

## **SPECIAL SPECIFICATIONS**

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## **1.1 SITE OFFICE FOR THE ENGINEER**

### **1.1.1 Provision of Site Office**

The successful Tenderer is to provide and maintain a site office as mentioned in the bid document at a location approved by the Engineer / Construction Manager in consultation with the Employer, within 15 days from the date of issue of Notice to Proceed.

### **1.1.2 Furnishing of the Site Office for the Engineer**

A separate Engineers office of about 25Sqm shall be provided. This Engineers office shall be of standard quality and furnished. The maintenance of this Engineers office is also the responsibility of contractor.

### **1.1.3 Surveying Equipment**

1.1.3.1 The Contractor shall provide at the site, at his own expense, atleast three approved set of surveying and measuring equipment. The set shall be used by the Contractor for requirement at site and also shall be made available from the commencement of contract for the use of the Engineer's Representative. The set shall consist of the following instruments:

<b>ITEMS</b>	<b>QUANTITY</b>
Total Station	1
Auto level with necessary accessories	1
Pogo with Reflector	1
Big Tripod	1
Small Tripod	1
Fiber glass tape (cased 30m)	2
Steel Pocket tape, 3	4
Surveying Umbrellas	2
Ranging Poles, 2.5m long	10
Level books – as required	
Field books – as required	

1.1.3.2 All equipment shall be supplied with their tripods, staff and such other equipment/item as the Engineer's Representative may require for the measuring, or setting -out of the work.

1.1.3.3 The Contractor shall be solely responsible for the maintenance of all such instruments and equipment and shall ensure they are, at all times, in good repair and adjustment. All equipment other than expendable items shall revert to the Contractor upon completion of the works.

1.1.3.4 The Contractor shall provide the Engineer, throughout the Contract period, with all necessary assistants and chainmen to assist with surveying work. The assistant shall keep the survey equipment in good order.

## **1.2 LABORATORY AND LABORATORY TESTING**

### **1.2.1 Description**

- 1.2.1.1 Testing of materials and completed work shall be carried out by a site laboratory established and allocated exclusively for that purpose, all testing shall be carried out under the direction and supervision of the Engineer's staff. All tests shall be performed in strict accordance with the appropriate Indian Standards or other standards as approved by the Engineer.
- 1.2.1.2 Any testing relating to the Works as required by the Engineer which cannot be carried out in the site laboratory shall be carried out at the Contractor's expense, at an independent laboratory approved by the Engineer.
- 1.2.1.3 The provision of laboratory facilities on site, as specified, shall in no way relieve Contractor of the responsibility for providing additional laboratory space and testing equipment as necessary in order to control materials at mixing plants and elsewhere and enable him to fulfil his obligations under the Contract.
- 1.2.1.4 If for any reason a laboratory cannot be setup at site, all the tests shall be got done in a laboratory approved by the Engineer.

### **1.2.2 Laboratory Building**

- 1.2.2.1 The Contractor shall provide, furnish, equip, keep clean and maintain to the satisfaction of the Engineer a laboratory building of a floor area not less than 30sq.m. The building shall be provided with electrical power, potable water, drainage, and shall have adequate daylight and artificial lighting.
- 1.2.2.2 The Laboratory shall be adequately staffed by the contractor with materials technicians and assistants in the numbers deemed necessary by the Engineer so that no interruption of unnecessary delay shall occur to construction activities due to delays in sampling or testing, in-site or in the laboratory, as required by the Contract. The testing equipment provided in the laboratory shall be sufficient to carry out the following tests;
- (a) modified Proctor compaction tests
  - (b) Field Density tests using core cutter and sand replacement methods
  - (c) Crushing strength of 150mm size concrete cubes.
  - (d) Sieve analysis
  - (e) All tests are asphalt

The Contractor shall, at the Commencement of the Contract, submit a detailed list of the equipment he is proposing to provide showing for each item its type and model, serial number, manufacturer's name and year of manufacture for the Engineer's approval.

