 162: Bush cutting 163: Cutting thick vegetation	
	(3) Branches of trees, shrubs and bushes		
	(4) Shoulders Edge marker posts Verges Side ditches Surface water channels with longitudinal gradient $\leq 3\%$ Bridge abutments and culvert markers Km posts Traffic signs Guardrails		
	(5) Culvert headwalls Pipe culverts Lined channels Sealed surfaces Kerbs		
Structures	(1) Steel or other metal structures	145: Repair of steel decking	
	(2) Concrete structures	233: Repair of concrete	
	(3) Expansion joints	142: Cleaning of bridge	
	(4) Bridge deck	146: Repair of timber decks and running strips	
	(5) Retaining walls	136: Repair of retaining wall	
	(6) River channels	143: Clearing of river channels	
Slopes	Embankment Slopes	(i) Performance based Maintenance	135: Repair of erosion damage
		(ii) Emergency Work	314: Erosion repair 315: Repair of road embankment
	Slopes in cuts	(i) Performance based Maintenance	135: Repair of erosion damage 136: Repair of retaining wall
		(ii) Emergency Work	314: Erosion repair 435: Erosion protection - gabions 436: Erosion protection - rock
	Removal of landslips/slides	(i) Performance based Maintenance	311: Removal of landslides
		(ii) Emergency Work	

Suggested Work (Unpaved Section)

Item		Suggested work (for reference)
Road Surface	(1) Road usability	115: Cleaning of road surface 113: Filling along edges with gravel 114 Edge repairs, patching 121: Grading the carriageway to reinstate camber and evenness, including watering and compaction 125: Spot filling of larger areas by mechanical means
	(2) Average operational traffic speed, calculated per 1000m section	
	(3) Minimum drivable speed at any point on the road section	
	(4) Camber	
	(5) Wearing Course	
	(6) Potholes <10 number in any 1000m section with diameter greater than 100mm	
	(7) Patching and potholes >400mm max diameter in a 1000m section	
	(8) Corrugation	
	(9) Rutting	
	(10) Cleanliness of pavement surface and shoulders	
Signage and road safety	(1) Traffic signs	151: Repair Signs
	(2) Horizontal demarcation and /or traffic markings	604: Traffic Markings
	(3) Km posts and guide posts	153: Repair of Guide Posts
	(4) Guardrails	152: Repair of Guardrails
Drainage	(1) Ditches and lined drains	137: Repair of ditch lining 131: Clearing of ditches by hand tools 133: Clearing of culverts 134: Repair of culverts 135: Repair of erosion damage
	(2) Ditches and unlined drains	
	(3) Collectors	
	(4) Culverts and similar	

Note: Work of (5) Vegetation Control, (6) Structures and (7) Slopes shall comply with corresponding works in “Paved section”.

PS07.5 Suggested Routine Maintenance Activities for Maintenance of Paved and Gravel Roads - All Material to be in accordance with the requirements of Vol II - Part 2- Section VIIA - General Specification

PS07.5.1 ROADWORKS

MAC 111 Filling of potholes with base materials (to be in accordance with Section 302)

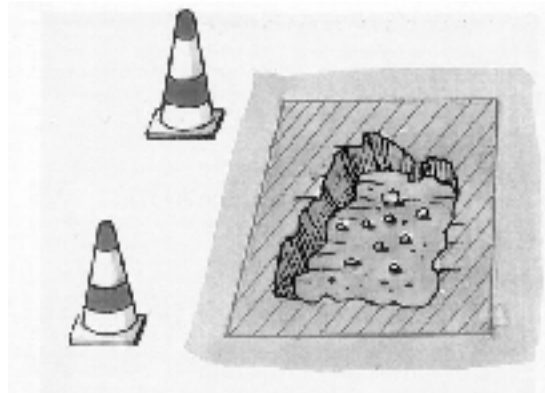
Remove all loose material, clean, fill with approved graded material, water, mix and compact in one or more layers of regular thickness depending on the depth. Includes minor base repairs. Note: this activity is step one in Patching of potholes, MAC 112.

MAC 112 Patching of potholes (to be in accordance with Series 300 of the Specification)

Note: the same principles apply for larger areas of pavement repair and road edges – careful preparation of the area to be patched is essential – the materials and workmanship used for pavement repairs, for example, sub-base, base, bitumen, chips, and level of compaction **MUST** be as required under the General Specification. Any work carried out which does not comply with the Specification must be rejected and the Contractor ordered to repair the defective work. It should be noted that deductions are made for if the road does not meet the specified service standard.

