

PARTICULAR SPECIFICATION

APPENDIX AQ

UTILITY SERVICES AND AGENCIES

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1. General

1.1 Utility Services and Agencies referred to herein include the providers for the following Utility Services:

- a) SP PowerGrid Ltd (PG) for electricity generation, power equipment installation, power distribution and maintenance, laying of incoming underground electricity cables, connection of these cables to LV distribution boards and meters in consumer's premises and provision and maintenance of street lighting and cabling up to the Over Ground (OG) Box for traffic lighting services;
- b) SP Services Pte Ltd (SPSL) for testing of internal electrical installations and systems before allowing turning on of power supplies and charges for use of electricity;
- c) SP PowerAssets Ltd (SPPA), power transmission licensee and owner of the power transmission and distribution assets;
- d) CityGas Pte Ltd for gas application, supply, distribution, maintenance, testing of internal gas installations before allowing turning on of gas supplies and charges for use of gas;
- e) PowerGas Ltd for the sole gas transporter and system operator in Singapore;
- f) Public Utilities Board (PUB) Water Supply (Network) Department for treatment, storage, supply, distribution, maintenance, testing of internal water/plumbing installations before allowing turning on of water supplies and charges for use of water and regulatory functions;
- g) Infocomm Development Authority (IDA) for provision of all necessary equipment and cables to connect all users requiring communication services by telecommunication;
- h) Public Utilities Board (PUB- Water Reclamation (Network) Department) for provision and maintenance of sewers, manholes, pumping mains, etc. for conveyance, treatment, and safe discharge of effluents of soil and waste water;
- i) Public Utilities Board (PUB-Catchment and Waterways Department) for provision and maintenance of all drains, storm water culverts, canals and rivers for the collection and conveyance of all surface rain water runoff connected to its collection and conveyance systems;

- j) Ministry of Defence's (MINDEF) own communication facilities and services. Locations of these facilities and services are confidential and any facilities and services located within the Site will be diverted by others prior to award of contract or if diversion is required during construction it will be identified in the Particular Specification; and
 - k) Facilities or services owned or operated by private companies such as StarHub , Singapore Cable Vision for cable video services, other cable, paging, SingTel, telecommunication by IDA and Multi-Media operators, etc.
- 1.2 For the purposes of this Specification, any company, authority or other organisation which owns and is responsible for the provision and maintenance of Utility Services stated herein, shall be deemed to be a Utility Agency.
- 1.3 For the purposes of this Clause of this Specification "diversion" means any change in extent and type, in any Utility Service and shall include but not limited to change in location, level, or in type, removal with subsequent replacement and brief interruption and all work in connection therewith. The scope for "Diversion" works shall include all upgrading works required by the Utility Agencies. Generally, all diversions will be undertaken by the respective Utility Agencies and charged to the Authority (unless specifically mentioned in the Particular Specification that the costs will be paid by the Contractor), except for sewers and drainage diversions where the PUB requires the Contractor to execute and complete these works to PUB requirements before they accept these for handing over.
- 1.4 The Contractor shall identify all Utility Services affected or anticipated to be encountered during the progress of his Works and provide a method statement for dealing with the presence of all Utility Services on the Site. He shall allow in his construction programme for all diversion activities including those to the Authority's cost. The duration of each diversion shall be ascertained from the respective Utility Agency and such agreements or confirmations shall be provided to the Authority for record. Where the diversion is to be carried out by the Contractor, a reasonable estimate of the duration to serve notice, execute and complete the diversion shall be subject to the Engineer's acceptance before including it in the construction programme.
- 1.5 The Contractor shall relocate the existing services which belong to the adjacent development to within these development's boundary after the completion of the roadworks. All the cost incurred shall be borne by the Contractor.

- 1.6 The Defects Liability Period shall commence upon the successful handing over of the diverted utilities or drain to the respective Utility Agencies or Authorities.

2. Care of Utility Services

- 2.1 For all Utility Services present on Site, the Contractor shall exercise the greatest care at all times to avoid damage to or interference with Utility Services and shall be responsible for any damage and interference caused by him or his sub-contractors directly or indirectly arising from anything done or omitted to be done. The Engineer may instruct that these Utility Services be protected at the Contractor's cost where these are likely to be damaged by site operations or as outlined in the Contractor's method statement.
- 2.2 Before excavations are carried out near Utility Services, the Contractor shall carry out full and adequate preliminary investigations with all the respective Utility Agencies and arrange for representatives of these Utility Agencies to be present on Site to locate Utility Services by means of suitable detectors and hand-dug trial holes and trenches. When the Contractor is working in the vicinity of PG's electricity cables, the Contractor shall engage the services of a Licensed Cable Detection Worker to carry out cable detection work. Prior to the commencement of cable detection work on Site, the Contractor shall verify that the cable detection instruments are calibrated to manufacturer's standard requirements and in good working condition until completion of the cable detection works. Earthworks using mechanical excavators can proceed only upon certification by the Licensed Cable Detection Worker that the area to be excavated is free from PG's electricity cables as well as from other Utility Services verified by the Contractor. Any Utility Services at risk will be exposed by hand-dug trial holes and trenches and adequately protected to the acceptance of the Engineer and the respective Utility Agency, immediately prior to commencement of excavation using mechanical excavators. The Contractor shall not on his own initiative remove or throw away any identification markers or cable slabs, or attempt to lift up or divert the cables.
- 2.3 Where diversions are necessitated by the Works, no adjacent work shall be commenced until the diversions have been made and confirmed by the respective Utility Agency unless otherwise accepted by the Engineer in writing.
- 2.4 If, in the Engineer's opinion, damage may be caused to Utility Services by the operation of mechanical excavators or other construction equipment the Contractor shall excavate or perform other activities by hand or other methods accepted by the Engineer.

