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2 **SITE INSTALLATIONS, SERVICES, AND ENVIRONMENTAL OBLIGATIONS**

2.1 **SCOPE OF WORK**

- i) Contractor for the Package shall be responsible for providing plant, equipment, materials and labour for the provision of all necessary Temporary Works, site installations and services required for the realisation of the Works under his Contract.
- ii) Contractor shall design, furnish, set-up, maintain and operate at the Site all Temporary Works, site installations and Contractor's Equipment for his own use as specified in this Section, or required by the Contractor, including camps, workshops, warehouses, storage and assembly areas, all machinery, vehicles, scaffolding, equipment, water and power supply, etc.
- iii) Temporary Works and services provided and operated by a Contractor for his own use as well as for that of the Employer and Engineer shall conform to the applicable Indian laws, regulations, standards, codes and sanitary requirements stipulated for such purpose. In addition, they shall comply fully with all Indian laws and regulations relating to environmental protection, mitigating measures for reducing environmental impacts and remedial works on completion of the Works.
- iv) The design, construction, operation and maintenance of a Contractor's Temporary Works and services may be subject to inspection by the Project Manager.
- v) All plants, camp facilities, installations and services provided by a Contractor for his own use as well as for that of the OWNER's and OWNER's representatives, wherever applicable, shall at all times remain his property, except when otherwise specified hereinafter. Should, after the Completion of Contract, the Contractor wish to sell his plants, facilities and equipment in India, he shall pay all taxes and duties required by law, as stipulated in the Conditions of Contract; and he has to obtain relevant permission from the Government for such sale.

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- vi) The temporary site roads which a Contractor shall construct, and maintain for the various working areas, camps, facilities and other temporary works are covered in the Section "Access roads" given in part 2-Particular Technical Specifications.


2.2 **SUBMITTALS**

- i) Within 21 days from the date of issue of the Letter of Acceptance, Contractor for the Package shall submit to the Project Manager updated layout drawings showing, at adequate scale, the locations and arrangement of all his Temporary Works and facilities. These drawings shall be consistent with the plan submitted by the Contractor with his Tender, as well as, with any amendments and additions subsequently agreed to by the Project Manager and the Contractor; and shall include:
- a) Camps for Contractor's employees,
 - b) Offices, parking areas, warehouses, storage areas, and medical care services,
 - c) Water supply, sewerage, sewage treatment and disposal, power supply and illumination, telephone service (radio and cable),
 - d) Temporary roadworks, including public road diversions,
 - e) Equipment pools and mechanical workshops,
 - f) Spoil areas, borrow, quarry and stockpile areas,
 - g) Concrete and materials processing plants, including cement storage,
 - h) Materials testing laboratory,
 - i) Explosives magazines,
 - j) Underground ventilation system,
 - k) Security and safety arrangements.
- ii) Within 28 days after the day of receipt of the Notice to Commence, Contractor for the Package shall submit to the Project Manager the following concerning his lot:

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	<ul style="list-style-type: none"> a) Detailed drawings at scale 1:500 showing the camp layout, buildings, roads, recreation areas, all utilities, etc., and drawings at scale 1:50 showing typical building construction details, b) Drawings and specifications for the establishment of an infirmary and first aid stations, and details of the ambulances, c) Detailed design for industrial and potable water supply to the camps and working areas; as well as, sewerage systems, sewage treatment and disposal with an estimate of number of people to be supplied with water, d) Detailed layout drawings for electrical installations and distribution systems at the Site, showing voltages, outlets, and routing of power lines, e) Detailed design and drawings including manufacturer's drawings for concrete and materials processing plants in accordance with the requirements of the pertinent Sections of these Specifications, f) Detailed breakdown of all equipment to be used for material testing and in the field laboratory in accordance with the requirements of the pertinent Sections of these Specifications, g) Details of the drilling and grouting equipment, h) Details of the underground ventilation system. <p>iii) Within 28 days after the day of receipt of the Notice to Commence, Contractor for the Package shall submit to the Project Manager an Environmental Monitoring and Protection Plan, which describes all measures to be taken by Contractor to comply with the requirements of Cl. 2.19 of this Section. This plan will also cover all measures to be taken by a Contractor to prevent, minimise or make good all possible environmental effects of the construction work, in particular:</p> <ul style="list-style-type: none"> a) Deterioration of the quality of water in rivers and streams, and of ground water, 	<div style="border: 1px solid black; padding: 5px; text-align: center;"> ISSUE P0 </div>