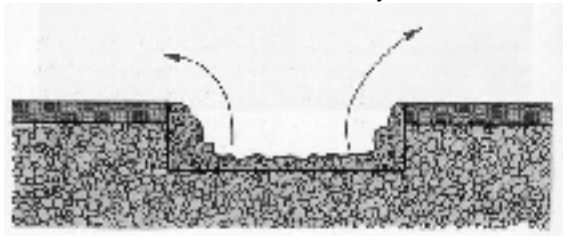
- (2) The pot hole patching involves three steps.

- (a) The area to be repaired is marked out with chalk by drawing a rectangle around the defects.

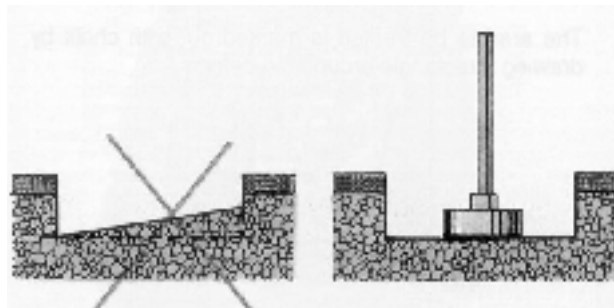


- (b) Excavation of the area to be repaired

- (i) Remove all material from within the marked out area of the road surface
- (ii) Remove all loose material,
- (iii) Trim the walls of the hole so they are vertical,



- (iv) Trim the bottom flat and horizontal. Clean the surface,
- (v) Compact the bottom of the hole.

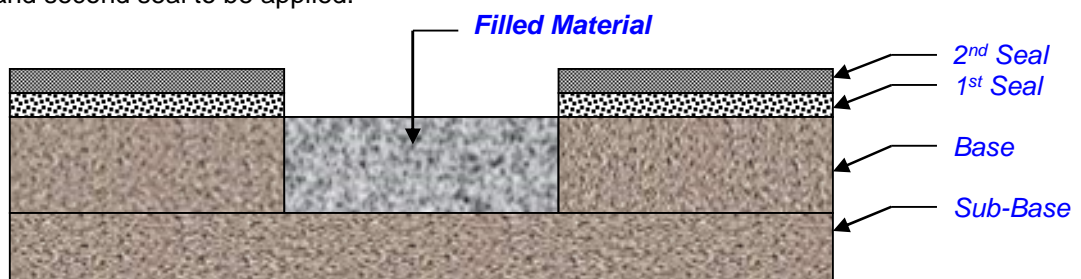


- (c) Fill the hole or road edge, as follows

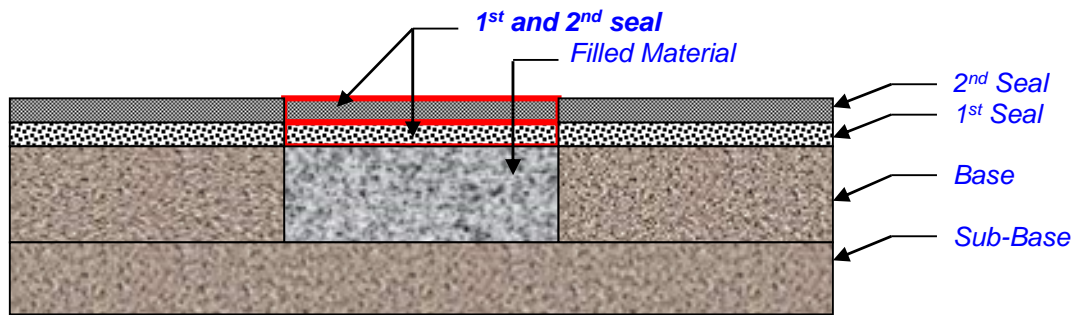
- (i) Fill with base course material, compact and apply first seal

The material is placed in the hole and compacted in one or more layers of regular thickness depending on the depth of the hole. The last layer shall be filled to an excess thickness of about 1/5 of the depth of the final layer, to allow for settlement on compaction

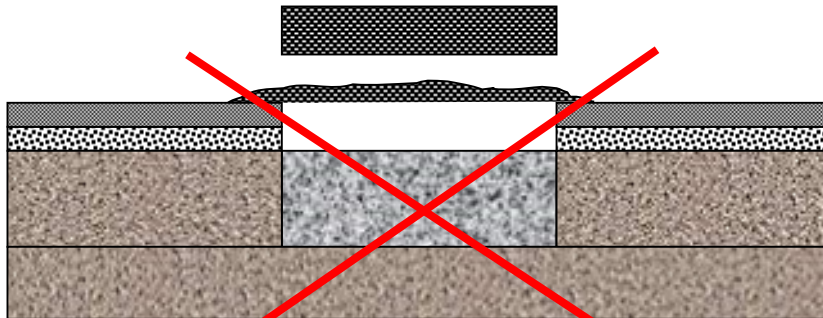
Compaction is continued until the surface is level. A vibrating roller or vibrating plate should be used (minimum compaction is by 5 ton hand operated vibratory or 2 ton vibrating plate ("Whacker Packer"). The surface shall be a bit under the surface of the road to allow for first and second seal to be applied.



