PART 2 – Employer's Requirements

Section VI - Employer's Requirements

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Specifications

The Technical Specifications to be used for this Contract contain two Parts as follows:

PART 1 The Standard Specifications for Road and Bridge Works, Published by the Ministry of Transport and Communication, Kenya 1986.

PART 2 Specifications of Particular Application (SPA)

Part 1 has not been bound into these Tender Documents but can be purchased from the Ministry of Transport and Infrastructure, Nairobi, Kenya.

The Specifications of Particular Application (Part 2) shall compliment, amend or supplement the Standard Specifications for Road and Bridge Works, 1986 (Part 1). Whenever there is conflict, the Provisions of Part 2 shall prevail over those in Part 1.

Clause numbers in the SPA coincide with the numbering as maintained in the Standard Specifications for Road and Bridge Works, 1986 (Part 1).

Equivalency of Standards and Codes

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards that ensure a substantially equal or higher quality than the standards and codes specified shall be accepted subject to the Project Manager's prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Project Manager at least 28 days prior to the date when the Contractor desires the Project Manager's consent. In the event the Project Manager determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents."

Contractor's Responsibility for Design

Subject to the requirements of the Specification, the Contractor shall be responsible for the general and detailed design of all works to be carried out under the Contract and for all plant and equipment provided.

The Contractor shall be responsible for checking all technical information provided in the Tender Drawings, Specification and Bill of Quantities and for confirming the suitability and output of his proposed plant and equipment for the duty required.

The drawings provided with the bidding documents are only for use by the Contractor in computing his bid and are not to be taken as record drawings.

The Contractor shall provide the manufacturer's name and technical details of all the components.
Scales shown on title blocks do not apply to the reduced scale drawings provided.

The Contractor shall be responsible for making all necessary site measurements and establishing all relevant data regarding conditions on site, required for the design, manufacture, installation and commissioning of the equipment.

The Contractor's design shall include any necessary modifications to existing installations to suit the characteristics of replacement plant proposed.

The Project Manager's approval of the Contractor's designs shall not relieve the Contractor of his responsibilities under the Contract.

Specifications of Particular Application - Part 2

All the requirements of Part 1 of the Technical Specifications relating to materials, quality and workmanship, together with all tests specified shall be adhered to except where modified by the terms of these Specifications of Particular Application as set forth hereinafter.

Table of Contents- Works Requirements –Specifications of Particular Application

SECTION 1 - GENERAL

101 LOCATION OF SITE AND EXTENT OF WORKS

The Works are located within the Mombasa Port and confined to certain areas scoped as Lot 2A as shown in the Tender Drawings.

The rough areas are defined as follows:

Lot 2A: Rearrangements and Markings of Container Terminal 1 West

The works comprise mainly marking of the yard to denote container placement locations and also directional markings for movement of trucks in and out of the yard as shown in the drawings.

It also involves installation of traffic and directional signage within the yard area in the drawings.

It also invovles the construction of anti climb fencing adjacent to the road in the drawings.

102 EXTENT OF THE CONTRACT

(a) General

The Works specified under this Contract shall include all general and ancillary works and works of any nature that is deemed necessary for the due and satisfactory construction, completion and maintenance of the Works to the full extent and meaning of the drawings and specifications, whilst complying with all General Conditions of Contract whether specifically mentioned or not in the clauses of the Specifications.

(b) Scope of the Works

The works comprising the contract will be as directed by the Project Manager. The nature of the works is the implementation of the Gate and Traffic Management Plan for Mombasa Port Lot 2A.

In summary the works at Mombasa Port will include:

Lot 2 - Rearrangements and Markings of Container Terminal 1 West

Works involved here include marking of the yard to denote container placement locations and also directional markings since movement of trucks in and out of the yard is expected to be in a clockwise direction.

Preparation and execution of traffic deviation scheme during construction works

Installation of directional signage, speed limit signs for trucks entering the terminal and yard identification signs.

Installation of anti-climb fencing running parallel to the road and associated gates .

Rehabilitation of concrete surfaces

The works detailed above are only indicative of the scope associated with this Contract and the Project Manager may where necessary substitute some of the works with others without substantially altering the overall Scope of the Works.

Completion Times

The time for completion of the lots at Mombasa Port shall be as follows:

LOT 2A: 6 months

103 CONTRACT / TENDER DRAWINGS

A book of Drawings accompanies these Contract Documents as a separate DIN A3 size book.

Two complete sets of full sized drawings will be issued to the successful Tenderer herein after referred to as the Contractor, at the commencement of or during the course of the Contract to facilitate the construction of the works in complete conformity with and to the

full intent of the Contract. The Contractor will be supplied with additional copies that he may require during the period of the Contract. Such drawings issued to the Contractor may be revised, amended, superseded, or supplemented by further drawings as the Project Manager may from time to time consider necessary for the satisfactory completion of the works.

It shall be the Contractor's responsibility to construct all Works in conformity with the latest revision, amendment or superseding drawings current at the time of construction of such Works, provided always that the Project Manager has given to the Contractor in writing such reasonable prior notices of intention to revise, amend or supersede as the nature of the revision or amendment requires, and the necessary revised, amended or superseding drawings have been issued to the Contractor.

Any delay in issuing revised, amended or superseding drawings shall entitle the Contractor to such reasonable additional payment as may be agreed between the Project Manager and the Contractor or by arbitration, including any abortive work already carried out by the Contractor prior to notice of intent to revise, amend or supersede having been given. The Contractor may be required to demolish, alter and correctly rebuild any part of the Works not in conformity with the drawings currently forming a part of the Contract at the time of construction of such Works at his own expense, provided always that such current drawings had previously been issued to him.

104 PROGRAMME FOR THE EXECUTION OF THE WORKS

(a) The programme shall be deemed to have taken into account normal climatic conditions to provide for the completion of the Works in the order and within the times specified therein.

(b) The information to be supplied to the Project Manager shall include drawings showing the general arrangement of the temporary offices and any other temporary buildings or structures which the Contractor proposes to use, details of the constructional plant, temporary works and all other devices which he proposes to adopt for the construction and completion of the whole of the Works, and in addition, details of the labour strength, skilled and unskilled, and supervision arrangements.

(c) The provision and maintenance of all temporary works, plant, equipment and appliances required for the Works shall be the responsibility of the Contractor in regard to construction, type, sufficiency and safety and approval by the Project Manager shall in no way relieve the Contractor of this responsibility.

(d) The order in which it is proposed to execute the permanent works shall be subject to adjustment and approval by the Project Manager, and the Contract Price shall be held to include for any reasonable and necessary adjustments required by the Project Manager during the course of the Works.

(e) The Contractor shall carry out the Contract in accordance with the programme agreed with the Project Manager but he shall in no manner be relieved by the Project Manager's approval of the programme of his obligations to complete the Works in the prescribed order and by the prescribed completion date, and he shall from time to time review his progress and make such amendments to his rate of execution of the Works as may be necessary to fulfil these obligations.

(f) Once the proposed programme is approved by the Project Manager, the Contractor shall

not depart from the programme without the written consent of the Project Manager. In the event of unforeseen difficulties or disturbances arising which force the Contractor to depart from the approved programme of Works, he shall advise the Project Manager in writing of such occurrences without delay and submit proposals for any necessary remedial measures, for which he shall obtain the Project Manager's approval before putting such measures into effect.

(g) The contractor is advised that the site (Lot A) is a busy 24 hour operational area and coordination with the Employer's activities will be a mandatory requirement. The Employer will avail areas for works, in line with the approved programme of works.

105 ORDER OF EXECUTION OF WORKS

In addition to Clause 105 of the Standard Specification, the Contractor shall carry out the Works such that a continuous and consecutive output of fully completed work is achieved.

108 METHOD OF CONSTRUCTION

Delete the first sentence in the third paragraph of the Standard Specification and insert instead:

The Project Manager's Representatives' normal working hours shall be 8 hours from Monday to Friday and 5 hours on Saturday with Sunday set aside for rest.

109 NOTICE OF OPERATIONS

Add the following Sub- Clauses:

109.1 Notification Terms

It shall be the Contractor's responsibility to notify the Project Manager when any item of Works are completed and ready for approval, and the Contractor shall give sufficient notice to allow control test to be performed.

119 USE OF EXPLOSIVES

The Contractor shall ensure that he complies with the current Government regulations with regard to explosives. No explosives of any kind shall be used within any Part or area of operation within the Port.

120 PROTECTION OF EXISTING WORKS AND SERVICES

The appropriate provisions of Section 1 of the Standard Specifications as regards the protection of existing works and services shall be adhered to in all respects.

The Contractor's attention is drawn to the fact that it is essential to maintain existing power, telephone, water, ICT, fibre optic, sewage and other services throughout the Contract Period.

The Contractor shall give every assistance to Engineers of the Telkom Kenya, the Kenya Power & Lighting Co. Ltd., the Ministry of Water Development and other relevant authorities to maintain the serviceability of their installations.

121 DIVERSION OF EXISTING SERVICES

If it should become necessary, for the proper execution of the work, temporarily, to remove or divert any existing pipe, cable, drain or other service, the Contractor shall obtain permission from the competent authority or owner for removal or diversion to be effected service. The Contractor shall carry out all necessary work in such a manner and at such times as may be approved by such authority or owner. The cost of all removal, diversion and reinstatement and all things connected therewith shall be paid for by the Employer through the Construction Contract.

If in the opinion of the Project Manager or of the competent authority or owner it should become necessary permanently to remove or realign any existing pipe, cable or other service, the Contractor shall obtain permission from the competent authority or owner for the removal or realignment to be effected. The Contractor shall carry out all necessary work in such a manner and at such times as may be approved by such authority or owner and the completed work shall be to the satisfaction of such authority or owner. The cost of all permanent removal and realignment and all things connected therewith shall be paid for by the Employer through the Construction Contract.