- 2.5 Notwithstanding the foregoing, the Contractor shall excavate by hand to expose/verify the presence of all Utility Services under all existing ground surfaces where construction of diaphragm walls, piling and the like is planned. Utility Services exposed by such excavation shall be protected (or where applicable shall be diverted) to the acceptance of the Engineer and the respective Utility Agency.
- 2.6 The Contractor shall provide access and the free use of the Site facilities at all times to representatives of the Utility Agencies including those engaged by the Authority as may be necessary for any inspection, operation, repair, curtailment, making of additional connections to and maintenance of their installations and services within the Site which are affected by the Works.
- 2.7 The Contractor shall measure and monitor the level of subsidence or deviation of Utility Services in areas where subsidence and deviation is anticipated due to construction or ground treatment work. The Contractor shall submit Weekly Reports in an accepted format on subsidence and deviation of Utility Services to the Engineer.
- 2.8 The Contractor shall take preventive measures to minimise effects of any movement on Utility Services when working in the vicinity of those Utility Services present on Site. Such preventive measures shall be accepted by the Engineer.
- 2.9 The Contractor shall take all care to ensure that no construction materials and debris, heavy Construction Equipment etc. be allowed to rest on top of Utility Services, in particular, cable joints, valves, bends and tees on gas and water mains, connections, appurtenances and any ancillary structures. Chamber covers shall not be removed, shifted, or obstructed without written clearance from the respective Utility Agencies. As a protective measure, the respective Utility Agencies will require chambers to be raised and later reinstated to final level at the Contractor's cost. All utilities found under temporary access for heavy Construction Equipment and vehicles shall be adequately protected from damage.
- 2.10 The Contractor shall comply with the Engineer's / Utility Agency's instruction to divert any adjacent Utilities that are likely to be damaged by the Contractor's works at the Contractor's cost.

3. Protection from Chemicals

- 3.1 The Contractor shall, in areas where chemicals are used in connection with his Works for whatever purposes, take all measures, whether precautionary or otherwise, to prevent such chemicals from affecting any Utility Services.

4. Maintenance of Sewerage Systems and Drains

- 4.1 Sewerage systems and drains within the Site shall be maintained by the Contractor at all times to the acceptance of the Engineer and to the satisfaction of the respective Utility Agencies.
- 4.2 Drainage of highways and other areas affected by the Works shall be maintained by the Contractor at all times to the acceptance of the Engineer and to the satisfaction of the respective Utility Agencies.
- 4.3 Prior to reinstatement of highways and other areas, the Contractor shall reinstate temporarily diverted drains, sewers and house connections all to the acceptance of the Engineer and the respective Utility Agency.

5. Existing Utilities

- 5.1 The Utility Drawings give approximate locations of underground services only. The details shown on the drawings have been abstracted from the record drawings provided by the respective major Utility Agencies. The Authority does not guarantee the accuracy or completeness of any of these record drawings provided by others. The Contractor shall note that public lighting cables, overhead cables and minor services and utility services serving the adjacent properties are not shown. Prior to the commencement of any part of the Works under the Contract, it is the responsibility of the Contractor to ascertain from all the respective Utility Agencies, including arranging for their assistance and presence on Site, the exact positions of all existing sewer mains, gas mains, water mains, electrical cables, telecom cables and other Utility Services. Drain lines (house connections to sewers) are normally not indicated on the Utility Drawings. The Contractor must locate on Site and map all drain lines before commencement of work.
- 5.2 Prior to diversion/realignment/relocation/raising/lowering/removal of Utilities Services affected the Works, the Contractor shall provide adequate support and protection of the Utility Services to the acceptance of the Engineer and in compliance with the requirements of the respective Utility Agencies. He shall submit all details of the support/protection to the respective Utility Agencies for approval prior to the commencement of such work.

- 5.3 The Contractor shall co-operate fully and render every possible assistance to all the respective Utility Agencies carrying out the aforesaid works. The Contract Price shall be deemed to include for the entire co-ordination costs, for the inconveniences or disruptions caused to the Contractor's works due to works undertaken by these Utility Agencies (whether stated to be paid by the Authority or by the Contractor), for providing all the supporting and protective works approved by these Utility Agencies prior to the commencement of the Contractor's works and for any delay costs associated with these affected utilities (except for utility diversions paid by the Authority which are completed beyond the scheduled completion dates).

6. Utility Programme

- 6.1 The Contractor shall submit a Utility Programme for all utility diversions, supports, etc. required for his works which are to be undertaken at his own costs. In addition, the Utility Programme shall also include those utilities that will be diverted at the Authority's cost. The Contractor shall regularly, as accepted by the Engineer, update this Utility Programme and advise the Engineer well in advance whenever the diversions are likely to be delayed. The Contractor shall be solely responsible for the entire co-ordination and completion of all utility works to be executed and completed on Site according to the Utility Programme submitted and accepted by the Engineer.
- 6.2 During the progress of the Works, the Contractor shall submit to the Engineer for his acceptance, details of any proposed amendments to the agreed Utility Drawings or Utility Programme before proceeding with such Utility works.

7. Diversion and Laying of Utility Services

- 7.1 Except for sewers and drainage diversion works to be carried out by the Contractor, all other utility diversions shall be performed by the respective Utility Agencies, unless specified otherwise.
- 7.2 The Contractor shall further investigate and establish by trial holes the exact locations of all existing underground Utility Services which need to be re-located early, in any case not exceeding two (2) months after the award of the Contract, Engineer that relocation work, if any, can be proceeded with. No claim due to delays in detecting, identifying and notifying the respective Utility Agencies on the relocation of these Utility Services will be allowed if such delay is due to the Contractor's inability to notify the Engineer or the Utility Agencies of the location of services in good time or within two (2) months after the award of the Contract.

- 7.3 In the event that there are existing utilities affected by either the Permanent or Temporary Works, the Contractor shall provide details for the permanent utility diversions to the Authority before asking the relevant utility department to divert the utilities. The Contractor shall prove to the Authority that prior consultations and approval of the utility departments have already been sought. The following details, stamped approved by the relevant Utility Agencies, shall be provided by the Contractor:
- a) Topographic plans showing proposed diversion route including dimension, survey co-ordinates and reduced levels. Manholes, valves and joint bays positions are also to be indicated with survey co-ordinates and reduced levels. Proposed utility markers showing the utility alignment, to be approved by the Authority, should also be indicated;
 - b) Reference plans showing the position of the proposed diverted utilities relative to positions of existing/proposed road related facilities such as bus shelters, bus bays, kerbs, drains, rigid pavements, etc.;
 - c) Engineering drawings with cross sections, blow up sections, etc., to clearly show the alignment and complete details of the proposed utility to be diverted;
 - d) Engineering drawings with design calculations showing protection details (against damage from future roadwork) of the proposed utilities to be diverted including permanent markings for the utilities;
 - e) Engineering drawings with design calculations showing protection details for road structures where the proposed utilities under-cross/over-cross with a view for future repair/replacement of damaged utilities; and
 - f) As - built drawings prepared by a Registered Surveyor of items a) to e) above.
- 7.4 For service diversions undertaken by the Utility Agencies, it is the Contractor's responsibility to ensure that proper markings, adequate protection and supports are provided including showing them on all as-built drawings submitted for the Engineer's acceptance.