(ii) Filling of pothole and compact.



(iii) Apply first and second seal.



(iv) The repaired pothole shall be at the same level as the surrounding road surface.

MAC 113 Filling along edges with gravel (material to be in accordance with Section 301)
 Use graded material to fill against the surface edge, water, mix and compact

MAC 114 Edge repairs, patching (to be in accordance with Series 300 of the Specification)
 Clean and broom the area. Supply the binder evenly over the surface. Aggregate is scattered by shovel from truck or wheel barrow. Chipping used should have the size of 10 mm. Compact by roller. A premix can also be used.

MAC 115 Crack sealing, minor areas (to be in accordance with Section 307)
 Cracks in the surface and in the pavement structure. Often parallel to the center line but can also be transverse. Sweep the area, fill the cracks with hot bitumen, scatter coarse sand over the strip of binder.

MAC 116 Crack sealing, larger damaged areas (to be in accordance with Sections 306 & 307)
 Cracks in the surface and in the pavement structure. Often parallel to the center line but can also be transverse, in this case named as mesh cracking. This means larger work sections. Sweep the area, fill the cracks with hot bitumen, scatter coarse sand over the binder. Alternatively, the section could be covered by a slurry, a premix by sand and emulsion mixed in a wheelbarrow and spread in a thin layer by shovel and levelled by a squeegee. The damaged area can also be covered by a spot resealing.

MAC 121 Heavy grading (m²)
 Grading the carriageway to restore camber and evenness, 8-10 passes, including watering and compaction.

MAC 124 Filling of potholes (m³) (material to be in accordance with Sections 301 & 302)
 The area to be filled shall be excavated with squared off edges and to a minimum depth equal to the lowest point of the pothole or until firm and compacted material is reached. The excavated material together with other approved filling material shall be mixed together, watered and placed back into the excavated hole and compacted using hand rammers or light compaction equipment. Make sure there

is no water in the pothole when it is filled. If the pothole is deep the material should be placed and compacted in layers not thicker than 5 cm. The surface level of the filled hole, after compaction, shall be level with the adjacent pavement surface, overfilling may be necessary to achieve this.

MAC 125 Spot filling (m³)

Includes larger areas, and large-scale work involving truckloads of material. Work not to be carried out by hand. (see 124 above).

MAC 127 Temporary draining of road surface (m³)

Digging drainage channels from water-filled potholes which enable water to drain to the ditch. Also digging small drainage channels and placing material to divert water flowing along the road to the ditches.

PS07.5.2 DRAINAGE AND EROSION PROTECTION

MAC 131 Clearing of Ditches by Hand Tools (m)

The Work shall comprise the clearing of all existing road side drains including mitre drains and catch drains of all silt, debris and other foreign matter such that all drains together with their adjacent side-slopes are fully restored to their original as-built dimensions. Ensure that no water can remain standing in the ditch during rain.

Where the ditch has silted more than 10 cm in depth, the vegetation and silt must be removed to the original depth and profile (with the exception of areas close to scour checks where silting is normal).

Use line levels to make sure that the ditch achieves a smooth longitudinal slope at the desired gradient. A ditch template can be used as an additional tool to confirm that the drain is excavated to its original depth and profile.

All debris, silt and other material from the ditch shall be removed well clear of the road and drainage system to prevent it being washed back. However, for mitre drains, some of the excavated soils shall be used to block the downhill side of the drain to ensure that the water flows into the mitre drain.

MAC 133 Clearing of Culverts (number)

This activity includes the following parts:

- Removal of all silt, debris and other foreign matter from inside the culvert and at the inlet and outlet. A long-handled shovel should be provided for the work.
- Cleaning inlet and outlet ditches for a minimum distance of 25 meters. If grass is established in the ditch it should be cut and the roots be left in place to provide erosion protection.

All debris and other cleared material shall be removed well clear of the road and the drainage system to prevent it from being washed back into the ditches. On completion of this activity, the culvert, including the inlet and outlet channels/drains shall allow the free and unhindered flow of water.

MAC 135 Repair of culverts (number) (To be in accordance with Section 402)

Repair of invert, concrete and steel surfacing, reconstruct correct level and fall,

MAC 135 Repairs of Erosion Damage (m³) (To be in accordance with Section 404)

This activity is for the repair of erosion damage on slopes and in ditch channels. Erosion damage on slopes (erosion channels) shall be repaired using locally available material. The material shall be compacted, using hand rammers or light compaction equipment, at the correct moisture content. To avoid new erosion damage, this activity should normally be combined with activity 139, Vegetation Erosion Protection.