Any of the work involving repair, replacement of existing pipes, cables or other services shall be carried out by the competent authority or owners if they so desire, in which case the Contractor shall allow them the facilities and assistance they may require and shall pay the full expense of such work and all things connected therewith in the first instance, but the cost shall be paid for by the Employer through the Construction Contract.

The Contractor shall allow in his rates for the programming of his work to allow for the necessary diversion of any services.

124 PROVISION OF LAND

The Contractor shall bear the costs of provision of any land he may require in respect of his own camps, offices, houses, temporary works, including Land for quarries and borrow pits, the cost of which shall be deemed to be included in his rates.

126 MATERIALS AND MANUFACTURED ARTICLES

Notwithstanding the provision of Clause 126 of the Standard Specifications, the Contractor's attention is drawn to his obligation with regard to quality and delivery schedule of materials and goods obtained from suppliers.

Should the Project Manager at any time be dissatisfied with any goods and materials intended for use or used by the Contractor upon the Works, he shall be empowered to reject goods and materials and shall order that they be replaced by others of acceptable quality. Any more work that may consequently have to be redone and the costs of the new suppliers shall all be borne by the Contractor.

131 SIGNBOARDS

The Contractor shall provide and erect one publicity signboard on the project site.

The wording script and method of marking shall be to the approval of the Project Manager.

143 COMPLIANCE WITH SPECIFICATIONS AND REMEDIAL WORK

All materials, plant, labour and workmanship in and connected with the execution of the works shall be the best of their respective kinds without regard to any trade terms and the Contractors shall comply to these and in all other respects with the relevant clauses and shall carry out the contract in a proper and workmanlike manner and in strict accordance with the working drawings and instructions of the Project Manager.

When any part of the Works or any plant or material is found upon examination by the Project Manager not to conform to the requirements or is at any stage before final acceptance damaged so that it no longer conforms to the requirements of the Specifications, the Project Manager may order its complete removal and replacement, at the Contractor's expense, with satisfactory work, plant or material or he may permit the Contractor to apply remedial measures in order to make good any such defects or damage. The actual remedial measures taken shall at all times be entirely at the Contractor's own initiative, risk and cost, but subject to the Project Manager's approval regarding the details thereof.

In particular remedial measures must ensure full compliance with the Specifications for the final product, shall not endanger or damage any other part of the Works and shall be carefully controlled and submitted to the Project Manager for examination when completed or at any intermediate stage as may be required.

For the guidance, an indication is given below of what would normally be required in the more common cases of defects or damage, but the Project Manager will in no way be bound to approve of or adhere to the measures given below as the actual remedial measures will be dictated by the circumstances of each particular case.

(a) Earthworks

(i) Where a cut slope has been over excavated or under cut, backfilling will not normally be allowed and the entire slope may have to be re-trimmed to obtain a uniform slope.

(ii) Where the floor of a cutting has been taken too deep, it will normally require backfilling and re-compaction with selected gravel in the case of soil or gravel excavation and with crushed stone material or suitably sized rock in the case of hard excavations. All necessary measures shall be taken to drain away ground water that may accumulate in backfilled sections.

(iii) Excess width of fills will have to be trimmed back.

(iv) Where erosion has damaged the surface of cuts or fills the damage shall be made good by backfilling with suitable material and re-trimming. In more serious cases the slopes may have to be cut back and back-filled by benching and compaction to the required standard of compaction with suitable small equipment and then re-trimmed.

(b) Local Defects in Pavement Layers

Where remedial measures are taken to make good local defects, the length and width of the area to be repaired by machines shall be such as will be necessary to accommodate the full width of the machines used and a reasonable length to ensure effective operation.

The depth to which material will have to be removed will depend on the type of material. Gravel will require breaking up to a depth of at least 75mm and crushed stone will usually

require breaking up over its full depth. Asphalt material will normally require removal for its full depth.

(c) Concrete

Concrete work will normally require the cutting back and complete removal of any weak or honeycombed sections and making good using special epoxy adhesives to bind fresh concrete to old concrete. Cracks when permitted to remain, shall be injected with suitable epoxy compounds and test cores drilled to test the efficiency of the injection process.

144 AVAILABILITY OF MATERIALS, WATER AND POWER SUPPLY

The Contractor shall be responsible for obtaining all materials from any local or foreign source. The Employer shall not be liable for any additional costs due to shortage of materials.

The material located by the Contractor shall be subject to the approval of the Project Manager before use in the Works.

The Contractor shall be responsible for the provision of clean water supply for the Works and for making his own Power Supply Connections and related payment of all charges associated with the provision and use of these.

145 ENVIRONMENTAL PROTECTION AND WASTE DISPOSAL

The contractor shall ensure so far as reasonably practicable to the satisfaction of the Supervisor that the impact of the construction on the environment shall be kept to a minimum and that appropriate measures are taken to mitigate any adverse effects during construction.

a) After extraction of materials, all borrow pits shall be back-filled to the satisfaction of the Project Manager. In particular borrow pits near the road sides shall be backfilled in such a way that no water collects in them. However, if a borrow pit is located at such a site where water that may collect in it can be used by the local people without creating conflict, then such borrow pits could be improved to remain as a water pan upon completion of works.

The Project Manager will issue instructions regarding such borrow areas during the time of construction.

a) Spilling of bitumen, fuels, oils and other pollutants shall be cleaned up immediately by the Contractor.

145.1 Landscape Preservation

(a) General

The Contractor shall exercise care to preserve the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring or defacing of the natural surroundings in the vicinity of the Works. Except where clearing is required for permanent works, approved construction roads or excavation operations, all trees, native shrubbery and vegetation shall be preserved and shall be protected from damage by the Contractor's construction operations and equipment. The edges of clearing and cuts through trees, shrubbery and vegetation shall be irregularly shaped to soften the

undesirable visual impact of straight lines. Movement of labour and equipment within the right-of-way and over routes provided for accesses to the Works shall be performed in a manner to prevent damage to grazing land, crops or property.

Except as otherwise provided in Section 5 of the Specification, special reseeding or replanting will not be required under these specifications; however, on completion of the Works, all work areas not seeded shall be scarified and left in a condition which will facilitate natural re-vegetation, provide for proper drainage and prevent erosion. All unnecessary destruction, scarring, damage or defacing of the landscape resulting from the Contractor's operations shall be repaired, replanted, reseeded or otherwise corrected and directed by the Project Manager and at the Contractor's expense.

(b) Construction Roads, Access Roads and Haulage Routes

The location, alignment and grade of construction roads shall be subject to the approval of the Project Manager. When no longer required by the Contractor, construction roads shall, if required by the Project Manager, be restored to the original contour and made impassable to vehicular traffic. The surfaces of such construction roads shall be scarified as needed to provide a condition which will facilitate natural re-vegetation, provide for proper drainage and prevent erosion.

(c) Construction Facilities

The Contractor's workshops, office and yard area shall be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent. On abandonment, all temporary buildings, including concrete footings and slabs and all construction materials and debris shall be removed from the site. The area shall be re-graded, as required, so that all surfaces drain naturally, blend with the natural terrain and are left in a condition that will facilitate natural re-vegetation, provide for proper drainage and prevent erosion.

(d) Blasting Precautions

In addition to any requirements of local regulations, the Contractor shall adopt precautions when using explosives, which will prevent scattering of rocks, stumps or other debris outside the Work area and prevent damage to surrounding trees, shrubbery and vegetation. Blasting should be done during the day, and residents within the vicinity of the blast site should be given ample warning including the time and date of the blasting operation.

145.2 Preservation of Trees and Shrubbery

(a) Preservation

All trees and shrubbery which are not specifically required to be cleared or removed for construction purposes shall be preserved and shall be protected from any damage that may be caused by the Contractor's construction operations and equipment. The Contractor shall plant trees at locations defined by the Project Manager and special care shall be exercised where trees or shrubs are exposed to injuries by construction equipment, blasting, excavating, dumping, chemical damage or other operations; and the Contractor shall adequately protect such trees by use of protective barriers or other methods approved by the Project Manager. The removal of trees or shrubs will be only after prior approval by the Project Manager.

The layout of the Contractor's construction facilities such as workshops, warehouses, storage areas and parking areas; location of access and haul routes; and operation in borrow and spoil areas shall be planned and conducted in such manner that all trees and shrubbery not approved for removal by the Project Manager shall be preserved and adequately protected from either direct or indirect damage by the Contractor's operations.

Except in emergency cases or when otherwise approved by the Project Manager, trees shall not be used for anchorages. Where such use is approved, the trunk shall be wrapped with a sufficient thickness of approved protective material before any rope, cable or wire is placed.

(b) Repair or Treatment of Damage

The Contractor shall be responsible for injuries to trees and shrubs caused by his operations. The term ''injury[1]' shall include, without limitation, bruising, scarring, tearing and breaking of roots, trunk or branches. All injured trees and shrubs shall be repaired or treated without delay, at the Contractor's expense. If damage occurs, the Project Manager will determine the method of repair or treatment to be used for injured trees and shrubs as recommended and undertaken by an experienced horticulturist provided by and at the expense of the Contractor. All repairs or treatment of injured trees shall be performed at the expense of the Contractor.

145.3 Prevention of Water Pollution

(a) General

The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage, of solid matter, contaminants, debris and other pollutants and wastes into streams, flowing or dry water courses, lakes, ocean and underground water sources. Such pollutants and wastes include, but are not restricted to, refuse, garbage, cement, concrete, sanitary waste, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts and thermal pollution. De-watering work for structures foundations or earthwork operations adjacent to, or encroaching on, streams or watercourses shall be conducted in a manner to prevent muddy water and eroded materials from entering the streams or watercourses by construction of intercepting ditches, bypass channels, barriers, settling ponds or by other approved means. Excavated materials or other construction materials shall not be stockpiled or deposited near or on stream banks, lake shorelines or other watercourse perimeters where they can be blown away or washed away by high water or storm runoff or can in any way encroach upon the watercourse itself.

