



**NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT
(NAVCDP)
Kiambu County Project Coordination Unit (CPCU)**

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ADDENDUM
PUBLISHED ON 13TH NOVEMBER 2025

The County Government of Kiambu, an implementing agency of the *NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)* in the department of Crop Production, Irrigation and Marketing invited eligible bidders to submit the below Sealed Bids on or before **14th November 2025**:

- Addendum 1:** The department has extended the tender opening date from **14th November 2025 to 1st December 2025** at 12.00 NOON to allow eligible bidders sufficient time to document and submit the bids. All other terms and conditions remain.
- Addendum 2:** Tender No: KE-KIAMBU COUNTY- 508068-CW-RFB which was previously categorized for Youth, will be conducted through national competitive procurement using Request for Bids (RFB) for as specified in the World Bank's "Procurement Regulations for IPF Borrowers" World bank's " Procurement Regulations for IPF Borrowers" First Published July 2016, Revised Fifth Edition September 2023("Procurement Regulations"), and is **open** to all eligible Bidders as defined in the Procurement Regulations.
- Addendum 3:** The site visit certificate will **NOT** be a mandatory requirement as indicated in the tender documents. This is in Reference to World Bank's "Procurement Regulations for IPF Borrowers" and the standard tender document clause ITB 7.7
- Addendum 4:** Specifications were omitted but are hereby attached.
- Addendum 5:** Drawings for the project were omitted but are hereby attached.

This clarification supersedes any conflicting information on the original tender documents regarding the above statements.

All bidders are advised to take note of this clarification when preparing their bids.

Reference Number	Tender Name	Bid Guarantee
Tender No: <i>KE-KIAMBU COUNTY- 508068-CW-RFB</i>	Construction and Expansion of Nyamuku Irrigation Project in Mang'u Ward – Gatundu North Sub County, Kiambu County	Ksh. 1,000,000

- Tender conditions are contained in the standard tender document. The tender document shall be downloaded free of charge www.tenders.go.ke or www.kiambu.go.ke.
- Complete tender documents original and copy shall be Submitted **Manually** and deposited at a tender Box located at **Kiambu Headquarters –Kiambu Town on or before 1st December 2025 at 12.00 Noon**. Electronic bidding will not be permitted. Late bids will be rejected. Tenders will be opened immediately thereafter in the presence of bidders or their representatives who may choose to attend.

CHIEF OFFICER
CROP PRODUCTION, IRRIGATION AND MARKETING
COUNTY GOVERNMENT OF KIAMB
P.O. Box 2344-00900 KIAMB



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NYAMUKU IRRIGATION PROJECT TENDER DOCUMENT VOLUME III.

Tender document comprises of:

**INVITATION TO TENDER
INFORMATION TO BIDDERS
GENERAL CONDITIONS OF CONTRACT
PARTICULAR CONDITIONS OF CONTRACT
CONTRACT FORMS**

**NYAMUKU IRRIGATION PROJECT TENDER DOCUMENT COMPRISES OF THREE
VOLUMES AS FOLLOWS:**

- 1. INVITATION TO TENDER - ---- VOLUME I**
- 2. BOOK OF DRAWINGS ---- VOLUME II**

3. SPECIFICATIONS ---- VOLUME III

2025

SECTION 5: TECHNICAL SPECIFICATIONS

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1 GENERAL

1.1 General Description of the Works

1.1.1 Works to be undertaken by the Contractor

The main works to be undertaken under this contract comprise the following:

- a) Construction, testing and commissioning of Nyamuku Irrigation Project involving rehabilitation of intake works and Sedimentation Basin.
- b) Supply, laying, fixing and testing of pipe network as specified in the BoQs and drawings.

Table 1-1: Summary of Scope of Works

Pipe name	Length, m	Diameter, mm	Class
PRELIMINARIES AND GENERALS			
INTAKE WORKS Construction (as per the Drawings)			
SEDIMENTATION BASIN WORKS Construction (as per the Drawings)			
CONVEYANCE	2,351.67	250	PN6
ML1	2,739.10	90, 75, 63, 32, 20	PN6
ML1-P	2,739.10	180, 110, 90, 63	PN6
ML2	2,620.33	110, 90, 75, 50, 40	PN6
ML2-P	2,620.33	90,75, 50, 40	PN6
SM1	2,739.10	110, 90, 75, 20	PN6
F2-SM1	365.02	75, 40	PN6
F3-SM1	292.71	50	PN6
F2-ML2	292.47	32	PN6

F1-ML2	1,486.85	32	PN6
F1-CONV	687.00	90	PN6
TOTAL LENGTH	18,246.69		

1.1.2 Works to be undertaken by the Farmers

The farmers will carry out all in-field works within their own plots as part of their contribution to the project.

The Contractor is obligated to coordinate his activities with those of the farmers.

1.2 Location of the Works

Nyamuku Irrigation Project is located in Nyamang'ara and Mukurwe sub-locations of Mang'u ward, Gatundu North Sub County of Kiambu County. The project lies in Agro-ecological zone UM2 - UM3.

It is 10 km North East of Gatundu Town. It is a gravity fed irrigation system abstracting water from Ndarugu River.

1.3 Climatic Conditions

The scheme lies in the agro –ecological zone UM 2 and UM 3 which is characterized by a two-cropping season (Figure 2.1). Ndarugu River sub-catchment experiences a bimodal rainfall pattern with two rainfall seasons of March to May and October to December as shown through rainfall data analysis at Gatundu North Agriculture Office Rainfall Station No. 9136063 and depicted in Table 4-1 and Fig.4-1. The region experiences an annual mean rainfall of about 1100mm.

Table 4- 1: Gatundu North Agriculture Office Rainfall Station: Mean monthly rainfall

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	47.8	41.2	109	259.1	182.9	44.1	25.7	21.1	25.3	91.8	188.6	79.5

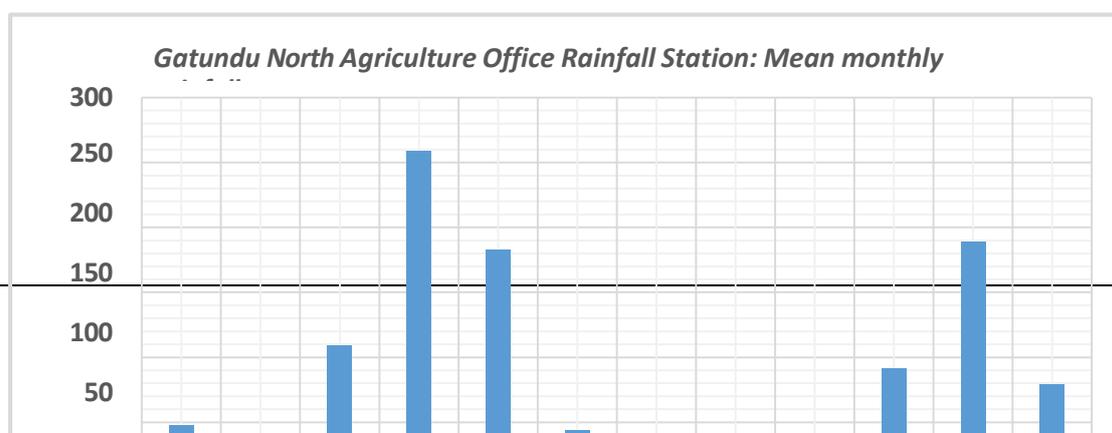


Figure 4- 1: Gatundu North Agriculture Office Rainfall Station: Mean monthly rainfall
The project area is mainly found in UM2 and UM3 agro-Ecological zone as depicted in figure 4-2 below.

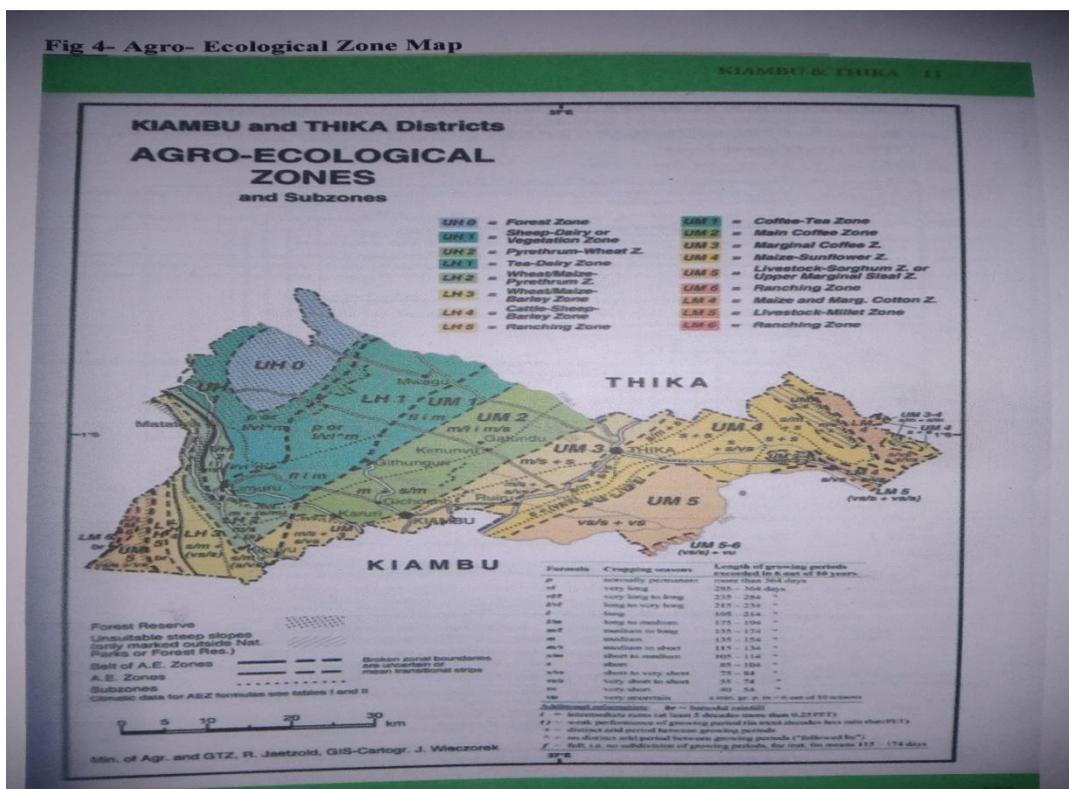


Figure 4.2: Agro-Ecological zones

1.4 Drawings and Documents

Nyamuku Irrigation Project tender document comprises of the following volumes:

- i. Volume I, invitation to tender containing general conditions of contract, particular conditions of contract, information to bidders etc
- ii. Volume II, Book of drawings
- iii. Volume III, specifications

1.5 Standard Specifications

For convenience and in order to establish the necessary standards of quality, reference has been made to specifications issued by national or other widely recognised bodies. Such specifications shall be referred to as ‘Standard Specifications’ and shall be the latest editions

of such Standard Specifications issued prior to the issue of these Tender documents together with such additions or amendments as may have been issued prior to the same date. Subject to the written approval of the Engineer, any other internationally accepted Standard Specification which requires an equal quality of work may be used.

If the Contractor proposes to use a Standard Specification other than that specified, three copies of the proposed Standard Specification in English, shall be submitted to the Engineer not less than 28 days before approval of Standard Specification is required.

In referring to Standard Specifications, the following abbreviations are used:

BS	British Standard
ISO	International Organisation for Standardisation
ASTM	American Society for Testing and Materials
ASA	American Standards Association
KBS	Kenya Bureau of Standards
KS	Kenya standard

1.6 Works Designed by the Contractor

All drawings, calculations, plans, reports, instruction manuals, pamphlets, data and all other documents required to be submitted by the Contractor under the Contract shall be clear and readable. The Contractor shall submit these drawings and documents in a logical order to the Engineer for review or approve at least fifty-six (56) calendar days prior to execution of the Works.

All shop drawings, including field erection, layout and construction details shall be furnished by the Contractor for the approval of the Engineer.

All the drawings and calculation to substantiate the design shall be checked, signed and approved by the Contractor prior to submission. The drawings shall also be signed by a qualified engineer responsible for the design.

Approval of the drawings by the Engineer shall not be construed as a complete check but will indicate only that the general method and detailing is satisfactory. The approval by the Engineer shall not relieve the Contractor of the requirement of the Contract or responsibility for correct installation and assembly of parts in final position or responsibility for the adequacy of method of construction.

All the cost thereof will be deemed to be included in the Contractor's unit rates and Contract sum.

1.7 As Built Drawings

Within forty-five (45) days after the receipt of the Completion Certificate, the Contractor shall submit to the Engineer all the approved drawings and documents (including operation and maintenance manuals), clearly revised and brought up to date by the Contractor to show the permanent construction actually made. The submission shall be made in the following manner and quantity:

- One (1) set of the A1 size reproducible drawings on high quality polyester transparent film or similar material,
- One (1) set of the A1 size blue print.
- The submission shall contain the drawing index.
- No separate payments will be made for the provision of the drawings as the cost thereof shall be deemed to be included in the unit rates and the Contract Sum.

1.8 Site Meetings

The Contractor shall be obliged to attend all meetings at the appointed time. The discussions of such meetings shall include but not be limited to the progress of work and problems having direct bearing on the immediate and long-term activities (construction, procurement, transport, labour etc).

The Engineer shall invite the Employer for such meetings.

1.9 Progress Photographs

The Contractor shall furnish the Engineer with coloured photographs (not less 8cm x 12cm size) of the work in progress throughout the Contract period. The photographs shall be taken at the start, during and at the completion of each major task of the work as directed by the Engineer. A brief description and date of each photograph shall be included.

All negatives shall be numbered, retained on the site and on completion of the Works the negatives shall become the property of the Employer.

1.10 Level Datum

The survey control points and benchmarks shown on the drawings shall be handed over to the Contractor as basis for surveying and setting out of Works. The Contractor shall be responsible for carrying out the field surveys for the performance of the Works.

Before using the control points and bench marks for setting out of the Works, the Contractor shall carry out a check survey thereon and satisfy himself as to their accuracy. The Employer shall bear no responsibility for the accuracy of any control point or benchmark.

The Contractor may establish additional temporary bench marks for his own convenience but each temporary bench mark shall be of a design and in a location approved by the Engineer and shall be accurate in relation to the bench marks established by the Engineer.

The Contractor shall protect the reference points and level bench marks and in the event of any damage he shall re-survey and re-establish the points and bench marks.

1.11 Setting Out

The Contractor shall appoint and employ the necessary qualified and experienced staff to set out the Works accurately. The Contractor shall establish and locate all lines and levels and be responsible for the correct location of all Works.

Where directed by the Engineer, the Contractor shall take such levels and dimensions as may be required for the purposes of measurements prior to disturbance of the ground. These shall be agreed between the Contractor and the Engineer in writing before any of the surface is disturbed or covered up.

1.12 Construction and Checking of Work

The Contractor shall be solely responsible for and shall provide all labour, tools, lifting tackle and other equipment required for the construction and checking of the Works.

No operatives shall be allowed to execute any type of work, which is normally carried out by a skilled tradesman, unless the operative is thoroughly experienced and proficient in the trade concerned. Supervisors and operatives may be required to demonstrate their proficiency or produce certificate of competence to the satisfaction of the Engineer.

As each part of the work is carried out it shall be subject to the approval by the Engineer.

1.13 Supervision and Labour

The Contractor will be required to maintain a competent supervising Site Agent and staff on site throughout the construction period until completion of the Works, and thereafter as may be required during the defects liability period. The Engineer shall give prior approval to the appointment of this supervising Site Agent and key staff and shall have authority to withdraw the approval at any time in accordance with the Conditions of Contract.

All staff and labour employed on the Works shall be employed in accordance with the local labour and employment laws and regulations.

1.14 Works Executed by the Employer or by other Contractors

The Employer reserves the right to execute, on the site, works not included under this Contract and to employ for this purpose either his own employees or other contractors whose contracts may be either a sub-contract under this Contract, or an entirely separate contract. The Contractor shall ensure that neither his own operations nor trespass by his employees shall interfere with the operations of the Employer, or his contractors employed on such works and

the same obligations shall be imposed on the Employer or other contractors in respect of work being executed under this Contract.

1.15 Contractor's Site Offices, Workshops, Storage and Working Areas

The Contractor shall acquire office, housing, workshop, stores, accommodation and camp for himself and his employees. In which case, the Contractor shall establish service and maintain all necessary buildings as offices, housing or workshop/stores for himself, the staff and his employees.

All huts, buildings, fixtures and fittings provided by the Contractor shall be removed and the site reinstated at the end of the Contract.

The location of all the offices, stores and the like shall be to the approval of the Engineer.

1.16 Definition and Use of the Site

1.16.1 Definition of the Site

The Site shall include all those areas of land which, being public or private:

- Are being provided by the Employer for the purpose of constructing the permanent works.
- Are being leased by the contractor for Temporary Works, including camps, offices and stores.
- Are acquired, leased, or operated by the Contractor as borrow pits or spoil tips for the Permanent Works, including all access roads.

1.16.2 Use of the Site

The lands and other places outside the Site which are the property of or under the control of the Employer shall not be used except with the approval of the Engineer.

The Contractor shall at any time remove any vehicle or vessel or any other obstruction under his control that may be required to be removed by the Engineer for any purpose. The Contractor shall move such obstruction promptly on instruction being given.

The Contractor shall maintain access for the inspection, operation and maintenance of any of the Employer's plant or works which lies within the Site or elsewhere.

The Contractor shall not use any portion of the Site for any purpose not connected with the Works unless the written permission of the Engineer has been obtained.

Except with the written permission of the Employer, to be given when necessary for the execution of the Works, the Contractor's employees will not be permitted to enter any of the Employer's buildings or lands, or sites under the control of other contractors or the Engineer. The Contractor shall warn his employees that any person found within such buildings or sites without authority is liable to be removed from the Works in accordance with the Conditions of Contract.

1.17 Possession of the Site

The Contractor shall restrict his activities to those areas of the Site adjacent to the works being executed and shall avoid any encroachment upon lands outside the areas for which possession has been given. Any trespass or damage or any claim arising from such encroachment shall be the Contractor's sole responsibility and he shall hold the Employer indemnified against all claims arising from such trespass or damage.

1.18 Interference with the Works

The Contractor shall not interfere in any way with any existing works, whether the property of the Employer or of a third party, whether or not the position of such works is indicated to the Contractor by the Engineer, except where such interference is specifically described as part of the Works, either in the Contract or in an instruction from the Engineer.

1.19 Material for the Works

All material shall comply with appropriate Standard Specifications unless otherwise required hereinafter.

The Contractor shall, before placing any order of materials, manufactured articles or machinery for incorporation in the Works, submit for the approval of the Engineer the names of the suppliers from whom he proposes to obtain such materials, manufactured articles or machinery, together with a list of the same, giving the origin, quality, weight, strength, description and other relevant details. No materials, manufactured articles or machinery shall be ordered or obtained from any suppliers which the Engineer has not approved in writing.

All materials shall be delivered to the Site a sufficient period of time before they are required for use in the Works, to enable the Engineer to take such samples as he may wish for testing and approval.

Notwithstanding the fact that approval has been given to the source of supply, the Engineer may forbid the use of any materials if, upon delivery, they are found to be defective, or he considers them unsuitable for incorporation in the Works. Such rejected materials shall be removed from the site forthwith.

The Contractor may propose alternative materials of equivalent quality to those specified, and subject to the approval, such materials may be used in the Works.

The Contractor shall have no claim against the Employer in respect of any financial loss which he may suffer as a result of the rejection of any such materials, and he shall also bear the cost of removing them from the Site.

The Engineer shall have the right to inspect materials and plant for the permanent works during the course of manufacture. The Contractor shall arrange for the right of access to manufacturing premises for the Engineer and his staff during normal working hours. The Engineer shall be given sufficient notice by the Contractor to allow him to observe the testing of any materials for the works at the place of manufacture. The Engineer shall also be given the opportunity to inspect any material or plant in their completed state prior to packing for transport to the site.

If requested by the Engineer, the Contractor shall provide to the Engineer copies of orders for the supply of goods or materials required in connection with the works.

1.20 Rejected Materials and Defective Work

Materials or work which, in the opinion of the Engineer, do not comply with the Specification, shall be classified as rejected materials or defective work, and shall be cut out and removed from the Works and replaced as directed by the Engineer.

1.21 Existing Works and Services

The Contractor shall acquaint himself with the positions of all existing works and services including water mains, storm water drains, cables, and service poles before any excavation is commenced.

The Contractor will be held responsible for any damage, however caused, in the course of the execution of the Works, to such existing works and services.

Such existing works and services, where exposed by the execution of the works, shall be properly shored, hung-up and supported to the satisfaction of the Engineer and of the authority concerned.

Poles supporting cables and the like adjacent to the Works shall be kept securely in place until the Works are completed and shall then be made as safe and permanent as before.

Notwithstanding the foregoing requirements and without lessening the Contractor's responsibility, the Contractor shall inform the Engineer immediately any existing works have been exposed and shall comply with any requirements of the authority concerned.

Only when and as directed by the Engineer shall the position of existing works or services be changed by the Contractor to meet the requirements of the proposed work.

The Contractor shall make adequate provision so that when carrying out his work, no interference, damage or pollution is caused to roads and footpaths, or to any mains, drains, and the like or other parts of the Works. Wherever loads have to be carried over ground in which pipes, valves, culverts, and the like are buried, the Contractor shall take all precautions including where necessary, the provision and use of sleepered roads, light gauge railways or other means to prevent damage occurring to such underground works. The Contractor shall not store any plant or materials or spoil heaps over existing water mains, or in such positions that interference with access to the mains, control gates and the likes is created. Approval by the Engineer to the means of protection employed shall not relieve the Contractor of any responsibility in respect of damage occasioned by his operations.

The laying of pipework, ducts, drains, and the like shall be arranged so as to cause as little interference as possible with the smooth operation of existing works.

When breaking out and making good existing structures, the Contractor shall disturb the existing structures as little as possible. All structures shall be made good with materials similar to those used in the existing works, or such materials which are considered by the Engineer to be of similar appearance and suitable in all other respects.

1.22 Existing Access

Existing access to lands, property and all other places shall be maintained by the Contractor during the continuance of the Works to the Engineer's satisfaction.

1.23 Liaison with Police and other Officials

The Contractor shall keep in close contact with the police and other officials in the areas concerned regarding their requirements for the control of workmen, movement of traffic, or other matters and shall provide all assistance and facilities which may be required by such officials in the execution of their duties.

1.24 Water and Power for Use on the Works

The Contractor shall be solely responsible for the location, procurement and maintenance of a water supply adequate in quality and quantity to meet his obligations under the Contract.

The Contractor shall be solely responsible for the location and continuity of the supply of water for use on the Works. Supplies may be derived from rivers and streams, but shall in all cases be to the Engineer's approval, and the abstraction of water from any sources shall not interfere with any permanent water supply. The Contractor shall be solely responsible for the transporting of water from its source to the point at which it is required for construction purposes, and in such quantities and quality as to enable the Works to proceed without hindrance due to the shortage of adequate water supplies.

The Contractor shall make his own arrangements for power supplies and shall be solely responsible for the location, procurement and maintenance of a power supply, adequate to meet his obligations under the Contract.

The Contractor shall make his own arrangements for the supply of adequate safe drinking water, electricity and other services to the Permanent Works, Temporary Works and Contractor's equipment and shall provide and maintain all pipes, cables and fittings which may be necessary to carry such services to his operations

1.25 Inspection by Engineer during the Defects Liability Period

The Engineer will give the Contractor due notice of his intention to carry out any inspection during the defects liability period. The Contractor shall, upon receipt of such notice, arrange for a responsible representative to be present at the times and dates named by the Engineer. This representative shall render all necessary assistance and shall take note of all matters and things to which his attention is directed by the Engineer.

1.26 Site Offices for the Engineer

The Contractor will construct and equip the site office as specified by PMU. See attached drawing.

1.27 Accommodation for the Engineer

The Engineer and his staff will arrange for their accommodation.

1.28 Survey Instruments and Chainmen for the Engineer

The Contractor shall provide and maintain in first class working order, for the sole use of the Engineer and his staff for the duration of the Contract, the following minimum survey instruments complete with all accessories, tapes, poles, staves, stagings, moulds, templates, profiles, and requisites necessary for checking and setting out, and measurement of the Works. The equipment shall revert to the Contractor at the end of the Contract period.

The survey equipment shall include the following or similar approved as a minimum:

Table 1-2: Survey Equipments

Description	Quantity
Automatic level machine	1
Tripod stand	1
Levelling staff	2
GTS 225 TOPCON Total station	1
Single Prism and target	3
Plumbing Pole tripod with bubble	3
50m measuring tape	1
Garmin GPS Set	2

1.29 Engineer's Laboratory

There will be no site laboratory. All samples will be taken to recognised laboratories approved by the Engineer. The Contractor shall allow for all the necessary labour and equipment necessary for the sampling.

1.30 Transport for the Engineer

The Engineer and his staff will be responsible for own transport arrangements.

1.31 Sign Boards

Before the erection of any sign boards or posters by the Contractor, the Contractor shall obtain the approval of the Employer and the Engineer to the size, location and wording of such sign boards or posters.

Unless otherwise agreed, the signboard shall be in seven sections. Section one shall contain:

Name of financing governments

- In white lettering on a blue background.
- The second section shall bear the words:

Names of the Program and Project

- in white lettering on a blue background.
- The Third section shall bear the words:

Name of the financiers

- in white lettering on a blue background.
- The Fourth section shall bear the words:

Name of the Employer

- in white lettering on a blue background.
- The fifth section shall bear the words:

Name of the implementing agency

- in blue lettering on a white background.
- The sixth section shall bear the words:

Name of the executing agency

- in blue lettering on a white background
- The Seventh section (Contractors' Board) shall bear the words: -

Name of the Contractor

- in blue lettering on a white background.
- Lettering on these boards shall be as directed by the Engineer.
- Further boards may be added with the names of sub-contractors.

1.32 Tracked Contractor's Equipment

The Contractor's tracked equipment may not be run on any public or private road without the written permission of the owner or authority concerned.

1.33 Fuel Supplies

The Contractor shall arrange for obtaining, storing and distributing all fuel oils required for the completion of the Works. The storage of fuel on site shall comply with the Petroleum Act and or Factories Act applicable in Kenya. Copies of this can be purchased by the Contractor at the Government Printer.

1.34 Telephone and Communications

The Contractor shall obtain suitable means of communications during the course of the Contract. The use of radio communications may be permitted but the Contractor shall be responsible for obtaining all the necessary permission and licences.

1.35 Preservation of Trees

No tree shall be removed without prior written permission of the Engineer who will limit the removal of trees to the minimum necessary to accommodate the Permanent Works.

If trees are removed or damaged by the Contractor or his employees, without approval, then the Contractor shall replace such trees.

Replacement of trees shall be with saplings more than two years of age, obtained from a reputable nursery and of a species approved by the Engineer. The Contractor shall plant, water and ensure that the replacement trees are properly established, all at his own cost.

1.36 Protection from Water

The Contractor shall keep the whole of the Works free from water and shall be deemed to have included in his Contract Sum all costs for pumping, shoring, temporary drains, sumps and other measures and provisions necessary for such purposes and for clearing away and making good to the satisfaction of the Engineer any damage caused thereby.

1.37 Protection against Fires

The Contractor is advised that, at all times, it is necessary to guard against fires starting within the Site or in the environs thereof, particularly as the result of the Works or from the actions of his employees. The Contractor shall have available, at all times, a trained fire-fighting team provided with adequate fire-fighting equipment and shall deal with all fires on the Site howsoever caused.

The Contractor shall be responsible for maintaining qualified firefighting crew on the Site at all times as well as maintaining an efficient fire alarm system. The Contractor shall also submit a fire prevention and fire-fighting program for the Engineer's approval.

The Contractor shall provide suitable and adequate firefighting equipment, to the satisfaction of the Engineer, for ready use at all the times in all the Engineer's site establishment including Contractor's residential quarters, labour camps and ancillary buildings. These shall be maintained until the completion of the construction and handing over of the works to the Employer.

The Contractor shall comply with laws and regulations regarding fires and with respect to the prevention of fires. No fire may be lit in the dry season without written permission from the Engineer and/or the relevant Authority.

1.38 Health & Safety Precautions

The Contractor's attention is drawn to the Circular Ref: KA/17/A/2(4) from Factories Inspectorate, Ministry of Labour, Notice No. 79 gazetted in the Kenya Gazette No. 56 (Legislative Supplement No. 38) in respect of the appointment of Safety Supervisors on Building and Works of Engineering Construction. In accordance with this requirement, the Contractor shall appoint a Safety Supervisor who shall be qualified in safety and familiar with the works being performed. The Safety Officer shall ensure that adequate measures and rules for the protection of health and safeguarding against accidents are enforced.

The Contractor shall take all necessary precautions against risks of loss of life or of injury to any person employed on the Works or to employees of the Employer and to the Engineer or to visitors or to persons having good and sufficient reasons to be about the Works, and to this end he shall properly safeguard the Works to the satisfaction of the Engineer.

The Contractor shall take all necessary precautions against risks of loss of life or of injury to any person employed on the Works or to employees of the Employer and to the Engineer or to visitors or to persons having good and sufficient reasons to be about the Works, and to this end he shall properly safeguard the Works to the satisfaction of the Engineer.

The Contractor shall at all times comply with any accident prevention regulations and any safety regulations peculiar to the various trades employed on the Works, and any safety regulations published by the Government.

The Contractor shall report promptly to the Engineer all accidents involving the death of or serious injury to any person on the Site or resulting from the Contractor's operations.

The Contractor shall, at his own expense, educate all his employees on safety precautions based on good practice on site. This shall be done in both English and Kiswahili languages. Safety instructions shall deal with all safety measures including but not be limited to the following; protective clothing, helmets and footwear, use of lifting equipment, precautions against electrical shock, welding, routine procedures in case of accidents, fires, etc., watchmen, warning notices and barriers, use of drilling equipment and dust suppression and use and storage of explosive.

1.39 Explosives and Fuels

The Contractor shall make arrangements to transport, store and handle explosives and fuels in a safe manner for protecting the public in accordance with the laws and security regulations in force in Kenya. In this regard, he shall submit a program to the Engineer for approval for the safe handling and storage of explosives and fuels. When approved, the Contractor shall issue a copy to each of his personnel involved with the handling of explosives and fuels.

The Contractor shall obtain all necessary licenses and shall pay all fees and charges in respect of the same as may be necessary for the purpose of moving explosives and fuels from place to place and storing the same, and shall make all applications and obtain approvals from the relevant authorities of the Government of Kenya.

The Contractor shall construct his explosives magazines at locations and in a manner complying with the relevant regulations of Kenya and approved by the Engineer. Detonators and fuse shall be stored in a separate magazine away from explosives. In no case shall they be transported in the same vehicle with explosives.

The Contractor shall provide adequate protective facilities to safely store and to prevent the loss or theft of explosives. Overnight storage of explosives and detonators outside of the magazines will not be permitted. Magazines shall be securely locked when not in use.

The Contractor shall maintain an inventory record of storage and withdrawal of all explosives including detonators. This record shall be available to the Engineer, and the Engineer shall be promptly notified of any loss or theft of explosives.

The Contractor shall supply and install sirens and loudspeakers systems, so that adequate warning may be given to all persons who may be endangered when explosives charges are to be fired. The Contractor shall ensure, prior to discharging explosives, that the area to be blasted is clear of all workmen, residents, pedestrians etc. In addition, he shall post flagmen on each of the roads entering the said area so as to stop and prevent any traffic from entering into the area until “all clear” notification is given.

During thunderstorms and other electrical disturbances, no charging and firing will be permitted.

1.40 Above Ground Fuel Storage Tanks

The fuel storage tank shall comply with BS 21, 1387, 799, 2594 and 5410 and shall have internal working pressure up to and including 0.4 bars, measured at the top of the tank, and a maximum internal vacuum of 10m bar. Unless otherwise shown on the drawings, the tank shall have a manhole whose centre shall be 450mm from one end. Filling point shall be fitted to the highest point in the tank shell and vent and dip point shall be fitted preferably at the centre of the manhole lid. The Contractor shall supply the dip stick.

The drain point shall be fitted at the lowest point in the tank and flush with the inside of the shell. This shall be at a minimum of 150mm from the ground level. The draw off shall be welded near the base of the tank on the vertical centre-line and at the opposite end to the drain.

The tank shall be suspended from the ground by saddle supports and the bond between the tank and the supports shall be broken by application of bituminous paint on the tank and the saddles. The tank shall be fitted with lifting tugs/hooks of sufficient strength at locations shown on the drawings. The location of the tank shall be firm ground with reinforced concrete slab with a provision of catch pits and sumps of sufficient capacities and to the satisfaction of the Engineer. A bund wall shall be provided round the hard standing concrete slab.

The tank shall be earthed in accordance with BS 7430 AND 6651. The earth system shall terminate with copper earth rod in earth test pit.

1.41 Watching, Fencing and Lighting

The Contractor shall employ competent watchmen to guard the Works both by day and night.

Any excavations, material dumps, spoil dumps or other obstructions likely to cause injury to any person or thing shall be suitably fenced off and at night marked by red warning lights.

Fences shall consist of at least three 15mm diameter hemp ropes or 4mm diameter wires, or more if required, stretched tightly between poles, and standards securely planted in solid ground, well clear of the excavation. The poles, and standards shall not be more than 15m apart, and where circumstances require, they shall be placed closer. Ropes or wires shall be stretched tight approximately 0.4m, 0.8m and 1.2m respectively above the ground. Banks of spoil may be accepted by the Engineer in lieu of fencing if of suitable height and form.

Fences and spoil banks shall be clearly marked at the ends, all corners, and along the length at intervals of not more than 15m by means of white lime washed boards, discs, stones or oil drums during the daytime and by red lamps burning at night. Markers shall be freshly lime washed at regular intervals to ensure that they are white and clean.

If a road is closed, or partly closed to traffic, temporary traffic and barricades shall be erected by the Contractor to the satisfaction of the Engineer and the police, or other relevant authority, to give proper warning to traffic and the public. Lettering on road signs shall be black on a yellow background and shall incorporate reflective material. The signs shall be adequately illuminated at night.

1.42 Soil Conservation

All precautions shall be taken by the Contractor to prevent the erosion of soil from any lands used or occupied by the Contractor for the purpose of the execution of the Temporary Works.

If in the opinion of the Engineer, the Contractor's operations in areas other than the permanent works caused soil erosion, the Contractor shall undertake soil conservation measures in these areas as directed by the Engineer. The details of the proposed soil conservation measures shall be submitted by the Contractor for the Engineer's approval prior to the execution of the said works.

All soil conservation measures shall be carried out at the earliest possible time, as approved by the Engineer, to ensure that the required protection is established most effectively during the progress of Works.

No separate payment will be made for the soil conservation measures and such costs shall be deemed to be included in the respective unit rates and the Contract Sum

1.43 Dust Abatement

During the performance of the work the Contractor shall carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance resulting from his operations. Measures shall include, but not be limited, to installation of dust suppression units on his rock drilling equipment, watering down of excavated material during loading operations, and use of water tankers to sprinkle access roads, disposal areas, etc.

The Contractor shall be held liable for any damage to crops, cultivated fields and dwellings of persons in the neighbourhood of the Works resulting from his operations.

No separate payment will be made for the dust abatement measures and the costs thereof shall be deemed to be included in the respective unit rates and the Contract Sum

1.44 Noise Control

All work shall be carried out without unreasonable noise. Compressors used on site shall be silenced either by using only full silenced models or fitted with effective exhaust silencers and properly lined and scaled acoustic covers all to the design of the manufacturers of the compressor or by the use of effective acoustic screens to enclose the noise source. Pneumatic percussion tools used on Site shall be fitted with silencers of a type recommended by the manufacturers of the tools. Compressors, silencers or other equipment shall be maintained in good and efficient working order.

No separate payment will be made for noise suppression measures and the costs thereof shall be included in the unit rates and the Contract Sum.

1.45 Sanitation

The Contractor shall provide adequate sanitation and refuse collection and disposal facilities complying with state laws and local by-laws for all houses, offices, workshops, and the like, erected on the site, all to the satisfaction of the Engineer.

The toilet facilities provided at the site by the Contractor shall be made available, free of charge, to the employees of the Contractor and any of his subcontractors.

The Contractor shall warn his employees and sub-contractors that any employee found fouling the site shall be removed from the site immediately in accordance with the Conditions of Contract.

The Contractor shall remove all rubbish and to this end shall provide adequate number of covered garbage bins/containers placed at convenient points around the site establishments. The Contractor shall institute and maintain a regular garbage collection and disposal system. Garbage shall be disposed of by burial or by other means approved by the Engineer.

No separate payment will be made for such sanitary arrangements and all such costs will be deemed to be included in the unit rates and Contract Sum.

1.46 First Aid and Medical Services

The Contractor shall provide and maintain all equipment necessary to render First Aid in case of accidents, snakebites or other emergencies. This equipment shall be kept in readiness at the sites of the works, at camps and wherever the Contractor's staff may regularly live and work. The Contractor shall ensure that there are persons available to all such places with knowledge of simple First Aid procedures and able to administer snakebite treatment.

Notwithstanding the minimum requirements prescribed above, the Contractor shall be responsible for the adequacy of all the arrangements made.