The testing of the works by the Engineer, in no way, absolves the Contractor from his responsibilities to carry out his own testing of the quality of his works and the materials used.

- 1.2.2.3 The laboratory building and equipment shall be used exclusively for the purposes for which they are intended and shall, together with all equipment, all samples and records, be open to inspection by the Engineer during all working hours.
- 1.2.2.4 The laboratory shall be fully operational within 15 days of commencement of Contract and remain so until all work in the opinion of the Engineer is complete. A sum of Rs. 5000/ day will be deducted from the money due to the Contractor for each day over the 15 day limit, for failure on the part of the Contractor to provide the laboratory to the Engineer's satisfaction. At the end of Construction the laboratory building with furniture and equipment shall revert to the Contractor. The laboratory shall not, however, be removed from site without the prior consent of the Engineer.
- 1.2.2.5 If in case the tests are to be done in an approved laboratory, such an approval shall be obtained from the Engineer within 15 days of commencement of Contract; in such cases the Clause 1.2.2.4 will not apply.
- 1.2.2.6 2 Vernier Callipers and 2 Screw Gauges having 0.01 mm least count shall be made always available at site by the Contractor
- 1.2.2.7 After removal of the laboratory the Contractor shall clean and level the site removing all foundations, drain water pipes and other services installed for the laboratory and return the ground to its original condition.

### **1.2.3 Contractor's Senior Materials Technician**

- 1.2.3.1 The Contractor shall provide a full-time senior materials technician to be responsible for the day-to-day activities of the laboratory and for site testing. He shall be directly and solely responsible to the Engineer or designated members of his staff. The senior materials technician shall have not less than ten years experience of the testing of earthworks and pavement materials and their construction, including asphalt concrete, and of concrete for structures, and shall be fully converse with the testing of materials as per latest Indian Standards. The experience and qualifications of the senior materials technician shall be to the approval of the Engineer.

### **1.2.4 Sample**

- 1.2.4.1 The Contractor shall submit samples of all materials and goods for inclusion in the works to the Engineer and only those approved by the Engineer and to the standards specified elsewhere in the Contract may be ordered for supply. Samples shall be submitted promptly in order not to delay the works.

All work executed shall be of equal standard in all respects to the approved samples and the Engineer may reject any work which, in his opinion, does not comply with the approved samples.

## **1.3 SITE SURVEYS, SETTING OUT AND DESIGN DETAILING**

### **1.3.1 Description**

The Contractor shall be responsible for the true and proper setting-out of the works in relation to the lines and levels of reference given by the Engineer or shown on the

Drawings and for the correctness of the position, levels, dimensions and alignment of all parts of the works and for the provision of all necessary instruments, appliances and labour used in connection therewith.

He shall carry out a detailed survey of the site in advance of his commencement of Construction work, and shall supply full details to the Engineer as specified in the following sub clauses.

All setting out and levelling shall be based on permanent Benchmarks obtained from the Local Authority.

### **1.3.2 Existing levels and Layouts**

1.3.2.1 Before commencing operations of any section of the works, the Contractor shall survey all existing detail in that section, in plan and in level and shall plot the results in such detail and to such scales as shall be to the satisfaction of the Engineer. These survey plots shall be supplied to the Engineer at least two weeks in advance of the start for services specified in Clause 1.14 of this specification and, in any event, at least four weeks before the intended commencement of construction on the section. Unless otherwise instructed by the Engineer the detailed survey plots will be supplied in 1:200 scale and printed on high quality transparent draughting medium as approved by the Engineer.

1.3.2.2 In addition to the requirements of Sub - clause 1.7.2.1 above, horizontal control lines shall be marked out by pegs at intervals of not more than 20m and the lines traversed with the odolite by steel band or by any other method acceptable to the Engineer. The alignments established shall be referenced by pegs offset at suitable distance on each side of the horizontal control lines. These offset pegs shall be painted in a conspicuous colour.

1.3.2.3 Cross sections of the existing ground and of the ground after completion of earthworks shall be taken at intervals not exceeding 20m along the horizontal control lines in an approved and acceptable manner.