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<div> <div> <div>b)</div> <div>Accumulation of any pollution by solid and liquid waste material anywhere in the project area,</div> </div> <div> <div>c)</div> <div>Undesirable levels of noise, air pollution and dust both at the construction site, as well as, along the access road to the site, and in quarries and borrow areas,</div> </div> <div> <div>d)</div> <div>Occurrence amongst site workers and their families of water-borne and other communicable illnesses, and the deterioration of levels of hygiene in the camps and construction areas.</div> </div> </div> <div> <div>iv)</div> <div>This environmental plan will also describe the procedures to be adopted by a Contractor for reporting on the environmental protection programme and for informing and communicating with government institutions.</div> </div> <div> <div>2.3</div> <div><u>SITE OFFICES, STORES, WAREHOUSES, MATERIALS YARD</u></div> </div> <div> <div>i)</div> <div>Contractor for the Package shall provide and equip, for his own and his subcontractors' use, main and secondary offices, warehouses, materials storage areas, fuel storage areas and explosives magazines, all of which shall be maintained in good conditions until the Completion of Works.</div> </div> <div> <div>ii)</div> <div>Listed hereunder are the buildings, shops and warehouses expected to be constructed and equipped by the Contractor for use in the performance of the Work under this Contract, in addition to facilities explicitly specified elsewhere in these Specifications:</div> <div> <div>a)</div> <div>Mechanical repair shop,</div> </div> <div> <div>b)</div> <div>Electrical repair shop,</div> </div> <div> <div>c)</div> <div>Metalwork and wood fabrication shop,</div> </div> <div> <div>d)</div> <div>Main warehouse and parts store,</div> </div> <div> <div>e)</div> <div>Bulk cement silo,</div> </div> <div> <div>f)</div> <div>Bagged cement store,</div> </div> <div> <div>g)</div> <div>Spare parts store,</div> </div> <div> <div>h)</div> <div>Gasoline and oil stations.</div> </div> </div> <div> <div>ISSUE</div> <div>P0</div> </div>		

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- iii) The Contractor is required to have at the Site at least one month's minimum reserve of materials both for construction activity and other requirements. For the monsoon months, from June to September, when transport to and from site may be difficult, his reserve requirements may need to be increased.


2.4 **CONCRETE AND MATERIALS PROCESSING PLANTS**

Contractor for the Package shall install and erect all necessary materials processing plants of sufficient capacity to meet the planned peak requirements during construction. The plants shall be subject to approval by the Project Manager; and shall be well designed and fabricated; and kept in good running order to ensure compliance with the materials quality specifications. All control and measuring equipment shall be regularly serviced and calibrated.

2.5 **MATERIALS TESTING LABORATORY**

- i) Contractor for the Package shall build and equip an adequate field laboratory for the sampling and for testing of materials for concrete, earth, rock or any other materials as specified in the pertinent Sections of these Specifications.
- ii) The laboratory shall be located in a dust-free building properly equipped with electricity, water, etc., and shall have enough room for storing the samples tested as required.
- iii) The equipment to be supplied and the methods of testing shall be in accordance with the relevant Indian Standards, or with requirements of the USBR Concrete Manual and USBR Earth Manual, wherever suitable provisions are not covered in Indian Standards. All apparatuses and equipment shall be brand new, of the latest design and manufactured by a reputed manufacturer, and properly calibrated with calibration certificate from Indian / International Authority whose acceptability to the Project Manager shall be ascertained by the Contractor beforehand. The proposed

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type and number of items of laboratory equipment shall be presented to the Project Manager prior to purchase.