1.47 HIV/AIDS Awareness

The Contractor shall take proactive steps to prevent and respond to social risks, including conducting HIV/AIDS sensitization and awareness campaigns for workers and ensure non-discrimination against HIV-positive workers.

1.48 GBV/SEA/SH Mitigation and Response

The contractor shall develop and implement a **GBV/SEA/SH Action Plan**, including: Codes of Conduct (CoC) for all staff and subcontractors, signed and enforced, mandatory training for workers on acceptable behaviour, GBV, SEA, and SH, reporting protocols, grievance mechanisms, and referral pathways for survivors, ensure separate and safe sanitation facilities for women and men on site and include women in decision-making processes and encourage employment of women.

1.49 Pollution

During the execution of the Works, the Contractor shall ensure that no pollution of existing watercourses is allowed to take place as a result of his operations. The Contractor shall take all reasonable steps to protect the environment on and off the site and to avoid damage or nuisance to persons or to property of the republic or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

1.50 Restoration of Drains, Streams, Canals etc

Subject to any requirement of the Works whereby a permanent change is to be effected, all drains, canals, pipes, channels, water-courses or streams temporarily cut through or disturbed

by the excavation of the Works are to be restored so that the water flowing in them may continue to flow in as full and free manner as it did before the disturbance.

1.51 Site Clearance

On completion of the Works, the Contractor shall clear the site and remove all temporary buildings, equipment and debris. The Contractor shall level off and grade all areas used for haul roads and all building, store and workshop areas. The whole of the site shall be left in a clean and tidy condition.

1.52 Weather Records

The Contractor shall erect a rain gauge (“Nylex 600” or similar approved) and a double bulb, minimum/maximum thermometer (0.1°C accuracy) at a site agreed with the Engineer. The Contractor shall be responsible for the daily measurement of rainfall and minimum and maximum temperature to be taken at 8:00a.m each day.

1.53 Tolerances

All works shall be constructed to the tolerances shown in Section 8 of these specifications.

1.54 Grievance Redress Mechanism

The contractor should maintain a Grievance Manual Register on grievances recording and resolution

1.55 Incidents/accidents

The contractor to document Incidents and Accidents Notification, especially those that have a significant adverse effect on the environment, the affected communities, the public or workers; and the immediate measures taken or that are planned to be taken to address it. The incidents accidents to be reported within 48 hours to the Project Engineer.

1.56 World Bank Environmental and Social Standards (ESS)

In addition to the Country existing Policy, Legal and Institutional Framework as outlined in the ESIA report, the contractor is should ensure compliance to the applicable ESS in order to reduce, minimise and mitigate risks and impacts of the subproject during the construction phase.

1.57 Environmental Monitoring and Evaluation

During supervisory site visit the contractor should prepare and avail all the compliance updated documents (visitors book, incident/accident register, Labour Masteroll, ESMP, copy of ESIA among others) as guided by Project Manager /CIT teams. The contractor should closely liaise with the site Environmental specialist in facilitating the process.

1.58 Units and Abbreviations

The units of measurement used in these Contract Documents are metric.

The following abbreviations have been used for units and for other words or phrases as indicated.

Abbreviations in the Contract Documents shall have the following meanings:

mm	millimetre
m	meter
km	kilometre
sq.m,m ²	square metre
ha	hectare
cu m,m ³	cubic metre
sec,s	second
hr	hour
min	minute
wk	week
l	litre
gm	gram
kg	kilogram
t	tonne
No	Number
nr	Number (in bill of quantities)
dia	diameter
max	maximum
min	minimum
AD	above datum (levels in metres)
ch	chainage (distance in metres)
eo	extra over
e	exceeding
ne	not exceeding

PQ	Provisional Quantity
PS	Provincial Sum
Do	Ditto
fob	free on board
cif	cost, insurance, freight
wt	weight
%	percent
mh	manhole
ic	inspection chamber
HYS	high yield steel
PCC	precast concrete
uPVC	uplasticised polyvinylchloride
GMS	galvanised mild steel
DI	ductile iron
SV	sluice valve
ISO	International Standards Organisation
KS	Kenyan Standard
BS	British Standard
Kshs.	Kenya Shillings

2 EARTHWORKS

2.1 Site Clearance and Stripping

General clearance is defined as the clearing, grubbing, removal and disposal of all vegetation, grass, debris, bushes, dense bush, trees, hedges, undergrowth, stumps, roots, shrubs, plants and backfilling of holes left by the removal of stumps and roots.

The widths and lengths over which site clearance is to be carried out shall be instructed by the Engineer. Site clearance over the area of quarries, borrow pits, stockpiles and spoil tips shall be carried out where instructed by the Engineer. The Engineer may give instructions that specific trees, stumps or objects shall not be removed during site clearance operation.

If termite moulds are excavated, the whole of the mould shall be removed.

Where the Engineer instructs that site clearance is required, the entire area shall be cleared and all materials thus cleared shall become the property of the Employer. Unless otherwise instructed, vegetation and perishable materials shall be carted to spoil areas, which spoil areas shall be provided in accordance with requirement of this Specification.

If the Contractor clears the Site in advance of the main Works such that the grass and other vegetation re-grows prior to the main Works commencing at any particular location then any additional, or repeating of, site clearance required shall be at the Contractor's expense.

When instructed by the Engineer, the Contractor shall demolish wholly or in part, remove and dispose of all buildings, foundations, structures, fences and any other obstructions which have not been designed to remain.

The Contractor shall carefully take down such buildings, structures, fences etc. and the components shall be dismantled, cleaned and stacked in separate heaps. All materials which, in the opinion of the Engineer, are not fit for re-use shall be removed from the site to spoil areas provided in accordance with the requirements of this Specification. All materials, which are re-usable, shall remain the property of the Employer and shall be preserved and protected by the Contractor until removed by the Employer or until the expiry of the Defects Liability Period.

All existing paths, fences, walls, hedges, trees, shrubs, lawn and other features which the Engineer instructs not to be removed or otherwise dealt with, shall be protected from the

damage, and any damage which occurs due to the Contractor's failure to take adequate precautions shall be repaired at the Contractor's expense.

Site clearance shall be measured in square metre, calculated as the plan area instructed by the Engineer to be cleared. The rate for the site clearance shall include for the cost of complying with the requirements of Clauses 2.1, 2.13 and 2.14.

Stripping work shall basically consist of removal of top soil, grasses, vegetative material to a depth of 150mm below ground level and its disposal to a stockpile. Stripping shall include for removal, stockpiling and for reinstatement or spreading as directed by the Engineer. Measurement and payment of this shall be in square metres, calculated as the plan area instructed by the Engineer.

2.2 Surface Levels

After the area of any section of the Works has been cleared and after trees have been felled, stumps removed and termite mounds excavated to the satisfaction of the Engineer, but before any other work is commenced, surface levels of the ground shall be taken. The levels shall be taken at spacing agreed with the Engineer. Levels shall similarly be taken on the surface of the ground after the removal of unsuitable overburden prior to placing fill and at the interface between natural ground, rock or artificial hard material layers. The levels shall be agreed with the Engineer. The Contractor shall prepare plans and sections which shall, when finally and mutually agreed, be signed by the Engineer and Contractor as truly representing the configurations of the areas in question at the commencement of excavation or fill construction.

2.3 Definition of Earthwork Materials

The following definitions of earthworks materials shall apply to this and other Clauses of the Specification in which reference is made to the defined materials:

- “top soil” shall mean the top layer of soil that can support vegetation;
- “Suitable material” shall comprise all material which arises from excavations within the Site and which is approved by the Engineer as acceptable for use in the works;
- “Unsuitable material” shall mean material other than suitable material and shall comprise:
 - material from swamps, marshes and bogs,
 - logs, stumps and perishable materials,
 - material susceptible to spontaneous combustion,
 - clay of liquid limit exceeding ninety (90) and/or plasticity index exceeding sixty five (65).

“Rock” or “hard material” shall be material which cannot be ripped to an average depth of greater than 300 mm by a track type crawler tractor complying with the following:

- in good order complete with all equipment and accessories as supplied;
- rated 300 BHP flywheel power or over;
- with an operating weight of not less than 37.2 tonnes;
- equipped with a hydraulically operated single tine ripper compatible with the tractor used; and
- operated by a qualified operator in accordance with the manufacturer's recommendations and to the satisfaction of the Engineer.

Where it is impractical to prove hard material by the above method then the quantity of hard material, if any, shall be determined by the Engineer.

Where excavation contains individual boulders of hard material greater than 0.3m³ each in volume then such boulders shall be classified as hard material.

- (d) “soft material” material shall mean all material other than that defined as “rock” or “hard material”.

2.4 Removal of Unsuitable Material

Where directed by the Engineer the Contractor shall remove unsuitable material to the depth as ordered or agreed by the Engineer and shall dispose of it in approved spoil tips.

2.5 Excavation General

Excavation shall be carried out with the allowances for working space given in the Method of Measurement to the Bill of Quantities, unless otherwise shown as lines, levels and profiles on the Drawings or to such other lines, levels and profiles as the Engineer may direct or approve in writing. The work shall be carried out by the Contractor in such a way as to avoid disturbance to the surrounding ground. Particular care shall be taken to maintain stability when excavating in close proximity to existing works.

The work shall be carried out in a careful manner to ensure that the exposed surfaces are as sound as the nature of the material permits and that no point shall protrude inside the lines shown on the Drawings except as otherwise specified or agreed by the Engineer. In soft excavation, which is to remain open permanently, exposed faces shall be formed accurately to the required slopes and profiles. Excavations in rock where the faces shall remain open permanently shall be trimmed so that no point protrudes within the required profile.

The Contractor shall examine all excavated faces regularly and shall remove all insecure material or materials resulting from any falls. Where instructed in writing by the Engineer, the Contractor shall wash down exposed surfaces of excavated rock for inspection.

The Contractor shall dispose of all material arising from excavations. If it is suitable and required for the Permanent Works it shall be placed directly in such Works or set aside for use as and when required in suitable approved dumps, otherwise it shall be removed to tips provided by the Contractor unless otherwise provided or directed by the Engineer.

The Contractor shall be responsible for keeping all excavations free from water from whatever cause arising and shall provide such pumping capacity and other measures as may be necessary for this purpose. The Contractor shall make good any damage that may result from his failure to keep the excavations free from water.

All excavation shall be carried out with care and the method and Contractor's equipment to be used in execution thereof shall be to the satisfaction of the Engineer. The Contractor shall be responsible for the safety and security of all excavations at all times during the execution of the contract and where necessary shall provide timbering, shoring or other measures required by the Engineer to prevent movement or loss of ground outside the boundaries, settlement of or damage to property, or injury to persons. The Contractor shall make good any damage to structures, services or other properties caused by such movement, loss of ground and settlement. The Contractor shall also take precautions to route his equipment in such a manner

as to minimise the likelihood of slips occurring due to vibration or surcharge from the working or movement of heavy machinery.

The Contractor will be permitted, subject to the approval of the Engineer, to adjust side slopes of excavations in soft materials which are to remain open temporarily in preference to shoring or strutting. However no payment shall be made for extra excavation volume as a result of these measures.

The Contractor shall notify the Engineer without delay of any permeable strata, fissures or unusual ground encountered during excavation.

2.6 Blasting

The Contractor shall not be permitted to use explosives for rock excavation without the approval of the Engineer. The Contractor shall only employ suitably qualified and experienced personnel to manage and supervise blasting operations. For each blasting operation, the Contractor shall submit to the Engineer for approval a statement detailing the type of explosives to be used, method of transport, storage, blasting procedures, safety precautions to be observed and the names and experience of the personnel who will supervise the work. Notwithstanding the Engineer's approval, the Contractor will be responsible for the blasting operations and shall accept full and absolute liability for any claims resulting either directly or indirectly from the use of explosives on the Site.

The blasting operations shall comply in every respect with the regulations and laws covering the use of explosives and the Contractor shall be responsible for obtaining all necessary permits.

2.7 Excavation beyond Line or Level

If from any cause whatsoever excavations are carried out beyond their true line and level other than on the instructions of the Engineer, the Contractor shall make good to the required line and level with the appropriate grade of filling to be contained in the true excavation, or with concrete or other approved material in such a manner as the Engineer may direct. This shall be at the Contractor's expense.

2.8 Approval of Excavation

When excavations have been taken out accurately to the profiles or dimensions required for the work the Contractor shall inform the Engineer who shall carry out an inspection of the excavation. If, after his inspection the Engineer requires additional excavation to be carried out, the Contractor shall do so to such new profiles or dimensions as the Engineer may direct.

2.9 Excavation for Structures

Open excavation to form a foundation for a structure shall be carried out to the lines necessary to permit the proper construction of the structure to the approval of the Engineer.

Where a structure is to be founded on soft ground, the excavation shall be taken down until the required formation is exposed and prepared to the approval of the Engineer. Where concrete has to be placed on a soft foundation, the Engineer may direct that a blinding layer of lean concrete be placed beneath the structural concrete immediately after completion and approval of the excavation, or require the Contractor to remove the last 100mm of excavation immediately prior to placing the concrete. If foundation conditions are very soft the Engineer

may instruct that additional material be excavated and replaced with compacted gravel or hardcore.

Where a structure is required to be founded on rock but is not required to penetrate into it, all soft overburden shall be removed and the surface of the rock cleared of any loose material by barring and wedging. Where the foundation is required to penetrate into the rock, excavation of the rock may be carried out by blasting but in such a manner as to prevent the shattering of the rock which is to remain. The Engineer may direct that the last 300mm of rock be left and be removed by barring and wedging or by the use of approved pneumatic tools so that the exposed surface is sound.

The Contractor shall report to the Engineer whenever excavations are ready to receive concrete. No concrete shall be placed in the foundations until the Contractor has obtained the Engineer's agreement that a secure foundation has been reached and that the excavation has been carried out to the lines and levels required.

2.10 Excavation for Fill Foundation

Foundations for embankments shall be excavated to the depths or to the soil or rock grade indicated on the Drawings or described in the Specification. The suitability of each part of the foundation for placing fill thereon shall be determined by the Engineer. No fill shall be placed before acceptance of the foundation by the Engineer and recording of the geology.

Where specified in the Drawings or Specification or directed by the Engineer, seams and other defects below the general level of the foundations shall be excavated and filled or covered with materials including mortar and concrete to the satisfaction of the Engineer before fill is placed thereon.

Where embankments are to be constructed on sloping ground, and where shown on the Drawings, benches shall be excavated in the foundations to the dimensions shown on the Drawings.

Except where specifically permitted by the Engineer all foundations for fill shall be kept free of water when placing fill thereon.

Earth foundations shall have the top 150mm sufficiently moistened and, if necessary, harrowed or scarified and compacted to at least ninety five per cent (95%) of the maximum dry density as determined by the AASHTO T99. Material too wet to be so compacted shall, as directed by the Engineer, be allowed to dry, harrowed or scarified to reduce the moisture content to the required amount and then be re-compacted.

2.11 Trench Excavation

Trench excavation shall be performed by the use of hand tools and approved mechanical equipment, in such manner as to minimise disturbance of the sides and bottom of the excavation.

Trenches for pipes shall be excavated to a sufficient depth to enable the pipe and the specified joint, bedding, haunching and surround to be accommodated. Unless otherwise stated, the width of the trench shall be equal to the nominal diameter of the pipe plus 600mm.

The Contractor shall fill any over excavation beneath the pipe or bedding at his own cost with well rammed selected general excavation material as per requirement of this Specification. The Contractor shall dispose of surplus excavated material not required for backfill to spoil tips.

The sides of trenches shall be adequately supported at all times. Alternatively where the Contractor has to excavate the trenches in open cut the Contractor shall ensure that the side slopes of the excavation are sufficient for stability.

Where rock or boulders are present in the sides or base of a trench in which a pipe is to be installed, the trench shall be trimmed so that when the pipeline is laid, no projection of rock comes within 200mm of the outside of the pipe at any point. The over excavated portion shall be backfilled as set out in this Specification with approved granular material at the Contractor's expense.

The Contractor shall be entirely responsible for the sufficiency of all temporary supports and side slopes to the excavations. The excavation shall be carried out in such a way as to maintain the stability of all roads and other adjacent structures or works.

2.12 Channel Excavation

The excavation of all channels shall be executed in such a manner as to ensure that the stability of side slopes is not endangered. Should slips or undercutting occur for reasons attributable to the Contractor's negligence or method of working, the Engineer will give instructions for remedial works to be carried out by the Contractor at the expense of the Contractor.

Where channels are to be reshaped, cleared and trimmed, the width, depth, side slopes and centre line radius shall be as shown on the Drawings. The Contractor shall clear all weeds and growth from existing channels and grade the beds to required levels. The area of waterway shown is the minimum required and sides of channels shall be trimmed to the required slope so as to provide widths not less than those shown on the Drawings.

Any channels, streams, drains or pipes taking water to or from cultivated land shall be diverted so as to maintain their flow before being moved or broken into unless express permission to the contrary is given by the Engineer. All diversions and their subsequent reinstatement are to be carried out to the satisfaction of the Engineer. The Contractor shall be deemed to have included the cost of dealing with this in his rates.

Side banks of channels shall be trimmed to a neat appearance and even surface.

In the construction of channels and embankments a local balance of cut and fill shall be maintained as far as possible unless the cut is unsuitable material or is specified in the drawings that the fill should be imported. A deficiency of fill material shall be made up by bed borrow or gleaning. Surplus material, if suitable and approved by the Engineer may be used for an increased width of embankment otherwise it may be spread at the toe of the embankment or placed on spoil tips as directed by the Engineer.

Where required the Contractor shall control the rates of filling and draw-down of water in channels so as not to endanger the stability of earthworks.

2.13 Disposal of Excavated Material

Material obtained from excavations which are suitable for forming embankments or other fill areas shall be placed directly in the Works or set aside for use as and when required in suitable approved dumps. Any such suitable material which may be surplus to the total requirements of the Works shall be taken to spoil in tips provided by the Contractor, unless otherwise provided or permitted by the Engineer.

If the Contractor is permitted to remove suitable material from the site to suit his operational procedure or to take such material for purposes other than forming embankments or other fill areas, he shall make good any consequent deficit of filling arising there from, unless otherwise agreed by the Engineer.

All material not suitable for embankments or other filling shall, unless otherwise directed by the Engineer, be taken to separate spoil tips provided by the Contractor.

The cost of disposal of surplus or unsuitable materials shall be deemed to be included in the respective unit rates for the excavation work and the Contract Sum.

2.14 Spoil Tips

The Contractor shall be responsible for the provision and sufficiency of tips for the permanent disposal of spoil and shall select their location within the general areas indicated on the Drawings or as otherwise designated or approved by the Engineer. The Contractor shall submit his proposals for the locations and detailed treatment of tips to the Engineer for approval, which will in no way relieve the Contractor of his responsibilities and obligations under the Contract, whether or not locations are shown on the Drawings or otherwise designated.

No spoil shall be permanently deposited elsewhere than on approved spoil tips unless approved by the Engineer. Spoil tips shall be built up and compacted and trimmed and regulated to levels and profiles approved by the Engineer. Where directed by the Engineer, upper surfaces and slopes of the tips shall be soiled to specified thickness.

2.15 Borrow Pits and Quarries

Where there may be an insufficiency of suitable material from excavations for filling or is specified on the drawings, the Contractor shall obtain such material from borrow pits or quarries approved by the Engineer where the filling is required for Permanent Works. The Engineer may propose a borrow pit for exploration by the Contractor, however, it shall be entirely the responsibility of the Contractor to locate suitable sources of borrow material for fills.

The Contractor shall investigate the site or sites which they propose to open up and shall provide full and detailed information by means of boreholes, trial pit testing reports, etc. to satisfy the Engineer that the quality of the material meets Specification requirements and that the quantity is adequate for the Works.

Notwithstanding the foregoing, the Engineer shall have the right to order the Contractor to obtain materials from a particular designated source or by widening cuttings for permanent works beyond specified profiles.

The Contractor shall provide equipment and make all other arrangements for excavating, loading and transporting material of the specified quality for completion of the Works in accordance with the agreed programme. These provisions shall include where necessary for any operations involving selection, stockpiling and rehandling of suitable material, the disposal of unsuitable material or overburden and any other operations which may be found necessary due to the nature and disposition of the excavated materials.

The pits and quarries shall be operated in a safe manner provided with ample drainage leaving no stagnant pools. On completion of the Works they shall be left free-draining and in a tidy and regular state. All loose material shall be barred down and no face shall be left overhanging except with the approval of the Engineer.

The removal of vegetation, topsoil and overburden at the borrow pits shall not be paid for separately. Contractor will be deemed to have allowed for the costs elsewhere in his rates. The same applies to any works required to access the borrow pits.

The rate for fill shall include for the supply of material inclusive of extraction, loading and transportation to Site for a maximum haulage distance of 30km, one way. Where suitable borrow pit is not available within this distance, overhaul will be paid for. Measurement shall be the product of the volume of compacted material insitu and the haulage distance in excess of 30km, one way, along the shortest route, as determined by the Engineer. The Contractor shall be responsible for the maintenance of this selected route, at his own cost.

2.16 Earth Filling

Material for filling shall be obtained from approved sources and shall not contain more than 1% of vegetation matter, rubbish and humus material and shall contain no boulders or rock of a size greater than half the compacted thickness of the layer. No material shall be used which is so uniformly graded that D_{60} divided by D_{10} is 4 or less, where D_{60} and D_{10} are sizes such that 60% and 10% by width of the particles are finer than D_{60} and D_{10} respectively.

Unless otherwise specified the fill material for the stilling basin embankments shall meet the following requirements:

- CBR after 4 days soaking compacted to 100% of AASHTO T99 at optimum moisture content of not more than 3%.
- Plasticity Index (PI) of more than 40%.
- Permeability of less than 1×10^{-6} mm/s

Prior to commencement of filling, the Contractor shall submit in writing to the Engineer for approval his proposals for carrying out the work such that the optimum use may be made of excavated material as far as possible. The proposals shall include the compaction equipment and methods for adjusting the moisture content of the material which he intends to use. No filling shall be carried out until the proposals and the material intended to be used are approved by the Engineer.

Fill shall be placed in layers not exceeding 150mm compacted thickness, each layer being scarified and thoroughly compacted to obtain a dry density not less than 95% of the maximum dry density as determined by AASHTO T99. The moisture content shall be adjusted as necessary to achieve the compaction standards.

The Contractor shall take all necessary measures to prevent any damage or defects to the Works which may be caused by settlements, slips or falls of embankments and shall make good such damage or defects as may occur to the satisfaction of the Engineer, all at his own cost.

Any instability of any adjacent excavation resulting from the embankment not being formed to the lines, levels and profile shown in the Drawings or as ordered by the Engineer will be the responsibility of the Contractor. Where double-handling of excavated material is necessary, the Contractor will be responsible for the temporary disposition of the material such that it does not endanger the stability of the excavation.

2.17 Backfilling of Structural Excavations

Backfilling of structural excavations shall be carried out with excavated material selected or approved by the Engineer. The material shall be placed in layers not exceeding 150mm compacted thickness or such other thickness as the Engineer may approve or direct and shall be compacted as specified in Clause 2.16.

When material is filled up to or over any structure, the filling shall be brought up equally on each side or as otherwise agreed by the Engineer so that no unequal pressures likely to cause damage to the structure are applied.

2.18 Filling under raised foundations

The material to be used as filling under raised foundations shall consist of suitable material obtained from adjacent excavations or approved borrow sources, and shall be placed in layers not exceeding 100mm compacted thickness. The material shall be compacted in accordance with Clause 2.16.

2.19 Frequency of Testing

Testing will be carried out as instructed by the Engineer with the following being the minimum testing frequencies:

- Field Dry Density Moisture Content Test. Every 500m² of compacted fill layer placed or at least 2 tests in any one length of compacted fill, whichever is greater.
- Particle Size Sieving Analysis, Atterberg Limits and AASHTO T99 test. Every 1000 cubic meters of compacted fill or at least 2 tests in any one length of compacted fill, whichever is greater.
- The apparatus for these tests and the manner in which they are carried out will be as described in BS 1377/1990 and AASHTO T99. All results of these tests shall be submitted to the Engineer with the least possible delay.

2.20 Granular Bedding

Granular bedding material shall comply with BS EN 12620 for aggregates within the sizes range 14mm to 5mm. Material complying with BS EN 12620 except in respect of grading may be used provided that it has a maximum size not exceeding 14mm.

2.21 Grassing

Before planting grass, all areas to be planted shall be cleared of stones and any other non-organic matter. Planting shall be carried out when directed, and the Contractor shall keep all grassed areas watered and weed free until the expiry of the Defects Liability Period. Any areas which have failed shall be replanted by the Contractor, at his own expense.

2.22 Slopes and Batters

Where a slope is given in the Specification or on the Drawings as a ratio of vertical and horizontal components, it shall be understood that the first component is vertical in all cases example. a “slope of 1 in 2” will mean one vertical in two horizontal and a “batter of 4 to 1” will mean four vertical to one horizontal. This meaning will be attributed to all other terms such as “inclination” and “gradient”.

2.23 Trial Pits

The Contractor shall excavate, maintain and afterwards refill any trial pits ordered by the Engineer. The sides of the pits shall, where deemed necessary by the Engineer for safety purposes, be supported by sheeting or boarding with adequate framing. A ladder shall be provided for inspection purposes.

2.24 Sheet Piling

Where shown on the drawings or instructed by the Engineer the construction of sheet piling shall comply with the codes of practice for earth retaining structures, BS 8002: 1994.

3 CONCRETE

3.1 Concrete General

Concrete shall consist of cement, graded aggregate and water carefully proportioned, thoroughly mixed, placed and compacted as specified.

The Contractor shall obtain formal approval from the Engineer before pouring any concrete for the permanent works. The Engineer shall allow concreting after ascertaining the required lines and levels, suitability of formwork, availability of required equipment and labour, proper fabrication and spacing of the steel bars and quality and quantity of cement and aggregates.

3.2 Cement

Cement for use in the permanent works shall be Ordinary Portland Cement from an approved manufacturer and shall be type CEM I 32,5N complying with BS EN 197-1. Where sulphate-resisting cement is specified, it shall comply with BS 4027.

All cements shall be certified by the manufacturers as complying with the requirements of the specification. Before orders are placed the Contractor shall submit details of the proposed supplier(s) together with such information on the proposed methods of transport, storage and certification so that the Engineer may satisfy himself that the quantity and quality required can be supplied and maintained throughout the construction period. Where necessary the Engineer may require representative samples of the proposed cement to be taken and forwarded to a nominated laboratory for analysis and testing before the source is approved.

No cement shall be used in the Works until deemed satisfactory by the Engineer.

3.3 Supply of Cement

Cement shall be obtained from one manufacturer unless otherwise authorised by the Engineer. Should the use of cement from different manufacturers be authorised, the different supplies of cement shall be stored separately and shall not be mixed.

The Contractor shall supply to the Engineer copies of the manufacturer's test certificates certifying that each consignment of cement has been tested and analysed, and that the results comply in all respects with the above standards. Each certificate shall state clearly the date of despatch and the number of bags despatched in each consignment.

Bagged cement shall be delivered in sealed 50kilogrammes sacks. Each bag shall be marked with the parcel number of the cement contained. Bagged cement shall be transported so that at no time is it exposed to damp and so that moisture cannot be absorbed from the atmosphere. Cement in bulk shall be transported in totally enclosed water tight and sealed containers.

If cement is obtained from an intermediate agent, such agent's arrangements for transporting and storing cement shall be to the approval of the Engineer.

3.4 Storage of Cement

The Contractor shall provide sufficient storage capacity on Site to ensure that his anticipated programme of work is not interrupted due to lack of cement. Factors outside the Contractor's control such as transport, weather conditions, holidays and breakdowns shall be taken into account.

Cement delivered to the Site in bulk shall be stored in dry, well ventilated weather proof silos or bins which shall be self-clearing. Cement delivered to the Site in bags shall be stored in dry, weather-proof sheds which shall have floors of damp proof construction raised at least 150mm above the surrounding ground.

Cement of different consignments shall be stored separately and consignments shall be used in the same order as they are delivered to the site. No cement shall be stored on the site for longer than three months from the date of despatch by the manufacturer. If not used within that period, the cement shall be removed from the site.

Any bag of cement which is damaged or found to contain cement which has set or partly set, shall be discarded and not used in the Permanent Works.

3.5 Testing of Cement

Cement shall be tested by the manufacturer. If the manufacturer's test certificate is not made available, representative samples shall be taken from different bags or containers of each consignment. They shall be suitably packed and sent to an approved laboratory for testing to prove the cement's compliance with the specified standards.

The Engineer may require cement to be tested after its delivery to the site. Any cement which has been in store at the site for longer than one month shall be re-tested.

The Engineer may take samples of cement from cement bins or bagged cement, from a parcel of cement after its delivery to the site, or from a parcel of cement which has been stored at the site for longer than one month.

In addition to the manufacturer's tests the Engineer may require the following tests to be carried out to BS EN 196-3:

- Comprehensive strength;
- Soundness.

Any cement which fails to meet the specified requirements shall not be used in the Permanent Works.

3.6 Aggregate for Concrete

3.6.1 General

Aggregates for concrete shall comply with BS EN 12620, and shall be obtained from a source or sources approved by the Engineer and shall be transported and stored in such a manner as will prevent:

- Contamination of the aggregates from the ground, rubbish, vegetation, dust or any other foreign material.
- Segregation.
- Intermixing of aggregates of differing characteristics.

Before aggregates from each source are approved for use in the Permanent Works, tests shall be carried out at an approved testing laboratory on representative samples submitted by the Contractor to check that the aggregates comply with the requirements of the Specification.

During concreting operations, tests shall be carried out to check that aggregates delivered for use in the Permanent Works comply with the requirements of the Specification.

Sampling and testing of aggregates for concrete shall be carried out in accordance with the requirements of BS 812 except where described otherwise.

Moisture contents of aggregates shall be determined as the moisture content of the aggregate compared with that of the aggregate in the saturated surface-dry condition. Specific gravities of aggregate shall be determined on aggregate in the saturated surface-dry condition.

Aggregates shall be stored on a clean, free draining surface. The various types and sizes of aggregates shall be kept separate from each other and each stockpile shall be kept as large as possible to maintain a reasonably uniform content in the aggregate.

3.6.2 *Fine Aggregates*

Fine aggregates shall be clean and durable and shall be natural sand, crushed gravel sand or crushed rock sand complying with BS EN 12620. All the material shall pass through a 5 mm BS sieve. In order to achieve an acceptable grading, it may be necessary to blend materials from more than one source.

As an alternative, fine aggregate for mortar only shall comply with BS 1199 and 1200.

The fine aggregate shall not contain iron pyrites or iron oxides. It shall not contain mica, shale, coal or other laminar, soft or porous materials unless the Contractor can show by tests on finished concrete as set out in BS EN 12390 that the presence of such materials does not adversely affect the properties of the concrete.

The proportion of clay, silt and other impurities passing a 75 microns BS sieve shall not exceed three per cent for natural or crushed gravel sand or 15 per cent for crushed rock sand. The shell content shall not exceed 15 per cent by weight.

Chlorides soluble in a 10 per cent solution by weight of nitric acid shall not exceed 0.05 per cent by weight expressed as chloride ion when tested as set out in BS 812, subject to the further restriction given in the note on total chloride content in sub-clause 3.5.5.

Soundness: After five cycles of the test set out in ASTM C88-76, the aggregate shall not show a weight loss of more than 10 per cent.

Samples taken from the fine aggregate shall pass the colour test for organic impurities described in Sub-Clause 3.6.4.

Tests on fine aggregates shall be carried out daily or as required by the Engineer on site during concreting operations as follows:

- Sieve analysis
- Moisture content. An approved “rapid” test may be used for this test.
- Percentage of material passing a 75 microns BS sieve by the Field Settling Test, checked when necessary by the Decantation Method.
- Test for organic impurities as described in sub-clause 3.5.4.
- The Contractor shall arrange to carry out the following tests when requested by the Engineer:
 - Specific gravity and water absorption.
 - Bulk density.
 - Other tests described in BS 812.

3.6.3 Coarse Aggregates

Coarse aggregates shall be clean, hard and durable crushed rock, crushed gravel or natural gravel complying with the requirements of BS EN 12620. The material shall be frost resistant and shall not contain any iron pyrites, iron oxides, flaky or laminated material, hollow shells, coals or other soft or porous material, or organic matter. The pieces shall be predominantly angular, rounded or irregular as defined in BS 812.

Coarse aggregate shall be supplied in the nominal sizes called for in the Contract and shall be graded in accordance with BS EN 12620 for each nominal size.

The proportions of clay, silt and other impurities passing a 75 microns BS sieve shall be not more than one per cent by weight.

The content of hollow and flat shells shall not be such as will adversely affect the concrete quality when tested as set out in BS 1881. The total shell content shall not be more than the following:

- | | |
|-------------------------------|---------------------------|
| • 40mm nominal size and above | 2 per cent of dry weight |
| • 20mm nominal size | 5 per cent of dry weight |
| • 10mm nominal size | 15 per cent of dry weight |

Chlorides soluble in a 10 percent solution by weight of nitric acid shall not exceed 0.03 per cent by weight, expressed as chloride ion when tested as set out in BS 812 but subject also to the further restriction on total chloride content given in sub-clause 3.5.5.

When tested in accordance with ASTM C289, the aggregate shall be non-reactive.

Soundness: After 5 cycles of the test set out in ASTM C88-76, the aggregate shall not show a weight loss of more than 12 per cent.

Flakiness Index: When tested in accordance with BS 812 shall be as set out hereunder:

- | | |
|-------------------------------|------------------|
| • 40mm nominal size and above | Not more than 40 |
| • 20mm nominal size and below | Not more than 34 |

If the flakiness index of the coarse aggregate varies more than five units from the average value of the aggregate used in the approved trial mix, a new set of trial mixes shall be carried out in the workability of the mixes have been adversely affected by such variation.

Impact Value: Not more than 45 per cent when tested in accordance with BS 812.

Ten per cent fines value: Not less than 50 kN when tested in accordance with BS 812.

Shrinkage: When mixed with other ingredients in the approved proportions for concrete and tested as set out in BS 1881, the shrinkage factor shall not exceed 0.05 per cent.

Water absorption: The aggregate shall not have water absorption of more than 2.5 per cent when tested as described in BS 812.

Tests on coarse aggregate shall be carried out daily or as required by the Engineer on site during concreting operations as follows:

- Sieve analysis
- Moisture content: An approved “rapid” test may be used for this test.
- Percentage of materials passing a 75 microns BS sieve by the Field Settling Test, checked when necessary by the Decantation Method.

The Contractor shall arrange to carry out the following tests when requested by the Engineer:

- Determination of Flakiness Index.
- Specific gravity and water absorption.
- Determination of “ten per cent fines” and of Los Angeles Abrasion.
- Other tests described in BS 812.

3.6.4 Test for Organic Impurities

Aggregates shall be tested for organic impurities by means of discoloration of a sodium hydroxide solution as follows:

A 340ml graduated prescribed bottle shall be filled to the 123ml mark with a sample of the aggregate to be tested. A 3 per cent solution of sodium hydroxide in water shall be added until the volume of the aggregate and liquid after shaking gives a total volume of 194ml. The bottle shall be stoppered, shaken thoroughly and allowed to stand for 24hours. Should the liquid then be darker than the standard colour solution the aggregate shall not be used for making concrete.

The standard colour solution shall be prepared in a 340ml prescription bottle as follows:

- 2.5ml of a 2 per cent solution of tannic acid in 10 per cent alcohol shall be added to 97.5ml of a 3 per cent solution of sodium hydroxide in water. The mixture shall be shaken and allowed to stand for 24 hours.

- A glass of the standard colour may be used in place of the standard solution.

3.6.5 Total Chloride and Sulphate Contents

The total chloride content arising from all ingredients in a mix, expressed as chloride ions as a percentage of the weight of cement in a mix, shall not exceed 0.5 per cent in any one sample or 0.3 per cent in 95 per cent of the samples tested. For prestressed concrete, steam cured concrete or concrete containing sulphate resisting cement or super sulphated cement, the total chloride content shall not exceed 0.5 per cent of the weight of cement in the mix.

The total sulphate content arising from all ingredients in a mix shall not exceed 0.4 per cent by weight of the aggregates or 4 per cent of the weight of cement in the mix, whichever is less. For this purpose the sulphate contents shall be expressed as SO₃ and shall be calculated from the sulphate contents of the cement, aggregates and any admixtures. Where applicable, sulphate contents shall be determined in accordance with tests described in BS 1047 and 3892.

Pulverised fuel ash shall not be used in conjunction with a cement complying with the requirements of BS 4027 in concrete required to be resistant to sulphates.

3.7 Admixtures

Admixtures for improving workability, accelerating or retarding setting of concrete, or for any other purpose, shall comply with BS EN 934 and only be used with the Engineer's written approval. Calcium chloride or admixture containing chlorides will, however, not be approved.

The Contractor shall submit samples of the admixtures he proposes to use to the Engineer for testing. If an admixture is approved for use it shall be obtained from an approved supplier and the Contractor's arrangement for measuring, mixing and adding the admixture to the concrete batch shall be strictly in accordance with the manufacturer's instructions or recommendations and subject to the approval of the Engineer.

The proportions of the concrete mixes and water/cement ratio shall be adjusted to the satisfaction of the Engineer so that the strength of the concrete with admixture is at least equal to the strength of the equivalent concrete without admixture.