- 7.5 The Contractor shall provide survey drawings showing the positions and levels of all existing services to the satisfaction and acceptance of the Engineer. It is the Contractor's sole responsibility to liaise with the respective Utility Agencies for the relocation of all the Utility Services encountered and ensuring that these Utility Services are relocated in good time. The Contractor shall therefore allow for necessary changes in the sequence of his works to accommodate the Utility Agencies' timing and requirements. The Contractor is required to incorporate into his Construction Programme the lead time or duration required by each of the respective Utility Agencies for diversion works.
- 7.6 The Contractor shall work closely with the Engineer and the respective Utility Agencies regarding the diversion work programme and the manner for trenching and subsequent reinstatement. No trench to expose Utility Services shall be covered up without the prior permission of the Engineer and the respective Utility Agencies.
- 7.7 As part of the Contractor's attendance obligations, the Contractor shall be required to assist in providing clear access for the route required by the Utility Agencies for the diversion of existing or laying of the new utility pipes, cables, mains during the construction period.
- 7.8 The Contractor shall provide watching and lighting facilities to the Utility Agencies and maintain the work free from water for any work performed by Utility Agencies during the Contract period. Any debris, rubbish and excavated material left behind by the Utility Agencies shall be attended to and removed off Site by the Contractor as and when instructed by the Engineer.
- 7.9 During the progress of the Works, the Contractor shall record and agree with the Engineer the location and type of all duct crossings under carriageways and footpaths. If removed, the Contractor shall provide equivalent duct crossings at or as near as possible to the original locations as part of the reinstatement of highways. As-built drawings of these duct crossings shall be submitted to the Engineer.
- 7.10 The Contractor shall comply with the Engineer's instructions for all attendance requests from the Utility Agencies. All such attendance requests shall be deemed included in the Contract Price.
- 7.11 When necessary the Contractor will be given possession of such additional areas, which shall be deemed to be part of the Site, to enable him to fulfil his obligations regarding the Utility Services diversions. The possession of such additional areas shall be subject to the terms laid down by the Engineer and shall be granted solely to enable the Contractor to meet such obligations.

- 7.12 The Contractor shall make due allowance for all costs, expenses, possible delays and/or inconvenience including engagement of registered Professional Engineer to prepare plans and submit drawings to PUB and/or other utility authorities or companies for approval (arising out of the aforesaid works which will not be executed by the respective Utility Agencies but shall be executed by the Contractor subject to the Utility Agencies' approval) in his Contract Price. The Utility Services diversions are not limited to those indicated on diversion drawings or in the Particular Specification and shall include those encountered during the detection for these Utility Services or uncovered during the progress of the Works. The Contractor may propose alternative method of diversion of those Utility Services that will be diverted by him, but subject to the acceptance of the Engineer and the respective Utility Agency.
- 7.13 The Contractor shall note that no utility services shall be laid within the proposed tree planting verge and shall work closely with the relevant Utility Agencies and their contractors for the services diversion works for compliance of the above.

8. Support of Utility Services

- 8.1 The Contractor shall protect, and support where necessary, all Utility Services liable to remain exposed during construction of the Works in a manner accepted by the Engineer and the respective Utility Agencies.
- 8.2 The Contractor shall submit for acceptance by the respective Utility Agencies and the Engineer the details of his proposed method of protection or support for such Utility Services during the construction of the Works.
- 8.3 The design of such supports shall take into account all forces of whatever nature including traffic vibrations (where applicable) acting on or produced by such Utility Services. In particular, valves, bends and tees on gas and water services shall be adequately restrained laterally and longitudinally in addition to being vertically supported.
- 8.4 The Contractor shall likewise submit for acceptance by the Engineer details of the method of supporting Utility Services during the backfilling and compaction of the ground under, over and around the Utility Services concerned. The method of support shall be such as to ensure that subsequent to the completion of the backfilling and compaction works, the Utility Services shall not suffer distortion or damage.

- 8.5 Although some services are stated to be supported or protected elsewhere, the Engineer or the Utility Agency may later require it to be diverted for reasons of safety, conditions of existing services, age, or adequacy of supports or the like. The cost of such diversions shall be borne by the Authority.

9. Abandoned Utility Services

- 9.1 All materials in abandoned Utility Services shall belong to the Authority. The Contractor shall safeguard all abandoned Utility Services irrespective of whether the diversion was paid for by the Authority or the Contractor. The abandoned Utility shall be delivered to a specified location or disposed of as directed by the Engineer in consultation with the respective Utility Agencies at the Contractor's cost. Removal of abandoned cables, water and gas mains can only be carried out after approval has been obtained from the respective Utility Agencies.

10. Standards

- 10.1 The Contractor shall construct or reinstate Utility Service ducts, manholes, draw-in pits, thrust blocks and the like to the acceptance of the Engineer and in accordance with the respective Utility Agency's latest standards or as modified herein.

11. Reporting and Repairing Damage

- 11.1 The Contractor shall immediately notify the Engineer and the respective Utility Agency in the event of any damage to Utility Services. For instance, when a watermain bursts and begins to flood his excavation, he must carry out immediately make shift repairs.
- 11.2 The Contractor shall within three (3) days after the occurrence of damage on utility, furnish in writing a full report of the damage to the Engineer and to the respective Utility Agency.
- 11.3 The Contractor shall propose method and means of repair of damaged Utility Services in consultation with the respective Utility Agency. The cost of repairs to any damaged Utility Services or installations shall be borne by the Contractor. The Contractor shall indemnify the Authority against all losses and claims arising from damage to Utility Services.

12. Special Requirements of PUB Water Supply (Network) Department

- 12.1 No structure, either permanent or temporary may be erected over or within one metre of PUB's watermain. A buried watermain requires a minimum cover of one metre, and adequate protection for the main must be provided should the cover be removed or reduced.
- 12.2 All necessary precautions must be taken to safeguard and to avoid damage to watermains. The cost of repairs to any watermain damaged as a result of work carried out, including the cost of the estimated quantities of water lost from the damaged mains, is to be borne by the Contractor. The PUB must also be indemnified against all losses and claims arising from damage to watermains. The Water Service & Operations Centre (WSOC) at Telephone No. 62824344 (24 hours) must be informed immediately in the event of damage to a watermain.
- 12.3 Diversion of watermains of 500 mm diameter and above, being PUB's vital watermains, should be avoided unless absolutely necessary. Plans on the approximate location of watermains can be obtained from PUB. The exact alignment and levels of all watermains within the proposed development must be determined by means of trial holes during the design stage and the pipe route should be pegged out. PUB must be consulted if any watermains are affected by the proposed works Engineer that the need for diversion can be ascertained.
- 12.4 Provision shall be made for the inspection, repair and maintenance of PUB's existing watermains and appurtenances within the proposed development and all watermains and appurtenances must be accessible at all times.
- 12.5 PUB's watermain valve chambers and appurtenances shall not be covered over with construction debris especially at worksites. The Contractor shall contact PUB, Water Supply (Network) Department or call PUB-One at 1800-2846600 to make arrangement for raising of valve chambers at worksites. The raised chamber shall be probably marked and be accessible at all times.
- 12.6 Services should not be laid directly over PUB's existing watermains. For undercrossing, a minimum clearance of 1 metre must be maintained. No service manhole is allowed to be erected on top of a watermain. A horizontal clearance of 1 metre between PUB's watermain and any pier/structure is required. PUB's watermains should also not be subjected to any vibrations caused by work carried out in the vicinity of PUB's watermains and appurtenances.