Wastewater from aggregate processing, concrete batching, or other construction operations shall not enter streams, watercourses or other surface water without the use of such turbidity control methods as settling ponds, gravel-filter entrapment dykes, approved flocculating processes that are not harmful to fish, recirculation systems for washing of aggregates or other approved methods. Any such wastewater discharged into surface waters shall contain the least concentration of settleable material possible. For the purpose of these Specifications, settleable material is defined as that material which will settle from the water by gravity during a 1-hour quiescent detention period.

(b) Compliance with Laws and Regulations

The Contractor shall comply with all applicable Kenyan Laws, orders, regulations and water

quality standards concerning the control and abatement of water pollution.

145.4 Abatement of Air Pollution

The Contractor shall comply with applicable Kenyan laws and regulations concerning the prevention and control of air pollution.

Notwithstanding the above in conduct of construction activities and operation of equipment, the Contractor shall utilize such practicable methods and devices as available to control, prevent and otherwise minimize atmospheric emissions or discharges of air contaminants.

Such practicable methods and devices include transport of water over long distances in tankers and/or provision of water extracted from new boreholes, as necessary to meet the applicable laws and regulations.

Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments or other inefficient operating conditions shall not be operated until corrective repairs or adjustments are made.

Burning of materials resulting from clearing of trees and brush, combustible construction materials and rubbish will be permitted only when atmospheric conditions for burning are considered favourable and when authorised by the Project Manager. In lieu of burning, such combustible materials may be disposed of by other methods as provided in Sub clause 145.9 hereof. Where open burning is permitted, the bum piles shall be properly constructed to minimise smoke and in no case shall unapproved materials, such as tires, plastics, rubber products, asphalt products or other materials that create heavy black smoke or nuisance odours, be burnt.

145.5 Dust Abatement

During the performance of the work required by these Specifications or any operations appurtenant thereto, whether on the right-of-way provided by the Employer or elsewhere, the Contractor shall furnish all the labour, equipment, materials and means required and shall carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance and to prevent dust which has originated from his operations from damaging crops, orchards, cultivated fields and dwellings or causing a nuisance to persons. The Contractor will be held liable for any damage resulting from dust originating from his operations under these Specifications on the right-of way or elsewhere. The Project Manager may direct sprinkling or other measures for dust abatement if necessary to obtain adequate control.

The cost of complying with this paragraph shall be included in the prices tendered in the Bill of Quantities for other items of Work.

145.6 Noise Abatement

The Contractor shall comply with applicable Kenyan laws, orders and regulations concerning the prevention, control and abatement of excessive noise. The movement of heavy vehicles should be restricted to working hours.

145.7 Preservation of Historical and Archaeological Data

Should the Contractor or any of his employees in the performance of his contract discover evidence of possible scientific, pre-historical or archaeological data, he will notify the Project Manager immediately giving the location and nature of the finding. Written confirmation shall be forwarded within 2 days. The Contractor shall exercise care so as not to damage artefacts or fossils uncovered during excavation operations and shall provide such co-operation and assistance as may be necessary to preserve the finds for removal or other disposition by the Employer.

Where appropriate by reason of a discovery, the Project Manager may order delays in the time of performance or changes in the Work or both. If such delays or changes or both are ordered, the time of performance and Contract Price shall be adjusted in accordance with the General Conditions of Contract.

The Contractor shall insert this Sub-Clause in all Subcontracts, which involve the performance of Work on the terrain of the site.

145.8 Pesticides

Pesticides include herbicides, insecticides, fungicides, rodenticides, pesticides, surface disinfectants, animal repellents and insect repellents.

Should the Contractor find it necessary to use pesticides in Work areas of this contract, he shall submit his plan for such use to the Project Manager for written approval. The Contractor shall read and comply with all labelling requirements when using pesticides.

The cost of complying with this Sub-Clause shall be included in the prices tendered in the Bill of Quantities for other items of Work.

145.9 Clean-up and Disposal of Waste Materials

(a) Clean-up

The Contractor shall, at all times, keep the construction area, including storage areas used, free from accumulations of waste materials or rubbish. All waste water and sewage from office, residential and mobile camps shall be piped to soak pits or other disposal areas constructed in accordance with local government regulations, and where and when such regulations require it, the Contractor shall obtain a permit or other appropriate documentation approving the disposal methods being used.

All used fuels, oils, other plant or vehicle fluids and old tyres and tubes shall be collected to a central disposal point, on a regular basis and disposed of as specified below. All household, office, workshop and other solid waste shall be collected to a central disposal area, on a daily basis and disposed of in a manner approved by the Project Manager.

Servicing of plant, equipment and vehicles shall whenever possible be carried out at a workshop area. This workshop area shall be equipped with secure storage areas for fuels oils and other fluids constructed in such a way as to contain any spillages which may occur and similar storage where used fluids can be stored securely prior to their disposal.

When servicing of plant, equipment and vehicles is carried out away from the workshop area it shall be done at locations and in such a manner as to avoid spillage and

contamination of streams and other drainage courses. Any spillages shall be cleaned up by either burning in place or collecting the contaminated soils and burning them at the central disposal area, all to the satisfaction of the Project Manager.

Prior to completion of the Work, the Contractor shall remove from the vicinity of the Work all plant facilities, buildings, rubbish, unused materials, concrete forms and other like material, belonging to him or used under his direction during construction. All Work areas shall be graded and left in a neat manner conforming to the natural appearance of the landscape as provided in Sub-Clause 145.1.

Any residue deposited on the ground from washing out transit mix trucks or any similar concrete operations shall be buried or cleaned up in a manner acceptable to the Project Manager.

In the event of the Contractor's failure to perform the above work, others may be engaged to perform the work at the expense of the Contractor.

(b) Disposal of Waste Material

(i) General

Waste materials including, but not restricted to, refuse, garbage, sanitary wastes, industrial wastes and oil and other petroleum products, shall be disposed of by the Contractor as directed by the Project Manager. Disposal of combustible materials shall be by burying, where burial of such materials is approved by the Project Manager; by burning, where burning of approved materials is permitted; or by removal from the construction area. - Disposal of non-combustible materials shall be by burying, where burial of such materials is approved by the Project Manager, or by removal from the construction area. Waste materials removed from the construction area shall be dumped at an approved dumping site.

(ii) Disposal of Material by Burying.

Only materials approved by the Project Manager may be buried. Burial shall be in pits the location, size and depth of which shall be approved by the Project Manager. The pits shall be covered by at least 0.6 m of earth material prior to abandonment.

(iii) Disposal of Material by Burning

All materials to be burned shall be piled in designated burning areas in such a manner as will cause the least fire hazards. Burning shall be thorough and complete and all charred pieces remaining after burning, except for scattered small pieces, shall be removed from the construction area and disposed of as otherwise provided in this Sub-Clause.

All burning activities are to be supervised. The Contractor shall, at all times, take special precautions to prevent fire from spreading beyond the piles being burned and shall be liable for any damage caused by his burning operations. The Contractor shall have available, at all times, suitable equipment and supplies for use in preventing and suppressing fires and shall be subject to all laws and regulations locally applicable for pre-suppression, suppression and prevention of fires.

(iv) Disposal of Material by Removal

Material to be disposed of by removal from the construction area shall be removed from

the area prior to the completion of the Work under these Specifications. All materials removed shall become the property of the Contractor.

Materials to be disposed of by dumping shall be hauled to an approved dump. It shall be the responsibility of the Contractor to make any necessary arrangements with private parties and with local officials pertinent to locations and regulations of such dumping. Any fees for charges that are to be paid for dumping of materials, shall be paid by the Contractor, and shall be included in the prices tendered in the Bill of Quantities for other items of Work.

145.10 Hunting and other Use of Natural Resources:

(i) The Contractor is required to prohibit his workers from hunting, trapping, killing or other use of natural resources (with the exception of vermin) on the site or on adjacent lands.

(ii) Both solid and liquid waste including empty containers should be managed in such a manner as to avoid exposing wildlife/livestock to possible poisoning or disease infection. Empty containers should not be strewn carelessly but disposed of in a responsible manner

(iii) Fuel wood or charcoal as well as rustic construction wood required for fencing or general construction should preferably be harvested in a controlled manner, and clearing or felling of trees or shrubs in an area should be forbidden.

145.11 Fire and Prevention

a) The Contractor shall prepare and carry out an effective fire-protection and prevention Programme covering all phases of construction under this contract. The plan shall be submitted to the Project Manager, prior to the start of construction operations. At the option of the Contractor, the fire-protection and prevention Programme may be incorporated into a safety Programme.

b) The Contractor shall provide and maintain in a ready condition near each active work location a fire-tool cache consisting of at least one 19 litre back pump filled with water, two axes, two McLeod tools, and enough shovels to equip five workers for firefighting purposes. A sufficient number of employees familiar with use of the equipment shall be available at all times when work is in progress. In the event of a fire resulting from project operations, the local fire-protection agency having jurisdiction shall be notified, and the Contractor shall take immediate control action with any and all available equipment and manpower.

c) In areas where significant fire hazard exists as determined by the Project Manager, the Contractor shall provide a fire patrol for 1 hour after shutdown of construction operations each day during the dry season

d) In areas where grass, bush, or other natural fuels are present and where roads or creek beds will not serve the purpose, the Contractor shall establish a firebreak on the uphill side of the project. The firebreak shall be within the right-of-way acquired by the Employer.

145.12 Measurement and Payment for Environment Protection and Waste Disposal

Except as specifically included in the Bill of Quantities or otherwise provided above, no separate measurement or payment will be made for any work included in this Clause, and relevant cost of all these requirements shall be included by the Contractor in his rates in the Bill of Quantities for other items of Work.