### **1.3.3 Bench Marks and Survey Points**

1.3.3.1 As the work proceeds, the contractor shall establish, at suitable location, substantial permanent benchmarks, clear of the works, from which, all subsequent setting out and levelling shall be carried out. The location of the benchmarks shall be agreed with the Engineer before they are established.

1.3.3.2 Benchmarks shall be constructed in class 20/20 concrete, with minimum dimensions of 0.3m x 0.3m, the upper surface being approximately 50mm above ground level. A 20mm diameter mild steel rod, not less than 300mm in length, shall be cast into the concrete so that it projects about 10mm above the centre of the surface of the concrete. The concrete surface shall be clearly engraved with the reference number of the benchmark. The co-ordinates and level of each benchmark shall be determined in metres to 3 decimal places.

1.3.3.3 The Contractor shall check co-ordinates and levels of benchmarks at monthly intervals and immediately notify the Engineer of any discrepancies.

#### **1.3.4 Survey, Design, Working and Shop Drawings**

1.3.4.1 The Contractor should note that the Drawings and Quantities in the Tender Documents, whilst detailed, have to be considered as preliminary, and only provide an indication of the locations, layouts and scope of works. The locations, layout and scope of works may be altered and in such cases the Contractor shall not be entitled to any claim whatsoever for such alterations over and above the measured works or measured variations at the tendered rates except in accordance with the provisions of relevant Clauses of the Conditions of Contract.

1.3.4.2 Subject to the above limitation, design detail will be provided by the Engineer in advance of the Contractor's intended commencement of construction as indicated in his approved construction programme or as otherwise agreed with the Engineer.

1.3.4.3 Should any Contractor's proposals for the any specialised items differ in entirely or substantially from that of the Engineer's or should it affect another component of the element or item of work beyond permissible variations from it, then the Contractor shall, at his own cost, be responsible for redesign to provide a complete acceptable system before approval of any part thereof. For such works, the Contractor shall furnish, at his own expense, the Engineer with copies of all design calculation, sketches, working drawings and similar information in as much detail as the Engineer may reasonable require for his full information and subsequent approval.

Such approval of the Contractor's design shall not relieve the Contractor from any of his duties, responsibilities or obligations under the Contract.

The above design work to be undertaken by the Contractor or his approved subcontractor shall be in accordance with f current practice generally using accepted design techniques in accordance to international standards or as specified in the relevant Tender Document all to the approval of the Engineer.

1.3.4.4 Contractor shall prepare the working drawings/shop drawings and documents, including diagrams and schedules shall show the details of proposals for the execution of the works and shall include everything necessary for the following purposes :

To illustrate in detail the arrangement of the various section of the works and to identify the various components.

To integrate the various sections of the works.

The shop drawings required shall include but not be limited to the following

General layout drawings for equipment and like items as deemed necessary by the Engineer.

- a) Detailed layout drawings all lift stations and pumping stations, showing the connection of mechanical and electrical services, ducting, paper work, conduit, cable tray and trunking together with earthing system

- b) Detailed layout drawings showing sections such as through ceiling voids and vertical shafts.
- c) System diagrams, circuit diagrams and wiring diagrams for all installations and equipment.
- d) The drawings, specifications and technical information for materials and equipment of building components such as doors, windows etc.

1.3.4.5 Working drawings and documents shall be made available in sufficient time in order to maintain the Programme of Work on site.

The Contractor shall liaise with the Engineer for the period required for any approval, which shall be a maximum of two weeks.

The Contractor shall ensure that all items to be ordered by him can be accommodated in the positions shown on the drawings and for taking all necessary dimensions on site together with any supporting information which may be necessary for preparing working drawings.

Materials or equipment shall be ordered nor construction of the associated works be commenced until such approval has been obtained from the Engineer.

The Contractor shall be deemed to have obtained a full and proper understanding of the Engineer's design and design intents and to have satisfied himself with their accuracy and suitability. In this respect, the Engineer will meet all reasonable requests made by the Contractor in furnishing design information and the like to the Contractor. No claim in respect of lack of knowledge will be admissible.