Erosion damage in ditch channels shall be repaired using locally available material. The material shall be compacted, using hand rammers or light compaction equipment, at the correct moisture content. If the section appears to likely to suffer from repeated erosion, the eroded section should be filled with rocks or scour checks should be installed.

MAC 136 Repair of retaining wall (To be in accordance with Section 513)

Rebuild collapsed wall, repair and replace broken blocks or concrete.

MAC 137 Repair of ditch linings (To be in accordance with Section 404)

Replace broken linings and realign the drain. Fill eroded areas with gravel material.

PS07.5.3 ROUTINE BRIDGE MAINTENANCE

MAC 142 Cleaning of Bridges

Clearing of all vegetation, soil and debris and other foreign matter from the bridge deck structure for its full width and length. Where drainage outlets have been built into the deck slab, these shall be fully cleared to allow the free and unhindered flow of water. Remove all dirt and debris in joints between beams abutment walls, and around beam bearings and supports. Dispose of cleared material debris away from the bridge and the stream.

MAC 143 Clearing of River Channels

Remove debris carried by floodwater or wind and lodged at piers or abutments, or at any point under the bridge. Also clear such debris for minimum 25 m upstream and downstream from the bridge. Dispose of debris away from the bridge and the stream.

MAC 144 Bridge Bush Clearing

Remove growing trees and bushes from areas under the bridge and upstream and downstream at least 25 m by cutting off near ground level. Dispose of cut material well away from the bridge and stream.

MAC 145 Repair of steel decking (to be in accordance with Section 512)

Tighten bolts or weld plates to make sure that the steel decking is smooth and/or replace steel decking plates.

MAC 146 Repair of timber decks and running strips (to be in accordance with Section 512)

Remove and replace damaged planks. Replace missing or loose nails or bolts.

PS07.5.4 TRAFFIC SAFETY

MAC 151 Repair of traffic signs (To be in accordance with Section 605)

Signs to be cleaned, repainted, bolts to be tightened, bush clearing or replaced

MAC 152 Repair of guardrails (To be in accordance with Section 603)

Tighten of bolts and/or replace broken parts, bush clearing.

MAC 153 Repair of guard posts (To be in accordance with Section 606)

Repaint if necessary, replace broken posts and raise posts knocked down.

MAC 155 Cleaning of paved road surface

All debris such as sand or any other items to be brushed away

MAC 156 Install/remove Community Road barriers

During the rainy season, it is recommended that vehicle loads are restricted on district and community roads. For this purpose, road barriers can be installed to stop heavy traffic and only allow light traffic to enter the road.

The road barrier consists of two heavy wood or concrete posts that are firmly embedded in the ground (min. 60 cm). The posts are installed on each side of the road with a distance of 230 cm between the posts. They should be installed in a location where it is not possible for heavy vehicles to pass on the outside of the barrier.

The barrier should be installed when the rain causes the road to lose strength due to increased moisture and removed after the rainy season when the road has regained most of its strength.

PS07.5.5 ROUTINE ROADSIDE MAINTENANCE

MAC 162 Grass Cutting (m²) (see Section 610 Bio-Engineering)

All bushes to be cut and removed within the road reserve - see PS07.2.3.1-E - Vegetation Clearance - diagram.

MAC 162 Bush Cutting (m²) (see PS07.2.3.1-E - Vegetation Clearance - diagram)

Cutting of all bush and other vegetation on both sides of the roadway to a height not greater than (10) centimeters.

The bush shall be cut to the entire width between the pavement edge and to the same level of the roadside drain back-slope as shown on the diagram.

Cutting on embankment slopes and other downhill slopes shall be as shown in the diagram.

The cut material shall be removed to suitable place outside the cut area. This is especially important when cutting bush in the ditch.

Additional areas shall be cut in curves and elsewhere, where required of road safety reasons. The Project Manager/Project Manager's Representative will specify these areas on the site.

MAC 163 Bush cutting, thick vegetation (m²)

All bushes to be cut and removed within the road reserve (see PS07.2.3.1-E - Vegetation Clearance - diagram).

PS07.6. QUALITY OF MATERIALS, TESTING & WORKMANSHIP TO BE EMPLOYED

(1) Notwithstanding the provisions of Clause 15 of the General Conditions of Contract, all materials testing and workmanship used by the Contractor shall comply with the MPWT General Specifications - see **Volume II - Part 2 - Section VIIA -General Specification**.

PS07.6.1 - Gravel Pavements

(1) Gravel pavements are designed as follows based on summation of the assessed minimum initial gravel thickness and the calculated annual gravel loss:

(2) For all unsealed roads the re-gravel thickness may be determined as described below:

Minimum Initial Gravel Thickness (d1) in mm

Sub-grade Strength CBR%	Initial daily number of commercial vehicles (both directions)			
	Type A1	Type A2	Type A3	Type A4
	< 15	15 – 50	50 – 150	150 - 500
3 - 4	350	425	500	575
5 – 9	225	275	325	375
10 – 14	175	225	250	275
15 – 19	150	175	200	225
≥ 20	125	150	175	200

(3) For an example contract for a Type A3 design (*Note: the design will vary according to the traffic volume and must be determined for the road to be maintained*).