- iv) Contractor for the Package shall operate and maintain the laboratory until Completion of the Works concerning his Package and make all facilities and services available to the Project Manager, as required. All sampling and testing to be undertaken shall be under the direct supervision of the Project Manager. The laboratory shall be run by the Contractor's personnel experienced in sampling and testing of materials, and quality control.
- v) Specialised testing, which may be required and which cannot be performed in the Contractor's laboratory due to lack of time or equipment shall be assigned to an independent organisation. The Contractor shall accept all results, instructions or restrictions stipulated by the Project Manager based on such tests.
- vi) Upon the Completion of Works, all laboratory equipment shall remain the property of the Contractor. However, the OWNER reserves the right to purchase some or all of the equipment.

2.6 **COMMUNICATION SYSTEMS**

2.6.1 **SITE COMMUNICATIONS**

- i) Contractor for the Package shall supply, install, operate and maintain a telephone switchboard, complete with standby power supply, to connect his offices with those of the Project Manager's, campsite, laboratories, workshops, stores, aggregate plants, batching plants, ice plant (as applicable), tunnel portals (as applicable), tunnel headings (as applicable), infirmary and first aid stations and all of his other work areas within the Site.
- ii) Contractor for the Package shall furnish a directory of the telephones installed at the Site and make it available to the Project Manager.
- iii) In addition to the local telephone system, the Contractor shall supply, install and maintain mobile two- way radio transceiver sets for the OWNER's, Engineers and Contractor's service vehicles for on-site communications.

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Walkie-talkie transceivers may also be required to monitor critical working areas, like concreting, where telephone or mobile radio is not feasible.

2.6.2 COMMUNICATION SYSTEM IN UNDERGROUND WORKS

- i) The Contractor shall install and maintain operational a communication system by telephone or preferably an underground radio system approved by the Project Manager between each heading face of the tunnel.
- ii) This communication system shall have its source of energy independent of the main energy supply for underground.
- iii) The availability of the communication with open air shall be ensured at all times throughout the whole duration of underground construction.

2.6.3 OUTSIDE COMMUNICATIONS

- i) Contractor for the Package shall install, operate and maintain a outside communication system at the Site to provide the access to the national and international telephone grid.
- ii) The OWNER will endorse the necessary license applications of Contractor for the Package.
- iii) Upon the Completion of Works, Contractor shall dismantle and remove from the Site the installed outside communications. However, OWNER reserves the right to purchase some or all of the equipment.


2.7 SERVICE VEHICLES

Contractor for the Package shall operate and maintain sufficient service vehicles for use by its own staff and employees in the management, for the supervision and performance of the work.

2.8 CAMPS FOR CONTRACTOR'S EMPLOYEES

- i) Contractor for the Package shall design, construct, provide furnishings, maintain, and operate two separate construction camps; one for Contractor's


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managers and engineers employed at Site, the other for the Contractor's labourers.

- ii) The construction camps shall provide for the housing, feeding and recreation of the Contractor's employees and those of his subcontractors as per Indian labour law and other relevant regulations. The camps shall be large enough to accommodate the anticipated peak work force.
- iii) Contractor for the Package shall be responsible for the necessary topographical surveys, clearing, and earthwork required for the landscaping and to provide satisfactory foundations for buildings, streets and auxiliary facilities.
- iv) All camp buildings shall be of sound construction and neat appearance, well insulated against severe cold, air conditioned, and connected to all utility services. Floor areas shall be based on the following minimum values:
 - a) Bedrooms in dormitories 6.0 m² per person,
 - b) Family dwellings (3 bedrooms) 15 m² per bedroom,
 - c) Social and Recreational 2.0 m² per person,
 - d) Public Dining Rooms 1.5 m² per person.
- v) Fixtures in the sanitary facilities shall be based on the following user ratios:
 - a) 1 toilet for not more than 6 users,
 - b) 1 shower for not more than 6 users,
 - c) 1 wash basin for not more than 4 users.
- vi) Food handling, preparation and serving shall be arranged by Contractor for the Package in properly equipped canteen buildings for all his and his subcontractors' employees.
- vii) Contractor for the Package shall be responsible for keeping his camp and buildings within it in good hygienic conditions. The standards and regulations presently in force in the project area with regard to personnel treatment, sanitary conditions, and fire and accident prevention shall be duly taken into account.
- viii) The prices charged by a Contractor for food, beverages, etc., available in the camp shall be calculated on a non-profit basis.