### **1.3.5 Construction Levels**

Before commencement of construction, the Contractor shall conduct a detailed topographic survey of each road in the project and submit to the Engineer, for approval, the following:

- (a) Tabulated control levels to which the works are to be referred to. Co-ordinates of each salient point shall be determined in metres to 3 decimal places.
- (b) Plan of the proposed road showing the location of the asphalt carriageway. The drawing shall clearly indicate the location of the boundary walls wherever available. Where boundary walls are not available the survey should show the extent of the right of way of the road. The existing services, as determined by site excavation, should also be marked up on these plans.
- (c) Profile of the existing road as directed by the Engineer
- (d) In the dual carriageway, profile shall be drawn for both carriageways.

#### **1.4 SOIL INVESTIGATION AND REPORT**

- 1.4.1** A soil investigation has been undertaken during the Design phase. However in case additional investigations are required during the course of construction the Contractor shall be advised of such requirement and the Contractor shall promptly carry out such investigations as advised by the Engineer.

#### **1.5 PROGRESS PHOTOGRAPHS**

- 1.5.1** The Contractor shall submit to the Engineer each month, throughout the period of the Contract, one set of progress photographs comprising 2 copies of 12 A4 size photographs selected by the Engineer from not less than 24 exposures of views of the works taken at the direction of the Engineer. The camera used for this purpose shall be such that the date is printed out on the negative.
- 1.5.2** In addition three copies of each of the 30 previously selected progress photographs and mounted in three separate and suitable albums shall also be delivered to the Engineer on the Preliminary Handing-over of the works. The arrangements for the progress photographs are subject to the approval of the Engineer and shall be discussed at as early a date as possible so that complete coverage can be assured.

#### **1.6 NOTICE BOARDS**

The Contractor shall provide, erect and maintain for the duration of the contract, two steel framed timber notice boards for the works, in location approved by SPV and the Engineer's Representative.

Notice Boards shall have a block board panel size of around 3m as detailed on the Drawings or equally approved. Prior to sign writing, the board shall be painted with two coats of white oil based paint back and front. The board shall be supported above the ground on steel struts painted matt black and fixed into concrete foundations, all to the approval of the Engineer. The sign shall be painted by a skilled sign writer to show the details described in the Contract. The Contractor is responsible for obtaining all necessary approvals for the erection of these notice boards.

Under no circumstances, shall sub-contractor's or supplier's name boards be fixed on hoarding or elsewhere on site.

#### **1.7 ADVERTISING**

- 1.7.1** Neither the Contractor nor any of those in his employment shall give information concerning the works for publication in any form without the written approval of the Engineer.
- 1.7.2** Neither the Contractor nor any of his sub-contractors shall erect placards or advertisements within the site other than the notice boards permitted under Clause 1.9.



## **1.8 SITE SAFETY**

### **1.8.1 Site Safety**

In order to improve the general vehicular traffic condition and to guarantee public safety from and around the work the Contractor shall provide all labour, and materials, and construct and maintain temporary traffic diversions through out the construction activities, to the directive and approval of the Engineer. It is therefore recognised that there is a particular responsibility placed upon the Contractor to take special precautions for public safety and to minimise the scale and extent of disruption. Plans for diversion shall always be submitted to the Engineer for prior approval.

### **1.8.2 Safety on Site**

1.8.2.1 The Contractor shall ensure that the works are carried out in a safe manner. According to internationally accepted guidelines on safe working procedures and to the satisfaction of the Engineer.

1.8.2.2 The following requirements shall be complied with by the Contractor:

- a) Excavation - All excavations shall be adequately supported to avoid collapses and effective safety barriers shall be erected with warning signs and devices around all open excavations to the satisfaction of the Engineer.

Struts and walling shall not be used as ladders and for the purpose of access to the base of excavation the Contractor shall provide proper ladders which shall be suitably secured.