3.8 Water for Concrete

Clean fresh water complying with BS EN 1008 is to be used for the mixing of all concrete and mortar, and is to be from a source approved by the Engineer.

3.9 Concrete Mixes

The design of concrete mixes shall be the sole responsibility of the Contractor, but may be undertaken in conjunction with the Engineer. Concrete mixes shall be designed mixes in accordance with the requirements of BS 5328 having the characteristics specified in Table 3.1 of this Specification. Concrete for use in water retaining structures shall comply with BS 8007.

Evidence shall be submitted to the Engineer, for all classes of concrete to be used, showing that at the intended workability the proposed mix proportions and production methods will produce concrete of the required quality.

The following information shall be provided before any designed mix is supplied:

- Nature and source of each material.
- Full details of tests on trial mixes including workability.
- Proposed quantities of each ingredient for one cubic metre of fully compacted concrete.

No change in the approved mix design will be permitted, unless the Contractor carries out trials on the proposed mix design to show that compliance with this Specification can be maintained.

Mix design shall in all cases be subject to the approval of the Engineer, but such approval shall in no way relieve the Contractor of his responsibility for the design and production of concrete in compliance with this Specification.

3.10 Trial Mixes

At least six (6) weeks before commencing the placing of any concrete in the works, trial mixes shall be prepared for each class of concrete to be used on the works. Three (3) batches of each class of concrete shall be made using materials typical of the proposed supply and under full scale production conditions.

The workability of each of the trial batches shall be determined and three (3) cubes made from each batch for testing at 28 days. A further three (3) cubes made from each batch may be made for tests at an earlier age if required.

The trial mix proportions shall be approved if the average compressive strength of the nine (9) cubes tested at 28 days exceeds the specified characteristic strength by 3 Newtons per square millimetre, or if nine tests at an earlier age indicate that it is likely to be exceeded by this amount.

To demonstrate that the maximum free water/cement ratio is not exceeded, two batches of concrete shall be made in a laboratory with cement and surface-dry aggregate known from past records of the supplier of the material to be typical. The proposed mix proportions will not be accepted unless both batches have the cement content specified and free water/cement ratio below the maximum specified in Table 3.1.

Table 3-1: Classes of Concrete

Class	Characteristic Compressive Strength N/mm²	Maximum Free Water/cement Ratio	Minimum Cement Content kg/m³	Maximum Cement Content kg/m³	Maximum Aggregate Size mm
C25/10/A	25	0.55	360	400	10
C25/20/A	25	0.55	360	400	20
C25/20/B	25	0.55	290	400	20
C25/20/C	25	-	240	540	20
C20/20/B	20	0.55	290	400	20
C20/40/B	20	0.55	260	400	40
C20/40/C	20	-	220	540	40
C15/40/C	15	-	180	540	40
C15/20/C	15	-	180	540	20

C10/40/C	10	-	150	540	40
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A, B and C denote exposure conditions for the finished concrete as defined in BS 8007.

3.11 Testing of Concrete

3.11.1 General

All concrete shall be sampled and tested in accordance with the requirements of BS EN 12350 and BS EN 12390 unless otherwise stated in this Specification or instructed by the Engineer.

The Contractor shall allow for all the necessary labour, materials and equipment necessary for the regular sampling and testing of concrete to be placed in the Works.

3.11.2 Cement Content

Tests shall be carried out as required by the Engineer to determine the cement content of the mix. The cement content of any batch of concrete shall not be less than the specified minimum value minus 5 per cent of that value nor more than the specified maximum value plus 5 per cent of that value.

3.11.3 Workability

The workability of the concrete shall be measured as required by the Engineer by slump tests or compaction factor tests and shall be within the following limits:

Slump	±	25mm or ± one third of required value whichever is greater.
Compacting	±	0.03 where required value is 0.90 or more
Factor	±	0.04 where required value is 0.90 to 0.80
	±	0.05 where required value is 0.80 or less

The required value shall be that which has been accepted under Clause 3.8 of this Specification.

3.11.4 Water/Cement Ratio

The water/cement ratio shall be determined as required by the Engineer and shall not exceed the specified maximum value by more than 5 per cent of that value.

3.11.5 Compressive Strength

Samples of concrete shall be taken for compressive strength at a rate of one sample per 15m³ of concrete placed or 15 batches of concrete placed whichever is the lesser volume. A greater frequency of sampling may be instructed by the Engineer until compliance with specified strength requirements has been confirmed for each class of concrete used in the Works.

Two test specimens shall be prepared from each sample and shall be cured for 28 days, or by any other method approved by the Engineer that enables the prediction of 28 day strength at an earlier time.

On completion of curing, the two test specimens shall be tested. Provided the difference between the two results does not exceed 14 per cent of the mean of the two results, the mean shall be taken as the test result. Where the difference between the two results exceeds 14 per cent of their mean, the lower of the two results shall be taken as the test result.

Compliance with the specified strength may be assumed if the conditions given in both (a) and (b) below are satisfied.

The average compressive strength determined from any one group of four consecutive 28 day test results exceeds the specified characteristic strength by not less than 3N/mm^2 for classes of concrete C20, C25 and C30 and not less than 2N/mm^2 for class C15 concrete.

Each individual 28 day test results is greater than the specified characteristic strength minus 3N/mm^2 for classes of concrete C20, C25 and C30 or 2N/mm^2 for class C15 concrete.

If only one tests result fails to meet the second requirement then that result may be considered to represent only the particular batch of concrete from which that sample was taken provided the average strength of the group satisfies the first requirement.

If more than one result in a group fails to meet the second requirement or if the average strength of any group of four consecutive test results fails to meet the first requirement, then all the concrete in all the batches represented by all such results shall be deemed not to comply with the strength requirements. For the purposes of this Clause, the batches of concrete represented by a group of four consecutive test results shall include the batches from which samples were taken to make the first and the last tests in the group of four, together with all the intervening batches.

3.12 Failure to Comply with Specified Requirements

Failure of concrete to comply with the specified requirements will result in it being classified as defective work. Immediately on notification by the Engineer that concrete work is defective, the Contractor shall take all measures necessary to improve concrete quality before further concrete is placed in the Works. If required by the Engineer, the rate of sampling of concrete shall be increased until adequate control is again established. Tests shall be carried out on the defective concrete or test cores taken from it to establish its in-situ strength. If the results of these tests satisfy the Engineer that the defective concrete will fulfil its design function then it may be accepted. If not, the Contractor shall propose strengthening or remedial work where possible or shall remove the defective concrete from the Works.

3.13 Concrete Returns and Records

The Contractor shall send weekly to the Engineer a return showing the quantities of cement and the number of mixings of each class of concrete used in each section of the Works.

Records shall be kept by the Contractor of the positions in the Works of all batches of concrete, of their class and of all test cubes or other specimens taken from them. Copies of these records shall be supplied to the Engineer.

3.14 Equipment and Construction Procedure

The design, layout, installation and operation of equipment for processing, handling, transporting, storing and proportioning concrete ingredients and for mixing, transporting and placing concrete shall be to the satisfaction of the Engineer. Before the equipment is ordered or delivered to site, the Contractor shall submit to the Engineer drawings showing the proposed arrangements of the equipment together with detailed descriptions of the equipment proposed.

3.15 Batching

The aggregates and cement shall be proportioned by means of efficient weigh batching machines except when the Engineer has approved the use of volume batching. The machines shall be carefully maintained and cleaned and they shall be provided with simple and

convenient means of checking the accuracy of the weighing mechanism, and they shall be checked when required by the Engineer.

For volume batching suitable gauge boxes shall be used.

3.16 Mixing Concrete by Machine

Where the concrete is to be mixed in machines, these shall be of the batch mixing or other approved type. The machines shall ensure that all the concreting materials including the water are thoroughly mixed together before any portion of the mixture is discharged. The mixing time shall not be less than thirty seconds per cubic foot (30sec/cft) of concrete, with a minimum of three minutes (3min) mixing time per batch. The machines must be capable of discharging their contents while running.

3.17 Mixing Concrete by Hand

Where it is not possible to employ machine mixing and approval has been obtained from the Engineer, concrete shall be mixed by hand as near as practicable to the site where it is to be deposited. Clean mixing bankers or platforms of sufficient area for the proper execution of the work shall be provided. These platforms if constructed of timber shall consist of planks closely jointed so as to avoid the loss of any grout or liquid from the wet concrete. The whole of the aggregate and cement shall be turned over on the banker in a dry state at least twice. The water shall then be added gradually through a rose head, after which the materials shall again be entirely turned over in a wet state at least three times.

3.18 Preparation of Surface to Receive Concrete

Foundations which are to receive concrete shall be properly drained and dewatered so that no water runs over or stands on a surface on which concrete is being placed. If required by the Engineer drains provided through or beneath concrete for the temporary conveyance of water shall afterwards be completely sealed to the Engineer's approval.

Before deposition of concrete against rock, the rock surface shall be thoroughly wetted and cleaned by the application of water, or of water and air, under pressure. No concrete shall be deposited until the surface has been cleaned and passed as satisfactory by the Engineer.

Faults or seams in the rock shall be cleaned to a depth satisfactory to the Engineer and if necessary stemmed with cement mortar of an approved mix.

Before any steel reinforcement is embedded in the concrete any loose mill scale, loose rust and any oil, grease or other deleterious matter shall be removed. Partially set concrete which may adhere to the exposed bars during concreting operations shall likewise be removed.

3.19 Authority to Commence Placing of Concrete

The Contractor shall give the Engineer at least 24 hours notice of his intention to place concrete in a particular section of the Works. Before concrete is placed the Contractor shall apply to the Engineer for approval of the cleanliness, alignment and suitability of surfaces against which the new concrete is to be placed and of the fixing of formwork, reinforcement, embedded parts and the like and he shall obtain written permission from the Engineer to proceed with concreting.

The Contractor shall carefully plan his concreting operation to ensure, where possible, that these operations are completed within the normal working day.

3.20 Dimension of Concrete Pours and Programme of Placing

Unless otherwise approved by the Engineer concrete shall be cast in one operation between external faces of concrete and joints shown on the Drawings or between construction joints or both.

The Contractor shall submit and obtain the Engineer's approval to a detailed concreting programme and his proposals for the location of construction joints.

3.21 Transport and Deposition of Concrete

Concrete shall be transported and deposited in such manner as to prevent segregation, loss of materials or contamination with foreign matter. The means of transport of concrete shall be subject to the approval of the Engineer. The containers for conveying the concrete shall be thoroughly cleaned immediately after use and sides dampened before work is started or restarted to prevent cement and fine material in the first batch adhering to the sides. Adequate precautions shall be taken to protect the concrete against wetting or drying out through exposure to the weather and to prevent segregation and consolidation of the mix due to prolonged jolting of the concrete. Concrete shall be placed in its final position and fully compacted before the onset of initial set. Wherever possible, concrete shall be deposited vertically in the final position required and shall not be dropped through a greater height than 1.5m. Where necessary, bins, drop chutes, downpipes or baffles shall be provided to prevent segregation of the material. Drying out of fresh concrete before deposition shall be prevented by the provision where necessary of suitable covers. Loss of slump during transport and deposition of the concrete shall not exceed 25mm.

Concrete shall not be placed in standing or running water unless so specified. Where concrete has to be placed under water, the Contractor shall submit to the Engineer his proposals indicating the methods and equipment to be employed. The concrete shall be deposited by bottom discharging watertight containers or through funnel shaped tremies which are kept continuously full with concrete up to a level above the water and which shall have the discharging bottoms immersed in the concrete in order to reduce to a minimum the contact of the concrete with the water. Special care shall be taken to avoid segregation and additional cement of about 25% must be added.

3.22 Distribution and Spreading of Concrete

Concrete shall be placed in layers not exceeding 500mm in depth approximately parallel to the horizontal or inclined construction joint planes. These layers shall be deposited from one face to the other until the full height of the lift is reached. Each layer shall be deposited on the previous one before the latter has taken its initial set and the exposed area of fresh concrete shall be maintained to the practical minimum. In order to accomplish this timing a new layer may be started before the previous layer is completed.

The face from which placing of concrete is to commence shall be selected so that if an emergency should occur which prevents the layer being completed the vertical construction joint will be formed in a structurally acceptable position.

Concrete shall not be placed during rain sufficiently heavy or prolonged to wash mortar from coarse aggregate on the exposed sloping faces of fresh concrete unless adequate shelter is provided.

Concrete shall not be placed against any surface (including formwork, reinforcement, embedded steelwork, adjacent concrete or rock) which during hot weather is not adequately dampened to prevent excessive absorption of water from the fresh concrete.

Once commenced, concreting shall be carried on as continuous operation between pre-arranged construction, expansion or contraction joints save only if an emergency occurs and interruption is unavoidable. The Contractor shall have readily available suitable prefabricated formwork for stop ends to form emergency vertical construction joints and, in the event of such an interruption occurring, the concrete already placed shall be properly finished up to the stop end and to a horizontal or inclined surface as directed by the Engineer. In water retaining structures the Contractor shall propose methods of making the joint watertight.

Concrete shall be placed carefully so as not to displace the formwork or reinforcement.

3.33 Compaction of Concrete

The Contractor shall thoroughly compact all concrete immediately after it has been placed in position. Unless otherwise authorised by the Engineer, compaction shall be accomplished with the aid of immersion vibrators as specified below, together, if necessary, with rods, shovels and the like. Particular care shall be taken to fill all voids and to work the concrete against rock and existing concrete surfaces, round any reinforcement and embedded fixtures and into the corners of the formwork.

If the Contractor does not wish to use immersion vibrators for any portion of the works he shall submit his proposals for alternative vibrators or compaction equipment and shall receive the Engineer's approval to the equipment before commencing to concrete the portion concerned.

Vibrators shall be of a type and size adequate for the portion placed. Vibrators shall operate at a frequency of between 7000 and 10000 impulses per minute. The Contractor shall ensure that vibrators are operated at pressures and voltages not less than those recommended by the manufacturer in order to ensure that the compactive effort is not reduced.

A sufficient number of vibrators shall be operated to enable the entire quantity of concrete being placed to be vibrated for the necessary period and in addition stand-by vibrators shall be available for instant use at each concreting place. The length and diameter of the vibrating element of immersion vibrators shall be sufficient to penetrate through the layer of concrete being placed and re-vibrate the upper portion of the underlying layer of concrete. Only men experienced in the use of vibrators shall be employed on this type of work.

Vibration shall be continued at each point until the concrete ceases to contract, a thin layer of mortar has appeared on the surface and air bubbles have ceased to appear. The period of vibration

necessary shall be determined by trial in the presence of the Engineer. Vibration shall then be continued for this period at each point before any further concrete is superimposed.

Immersion vibrators shall be inserted vertically to penetrate into the layer underneath at regular intervals, which shall not exceed the distance from the element over which vibration is visibly effective and in any case shall not exceed 700mm. Vibrators shall not be used to move concrete laterally and shall be withdrawn slowly to prevent the formation of voids. Vibrators shall not be applied to reinforcement or other embedded items.

3.24 Protection of Concrete

Freshly placed concrete shall be protected from rainfall and from water running over the surface until it is sufficiently hard to resist damage from this cause.

No traffic shall be allowed on any concrete surface until such time as it is hard enough to resist damage by such traffic.

Concrete placed in the Permanent Works shall not be subjected to any structural loading until it has attained at least its nominal strength.

If the Contractor desires to impose structural loads on newly placed concrete, he shall make at least three test cubes and cure them in the same conditions as the concrete they represent. These cubes shall be tested singly at suitable intervals in order to estimate the time at which the nominal strength is reached.

3.25 No Partially Set Concrete shall be used

All concrete must be placed and compacted in its final position within thirty minutes (30min) of discharge from the mixer unless otherwise approved. No partially set material shall be used in this work.

3.26 Plum Concrete

Plums shall be hard clean natural stones embedded in mass concrete during the placing of the concrete. Unless otherwise shown on the drawings, the plums shall not be larger than one third of the cross section of the concrete and should not be placed closer than 150mm to each other vertically and 100mm horizontally. The volume of plums shall unless otherwise specified, not exceed forty per cent (40%) of the mass concrete volume and care shall be taken to ensure that the minimum cover over any plums is 100 mm.

3.27 Concreting in Adverse Weather

No concreting will be allowed to take place in the open during storms or heavy rains. Where strong winds are likely to be experienced additional precautions to ensure protection from driving rain and dust shall also be taken.

The Engineer may withhold approval of commencement of concreting until he is satisfied that full and adequate arrangements have been made.

3.28 Concreting at Night or in the Dark

Where approval has been given to carry out concreting operations at night or in places where daylight is excluded, the Contractor is to provide adequate lighting at all points where mixing, transportation and placing of concrete are in progress.

3.29 Concreting in High or Low Ambient Temperature

Where the ambient temperature exceeds thirty-two degrees Celsius (32°C), the Contractor shall take special measures in the mixing, placing and curing of concrete. The temperature of the concrete when deposited shall not exceed thirty degrees Celsius (30°C). The Contractor shall carry out all necessary special measures to ensure that the maximum concrete temperature after placing shall not exceed fifty degrees Celsius (50°C) or thirty degrees Celsius (30°C) above the concrete temperature at the time of placing, whichever is lower.

During placing suitable means shall be provided to prevent premature stiffening of the concrete placed in contact with hot surfaces.

The Contractor shall not mix and place concrete when the ambient temperature falls below three degrees Celsius (3°C).

3.30 Curing and Protection

Concrete shall be protected during the first stage of hardening from the harmful effects of sunshine, drying winds, cold, rain or running water. The Contractor shall pay particular attention to the need to protect concrete immediately after the finishing operation and prior to its final set and shall submit their proposals to achieve this protection for the Engineer's approval. Protection of concrete which has achieved its final set shall consist of one or more of the following:

- (a) A layer of sacking, canvas, hessian, straw mats or similar absorbent material or a layer of sand, kept constantly moist by spraying with water as necessary for fourteen (14) days or such periods as may be directed by the Engineer.
- (b) After thoroughly wetting, a layer of approved waterproof paper or plastic membrane kept in contact with the concrete for fourteen (14) days or such period as may be directed by the Engineer.

The use of saline water for curing purposes will not be permitted.

3.31 Steel Reinforcement

3.31.1 Materials

Unless otherwise directed or otherwise shown on the Drawings, hot rolled high yield reinforcement shall be used throughout the works.

Where required, mild steel reinforcement, medium tensile steel reinforcement and high tensile steel reinforcement shall comply with BS 4449. Cold twisted steel wire for the reinforcement of concrete shall comply with BS 4482.

All reinforcement shall be from an approved manufacturer and, if required by the Engineer, the Contractor shall submit a test certificate of the rollings. The Contractor shall, when requested by the Engineer, provide sample pieces 1.0m long for testing.

Tying wire shall be 1.6mm diameter soft annealed iron wire.

Before any steel reinforcement is embedded in the concrete any loose mill scale, loose rust and any oil, grease or other deleterious matter shall be removed. Partially set concrete which may adhere to the exposed bars during concreting operations shall likewise be removed.

3.31.2 Fabricating Reinforcement

Bar reinforcements shall be bent to the shapes shown on the Drawings and bending schedules. All bars shall be bent cold, unless otherwise permitted by the Engineer. All hooks, bends, and the like, unless otherwise shown on the Drawings, shall be to BS 4666. The Contractor shall satisfy himself as to the accuracy of any bar bending schedules supplied and shall provide all reinforcement in accordance with the Drawing. Bar reinforcement shall be bundled and each bundle of steel shall be tagged with identifying tags, showing the size and mark of the bar. The bundles shall be stacked clear of the ground in easily accessible positions that do not in any way hinder the progress of work and shall be kept clean.

3.31.3 Fixing Reinforcement

When placed in the work reinforcement shall be free from coatings or dirt, detrimental scale, paint, oil or other foreign substances. When steel has on its surface rust, loose scale and dust which is easily removable, it may be cleaned by a method approved by the Engineer.

All reinforcing bars, ties, links and fabric shall be fixed in the positions shown on the Drawings within the tolerances specified in BS 8666. In no case shall the cover specified on the Drawings be increased by more than 5mm.

Displacement of reinforcement beyond the specified tolerance shall be prevented by supporting the bars sufficiently and securely fixing them together at intersections where necessary.

The ends of all tying wires shall be turned into the body of the concrete and not allowed to project towards the surfaces of the concrete.

Spacers shall be used to maintain the cover to all steel and shall be made of dense cement mortar of one part cement and two parts sand.

Spacers shall be triangular in section and only one acute edge shall bear against the formwork, the flat side shall bear against the steel. Wire cast into the blocks to fix them to the reinforcement shall be 1.6mm diameter soft annealed iron. Spacers shall not be used on the wet face of water retaining or water excluding structures. Chairs, stools, etc. shall be used to maintain clearance between two or more layers of reinforcement.

Nothing shall be allowed to interfere with the specified position of reinforcement. The fixing of reinforcement shall be checked before and during concreting, and particular attention shall be given to the position of top steel in cantilever sections. During concrete placing a competent steel fixer shall be in attendance to adjust and correct the position of any reinforcement which may be displaced.

3.31.4 Splicing and Lapping

All reinforcement shall be provided in full lengths as indicated on the Drawings or bending schedules. Splicing of bars, except where shown on the Drawings, shall not be permitted without the written approval of the Engineer. Splices shall be staggered as far as possible. Bar reinforcement shall not be welded without the Engineer's written permission.

In lapped splices, the bars shall be placed in contact and wired together in such manner as to maintain a clearance between bars of not less than 50mm.

Mesh or bar reinforcement shall overlap sufficiently to maintain a uniform strength and shall be securely fastened at ends and edges. The edge lap shall not be less than 40 diameters of the mesh reinforcement bar or two mesh widths whichever is greater.

3.32 Cover to Reinforcement

The concrete cover to reinforcement shall be 50mm unless otherwise shown on the Drawings.

The Contractor shall provide any necessary concrete pads for ensuring the cover is attained and in no case shall timber packing be used.

3.33 Formwork

3.33.1 Definitions

Forms, formwork or shuttering shall mean all temporary moulds forming the concrete to the required shape together with any special lining that may be required to produce the concrete finish specified.

Falsework or centering shall mean the furnishing, placing and removal of all temporary construction such as framing, props and struts required for the support of forms.

3.33.2 Materials

The formwork may be of seasoned, planed, tongued and grooved timber, plywood, blockboard, tempered hardboard, steel or as specified on the Drawings.

All timber used for formwork shall be sound wood, well-seasoned and free from loose knots, shakes, large checks, warping and other defects. Before use on the work, it shall be properly stacked and protected from injury from any source. Any timber which becomes badly warped or cracked, prior to the placing of concrete shall be rejected. All formwork for outside surfaces before final ground level shall be either tongued and grooved or provided with a suitable lining to produce a smooth surface finish.

3.33.3 Forms

All forms shall be of wood or metal and shall be built grout-tight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incidental to the construction operations. Forms shall be constructed and maintained so as to prevent warping and the openings of joints due to shrinkage of the timber.

The forms shall be substantial and unyielding and shall be so designed that the finished concrete will conform to the proper dimensions and contours. The design of the forms shall take into account the effect of vibration of concrete as it is placed.

All formwork shall, unless otherwise directed, be provided with 25mm by 25mm angle fillets (chamfers) so as to form splays on internal and external angles.

A grout check formed from 25mm square hardwood timber shall be incorporated in the formwork to provide a clean, level, horizontal joint on exposed concrete surfaces at the top of each lift.

All joints in the formwork shall be either horizontal or vertical. End formwork shall be square across the mass of concrete.

Where concrete is to be deposited to a slope steeper than 20 degrees to the horizontal, top formwork shall be used to enable the concrete to be properly compacted unless the Engineer agrees otherwise.

Openings for the inspection and cleaning of the inside of formwork for walls, piers and columns shall be formed in such a way that they can be closed conveniently before commencing to place concrete.

Form clamps, tie bolts and anchors shall be used to fasten forms. The use of wire ties to hold forms in position during placing of concrete will not be permitted. Tie bolts and clamps shall be positive in action and of sufficient strength and number to prevent spreading or springing of the forms. They shall be of such type that no metal part shall be left within the specified concrete cover. For water retaining sections, methods of fixing the forms which result in holes through the concrete section when the formwork is removed shall not be used and built-in wall ties shall be fitted with water baffles.

All forms for outside surfaces shall be constructed with stiff wales at right angles to the studs and all form clamps shall extend through and fasten such wales.

The shape, strength, rigidity, grout tightness and surface smoothness of forms which are re-used shall be maintained at all times. Any warped, bulged or otherwise damaged timber shall be replaced. Forms which are unsatisfactory shall not be re-used. If the surface finish on the formed concrete deteriorates as a result of deterioration of the faces of the forms, the Engineer shall instruct that forms be resurfaced, or discarded.

All forms shall be treated with approved mould or similar oil or be soaked with water immediately before placing concrete to prevent adherence of concrete. Any materials which adhere to or discolour concrete shall not be used.

All forms shall be set and maintained true to the line designated until the concrete is sufficiently hardened. Forms shall remain in place for periods which shall be as specified in Clause 3.26. When forms appear to be unsatisfactory in any way, either before or during the placing of concrete, the Engineer shall order the work stopped until the defects have been corrected.

All formwork shall be approved by the Engineer before concrete is placed within it. The Contractor shall, if required by the Engineer, provide copies of calculations of the strength and stability of the formwork and falsework. Notwithstanding the Engineer's approval of these calculations, the Contractor shall be held responsible for the safety and adequacy of formwork.

3.33.4 Falsework and Centering

Detailed plans for a falsework or centering shall be supplied by the Contractor to the Engineer at least 14 days in advance of the time the Contractor begins construction of the falsework. Notwithstanding the approval of the Engineer of any designs for falsework submitted by the Contractor, the Contractor shall be solely responsible for the strength, safety and adequacy of the falsework or centering.

All falsework shall be designed and constructed to provide the necessary rigidity and to support the loads from the weight of green concrete and shuttering and incidental construction loads.

Falsework or centering shall be founded upon a solid footing safe against undermining and protected from softening. Falsework which cannot be founded on satisfactory footings shall be supported on piling which shall be spaced, driven and removed in a manner approved by the Engineer. The engineer may require the Contractor to employ screw jacks, or hard wood wedges to take up any settlement in the formwork either before or during the placing of concrete.

Falsework shall be set to give the finished structure the required grade and camber shown on the Drawings.

3.33.5 Forms for Joints

Where permanent or temporary joints are to be made in horizontal or inclined members, stout stopping off boards shall be securely fixed across the mould to form a water-tight joint. The form of the permanent joint shall be as shown on the Drawings.

Where reinforcement or waterstops pass through the face of a joint the stopping off board shall be drilled so that the bars or waterstop can pass through, or the board shall be made in sections with a half round indentation in the joint faces for each bar so that when placed the board is neat and accurate fit and no grout leaks from the concrete through the bar holes, joints or around the waterstop.

3.33.6 Release Agents

Only approved chemical release agents, mould creams (emulsions of water in oil) or oils containing a proportion of surfactant not exceeding 2 percent will be permitted. Water soluble emulsions and oils without surfactant shall not be used. Oil based release agents shall be applied at a rate of 7 square metres per litre one day in advance of concreting, preferably by spray or roller. Chemical release agents shall be applied in accordance with the manufacturer's recommendations.

New timber face work shall be given three coats of release agent before use on the work to ensure uniformity of porosity on the surface.

On no account shall the release agent come into contact with the reinforcement.

3.34 Removal of Formwork

Formwork shall be carefully removed without shock or disturbance to the concrete. No formwork shall be removed until the concrete has gained sufficient strength to withstand safely any stresses to which it may thereby be subjected.

The minimum periods which shall elapse between completion of placing concrete and removal of forms are given in the following Table 3.2, and apply to ambient temperatures higher than 10°C. At lower temperatures or if cements other than ordinary Portland are involved, the Engineer may instruct longer periods.

Compliance with these requirements shall not relieve the Contractor of his obligation to delay removal of formwork until such removal can be completed without damage to the concrete.

Table 3-2: Formwork Striking Time

Position of formwork	Striking Time
Beam sides, walls and columns	1 to 2 day
Slab soffits - props remain undisturbed	4 days
Beam soffits - props remain undisturbed	7 days
Removal of slab props	14 days
Removal of beam props	21 days

3.35 Surface Finishes

3.35.1 General

After removal of the formwork no treatment of any kind other than that required for curing the concrete shall be applied to the concrete faces until after inspection by the Engineer. All honeycombed areas, deformed surfaces or other defective surfaces shall then be repaired at the direction of the Engineer. Immediately following the Engineer's inspection of surface finish, all tie bolt cavities shall be filled with sand cement mortar and the surface left smooth, sound, even and uniform in colour.

Should the finishes surface either as-stuck or after repair exhibit a non uniform colour or texture, the Engineer shall have the right to order that the surface be given a skim coat and then painted.

3.35.2 Formed Surfaces

All joints between panels shall be vertical and horizontal unless otherwise directed. Suitable joints shall be provided between sheets to maintain accurate alignment in the plane of the sheets.

For warped surfaces, facings shall be built up of laminated splines cut to make a tight surface which shall then be dressed and sanded to the required curvature.

Type F1: This finish is for surfaces against which backfill or further concrete will be placed. Formwork shall consist of sawn boards, sheet metal or any other suitable material which will prevent the loss of grout when the concrete is being placed.

Type F2: This finish is for surfaces which are permanently exposed to view but where the highest standard of finish is not required. Forms to provide a Type F2 finish shall be faced with wrought thicknesses tongued and grooved boards with square edges arranged in a uniform pattern and close jointed or with suitable sheet material. The thickness of boards or sheets shall be such that there shall be no visible deflection under the pressure exerted by the concrete placed against them. Joints between boards or panels shall be horizontal and vertical unless otherwise directed. This finish shall be such as to require no general filling of surface pitting, but fins, surface discoloration and other minor defects shall be remedied by methods agreed by the Engineer.

Type F3: This finish is for surfaces which will be in contact with water flowing at high velocity and for surfaces permanently exposed to view where good appearance and alignment are of importance. To achieve this finish, which shall be free of boardmarks, the formwork shall be faced with plywood complying with BS 1088 or equivalent material in large sheets. The sheets shall be arranged in an approved, uniform pattern. Wherever possible, joints between sheets shall be arranged to

coincide with architectural features or changes in direction of the surface. Suitable joints shall be provided between sheets to maintain accurate alignment in the place of the sheets. Unfaced wrought boarding or standard steel panels will not be permitted for Type F3 finish. The Contractor shall ensure that the surface is protected from rust marks, spillages and stains of all kinds.

Type F4: This finish is similar to that required for type F3 but is used in places where a first class alignment and a dense surface free from airholes and other defects is required, suitable for the application of decorative finishes, in very high velocity water channels and in other similar circumstances.

3.35.3 *Unformed Surfaces*

Type U1: This is screed finish for surfaces of roads of foundations, beds, slabs, and structural members to be covered by backfill, subsequent stages of construction, bonded concrete topping or cement mortar beds to receive pavings, and on exposed surfaces of paving where a superior finish is not required. It is also the first stage of Type U2 and U3 finishes. The finishing operations shall consist of levelling and screeding the concrete to produce a uniform, plane or ridged surface, surplus concrete being struck off by a straight edge immediately after compaction.

Type U2: This is a floated finish for exposed surfaces where a hard smooth steel trowelled surface is not required. Floating shall be done only after the concrete has hardened sufficiently, and may be by hand or machine. Care should be taken that the concrete is worked no more than is necessary to produce a uniform surface free from float marks.

Type U3: This is a hard smooth steel trowelled finish for surfaces exposed to water flowing at high velocity. Trowelling shall not commence until the moisture film has disappeared and the concrete has hardened sufficiently to prevent excess laitance from being worked to the surface. The surface shall be trowelled under firm pressure and left free from trowel marks.

Type U4: This finish is similar to Type U3 finish but the permissible tolerances are smaller.

3.35.4 *Surface Tolerances*

All parts of concrete surfaces shall be in the positions shown on the Drawings within the tolerances set out in Table 3.3 or Table 3.4.

In cases where the Drawings call for tolerances other than those given in Table 3.3 or Table 3.4, the Drawings shall rule.

Where precast units have been set to a specified tolerance, further adjustments shall be made as necessary to provide a satisfactory straight or curved line. When the Engineer has approved the alignment, the Contractor shall fix the units so that there is no possibility of further movement.

Table 3-3: Surface Tolerance for Formed Surfaces

Type of Finish	Tolerance in mm (See Note 1)		
	A	B	C
FI	10	10	+25 to -10
F2	5	10	+15 to -15
F3	2	5	+10 to -10
F4	See Note 2	2	+5 to -5

Note 1:

The tolerances, A, B and C given in the table are defined as follows:

- A** is an abrupt irregularity in the surface due to misaligned formwork or defects in the face of the formwork.
- B** is a gradual deviation from a plane surface as indicated by a straight edge 3 metres long. In the case of curved surfaces, the straight edge shall be replaced by a correctly shaped template.
- C** is the amount by which the whole or part of a concrete face is displaced from the correct position shown on the Drawings.

Note 2:

Abrupt irregularities are not permitted in a Type F4 finish. Any residual irregularities which remain after removal of formwork shall be removed by grinding to achieve a transition of 1 in 50 between the surfaces adjacent to the irregularity.

Table 3-4: Surface Tolerances for Unformed Surfaces

Type of Finish	Tolerance in mm (See Note 1)		
	D	E	F
U1	-	10	+20 to -10
U2	Nil	10	+20 to -10
U3	Nil	5	+12.5 to -7.5
U4	Nil	2	+6 to -4

Notes:

- D** is the maximum allowable value of any sudden change of level in the surface.
- E** is the maximum allowable value of any gradual irregularity of the surface, as indicated by the gap between the surface and a 3m long straight edge or correctly shaped template placed on the surface.
- F** is the maximum allowable value of the difference in level or position between a straight edge or correctly shaped template placed on the surface and the specified level or position of that surface.

3.36 Conduits, Box-outs and Apertures

The layout of conduits, box-outs, grooves, apertures and the like shall be as shown on the Drawings or as directed by the Engineer, and shall be subject to inspection and approval by the Engineer before commencing concreting.

Conduits shall be placed as near the centres of members as possible and sufficient space shall be provided between adjacent conduits to prevent difficulties in the placing of concrete.

Box-outs, holes, grooves, apertures and the like shall be accurately set out in the formwork prior to placing the concrete. Fixing blocks, ends of brackets, bolts and, where possible, built in parts shall be cast into the concrete at the time of placing. No part of the concrete works shall be cut out for any such item, or for any other reason, without the Engineer's permission.

The Contractor shall ensure that all sub-contractors are informed of his programme for the structural works at the commencement of the Contract and that such sub-contractor's requirements relating to concrete members are approved well in advance. The Contractor shall obtain from all such sub-contractors complete information of their requirements regarding conduits, pipes, fixing blocks, ducts, holes and any other items to be cast into or formed in the concrete members. Failure of a sub-contractor to supply such information shall not be allowed to delay the progress of the Works.

3.37 Construction joints

Concreting shall be carried out continuously up to construction joints, the position and arrangement of which shall be as indicated on the Drawings or as previously approved by the Engineer. The Contractor is to allow for working beyond the ordinary working hours where necessary in order that each section of concrete may be completed without any lapse while the work is in hand. All construction joints are to be formed square to the work.

Where vertical construction joints are required, the joint face of the first stage concrete shall be finished against a stopping-off board, or vertical end shutter, suitably notched to pass the reinforcement. When the concrete is hard and the shutter is removed, the whole joint surface shall be thoroughly hacked and roughened or scabbled with suitable tools so that no smooth skin of concrete is visible and that all aggregates and solid matrix around them is exposed.

For horizontal or slightly inclined construction joints, the surfaces shall preferably be prepared when the concrete has set but not hardened by jetting with a fine spray of water and brushing with a stiff brush to remove the smooth skin and expose the aggregate without disturbing it. Where this treatment is impractical and work is resumed after the concrete surface has hardened, a similar procedure shall be adopted as on vertical joints.

If, in the opinion of the Engineer, any deleterious material has come into contact with the concrete of the construction joint or if the concrete is honeycombed or unsound for any reason, the concrete shall be cut back to such a depth as the Engineer shall order and the roughened surfaces shall be thoroughly cleaned by compressed air and water jets or other approved means.

Immediately before concreting is resumed, the roughened joint surface shall be thoroughly cleaned with compressed air and water jets and slightly wetted and cement grout placed. The Contractor shall take precaution to avoid segregation of the concrete along the joint plane and to obtain thorough compaction.