146 DEMOLITION AND BREAKING OUT

General

The Contractor shall demolish, break out wholly or partially and remove all structures and superficial obstructions on the Site as shown on the Drawings, as described in the Specification or as instructed by the Project Manager

Method of Demolition or breaking out

The methods of demolition and breaking out shall be submitted to the Project Manager for consideration 4 weeks before such work is due to begin. Any approval given under this Clause shall in no way relieve the Contractor of his contractual obligations.

Removal of existing steelwork

All steel fixings, poles, brackets supporting services etc. that require to be removed from the works shall be unbolted or cut off using methods to be approved by the Project Manager. All such steel work shall if not reused in any part of the works, shall be removed from site either to a dump site or to scrap yard outside the Port area.

SECTION 2 - MATERIALS AND TESTING OF MATERIALS

202 TESTING BY THE CONTRACTOR

Add the following paragraph to Clause 202 of the Standard Specifications:

The onus rests with the Contractor to produce work which confirms in quality and accuracy of detail to the requirements of the Specifications and drawings, and the Contractor must, at his own expense institute a quality control system to ensure adequate supervision and positive control of the Works at all times, and the Contractor must provide chainmen and surveyor for the Project Manager to carry out checks on the Works.

The Contractor shall submit to the Project Manager the results of the relevant tests, measurements and levels indicating compliance with the specifications on completion of every part of the work.

The Contractor shall make his laboratory accessible to the Project Manager's Representative for cross checking the test results and inspection during material testing in the laboratory.

204 SIEVES

Amend the following:-

204.1 SIEVE SIZES

A standard set of sieves for general use shall consist of the following sieve sizes mm: 100-63-50-37.5-25-20-14-10-6.3-5-42-1-0.6-0.5-0.425-0.300-0.150-0.075mm.

The sieves from 0.425 to 0.075 mm shall be suited for wet sieving.

205 SOILS AND GRAVELS

Whenever in the Contract Documents a minimum California Bearing Ratio (CBR) is specified, the CBR of the materials shall be determined at the specified state of compaction.

(a) after four days soaking in the case of neat materials, and

(b) after seven days curing plus seven days soaking in the case of cement or lime improved materials.

207 CEMENT

Delete "KS 02-21" and replace with "KS 1725 2001 CEM 1 42.5"

219 HOT-APPLIED THERMOPLASTIC MATERIAL FOR ROAD MARKING

(a) General requirements
The material for hot-applied thermoplastic "paint" for road marking shall be in accordance with ES 3252: Part 1.

(b) Colour

(i) White
The colour of white markings shall be BS Colour No 00E55 or BS 4800
ii) Yellow

The colour of yellow markings shall be to BS Colour No.08E51 of BS 4800.

(c) Composition

The thermoplastic material shall consist of light coloured aggregate, pigment and extender bound together with resin plasticized with oil as necessary, in approximately the following proportions

Aggregate, including ballotini: 60%
Pigment and extender: 20%
Binder: 20%

The maximum size of the aggregate shall be 2 mm.

The softening point of the binder shall be 45^0c - 50^0C

(d) Reflectorization

Reflectorization shall be by ballotini beads to BS 6088, which shall make up approximately 20% of the total mix and shall be treated as part of the aggregate. The ballotini shall be reasonably spherical and free from flaws and of a size suitable for this method of reflectorization, subject to a maximum size of 2 mm.

207 REFLECTIVE MATERIALS ON ROAD SIGN

The reflective material, when applied to the sign plate, shall give the appearance of a continuous reflecting surface under any angle of observation. It shall consist of a smooth exterior film with spherical lenses embedded beneath the surface, and shall have a protected, precoated adhesive backing which shall be tack-free, heat activated for mechanical vacuum-heat application. The combination of various elements shall result in a non-exposed lens type optical reflecting system, The reflective material shall be as per the instruction of the manufacturer of the retro reflective material.

The reflective material shall comply with the following the standard specifications for roads and bridges construction by MOTC 1986:

226 FREQUENCY OF TESTING

In (i) (ii) (iii) and (iv) delete "T99" and substitute "T180" instead.

228 OUTLINE TESTING AND INSPECTION BY THE PROJECT MANAGER

The Project Manager will at regular intervals inspect and test materials and completed work for compliance with the specified requirements. Samples and lot sizes for routine testing shall be at the Project Manager's discretion.

All sections of completed work including all test results carried out by the Contractor, shall be submitted to the Project Manager for routine inspection and testing and the Contractor shall not cover up or construct any work on top of sections of completed work before written approval has been given by the Project Manager.

The Contractor shall arrange the submission of work for testing in such a manner that the Project Manager will have the opportunity to inspect and test the Works.

SECTION 4 – SITE CLEARANCE AND TOP SOIL STRIPPING

403 REMOVAL OF STRUCTURES, FENCES AND OBSTRUCTIONS

When instructed by the Project Manager, the Contractor shall demolish wholly or in part, remove and dispose of existing concrete surfaces with subgrade, existing fences (all kind), with poles (steel or concrete) and demolition of signage (all kind), with accessory and foundation and any other obstructions which have not been designated to remain.

The Contractor shall carefully take down such structures, fences etc. and the components shall be dismantled, cleaned and stacked in separate heaps. Ail materials which, in the opinion of the Project Manager, are not fit for re use shall be removed from the bite to spoil areas provided in accordance with the requirements of Section 6 of this Specification.

All materials which are re-usable shall remain the property of the Employer and shall be preserved and executed by the Contractor until removed by the Employer or until the expiry of the Period of Maintenance.

404 REMOVAL OF EXISTING PAVEMENT MARKINGS

Existing pavement markings shall be removed prior to the application of new markings.

The existing markings can be removed using paint removers, and thereafter the surface shall be water-blasted, sandblasted and/or shot blasted until a minimum of 90% of the pavement surface is exposed.

SECTION 9 – PASSAGE OF TRAFFIC

901 SCOPE OF SECTION

The Contractor shall prepare a traffic deviation scheme for the period of the Works. This scheme shall include all temporary signs, barriers, lights etc. which are necessary to allow a safe passage of traffic during the Works.

The traffic deviation scheme has to be submitted to the Project Manager for approval.

SECTION 13 – GRADED CRUSHED STONE SUBBASE AND BASE

1301 DEFINITIONS

The graded crushed stone for subbase shall meet the requirements specified in Clause 1303 for:
Stone Class "A" for Subbase; and
Nominal size "0/40".

The crushing ratio for all graded crushed stone pavement materials shall be minimum 100%.

1304 CRUSHING, SCREENING AND MIXING

The crushing installation used in the production of Graded Crushed Stone shall be a multiple stage crusher capable of producing material complying with the specified requirements. The crushed material shall be separated by screening into at least 4 different aggregate fractions and recombined in a mixing plant to produce the specified particle size distribution.

The mixing plant shall be an approved type mixer of proven suitability for producing a mixture complying with all the requirements of the specifications. The mixing plant shall be equipped with satisfactory means to control mix proportions of different aggregate fractions and water.

All materials shall be added and mixed on the plant ready for spreading and compaction. The water content added at the mixing plant shall be such that the moisture content during placing and compaction will be within +/-2 % of the optimum moisture content determined according to AASHTO t.180.

1306 LAYING AND COMPACTING GRADED CRUSHED STONE SUBBASE

Graded crushed stone shall be laid by paver. Laying and mixing by grader shall not be permitted, except on confined areas.

Construction Requirements

1. Preparation of Existing Surface

   The existing surface shall be graded and finished as provided under Section 5 of these Specifications before placing the sub-base material.

2. Placing

   The aggregate sub-base material shall be placed as a uniform mixture on a prepared sub-grade in a quantity which will provide the required compacted thickness.

   When more than one layer is required, each layer shall be shaped and compacted before the succeeding layer is placed.

   The placing of material shall begin at the point designated by the Project Manager. Placing shall be from vehicles especially equipped to distribute the material in a continuous uniform layer or windrow.

   The layer or windrow shall be of such size that, when spread and compacted the finished layer be in reasonably close conformity to the nominal thickness shown on the Tender Drawings.

When hauling is done over previously placed material, hauling equipment shall be dispersed uniformly over the entire surface of the previously constructed layer, to minimize rutting or uneven compaction.

3. Spreading and Compacting

When uniformly mixed, the mixture shall be spread to the plan thickness, for compaction.

Where the required thickness is 150 mm or less, the material may be spread and compacted in one layer.

Where the required thickness is more than 150 mm, the aggregate sub-base shall be spread and compacted in two or more layers of approximately equal thickness, and the maximum compacted thickness of any one layer shall not exceed 150 mm.

All subsequent layers shall be spread and compacted in a similar manner.

The moisture content of sub-base material shall, if necessary, be adjusted prior to compaction by watering with approved sprinklers mounted on trucks or by drying out, as required in order to obtain the required compaction.

Immediately following final spreading and smoothening, each layer shall be compacted to the full width by means of approved compaction equipment.

Rolling shall progress gradually from the sides to the centre, parallel to the centreline of the road and shall continue until the whole surface has been rolled.

Any irregularities or depressions that develop shall be corrected by loosening the material at these places and adding or removing material until the surface is smooth and uniform.

Along curbs, headers, and walls, and at all places not accessible to the roller, the sub-base material shall be compacted thoroughly with approved tampers or compactors.

If the layers of sub-base material, or part thereof, do not conform to the required finish, the Contractor shall, at his own expense, make the necessary corrections.

Compaction of each layer shall continue until a density of not less than 96 percent of the maximum dry density determined in accordance with BS 1377 – Test 14 has been achieved. In-place density determination shall be made in accordance with AASHTO T 191.

4. Trial Sections

Before sub-base construction is started, the Contractor shall spread and compact trial sections as directed by the Project Manager.

The purpose of the trial sections is to check the suitability of the materials and the efficiency of the equipment and construction method which is proposed to be used by the Contractor.

Therefore, the Contractor must use the same material, equipment and procedures that he proposes to use for the main work. One trial section of about 500 m2 shall be made for every type of material and/or construction equipment/procedure proposed for use.