(4) The total gravel thickness (D) is determined from the equation:

$$D = d1 + (N \times GL)$$

where N = the period between regravelling operations (in years) and
GL = the annual gravel loss (in millimetres)
N has been taken as 4 years, and
GL is determined from the equation:

$$GL = \frac{T^2 f}{T^2 + 50} (4.2 + 0.092 T + 3.5 R^2 + 1.88v)$$

where T is the annual traffic volume in the first year in both directions, measured in thousands of vehicles
R is the average annual rainfall measured in metres
v is the total (rise + fall) as a percentage of the length of road under consideration, and
f = 0.9

- (5) For the example contract, T is 45 and R is 1.75. (*Note: 'T' and 'R' must be determined for the road to be maintained*)
- (6) In fill situations the minimum initial gravel thickness will be determined by the CBR value of the fill material within the top 1000 mm of the embankment.
- (7) In cut situations the minimum initial gravel thickness will be determined by the CBR value of the 1000 mm of material immediately below formation level. Where such CBR value is less than 10% the requirements of Sub-clause 203.01.5 of the Basic Specifications will apply.
- (8) For the considered example contract the regravelling thickness is 190mm.

PS07.7 REPORTING OF WORK

1. Weekly Report

(1) The Contractor shall compile the inspection result as stipulated in PS07.4.2 into the form of Weekly Report and submit to the Project Manager **only** for his confirmation. This report shall not be applied for determination of the monthly payment amount to the Contractor. Sample of the report is as shown in the following pages.

(2) Monthly Statement

(1) The Contractor shall submit the Monthly Statement to the Project Manager in accordance with Sub-clause 40.1 of the General Conditions of Contract. The compliance (or non-compliance) and the monthly payment amount of the Contractor shall be clearly presented in the Statement. The Statement shall be used during the Formal Inspection as stipulated in PS07.4.2. Note the payment amount shall be determined in accordance with this Statement and the Memorandum of Formal Inspection. Sample of the Statement and the Memorandum are given below:

(3) Handover Report

(1) Immediately prior to the completion of the Contract, the Contractor shall prepare a Handover Report. The purpose of the Report is to provide a smooth transition to the next Contract and ensure that the next Contractor is aware of any outstanding issues. The Report shall:

- i) summarize any unresolved issues;
- ii) include As-built drawings, indicating the latest feature of the road, and
- iii) provide the following details:
 - a) A schedule of outstanding defects and liabilities
 - b) Any unresolved issues, especially those that may impact the next Contractor
 - c) Details of any sensitive issues
 - d) Any ongoing special monitoring/maintenance needs.

Example Monthly Statement Form (Unpaved Section)