Reflective wearing shall be worn by all workmen on or close to a highway and, where necessary, temporary road signs and cones shall be provided to ensure a safe working area.

- b) Protective Clothing - The Contractor shall ensure that all personnel on site are supplied with the necessary protective clothing such as safety helmets, goggles, face masks, ear muffs, gloves, boots, etc. which are required for the operations being performed.

- c) Scaffolding - Suitable and sufficient scaffolds shall be provided and properly maintained for all work that cannot safely be carried out from the ground or from part of the structure or from a ladder.

Every scaffold shall be of good construction, of suitable and sound material and of adequate strength for the purpose for which it is used. Unless designed as an independent structure, every scaffold shall be rigidly connected to a part of the structure which is of sufficient strength to afford safe support. Protective headgear shall always be worn.

- d) Lifting Device - Every rope, chain, pulley, bloc, hook, winch, crane or other lifting gear used for raising or lowering loads of as a means of suspending them shall be

of good construction, sound material, adequate strength and free from defects. They shall be properly maintained and tested at regular intervals by a competent person, who shall be to the approval of the Engineer.

- e) Working in existing manholes etc. , - Checks shall be carried out before entry to ensure that the atmosphere is fit for respiration and no smoking naked lights or flames are to be permitted in any sewer, manhole or chambers or adjacent to them when these are open

The equipment which shall be made available shall include but not limited to:

- a) Gas detector lamps with lead acetate papers.
- b) Lifting harness with ropes
- c) Handlamps with spare batteries
- d) First aid kit.
- e) Protective head gear.
- f) Rubber Gloves.
- g) Breathing apparatus.

- 1.8.2.3 Throughout the period of the Contract, the Contractor shall provide safety helmets and high reflectivity jackets to all Consultant's staff and visitors. Barriers must be provided to all excavations for the safety of the public and flagmen must be used for all items of plant for the safety of the operatives, supervision staff and members of the public.

### **1.8.3 Vehicular Movement**

- 1.8.3.1 Before commencing the works, the Contractor shall consult with and obtain from the Employer and the Engineer their requirements for temporary safety signs, road markings, lighting and other measures necessary to ensure the safety of the public, and shall comply with these requirements will not relieve the Contractor of his obligations under the Contract. The Contractor shall also take a No Objection Certificate from Consultants supervising other Contracts in the area, get details of newly installed and temporary services and obtain access requirements for other contractors.

- 1.8.3.2 The Contractor shall deploy, as a full time member of his site staff for the duration of the contract, whose duties shall include the production and implementation of safety management schemes. Qualification and experience of the safety management staff shall be subject to the approval of the Engineer.

- 1.8.3.3 Throughout the Contract, the Contractor shall maintain vehicular and personnel access to all parts within the site at all time.

Adequate warning and direction signs are to be erected wherever necessary and diversions are to be maintained in good condition to the satisfaction of the Engineer.

- 1.8.3.4 Temporary diversions shall be constructed and maintained to the standards approved by the Engineer. Upon completion of the Permanent works, the temporary diversions shall be removed and the site restored to the satisfaction of the Engineer.

- 1.8.3.5 All diversions and safety sign boards must be constructed and maintained to the highest standards with regular washing of cones and daily maintenance of flashing lights. The signs and cones should be self-stabilising, and if extra stability is required only small sandbags should be used.
- 1.8.3.6 All stockpiles of material to be used in the works must be fenced off and all unsuitable material must be removed from site on a daily basis and not stockpiled on site.
- 1.8.3.7 Payment for safety management shall be considered as included in the various pay items of B.O.Q. deductions to be made, from moneys due to the Contractor, for failure on the part of the Contractor to provide adequately for safety and for the accommodation of safety management plan.

## **1.9 SERVICES**

### **1.9.1 Contractor to establish location of Services**

Before the Contractor may proceed with the Works in any given area he is required to establish the precise location of all services in that area as executed by other contractors.