3.38 Movement joints

Movement joints shall be formed in the position and manner shown on the Contract Drawings or instructed by the Engineer. In the case of water retaining structures, joints shall be made water-tight by the provision of a continuous waterstop, with suitable water resistant filler material and sealant. The materials and workmanship utilised in movement joints shall comply with the following:

- (a) Compressible filler shall be self-expanding cork filler consisting of cork granules bonded together with an insoluble, synthetic resin. When subject to wet or moist conditions the filler shall be capable of swelling to occupy a larger volume than that of the material supplied. The expansion properties of the filler shall not be less than one hundred and forty per cent (140%) when immersed in boiling water for one hour (1hr). The filler shall be supplied and stored in sealed moisture resistant wrappings. Compressible filler shall be secured to the first cast concrete surface using an approved adhesive.
- (b) Waterstops, either centrally or externally placed, shall be Polyvinyl Chloride (PVC) of the dimensions and type shown on the Drawings. PVC waterstops shall have an elongation of at least 300% at rupture with a tensile strength of more than 12.3N/mm². Glueing temperature shall be about 150°C. The PVC waterstop shall accommodate a transverse movement of at least 50mm. For expansion joints the waterstops shall incorporate a centre bulb or box to allow movement to be accommodated. Centrally placed waterstops shall have reinforced eyelets on the outer flange to facilitate the positioning of the water stops by wiring to the surrounded steelwork. Externally placed waterstops shall include a wide reinforced nailing flange for positive fixing to formwork or adjacent concrete faces. Waterstop shall be firmly supported by split stop-end shuttering where appropriate, and in no case shall the waterstops be pierced to assist in fixing. Special care should be taken to ensure that the concrete is well worked against the embedded part of the waterstops and is free from honeycombing. Precautions shall be taken to protect any projecting portions of the waterstops from damage during the progress of the work and from sunlight and heat. Where waterstops are required to be jointed, this shall be undertaken using approved heat welding equipment. The waterstops shall be installed in accordance with the manufacturer's instructions and to the approval of the Engineer.
- (c) Joint sealant shall be bitumen-rubber sealing compounds and shall be pourable and in accordance with BS 2499 for horizontal joints and shall be an approved solvent type gun grade applied by suitable for vertical joints.
- (d) Miscellaneous materials necessary for the installation of movement joints such as adhesives for securing filler materials, bond breaking tapes, bituminous paints for creating a discontinuity between concrete surfaces and primers shall be compatible with the compressible filler, waterstops and sealant specified previously.

Contraction joints where specified shall be formed in the position and manner shown on the Drawings. The reinforcement shall be discontinuous across the joint. Dowel bars, waterstops and sealant shall be provided as shown. The face of the first stage concrete shall be finished fair faced and after curing painted with two coats of bituminous paint. Casting of waterstops and sealing of joints is to be carried out in accordance with the manufacturer's instructions. Dowel bars shall be round mild steel of the dimensions shown on the Drawings. The bars shall

be cast into the first stage concrete and the protruding part shall be painted with two coats of bituminous paint.

Expansion joints where specified shall be formed in the position and manner shown on the Drawings. The reinforcement shall be discontinuous across the joint. Dowel bars, waterstops, compressible filler and sealant shall be provided as shown. The face of the first stage concrete shall be finished fair faced and after curing the compressible filler shall be fixed in position in a manner to the approval of the Engineer. Casting in of waterstops and sealing of joints is to be carried out in accordance with the manufacturer's instructions. Dowel bars shall be round mild steel of the dimensions shown on the drawings. The bars shall be cast into the first stage concrete and the protruding part shall be painted with two coats of bituminous paint. An end cap shall be fixed to the end of each bar prior to pouring the second stage concrete, in order to create a void at the end of the bar to accommodate any movement.

3.39 Precast Concrete Units

Precast concrete units shall be provided by an approved specialist supplier or may, subject to the Engineer's written approval, be manufactured by the Contractor. The Engineer may require the Contractor to supply samples of precast concrete units for testing prior to the approval of the proposed supply for each type of unit and such samples shall be supplied and tested as directed by the Engineer.

Precast concrete units shall be made in accordance with the provisions of this Specification covering concrete work. Precast concrete units shall be manufactured under shed roofs and protected from the weather. The units shall remain in the moulds for seven days and shall remain protected for a further seven days, during which periods the concrete shall be shielded by sacking or other approved material which shall be kept wet. The units shall then be moved from the sheds and stacked in the open for at least a further seven days to season before being set in position.

Precast concrete work shall be tested as directed by the Engineer and work failing to meet the requirements of the Specification shall be rejected. Precast units that become damaged during handling shall likewise be rejected.

The Contractor shall, when required, make arrangements with his supplier for access to the supplier's work for the Engineer to inspect and carry out tests on precast concrete units.

All precast units shall be marked with individual identification. Lifting hooks are to be attached only to those positions shown on the Drawings or detailed by the Engineer. The Contractor shall be deemed to have included in their rates for all measures required to handle and stack units safely and without undue stressing.

3.40 Breaking out Existing Concrete or Block work

Well in advance of the commencement of the work the Contractor shall seek the approval of the Engineer regarding the proposed method of breaking out existing concrete or blockwork in the positions shown on the Drawings or as directed by the Engineer.

3.41 Cement Grout

Cement grout for general purposes shall consist of Portland cement and water mixed in the proportion of one (1) part by volume of cement and one and a half (1.5) parts by volume of water. The grout shall be used within one hour (1hr) of mixing.

3.42 Cement Mortar

Cement mortar shall be machine mixed and unless otherwise specified, consist of three (3) parts of sand to one (1) part of Ordinary Portland cement mixed and thoroughly incorporated together. Just enough water will be added to give a workability appropriate to its use. The above proportions are by volume. Mortar shall be used whilst freshly mixed and no softening or retempering will be allowed.

3.43 Concrete Block and Bricks Masonry

Concrete blocks and bricks shall comply with BS 6073: Part 1 and shall have a minimum 28 days compressive strength of 3.5N/mm^2 and 7N/mm^2 respectively. The concrete blocks and bricks shall be laid in a staggered pattern such that the vertical joints between two consecutive layers are offset by half a block length. Joints on the inside faces shall be rendered in which case the joints shall be raked out at a depth of 5mm. Rendering shall consist of 1:2mortar applied to a thickness so as to ensure professional finish

The mix used to manufacture concrete blocks shall not be leaner than 1:9 by volume and the maximum size of aggregate shall be 10mm. The standard size of the concrete block shall be 400mm x 200x 200mm and 300 x 100 x 100 for bricks. However blocks and bricks of other sizes may be used if approved by the Engineer for proper bonding at corners and openings

The concrete blocks and bricks shall be wetted before laying and shall be set in mortar, which complies with the specifications given in Clause 3.42. Unless otherwise stated, the maximum joint thickness shall be 12mm and the horizontal and vertical joints shall be filled with mortar. Joints shall be finished flush with the face of the blocks and bricks. The Concrete block and brick masonry shall be cured for a period of seven days by covering the work with two layers of hessian, which is kept permanently saturated. Provision shall be made to clean all exposed faces both as the work proceeds and on completion so that they are left in a neat, tidy and clean condition.

Building masonry will not be permitted in heavy rain without the approval of the Engineer. In such instances the Contractor shall make provision to protect materials and the newly placed mortar from the rain.

Concrete blocks shall either be obtained from an approved manufacture or made on site in approved block making machines. When casting of the concrete blocks is done at site, these shall be removed from the casting machine and deposited on edge on covered racks and left for 3 days, during which time they shall be kept constantly wet. Afterwards they may be placed on racks in the open provided they are protected by hessian cloth or similar and kept wet for a further 5 days. Thereafter they shall not be moved or used in the works until they are 28 days old.

Chambers shall be constructed after pipes have been laid, except the bases may be constructed earlier to avoid deterioration of the formation.

Backfilling around completed chambers shall be with suitable material deposited equally all round and compacted in accordance with the Specifications.

Where any pipes are built into concrete or block work the pipe shall be surrounded in two layers of polythene sheeting unless a puddle flange has been shown on the Drawings.

3.44 Rendering Work

3.44.1 Material

Cement, water and fine aggregate shall conform to the requirements specified in the concrete works. Mesh reinforcement shall be plain diamond expanded steel lathing to BS 1369 where specified. Lime shall be to BS 980 and shall be mixed with water and allowed to stand prior to use according to the manufacturer's recommendations.

The mix proportion of the cement mortar by volume shall be as follows:

- For rendering coat, Cement : Sand = 1:5
- For finishing coat, Cement : Sand = 1:3

Lime putty may be mixed in mortar for finishing coat at 10% of sand by volume.

3.44.2 Waterproof Cement Mortar

Waterproof mortar shall be made by mixing a waterproof agent into ordinary cement mortar. The Contractor shall be responsible for selection and quality of the waterproof agent and this shall be approved by the Engineer before use. The mixing and application shall be in accordance with the manufacturer's instructions.

3.44.3 Application

The surface which are to receive a rendering coat shall be free from all laitance, scum, loose carbonate scale, loose aggregate dirt and other foreign matters. Concrete block, brick or stone surfaces shall be sufficiently and uniformly damped immediately before application of mortar. Concrete surfaces shall be kept thoroughly wet for 24 hours prior to the application of mortar.

Where shown on the drawings or directed by the Engineer, steel wire lath shall be fixed to the brick, concrete block or concrete walls before applying cement mortar plaster.

Cement mortar shall be used within 30 minutes from the time of mixing. Retempering shall not be permitted.

The total thickness of rendering plus finishing coat shall be 30mm for the floors and 20mm for wall. Cement mortar finish shall be trowel finished unless otherwise specified. When the finishing coat is applied, the entire surface of floor or wall shall be finished in one operation in order to minimise joint marks.

When expansion and control joints exist in the base structure, provision shall be made to prevent cracking of the mortar by inserting metal expansion beads within the coating thickness in a manner approved by the Engineer.

The finished surface shall be perfectly plumb or level as the case may be except where otherwise specified without any bulging, runs, bruises or stains.

After application of the finishing coat, the surfaces shall be kept continuously damp for not less than 48 hours and then allowed to become thoroughly dry. Moistening shall be started as soon as the surface has hardened sufficiently not to cause displacement or damage.

3.45 In Situ Concrete Chambers

In situ concrete chambers shall be constructed generally in accordance with Section 3 of this Specification.

3.46 Chamber Covers and Slabs

Covers and slabs shall be the type, size and weight shown in the drawings. Care shall be taken to see that slabs are even so that the cover can seat without rocking.

Covers and frames shall be provided as shown on the drawings. The tops of the covers shall be flush at all points with the surrounding surface of paved areas or as directed in unpaved areas. Any slight adjustment of the slab level which may be necessary to accomplish this shall be effected by topping the side walls with concrete.

4 STONWORK

4.1 Stones

Stone for all purposes shall be the best of its kind, sound and durable, free from flaws and from soft, weathered or decomposed parts. The stone and the quarry from which it is obtained shall be subject to the approval of the Engineer, samples shall be submitted by the Contractor of the stone he proposes to use in the Works and the Engineer's approval shall be obtained before such stone is used or any order is placed. The stone used shall be clean and must be washed if deemed necessary in the opinion of the Engineer.

Stones for face work shall be as far as possible quarry split and not bullnosed or hammer dressed. A moderate amount of dressing to trim off large projections will however be permitted. Exposed faces of stones for masonry shall be free from tool marks except such as are inherent in the nature of any dressing that may be specified. In rock-faced work the roughness on the surface shall not project more than 40 mm for stone less than 0.3 m² face area and not more than 60 mm for large stones.

4.2 Stone Masonry

Masonry shall be built to the lines and levels shown on the Drawings.

For face work the stones shall show a face of not less than 0.025 m² and not more than 0.1 m² in area and none shall be less than 100 mm in depth; they shall be laid to give a uniformly random appearance and shall be selected in laying so as to present an even distribution of large and small stones on the face.

For the arises, stones shall be roughly squared, quarry split and of a size to give outbands varying from 300mm to 500mm in length and inbands from 150mm to 250mm. The alignment of arises shall be set true to the required lines.

The stones shall be set in mortar with their natural bedding plane (if any) as near normal as possible to the face or normal to the line of thrust in the case of load bearing structures. Particular care must be given to obtaining a sound bond both longitudinally and transversely and there shall be at least one bonder, or length not less than two-thirds of the wall thickness, in each square yard of wall face.

The mortar, unless otherwise specified, shall be machine mixed cement and sand in the proportion of one part to three (1:3) parts generally as described in the specification. Mortar shall completely fill all interstices between the stones.

The face joints in rubble masonry may vary in thickness from 10mm to 20mm. They shall be finished as a neat weathered joint with mortar while the work proceeds where the masonry is specified to be “unpointed”. Where pointing is specified, the joints in each day’s work shall be raked out to a depth of not less than 25mm before the mortar has set. Subsequently the joint shall be filled with mortar and finished in accordance with Clause 4.6. The face of the masonry is to be kept wet while the pointing is proceeding. Provision shall be made to clean all exposed faces both as work proceeds and on completion so that they are left in a neat, tidy and clean condition.

Building of masonry will not be allowed in heavy rain without the written consent of the Engineer. Building shall only proceed when suitable precautions to the satisfaction of the Engineer shall be taken against the action of rain on newly placed mortar. If for any reason of urgency the consent of the Engineer should be desired to a departure from these provisions, the Contractor shall submit to the Engineer for approval their proposals for protecting the materials and work from the weather.

4.3 Types of Masonry

The arrangement of the stones on the exposed face or faces of the masonry shall be as described below according to which type is called for on the Drawings.

Random rubble uncoursed masonry shall be built with stones of irregular shapes taken generally as they come from the quarry, preparation being limited to the removal of inconvenient corners and excrescences. They shall be selected as the work proceeds to give a uniformly random appearance and no attempt shall be made to form courses.

Random rubble masonry brought to courses shall be generally as the preceding type except that it shall be levelled up to courses between 300mm to 400mm in depth and coinciding with the quoin stones.

Squared rubble coursed masonry shall be built in courses between 100mm to 250mm in depth of stones squared to rectangular shapes and selected so that all stones in one course are of approximately the same height.

4.4 Bedding of Stone Masonry

Unless otherwise directed by the Engineer, all masonry stones, when incorporated in the Works shall be laid on its natural bed, except in the case of arches where the natural bed shall be radial.

4.5 Special Stonework

Special stonework shall consist of approved stones dressed to the shapes and dimensions and with the faces tooled, all as shown on the Drawings. All stones shall be laid true to line and centre with mortar joints as shown on the Drawings.

4.6 Pointing of Joints in Masonry

Unless otherwise shown on the Drawings, pointing to masonry joints shall be flush and shall be formed by raking the joint clean and then filling it with pointing consistency mortar which shall be given a flush face with a steel trowel.

4.7 Hand Placed Rubble Filling

Hand placed rubble filling shall consist of stones individually selected and placed by hand firmly in place in bearing contact with each other or with the sides of the space to be filled; the voids shall be carefully filled with small rocks and spalls wedged together to form a compact mass. The sides of stones shall be roughly trimmed if necessary with a spalling hammer to obtain a reasonably close fit. On the exposed face the stones shall be placed with their flattened sides uppermost and in the plane of the face.

4.8 Tipped Rock/Pitching

Rock protection on embankment slopes and around structures shall be to the lines and levels shown on the contract Drawings. The terms “tipped rock” and “pitching” refer to the manner in which the rock is placed.

The different classes of rock are specified on the Drawings according to nominal size and the maximum and minimum size of the individual particles. Within the size limits of each class, the rock fragments shall be well graded with not more than forty per cent (40%) of the rocks being smaller than the stated nominal size. The shape of the rock shall be roughly uniform with no dimension less than sixty percent (60%) of the largest dimension. The individual rock pieces shall be dense, durable and abrasion resistant.

The Contractor shall submit bulk samples of not less than 2m³ of each class of rock for approval by the Engineer prior to placing. These samples shall be retained for comparison with material being placed in order to ensure a reasonable degree of uniformity within each class.

The base on which rock protection is to be placed shall be compacted and trimmed to the lines and levels shown on the drawings. Where two or more classes of rock are specified, the lower layers shall be completed to the Engineer's approval before the placing of subsequent layers.

Tipped Rock shall be tipped directly into place and roughly trimmed to the required profile. The thickness, lines and levels of each class of tipped rock is shown on the Drawings.

Pitching will be used where a finished horizontal or inclined surface is required. It shall consist of hand placed stones, with spalls wedged into the interstices to produce an even surface, without projection above the neat lines shown on the Drawings. Care shall be taken to ensure that the stones are well bedded and the percentage of spalls shall not exceed forty percent (40%) of the total rock volume. Pitching on slopes shall be built upwards from the toe, unless otherwise directed by the Engineer. A coping consisting of large flat stones shall be laid along the top of stone pitching on slopes to produce a firm edge.

Tipped Rock and Stone Pitching shall consist of selected hard durable rock free from weathered or decomposed parts to the approval of the Engineer, containing no flaky stone and being well graded within the limits shown below. The class and the thickness of the layer shall be as shown in Table 4.1 below

Table 4-1: Classification of stone pitching materials

Class	Size of stone d (mm)	Percentage by weight smaller than stone sized (%)
A	300	100
	125	40-50
	45	0
B	150	100
	63	40-50
	31.5	0
C	63	100
	22	60-85
	8	20-40
	4	0
D	31.5	100
	16	50-80
	8	20-50
	4	0
E	350	100
	200	0
F	225	100
	90	35-55
	45	0
G	850	100
	500	30-60
	300	0

Tipped rock/stone pitching shall be placed in an approved manner in order to produce a uniform well-knit unsegregated layer in which all sizes are held in position.

4.9 Gabions

Gabions shall be of the types and sizes shown on the Drawings. The cages shall be constructed from mild steel wire complying with BS 1052, "Specification for mild steel wire for general

engineering purposes”, galvanised in accordance with BS 443, “Specification for testing zinc coatings on steel wire and for quality requirements”. The wire shall be 3mm diameter formed into a fabric having a mesh of 75mm x 100mm for baskets and 60 mm x 80 mm for mattresses.

Stone filling for gabions shall consist of hard durable rock, free from weathered or decomposed parts. The minimum dimensions of each stone shall not be less than half its maximum dimension. For mattresses the stone shall be 200mm to 150mm for baskets the stone shall be 300mm to 200mm. The stone shall be obtained from a source approved by the Engineer. No stone shall be smaller than the size of the gabion mesh. In carrying out the filling, selected pieces of stone of elongated shape shall be placed with their flatter and elongated faces in contact with the mesh wherever possible.

The empty gabions shall be placed to line and level as shown on the Drawings or as directed by the Engineer and then stretched so that the gabions regain their shape on being filled. Diaphragms shall be provided at not more than 1m intervals for baskets and not more than 0.6m intervals for mattresses. A gabion shall not be completely filled until the adjacent basket or mattress has been half filled, unless otherwise directed, in order not to cause displacements from bulging during filling.

For baskets at least two horizontal connection wires shall be tied between front and back of the gabion in each 1m compartment, at a height of 300mm and 600mm from the bottom as the stone fill reaches these levels. Additional tie wires shall be provided if necessary and in no case shall the gabion basket bulge by more than 40mm. Where a continuous line of gabions is required, adjacent gabions shall be securely tied together at the top and bottom of the gabions with tying wire.

The gabions shall be filled to a level just sufficient to require the lid to be forced into place with a bar. The lid and all joints between baskets and between diaphragms and baskets shall each be tied down with a continuous running wire.

Where gabions are to be shaped, the shape shall be formed by folding the mesh internally and tying it with a continuous running wire.

All tying wire shall be galvanised and of same gauge as specified for the cages above.

The surface upon which gabions are to be laid shall be compacted to a minimum dry density of 95% of the maximum dry density (AASHTO T99).

4.10 Geotextile Filter Cloth

Geotextile filter cloth shall be made of non-woven polyester material with a minimum weight of 270g/m² and minimum thickness of 2.3mm.

The material shall be placed carefully on suitably cleared surfaces, such that tearing or piercing is avoided at all times.

Continuity at horizontal and vertical joints shall be achieved with a minimum overlap of 0.6m. Overlaps may be physically sealed using spot welds with an open flame and subject to approval of the Engineer. On a horizontal join, the new layer shall be placed on the outside and backfilling shall proceed carefully to ensure that full contact of the join overlap is maintained. On a vertical join, the new layer shall be placed on the inside, and backfilling shall proceed

such that contact is first on the outside layer, thereby sealing the inside layer to prevent soil migration between the overlap.

4.11 Graded Filters

The filter shall consist of well graded natural or manufactured aggregate having the following gradation. In the following ratios, FM represents the filter material and BM the base material.

For graded filters of sub-rounded particles:

50% size FM

$R_{50} = \frac{\text{FM}}{\text{BM}} = 12 \text{ to } 58$

50% size BM

and

15% size FM

$R_{15} = \text{-----} = 12 \text{ to } 40$

15% size BM

For graded filters of angular particles:

50% size FM

$R_{50} = \text{-----} = 9 \text{ to } 30$

50% size BM

and

15% size FM

$R_{15} = \text{-----} = 6 \text{ to } 18$

15% size BM

The filter material should pass a 7mm for minimising particle segregation and bridging during placement. Also the filter must not have more than five per cent (5%) of material finer than that passing a 60 micron sieve to prevent movement of fines within the filter.

The graded filters shall consist of stone graded to meet the requirements indicated in Table 4.2 below.

Table 4-2: Classification of Filter material

Class	Size of stone d (mm)	Percentage by weight smaller than stone sized (%)
A	63	100
	31	70-100
	8	10-80
	2	0-25
	1.4	0
B	16	100

	4	64-100
	15	15-64
	0.009	0-025

The filter shall be placed in layers and tamped into place in such a manner that mixing between layers or between the filter material and the formation to be protected, shall not occur.

Care shall be taken to ensure that segregation of sizes does not occur. The minimum thickness of each filter layer shall be 250mm unless otherwise shown on the Drawings. Where the term “gravel backing” is used on the drawings or Bills of Quantities, this shall be taken to mean graded filter class A material.

4.12 Hardcore

Hardcore shall consist of broken rock, concrete or other approved hard material, clean and free from extraneous matter, having a maximum particle size of 100mm. It shall be spread and levelled, watered and compacted, and then blinded with a layer of fine material of grading 3mm to dust, watered and compacted all to the Engineer’s approval.

5 PIPEWORK

5.1 General

The Contractor shall construct pipelines to the lines and levels using grades, classes, or designs of pipe, bedding, haunching and surrounding as shown on the Drawings or directed by the Engineer.

Unless otherwise described in the Contract or agreed by the Engineer only one type of pipe shall be used within any individual length.

All materials shall be subject to the approval of the Engineer prior to procurement and delivery. Upon delivery, the Engineer shall inspect the delivered material for compliance with the specifications. In case of non-conformity, the Contractor shall replace the material at his own cost.

The pipes and fittings shall comply in all respects with British Standards and jointing of pipes and fittings shall be carried out in accordance with the manufacturers' instructions and to the approval of the Engineer.

5.2 Storage and Protection of Materials

Pipes shall be stacked on a firm base using two timber packers only under the barrel of rigid pipes such as concrete.

Flexible pipes such as PVC-U shall be stacked closely side by side on a firm plane base so that the whole length of the barrel is uniformly supported and sockets are clear of the ground. Each succeeding layer shall be placed at right angles to the previous layers. The height of any stack shall be not more than six layers of pipes and in the case of steel, not more than two layers.

Each class and size of pipe shall be stored separately in its own stockpile.

Fittings and specials of any type shall be stored in a single layer only.

Pipes and fittings shall at all times be adequately protected from damage during transport, storage and handling. Cracked or chipped pipes shall not be used in the permanent works. Steel

and large diameter plastic pipes shall be fitted in the factory with end caps or reinforcement adequate to prevent distortion during transport, storage and handling.

Plastic pipes and fittings shall be protected from direct sunlight and excessive heat. Deformed pipes and fittings shall not be used in the permanent works.

All rubber rings or other materials that may deteriorate under the action of sunlight, ozone or inclement weather shall be stored in permanent shade in lockable weatherproof sheds. Care shall be taken at all times to prevent contamination of rubber or plastic products or other petroleum-derived solvents.

Granular bedding shall be stored on a firm impermeable base so that it does not become contaminated with deleterious matter.

5.3 Handling Pipes and Fittings

Before any pipes are delivered to site the Contractor shall submit details to the Engineer of his proposals for handling pipes during transport, in store and during laying.

Pipes and specials shall only be transported on properly constructed or adapted vehicles containing correctly shaped and padded cradles or with strong, sawdust filled bags separating pipes and vehicle body. During transport and in store, pipes shall not rest on narrow traverse supports likely to cause damage to the pipe or its coating. Pipes shall not be unloaded from a vehicle by tipping or dropping.

Pipes, specials and fittings shall not be subjected to rough handling at any time. Under no circumstances shall they be dropped during loading or off-loading or be allowed to collide with one another. Any materials that have been dropped from a vehicle shall immediately be rejected for use on the Works. The same shall apply for any pipes found defective before laying.

The handling of any pipes exceeding 200kg mass other than by means of a crane is specifically forbidden. The Contractor shall maintain a suitable mobile crane on the Site and shall use it for all loading, unloading, transferring between vehicles and lowering into the trench of such pipes. The crane shall be fitted with a sling of ample width. Wire rope slings or hooks in the ends of pipes shall not be used for pipes or fittings of any diameter or mass.

In making arrangements for handling pipes, the Contractor shall take into account any recommendations made by the pipe manufacturer.

Where appropriate the requirements of this Clause shall apply to fittings and other components.

5.4 Cutting Pipes

The cutting of pipes for making up lengths shall be carried out by a method which leaves a clean square end.

Concrete pipes shall be cut with a concrete saw or by hand. If cut by hand the end of the pipes shall be trimmed even and square and if reinforced, the steel shall be cut flush with the face of the concrete. If instructed by the Engineer the exposed ends of the steel shall be protected with bitumen or a cement grout.

Steel pipes to be cut shall have the line to be cut clearly marked round the pipe. Cutting shall be carried out by cutting disc or by oxy-acetylene and the cut end shall subsequently be ground to the correct profile for the method of jointing in use.

5.5 Pipes and Fittings

5.5.1 Concrete Pipes

Concrete pipes shall comply with BS 5911 “Specification for concrete cylindrical pipes, bends, junctions and manholes, unreinforced or reinforced with steel cages or hoops” save that the crushing test loads for the various diameters of pipe shall be as follows:

Table 5-1: Pipes and Fittings

Nominal size of pipe (mm)	Works proof load kN/m effective length
300	23 (Class M equivalent)
450	35 (Class M equivalent)
600	46 (Class M equivalent)
800	54 (Class M equivalent)
900	85 (Class M equivalent)
1000	73 (Class M equivalent)
1200	110 (Class M equivalent)
1500	132 (Class M equivalent)

Works proof loads shall be 80% of the maximum loads for each size of pipe.

Damaged pipes showing signs of visible cracking either on the inside or outside surface shall not be used.

5.5.2 Steel Pipes

Steel pipes and fittings shall comply with BS EN 10224:2003 non-alloy steel tubes and fittings for the conveyance of aqueous liquids including water for human consumption – technical delivery conditions.

Pipe shall be either seamless, electric welded or submerged arc welded. However, the manufacturing process shall not be beyond their allocated diameter ranges:

Table 5-2: Steel Pipes

Manufacturing process	Outside diameter range, mm	Thickness range, mm
Seamless (S)	26.9 – 711	2.0 – 100
Electric Welded (EW)	26.9 – 610	1.4 – 16
Submerged Arc Welded (SAW)	168.3 - 2743	2.9 - 50

Seamless (S) pipe is formed by a method of hot working steel to form a tubular product without a welded seam. If necessary, the hot worked tubular product may be subsequently cold finished to produce the desired shape, dimension and properties.

Electric Welded (EW) pipe formed continuously from a steel strip with a longitudinal seam. This seam is joined by electric resistance or electric induction welding wherein the edges to be welded are mechanically pressed together and the heat for welding is generated by the resistance to flow of the electric current.

Submerged Welded pipe (SAW) formed from a steel strip with a longitudinal or helical (spiral) seam. The seams are then welded together by a coalescence of metals caused by heating them with an arc or arcs between a bare consumable electrode or electrodes. The arc and molten metal are shielded by a blanket of granular, fusible material on the work. Welding shall include at least one pass on the inside and one pass on the outside of the pipe.

Pipes shall not include welds used for joining lengths of steel strip together prior to forming except for helical welded pipe provided that such weld is made using the same method of welding as the helical seam.

Pipes shall not contain circumferential welds. Pipes shall not be manufactured on site.

Pipes formed from, plate, strip or coil shall have edges mechanically sheared before forming. In the case of pipes thicker than 10mm to be manufactured by the Submerged Arc Process (SAW), the edges of plate, strip or coil shall be chamfered by mechanical milling.

Pipe shall be delivered in 12m exact lengths for DN 250 and above and 6m exact lengths for DN 200 and below. The tolerances on pipe length shall be in accordance to Table 9 of BS EN 10224.

Unless otherwise specified, pipe shall be supplied with spigot and socket push-fit joints with elastomeric seals. The joints shall be flexible joints as defined in BS EN 805:2000 and the allowable angular deflection of the joints shall comply with the Class B limits given in Table 5 of EN 805.

Steel pipes and fittings larger or equal to DN 200 shall be internally lined throughout their entire length internally with either:

- (a) Fusion bonded epoxy to AWWA C213 (400 µm dry film thickness);
- (b) Solvent free liquid epoxy to AWWA C210 (400 µm dry film thickness);
- (c) Polyurethane to AWWA C222 (500 µm dry film thickness).

The materials and application process shall be subject to the Engineer's approval.

Steel pipes and fittings smaller or equal to DN 150 may be lined in cement mortar to AWWA C205.

For steel pipes DN 500 and below, the external protection shall be fusion-bonded epoxy to AWWA C213.

Dimensions for fittings shall comply with BS EN 10224. In the case of fittings such as reducers, laterals and washout tees not covered in BS EN 10224, the dimensions shall comply with AWWA C208.

Calculation of thickness of bends and reinforcement of tees and laterals shall comply with AWWA C208 and AWWA M11. The Contractor shall submit details of such calculations.

Flange jointed pipes shall have flanges complying with BS EN 1092: 2002.

All steel flanged pipes and fittings shall be supplied complete with hot dipped galvanised bolts, nuts to BS EN ISO 1461 (minimum 305g/m²) and appropriate gaskets. Gaskets shall be EPDM rubber and conform to BS EN 681. They shall be suitable for potable water.

The Contractor shall make available to the Engineer the manufacturer's certificates covering the chemical analysis and physical properties of each cast of steel used in the manufacture of pipes. In addition, a product analysis shall be conducted on the steel coils, plates, billet or blanks prior to pipe manufacture.

All pipes shall be hydraulically tested before leaving the factory to induce a hoop stress equal to 70% of the minimum yield stress pressure as specified in BS EN 10224.

All pipes shall be tested according to Table 14 of BS EN 10224 and at the frequency stipulated in Table 15.

All tests shall be carried at the expense of the Contractor at the place of manufacture and the Contractor shall supply a signed certificate on delivery of the goods concerned giving results of the tests and certify that the goods concerned have been manufactured in accordance with this Specification.

5.5.3 *Galvanised Steel Tubes*

Galvanised mild steel tubes and fittings shall comply with BS 1387 Class B or "Medium Grade". Threading for screwed and socketed joints shall be in accordance with the requirements of BS 21.

Joints shall be made with an approved pipe-jointing compound in accordance with the manufacturer's instructions. Red lead compounds shall not be used. Joints in underground piping shall be coated with bitumen or other approved composition.

All underground sections of pipework to be protected against corrosion by treating with K1-60 bitumen emulsion primer, and wrapped with fibreglass and coated with two coats of bituminous tap coats all to manufacturer's specification.

The bituminous paint is to be manufactured to ASTM D1187-82.

All fittings for galvanised steel water pipework shall be galvanised heavy weight fittings in accordance with BS EN 10241. All fittings shall be subject to the approval of the Engineer.

Brass or gunmetal fittings shall be subject to the approval of the Engineer.

5.5.4 *PVC-U Pipes*

Unplasticized Polyvinyl Chloride (PVC-U) pressure pipes shall have outside diameters, laying lengths and wall thickness complying with KS-06-149 Part 2: 2000. Joints shall be of the spigot and integral socket type. Solvent weld joints are not permitted in buried PVC-U pipelines.

Fittings for use with PVC-U pressure pipe shall be manufactured from either PVC-U or cast iron with socketed joints and shall comply with ISO 727. Cast iron fittings shall be bitumen coated. Aluminium alloy fittings are not permitted.

The metal adaptor fittings shall comply with ISO 4132.

5.5.5 PE Pipes

Polyethylene (PE) pipes and fittings shall comply with ISO 4427:1996.

5.6 Valves

5.6.1 Gate Valves

Gate valves shall conform to BS 5153-1:2004. The valves shall be tested in accordance with BS EN 1074-2:2000.

Non-return valves	BS EN 1074-3:2000
Air valves	BS EN 1074-4 :2000
Hydrants	BS EN 1074-6 :2004

All gate valves shall close in a clockwise direction and the direction of opening and closing shall be cast on the handwheels or valve casing with the words 'OPEN' and 'CLOSE' respectively. All gate valves shall be capable of being operated manually with a maximum applied torque of 100 Nm for valves with a nominal diameter less than 450mm. The Contractor shall ensure that the gate valves supplied are fitted with appropriate thrust bearing guides and gearing to fulfil these requirements, ensuring that when reduction gearing is employed, the gear ratio shall not exceed 4:1.

Isolating gate valves shall permit manual closing off of the raw water supply.

5.6.2 Butterfly Valves

Butterfly valves shall conform to BS EN 593:1998: "Industrial valves. Metallic butterfly valves." The valves shall be tested in accordance with BS EN 1074-2:2000.

The use of butterfly valves as main line valves shall not be permitted.

5.6.3 Check Valves

Check valves shall comply with BS EN 12334:2001: "Industrial valves. Cast iron check valves." The valves shall be tested in accordance with BS EN 1074-3:2000.

The valves shall be installed in a horizontal position to avoid malfunctioning of the check.

5.6.4 *Single Air Valves*

Single air release valves shall be of the small orifice type and shall have bodies of cast iron. The inlet shall be 25mm diameter fitted with an isolating plug cock and shall be screwed in an 80mm diameter blank flange drilled and tapped to BS 21. Single air valves shall be of pattern and manufacture approved by the Engineer for the conditions under which they will operate, and be fitted with a pressure gauge tapping and plug. Floats are to be manufactured from high-density polyethylene.

The valves shall be tested in accordance with BS EN 1074-4:2000.

5.6.5 *Double Air Valves*

Air release and vacuum break valves shall be of a compact, single chamber design with solid cylindrical high density polyethylene control floats housed in a tubular stainless steel body with stainless steel ends secured by stainless steel tie rods.

The valves shall have integral surge alleviation mechanisms that shall operate automatically to limit transient pressure rise or shock induced by closure due to high velocity air discharge or the subsequent rejoining of separated water columns. The limitation of pressure rise must be achieved by deceleration of approaching water before valve closure.

The intake/discharge orifice area shall be equal to the nominal size of the valve.

The valve design shall incorporate an overpressure safety feature that will fail without an explosive effect. This feature shall consist of easily replaceable components such as gaskets, seals or the like.

The valves shall be tested in accordance with BS EN 1074-4:2000.

5.6.6 *Flow Control Valves*

Pressure and flow control valves shall be installed as shown on the Contract Drawings and be suitable for the operating conditions specified.

The basic valves shall be either of the pressure compensating globe valve design with externally arranged spring and diaphragm assembly or of the streamline two chamber concentric plunger and pilot valve regulating assembly enclosed within the valve body as required for the particular applications.

Valve bodies shall be of a suitable grade of close-grained cast iron to BS EN 1561:1997.

Valves shall be sized such that the fully open capacity is more than adequate to accept the specified maximum flow at the minimum differential pressure.

The globe valve design shall have the main seat in the stream flow and an upper cylinder for the valve element control piston type and shall have the required number of bosses drilled and tapped to receive strainer unit, relay valves and pressure gauges. The cover plate shall include an air vent and lifting eyes. The main seat shall have a renewable element and the upper portion shall be in the form of a piston and the lower portion shall have a face ring and ported guide.

Valves shall be fitted with an external control relay system which shall be capable of controlling the required parameter of flow or pressure within + or -5 per cent of the set value. The relay system shall include connecting piping couplings and isolating valves to permit maintenance or replacement without interrupting supply.

The rate of response of opening and closing of the main valve shall be adjustable and means for external indication of the main valve element position shall be fitted.

The particular control system for the different duties shall be as specified below.

a) Altitude Valves

The main valve shall be controlled by a slave ball cock mounted in the controlled tank at top water level and connected to the valve operating mechanism by small-bore pipework. The level of the ball shall be adjustable in service so that the main valve is fully drop-tight closed when the water level in the tank reaches top water level.

b) Flow Control Valves

Flow control valves shall be designed to prevent the flow downstream rising above that specified in the Particular Specification or shown on the Drawings for the particular application, regardless of the operating pressures in the system upstream or downstream of the valve. The relay system valve shall be operated by the pressure differential measured across the main flow orifice which shall be fitted at the upstream end of the flow control valve.

c) Pressure Reducing Valves

Pressure reducing valves shall be designed to reduce a constant or variable inlet pressure to a predetermined constant outlet pressure, at flows varying from the maximum capacity of the valve to zero flow. Adjustment of the outlet pressure shall be made by a screw on the relay valve or by changing weights as appropriate. A pressure gauge indicating downstream pressure shall be incorporated.

d) Pressure Sustaining Valves

Pressure sustaining valves shall be designed to maintain the pressure in the pipeline immediately upstream of the valve at or above a preset value, irrespective of the flow and pressure conditions downstream of the valve. Adjustment of the upstream pressure shall be made by a screw on the relay valve or by changing weights as appropriate. A pressure gauge indicating upstream pressure shall be incorporated.

e) Pressure Relief Valves

Pressure relief valves shall be designed to prevent the pressure in the pipeline immediately upstream of the valve rising above a preset value. The valve shall remain closed at lower pressures. Adjustment of the pressure at which the valve opens to relieve pressure shall be made by a screw on the relay valve or by changing weights as appropriate. A pressure gauge indicating upstream pressure shall be incorporated.