WEEKLY REPORT FORM				Statement No.	2
Province No.		Bolkham xai		Contract period	
Road No.				Mar-2018 to	
DPWT-Road Office/Responsible OPWT				Submission date	
Contract name & No.				30-May-2018	
Contractor's name		Unit rate (per km-month), Kip		As required	
		Section length (A)		864,583.33	
				BoQ No.	
				130	
				km	
Item		Length of non-compliance (km) (B)	Reduction rate (%) (C)	Reduction length (km) D = (B) x (C)	Corresponding section
(1) Road usability		0.00	20%	0.00	
(2) Pavement	(2)-1 Average operational traffic speed, calculated per 1000m sections.	2.00	20%	0.40	km 2-3, km 5-6
	(2)-2 Minimum drivable speed, at any point of the road.	0.00	20%	0.00	
	(2)-3 Camber	0.00	25%	0.00	
	(2)-4 Wearing course	0.00	50%	0.00	
	(2)-5 Potholes	0.00	50%	0.00	
	(2)-6 Corrugation	0.00	20%	0.00	
	(2)-7 Cleanliness of the pavement surface and shoulders	0.00	25%	0.00	
(3) Signaling and road safety	(3)-1 Traffic signs	1.00	25%	0.25	km 6-7
	(3)-2 Horizontal demarcation and/or pavement paint	1.00	25%	0.25	km 7-8
	(3)-3 Km posts and guide posts	0.00	25%	0.00	
	(3)-4 Guardrails	1.00	25%	0.25	km 4-5
(4) Drainage	(4)-1 Ditches and vertical drains with lining	0.00	50%	0.00	
	(4)-2 Ditches and vertical drains without lining	0.00	50%	0.00	
	(4)-3 Collectors	0.00	50%	0.00	
	(4)-4 Culverts and similar	0.00	50%	0.00	
(5) Vegetation control	(5)-1 -Shoulders -Medians -Traffic islands & verges -Rest areas (including around rest area furniture) -Side ditches -Surface water channels with gradient < 3% -Bridge ends -Km posts -Traffic signs -Culvert marker posts -Guardrails -Guide posts -Lighting Columns	0.00	20%	0.00	
	(5)-2 -Large vegetated areas -Surface water channels with longitudinal gradient ≥ 3%	1.00	20%	0.20	km 3-4
	(5)-3 -Culvert head walls -Pipe culverts -Lined channels -Sealed surfaces -Kerb stone	0.00	20%	0.00	
	(5)-4 -Branches of trees, scrubs and bushes	0.00	20%	0.00	
	(6)-1 Steel or other metal structures	0.00	50%	0.00	
	(6)-2 Concrete structures	0.00	50%	0.00	
	(6)-3 Expansion joints		50%	0.00	
	(6)-4 Bridge deck		50%	0.00	
	(6)-5 Retaining walls		50%	0.00	
	(6)-6 Riverbeds		50%	0.00	
(7) Slopes	(7)-1 Embankment slopes	(1) Performance based maintenance	0.00	20%	0.00
		(2) Emergency work	Not Applicable		
	(7)-2 Slopes in cuts	(1) Performance based maintenance	0.00	20%	0.00
		(2) Emergency work	Not Applicable		
	(7)-3 Removal of slides	(1) Performance based maintenance	0.00	20%	0.00
		(2) Emergency work	Not Applicable		
Total reduction length (km): (E)				1.35	
Length of compliance (km): (F) = (A) - (E)				128.65	
Total monthly amount: (R) x (F)				111,228,646	
Received by the Engineer			Submitted by the Engineer		
Name:			Name:		
Date:			Date:		

PS07.8 MEASUREMENT

(1) Measurement shall be as follows:

Item No.	Description	Unit
PBM		
Paved Section		
PB01.1-1	36 months	km-month
Unpaved Section		
PB02.1-1	36 months	km-month

PS07.9 PAYMENT

- (1) Payment shall include all operations to achieve the requirements specified herein.
- (2) Payment amount shall be calculated in accordance with the rates in the Bill of Quantities and the reduction as stipulated in PS07.3 in case that non-compliance of the Contractor is confirmed.

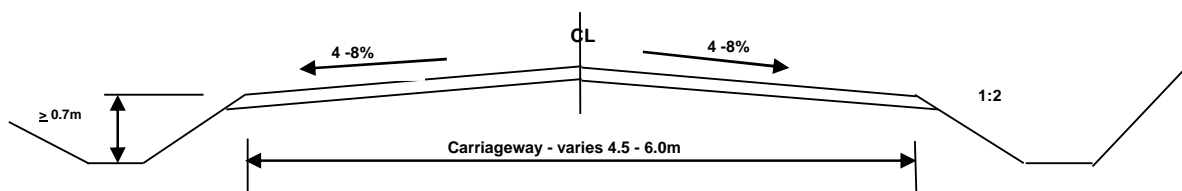
PS08 INITIAL MAINTENANCE WORKS

- (1) Initial Maintenance Works are required to repair short stretches of road sections that are not meeting required service levels. The works mainly include heavy grading, ditch clearing, spot-filling with gravel materials and etc. The payment will be made in relation to the work items carried out in conformity with the Specifications, as measured by the contractor and verified by the Project Manager and valued at unit rates and priced stated in a separate Bill of Quantities.
- (2) Proposed maintenance activities, their quantities and exact location are provided in the strip maps given in **Volume I – Part 2 – Works Requirements, Drawings**.
- (3) All Initial Maintenance Works should be carried out in accordance with following:

MAC 121 Heavy Grading (m²)

Reshaping of the gravel/earth carriageway to specified camber:

- Provincial road traffic >75 vehicles per day camber >4%
- Provincial road traffic < 75 vehicles per day camber >4%
- District/community road camber 4-8%



In curves, the cross-fall across the carriageway shall be 4-6%. A smooth transition from camber to cross-fall shall be achieved.

The camber and cross-fall shall be measured at random every 100 m. The Project Manager’s Representative shall also measure the camber or cross-fall in locations that appear to have the wrong camber or cross-fall.

This operation will generally require 8-10 passes with the grader. Before the grading it might be necessary to scarify the road surface. This is often required in the dry season. If the heavy grading takes place when there is moisture in the road, scarifying is not required. Scarifying is a separate activity.