- 12.7 Provision shall be made for PUB to lay new watermain along roads/service verges to serve new developments. If culverts are to be constructed, the Contractor shall incorporate service ducts in the culvert design to enable the laying of watermain and connecting pipes to serve new developments.
- 12.8 If deemed necessary by PUB, the connecting pipe should be housed in a service duct with removable cover. The service duct will have to be provided by the Contractor. The design of the service duct shall be submitted to PUB for approval.
- 12.9 The Contractor shall ensure that all PUB manholes within the development site are accessible at all times. When excavating in the vicinity of these manholes, the Contractor shall take all necessary precautions regarding the safety and stability of the manhole structure and foundation.

13. Special Requirements of PowerGas

- 13.1 The Contractor shall check the worksite above and in the vicinity of all known gas lines prior to the commencement of work daily or at the beginning of every shift for any presence of gas leak. The checks shall be carried out with a combustible gas detector.
- 13.2 Upon detection of a gas leak, the Contractor shall stop all work, shutdown all machines and evacuate all personnel and workers from the worksite. No hot work shall be allowed and all sources of ignition at and in the vicinity of the worksite shall be extinguished. The Contractor shall cordon off the worksite, place 'NO SMOKING' signs at strategic locations and prevent anyone from smoking in the vicinity of the worksite. At the same time, PGAS Service Operation Centre at Tel No. 1800-7521800 must be informed immediately.
- 13.3 Hot work refers to any work involving the use of a local source of ignition and includes welding, gas-cutting, grinding, chipping and any process capable of generating heat, sparks or both, which may be capable of igniting flammable vapour or any other combustible material.
- 13.4 Work shall only resume after the Contractor has been informed by PGAS Officer that the gas leak had been sealed and the worksite has been checked and verified free from gas by the Contractor.
- 13.5 Where piling works are involved near gas mains, the exact location of the mains must be determined through trial trenches. If the gas mains are less than 5m from the nearest pile, PGAS must be contacted for further advice prior to the commencement of the piling work.

- 13.6 No building structure is allowed to be built on top of the existing gas mains and services. Upon taking possession of the Site, the Contractor shall arrange a joint site inspection with PGAS soonest possible to identify all gas manholes within or nearby the site. The Contractor is to ensure that these manholes are accessible to PGAS at all times.
- 13.7 Where the depth of any excavation exceeds the distance from the gas main to the side of the excavation and the length of the excavation parallel to the gas main exceeds 10 metres, the gas main may be required to be diverted at the Contractor's cost. Consultation with PGAS on diversion or other requirements must be made prior to the commencement of work.
- 13.8 Should diversions or alterations of existing gas mains and services be necessary, the total estimated cost will have to be paid before commencement of the diversion work.
- 13.9 All emergency reports of gas leak and situations affecting the stability of gas mains are to be made to the PGAS Service Operation Centre at Tel No. 1800-7521800 which is manned round the clock.

14. Special Requirements of PowerGrid for Underground Electricity Cables

- 14.1 The Contractor shall engage the services of Licensed Cable Detection Workers to carry out cable detection work prior to commencement of earthworks in compliance with Part VI A of the Public Utilities Act and Public Utilities (Cable Detection Workers) Regulations, 1989 and take all necessary precautionary measures to prevent damage to underground electricity cables.
- 14.2 Failure to engage a Licensed Cable Detection Worker prior to the commencement of earthworks is an offence under the Public Utilities (Cable Detection Workers) Regulations, 1989, and carries a maximum penalty of \$5,000. Further, if any PG cable is damaged, the person convicted is liable to fine and/or imprisonment.
- 14.3 The Licensed Cable Detection Worker shall:
- i) use cable detecting device/instruments that are tested and confirmed to be in good working condition. Irrespective of whether cables are indicated in the cable route drawings obtainable from PG for reference, he shall determine the presence of underground electricity cables at the proposed earthwork sites and mark out and provide the as-built details of the cable routes Engineer determined;

- ii) ensure that a sufficient number of trial holes are carefully dug to establish the depth of the underground cables before carrying out full-scale excavation work;
- iii) thoroughly brief the site supervisors, foremen, earthworks machine operators and workers on the locations, positions, and levels of the cables/cable joints/equipment and the taking of all necessary precautionary measures prior to commencement of earthworks;
- iv) notify PG on the commencement and completion of cable detection work and commencement date of the earthworks including providing details when requested by PG;
- v) promptly report any damage to cable/equipment to PG and submit an investigation report within 48 hours, giving locations of the damage and the circumstances leading to the damage; and
- vi) keep proper record of cable detection work carried out.

14.4 All PG's Utility Services at Site shall be treated as in service or live unless otherwise confirmed by PG Officers. In the event where verification of cables in service or live is required, the contractor shall liaise and coordinate the necessary works, including the time and cost to complete these works, to the satisfaction of PG.

14.5 All power equipment/plant, underground cables and connections up to and including the meter carried out by PG to hook on to the LV switchboard or to the power rooms shall be paid directly by the Authority. The Contractor shall provide attendance including providing lead-in cable ducts, openings in slabs, walls, ceilings, etc to PG's requirements. All attendances and profits and overheads in connection with this aspect of PG's works and requirements shall be deemed included in the Contract Price.