After final compaction of each trial section, the Contractor shall carry out such field density tests and other tests required as directed by the Project Manager.

If a trial section shows that the proposed materials, equipment or procedures in the Project Manager's opinion are not suitable for sub-base, the material shall be removed at the Contractor's expense, and a new trial section shall be constructed.

If the basic conditions regarding the type of material or procedure change during the execution of the work, new trial sections shall be constructed.

5. Measurement and Payment

The graded crushed stone for sub-base and base shall be measured and paid for in cubic meters of material compacted in accordance with the Drawings and specification requirements, and accepted by the Project Manager.

The volumes to be measured shall be based on the road plan and typical cross section of road pavement shown on the Drawings where the required thickness is uniform and on the cross sections approved by the Project Manager.

Payment shall be full compensation for hauling, supplying, placing, compacting, finishing and testing the materials, the supply and placing of running course and maintenance of the surface under traffic, and all others costs necessary or usual for the proper completion of the works described in this Specification.

SECTION 17 - CONCRETE WORKS

1703 MATERIALS FOR CONCRETE

(b) Replace the first 3 lines with the following:

Only CEM I Class 42.5 N (or higher strength) Portland cement complying with the requirements of Kenyan Standard KS EAS 18-1:2001 shall be used in the works unless otherwise specified, ordered or permitted in writing.

1704 THE DESIGN OF CONCRETE MIXES

The Concrete for the paved area of the terminals shall be C32/40 (meaning Cylinder strength 32, and cube strength 40). The maximum aggregate size shall be 20 mm and minimum cement content shall be 400 kg/m3 with water:cement ratio of 0.5.

1705 FIBRE REINFORCEMENT

Fibres for concrete shall be ENDURO 600 macro-synthetic fibres or similar approved polypropylene/polyethylene high performance macro-monofilament fibre and manufactured specifically for the reinforcement of concrete.

The macro-synthetic fibres shall be mixed at the batch plant, at a rate of 9 kg/m^3, and mixed to ensure uniform distribution of the fibres throughout the concrete mix. The specified dosage per cubic meter should be added to the mixer after batching the other concrete materials.

Applicable reference standards shall be the following:

ASTM C III6: Standard Specification for Fibre-Reinforced Concrete

ASTM C 1550 Standard Test Method for Flexural Toughness of Fibre-Reinforced Concrete

SECTION 20 – ROAD FURNITURE

2004 PERMANENT ROAD SIGNS

The specifications are as per the "Manual for Traffic signs in Kenya, Part II: June, 1975.

Scope of Works

Works consist of furnishing, fabricating, and erecting the specified types of traffic signs at locations indicated on the Tender Drawings or as directed by the Project Manager.

Permanent road signs shall comply with the requirements of BS 873 parts 2. 6 and 7 in respect of quality including the pre-treatment, preparation and protective coatings for the frame, posts and fittings.

1) Materials

(a) Materials shall conform to the requirements noted in the Tender Drawings. Steel and aluminium materials shall be of durable quality and shall be approved by the Project Manager.

Bolts to be used for tightening sign boards shall be steel bolts, fully galvanized, and free from deformation and bending. Each bolt shall be tightened with a galvanized nut and washer.

(b) Aluminium plates shall be degreased, etched, neutralized and processed prior to use as traffic sign boards. Reflective sheeting shall conform to the requirements of AASHTO M 268 and shall be of the colour specified by the Project Manager or as shown on the Tender Drawings and shall include a pre-coated adhesive on the back capable of forming a durable bond, by vacuum or roller method, to aluminium plates.

(c) Steel poles for traffic signs shall either be processed for rust prevention by phosphatic membrane or zinc galvanizing, or if approved by the Project Manager, by means of a rust prevention painting process. All details of materials and painting shall be approved in advance by the Project Manager.

(d) Road signs shall be obtained from a manufacturer approved by the Project Manager and before placing any order for the manufacture of the road signs, the Contractor shall submit to the Project Manager two copies of the following information:

i. The name of the firm from which he proposes to obtain the signs together with the place of manufacture or fabrication.

ii. A description of the items to be supplied with the manufacturer's specification together with a description of quality, grade, weight and strength.

iii. The manufacturer's "type" test certificates or recent test results carried out on similar items.

iv. A sample sign, post and fittings which shall be stored on Site for the Project Manager.

(3) Construction Requirements

1) Preparation

(a) The manufacturer or vendor of the sign boards shall make available the following information:

(i) Instructions on the assembly and erection of the road.

(ii) Details of any limitations in location or usage.

(iii) Instructions on the operation and maintenance of the board.

(b) The type and location of the traffic sign boards shall conform to the Tender Drawings and the instructions of the Project Manager.

2) Erection of Sign Boards

(a) The type and location of traffic signs shall conform to the Tender Drawings and the instructions of the Project Manager.

(b) Poles shall be set on a foundation as shown on the Tender Drawing after digging holes by means of auger or other equipment approved by the Project Manager. When handwork is required, care shall be exercised not to damage existing pavement.

(c) Poles shall be supported as necessary until the concrete has achieved sufficient strength and the hole shall then be backfilled and thoroughly compacted with suitable material to the satisfaction of the Project Manager. The adjacent surface shall be restored to its original condition as directed by the Project Manager.

(d) When traffic signs are to be installed on existing roads or car park, extreme care shall be exercised to prevent obstruction of traffic. Any damaged portion shall be repaired to its original condition immediately after the installation of the boards. The boards shall be carefully handled so as not to cause damage, and the Contractor shall repair or replace boards at his own expense in the event of them sustaining any damage.

(e) The Contractor shall cut back trees and vegetation to permit visibility and shall not permit material to be dumped so as to obscure the signs.

(f) All the boards shall be maintained in a clear and legible condition and shall be washed down when necessary.

3) Size and siting

All Signs Should Be Sited On The Drivers Nearside.

Warning Signage

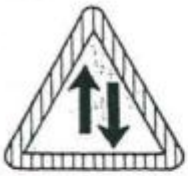
Height (mm)	**Distance of sign from hazard (m)**	**Recommended visibility distance (m)**
750 (Height of triangle (mm))	50	60

WARNING SIGNS

W1. Sharp left-hand bend ahead.

W2. Sharp right-hand bend ahead.

W17. Crossing for pedestrians ahead.



W25. Two-way traffic ahead.

W26. Hazard ahead.

W27. Road junction ahead.

KEY

BLUE

BLACK

GREEN

RED

WHITE

YELLOW

W28A. Junction ahead with road on which traffic is required to stop or give way.

W28B. Junction ahead with road entering from the left* on which traffic is required to stop or give way.

*Note.—Or the right if symbol so indicates.

Prohibition sign

Diameter (mm)	Size of additional plate below standing and parking signs		Size of single arrow plate A1,A3 WIDTH X HEIGHT (HEIGHT IN BRACKETS = HEIGHT WITHOUT DISTANCE FIGURE) mm	Size of single arrow plate A2 WIDTH X HEIGHT (HEIGHT IN BRACKETS = HEIGHT WITHOUT DISTANCE FIGURE) mm
	X- HEIGHT (mm)	Width (mm)		
1000 (Diameter (mm))	64	1000	600 X 300 (200)	750 X 300 (125)

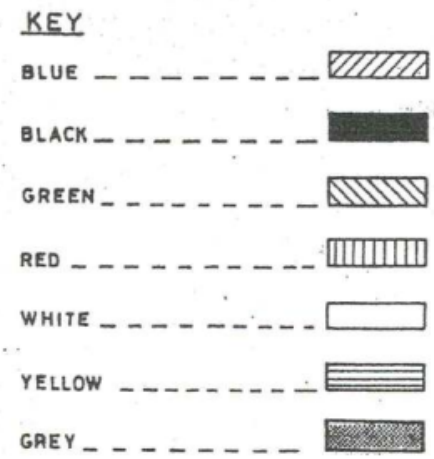
P1. NO ENTRY. Entry forbidden to all vehicles.

P20. Left turn prohibited to all vehicles.

P21. Right turn prohibited to all vehicles.

P22. About turn (or "U" turn) prohibited to all vehicles.

P23. NO OVERTAKING. Overtaking of any four-wheeled motor vehicle by any other four-wheeled motor vehicle prohibited.



P25. SPEED LIMIT. No vehicle to exceed such speed in kilometres per hour as is indicated by the numerals.

Mandatory signs

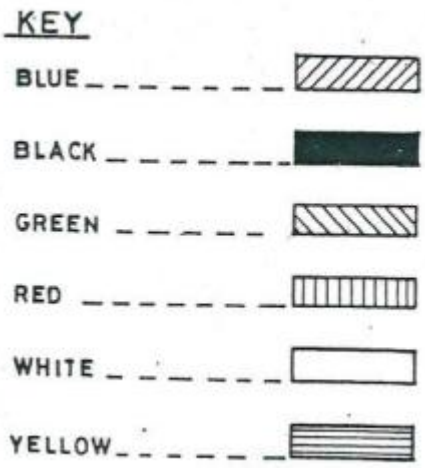
Diameter (mm)	Size of additional plate below standing and parking signs	
	X- HEIGHT (mm)	Width (mm)
1000 (Diameter (mm))	64	1000

M1. Requires all vehicles to turn to the left. (The direction of the arrow may be reversed in which case all vehicles are required to turn to the right).

M2. Requires all vehicles to travel straight ahead.

M3. Requires all vehicles to turn to the right at the next junction. (The direction of the arrow may be reversed in which case all vehicles are required to turn to the left at the next junction.)

M4. Requires all vehicles either to travel straight ahead or to turn to the right (or to the left if the direction of the horizontal arrow is reversed) at the next junction.



M10. MINIMUM SPEED REQUIRED. All motor vehicles must travel at a speed in kilometres per hour of or in excess of that which is indicated by the numerals.