In the first two passes with the grader the existing road surface is split in the middle of the road and the material from each side combined in a row together with the material (if any, see MAC 132, Ditch Clearing below) from the ditches. In the next two passes all surface material should be brought into the middle of the road in one row. Water needs to be added in this activity to achieve the optimal water content. The following 2-4 passes are used for shaping the road to the specified camber. Compaction is done by vibrating roller starting from the edge of the road. A 6-ton roller needs 2-3 passes and a 4-ton roller needs 3-5 passes (thickness of the wearing course layer \leq 10 cm). If the layer is thicker than 10 cm the number of passes should be increased to achieve the required compaction.

MAC 125 Spot filling (m³)

Spot filling shall be done in location and quantities as instructed by the Project Manager. The material shall be in accordance with **Vol II - Part 2 - VIIA General Specification - Section 301** of approved gravel wearing course material. Normally the spot filling is done before heavy grading to provide a better gravel wearing course in places where there remains too little gravel. If the spot filling is carried out as a free-standing activity, the filled area shall be shaped into the correct camber and compacted as specified in **Vol II - Part 2 - VIIA General Specification - Section 301**.

Quality of Materials to be used for Spot filling

All materials used by the Contractor shall comply with the MPWT General Specification as given in **Vol II - Part 2 - VIIA General Specification - Section 301, 302 and 310**.

MAC 132 Clearing of Ditches by Machine (m)

Clearing of all existing road ditches (side drains) including mitre drains and catch drains of all soil, debris and other foreign matter. The ditches shall be restored to the dimension shown on MPWT standard drawings of 1.0m or to a depth specified by the Project Manager, but not less than 0.60 m.

Clearing of ditches by grader is the first step in the heavy grading activity as material from the ditches can be re-used in the road surface. For this activity a blade extension shaped as a ditch is very suitable and appropriate.

With time a lot of gravel from the carriageway is transported into the ditch by water and vehicles. Often, this material can be recovered and used as gravel wearing course. Material recovered from the ditch has a tendency to create large dust problems when mixed into the gravel wearing course. Therefore, no recovery of ditch material should take place through villages or where there are many houses along the road.

If there is unsuitable soil in the ditch this has to be taken behind the back slope in the first pass. If this is not possible this soil should be brought to the road shoulder, uploaded and transported to waste disposal in accordance with **PS02 Surplus Materials Disposal Plan**. (This must be decided with the Project Manager/Project Manager's Representative).

In next pass the useable gravel from the ditch should be brought back in the road. The road width should be restored as once constructed, and the depth of the ditches should not be less than 0.60 m. The surface material from the ditches should now form two rows, one of each side of the road. This material shall be used in the heavy grading operation (see MAC 121, Heavy Grading).

MAC 133 Clearing of Culverts (number)

This activity includes the following parts:

- Removal of all silt, debris and other foreign matter from inside the culvert and at the inlet and outlet. A long handled shovel should be provided for the work.
- Cleaning inlet and outlet ditches for a minimum distance of 25 meters. If grass is established in the ditch it should be cut and the roots be left in place to provide erosion protection.

All debris and other cleared material shall be removed well clear of the road and the drainage system to prevent it from being washed back into the ditches. On completion of this activity, the culvert, including the inlet and outlet channels/drains shall allow the free and unhindered flow of water.

PS09 EMERGENCY WORKS

PS09.1 Emergency Works

(1) Provisional quantities in the Bill of Quantities are given to provide a common basis for bidding. Actual quantities for Emergency Works will be specified in Work Orders, issued by the Project Manager in accordance with the General Conditions of Contract. The basis of payment for Emergency Works will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Project Manager and valued at the unit rates and prices bid in the priced Bill of Quantities

PS09.2 Identification of Emergency Works

(1) The need for execution of Emergency Works is jointly identified by the Project Manager and the Contractor and the execution of Emergency Works shall always require a written instruction from the Project Manager.

(2) The execution of Emergency Works shall be ordered by the Project Manager based on losses or damages occurred as a result of natural phenomena (such as strong storms, flooding or earthquakes) with unspecified consequences, or on the possibility of damages or losses occurring, or the safety of individuals, or works being at risk as result of the natural phenomena. In order to characterize the Emergency Works, the Project Manager shall forward a Technical Report to the Employer's Representative requesting the execution of Emergency Works and characterizing the situation. On the approval of the Employer's Representative, the Project Manager may issue a Work Order to the Contractor.

(3) The DPWT or Government authorities may declare an Emergency Situation on the basis of local legislation. In those cases, the Project Manager may issue a Work Order for Emergency Works to the Contractor without prior approval of the Employer's Representative.

PS09.2.1 Definition of “Unforeseen Natural Phenomena”

(1) Emergency Works are designed to repair those damages to the road under contract which are caused directly by unforeseen natural phenomena with imponderable consequences occurring either in the area of the road or elsewhere, but with a direct impact on the road. “Unforeseen Natural Phenomena” are defined as follows:

Exceptionally heavy mango and monsoon rains causing major landslides and down slope washouts, flooding above the normal average maximum annual levels, wash out of culverts, and destruction of side drains, damage to bridge substructure and superstructure. (*“Unforeseen Natural Phenomena” exclude damage caused by trees falling on the road, minor erosions of the road and embankments, and damage caused by traffic accidents; these must be remedied by the Contractor as a part of his normal obligations under the contract*).