14.6 The following documents are required to obtain PG's in-principle no objection for the temporary suspension of power cables:

- i) Trial Trench Report
- ii) Indication of affected cable(s) on purchased cable plans
- iii) Method Statement for proposed suspension (Cable Joint suspension is strictly prohibited, and shall be 6m away from point of cable suspension)

- iv) PE endorsed utilities support drawings for proposed suspension
- 14.7 The following documents are required for PG's vetting prior to any Official Quotation request through their eBusiness portal:
- i) Cable Diversion Plan that is separated into the various voltage level (e.g. LV, 6.6kV and 22kV)
 - ii) Overall Diversion Plan presenting all utilities
 - iii) Utilities Cross Sectional Drawing
 - iv) Longitudinal Drawing presenting power cables undercrossing any other utilities, for e.g. PUB Drain, if any
 - v) Trial Trench report for the proposed cable diversion corridor
 - vi) Official documentation from stakeholders, for e.g. encroachment of cable diversion corridor into State Land
- 14.8 For items 14.7 (i) to (v), the drawings are to have PE endorsement as well as Project Title, Legend, Drawing No. and Date. Submission through the eBusiness Portal may proceed once the documents have been verified and vetted by PG.
- 15. Public Street Lighting Work for At-Grade Roads and Viaduct**
- 15.1 General
- 15.1.1 All proposed roads shall be installed with street lighting. All streetlights must be commissioned before the roads are opened to the public.
 - 15.1.2 Removal and installation of street lighting shall be carried out by the Employer's Public Street Lighting term contractor.
 - 15.1.3 The Contractor shall submit schedule of the street lighting installation works and two sets of layout plans of the proposed roads to LTA (RIM) for the street lighting design and proposed underground pipe routing.
 - 15.1.4 The Contractor shall arrange a joint site meeting with the LTA (RIM)/ Employer's Public Street Lighting term contractor to confirm the final position of the underground pipes, street lighting lamp posts and public street lighting OG boxes within the road reserve.

- 15.1.5 The Contractor shall ensure that the final position of the underground pipes, street lighting lampposts and public street lighting OG boxes must be located within LTA road reserve line.
- 15.1.6 The Contractor shall co-ordinate and notify LTA (RIM) and the Employer's Public Street Lighting term contractor on all matters relating to the installation of public street lighting works, except OG boxes, at least 2 month prior to the commencement of any road widening or traffic diversion works.
- 15.1.7 Where works are to be undertaken by the Contractor such as heavy duty PVC pipes to be laid, these are subject to the LTA's approval.
- 15.1.8 The Contractor shall liaise and co-ordinate with the respective agencies/authorities on the removal/re-installation of equipments such as J-eye, communication antenna, camera etc mounted on existing street lamp posts to the new proposed street lamp posts.
- 15.2 Technical Requirements
 - 15.2.1 The Contractor shall provide and make available all the necessary foundations, mounting facilities, cable duct crossings, UPVC conduit pipes, holding down bolts, cable warning slabs, GI conduits, connection points and opening for the installation of public street lighting by the Employer's Public Street Lighting term contractor.
 - 15.2.2 The Contractor shall provide and lay 1 no. 100mm diameter heavy duty UPVC pipes complying to latest edition of SS141, Class B type with pulling ropes / cables / pull wire and cable warning slab at a depth of at least 1000mm from the finished ground level on roads and on turf along the new road kerb for public street lighting as shown on the Drawings. When necessary, the UPVC pipe shall be laid to the nearest existing street lighting lamppost that is not affected by the works.
 - 15.2.3 The Contractor shall provide and lay 2 nos. 100mm diameter heavy duty UPVC pipes complying to latest edition of SS141, Class B type with pulling ropes / cables / pull wire encased with cement dust all round and cable warning slab at a depth of at least 1000mm from the finished ground level at road crossings (including road junctions) for public street lighting as shown on the Drawings. The spare UPVC pipe shall be covered with end caps at both ends.

- 15.2.4 The Contractor shall note that no foundation is required to be provided for public street lighting at the at-grade roads. However, the Contractor shall provide all the necessary foundations and UPVC pipes for the installation of public street lighting in his design of the flyover / viaduct structures and drainage system. Each foundation shall include 4 nos. of 25mm diameter J-bolt complete with washers and nuts of stainless steel grade SS 316. The heavy duty UPVC pipes in the parapet shall be of 100mm in diameter complying to latest edition of SS141, Class B type with pulling ropes / cables / pull wire.
- 15.2.5 For sections of roads which have wide spans of flyover / viaduct traversing across it and where the height is constrained by the structures, the affected road section shall be lighted by soffit under the flyover / viaduct. The Contractor shall provide appropriate size of GI conduits running truly vertical, horizontal or parallel with the features of the flyover / viaduct. Conduit shall run continuous exposed or buried between outlets with minimum number of bends. All GI conduits shall be manufactured in accordance to the latest edition of BS 4568, Part 1 and Class 4. The conduits shall be earthed in accordance to the latest edition of CP5.
- 15.2.6 For footpath constructed under the flyover / viaduct, the Contractor shall provide UPVC pipes for the installation of footpath lighting. And where the height is constrained by the structures of flyover / viaduct, the Contractor shall provide appropriate size of GI conduits exposed or buried along the structures.
- 15.2.7 The Contractor shall engage a registered Structural Professional Engineer to design and endorse on the calculations, imposed loads and forces and dimensional drawings for all the foundations and mounting facilities required for the installation of public street lighting lampposts.
- 15.2.8 After the installation of public street lighting lamppost on each foundation of the viaduct structures, the Contractor shall provide pressurised, flowable high strength non shrink cementitious grout to fill up the gaps between the foundation and the base plate of the lamppost to the satisfaction of LTA (RIM).
- 15.2.9 For temporary traffic diversion works using steel plates on the road, the Contractor shall provide the necessary mounting facilities, inclusive of 25mm diameter J-bolts complete with washers and nuts of stainless steel grade SS 316, for installation of street lighting lampposts.

15.3 OG Boxes

- 15.3.1 For works that involve public street lighting OG boxes, the Civil Contractor shall co-ordinate and notifies LTA (RIM) and the Employer's Public Street Lighting term contractor at least 3 months before commencement of work. The Contractor shall note that under SP Services "Offer of transmission of Low Tension Connection", the Transmission Licensee shall not be obliged to meet the Target Date for Connection unless payment is made at least 7 weeks in advance where an OG box is required.