## **1.10 AS BUILT RECORDS**

- 1.10.1 On or before the completion of the works, at the direction of the Engineer, the Contractor shall prepare detailed drawings and other records, as required, of the works executed. The Contractor is required to submit the soft copy as well as two hard copies of the as built records to the scale advised by the Engineer.

## **1.11 PROGRAMME OF WORKS**

- 1.11.1 In respect of the programme of works required under Clause 17 of the General Conditions of Contract the following specific requirements shall apply: -
- The works shall be programmed in such a way as to minimise disruption to other works
  - Works shall not be carried out simultaneously over large areas of the site but shall be sequenced so that all operations likely to cause disruption to other works shall be undertaken and completed in discrete area before commencement of operations in other areas.
  - Works, which, by their nature, will create disruption and / or obstructions to other works, shall be programmed to be undertaken in a continuous sequence of events from the initial disruption until the restoration of access without and significant delay between operations.
- 1.11.2 The Contractor's Programme of Works, submitted in accordance with Clause 17 of the Conditions of Contract, shall be subject to the approval of the Engineer and of Employer,

the Contractor has not properly achieved the objectives of the programme, then they may require the Contractor to revise his Programme and the Contractor shall do so forth, for this reason the Contractor is advised to liaise closely with the Engineer during the production of his Programme.

- 1.11.3 The Contractor should note that when a phase or phases of the works is/are programmed to be completed before commencement of another phase, the Contractor may not commence work on the later phase until the former phase is completed, even if the former phase overruns its allocated construction time, without the specific permission of the Engineer's Representative.
- 1.11.4 In addition to the Works Programme required under Clause 17 of the Conditions of Contract, the Contractor shall produce individual programmes for each element of the works likely to cause significant disruption to other works, for the approval of the Engineer and prior to commencement of the element of the works, clearly showing the sequencing of construction operations in such a manner as to minimise the duration of the disruption.
- 1.11.5 The Contractor shall note that different work in various parts of site by other contractors may be in progress or may commence during the Contract Period. It will be the Contractor's responsibility to liaise with contractors on adjacent sites in order to ensure the detail progress. The Contractor's Programme will be phased and will make full allowance for the need for a co-operative timing with adjacent contractors.

## **1.12 CONTRACTOR'S OFFICES, YARD, STORES AND PLANT AREA**

- 1.12.1 The Contractor's main office shall be located in the general vicinity of the Engineer's office, on land to be provided, by the Contractor, for the duration of the project. The Contractor's main office shall be used for the purposes of administering the Project but may not be used for the storage of construction materials nor for storage or maintenance of plant and shall not be allowed to become unsightly.
- 1.12.2 The Contractor's other offices, yard, stores and plant area shall be provided, by the Contractor, at location(s) to the approval of the Employer. The Contractor shall be responsible for all associated expenses including rents, assessments or temporary occupation license fees, establishment, running and maintenance costs, the supply of all services, as well as the obtaining of any appropriate No Objection Certificates.
- 1.12.3 Within 7 days of the Commencement date of the Contract, the Contractor shall submit, for the approval of the Engineer, a drawing showing detailed plans for his offices, yard, stores and plant area, together with all sanitary arrangements, and for the supply of water and electricity. Until the Engineer has given his approval in writing, no construction of any of the Contractor's facilities shall commence. The area shall be fenced in accordance with the Engineer's approval.
- 1.12.4 The Contractor shall not be permitted to erect temporary building or structures elsewhere without the specific permission in writing of the Engineer, including approval of the dimensions and specifications of such buildings or structures and their location.