4) Placement

The signs should be set so that the nearest edge of the sign is at least 0.5 m from the edge of the carriageway.

5) Mounting height

Where possible the lower edge of the sign should be between 0.9 m and 1.5 m above the highest point of the carriageway alongside.

5) Orientation

Signs are normally to be set transverse to the line of travel of approaching road users.

In order to avoid specular reflection from the headlamp beams, signs which face along the carriageway, should be set at an angel of 95^0 measured clockwise from the nearest edge of the carriageway where it is straight.

Signs sited on left bends should be set at an angle of 95^0 measured clockwise from a line joining the edge of the carriageway at the sign point on the nearside carriageway edge 180 m before the sign.

Signs sited on right bends should be set at an angle of 90^0 to the tangent at that point.

2005 ROAD MARKINGS

(1) Scope of Works

Works included under this Section shall comprise the furnishing and application of permanent and temporary pavement markings on completed or uncompleted paved areas at the locations and of the dimensions shown on the Tender Drawings in accordance with the requirements specified or referred to herein.

(2) Materials

1) Hot Applied Thermoplastic Material

(a) The material for hot-applied thermoplastic paint for pavement marking shall be in accordance with AASHTO M 247 (Type 2). Samples shall be submitted to the Project Manager at least 2 weeks prior to the proposed use.

(b) Colour

(i) The colour of white markings shall be BS Colour No 00E55 as per BS 4800.

(ii) The colour of yellow markings shall be to BS Colour No. 08E51 as per BS 4800.

(c) Composition

The thermoplastic material shall consist of light coloured aggregates, pigment and extender bound together with resin plasticized with oil as necessary, in approximately the following proportions:

Aggregate, including ballotini	:	60%
Pigment and extender	:	20%
Binder	:	20%

The maximum size of the aggregates shall be 2mm. The softening point of the binder shall be 45°C – 50°C.

(d) Reflectorisation

Reflectorisation shall be by ballotini beads pursuant to AASHTO M 247 (Type 2) or BS 6088, which shall make up approximately 20% of the total mix, and shall be treated as part of the aggregate. The ballotini shall be reasonably spherical and free from flaws and of a size suitable for this method of reflectorisation, subject to a maximum size of 2 mm.

2) Acrylic paint

(a) Material

Acrylic paint for road/yard surface markings shall be specifically manufactured for such purposes.

(b) Application suitability

It shall be suitable for applying by brush, low pressure spraying equipment and high-pressure spraying equipment.

(c) Colour

(i) White

The colour white markings shall be BS colour No. 00E55 of BS 4800.

The pigment used for white materials shall be titanium dioxide Type A (Anatase) of Type R (Rutile) complying with BS 1851.

(ii) Yellow

The colour white markings shall be BS colour No. 00E51 of BS 4800.

(d) Reflectorizing

The paint shall be reflectorized unless otherwise specified.

(e) Drying time

The drying time allowed shall be as specified by the manufacturer, subject to the touch dry conditions being reached in a maximum of 15 minutes.

(f) Approval for use

The paint shall be of a type approved by the project Engineer, and samples and manufacturers shall be submitted to the Engineer for approval

(g) Substrate Preparation

(i) Asphalt Substrates

New asphalt must be allowed to cure and oxidise until its black and glossy surface turns grey and matt before applying the coating.

The time it takes for oxidation will vary depending on the nature of the surface and the ambient temperatures and humidity.

Generally, it will take up to 3 weeks in ambient temperature.

The substrate should be clean, sound, smooth, and free from contamination such as mortar and paint splashes, curing compounds, oil, and grease.

The surface must be clean, dry, and free from dust, oil grease, and any contaminations that could affect the adhesion.

All loose grit and other debris must be removed by vacuuming, blowing, or sweeping prior to the application of the Acrylic paint.

(ii) Concrete Substrates

Ensure the substrate surface is dry with no standing water, smooth, and any surface imperfections are repaired with a suitable cementitious repair mortar.

Spalled surfaces, cracks, and defected concrete should be repaired.

Repair of surface imperfections using cementitious repair mortar

New concrete substrate should be at least 28 days old.

Where these methods are considered impracticable, alternative methods may be considered but a clean, sound, and dry substrate must still result. In particular, it is essential that the substrate does not suffer from conditions of rising damp.

Any alternative preparations must be approved by Engineer prior to the commencement of work, as the final performance of the system relies upon the performance of sound and level substrates

3) Epoxy paint

(a) Material

Epoxy paint shall be a two pack component paint based on Epoxy resin. The epoxy pavement marking material shall consist of 100% solids, two-part hybridized epoxy system formulated and designed to provide a simple volumetric mixing ratio of the two components (e.g., two volumes of Part A to one volume of Part B).

(b) Composition

The component A composition shall be within the following limits:

	WHITE	NON-LEAD YELLOW
Pigments		
Titanium Dioxide (ASTM D-476 Type II & III)	33-38%	5-15%
Organic Yellow		5-15%
Binder	60-70%	77-83%
Epoxy Resin		

(c) Primer coat

The primer coat shall be approved by the Engineer so as to enable the subsequent coats to have adequate adhesion to the substrate.

(d) Reflectorizing

The paint shall be reflectorized unless otherwise specified.

(e) Drying time

The drying time allowed shall be as specified by the manufacturer.

(f) Approval for use

The paint shall be of a type approved by the project Engineer, and samples and manufacturers shall be submitted to the Engineer for approval

(g) Toxicity

Upon heating to application temperature, the material shall not exude fumes which are toxic or injurious to persons or property

(h) Viscosity

Formulations of each component shall be such that the viscosity of both components shall coincide (within 10%) at a recommended spray temperature.

(i) Track Fre eTime

The hybridized epoxy pavement marking material, when mixed in the proper ratio and applied at 20 mils+/-0.5 mil wet film thick-ness at 75°F/-2°F and with the proper saturation of glass spheres, shall exhibit no tracking time of 45 minutes or less when tested according to ASTM D-711.

(j) Curing

The hybridized epoxy pavement marking materials shall be capable of fully curing under a constant surface temperature of 40°F or above.

(k) Adhesion to Concrete

The hybridized epoxy pavement marking materials, when tested according to ASTM D-7234 (formerly ASTM D-4541), shall have such a higher degree of adhesion to the specified concrete (4,000 psi minimum) surface that there shall be a 100% concrete failure in the performance of this test. The prepared specimens shall be conditioned at room temperature (75°F+/-2°F) for a mini-mum of 72 hours prior to the performance of the tests indicated.

(l) Hardness

The hybridized epoxy pavement marking materials, when tested according to ASTM D-2240, shall have a Shore D Hardness greater than 80. Samples shall be allowed to cure at room temperature (75°F+/-2°F) for a minimum of 72 hours prior to performing the indicated test.

(m) Abrasion Resistance

The hybridized epoxy pavement marking materials, when tested according to ASTM D-4060 (formerly ASTM C-501) using a Taber Abrader, CS-17 wheels, at 1,000 gm for 1,000 cycles shall not have more than 60 mg weight loss. The test shall be run on samples applied at 15 mils+/-0.5 mil to S-16 stainless steel plates, without glass spheres, and cured at 75˚F+/-2˚F for a minimum of 72 hours.

(n) Tensile Strength

When tested according to ASTM D-638, the hybridized epoxy pavement marking materials shall have an average tensile strength of not less than 6,000 pounds per square inch. The Type IV Specimens shall be pulled at a rate of 1/4 inch per minute by a suitable dynamic testing machine. The samples shall be allowed to cure at room temperature (75°F+/-2°F) for a minimum of 72 hours prior to performing the indicated tests.

(o) Compressive Strength

When tested according to ASTM D-695, the catalyzed epoxy pavement marking materials shall have a compressive strength of not less than 12,000 pounds per square inch. The cast sample shall be conditioned at room temperature (75°F/-2°F) for
a minimum of 72 hours before performing the indicated tests. The rate of compression of these samples shall be no more than 1/4 inch per minute

(p) Substrate Preparation

Ensure the substrate surface is dry with no standing water, smooth, and any surface imperfections are repaired with a suitable cementitious repair mortar.

Spalled surfaces, cracks, and defected concrete should be repaired.

Repair of surface imperfections using cementitious repair mortar

New concrete substrate should be at least 28 days old.

Where these methods are considered impracticable, alternative methods may be considered but a clean, sound, and dry substrate must still result. In particular, it is essential that the substrate does not suffer from conditions of rising damp.

Any alternative preparations must be approved by Engineer prior to the commencement of work, as the final performance of the system relies upon the performance of sound and level substrates

(3) Construction Requirements

1) Layouts and Alignment

(a) Suitable layouts and lines of proposed stripes shall be spotted in advance of the paint application and control points shall be provided and spaced at such distances as will ensure an accurate location of all lines and markings.

(b) The Contractor shall provide an experienced technician to supervise the location, alignment, layout, dimensioning and application of paint.

(c) Single stripes shall be applied wholly on one side of the longitudinal pavement joints and double or multiple stripes shall be centred over similar joints.

2) Preparation

(a) The surface area to be marked shall be clean, dry and free from loose particles. Setting out and location of all the markings shall be approved by the Project Manager before the Works begin.

(b) Preparation and application of the material shall be in accordance with the manufacturer's instructions. On concrete surfaces the Contractor shall first apply a tack coat of a type compatible with the thermoplastic material.

3) Application

(a) General

All marks shall be laid by self-propelled machines equipped with cut-off valves and nozzles capable of forming clean and sharp edged lines and markings of the specified thickness.

All markings shall present a clean cut, uniform and workmanlike appearance and the surface shall be free from streaks and cracks. All markings which do not have a uniform satisfactory appearance by day and night shall be corrected by the Contractor at his own expense.

Paint material shall be laid by a spray or screed to the dimensions shown on the Drawings. The finished thickness of the material shall be a minimum of 1.5 mm for spray application and 3 mm for screed application, both exclusive of the glass beads described below.