5.6.7 Float Valves

Float operated valves shall comply with BS 1212 and BS 1968 and BS 2456 “specifications for float ball valves”.

Ball valves shall be the plastic diaphragm type or similar approved with seatings to suit the working pressure of 5 bars with plastic float to BS 2456 and internal overflow.

5.6.8 Painting of Valves

All valves shall be painted internally and externally to give the same standard of protection as for steel pipes and fittings. Surface protection shall be all to the approval of the Engineer.

5.7 Laying Pipes in Trenches and Headings

Immediately before pipes are placed in any trench, the bottom shall be cleared of all stones and other debris and shall be in a condition acceptable to the Engineer. Prior to placing in the trench, all pipes shall be inspected for damage. Damaged pipes which in the opinion of the Engineer cannot satisfactorily be made good shall not be used in the permanent works. End caps or discs placed on the pipes for protection during transit shall not be removed until immediately before the pipes are jointed.

Pipes shall be laid in straight lines unless otherwise shown on the drawings. No pipe shall deviate from the true line and level by more than 5mm. Pipes shall be firmly bedded throughout their length to the required alignment and level so that they are concentric at each joint. All pipes shall be suitably wedged, shored or otherwise restrained to prevent movement during testing and backfilling but such restraints shall not be left in place permanently unless instructed or agreed by the Engineer.

Pipes which are to receive a concrete bed and haunch or surround shall be set on suitable concrete blocks or bricks with a pad of hessian-based damp proof course two millimetres thick interposed between the pipe and the block. Setting blocks shall not be used with other forms of bedding.

Unless otherwise agreed by the Engineer a close-fitting brush or swap shall be placed in pipelines having nominal diameters of 650mm or less and shall be drawn forward progressively as pipe laying proceeds by means of a suitable rope which shall be threaded through each pipe as it is laid. Pipelines having nominal diameters greater than 650mm shall be kept clean by suitable means as pipe laying proceeds. No debris of any kind shall be allowed to remain in the pipeline. Where the pipeline has internal lining, persons entering shall wear rubber boots and equipment trolleys shall have rubber tyred wheels. Pipes and joints shall be kept free of dirt, mud and other deleterious matter at all times. If pipe laying is stopped at any time, a cap shall immediately be placed on the end of the last pipe laid to exclude dirt.

Suitable precautions shall be taken to prevent the floating of pipes due to flooding of trenches. If floating should occur, the whole of the pipe run affected shall be removed and trench prepared again. No pipes shall be re-laid in trenches which have flooded until the trenches and the pipes have been inspected by the Engineer. The Contractor shall be entirely responsible for the sufficiency of all temporary supports and side slopes to the excavations. The excavation shall be carried out in such a way as to maintain the stability of all roads and other adjacent structures or works.

Pipes having integral sockets shall be laid with sockets facing upstream unless otherwise agreed or instructed by the Engineer.

Pipes in headings shall be laid in accordance with the requirements of this clause but pipe lengths shall not exceed 1.5m unless otherwise agreed by the Engineer.

5.8 Pipes Laid on Natural Ground

Filling shall commence with selected fill consisting of easily compacted material from which all stones larger than 25mm and all lumps of clay larger than 75mm have been removed. The selected fill shall be deposited equally on each side of the pipe carefully compacted in layers not more than 150mm thick. Care shall be taken to ensure that no voids are left under the pipe. The filling shall be continued to a level of 300mm above the crown of the pipe

In the case of steel, ductile iron and plastic pipes, the Contractor shall ensure that no distortion of the pipe takes place during the backfilling operation.

The remainder of the trench shall be filled with excavated material and compacted in 150mm thick layers by means of a vibrating plate compactor or a mechanical rammer. The trench shall be filled flush with the surrounding ground surface.

5.9 Pipes laid on Granular Bedding

Granular bedding material shall be placed and compacted generally on both sides of the pipe up to the horizontal diameter of the pipe. Care shall be taken to ensure that no voids are left under the pipe. Thereafter the selected fill shall be as described in Clause 5.8 above.

5.10 Pipes with Concrete Bedding and Surround

The configuration of the concrete bedding, surround or arch shall be as shown on the drawings including the location of reinforcement if any is required. Pipes to be set in concrete shall be supported as set out in Clause 5.7. Small diameter pipes in short lengths shall be supported behind pipe socket. Large diameter pipes and long lengths shall be supported on two packers.

After jointing and testing as set out in the appropriate parts of this section, concrete of the class shown on the drawings shall be carefully placed and compacted under the pipes making sure that no voids are left, and brought up to the configuration shown on the drawings. The Contractor shall ensure that the pipes do not float or are in any way disturbed during concrete placing. The remainder of the backfill shall be placed as set out in Section 2 of this Specification.

Where pipes, which are laid on a bed of granular material, are to be protected by a concrete arch, the laying and jointing shall proceed as set out in the appropriate parts of the Specification and granular material shall be brought up to the horizontal diameters of the pipes.

After testing, concrete shall be placed over the pipes to the configuration shown on the drawings and the remainder of the backfill shall hereafter be placed as set out in Section 2 of this Specification.

Flexible joints shall be formed in concrete beddings, arches or surrounds in the location shown on the drawings. Such joints shall coincide with the pipe joint in such a way that the end of the socket is flush with one face of the joint and the socket faces into the joint space.

Joints in concrete beddings, arches and surrounds shall be 18 mm wide unless otherwise instructed by the Engineer and shall be filled with a compressible material such as a sheet of cane fibre board or cork board. The material used shall be subject to the approval of the Engineer.

5.11 Special Accessories for the Buried Pipe Network

5.11.1 Scope

This section of the specification concerns the supply and installation of accessories for the buried pipe network at the locations shown on the approved Drawings or as directed by the Engineer.

The several parts of the accessories, as described below, shall be considered as a complete unit, which will serve to supply water to the hydrant outlets from the underground distribution network. Each part shall be fabricated by an internationally recognised manufacturer and shall conform to the conditions of operation, the characteristics, the testing and other requirements described below.

The several parts of the accessories, as described below, shall be considered as complete unit, which will serve to supply water to the hydrant outlets from the underground distribution network. Each part shall be fabricated by an internationally recognized manufacturer and shall conform to the conditions of operation, the characteristics, the testing and other requirements described below.

The Contractor shall at the time and place required, submit to the Engineer proposals concerning the manufacturers selected by him for the supply of the accessories, accompanied by a detailed report, specifications and certificates showing that the proposed components have been successfully used in similar sprinkler systems, so as to prove that the proposed accessories conform to the requirements of this specification in a satisfactory manner.

Subsequent to the provision and acceptance of the proposals as above, the Engineer may agree to the use of the proposed accessories, but his consent cannot be interpreted in any case whatsoever, as relieving the Contractor of his responsibilities for the supply of accessories which shall prove adequate and efficient during the testing procedure and the operation of the network.

The Engineer reserves the right, on the other hand to reject the Contractor's proposals if he finds them incomplete or vague or if the proposed accessories do not conform to the requirements of this specification.

In such a case, within a reasonable period, not longer than one month, after communication of the above decision of the Engineer to the Contractor, the latter is required to supplement and improve his original proposals and submit his revised recommendations.

If the Contractor fails to submit, within the above time limit, his final recommendations, or if the Engineer for the same reasons rejects these for which his original proposals were rejected, he is required to supply accessories, which will satisfy the Engineer. If, however, he does not agree and insists on supplying the accessories which he has proposed, he must deposit a guarantee to an amount equal to the value of these accessories. This guarantee will remain in the hands of the Employer until the final acceptance and will be forfeited to the latter if, during the test procedure and the operation of the network, it is ascertained that the accessories supplied by the Contractor are not satisfactory. It is understood that the Contractor is, in addition, required to fulfill all his other obligations for the restoration of all defective construction until final acceptance by the Engineer.

5.11.2 Acceptance Tests

Included with the specifications submitted by the Contractor, shall be copies of any relevant international standards to which the items are to be constructed. The Engineer reserves the right to request independent authenticated tests at the point of manufacture and also similar tests in situ under operating conditions. All costs shall be borne by the Contractor who will promptly replace any components which, in the judgement of the Engineer are found, either after testing or during operation and until final acceptance, as not conforming to the requirements of this Specification.

5.11.3 Measurement and Payment

Measurement shall be by assessing the number of satisfactorily installed and accepted accessories.

Payment will be made for the number of accessories measured as described above and on the basis of the respective contract unit prices. Such prices and payment constitute full compensation to the Contractor for supplying, hauling, storing and installing the accessories, for paying patent rights, for furnishing the equipment, materials and labour required for installing and checking the operation of the accessories in accordance with the foregoing requirements, and for any other related expense even if not explicitly stated above but necessary for the complete and proper performance of the work and the satisfactory operation of the accessories.

5.11.4 Irrigation Hydrants

There are generally two types of hydrants as shown on the Drawings:

- Type 1 Plot hydrant
- Type 2 Field hydrant

5.11.5 Pressure Reducing Valves

There is a requirement for Pressure Reducing Valves, which will protect the installed pipelines against high pressures.

The Contractor shall submit to the Engineer proposals referring to the valves to be used and the name of the manufacturer with whom he intends to place the purchase order, accompanied by a detailed report, specifications and certificates showing that the proposed valves have been successfully used in similar cases so as to prove that the proposed valves conform to the requirements of this specification in a satisfactory manner.

Following completion of the construction of the pipe network, and prior to its final acceptance, the engineer may demand the performance of tests to ascertain the efficiency and adequacy of the installed valves. To this effect, the Contractor shall, at his own expense, place at appropriate locations of the network to be designated by the Engineer automatic recording manometers with the minimum possible inertia of moving parts so as to ascertain in an unquestionable manner, the adequacy of the valves, especially during filling and draining of the network as well as on sudden opening and immediate shut down of a riser located at a relatively unfavourable point.

The Contractor shall take into account the fact that the valves must be “drop tight” or “sealed” at no flow conditions and that the seals and operating mechanisms must be proof against suspended solids in the supply water (untreated river water). The valves shall operate automatically, hydraulically, without electricity.

5.12 Joints in Pipelines

5.12.1 Concrete Pipes

Rigid Joints

When laying rigidly jointed pipelines with pipes having integral sockets, before entering a pipe spigot into its socket, both spigot and socket shall be clean and free from mud, oil, grease or other deleterious matter. A gasket of tarred hemp yarn, cut to length so that it forms a butt joint at the crown of the pipe shall be wrapped round the spigot which shall then be fully entered into the socket and the gasket caulked up hard into the joint. The joint shall then be filled completely with a plastic mortar composed of one part of cement to two parts of sand.

The pipes shall not be pressure tested or disturbed in any way for at least 48 hours after jointing.

Rigidly jointed sleeves used to join two spigots shall be jointed in the same manner as integral sockets.

If the drawings require ogee jointed pipes to be laid with a mortar joint, the joint shall be made at the time of laying. Mortar as described above shall be applied to the lower semi-circumference of the socket and to the upper semi circumference of the spigot and the pipe shall be drawn hard into the socket. Excess mortar squeezed out of the joint shall be removed from both the inside and outside of the joint.

Flexible Joints

Flexible joints between pipes having integral socket may be formed by a shaped rubber gasket fitted within the socket or by a rubber ring of circular cross section (O-ring) placed on the pipe spigot. The type of flexible joint to be used shall be subject to the approval of the Engineer and shall be made strictly in accordance with the manufacturer’s recommendations.

5.12.2 PVC-U Pipes

Flexible jointed PVC-U pipes shall be jointed in accordance with the manufacturer's instructions.

Solvent welded joints shall be made strictly in accordance with the manufacturer's instructions using solvent supplied by him for exposed pipes.

5.12.3 Steel Pipes

These shall be caulked in thread seal for rigid joints. Flexible joints incorporating rubber O-rings shall be made in accordance with the manufacturer's instructions. Joints incorporating bolted or screwed glands or couplings shall be made in accordance with the manufacturer's instructions.

Components of flexible joints from different manufacturers shall not be used together.

5.13 Connections to Existing Pipelines

Where a connection is to be made to an existing water pipe other than that at a chamber, a pipe saddle of the correct size shall be used for this purpose. The hole in the pipe shall be cut precisely to fit the saddle.

Saddles for uPVC pipes shall be made of the same material as the pipes and shall be fixed with a solvent in accordance with the manufacturer's instructions.

5.14 Pipes through Structures

Where a pipeline passes into or out of a structure, including a manhole cover or similar chamber, two flexible joints shall be formed. The flexible joint shall consist of a 500mm long pipe section connected along the main pipe, with the nearest end 500mm from the face of the structure. One joint will be made on the incoming pipe and another joint on the outgoing pipe.

When the structure is less than one pipe length wide, the above requirement shall not apply and a sleeve shall be formed through the structure so that there is a clear space at least 75mm wide all-round the pipe. Adequate means shall be provided to prevent soil from entering this gap.

5.15 Pipelines within Concrete Structures

Sections of pipelines which are to be cast into concrete may be installed in advance of the remaining parts of the pipeline subject to the agreement of the Engineer. Such sections shall be placed accurately into position and fixed so that they cannot move during placing of concrete around them.

5.16 Pipes under Roads

All pipes at the crossing of driveways and roads shall be surrounded with concrete for the entire length of crossing before trench backfilling.

Concrete surround shall be approved by the Engineer on satisfactory compliance with protection of pipes as detailed in Section 5.9.

5.17 Cleaning

The insides of all pipes, valves, tanks and fittings shall be clean, smooth, and free from blister, loose scale and dirt when erected. All lines shall be cleaned after all installation work.

When pipes are installed all ends shall be suitably plugged until final fixing of fixtures can be carried out. Pieces of cloth or stone will not be permitted.

5.18 Pressure Testing of Pipelines

As the installation of the pipework proceeds, the various sections shall be tested before they are built in, concealed, or finally connected. The Contractor shall advise the Engineer in writing at least three days in advance of the carrying out of such tests, and such tests shall, if considered necessary by the Engineer, be carried out in his presence.

All tests shall be at the expense of the Contractor and it shall be the responsibility of the Contractor to make all necessary records of the tests and results and submit these to the Engineer in the final form agreed.

All pipe systems shall be tested hydraulically for a period of one hour to not less than one and a half times the design working pressure. Testing shall comply with BS EN 805:2000 for standard field testing of pipelines.

If preferred, the Contractor may test the pipelines in sections. Any such section found to be satisfactory need not be the subject of a further test when the system has been completed, unless specifically requested by the Engineer.

During the test, each branch and joint shall be examined carefully for leaks and any defects observed shall be made good by the Contractor and the section re-tested.

5.19 Painting of Exposed Pipes and Fittings

All metal surfaces within chambers shall be mechanically wire brushed to remove all loose scale, grease etc. Within two hours of cleaning a primer shall be applied, followed after two hours by a first coat of heavy consistency bitumen paint all to the approval of the Engineer. A second coat of the heavy consistency paint shall be applied after 24 hours. The final coating thickness shall not be less than 250 microns.

Preparation and application of the coating system shall be strictly in accordance with the Manufacturer's instructions.

This clause shall not be applied to chemically or thermally bonded coatings on steel pipes.

5.20 Marker Posts

Precast concrete marker posts shall be set in concrete and fixed near valves, fire hydrants, washouts, changes in direction of the mains and where directed by the Engineer. The posts shall be detailed as directed by the Engineer.

5.21 Portable Sprinkler Irrigation Equipment

5.21.1 Scope

The Tender involves the fitting of plot hydrants for overhead irrigation.

The contractor shall have submitted with his Tender detailed specifications as to the dimensions, type and materials utilized in such works, together with any detail that the Contractor may consider to be relevant.

The Contractor shall at the time and place required submit to the Engineer proposals concerning the manufacturers selected by him for the supply of the portable sprinkler-irrigation equipment accompanied by a detailed report, specifications and certificates showing that the proposed components have been successfully used in similar sprinkler systems so as to prove that the proposed equipment conforms to the requirements of this specification in a satisfactory manner.

Subsequent to the provision and acceptance of the proposals as above, the Engineer may agree to the use of the proposed equipment, but his consent cannot be interpreted in any case whatsoever, as relieving the Contractor of his responsibilities for the supply of equipment which shall prove adequate and efficient during the testing procedure and the operation of the network.

The Engineer reserves the right, on the other hand, to reject the Contractor's proposals if he finds them incomplete or if the proposed equipment does not conform to the requirements of this specification.

In such a case, within a reasonable period, not longer than one month, after communication of the above decision of the Engineer to the Contractor, the latter is required to supplement and improve his original proposals and submit his revised recommendations.

If the Contractor fails to submit, within the above time limit, his final recommendations or if these are rejected by the Engineer for the same reasons for which his original proposals were rejected, he is required to supply portable sprinkler irrigation equipment which will supply the Engineer. If, however, he does not agree and insists on supplying the equipment which he has proposed, he must deposit a guarantee to an amount equal to the value of the equipment. This guarantee will remain in the hands of the Employer until the final acceptance and will be forfeited to the latter if during the test procedure and the operation of the network, it is ascertained that the portable sprinkler irrigation equipment supplied by the Contractor is not satisfactory. It is understood that the Contractor is, in restoration of all defective construction until final acceptance by the Engineer.

5.21.2 Acceptance Tests

Included with the specifications submitted by the Contractor shall be copies of any relevant international standards to which the items are to be constructed. The Engineer reserves the right to request independent authenticated tests at the point of manufacture and also similar tests at the point of manufacture and also similar tests in situ under operating conditions. All costs shall be borne by the Contractor who will promptly replace any equipment which in the judgment of the Engineer is found, either after testing or during operation and until final acceptance, as not conforming to the requirements of this Specification.

5.21.3 Measurement and Payment

Measurement shall be made by assessing the number of satisfactorily installed and accepted items of portable sprinkler irrigation equipment.

Payment will be made for the number of items measured as described above and on the basis of the respective contract unit prices. Such prices and payment constitute full compensation to the Contractor for supplying, hauling, storing and installing the equipment for paying patent rights for furnishing the equipment, materials and labour required for installing and checking the operation of the items in accordance with the foregoing requirements, and for any other related expense even if not explicitly stated above, but necessary for the complete and proper performance of the work and the satisfactory operation of the portable sprinkler irrigation equipment.

5.21.4 Portable Sprinkling Irrigation Equipment

This equipment comprises the following as shown in the drawings:

- HDPE pipes of 6 m lengths, 20 -25mm diameter and of class 4 (6 bar),
- HDPE/GI adaptors,
- GI equal tee,
- ½ inch (12.5mm) diameter GI riser pipe with support (tripod or equivalent),
- ½ inch sprinklers (double or single nozzle) to deliver on average 0.63m³/hr at between 15 – 40m heads and of highly durable material (not plastic) and corrosion resistant,

Also refer to sub-sections 5.21.1, 5.21.2 and 5.21.3.

All equipment should be of recognised standards.

6 STEELWORK

6.1 General

Except where otherwise specified, structural steel shall be grade 43, complying with BS 7668, “Specification for weldable structural steels”.

All structural rolled steel members shall comply in dimension, weight and tolerance with that shown on the drawings and with BS 4, “Structural steel sections” and BS EN 10056, 10067 and 10210.

6.2 Bolts, Nuts and Fastenings

Bolts, studs, nuts and washers etc, shall be of mild steel unless otherwise specified. The dimensions and tolerances of nuts and bolts shall comply with BS 4190, “Specification for ISO metric black hexagon bolts, screws and nuts” or where specified to BS 3692, “Specification for ISO metric precision hexagon bolts, screws and nuts” and the threads shall be to BS 3643, “ISO metric screw threads”. The heads of the bolts shall be forged out of the solid bar and the ends shall be cleanly cut with standard threads and the nuts must fit the bolts accurately and tightly. Washers of the shape and type indicated on the drawings shall comply with BS 4320, “Specification for metal washers for engineering purposes”

Where nuts, bolts and washers are required to be galvanized, the galvanizing shall be to BS 3382, “Specification for electroplated coatings on threaded components”.

6.3 Electrodes

Electrodes used in welding mild steel shall comply with the requirements of BS 639, “Specification for covered carbon and carbon manganese steel electrodes for manual metal-arc welding”.

6.4 Contractor’s Shop Drawings

Where the Contractor is required to undertake the detailed design of the steelwork components, he shall provide the Engineer with copies of detailed shop drawings for approval at least fourteen (14) days before commencing fabrication. The Contractor shall be responsible for the detailed design of all connections and these shall be fully detailed on the shop drawings together with all dimensions, clearances, welding details and procedures, machining, marking, etc. The Contractor shall not commence fabrication until he has received the Engineer’s written

approval of the shop drawings. Approval of such drawings shall in no way relieve the Contractor of his responsibility for accuracy or the correct operation of the component.

6.5 Fabrication and Erection of Steelwork

The standard of workmanship and engineering practices to be adopted for fabrication and erection shall conform to BS 449, "Specification for the use of structural steel in building" and BS 5531, "Code of practice for safety in erecting structural frames".

The Contractor shall supply samples of materials and standards of workmanship as required by the Engineer. All samples approved by the Engineer shall be retained and shall be considered as setting the standard for all subsequent work.

Inspection of work will be carried out by the Engineer and the Contractor shall give sufficient notice of the date when fabricated steelwork is ready for inspection. The Contractor shall provide particulars of places and dates of manufacture of all materials for the Permanent Works and the names of the manufactures. Copies in duplicate of all orders for materials shall be sent to the Engineer at the time of placing such orders.

The Contractor shall ensure that all foundation bolts and supports including built-in bolts, etc upon which the steelwork is to be erected are in the correct position and that the steelwork fits correctly in required positions without forcing or straining in any way. Any check by the Engineer of the Contractor's measurements shall not relieve him of his responsibility for obtaining this fit unless any errors in position are clearly not attributable to him.

No permanent bolting or site welding shall be done until proper alignment has been obtained. The Contractor may use temporary jigs, anchors or supports during erection, but must allow for thermal movement to take place freely at all times.

If the Contractor wishes to drill holes in or fix attachments to the steelwork to carry temporary work such as shuttering, he shall obtain the Engineer's approval of the positions and details of all such holes or attachments and shall close such holes and remove the attachments to the satisfaction of the Engineer.

On completion of erection of any part of the steelwork on which the Contractor wishes to add further works, such as roofing, he shall first obtain the Engineer's approval of the steelwork and remedy any defects required by the Engineer. Any approval given shall in no way relieve the Contractor of his responsibility for ensuring the subsequent correct positioning and behaviour of the steel work of other parts of the structure.

6.6 Welding

All shop welds shall be carried out by qualified welders who shall be under competent supervision. All welding is to be carried out in accordance with BS 5135, "Specification for arc welding of carbon and carbon manganese steels". The Contractor's proposals for welding shall be submitted to the Engineer for approval before any work is undertaken.

The Engineer may call for a test of a welder's capabilities in accordance with BS 4872, "Specification for approval testing of welders when welding procedure is not required".

In the case of site welds, the welding procedure for making each type of joint shall be approved by the Engineer before the work is commenced and the Contractor shall make such trial welds as the Engineer may require to demonstrate the soundness of the proposed method and the competence of his workmen.

Where site welding is used all welded joints shall be subject to inspection by the Engineer. Any welds that are in the opinion of the Engineer defective shall be cut out and the welds remade to the satisfaction of the Engineer. The cost of such corrective measures including any resultant delays shall be borne by the Contractor.

6.7 Painting General

The Contractor shall submit to the Engineer for his approval details of the types and manufacturers of paints he is proposing to use, together with the manufacturer's recommendations concerning preparation of surfaces, primers and undercoats, application methods, safety precautions and drying times for each type of paint. All paints used in the Works must be supplied ready-mixed in unbroken, sealed containers, which clearly show the type, colour and manufacturer of the paint and carry detailed "instructions for use".

All metal surfaces on which paint is to be applied shall be blast cleaned as laid down in BS 7079, "Preparation of steel substrates before application of paints and related products", or other mechanical means and fully prepared in accordance with the manufacturer's recommendations. Applications of paint coatings on external work shall not be carried out or continued in mist, rain or excessively damp conditions. The Contractor shall take all necessary precautions to prevent dust and dirt coming into contact with freshly applied paint before it has dried.

Paints shall be applied either by brushing or spraying in accordance with the manufacturer's instructions. The thinning of paints shall not be permitted without the approval of the Engineer. Unless otherwise recommended by the manufacturer, the minimum interval between the application of a first coat of paint and the second shall be twenty four hours (24 hrs). Special care shall be taken to ensure complete coverage of all corners, arises and openings without causing an excessive build-up of paint and avoiding runs.

Steelwork to be painted shall be clean and free from all rust, grease, oil and mill scale.

6.8 Painting Steelwork Immersed in Water

Steelwork subject to immersion in water shall be blast cleaned or thoroughly mechanically cleaned by an approved alternative process and immediately coated before leaving the factory with zinc phosphate or similar compatible metallic inhibitive primer with a minimum dry film thickness of 50 microns. Following drying of the primer, the steelwork shall be coated with one coat of non-toxic, non-tainting, high build bituminous paint to BS 3416, "Specification for bitumen-based coating for cold application, suitable for use in contact with potable water", having a minimum dry film thickness of 100 microns.

After erection, damaged areas of steelwork shall be mechanically cleaned and touched up with primer and bituminous paint to fully restore the factory applied coating system and thickness.

Finally, two overall finish coats of bituminous paint with a minimum dry film thickness per coat of 100 microns giving an overall minimum dry film thickness of the complete coating system of 350 microns.

6.9 Painting other steelwork

Where steelwork, which is not galvanized and not subject to immersion in water is required to be painted, it shall be thoroughly cleaned and painted prior to leaving the factory with:

- One coat of zinc phosphate or similar compatible metallic inhibitive primer with a minimum dry film thickness of 50 microns.
- One coat of red lead primer with a minimum dry film thickness of 50 microns.
- Two coats of micaceous iron oxide undercoat paint with a minimum dry film thickness per coat of 50 microns.

After erection, damaged areas of steelwork shall be mechanically cleaned and touched up with primer and under coat to fully restore the factory applied coating system and thickness.

Finally, one overall finish coat of enamel gloss micaceous iron oxide paint with a minimum dry film thickness of 50 microns giving an overall minimum dry film thickness for the complete coating system of 250 microns.

6.10 Galvanising

All steel and ironwork of whatever kind required to be galvanised is to be pickled in dilute hydrochloric acid and then washed, fluxed and stoved and coated with zinc by dipping in a bath of molten zinc. All components are to be immersed in the bath only for the time sufficient for them to attain the temperature of the bath, they are then to be withdrawn at such a speed that a coating of 80 microns thickness is achieved, or such other practical maximum thickness for the component as defined in BN EN ISO 1461:1999, "Specification for hot dip galvanised coatings on iron and steel articles".

The galvanising is to be carried out after all drilling, chipping, trimming, filing, fitting and bending operations are complete and shall cover all faces evenly.

After erection of galvanised steel components, damaged or welded areas shall be painted immediately after cleaning with two coats of metallic zinc primer with each coat having a thickness of 50 microns. The paint shall be applied strictly in accordance with the manufacturer's instructions and shall be compatible with any subsequent paint systems to be applied.

6.11 Galvanised Handrails

Handrail tubes shall be 38mm nominal diameter steel tube to BS 1387, "Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads". The top and bottom rails shall be 900mm and 450mm respectively above floor level. The rails and vertical standards shall be connected using screwed steel pipe fittings to BS 1740, "Specification for wrought steel pipe fittings (screwed BS 21 R-series threads)", where practical with the final connections being welded in accordance with Clause 6.6.

The handrail assembly shall be securely mounted on base plates fabricated of mild steel and attached to the base or foundation slab in a manner to be approved by the Engineer.

All sharp edges and rough areas shall be carefully ground off and the entire handrail assembly cleaned and galvanised in accordance with Clause 6.10.

6.12 Gates

Gates of the types and sizes shown on the drawings shall be supplied and installed where indicated on the drawings. The gate, shall be drop-tight and shall be suitable in all respects for use in raw water. The gates shall have flush inverts.

Gates shall be supplied complete with all frames, cills, gates, seals, spindles, handwheels and headstocks as required.

The frames and gates shall be fabricated in galvanised steel.

All gates shall have rising spindles with protection tubes, headstock, handwheel etc. and intermediate supports where the spindle is longer than 1500mm. Intermediate guide brackets are to be located 600mm above the gate frame, 400mm below the base of the headstock and at a maximum spacing of 1500mm, to suit or as recommended by the manufacturer and as approved by the Engineer.

6.13 Stoplogs

Where shown on drawings the stop-logs shall be hardwood of the stated dimensions and shall be approved by the Engineer before supplying to site. Where shown on the drawings stop-logs shall be bolted to steel frames of stated dimensions to form hardwood gates.

7 ROADWORKS

7.1 General

7.1.1 Earthworks

Earthworks shall be carried out in accordance with the requirements of Section 2 of this Specification.

In carrying out the earthworks, the Contractor shall take all necessary precautions to avoid damage to or deterioration of the earthwork materials. He shall so arrange his work that water, which is brought onto or enters the earthworks at any time either in advance of or during construction shall be rapidly dispersed until the permanent work is completed.

7.1.2 Formation Level

Formation level on embankments and in cuttings shall be the surface level of the ground obtained after completion of the earthworks.

7.1.3 Preparation and Formation

The formation to carriageways and verges shall be prepared to the satisfaction of the Engineer, well cleaned, free from mud and slurry, properly shaped and compacted by rolling to an even and uniform surface as shown on the Drawings or directed by the Engineer. Where soft pockets become evident during rolling, they shall be removed and replaced with sound compacted material.

Unless directed otherwise by the Engineer the formation shall be covered by the sub-base within 48 hours after the preparation the formation.

Once the formation has been prepared, constructional traffic, other than that specifically required for subsequent roadwork operations, shall not be allowed to run thereon without the permission of the Engineer.

7.1.4 Gravel Wearing Course

On completion of the road formation the Contractor shall lay sufficient gravel wearing course over the full width of the carriageway to achieve the consolidated depth and camber shown on the drawings or as directed by the Engineer.

Gravel wearing course shall consist of suitable natural gravel obtained from borrow pits approved by the Engineer and complying with the wet sieve analysis given below:

Table 7-1: Wet Sieve Analysis

BS Sieve size (mm)	Percentage passing
75	100
37.5	100
20	95 – 100
10	65 – 100
5	45 – 85
2.36	30 – 70
0.60	20 – 45
0.075	10 – 30

The gravel wearing course shall also comply with the following requirements:

- 4 days soaked CBR 20
- Plasticity Index 25
- Plastic Modulus 500

The CBR shall be determined in accordance with BS 1377 Test 16 on a sample compacted to 95% of maximum dry density as determined by BS 1377 Test B and then soaked for 4 days.

The material shall be spread in a uniform layer across the full width of the construction. The thickness of the layer shall be such that after compaction the thickness shall not exceed 150mm. Where a greater final thickness is required the material shall be laid and processed in two or more equal layers.

The material shall be mixed to a uniform consistency and any oversize materials shall be removed to an approved spoil dump.

The work area shall be kept continuously drained and any damage caused by water accumulating on or running off the surface shall be made good.

If necessary, water shall be added to bring the moisture content to between 80% and 105% of the optimum moisture content as determined by AASHTO 99 prior to commencing compaction.

7.1.5 Compaction of Gravel Wearing Course

All rolling shall be carried out longitudinally along the carriageway commencing at the carriageway edges and working in towards the centre. Material is to be compacted to 95% of the centre. Material is to be compacted to 95% of its maximum dry density or such other percentages as indicated on the drawings. Maximum dry density shall be as determined by AASHTO T99.

The in-situ dry density of the compacted material will be determined by the sand replacement method described in Test No 15A in BS 1377 or such other test as the Engineer shall consider appropriate. Each layer of fill material shall be approved by the Engineer prior to the placing of subsequent layers. Where the material is too wet or too dry the Contractor shall have the option of collecting the moisture content by watering or drying as appropriate, or modifying his compaction procedure so as to obtain the required dry density.

7.2 Rehabilitation of Existing Access Roads

7.2.1 General

The provisions of Clause 2 shall apply save where expressly varied hereunder.

All interventions shown on strip maps provided are subject to confirmation by the Engineer on Site.

7.2.2 Site Clearing

The width and length over which site clearing is to be carried out shall be as instructed by the Engineer.

7.2.3 Spoil of Unsuitable Material

This shall be in situ material, which is unsuitable to remain in the road, and has been instructed by the Engineer to be spoilt. Unsuitable material shall be deposited in spoil areas located by the Contractor subject to the approval by the Engineer. The rate for spoil shall include for the cost of excavating the material, loading, transporting, depositing, spreading and levelling the material in a spoil area, all to the satisfaction of the Engineer.

7.2.4 Earthworks Fill

The Contractor shall supply from a source approved by the Engineer, place and compact suitable borrow material having a minimum CBR of 10%, at 95% compaction as determined by AASHTO T99 to areas that require to be raised or where there is a deficiency of in situ material for reshaping.

7.2.5 Light Grading

Where this term is instructed, the road shall be graded to redistribute the existing material as required to achieve the specified cross section of the road, watered and compacted. This item applies where the required movement of material is not greater than 1m³/m

7.2.6 Heavy Grading

The Contractor shall scarify the road surface, add fill material where required, reshape and compact to achieve the specified cross section. This item applies where the required movement of material is greater than 1m³/m

7.2.7 Gravel Stockpiling

No separate measurement shall be made for stockpiling gravel and the Contractor will be deemed to have allowed for the costs elsewhere in his rates.

7.2.8 Overburden Removal

The removal of vegetation, topsoil and overburden at gravel borrow pits shall not be paid for separately. Contractor will be deemed to have allowed for the costs elsewhere in his rates. The same applies to any works required to access the borrow pits.

7.2.9 Haulage

The rate for gravel wearing course includes for the supply of material inclusive of extraction, loading and transportation to Site for a maximum haulage distance of 30km. Where suitable gravel is not available within this distance, overhaul will be paid for. Measurement shall be the product of the volume of compacted material in situ and the haulage distance in excess of 30km, one way, along the shortest route, as determined by the Engineer.

7.3 Drainage Works

7.3.1 Culvert installation

This shall include the provision and installation of a specified internal diameter including excavation and backfill to a compaction of 95% of maximum dry density as determined by AASHTO T99. The backfill material is to be approved by the Engineer. The rate includes any provisions necessary for diversion of traffic.

7.3.2 Mass Concrete, Beds and Surrounds

Unless otherwise shown on the drawings, the concrete shall be class C20/20

7.3.3 Mitre Drains and Catch Water Drains

These will be formed at the locations and the lines and levels shown on the drawings or instructed by the Engineer.

7.3.4 Side Drains

These will be formed to the lines and levels as shown in the drawings and at locations as instructed by the Engineer. Material excavated from the side drains may be incorporated into the reshaped road if suitable. Otherwise, it shall be spoiled in approved spoil areas.

7.3.5 Cleaning of Existing Drains

The Contractor shall clean existing blocked culverts and clear side drains as may be directed by the Engineer.

7.3.6 Repair of Existing Drains

The Contractor shall replace broken culverts, and repair or reconstruct broken wingwalls and headwalls as directed by the Engineer.

8 CONSTRUCTION TOLERANCES

The following are the tolerances within which the works are to be executed or as directed by the Engineer:

EARTHWORKS

Top level of Embankments after compaction		+100/ -0mm
Sides of Embankments over a 10 m length		+100/ -0mm
Channel or Excavation cutting		+20/ -20mm
Channel Water Way Area		- 0
Horizontal Alignment of Channels:	Maximum	300mm
	Over 20m length	100 mm
Formation Level for Structures		+0/ -ve filled with concrete
Formation Level for Gabions		+0/ -100mm

CONCRETE STRUCTURES

The following tolerances shall apply to all wrought formed and fair or fine unformed finishes.