The threshold values are those given in PS09.7 – the provisions for issuing a Work Order for Emergency Works are for quantities **greater** than those shown in the table below:

Activity	Unit	Quantity per Emergency event
Slides of material onto road	m ³	200
Slides of material onto road that completely block the passage of traffic	m ³	50
Down slope washouts	m ³	75
Culverts	Number	--
DBST	m ²	200

Base course	m ³	50
Concrete	m ³	5
Embankment	m ³	100

(2) Without being limitative, the following is a list of damages requiring Emergency Works:

Eligible damages are defined as: (i) complete destruction of a culvert as a result of exceptional rainfall quantities, which lead to an interruption of road traffic, (ii) interruption of a road following washouts, equivalent to more than 50 (fifty) cubic meter of material on a road section of 500 meters length, (iii) submersion of the road along more than 100 meters, provided that the submersion is not the result of deficiencies in the drainage system or of insufficient maintenance of drainage structures, and those items listed in the BoQ for Emergency Work.

PS09.3 Procedure For Requesting Emergency Works

(1) If damages clearly caused by “Unforeseen Natural Phenomena” result in a reduction of Service Levels below the normal threshold values specified in this contract, the Contractor may make a formal request to the Project Manager to carry out Emergency Works designed specifically to remedy those damages. In the event of an Emergency the Contractor must (i) immediately inform the Project Manager of the occurrence, by telephone, radio or other means, (ii) document the circumstances of the Force Majeure event and the damages caused, through photographs, video and other suitable means. The Project Manager will then prepare a written report stating the type of works to be carried out, their exact location and the estimated quantities and costs, including photographic documentation. In any case, a request for Emergency Works must be made immediately after the Project Manager gains knowledge of the existence of damages caused by “Unforeseen Natural Phenomena”.

(2) Upon receipt of the report the Employer's Representative and not later than 24 hours thereafter, will evaluate the report and liaise with Project Manager to sanction the work. The Project Manager’s order will specify the type of works, their estimated quantities, the estimated amount to be paid to the Contractor, and the time allowed for their execution. The order may indicate a requirement for an engineering/geotechnical assessment of the options and the design requirements for the permanent repairs to the site (for example the requirement for a retaining wall, gabions, etc).

PS09.4 Remuneration of Emergency Works

(1) Emergency works are remunerated by the Employer on a re-measure basis for each work order, the unit prices being as stated in the Bill of Quantities. The work items and the unit prices to be applied are specified in **Part 1 Section IV (Bidding Forms - Bills of Quantities)** of this bidding document.

PS09.5 Provision for Emergency Works

(1) The total contract amount includes a Lump Sum for provisional quantities of Emergency Works during the contract period, in accordance with the BDS. The actual payments for Emergency Work will be based on the tendered rates.

PS09.6 Obligations of Contractor during Emergencies and Emergency Works

(1) Given the nature of this contract and the fact that Emergency Works are remunerated separately, the Contractor will, during the execution of Emergency Works, continue to be responsible for assuring the normal Service Levels on all road(s) included in the contract. In particular, the Contractor will do everything reasonably possible in order to ensure the normal use of all the road(s) under contract, including the sections affected by emergencies.

(2) If road traffic has been interrupted because of an emergency, the Contractor will take the measures necessary (i) to reopen the road to traffic in the shortest time possible, and (ii) maintain the road open during emergency works, without being entitled to a specific compensation for those measures. This is valid specifically for trees or other objects which may have fallen on the road,

damage to access ramps to bridges, erosion of embankments, collapse of slopes, traffic accidents, flooding, etc.

PS09.7 Minor Repairs made necessary by “Unforeseen Natural Phenomena”

(1) If the works necessary to remedy damages caused by an “Unforeseen Natural Phenomena” are below certain threshold values, the Contractor will carry out those works as part of his normal obligations and without having the right to invoke the provision of the contract concerning emergencies and the remuneration of emergency works. In these cases the consent of the Project Manager is not needed and the Contractor will simply carry out the works on his own initiative. He will nevertheless inform the Project Manager of the damages occurred and the remedial measures taken.

(2) The threshold values for minor repairs are as shown in the table below:

Activity	Unit	Quantity per Emergency event
Slides of material onto road	m ³	200
Slides of material onto road that completely block the passage of traffic	m ³	50
Down slope washouts	m ³	75
Culverts	Number	--
DBST	m ²	200
Base course	m ³	50
Concrete	m ³	5
Embankment	m ³	100