Glass beads shall be applied to the surface of permanent markings immediately after they have been laid. All glass beads shall be applied by a pressure or spray application at a rate specified in the manufacturer's specifications.

4) Protection

All pavement markings shall be protected from traffic.

After the application of the paint, all markings shall be protected from injury or damage of any kind. The Contractor shall be directly responsible and shall erect or place suitable warning signs, flags, or barricades, protective screens, or coverings as required.

Adjacent surfaces shall be protected from disfiguration by spatter, splashes, spillage, drippings of paint or other materials.

5) Dimensions

The specifications are as contained in the manual for traffic signs in Kenya Part I (Road markings) and as shown below:

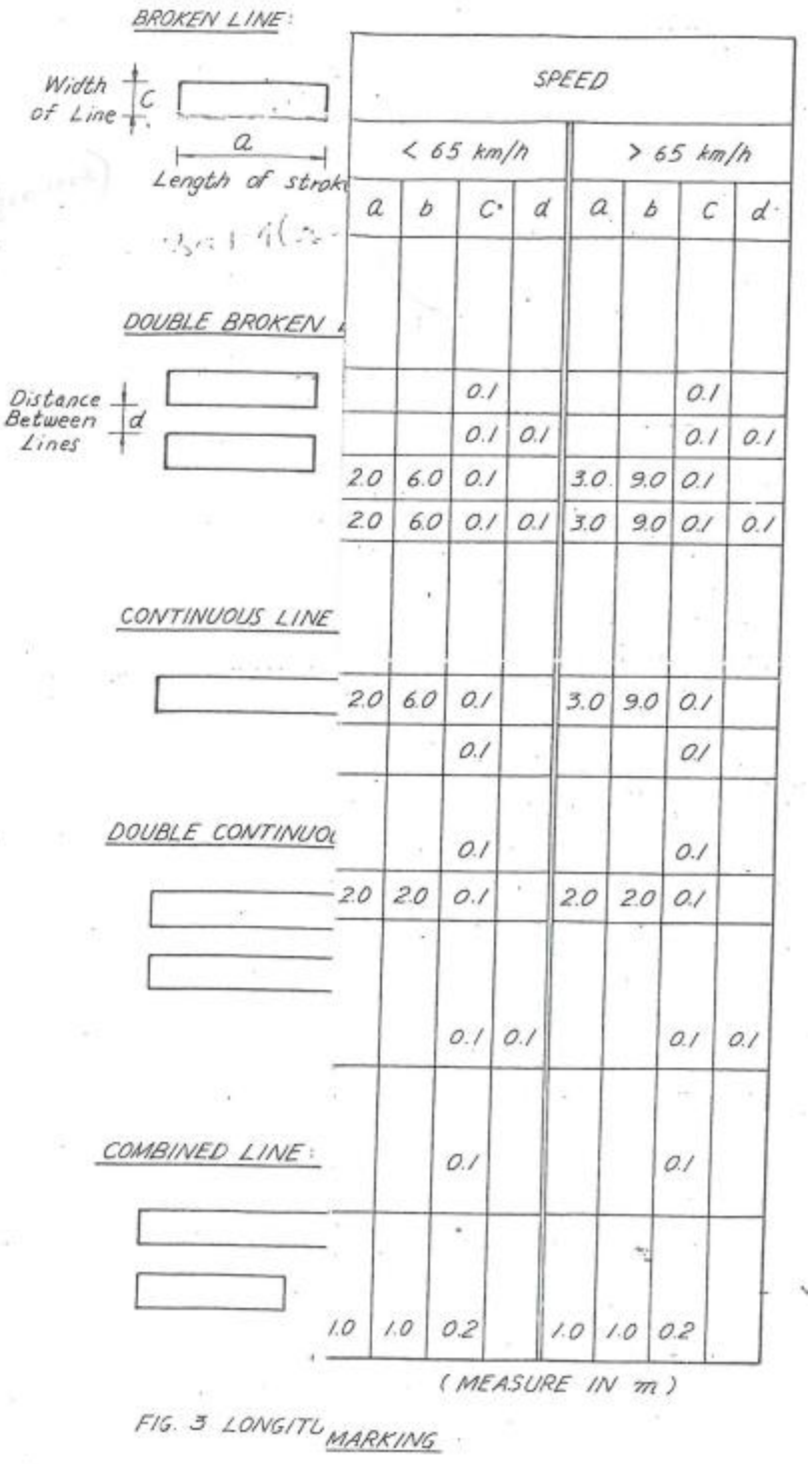
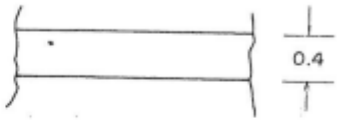
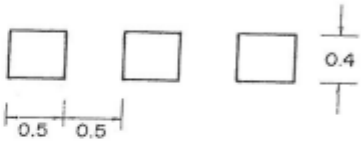
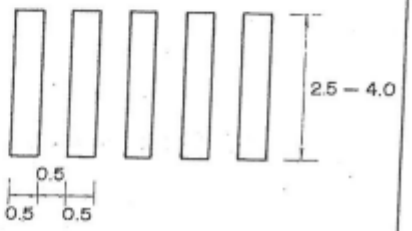


FIG. 3 LONGITU MARKING

	TYPE	DIMENSION (m)
1	STOP LINE	
2	GIVE WAY LINE	
3	SAFETY LINE	
4	PEDESTRIAN CROSSING	

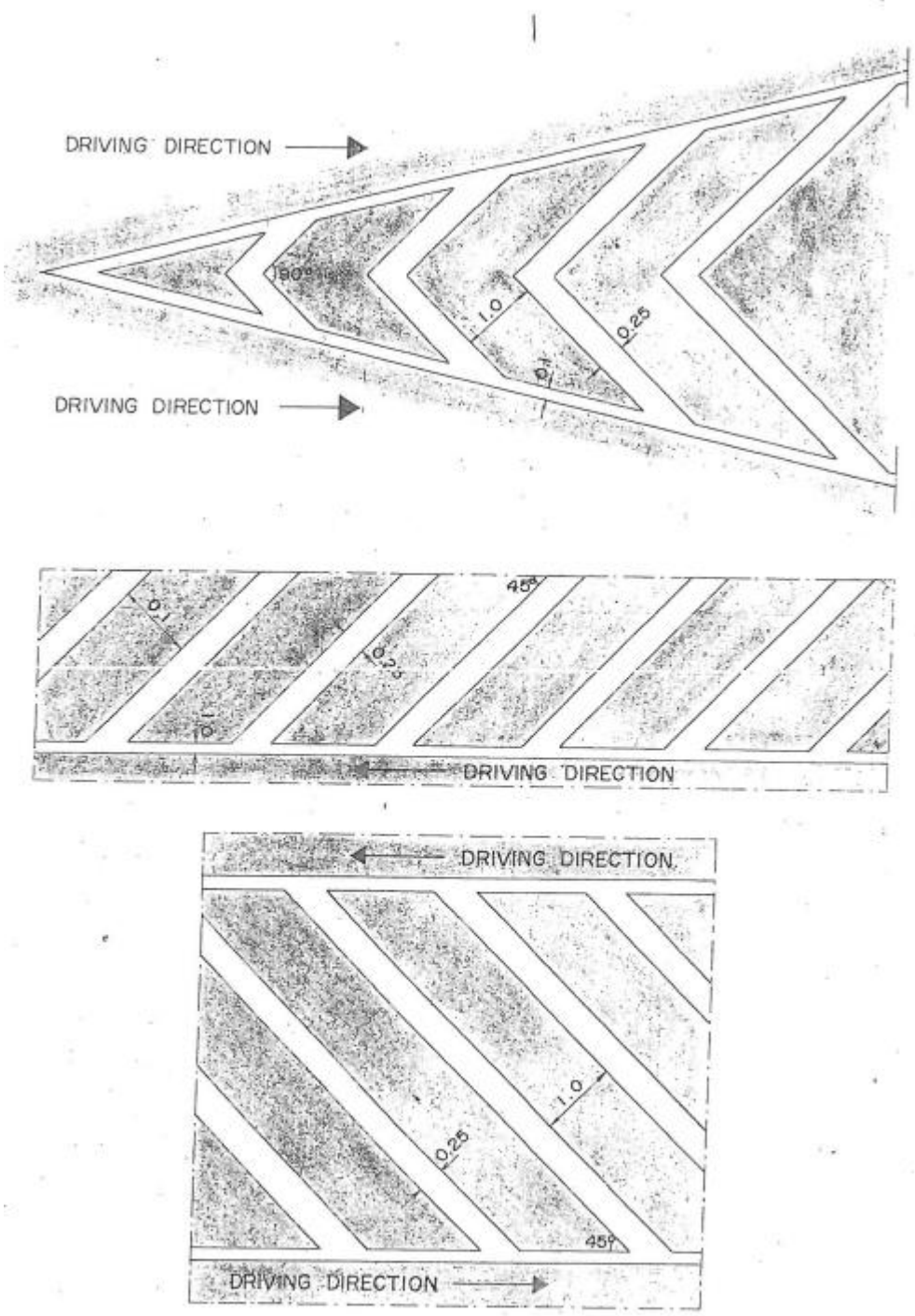
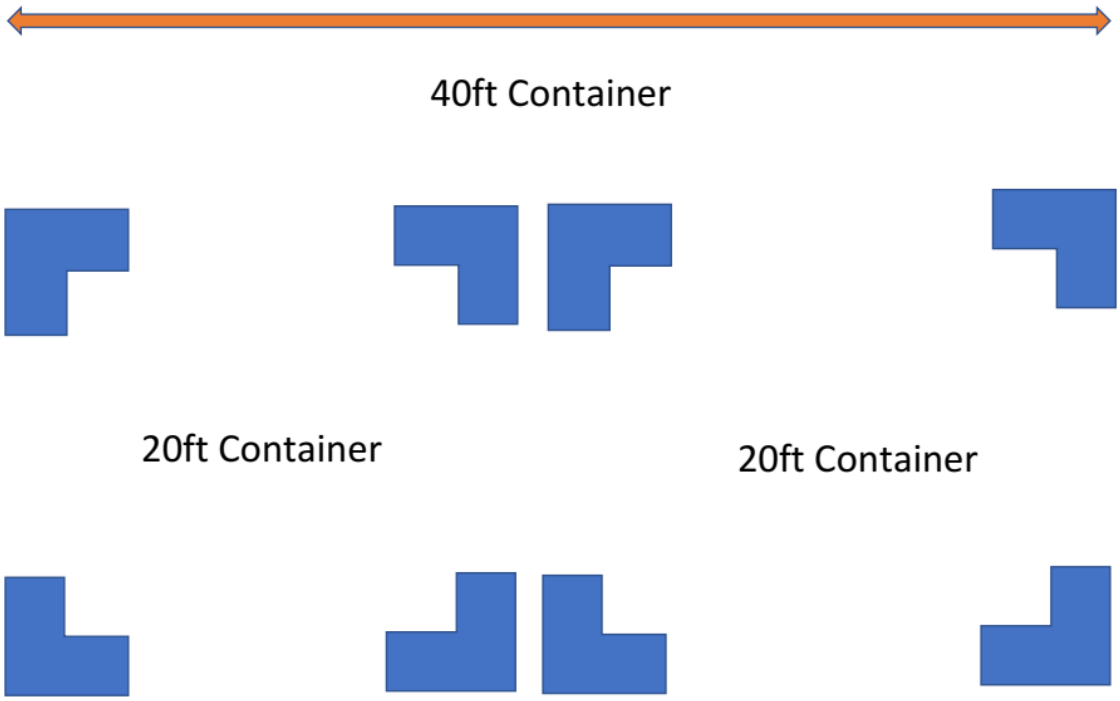