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2.9 MEDICAL CARE FACILITIES

- i) Contractor shall comply with laws and health standards presently in force in India. In the event of illness of an epidemic nature breaking out, Contractor shall carry out and comply with all orders, arrangements or regulations, which may be issued by the Government or local authorities.
- ii) Contractor for the Package shall construct, equip, and maintain at the Site, the following medical care facilities:
 - a) One first aid stations at each work site with Doctors/Medical attendants & facility to transfer serious patients to nearby hospitals.
- iii) The construction of these facilities shall be such as to provide reasonable quiet, privacy, communications, adequate ventilation, air-conditioning, heating, light, hot and cold water, toilet facilities, electrical outlets, and impervious floors, walls and roofs.
- iv) All enclosed portions shall be provided with natural light by means of exterior glazed openings with an area not less than one tenth of the total floor area, and natural ventilation by means of openable exterior openings with an area not less than one twentieth of the total floor area, and shall be provided with sufficient artificial light and a mechanically operated ventilating and air-conditioning system. The mechanically operated ventilating system shall be capable of supplying a minimum of 0.15 m³/minute per occupant but not less than 2.0 m³/minute. The air conditioning system shall be capable of maintaining a temperature of below 25 degree Celsius.

2.10 POWER SUPPLY AND ILLUMINATION

- i) Contractor for the Package shall provide, install and keep operational throughout the Time for Completion his own generating facilities of such capacity as considered necessary to supply all participants at his Site and in his camps. The power generating sets shall be installed in separate concrete or steel structure buildings on concrete foundations. The power supply to the construction sites, camps and the entire project area shall be

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designed for continuous operation, 24 hours a day, with sufficient capacity to satisfy peak and emergency demands.

- ii) Contractor shall install, operate and maintain electrical distribution systems which shall include all other necessary transformers, circuit breakers, disconnect and safety switches, voltage regulators, transmission lines, poles, pole hardware, conductors, meters and other equipment necessary for power distribution throughout the Site and temporary facilities.
- iii) Local standby generating units to prevent the interruption of work during the failure of the primary power source and capable of maintaining minimum services such as illumination, water supply, dewatering, etc., safety and security shall also be provided by the Contractor.
- iv) Contractor shall ensure adequate illumination for all his operations at the Site and at the camp, including illumination of the streets. The minimum intensities for illumination, measured at floor level, in general shall be as follows:

Area or Operation		Luminous Intensity
a)	Excavation and spoil areas, and outdoor access ways	35 Lux
b)	General construction areas, outdoor concrete placement, active storage areas, loading platforms, refuelling, and field maintenance areas	55 Lux
c)	Indoor construction areas	110 Lux
d)	Tunnel and general underground work areas	55 Lux
e)	Tunnel headings during drilling, mucking and scaling	110 Lux
f)	General construction plant and shops, e.g. batching plants, mechanical and electrical, equipment rooms, carpentry shops, active storerooms, barracks or living quarters, lockers or dressing rooms, mess halls, and indoor toilets	100 Lux
g)	First aid stations, and infirmaries	550 Lux
h)	General offices (for incandescent light = 14 W/m ² of floor area)	140 Lux
i)	Drafting and Engineering rooms	240 Lux

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j)	General interiors warehouses, corridors, hallways and exit ways	50 Lux
k)	Welding	330 Lux

- v) It is not binding to OWNER for supply of power from Grid or otherwise. However, in case OWNER can make available this facility, the rate of per unit of such electricity consumption shall be fixed by OWNER. Non-availability of power however, would not entitle the Contractor to make any claims whatsoever either for time extension or extra payments.

2.11 **WATER SUPPLY**

- i) The Contractor shall design, install, operate and maintain two separate water supply systems at the Site:
- a) Industrial water: for general construction use, treated to the extent necessary to meet specified requirements (e.g. for concrete),
 - b) Potable water: for supply to all buildings and plants requiring high quality water meeting relevant requirements for drinking water.
- ii) Water shall be supplied by the Contractor from suitable natural sources available within the Project area. The water shall be free of contamination and unaffected by the Site construction work. In isolated areas with no natural sources, the Contractor shall provide sufficient number of water-carts to cover the requirements on both the industrial as well as potable water.
- iii) The Contractor shall furnish, install, operate and maintain all pumps, piping, fittings, valves, storage tanks, purification plant and chlorination for the water supply and distribution systems, adequate in quantity and pressure. Industrial water shall be used for construction purposes only if of adequate quality. There shall be no cross connections of any kind between the industrial and potable water supply systems. Only potable water shall be piped into buildings.
- iv) Throughout the duration of the construction, the Contractor shall take regular samples from all water supplies to examine it for suitability and

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treatment required, and make weekly the bacteriological tests from potable water systems.