Tolerance from Specified Position

Maximum departure of plan position of structure	150mm
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Tolerance from Specified Dimension

Maximum departure in thickness, cross-sectional	
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dimension or position of columns, beams, walls,
footings and the like +25/ -10mm

Surface Tolerance on Straightness or Departure from Specified Curve

General Surfaces

Maximum deviation in horizontal or vertical direction

- gradual over a 10m length 25mm
- abrupt 10mm

Surfaces in Contact with Flowing Water

Maximum deviation in direction of flow or normal to flow

- gradual over a 10m length 15mm
- abrupt 5mm

Reinforcement

Maximum departure in required spacing 15mm

Minimum lap length shall be:

- In the case of mild steel reinforcing 40 times bar diameter
- in the case of high yield steel reinforcing 50 times bar diameter

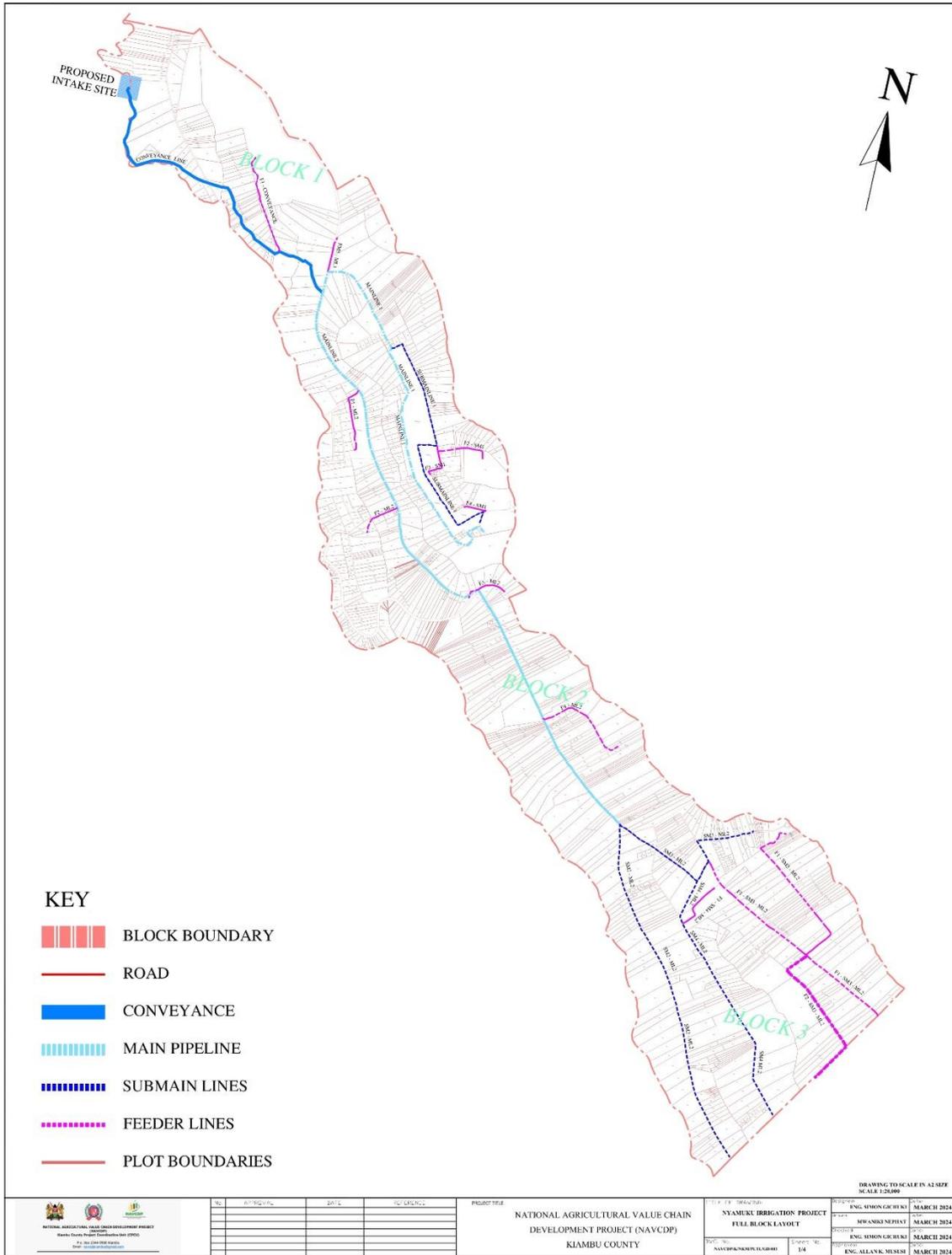
Stonework

Pitching and Masonry over a 2 m length +100/ -25mm

Face of gabion basket +75/ -25mm

Thickness of tipped rock or filter layer +100/ - 0mm

DRAWINGS

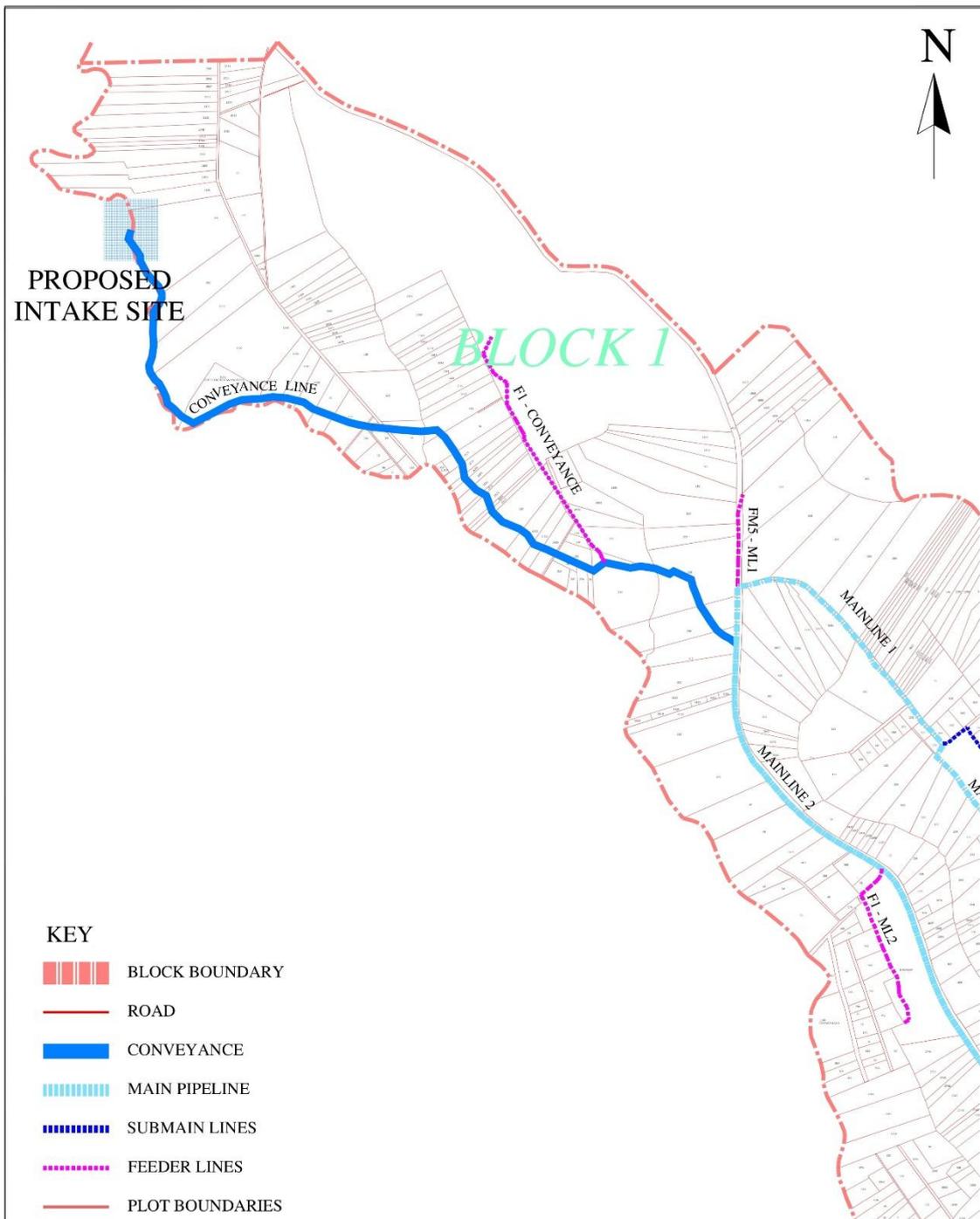


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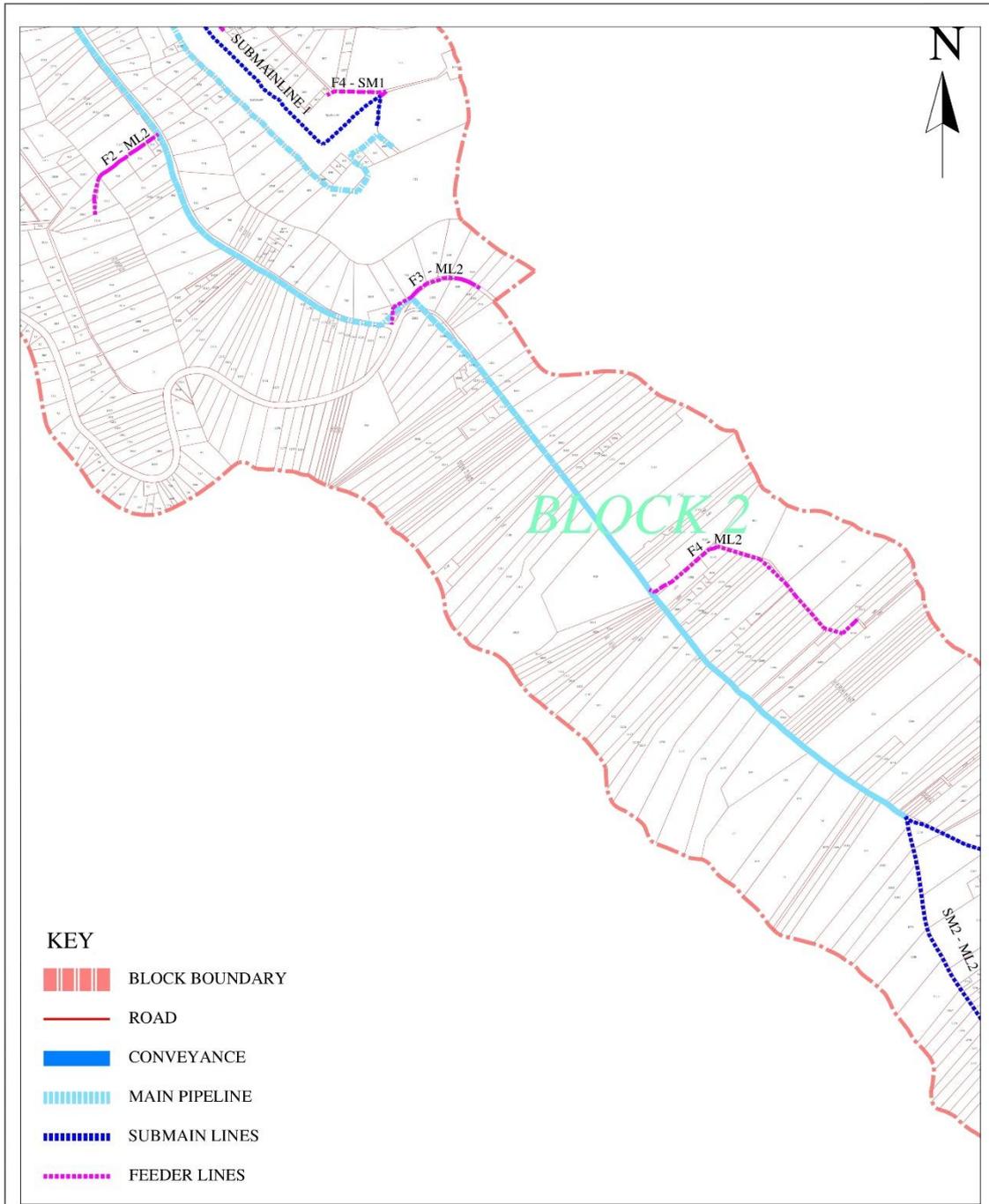
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-  ROAD
-  CONVEYANCE
-  MAIN PIPELINE
-  SUBMAIN LINES
-  FEEDER LINES
-  PLOT BOUNDARIES

DRAWING TO SCALE IN A2 SIZE
SCALE 1:20,000

	NO.	REVISIONS	DATE	REASON	PROJECT TITLE NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBU COUNTY	TITLE / SUBJECT SIYAMUKU IRRIGATION PROJECT FULL BLOCK LAYOUT	DESIGNER ENG. SIMON GICHUKI	DATE MARCH 2024	
							CHECKER MWANKI SEPHAT	DATE MARCH 2024	
						DRAWN BY NAVCFANRUPULADHAI	SHEET NO. 14	APPROVED BY ENG. ALLAN K. MUSAISI	DATE MARCH 2024

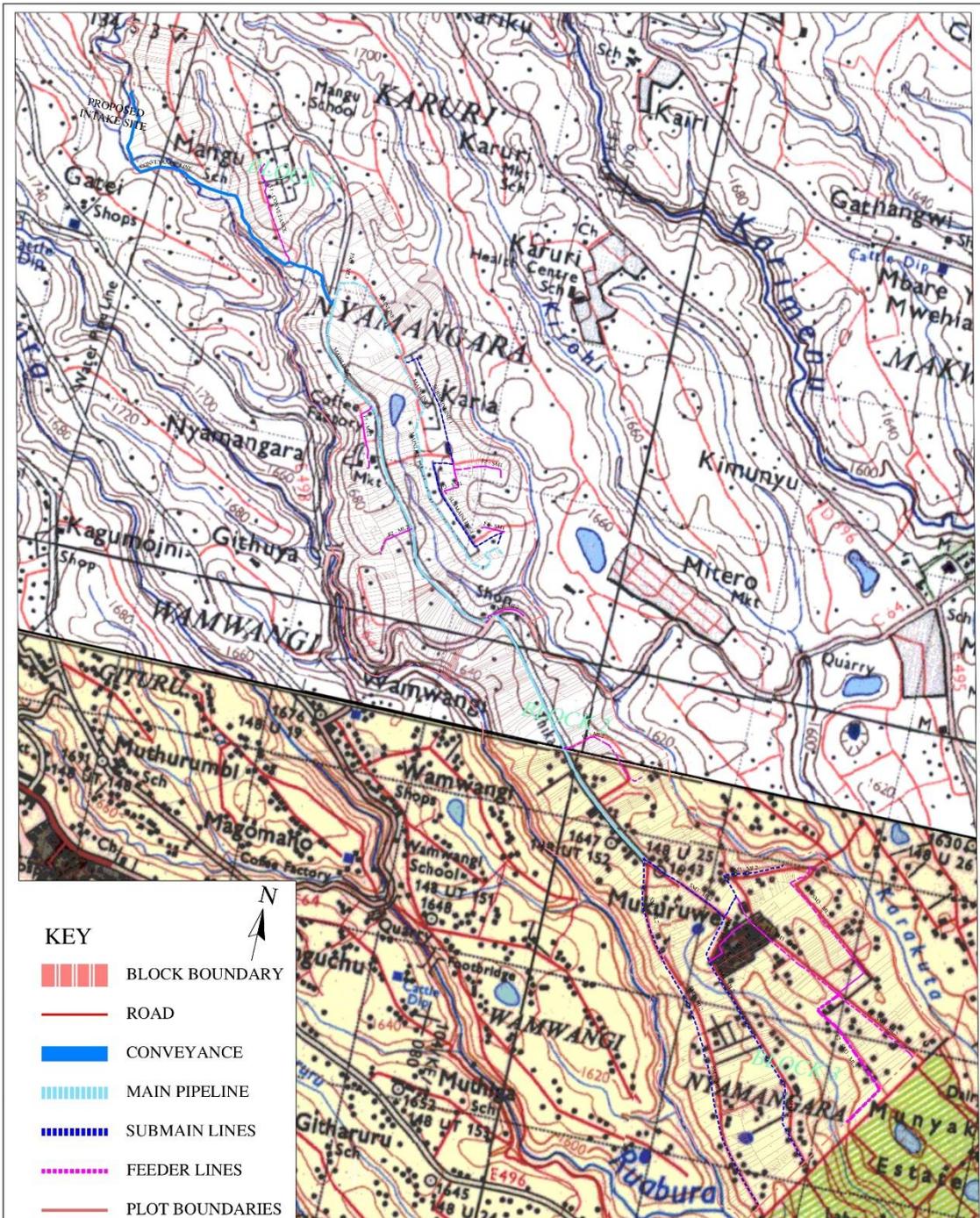


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							CHECKER MWANIKI SEPHAT	DATE MARCH 2024
							APPROVER ENG. SIMON GICHUKI	DATE MARCH 2024
							APPROVER ENG. ALLAN K. MUSAISI	DATE MARCH 2024

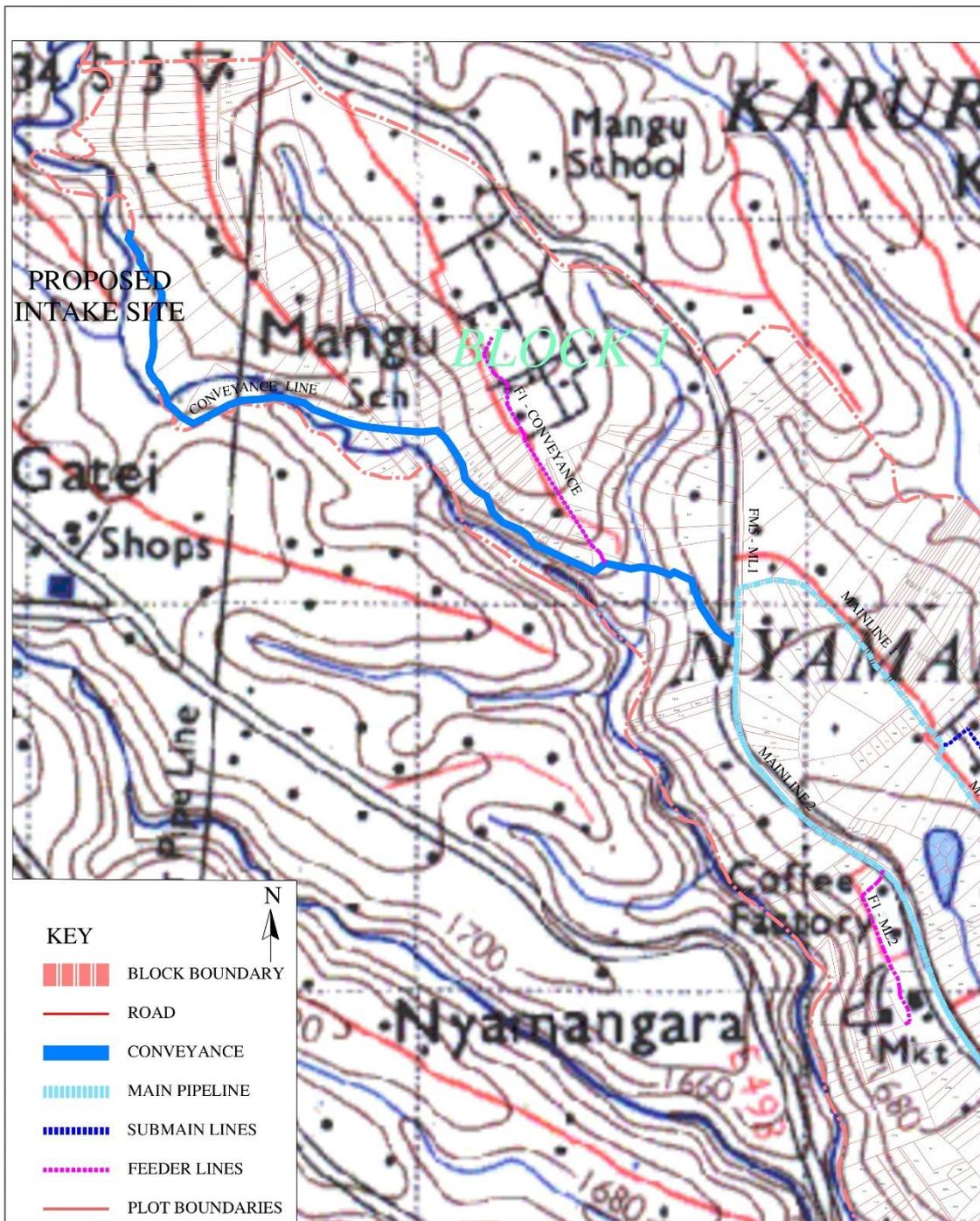


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SCALE 1:2,000

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							CHECKED BY	MWANGI SEPHET	DATE	MARCH 2024
							DRAWN BY	ENG. SIMON GICHUKI		MARCH 2024
							SCALE	3/4	APPROVED BY	ENG. ALLAN K. MUSESI
										MARCH 2024



DRAWING TO SCALE IN A2 SIZE SCALE 1:20,000			
	NO.	REVISIONS	DATE
PROJECT TITLE		DESIGNER	DATE
NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)		ENG. SIMON GICHUKI	MARCH 2024
KIAMBU COUNTY		HWANKO NDEHETI	MARCH 2024
		ENG. SIMON GICHUKI	MARCH 2024
		ENG. ALLANK MESSIN	MARCH 2024



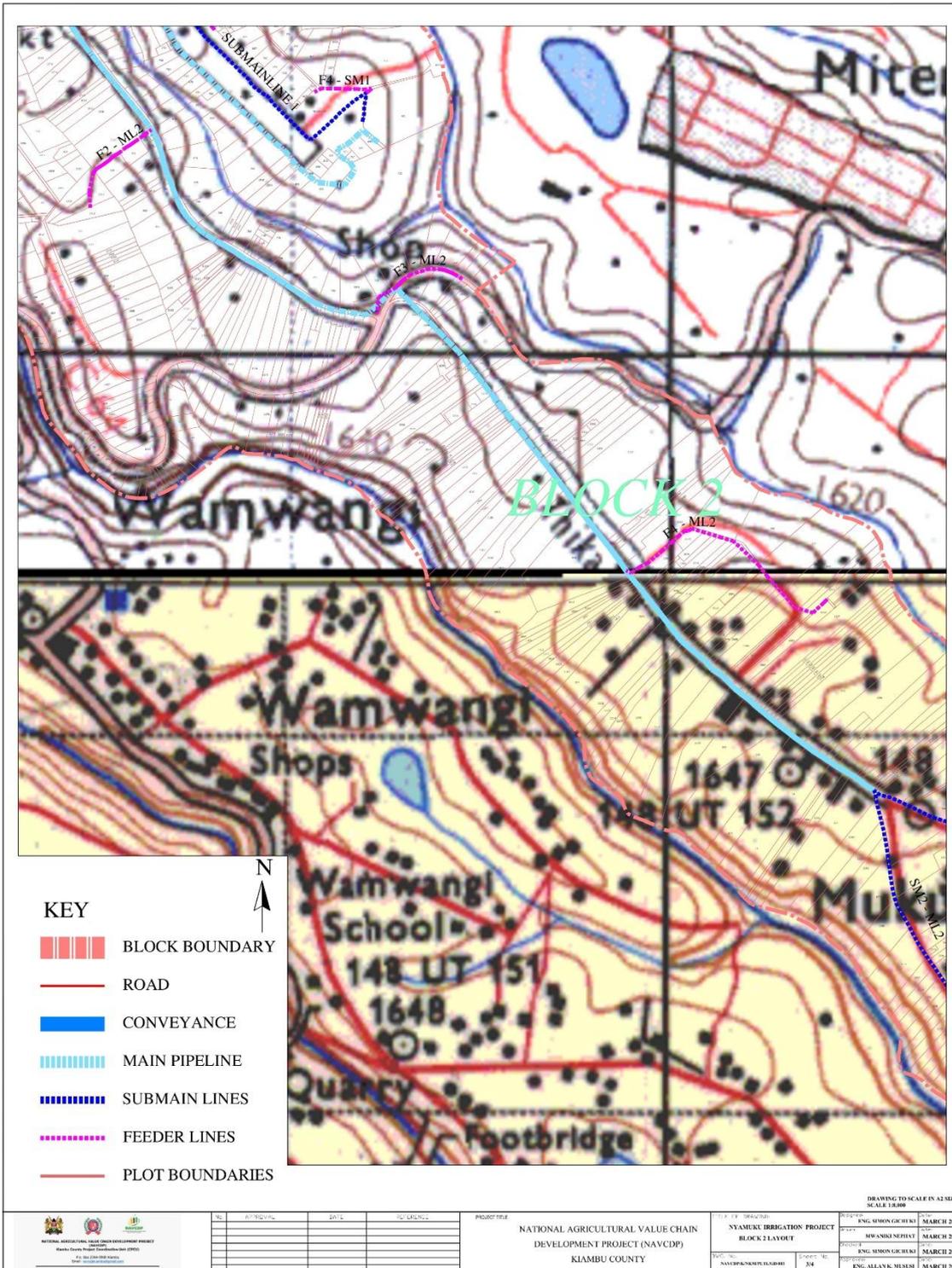
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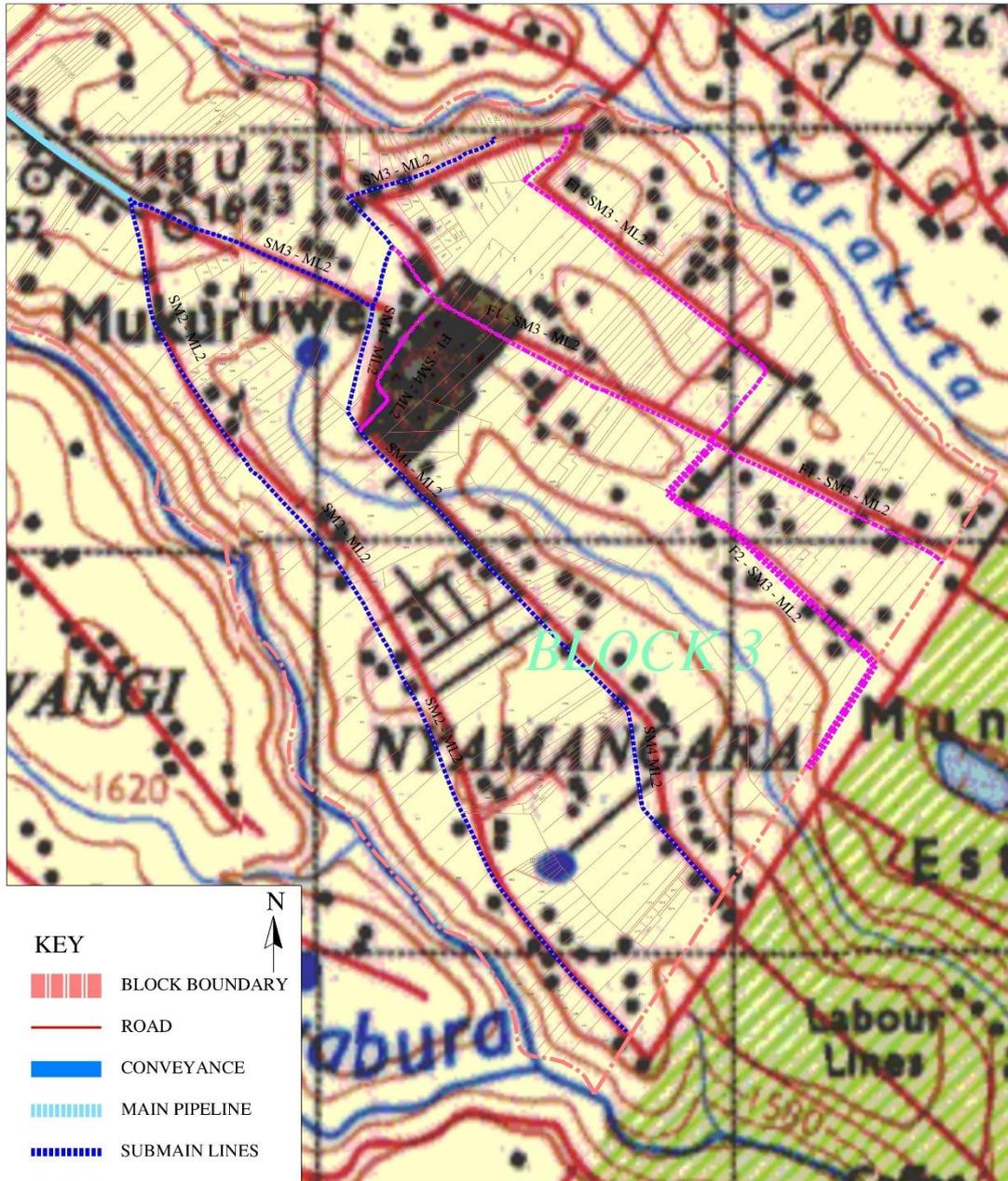
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- ROAD
- CONVEYANCE
- MAIN PIPELINE
- SUBMAIN LINES
- FEEDER LINES
- PLOT BOUNDARIES

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DRAWING TO SCALE IN A2 SIZE
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	NO.	REVISIONS	DATE	NO. SHEETS	PROJECT TITLE	DESIGNED BY	DATE
					NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBU COUNTY	ENG. SIMON GICHUKI	MARCH 2024
					NYAMUKU IRRIGATION PROJECT BLOCK 1 LAYOUT	HWANKI SEPHET	MARCH 2024
						ENG. SIMON GICHUKI	MARCH 2024
						ENG. ALLANK MUSAISI	MARCH 2024

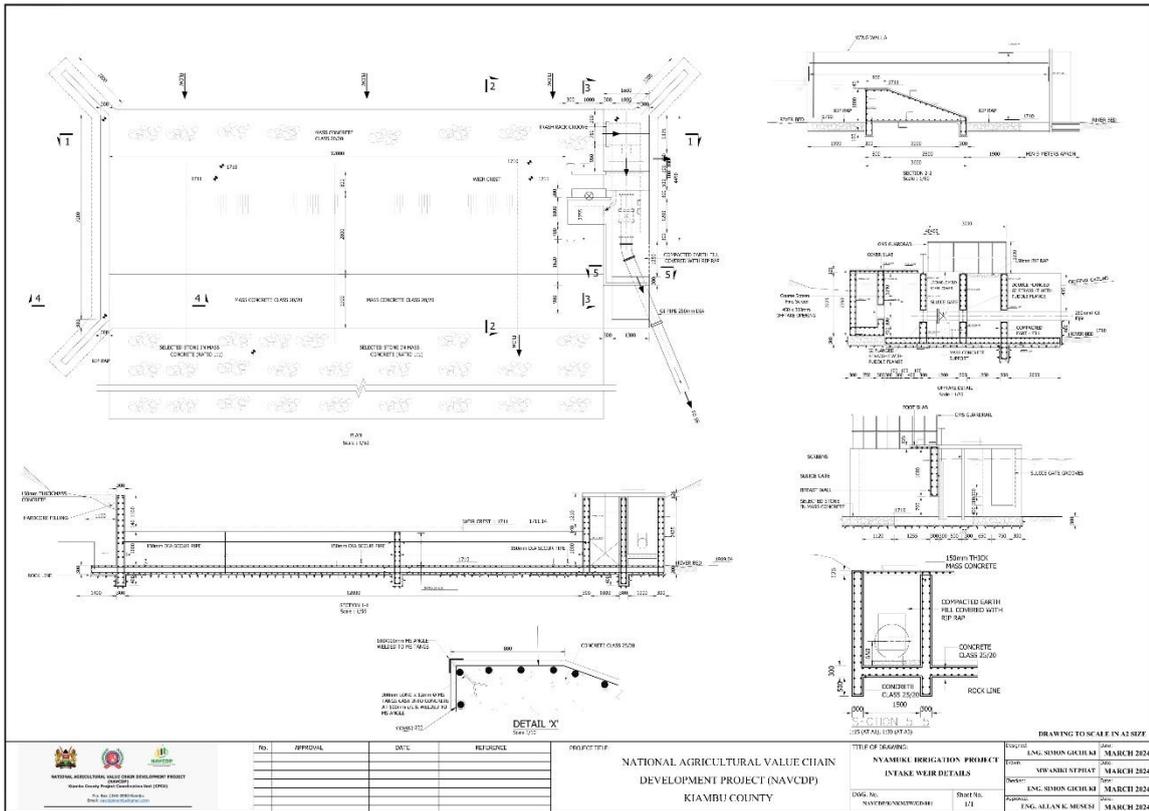




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 - MAIN PIPELINE
 - SUBMAIN LINES
 - FEEDER LINES
 - PLOT BOUNDARIES



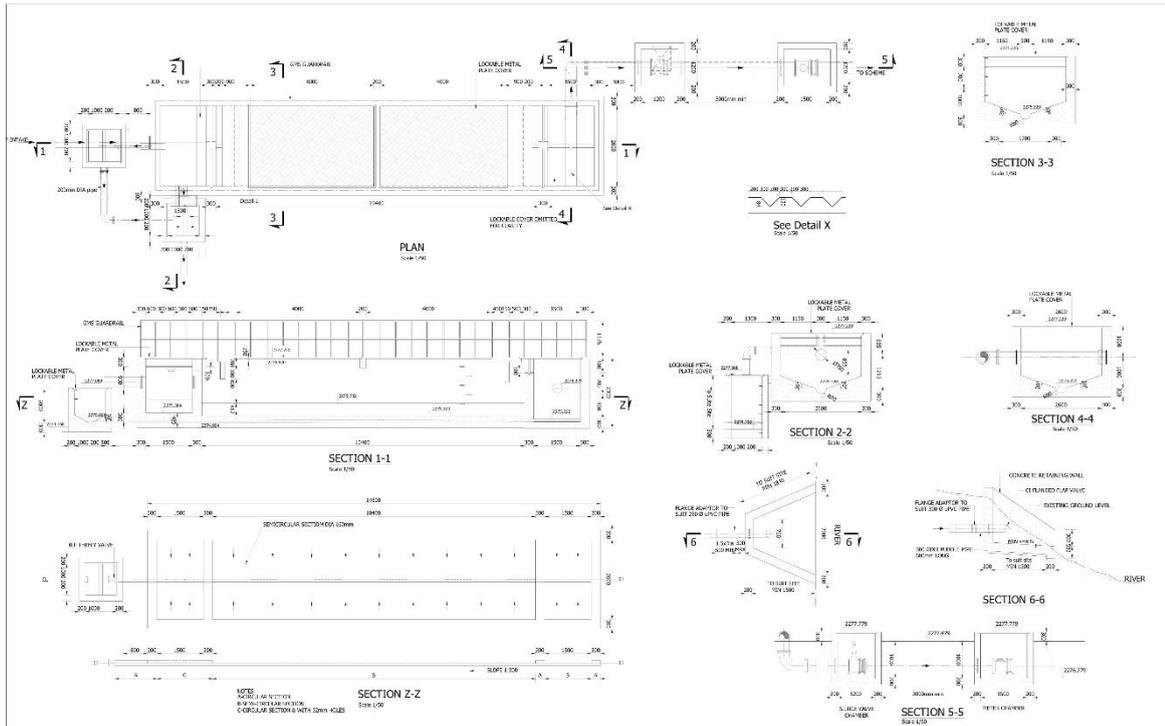
	NO.	REVISIONS	DATE	REASON	PROJECT TITLE NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIambu COUNTY	TITLE / DRAWING SYAMUKU IRRIGATION PROJECT BLOCK 4 LAYOUT	DESIGNED BY	ENG. SIMON GICHUKI	DATE	MARCH 2024
							CHECKED BY	MWANGI NEHEU	DATE	MARCH 2024
							APPROVED BY	ENG. SIMON GICHUKI	DATE	MARCH 2024
							APPROVED BY	ENG. ALLAN K. MUSESI	DATE	MARCH 2024



NO.	APPROVAL	DATE	REFERENCE	PROJECT TITLE

NATIONAL AGRICULTURAL VALUE CHAIN
DEVELOPMENT PROJECT (NAVCDP)
KIAMBU COUNTY

TITLE OF DRAWING		DATE
NYAMIRI IRRIGATION PROJECT INTAKE WEIR DETAILS		MARCH 2024
DRAWN BY: (NAME AND SIGNATURE)		DATE: (DATE)
CHECKED BY: (NAME AND SIGNATURE)		DATE: (DATE)
DESIGNED BY: (NAME AND SIGNATURE)		DATE: (DATE)
APPROVED BY: (NAME AND SIGNATURE)		DATE: (DATE)



KIAMBU COUNTY

No.	APPROVAL	DATE	REFERENCE



REPUBLIC OF KENYA
MINISTRY OF AGRICULTURE,
LIVESTOCK, FISHERIES AND
IRRIGATION STATE
DEPARTMENT OF
AGRICULTURE

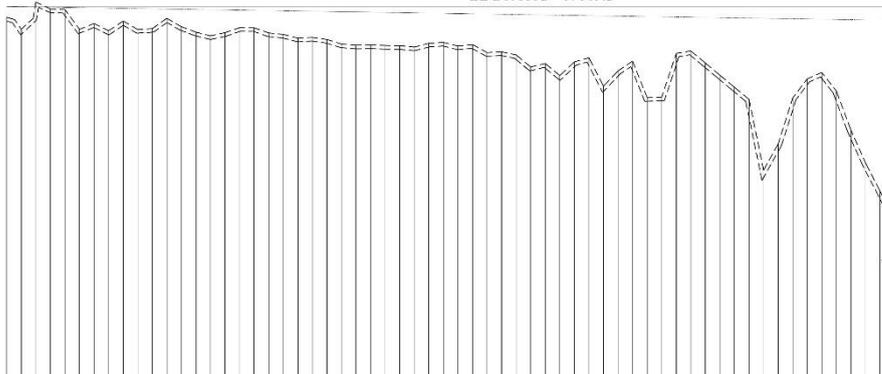
PROJECT TITLE
SPECIAL AGRICULTURE
WATER DEVELOPMENT
PROJECT KARIAKO
COUNCIL OF DISTRICTS
KARIAKO, MURANGI AND
MURANGI

TITLE OF DRAWING
DIMENSION: 845 X

DESIGNED BY	DATE
JAMBO WAMALI	FEB 2024
MPWAMBA NEPHEU	FEB 2024
ENG. SIMON GACHUHA	FEB 2024
ENG. ALI A.C.K. MURUKU	FEB 2024

Conveyance

EL STATIC = 1711.43



CHAINAGE (m)	GROUND LEVEL (m amsl)	INVERT LEVEL (m amsl)	TRENCH DEPTH (m)	DESIGN FLOW (L/s)	PIPE DETAILS	BEDDING DETAILS
0+00	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+10	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+20	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+30	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+40	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+50	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+60	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+70	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+80	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+90	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+100	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+110	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+120	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+130	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+140	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+150	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+160	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+170	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+180	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+190	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD
0+200	1711.43	1711.43	0.00	0.02828	HDPE PIPE CLASS PN6, Dia 250mm	APPROVED REGIONAL MATERIAL, COMPACTED TO 95% MFD

NOTES
 1. THE CONVEYANCE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE NATIONAL BUREAU OF STANDARDS (KEBS).
 2. THE CONVEYANCE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE NATIONAL BUREAU OF STANDARDS (KEBS).
 3. THE CONVEYANCE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE NATIONAL BUREAU OF STANDARDS (KEBS).