FIG. 7 HATCHED AND CHEVRON MARKINGS


40ft Container
20ft Container
20ft Container

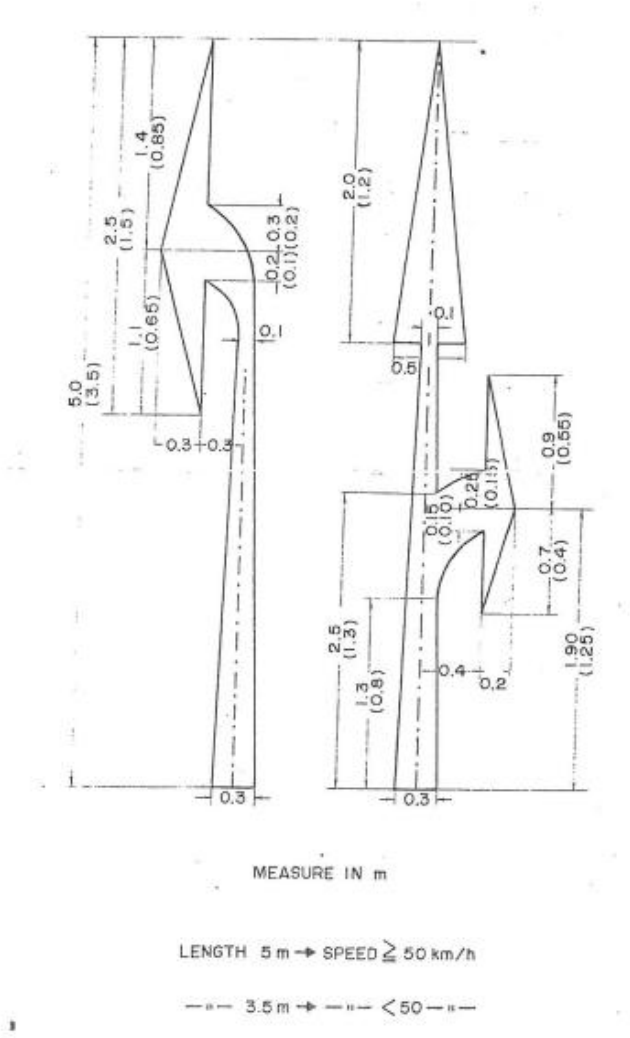


FIG. 6 LANE INDICATION ARROWS

2013 SECURITY FENCE

The fence should be high security welded mesh with the following specifications:

Mesh panel mesh

Type	Heavy duty metallic + powder coated
Wire diameter	5mm
Mesh	12,7 x 76.2
Height	2100mm
Width	2500mm
Colour	Green/Black
Panel	With 3 beds

Posts

Type	Heavy duty metallic + powder coated
Post size	60x60x2.0mm
Lenght	2600mm
Height	2100mm
Colour	Green/Black

Corner posts

Type	Heavy duty metallic + powder coated
Post size	60x60x2.0mm
Length	2600mm
Height	2100mm
Colour	Green/Black

Flat bars with bolts/nuts

Type	Heavy duty metallic + powder coated
Post size	60x4mmx2100mm
Length	2600mm
Height	2100mm
Colour	Green/Black
Bolts/nuts	M8x100 bolts and nuts

2014 TERMINAL FENCING

Terminal fencing shall be meshed wire fencing with a minimum height of 3 m and poles every 5 m with adequate corrosion protection.

The Bidder shall submit together with his Bid technical specifications of the terminal fence he intends to install.

SECTION 24 – MISCELLANEOUS WORKS

2401 GATE FOR PARKING AREA

The gate shall be minimum 4 m wide with two wings and shall be operated by hand. Gates are to be of solid construction such as galvanised weld mesh and must match the height of the wall.

The Bidder shall submit together with his Bid technical specifications of the gate he intends to install.

2403 PEDESTRIAN GATE

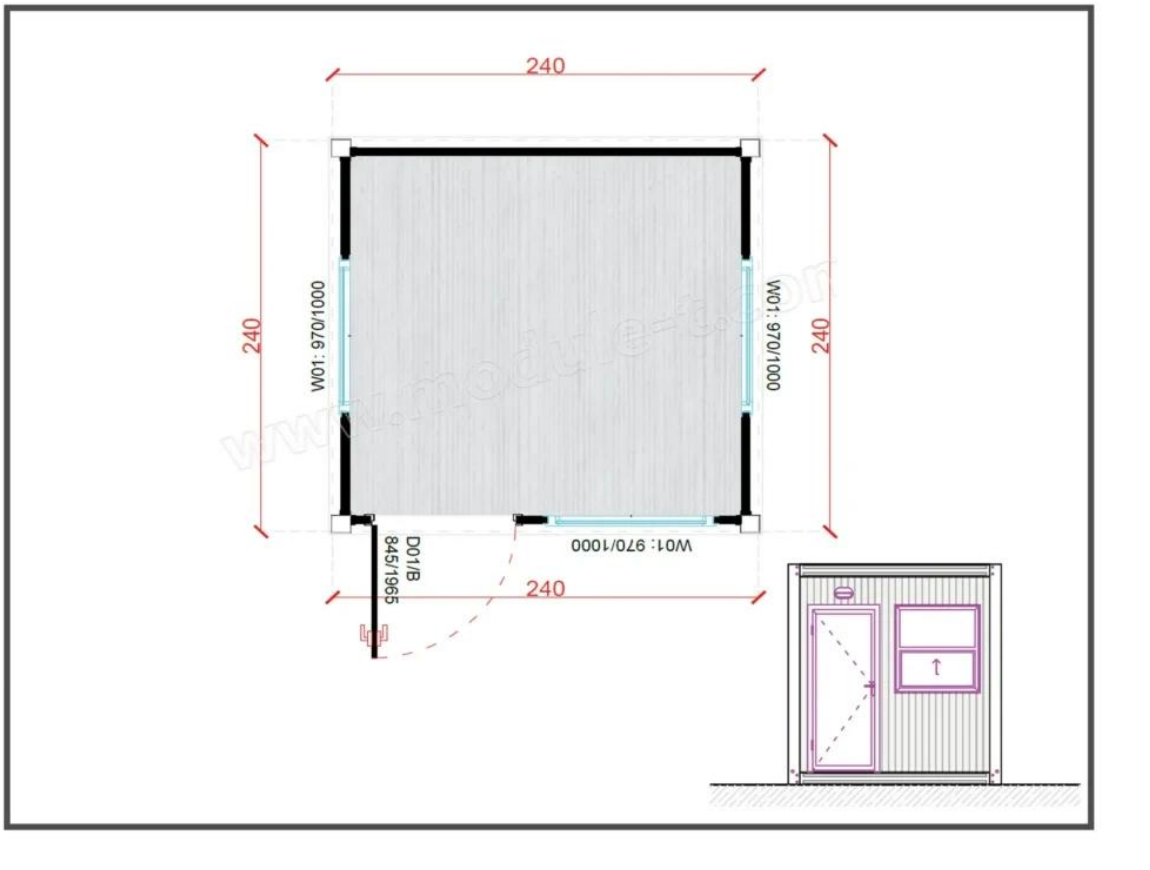
Pedestrian gate comprising of aluminium metal with overall size 1500 x 2500 mm high in plates, bars, sections and tubes; complete with 50 x 50 x2mm thick framing, 25 x 25 x 2mm thick horizontal members @ 75mm c/c complete with padlock and receiver

2404 PREFABRICATED, MODULAR SECURITY BUILDING AT THE GATE

The dimensions of the gate house is 2400 x 2400 mm x 3000 mm high.

Structural Framework: They shall be robust steel or aluminium frames, which gives them a stable plinth that can withstand adverse weathering or usage.

The dimensions of the structure, windows and doors are as shown below (in cm).


240
240
240
240
W01: 970/1000
W01: 970/1000
D01/B
845/1965
W01: 970/1000

Supplementary Information

[NONE]