2.12 **SANITATION AND SEWERAGE**

- i) All offices, workshops, laboratory and other occupied work buildings shall be provided with toilets connected to properly constructed and regularly maintained septic tanks approved by the Project Manager.
- ii) The campsites shall be provided with a complete, properly maintained and operated sewerage system, including septic tanks, sewage treatment and disposal facilities. Facilities for washing clothes shall also be provided and linked to the sewerage system.


2.13 **WASTE AND GARBAGE DISPOSAL**

- i) The Contractor shall collect waste material and garbage from camp, offices and workshops on a daily basis and transport it to an area approved by the Project Manager where it shall be incinerated and buried.
- ii) The Site shall be kept clean and free of refuse at all times. No waste shall be dumped in areas other than those approved by the Project Manager for waste disposal. No waste of any kind shall be deposited in any watercourses.

2.14 **FENCING AND SITE SECURITY**

- i) The Contractor's offices, workshops and storage compounds, campsites and all construction areas where exclusion of unauthorised personnel is necessary for safety and security, shall be adequately fenced, gated and guarded.
- ii) The Contractor shall employ an adequate force of properly trained security guards at the work site and at the construction camp on 24-hour duty including Sundays and holidays. Storage areas shall be fenced, lighted and regularly patrolled by security guards. Warehouse buildings and explosive magazines shall be kept locked, and keys accounted for at all times.

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- iii) All employees engaged in the execution and maintenance of the Works shall wear identification badges when at the work site.
- iv) The Contractor shall be responsible for the losses occurring in his installations and those of the OWNER resulting from carelessness on his part.

2.15 **INSPECTION BY THE PROJECT MANAGER**

The OWNER and the Project Manager have the right at any time to inspect any part of the Contractor's site facilities, without advance notification, and to instruct immediate rectification of any contravention of the specified requirements.

2.16 **COMMISSIONING**


2.16.1 **MEASUREMENT AND PAYMENT**

There will be no measurement for payment for any of the activities related to equipment commissioning which are specified in this Section and all costs related thereto will be covered by the Unit Prices given in the BOQ of Tender Documents.

2.17 **FINAL CLEAN-UP**

- i) Upon the Completion of Works, or when any plant has completed its works the Contractor shall dismantle and demobilise all temporary facilities erected by himself or his subcontractors, and remove all debris, objectionable material, and all other refuse which may have been deposited on Site during the construction period. Such materials may be deposited only in areas approved by the Project Manager.
- ii) All excavated areas shall be filled, graded and dressed in a clean and orderly condition acceptable to the Project Manager. As far as possible, such areas should conform to the natural appearance of the landscape.

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- iii) No demobilisation or removal of temporary facilities and equipment shall be made without prior approval of the Project Manager.

2.18 **ENVIRONMENTAL OBLIGATIONS**

- i) The Contractor shall, during the whole period of the Works comply fully with all Indian laws and regulations relating to environmental protection, mitigating measures for reducing environmental impacts and remedial works on completion of the Works. This obligation shall extend to the construction sites themselves, all the Contractor's site installations, and all quarries, borrow areas and tips.
- ii) Notwithstanding any specific obligations as these may be specified in prevailing Indian laws and regulations, the Contractor shall at all times comply with the following particular requirements for the protection of the environment, the local population and the workers at the construction site (to the satisfaction of the Project Manager):
- a) Collect, treat, remove from site and dispose of in accordance with the regulations all domestic and industrial waste and excess construction materials (both solid and liquid), fuel, chemicals and other matter,
 - b) Take all possible steps to prevent pollution of streams, rivers, and other water supplies, at or in the vicinity of the Site and shall comply with applicable laws, orders and regulations in force in India concerning the control and abatement of water pollution,
 - c) Under no circumstances shall the sewage from the camps, or other contaminated water, be released directly into the River or other natural streams or any open areas without prior treatment,
 - d) Make every effort to minimise the harmful effects of transport to and from the site, in particular vehicle emissions and noise and the control of dust on roads,