16. Special Requirements of Infocomm Development Authority

- 16.1 The Contractor shall give not less than eight (8) calendar weeks notice to IDA of any IDA facilities going to be or likely to be affected by the Works Engineer that IDA may take such appropriate action as IDA deems fit including arranging for the same to be resited. The period for the resiting of IDA facilities shall be determined by IDA.
- 16.2 The Contractor shall ensure that all empty ducts which are blocked or damaged by reason of, consequent to or during the course of the Works are cleared or replaced, as the case may be, at his own expense. The Contractor shall not during the course of the Works remove or replace any of the IDA pipes, empty or containing cable(s), unless such removal is authorised by IDA. Where such removal is authorised by IDA, the Contractor shall carry out the removal at his own expense in such manner and with such tools as may be specified by IDA in the presence of the IDA's representative(s).
- 16.3 In addition to the notification required above, the Contractor shall strictly adhere to the following procedure in the event of damage to any IDA facilities:
- a) The Contractor shall immediately inform IDA and the Engineer, and arrange for a Site meeting on the same day on which the damage occurs with all the parties concerned. Such parties as are present on the appointed time shall, notwithstanding the absence of other interested parties, proceed with the Site meeting including inspection of the damage. The Contractor shall confirm in writing to IDA at the Site meeting that such damage has occurred.
 - b) The Contractor shall within seven (7) days after the occurrence of the damage furnish in writing a full report of the damage to IDA and the Engineer.

17. Special Requirements of the PUB-Water Reclamation (Network) Department

- 17.1 The following requirements are to serve as general guidelines and may vary in some cases depending on the conditions of the sewerage systems. All sewers/drainlines to be abandoned and demolished shall be sealed off by the Contractor under the supervision of the PUB. The Contractor shall submit a detailed plan showing all the sewers/drainlines to be abandoned and sealed to PUB for approval. The Contractor shall inform the PUB at least two (2) weeks in advance before any works to abandon/seal the sewer/drainline and their connections could be carried out. It is the responsibility of the Contractor to carry out a thorough investigation of all the drainlines connected to the existing sewer and manhole which are to be abandoned. The Contractor shall ensure that no sewers/drainlines and manholes shall be abandoned and sealed without the approval of the PUB.
- 17.2 The Contractor shall take due care and precautionary measures to ensure that no damage or settlement occurs to any existing sewer or pumping main. The Contractor shall carry out pre and post CCTV survey of all the sewer lines in and within the vicinity of the works, up to 25m beyond the contract boundary. A set of the CCTV survey reports and tapes shall be submitted to the PUB for record. Where any existing sewerage facility is adversely affected by the Contractor's work, the Contractor will be required to carry out all necessary remedial work to the satisfaction of the PUB at the Contractor's own cost.
- 17.3 Additional/standby sewers shall be provided if existing ones have less than one metre vertical clearance from permanent structures/expressways/MRT or road tunnels.
- 17.4 No pumping is allowed if sewer is affected and instead long diversion sewers shall be laid to continue gravity flow to far away deeper sewers.
- 17.5 Special care shall be taken where existing treated timber or bakau piles support sewer/pumping mains pipelines and manholes. Where these piles are cut off to facilitate the works, the Contractor shall ensure that the stability and integrity of the supported structures are not adversely affected.
- 17.6 Left-in sheetpile or permanent retaining structure shall be provided where new structures (e.g. road or MRT tunnels) are constructed too close to existing sewers, rendering future excavation to repair sewer difficult.

- 17.7 Where pipelines are supported over an excavation, the Contractor shall ensure that the support system is adequately designed to prevent any damage or subsidence of the pipelines. The Contractor shall submit detailed drawings, including calculations, of the proposed support system to the Water Reclamation (Network) Department for consideration. Both the drawings and calculations shall be endorsed by a Professional Engineer (PE) In backfilling the excavation, the following procedure shall be observed :-
- a) Approved fill material, free from clay lumps or stones, shall be compacted around the pipe in layers not exceeding 150 mm thickness to form a compacted fill of at least 300 mm thick above the pipe.
 - b) Where the vertical clearance between the underside of the pipe (and its concrete bedding, if any) and the completed tunnel structure is less than 2 metres, approved sand shall be the fill material beneath the pipe. Where this vertical clearance is greater than 2 metres, the first 2 metres below the pipe shall be filled with approved sand and the approved fill material below this sand layer shall be properly rammed and consolidated in layers not exceeding 150mm thick.
- 17.8 If the proposed tunnels/depressed roads/expressways are constructed below existing sewers, PE-endorsed method statements shall be given to enable future excavation to be carried out for the repair of the sewers. The method statement shall be comprehensive and include calculations, plant and machinery (with model/make) required, time taken to execute etc. The method statement should be endorsed by and lodged with relevant agencies (e.g. LTA's Development and Building Control Department) so that PUB could execute repair swiftly when needed. If LTA finds the repair of the existing sewer by open-cut not feasible, then an additional pipe (i.e. dual pipes) would have to be provided over the LTA's structure.
- 17.9 Additional manholes shall be provided at both the upstream and downstream ends of the section of proposed/ existing sewers to facilitate over-pumping of used water during sewer maintenance.
- 17.10 In the event that damage to existing sewers and pumping mains occurs, the Contractor shall carry out immediate repairs to the damaged pipes. The Contractor shall work continuously (24 hours a day) until the damage is made good to the satisfaction of the PUB. Any expenditure incurred for the repairs shall be borne by the Contractor.

- 17.11 If pumping of sewage is necessary to effect repairs or to relieve any surcharge of the sewers, this shall be carried out by the Contractor at his own expense and in accordance with the PUB's requirements. The Contractor shall ensure that adequate facilities (including standby equipment) are provided for the pumping of sewage.
- 17.12 Any damage to existing sewers or pumping mains or any part of the sewerage system must be reported immediately to the PUB.

Unless otherwise specified, the minimum clearance shall be as follows:-

- i) (a) No structures shall be built over any sewers/pumping mains.
- (b) All structures shall be built at the following minimum lateral distances away from sewers:

Sewer Size (mm diameter)	Sewer Depth (m)	Minimum Distance (m)
150 to 600	≤ 3	1.0
	> 3 and ≤ 5	1.5
	> 5	2.0
>600 to 1500		2.5
>1500 to 2500		3.0
>2500		4.0

- (c) The minimum distances shall be measured from the outer most edge of the building structure, including footings and overhangs, to the centreline of the sewer/pumping main.
- ii) Minimum headroom of 8m (between underside of viaduct and existing ground level) where the viaduct overcrosses any sewerage facility.

Where the above minimum requirements are not met, the Contractor shall promptly inform the Engineer and the PUB. The PUB will decide if a diversion of the affected facility is required. Any such diversion shall be carried out by and at the Contractor's own cost when instructed by the Engineer upon confirmation by PUB.