LEGEND
 - - - - - PROPOSED CONVEYANCE
 - - - - - EXISTING CONVEYANCE
 - - - - - EXISTING GROUND LEVEL

↑ SINGLE AIR VALVE
 ↑ DOUBLE AIR VALVE
 ↓ WASHOUT VALVE

SCALE
 HORIZONTAL SCALE: 1:2000
 VERTICAL SCALE: 1:200

DRAWING TO SCALE IN A2 SIZE



No.	APPROVAL	DATE	REFERENCE

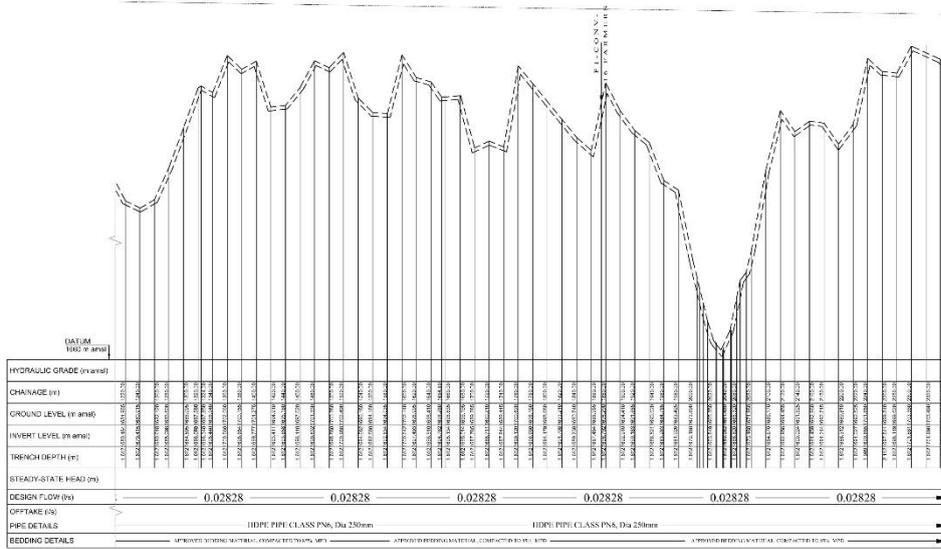
PROJECT TITLE
NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)
KIAMBU COUNTY

TITLE OF DRAWING
CONVEYANCE
 Chainage 0+00.00 to 1+200.00 KM

Drawn by	Date
ENG. SIMON GICHUKI	MARCH 2024
MR. MWAMBI MWITATI	MARCH 2024
ENG. SIMON GICHUKI	MARCH 2024
ENG. ALJANCK MUMISI	MARCH 2024

Conveyance

EL STATIC = 1711.43



NOTES

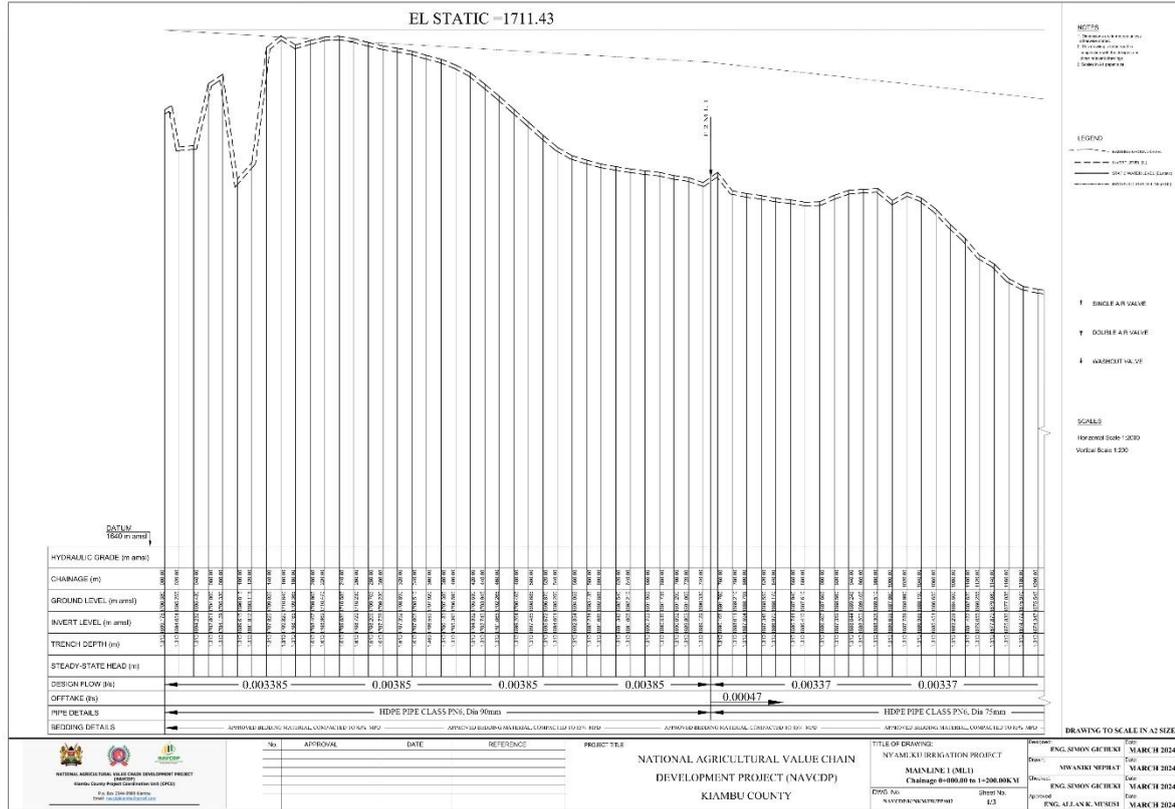
LEGEND

SCALE

DRAWING TO SCALE IN A2 SIZE

<p>NATIONAL AGRICULTURAL DEVELOPMENT BANK (NADBANK) NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) Kilimo, Ujuzi na Ujenzi P.O. Box 2000 Nairobi Phone: +254 20 2720000</p>	<table border="1"> <thead> <tr> <th>No.</th> <th>APPROVAL</th> <th>DATE</th> <th>REFERENCE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	No.	APPROVAL	DATE	REFERENCE													<p>PROJECT TITLE</p> <p>NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBURU COUNTY</p>	<p>TITLE OF DRAWING</p> <p>WYAMUKI IRRIGATION PROJECT CONVEYANCE Chainage 1+200.00 to 2+351.67 KM</p> <p>Drawn By: WATER/NA/NA/11/0001 Sheet No: 22</p>	<table border="1"> <thead> <tr> <th>Checked By</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>ENG. SIMON GICHUKI</td> <td>MARCH 2024</td> </tr> <tr> <td>MWAMBI MIPAT</td> <td>MARCH 2024</td> </tr> <tr> <td>ENG. SIMON GICHUKI</td> <td>MARCH 2024</td> </tr> <tr> <td>ENG. AJJANKI MUMISI</td> <td>MARCH 2024</td> </tr> </tbody> </table>	Checked By	Date	ENG. SIMON GICHUKI	MARCH 2024	MWAMBI MIPAT	MARCH 2024	ENG. SIMON GICHUKI	MARCH 2024	ENG. AJJANKI MUMISI	MARCH 2024
	No.	APPROVAL	DATE	REFERENCE																										
Checked By	Date																													
ENG. SIMON GICHUKI	MARCH 2024																													
MWAMBI MIPAT	MARCH 2024																													
ENG. SIMON GICHUKI	MARCH 2024																													
ENG. AJJANKI MUMISI	MARCH 2024																													

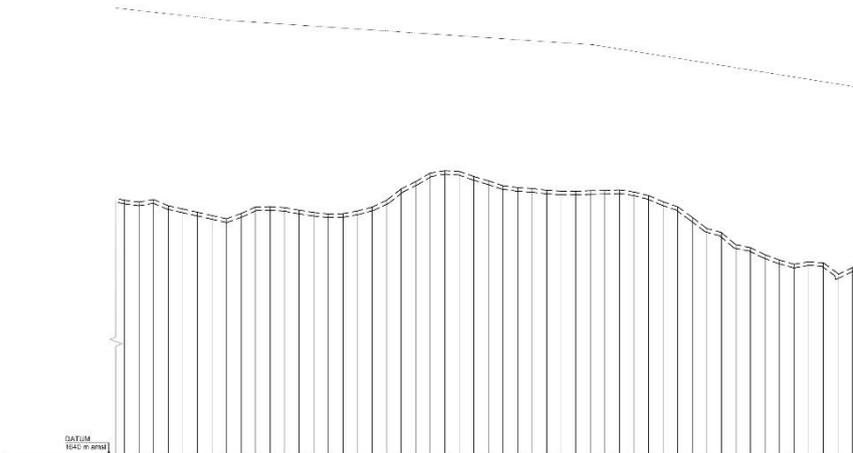
EL STATIC = 1711.43



CHAINAGE (m)	GROUND LEVEL (m AMSL)	INVERT LEVEL (m AMSL)	TRENCH DEPTH (m)	STEADY-STATE HEAD (m)	DESIGN FLOW (m³/s)	OFFTAKE (m³/s)	PIPE DETAILS
0+000	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+050	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+100	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+150	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+200	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+250	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+300	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+350	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+400	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+450	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+500	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+550	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+600	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+650	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+700	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+750	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+800	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+850	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+900	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
0+950	1711.43	1708.50	2.93	0.00385			HDPE PIPE CLASS PN6, Dia 900mm
1+000	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+050	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+100	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+150	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+200	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+250	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+300	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+350	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+400	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+450	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+500	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+550	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+600	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+650	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+700	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+750	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+800	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+850	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+900	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
1+950	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm
2+000	1711.43	1708.50	2.93	0.00337			HDPE PIPE CLASS PN6, Dia 750mm

<p>NATIONAL WATER COMMISSION NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT KIambu County Water Services Unit (KWSSU)</p>	<table border="1"> <thead> <tr> <th>No.</th> <th>APPROVAL</th> <th>DATE</th> <th>REFERENCE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	No.	APPROVAL	DATE	REFERENCE									<p>PROJECT TITLE</p> <p>NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBUR COUNTY</p>	<p>TITLE OF DRAWING</p> <p>NYAMAKI IRRIGATION PROJECT MAINLINE L1 (M1) Chainage 0+000.00 to 1+200.00 KM</p> <p>Drawn By: WATER/NAV/17/07/2024 Sheet No: 4/3</p>	<p>DATE</p> <p>ENG. SIMON GICHUKI MARCH 2024 SWANIKI WIPKAT MARCH 2024 ENG. SIMON GICHUKI MARCH 2024 ENG. AJJANKI MUMISI MARCH 2024</p>
	No.	APPROVAL	DATE	REFERENCE												
<p>APPROVAL: HEAD OF REGIONAL OFFICE FOR NYM, SWU</p> <p>APPROVAL: HEAD OF REGIONAL OFFICE FOR NYM, SWU</p> <p>APPROVAL: HEAD OF REGIONAL OFFICE FOR NYM, SWU</p>		<p>DRAWING TO SCALE IN A2 SIZE</p>														

EL STATIC=1711.43



HYDRAULIC GRADE (m amsl)	CHANNEL (m)	GROUND LEVEL (m amsl)	INVERT LEVEL (m amsl)	TRENCH DEPTH (m)	STEADY STATE HEAD (m)	DESIGN FLOW (l/s)	OFF-TAKE (l/s)	PIPE DETAILS
1711.43	0.00337	1711.43	1711.43	0.00000	0.00337	0.00337	0.00000	HDPE-PPH CLASS P166, Dia 63mm
1711.43	0.001775	1711.43	1711.43	0.00000	0.001775	0.001775	0.00000	HDPE-PPH CLASS P166, Dia 63mm
1711.43	0.00160	1711.43	1711.43	0.00000	0.00160	0.00160	0.00000	HDPE-PPH CLASS P166, Dia 63mm
1711.43	0.00160	1711.43	1711.43	0.00000	0.00160	0.00160	0.00000	HDPE-PPH CLASS P166, Dia 63mm
1711.43	0.00041	1711.43	1711.43	0.00000	0.00041	0.00041	0.00000	HDPE-PPH CLASS P166, Dia 72mm
1711.43	0.00041	1711.43	1711.43	0.00000	0.00041	0.00041	0.00000	HDPE-PPH CLASS P166, Dia 72mm

NOTES

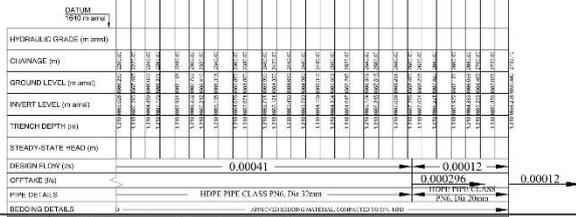
LEGEND

1 SINGLE AIR VALVE
 2 DOUBLE AIR VALVE
 3 WASHOUT VALVE

SCALE
 Horizontal Scale: 1:2500
 Vertical Scale: 1:200

<p>NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) Kiambu County Water and Irrigation Department</p>	<table border="1"> <thead> <tr> <th>No.</th> <th>APPROVAL</th> <th>DATE</th> <th>REFERENCE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	No.	APPROVAL	DATE	REFERENCE					<p>PROJECT TITLE</p> <p>NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBU COUNTY</p>	<p>TITLE OF DRAWING</p> <p>NYAMUKI IRRIGATION PROJECT MAINLINE I (M/L1) Chainage 1+200.00 to 2+200.00 KM</p>	<p>Checked: ENG. SIMON GICHUKI Date: MARCH 2024</p>
		No.	APPROVAL	DATE	REFERENCE							
<p>Drawn: MWAMBI WIPKAT Date: MARCH 2024</p>												
<p>Approved: ENG. SIMON GICHUKI Date: MARCH 2024</p>	<p>Approved: ENG. ALJANCK MUMISI Date: MARCH 2024</p>	<p>Sheet No: 2/3</p>	<p>Project No: WATER/NAVCDP/2024</p>									

EL STATIC = 1711.43



NOTES

LEGEND

SCALE

DRAWING TO SCALE IN A2 SIZE



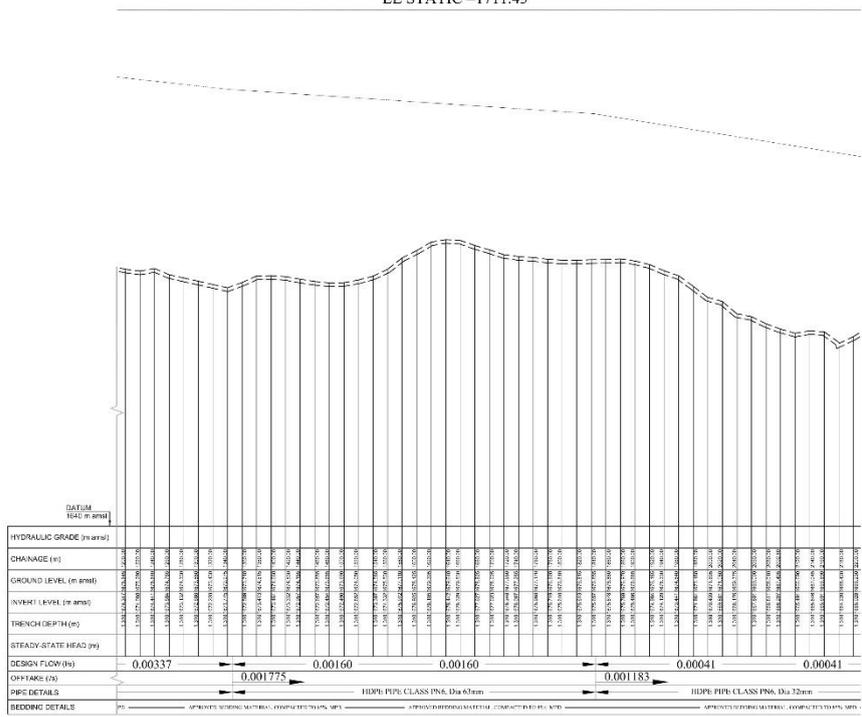
No.	APPROVAL	DATE	REFERENCE	PROJECT TITLE

NATIONAL AGRICULTURAL VALUE CHAIN
DEVELOPMENT PROJECT (NAVCDP)
KIAMBUR COUNTY

TITLE OF DRAWING: NYAMUKI IRRIGATION PROJECT
MAINLINE 1 (M1)
Chainage 2+280.00 to 2+539.10KVI

Drawn By	Checked By	Approved By	Date
ENG. SIMON GICHUKI	MWAMBUNI WIPAT	ENG. SIMON GICHUKI	MARCH 2024
		ENG. AJJANK. MUMISI	MARCH 2024

EL STATIC=1711.43



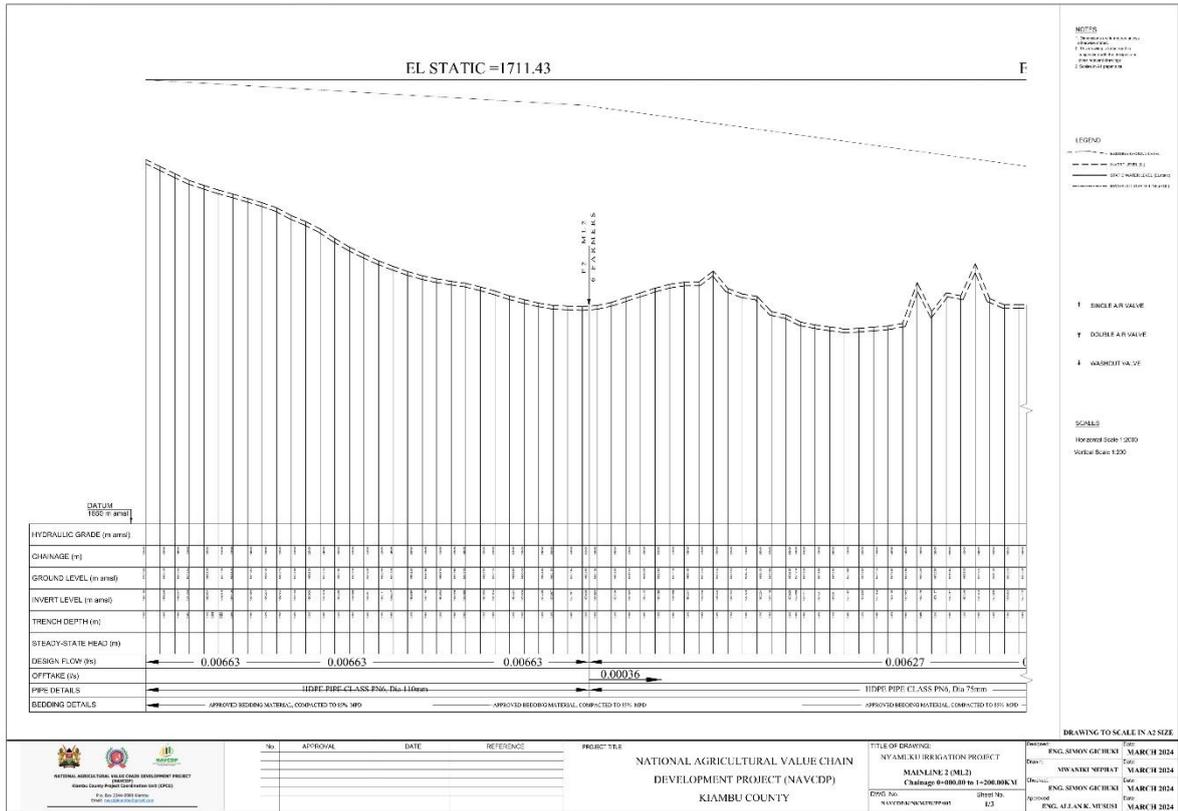
NOTES

LEGEND

1 SINGLE AIR VALVE
 2 DOUBLE AIR VALVE
 3 WASHOUT VALVE

SCALE
 Horizontal Scale: 1:2500
 Vertical Scale: 1:200

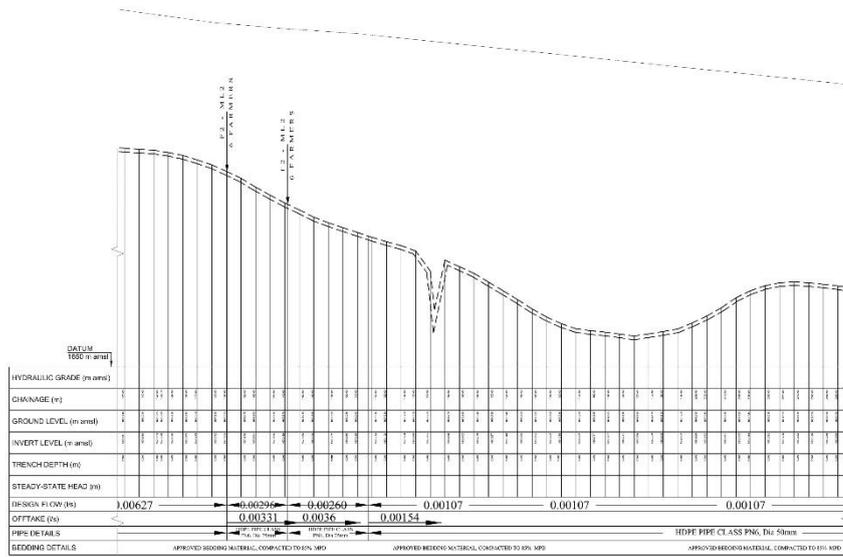
	No.	APPROVAL	DATE	REFERENCE	PROJECT TITLE	TITLE OF DRAWING	DATE
					NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBU COUNTY	NYAMUKI IRRIGATION PROJECT MAINLINE 1 (P (ML1-P)) Chainage 1+200.00 to 2+200.00 KM	ENG. SIMON GICHUKI MARCH 2024 MWAMBI NYIRAT MARCH 2024 ENG. SIMON GICHUKI MARCH 2024 ENG. ALJANCK MUMISI MARCH 2024



No.	APPROVAL	DATE	REFERENCE	PROJECT TITLE	TITLE OF DRAWING	DATE
				NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBUR COUNTY	NYAMUKI IRRIGATION PROJECT MAINLINE 2 (MIL2) Chainage 0+000.00 to 1+200.00KM	ENG. SIMON GICHUKI MARCH 2024
						ENG. MWAMBI NYIRAT MARCH 2024
						ENG. SIMON GICHUKI MARCH 2024
						ENG. AJJANK. MUMISI MARCH 2024

L. STATIC = 1711.43

EI



NOTES
1. THE DRAWING IS TO BE USED IN CONJUNCTION WITH THE SPECIFICATIONS AND CONDITIONS OF CONTRACT FOR THE PROJECT.

LEGEND
--- HYDRAULIC GRADE
--- GROUND LEVEL
--- INVERT LEVEL

1 SINGLE AIR VALVE
2 DOUBLE AIR VALVE
3 WASHOUT VALVE

SCALE
HORIZONTAL SCALE 1:2500
VERTICAL SCALE 1:200

DRAWING TO SCALE IN A2 SIZE

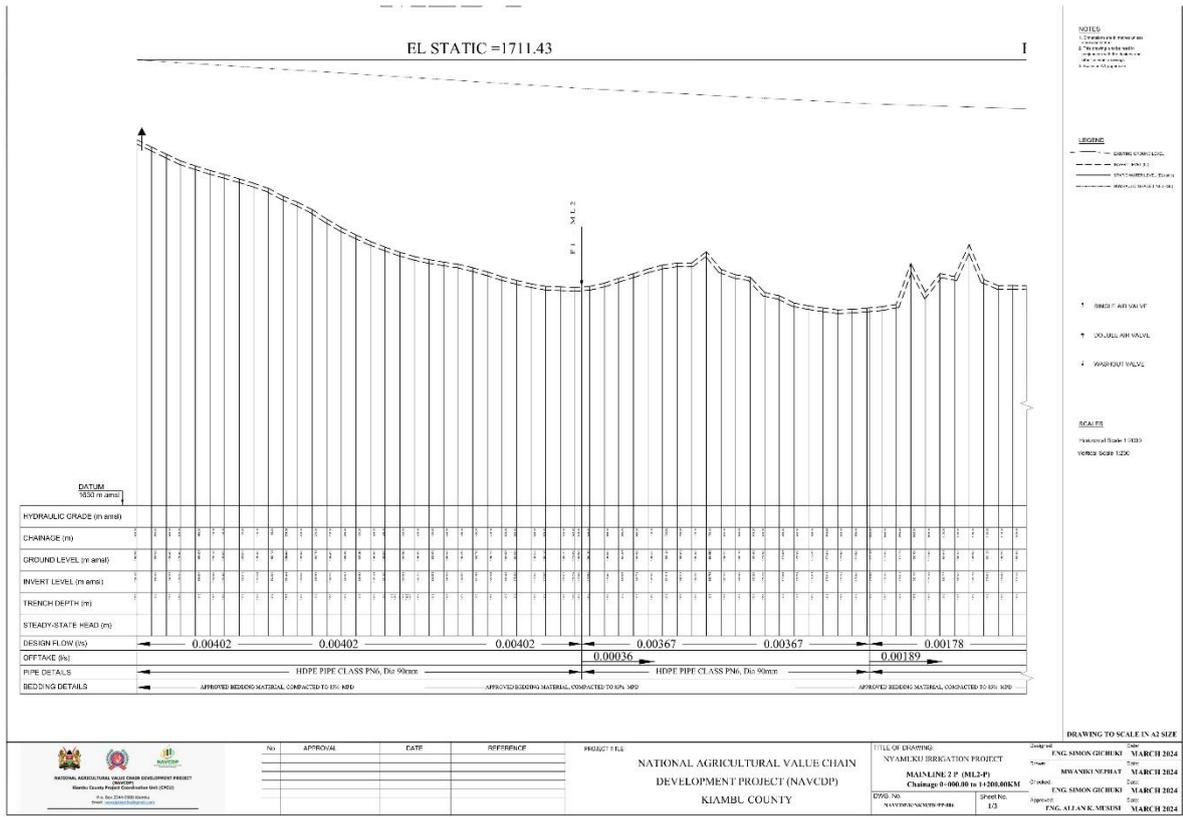


No.	APPROVAL	DATE	REFERENCE

PROJECT TITLE
NATIONAL AGRICULTURAL VALUE CHAIN
DEVELOPMENT PROJECT (NAVCDP)
KIAMBUR COUNTY

TITLE OF DRAWING
KIAMBUR IRRIGATION PROJECT
MAINLINE 2 (MIL2)
Chainage 1+200.00 to 2+200.00 KM

DESIGNED BY	DATE
ENG. SIMON GICHUKI	MARCH 2024
DR. M. WAMBUI NYIRATI	MARCH 2024
ENG. SIMON GICHUKI	MARCH 2024
ENG. A. J. ANK. MUMISI	MARCH 2024

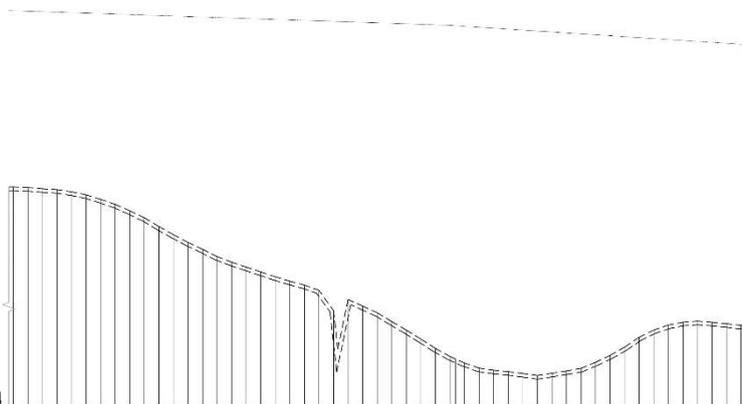


No.	APPROVAL	DATE	REFERENCE

PROJECT TITLE
**NATIONAL AGRICULTURAL VALUE CHAIN
 DEVELOPMENT PROJECT (NAVCDP)**
 KIAMBU COUNTY

TITLE OF DRAWING		DATE
NYAMUKI IRRIGATION PROJECT	ENG. SIMON GICHIRI	MARCH 2024
MAINLINE 2 P (M12-P)	ENG. SIMON GICHIRI	MARCH 2024
Chainage 0+000.00 to 1+208.00KM	ENG. SIMON GICHIRI	MARCH 2024
DWG. NO. WATER/NAVCDP/001	Sheet No. 1/2	DATE: MARCH 2024

EL STATIC = 1711.43



DATUM 1830 (m amsl)	
HYDRAULIC GRADE (m amsl)	
CHAMBER (m)	
GROUND LEVEL (m amsl)	
INVERT LEVEL (m amsl)	
TRENCH DEPTH (m)	
STEADY STATE HEAD (m)	
DESIGN FLOW (l/s)	
OFFTAKE (l/s)	
PIPC DETAILS	
BEDDING DETAILS	

NOTES
 1. THE DRAWING IS THE PROPERTY OF THE CLIENT AND IS NOT TO BE REPRODUCED OR COPIED IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF THE CONSULTANT.
 2. THE CONSULTANT'S LIABILITY IS LIMITED TO THE SCOPE OF THE SERVICES PROVIDED.
 3. THE CLIENT IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE RELEVANT AUTHORITIES.
 4. THE DRAWING IS TO BE USED IN CONJUNCTION WITH THE CONTRACT DOCUMENTS.

LEGEND
 --- PROPOSED HYDRAULIC GRADE
 --- EXISTING GROUND LEVEL
 --- EXISTING TRENCH INVERT
 --- PROPOSED TRENCH INVERT

1 SINGLE AIR VALVE
 2 DOUBLE AIR VALVE
 3 WASHOUT VALVE

SCALE
 HORIZONTAL SCALE 1:2500
 VERTICAL SCALE 1:200



No.	APPROVAL	DATE	REFERENCE

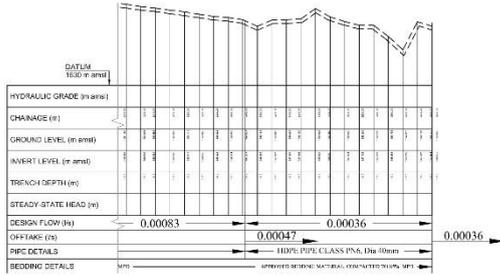
PROJECT TITLE
**NATIONAL AGRICULTURAL VALUE CHAIN
 DEVELOPMENT PROJECT (NAVCDP)
 KIambu COUNTY**

TITLE OF DRAWING
**NYAMUKI IRRIGATION PROJECT
 MAINLINE 2 P (ML2-P)
 Chainage 1+200.00 to 2+200.00 KM**

Drawn By: WATER/NA/NT/00044
 Sheet No: 2/3

Checked By	Date
ENG. SIMON GICHUKI	MARCH 2024
MR. MWAMBI NYIRAT	MARCH 2024
ENG. SIMON GICHUKI	MARCH 2024
ENG. ALJANCK MUMISI	MARCH 2024

EL STATIC = 1711.43



NOTES
 1. THE DRAWING IS TO BE USED IN CONJUNCTION WITH THE SPECIFICATION AND BILL OF MATERIALS.
 2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS.
 3. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES.

LEGEND
 --- HYDRAULIC GRADE LINE
 --- GROUND LEVEL
 --- INVERT LEVEL
 --- TRENCH DEPTH

↑ SINGLE AIR VALVE
 ↑ DOUBLE AIR VALVE
 ↓ WASTEWATER VALVE

SCALE
 HORIZONTAL SCALE: 1:2500
 VERTICAL SCALE: 1:200

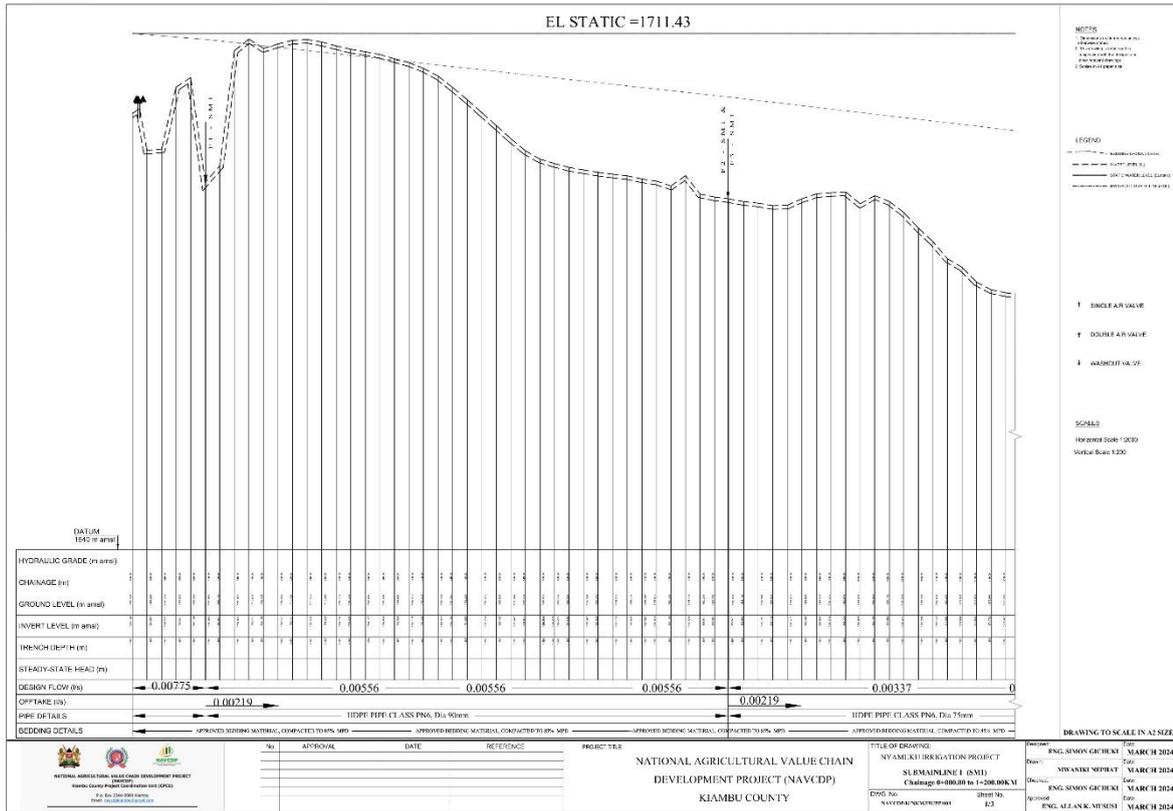


No.	APPROVAL	DATE	REFERENCE

PROJECT TITLE
 NATIONAL AGRICULTURAL VALUE CHAIN
 DEVELOPMENT PROJECT (NAVCDP)
 KIAMBUR COUNTY

TITLE OF DRAWING
 NYAMUKI IRRIGATION PROJECT
 MAINLINE 2 P (ML2-P)
 Chainage 2+200.00 to 2+426.31KM

DESIGNED BY	DATE	APPROVED BY	DATE
ENG. SIMON GICHUKI	MARCH 2024	ENG. SIMON GICHUKI	MARCH 2024
MR. MWAMBI NYIRATI	MARCH 2024	ENG. SIMON GICHUKI	MARCH 2024
MR. JAMES MURUGU	MARCH 2024	ENG. ALJAN K. MUMUKI	MARCH 2024



MINISTRY OF WATER AND IRRIGATION
 NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)
 KIAMBU COUNTY

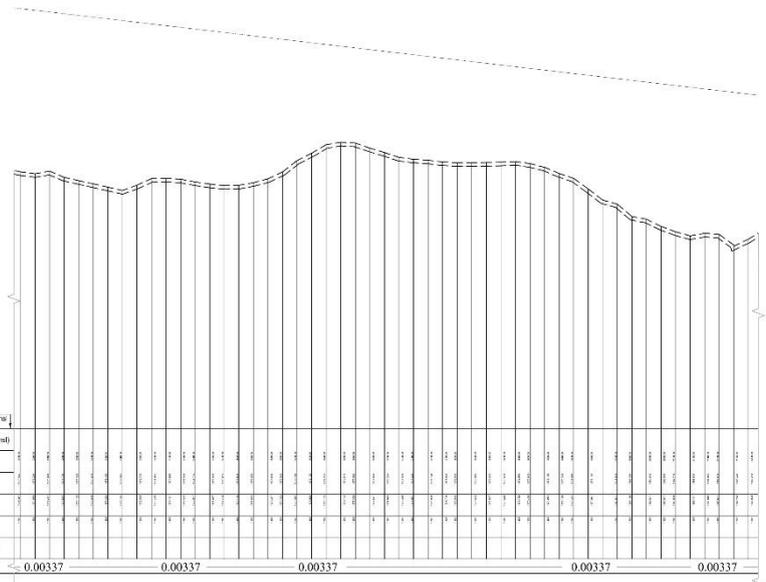
No.	APPROVAL	DATE	REFERENCE

PROJECT TITLE
 NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)
 KIAMBU COUNTY

TITLE OF DRAWING
 NYAMAKI IRRIGATION PROJECT
 SL MAINLINE 1 (SM1)
 Chainage 0+000.00 to 1+200.00 KM

DATE: MARCH 2024
 DRAWN BY: MWANIKI WIPKAT
 CHECKED BY: ENG. SIMON GICHUKI
 APPROVED BY: ENG. ALJAN K. MUMISI

EL. STATIC = 1711.43



DATUM 1692 m amsl	
HYDRAULIC GRADE (m amsl)	
CHANNELS (m)	
GROUND LEVEL (m amsl)	
INVERT LEVEL (m amsl)	
TRENCH DEPTH (m)	
STEADY-STATE HEAD (m)	
DESIGN FLOW (m³/s)	0.00337
PIPE DETAILS	HDPE PIPE, CLASS PNA, Dia 75mm
BEDDING DETAILS	APPROVED BEDDING MATERIAL, COMPACTED TO 95% MFD

NOTES
1. THE DRAWING IS FOR INFORMATION ONLY.
2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND LEVELS ON SITE.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS.
4. THE CONTRACTOR SHALL MAINTAIN ACCESS AT ALL TIMES.