- 1.12.5 The Contractor shall take all steps necessary as directed by the Engineer to minimise or eliminate dust, noise or any other nuisance, which may occur. Plant emitting dust, smoke, excessive noise or other nuisance shall not be permitted to be sited at any location which shall cause nuisance to any building or other installation, whether complete or under construction, site offices, camps, or other similar buildings.
- 1.12.6 Under no circumstances shall overnight accommodation be permitted on site except for Site watchman in carrying out their duties.
- 1.12.7 Throughout the period of the Contract, the Contractor shall maintain the area of his operation within the limits of the site in a clean, tidy and safe condition by arranging materials and the like in an orderly manner. All rubbish, debris, waste materials and the like shall be systematically cleared from the site as it accumulates.
- 1.12.8 The Contractor shall satisfy himself as to the means of access to the site and other relative items affecting him, his sub-contractors and suppliers.
- 1.12.9 Upon completion of the Contract, or, in the case of facilities required by the Contractor during the Period of Maintenance, on completion of the period of maintenance the Contractor shall remove all buildings and other facilities from the site including all foundations and services, clean and level the site and restore the ground to its original condition.

## **2.1 SITE PREPARATION**

### **2.1.1 General**

The Contractor shall maintain close liaison with the Engineer and the Employer and shall obtain their approval prior to removal of any service installation. Where external Service Authority installations are to be removed, they shall be removed after the existing facilities have been relocated and commissioned or after they have been redundant and after any electrical supply has been made safe by the Authority or the Contractor whichever is appropriate.

“Site clearance” shall include the demolition/removal of all plants, bushes, underground structure, foundations, manholes, chambers, drains, septic tanks, cesspits, soak away, pipelines, undergrowth, trees (of any girth), tree stumps, buildings, services, rubbish and debris which are required to be cleared to construct the Works. Site clearance as directed by the Engineer shall include clearing and grubbing for the road corridor. The rate shall include for backfilling with suitable material all voids created by the removal of above mentioned items.

It is deemed that except for the items mentioned in this bill, costs of all other works in connection with site clearance are included in various pay items of other bills.

### **2.1.2 Removal of Trees**

#### **a) General**

1. This item consists of the removal of trees of any girth, their disposal as instructed by the Employer and Engineer and the backfilling of the hole left after uprooting the tree.
2. If any tree is conflicting with the road works then Contractor shall inform the Consultant.

Removal of trees shall be performed only after written approval from the Employer.

b) Measurement and Payment

Payment under this item shall be made per unit of trees removed.

The unit price shall constitute full compensation for the removal, hauling, disposing off of the tree of any girth as described herein and as directed by the Engineer and for all material, labour equipment, supplies and incidentals necessary to complete the Work.

No payment shall be made for the removal of bushes, stumps, roots etc., whose cost is considered as included in other pay items of the bill.

### **2.1.3 Removal of Fence**

a) General

The Contractor shall take down existing fencing and gates within the Contract Right-of-Way as shown on the Drawings or as directed by the Engineer and shall ensure the provision of suitable terminal posts, tensions, tie wires, lengths of fencing or whatever is necessary to ensure the integrity of the remaining lengths of fencing and stop the entry of animals should the remaining fenced area be under cultivation or a plantation.

Prior to removal, the fencing is to be inspected by the Engineer to assess its suitability for re-use.

Sections of fencing designated by the Engineer as suitable for re-use shall be dismantled, removed and stored in a manner approved by the Engineer to leave all parts of the fencing system suitable for re-use and late re-erection as directed by the Engineer.

b) Measurement and Payment

Payment under this Item shall be made per linear metre of fence removed.

The unit price shall constitute full compensation for the works described herein and as directed by the Engineer and for all material, labour, equipment, supplies and incidentals necessary to complete the Works.

#### **2.1.4 Removal of Concrete Structures**

a) General

The Contractor shall remove wholly or in part and satisfactorily dispose of all structures (manhole, slabs, walls, building or any other concrete structure) as indicated on the Drawings or directed by the Engineer, and which are not specifically described under a separate Clause of this Specifications.

All material removed and all structures demolished shall be removed from the Work Site, hauled away and disposed off in approved disposal area and as approved by the Engineer.

The voids or depression which are the result of the demolition of structures shall be backfilled with borrow material as approved by the Engineer. Backfilling material shall be placed in horizontal layers of over 15 cm in depth and compacted to not less than 98%.

b) Measurement and Payment

Payment for the removal and disposal of all structures and related obstructions as described above will be at the cubic metre rate included in the Bill of Quantities which shall include all labour and equipment to demolish, remove the obstructions as building materials, concrete, debris etc., loading, hauling irrespective of haulage distance, disposing off all materials removed, and backfilling with borrow material and depression of voids, as indicated on the Drawing, specified herein and as directed by the Engineer.