- 17.13 The whole of the sewerage works are to be executed in accordance with the current "Specification for Sewerage Work" of the PUB. The standard specification together with PUB (WRN)'s Contract Specification on Material General, Works General and Safety Requirements will constitute the Specification. Copies of these publications can be purchased from the PUB.
- 17.14 Notwithstanding any provisions stated elsewhere, the Contractor shall comply with the following time limits for commencement of reinstatement of carriageways:-
- i) for trenches along road - within 3 days after backfilling.
 - ii) for trenches across roads - within 24 hours after backfilling.
 - iii) for trial pits - as specified by the Engineer depending on the location of the trial pit.
- 18. Procedure for Obtaining Approvals and Clearance from PUB-Water Reclamation (Network) (WRN) Department**
- 18.1 The PE shall submit Form A (Notice for commencement of works) attaching also Form GC (General Conditions and Undertaking Form) on behalf of the Authority to notify PUB of the commencement of sewerage works.
- 18.2 The PE shall supervise and carry out his own checks on the foundation works, levels and alignment of the sewer, type of pipes used, water-testing of all sections of sewer including sewer connection line from inspection chambers prior to concrete haunching and backfilling during construction. The PE shall keep and maintain proper records of such checks carried out by him for verification by PUB as and when required.
- The PE shall submit application Form B (Permission to work in the Public Sewerage System) to PUB prior to carrying out final connection to existing manholes and existing sewer. Upon approval of the application a representative from PUB-Water Reclamation (Network) is required to be present on Site to witness the execution of sewer connection to existing manholes and sewer (including replacement of pipe junction fitting and breaking of manhole). The PE shall make the necessary arrangement with PUB.
- 18.3 On completion of the sewerage work the PE shall carry out his own inspections and arrange for the necessary rectification works until works are in order.

- 18.4 The PE shall submit to PUB a Certificate of Supervision and Inspection of the sewerage works attaching the Contractor's Form for Confirmation of Completion of Sewerage Works (required to be submitted to the PE by the Contractor), the PSB Certificates of Compliance for pipes and fittings used on this project and the Registered Surveyor's "As Constructed" drawings.
- 18.5 The PE shall arrange with PUB for the final inspection of the completed works. Any outstanding work or defects found by PUB during the inspection will be conveyed to the PE/Authority who will arrange to carry out the necessary rectification work to the satisfaction of PUB.
- 18.6 Having complied with all the above, PUB will give written permission to allow the diverted sewer to put into use.

19. Handing Over of the Diverted Sewer to PUB-(WRN) Department

- 19.1 The dates of handing over of the diverted sewers should be after the whole of the Works under the Contract is substantially completed. However as the diverted sewers would be subjected to disturbances during the construction of the whole of the Works, PUB would require to re-inspect the diverted sewers when the whole of the Works is completed before taking over the sewers. The PE shall make the necessary arrangement with PUB for the re-inspection. PUB requires a minimum of twelve (12) months Defects Liability Period (DLP) from the date of hand-over of the sewer.

20. Special Requirements of PUB for Drainage Works

- 20.1 All works affecting storm water drainage systems shall be approved by the PUB.
- 20.2 All such works shall be carried out in compliance with The Sewerage and Drainage Act 1999, Sewerage and Drainage (Surface Water Drainage) Regulations 1999 and the current Code of Practice on Surface Water Drainage.
- 20.3 The Contractor shall locate and identify all drains within and in the vicinity of his work site. The execution of his work shall not change, disrupt, fill, block, divert or disturb the existing overland flow or the existing system of drains unless an alternative approved drainage system has been provided and permission for use has been given by the PUB. The runoff within, upstream of and adjacent to the work site shall be effectively drained away without causing flooding within the work site or in areas outside the work site at all times.

- 20.4 The Contractor shall submit proposals for alternative drainage systems, where temporary or permanent diversions of existing drains are necessary for his work, through the Land Transport Authority (LTA) to the PUB for approval early, well before the proposed commencement of the diversion work. The alternative system shall be based on gravity flow and shall have at least the hydraulic capacity of the existing system. All proposed drain diversions shall be technically and physically feasible and acceptable to the PUB.
- 20.5 Unless otherwise approved by the PUB, the Contractor is required to design and construct drains, culverts and foundations to their ultimate required sizes and to remove/seal off existing drains and culverts as part of his work all in accordance with PUB's requirements. This work is over and above that for diversion of drains to enable his work or reinstatement. Drainage works shall be carried out to the PUB's current "Standard Specification for Drainage Works", including any revisions and amendments thereto, except where otherwise specified. The design of the works, construction method and integration of the works into the construction sequence shall be submitted to LTA/PUB early for approval. As-constructed drawings and records shall be submitted by the Contractor for the permanent drainage works constructed.
- 20.6 The Contractor shall not enter or use any Drainage Reserve for carrying out any work or for transporting, moving or parking any plant, machinery, equipment or material across any drain or along the banks of any drain, without the prior written approval of the PUB. Copies of the drawings showing the locations of Drainage Reserves can be obtained from the PUB.
- 20.7 No structure, fence, retaining wall, foundation, services or any temporary or permanent obstruction or structure shall be erected, constructed or laid within a drain/Drainage Reserve without the prior written permission of the PUB.
- 20.8 Where structures are permitted to be constructed across drains/ Drainage Reserves, the conditions listed in Clause 5.4 of the current edition of the Code of Practice shall be complied with.
- 20.9 All service pipes, cables and conduits including sewer pipes shall undercross any drain encountered in the works with not less than the minimum clearance stipulated in Clause 5.5 of the Code of Practice on Surface Water Drainage.
- 20.10 Where tunnels and underpasses are to be constructed below rivers/canals, the tunnels and underpasses shall be laid well below the critical levels of the affected rivers/canals.

- 20.11 The Contractor is required to ensure that his construction activities do not affect drains and their function, as stipulated in Section 6 of the Code of Practice on Surface Water Drainage. In addition to section 6.3 of the Code of Practice on Surface Water Drainage, the Specification for Earth Control Measures and Specification of Turbidity Curtains (where applicable), of **Appendix A** of the General Specification shall be compiled with.
- 20.12 The Contractor is required to carry out a pre-work survey of all drainage facilities in the vicinity of his work site and to submit this to the Catchment and Waterways Department. He is required to monitor the drainage facilities, to rectify and reinstate drainage facilities affected by his work during the course of his work and to carry out a post-work survey and final desilting and inspection with the PUB/LTA before vacating the Site.
- 20.13 The pre-work and post-work surveys shall cover drainage facilities in the area affected by the Contractor's work. All drainage facilities shall be located and identified. The survey shall show the levels of the drainage facilities and shall be accompanied by a set of record photographs showing the conditions of the drainage facilities. All survey work shall be carried out by a Registered Surveyor.
- 20.14 The Contractor shall inform the PUB in writing at least two weeks before the commencement of any work at the site which affects drains.
- 20.15 The Contractor shall take due care and precautionary measures to ensure that no damage or settlement occurs to any existing drain/drainage facilities in the course of his work. The Contractor shall carry out soil instrumentation for monitoring the soil/geo-technical/structural movements or changes at and around the work-site throughout the contract period. Weekly reports of the results of the soil instrumentation shall be submitted to the PUB/LTA for record.
- 20.16 Any damage or adverse effects to drains/drainage facilities shall be immediately reported to the PUB. Any obstruction to flow shall be immediately and completely cleared and the damage repaired. The Contractor shall work continuously (24 hr a day) until the damage is made good to the satisfaction of PUB.