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	<div> <div>e)</div> <div>Provide its work force with fuel for cooking and heating and ensure that workers on the site do not cut wood or other vegetation as firewood,</div> </div> <div> <div>f)</div> <div>Take measures and construct works, on the instructions of the Project Manager, to prevent soil erosion from slopes in the construction area,</div> </div> <div> <div>g)</div> <div>Not clear any areas of forest or woodland without the approval of the Project Manager.</div> </div> <div> <div>iii)</div> <div>In order to reduce adverse effect on public health resulting from the influx into the project area on construction workers, the Contractor will be obliged to undertake during the whole construction period the following preventive measures:</div> <div> <div>a)</div> <div>Ensure that all construction staff and workers, prior to being accepted to work on site, submit certificates of good health and, during the construction period, ensure that all employees are give a periodic physical examination (at least once a year and following any serious illness) by a qualified medical practitioner,</div> </div> <div> <div>b)</div> <div>Ensure that any workers suffering from contagious illnesses are removed from site for treatment and are not permitted to return to the site without an updated medical certificate of fitness.</div> </div> <div> <div>c)</div> <div>Carry out regular spraying of all parts of the site and site installations to control mosquito vector diseases, using approved insecticides,</div> </div> <div> <div>d)</div> <div>Implement a control programme to ensure the maintenance of satisfactory sanitary conditions on the site and in the living areas, and report to the Project Manager all cases of serious enteric and/or water-borne illness.</div> </div> </div> <div> <div>iv)</div> <div>The Contractor will send representatives to constituted project environmental monitoring committees, as instructed with the Project Manager, and will at all times comply with the requests of said committees with regard to the need for environmental or health protection measures. He</div> </div>	<div> <div>ISSUE</div> <div>P0</div> </div>

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will also maintain close contact with local representatives and government institutions in addressing issues arising from the construction activities. Such issues needing particular attention are the following:

- a) Pollution caused by construction work,
 - b) Disputes related to the leasing of land for construction activities and/or site installations etc.,
 - c) Disputes arising from traffic congestion and restrictions on the use of the main project access road and roads in the project area,
 - d) All matters relating to road safety and the reduction to a minimum of the risk of traffic accidents.
- v) The Contractor will submit to the Project Manager monthly reports on environmental performance and control. These reports will give details of all environmental protection measures taken during the months, as well as:
- a) Any environmental problems encountered during the month,
 - b) Details of health conditions, in particular any occurrence of contagious illness and any accidents,
 - c) Any notices received from government or state institutions relating to environmental matters, and the action taken by the Contractor as a result.
- vi) In view of the limited space available for the site accommodation facilities and in order to avoid problems of assimilation with the present population of the project region, the Contractor shall keep the number of workers imported from other areas to the minimum required for him to complete the Works on time and in accordance with the specifications. The Contractor will co-operate with the local authorities at all times to prevent migration to the area of unauthorised persons not involved directly in the construction work. To this end, he will at all times strictly control the movement of persons into and out of the construction areas and camps.

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2.19 PAYMENT FOR SITE INSTALLATION AND SERVICES

- i) The initial mobilisation costs such as purchase and transport of Contractor's Equipment and materials to the Site, planning, designing, installing, operating, maintaining and removing of all Temporary Works, site installations, services and facilities specified in this Section, making submittals to the Project Manager, recruiting and transferring staff, obtaining rights of way, clearing, grading and excavating in areas for temporary facilities, and any other costs involved in preparation for constructing Permanent Works will not be paid separately and the entire cost thereof shall be included in the Unit Prices for other items of the Works.
- ii) No separate payment shall be made for complying with any environmental obligations required by Indian national and state laws and regulations, and/or as described in this Section, and all such costs incurred by the Contractor to this end shall be considered as being included in the Contractor's Unit Prices.

End of Chapter

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