### **3.0 CONSTRUCTION OF STORM WATER DRAINS**

#### **3.1 General**

All rates inserted shall include for working in close proximity to the proposed service utilities, the provision of temporary supports to services, any special protective measures required by the Engineer, dewatering, excavation in any materials, backfilling, levelling and compaction of excavations. It also includes for supply and placing of bedding and surround materials (except concrete for pipelines which shall be measured separately or as otherwise stated in the Bill Item description), disposal of debris to tip and disposal of unsuitable material and/or surplus suitable material.

#### **3.2 Excavation for drains**

3.2.1 General Specifications in Section -2 - Earthworks are applicable for excavation for Drains also.

3.2.2 Stacking of excavated material

The excavated material shall be stacked near the drains, but away from the compound walls such that the stability of the walls are not endangered. The suitable material shall be used in leveling the area between the compound wall and the footpath.

While planning trench excavation for drains, the contractor should take precautions, against caving in of sides of trench, and dewatering of trench with appropriate measures.

The excavation shall conform to the lines grades and bottom slopes shown or specified in the drawings/ schedules. Any excess depth in cutting shall be made good with approved soil.

The sides of excavation shall be trimmed to receive the drains.

### **3.3 Dewatering**

If ground water is met with, it shall be removed by suitable means including pumping and bailing out and the excavation shall be kept dry at all times. Care shall be taken to discharge the drained water into suitable outlets, without causing damage to either the works or adjoining property. The contractor shall rectify any damage caused either due to improper dewatering or improper discharge of the drained water, at his own cost.

### **3.4 Backfilling**

All space between the drain walls and the side of excavation shall be backfilled to the original surface level making due allowance to settlement, in layers not exceeding 150mm thickness. The backfilling shall be compacted to 95 percent MDD.

### **3.5 Construction of Drains**

The drains shall be constructed with the specified material, which could be, rubble masonry, brick masonry or Concrete. The construction shall follow the relevant general specification depending on the material used.

### **3.6 Matters of special attention**

- 3.6.1 The bottom of the trench shall correspond to the invert of the drain plus the thickness of the bedding. The slope of the trench bottom shall be adjusted in the earth excavation.
- 3.6.2 Before laying concrete base slab, the surface of the bedding layer shall be sprinkled with water in order to reduce the loss of water from the concrete bed.
- 3.6.3 The concrete shall be vibrated and compacted.
- 3.6.4 There shall be an interval of at least 24 hours before the sidewalls of the drain are cast on the base slab
- 3.6.5 The sides of the excavation shall be moistened with water to reduce the loss of water from the concrete walls to be placed.
- 3.6.6 Expansion joints shall be provided at 20m interval in the concrete walls.
- 3.6.7 Expansion joints shall also be provided wherever there is a change in alignment.



**3.7 Concrete Cover slabs**

**3.7.1 Insitu cover slabs**

The insitu cover slabs shall be cast as per the general specification for concrete.

**3.7.2 Precast cover slabs**

The precast slabs shall be cast to the dimensions given in the drawings. There shall be flushdown hooks and drain holes in the slabs, irrespective of whether these are shown in the drawings or not.

**3.8 Drainage through Drain walls/ Kerbs**

In locations as shown on the drawings or instructed by the Engineer simple drainage openings through drain walls shall be made. These openings shall be made by placing 110mm diameter uPVC pipes in the drain walls at a maximum spacing of 4m. The road surface at the pipe openings shall be depressed by 20mm below level of the road surface at the opening. This depression shall be gradual in an area of 300mmx300mm in front of the pipe, enabling the storm water to pond in front of the pipe and flow into the drain. The proposal for the detail of opening shall be approved by the Engineer before installing the pipes.