- 20.17 Where jet-grouting work is to be carried out in the vicinity of drainage facilities, the Contractor shall submit detailed pre-work and post-work surveys to the LTA/PUB. The Contractor shall take stringent precautionary measures to safeguard drainage facilities during the jet-grouting work. The functional and structural integrity of these facilities shall not be impaired by any upheaval or other ground movement. In the event that adverse effect is caused by the jet-grouting work, the Contractor shall immediately attend to remedial works.

- 20.18 Where temporary or permanent diversions of drains are necessary to facilitate the Contractor's work, the Contractor shall submit proposals for the drain diversions through the LTA to the PUB for approval early. The drainage proposals shall be endorsed by a PE engaged by the Contractor and shall be designed to have at least the hydraulic capacity of the existing system. The connections to the existing drains upstream and downstream shall be properly designed, with transitions if necessary, and there shall be no sharp bends along the diversion routes. Hydraulic calculations endorsed by the PE shall be submitted with the proposals and the Contractor shall show in his submission that the proposed drain diversions are technically and physically feasible.

- 20.19 The Contractor shall obtain approvals for the proposed drain diversion work from other relevant authorities where such approvals are necessary (such as LTA (Roads) where the drain diversion work also involves road diversion).

- 20.20 Where the Contractor proposes that a set of diversions of drains be carried out in phases in conjunction with his work, the complete sequence and timetable of drain diversions and integration of the drain diversion work with the construction work shall be submitted as one proposal from the onset for approval.

- 20.21 The Contractor shall not carry out any work on the existing system of drains until the approved drain diversion has been provided and inspected and permission for use has been given by the PUB.

- 20.22 The Contractor shall be responsible for the structural and cleansing maintenance of the diversion drains. The ground on the sides of the diversion drains shall be kept clear and paved access, railings etc shall be provided to enable inspection of the diversion drains at all times. The Contractor shall ensure that the diversion drains are kept in good structural condition that the drain sections are clear and the drains free-flowing at all times.

- 20.23 The Contractor shall restore flow to the permanent channels, reinstate the site to its original condition and remove the temporary drain diversions as soon as the temporary drain diversions are no longer required.

- 20.24 Where the Contractor is required to design and construct drains and culverts to their ultimate required sizes and to remove/seal off existing drains and culverts as part of his work as indicated in the drawings or specifications, or otherwise as required to comply with PUB's approval, the design and the details of the work shall be submitted for approval early. The design, calculations and detailed drawings shall be endorsed by a PE engaged by the Contractor. The design shall include the connection details and transitions to existing drains upstream and downstream. Site investigations shall be carried out to establish and confirm information on the existing drains that the proposed drains and culverts are to be connected to. Site investigations on the position of services shall also be carried out early Engineer that the design can be optimised to avoid diversion of services and Engineer that unavoidable diversions of services identified early.

- 20.25 Drains to be abandoned shall be properly filled and sealed off. Abandoned culverts shall be filled with Grade 7 concrete.

- 20.26 All structural designs, calculations and drawings submitted by the Contractor shall be endorsed by a PE registered in Singapore and comply with the LTA's Civil Design Criteria and Materials & Workmanship Specification.

- 20.27 The Contractor shall make submissions to the Building & Construction Authority (BCA) and obtain the BCA's approval, where required under the Building Control Act, 1990 and the Building Control Regulations, 1990, for all structural works proposed and structural designs carried out by his PE, all in accordance with the provisions under the Building Control Act, 1990 and the Building Control Regulations, 1990.

- 20.28 Where required under the Building Control Act, 1990 and the Building Control Regulations, 1990, the Contractor shall engage a registered Accredited Checker to check and certify the structural designs carried out by his PE and make submission to and obtain all necessary certificates from the Building Control Division.

- 20.29 For the drains and culverts constructed to ultimate required sizes and for the permanent diversions of drains carried out by the Contractor, the drains and culverts constructed shall be handed over to the PUB at the end of the Defects Liability Period (DLP). As-constructed drawings and records of these permanent drains and culverts shall be submitted early and these records must be submitted, checked, corrected and accepted before the handing over of the drains and culverts.

- 20.30 One month before the end of the DLP of the drainage works, the Contractor shall advise the Engineer to arrange for an inspection of the works for the handing over. The Contractor shall arrange for the cleaning up of the works, opening of manholes, ventilation and provision of ladders where necessary and all other preparations required for the inspection of the works.
- 20.31 On the arranged date of inspection, which shall be prior to the end of DLP, the Engineer shall inspect the works accompanied by the Contractor or his representative. Any defect found shall be rectified to the acceptance of the Engineer. The work shall then again be cleaned and inspected and the handing over to the Catchment and Waterways Department shall be made when the Engineer is completely satisfied with the quality of the works.
- 20.32 As-constructed drawings and records shall be submitted by the Contractor for the permanent drainage works constructed. The Contractor shall submit one set of transparencies of “as-constructed plans” showing details of the drainage works as constructed and completed on site, including the Drainage Reserves boundaries, for the written approval of the Engineer. The “as-constructed plans” shall consist of a set of site plans, longitudinal sections, cross sections and any additional detailed drawings for all variations, all drawn to scale and layout as required by the Catchment and Waterways Department. Among the “as-constructed plans”, the “as-constructed planimetric plans” shall be prepared and endorsed by a Registered Surveyor. The plans shall show, among other details, the drainage reserve lines and the as-constructed drains clearly, and all other information necessary to establish whether there is any encroachment of the drains on other properties.
- 20.33 In addition, the Contractor shall submit the “as-constructed plans” in a compatible computer graphics format suitable for use on PUB “Intergraph” Computer Aided Drafting System using Intergraph’s proprietary software known as “Interactive Graphics Design Software”. Details of the system and format are available from the PUB on application.