LEGEND
--- GROUND LEVEL
--- HYDRAULIC GRADE
--- CHANNELS
--- TRENCHES
--- PIPES

1 SINGLE AIR VALVE
2 DOUBLE AIR VALVE
3 WASHOUT VALVE

SCALE
HORIZONTAL SCALE: 1:500
VERTICAL SCALE: 1:200

<p>NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT KIAMBU COUNTY P.O. Box 2304-001 Nairobi Email: naicd@kenya.go.ke</p>	<table border="1"> <thead> <tr> <th>No.</th> <th>APPROVAL</th> <th>DATE</th> <th>REFERENCE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	No.	APPROVAL	DATE	REFERENCE									<p>PROJECT TITLE</p> <p>NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBU COUNTY</p>	<p>TITLE OF DRAWING</p> <p>NYAMAKI IRRIGATION PROJECT SL MAINLINE 1 (SM1) Channel 1+200.00 to 2+200.00 KM</p> <p>Drawn By: WATER/NAICD/000001 Sheet No: 2/3</p>	<table border="1"> <thead> <tr> <th>Checked</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>ENG. SIMON GICHUKI</td> <td>MARCH 2024</td> </tr> <tr> <td>MR. M. W. M. M. M. M. M.</td> <td> </td> </tr> <tr> <td>MR. M. W. M. M. M. M. M.</td> <td> </td> </tr> <tr> <td>MR. M. W. M. M. M. M. M.</td> <td> </td> </tr> </tbody> </table>	Checked	Date	ENG. SIMON GICHUKI	MARCH 2024	MR. M. W. M. M. M. M. M.		MR. M. W. M. M. M. M. M.		MR. M. W. M. M. M. M. M.	
	No.	APPROVAL	DATE	REFERENCE																						
Checked	Date																									
ENG. SIMON GICHUKI	MARCH 2024																									
MR. M. W. M. M. M. M. M.																										
MR. M. W. M. M. M. M. M.																										
MR. M. W. M. M. M. M. M.																										
<p>APPROVED BEDDING MATERIAL, COMPACTED TO 95% MFD</p> <p>APPROVED BEDDING MATERIAL, COMPACTED TO 95% MFD</p>	<p>APPROVED BEDDING MATERIAL, COMPACTED TO 95% MFD</p> <p>APPROVED BEDDING MATERIAL, COMPACTED TO 95% MFD</p>	<p>APPROVED BEDDING MATERIAL, COMPACTED TO 95% MFD</p> <p>APPROVED BEDDING MATERIAL, COMPACTED TO 95% MFD</p>	<p>APPROVED BEDDING MATERIAL, COMPACTED TO 95% MFD</p> <p>APPROVED BEDDING MATERIAL, COMPACTED TO 95% MFD</p>	<table border="1"> <thead> <tr> <th>Checked</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>ENG. SIMON GICHUKI</td> <td>MARCH 2024</td> </tr> <tr> <td>MR. M. W. M. M. M. M. M.</td> <td> </td> </tr> <tr> <td>MR. M. W. M. M. M. M. M.</td> <td> </td> </tr> <tr> <td>MR. M. W. M. M. M. M. M.</td> <td> </td> </tr> </tbody> </table>	Checked	Date	ENG. SIMON GICHUKI	MARCH 2024	MR. M. W. M. M. M. M. M.		MR. M. W. M. M. M. M. M.		MR. M. W. M. M. M. M. M.													
Checked	Date																									
ENG. SIMON GICHUKI	MARCH 2024																									
MR. M. W. M. M. M. M. M.																										
MR. M. W. M. M. M. M. M.																										
MR. M. W. M. M. M. M. M.																										

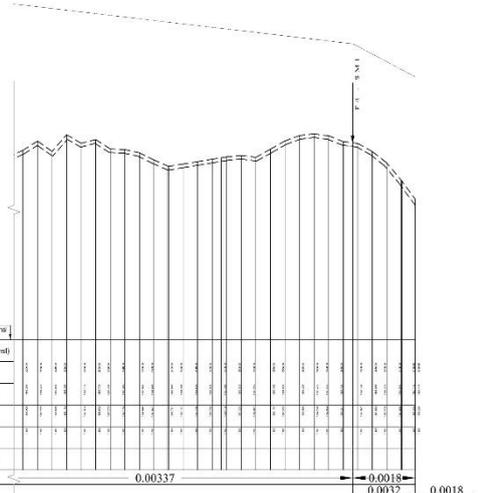
EL. STATIC = 1711.43

NOTES
 1. THIS DRAWING IS THE PROPERTY OF THE CLIENT AND IS NOT TO BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF THE CONSULTANT.
 2. THE CLIENT IS RESPONSIBLE FOR THE ACCURACY OF THE DATA PROVIDED.

LEGEND
 --- PROPOSED MAINLINE PIPE
 --- EXISTING MAINLINE PIPE
 --- EXISTING WATER MAINLINE PIPE

I SINGLE AIR VALVE
 T DOUBLE AIR VALVE
 W WASHOUT VALVE

SCALE
 HORIZONTAL SCALE 1:500
 VERTICAL SCALE 1:200



DATUM 1662 m AMSL	
HYDRAULIC GRADE (m AMSL)	1711.43
CHANGINGE (m)	0.00337
GROUND LEVEL (m AMSL)	1711.43
INVERT LEVEL (m AMSL)	1711.43
TRENCH DEPTH (m)	0.0018
STEADY-STATE HEAD (m)	0.00337
DESIGN FLOW (m³/s)	0.0018
PIPE DETAILS	HDPE PIPE CLASS PN16, Dia 75mm
BEDDING DETAILS	APPROVED BEDDING MATERIALS CONNECTED TO HY. APP.



No.	APPROVAL	DATE	REFERENCE	PROJECT FILE

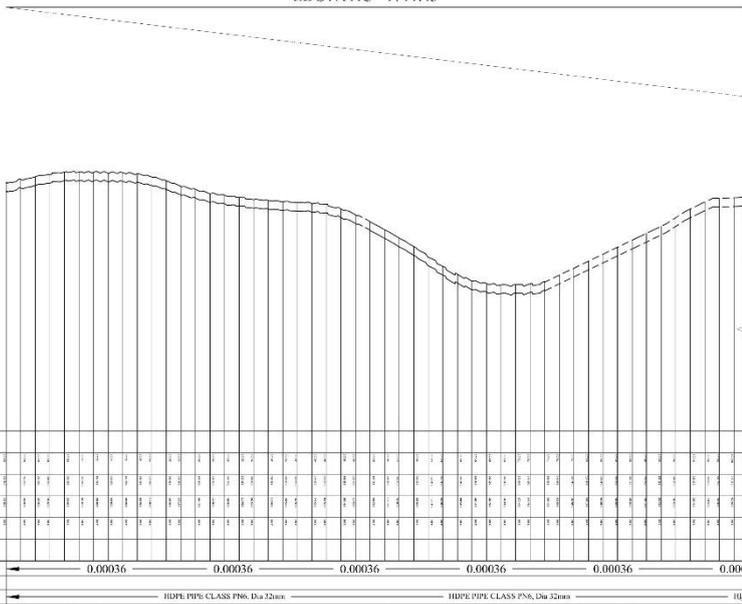
NATIONAL AGRICULTURAL VALUE CHAIN
 DEVELOPMENT PROJECT (NAVCDP)
 KIAMBUR COUNTY

TITLE OF DRAWING:
 NYAMAKI IRRIGATION PROJECT
 SL MAINLINE 1 (SM1)
 Chainage 2+200.00 to 2+539.10 KM

Drawn by	Checked by	Date
ENG. SIMON GICHUKI	ENG. SIMON GICHUKI	MARCH 2024
MWAKIMI MUPAT	ENG. SIMON GICHUKI	MARCH 2024
ENG. SIMON GICHUKI	ENG. SIMON GICHUKI	MARCH 2024
ENG. AJJANK. MUMISI	ENG. SIMON GICHUKI	MARCH 2024

F1-ML2

EL. STATIC = 1711.43



DATUM 1000 m AMSL	
HYDRAULIC GRADE (m AMSL)	
CHANNEL GRADE (m)	
GROUND LEVEL (m AMSL)	
INVERT LEVEL (m AMSL)	
TRENCH DEPTH (m)	
STEADY STATE HEAD (m)	
DESIGN FLOW (m ³ /s)	0.00036
CHITRAKE (m)	
PIC DETAILS	HDPE PIPE CLASS PN6, Dia 32mm
BEDDING DETAILS	APPROVED BEDDING MATERIAL, APPROVED 150mm, M7

NOTES

1. THE DRAWING IS THE PROPERTY OF THE ENGINEER AND SHOULD NOT BE REPRODUCED OR COPIED IN ANY MANNER WITHOUT HIS WRITTEN PERMISSION.

LEGEND

— INVERT LEVEL

— GROUND LEVEL

— CHANNEL GRADE

— TRENCH DEPTH

1 SINGLE AIR VALVE

2 DOUBLE AIR VALVE

3 WASHOUT VALVE

SCALE

HORIZONTAL SCALE 1:2000

VERTICAL SCALE 1:200

DRAWING TO SCALE IN A2 SIZE

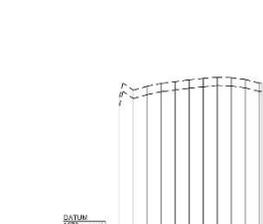
	No.	APPROVAL	DATE	REFERENCE	PROJECT TITLE	TITLE OF DRAWING	DATE
					NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBU COUNTY	NYAMIKI IRRIGATION PROJECT FIELD #1 MAINLINE 2 (F1-ML2) Chabaga 0+000.00 to 1+000.00KM	ENG. SIMON GICHUKI MARCH 2024
						ENG. SIMON GICHUKI MARCH 2024	ENG. SIMON GICHUKI MARCH 2024
						ENG. ALJANCK MUMISI MARCH 2024	ENG. ALJANCK MUMISI MARCH 2024

EL STATIC = 1711.43

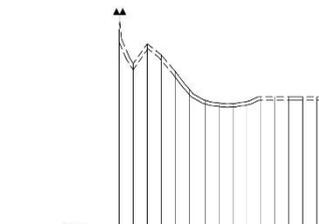
F2-ML1

F2-ML2

EL STATIC = 1711.43



STATION	1	2	3	4	5	6	7	8	9	10	11	12
CHANGISE (m)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
GROUND LEVEL (m amsl)	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43
INVERT LEVEL (m amsl)	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43
TRENCH DEPTH (m)	0	0	0	0	0	0	0	0	0	0	0	0
DESIGN FLOW (m³/s)	0.00047											
STEADY-STATE HEAD (m)	0.00047											
DESIGN FLOW (m³/s)	0.00047											
OFFTAKES (m)	0.00047											
PIPE DETAILS	dPVC PIPE CLASS PN6, Dia 32mm											
BRIDGING DETAILS	APPROVED BRIDGING DETAIL, COORDINATED TO SP. 10/2											



STATION	1	2	3	4	5	6	7	8	9	10	11	12
CHANGISE (m)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
GROUND LEVEL (m amsl)	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43
INVERT LEVEL (m amsl)	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43	1711.43
TRENCH DEPTH (m)	0	0	0	0	0	0	0	0	0	0	0	0
DESIGN FLOW (m³/s)	0.00089											
STEADY-STATE HEAD (m)	0.00089											
DESIGN FLOW (m³/s)	0.00089											
OFFTAKES (m)	0.00089											
PIPE DETAILS	dPVC PIPE CLASS PN6, Dia 32mm											
BRIDGING DETAILS	APPROVED BRIDGING DETAIL, COORDINATED TO SP. 10/2											

NOTES
 1. THE DRAWING IS TO BE USED IN CONJUNCTION WITH THE SPECIFICATIONS AND CONTRACT DOCUMENTS.
 2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS.
 3. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES.

LEGEND
 --- APPROVED BRIDGING DETAIL, COORDINATED TO SP. 10/2
 --- dPVC PIPE CLASS PN6, Dia 32mm
 --- APPROVED BRIDGING DETAIL, COORDINATED TO SP. 10/2

1 SINGLE AIR VALVE
 2 DOUBLE AIR VALVE
 3 WASHOUT VALVE

SCALE
 HORIZONTAL SCALE 1:2500
 VERTICAL SCALE 1:200

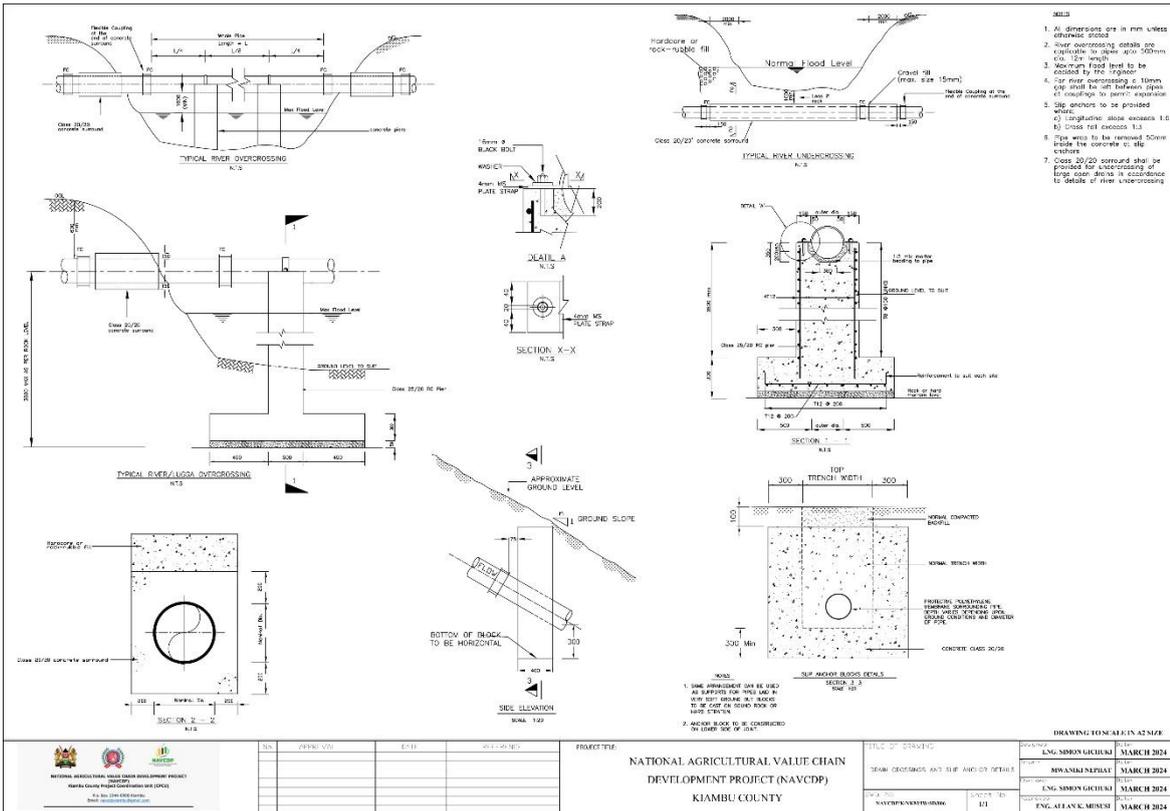


No.	APPROVAL	DATE	REFERENCE

PROJECT TITLE
NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)
 KIAMBUR COUNTY

TITLE OF DRAWING
HYDRAULIC INVESTIGATION PROJECT
 FARMER 1 (MANGENI 1 - F2-ML1) CHANGE (F2-ML1, F2-ML2)

Drawn by	Checked by	Approved by	Date
ENG. SIMON GICHUKI	MWAMBI MIPAT	ENG. SIMON GICHUKI	MARCH 2024



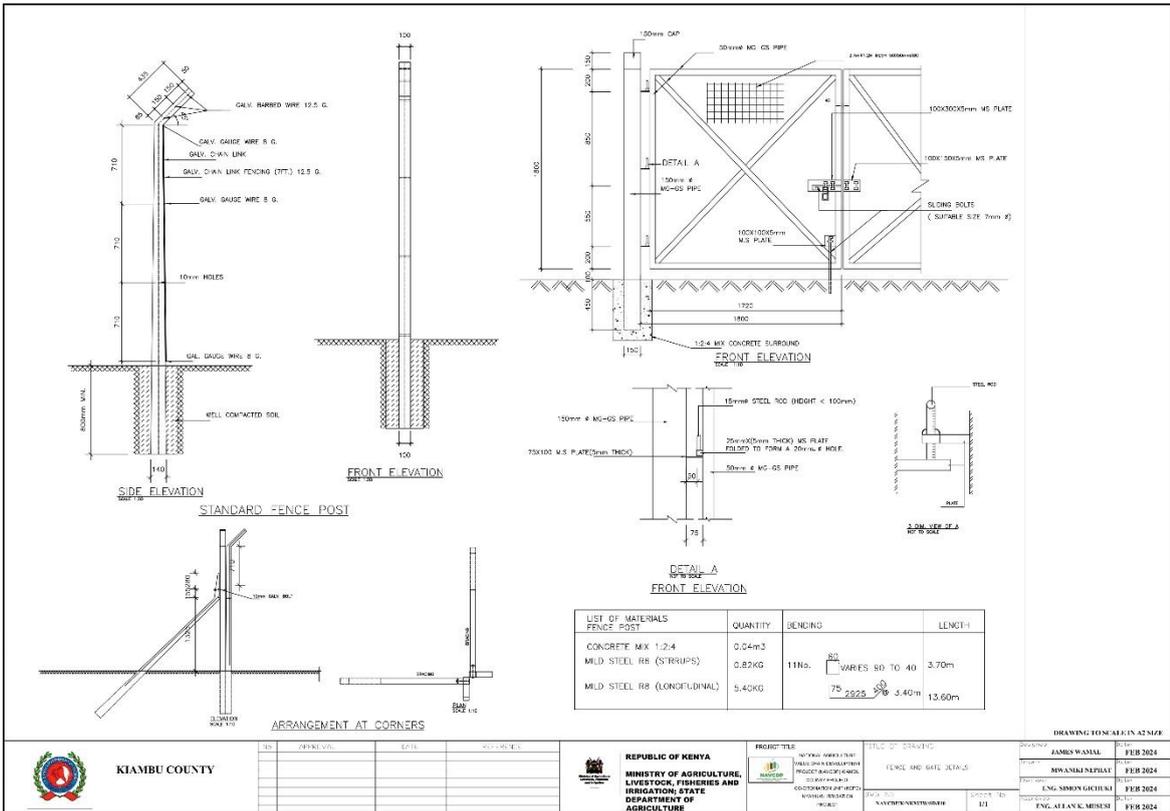
- NOTES**
1. All dimensions are in mm unless otherwise stated.
 2. River overcrossing shall be constructed on a firm and stable subgrade.
 3. Minimum flow level to be provided by the structure.
 4. Concrete overcrossing shall be constructed on a firm and stable subgrade.
 5. All anchors to be provided.
 6. All dimensions shall be in accordance with the drawing.
 7. Class 20/25 concrete shall be provided for the structure of the river overcrossing in accordance with the drawing.



NO.	REVISION	DATE	BY	CHKD BY

PROJECT TITLE: NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBUR COUNTY

NO.	REVISION	DATE	BY	CHKD BY



KIAMBU COUNTY

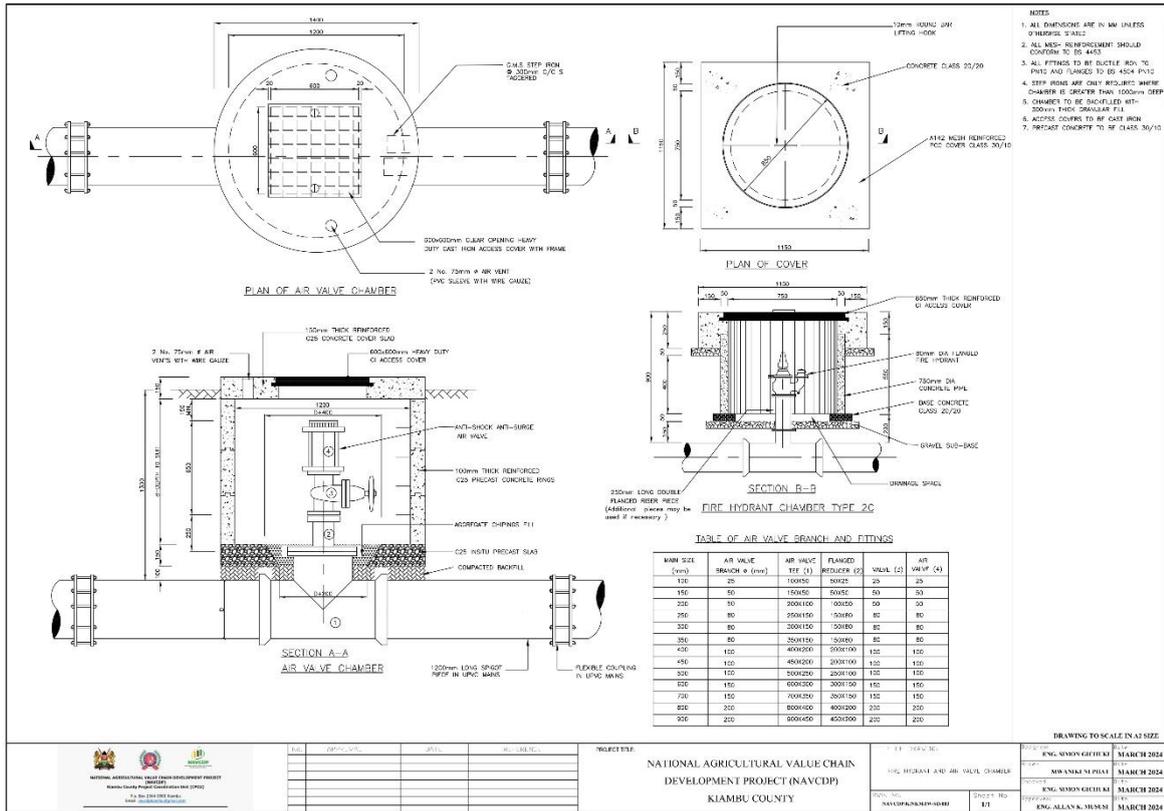
NO.	APPROVAL	DATE	REVISIONS

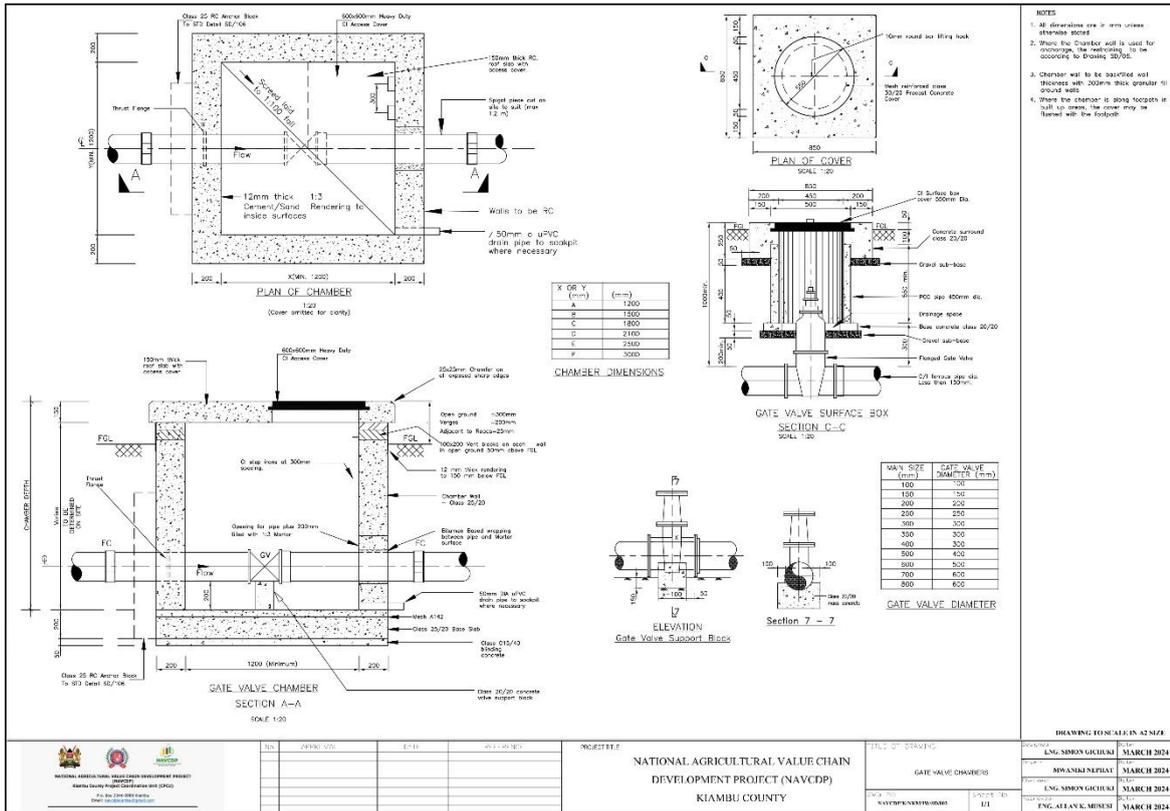
REPUBLIC OF KENYA
 MINISTRY OF AGRICULTURE,
 LIVESTOCK, FISHERIES AND
 IRRIGATION STATE
 DEPARTMENT OF
 AGRICULTURE

PROJECT TITLE
 WATER AND IRRIGATION
 PROJECTS
 COORDINATOR
 ENGINEER

TITLE OF DRAWING
 FENCE AND GATE DETAILS
 SHEET NO.
 011

DESIGNED BY	DATE
JAMES WAMALI	FEB 2024
MPWAMBA NEPHEAU	FEB 2024
ENG. SIMON GACHAU	FEB 2024
ENG. ALI ANA MUSAHI	FEB 2024

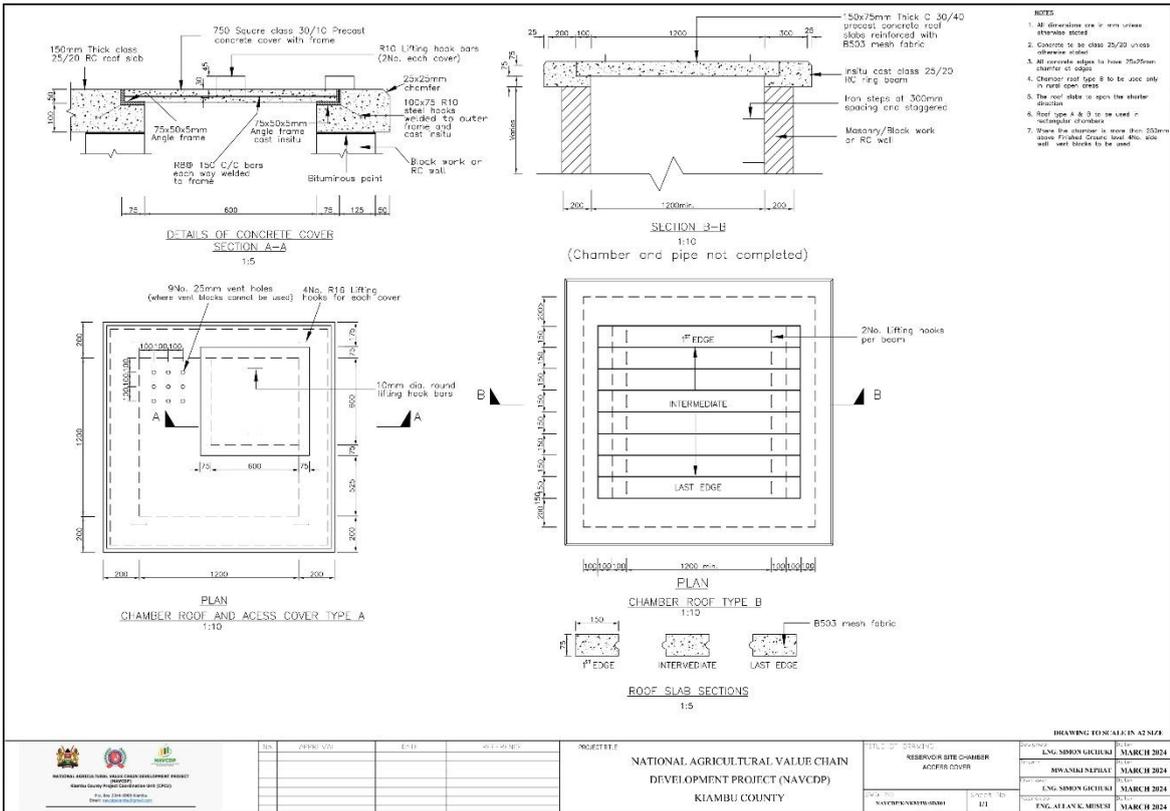




REV	DESCRIPTION	DATE	BY	CHECKED

PROJECT TITLE
NATIONAL AGRICULTURAL VALUE CHAIN
DEVELOPMENT PROJECT (NAVCDP)
KIAMBU COUNTY

TITLE OF DRAWING		DRAWN BY		DATE	
GATE VALVE CHAMBER		ENG. SIMON GACHAU		MARCH 2024	
CHECKED BY		MR. WAMUKU		MARCH 2024	
APPROVED BY		ENG. SIMON GACHAU		MARCH 2024	
SCALE		1:1		APPROVED BY	
				ENG. ALAN K. MURUKU	
				MARCH 2024	

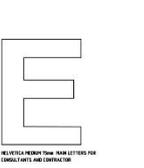
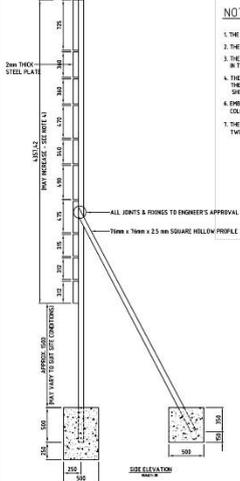
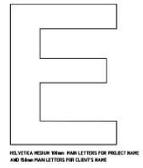
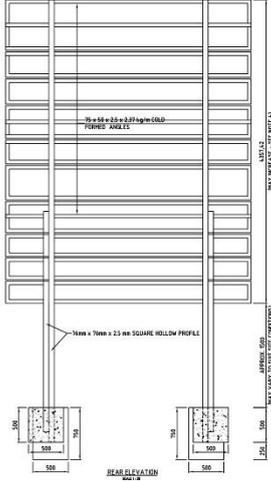
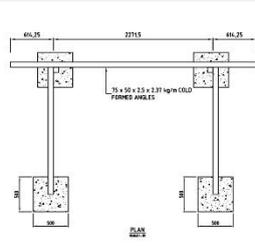


NO.	REVISION	DATE	BY	REASON

PROJECT TITLE
NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)
KIAMBU COUNTY

DRAWING TO SCALE IN A2 SIZE	
DESIGNED BY	ENG. SIMON GACHAU
DATE	MARCH 2024
DRAWN BY	MWANGI NEPAU
DATE	MARCH 2024
CHECKED BY	ENG. SIMON GACHAU
DATE	MARCH 2024
APPROVED BY	ENG. ALI SAUK MUSA
DATE	MARCH 2024

THE GOVERNMENT OF THE REPUBLIC OF KENYA	
PROJECT: NYAMUKU IRRIGATION DEVELOPMENT PROJECT	
DRAWN BY: GOVERNMENT OF THE REPUBLIC OF KENYA	
PROJECT: NATIONAL AGRICULTURE VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBU COUNTY PROJECT	
DATE: 10/03/2024	SCALE: 1:100
DESIGNED BY: CONSULTANT ADDRESS	DATE: 10/03/2024
DRAWN BY: CONTRACTOR ADDRESS	DATE: 10/03/2024
SCALE: 1:100	
LOCAL RESPONSIBILITIES: GOVERNMENT OF THE REPUBLIC OF KENYA	

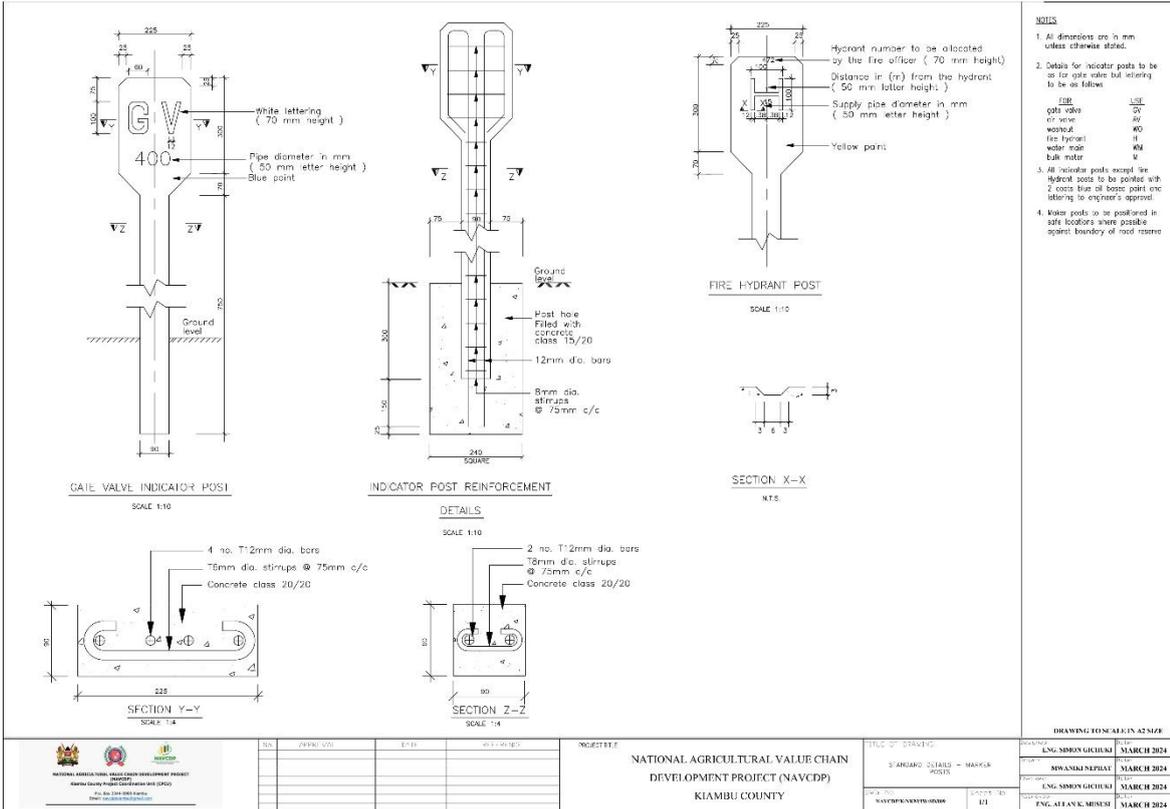


- NOTES**
1. THE LETTERING TYPE TO BE USED IS HELVETICA MEDIUM.
 2. THE LETTERING SIZE AND DIMENSIONS ARE AS SHOWN.
 3. THE NAME OF THE PROJECT AND CLIENT MAY BE RE-SIZED PROPORTIONATELY IN THE EVENT OF IT BEING TOO LONG.
 4. THE HEIGHT OF THE SIGN BOUNDARY VARY DEPENDING ON THE NUMBER OF PROFESSIONAL SERVICES THAT ARE TO BE SHOWN. NOTE THAT ALL THE PROFESSIONAL SERVICES ARE TO BE SHOWN.
 5. THE LOGOS (COMPANY LOGOS) ARE TO BE IN THEIR CORRECT RESPECTIVE COLOURS ON A WHITE BACKGROUND AND ARE TO BE PLACED AS SHOWN.
 6. THE METAL FRAME AND SUPPORTS TO BE PAINTED WITH ONE COAT PRIMER AND TWO COATS FINISH PAINT TO THE ENGINEER'S APPROVAL.

ALL JOINTS & FINISHES TO ENGINEER'S APPROVAL

75mm x 75mm x 2.5mm SQUARE HOLLOW PROFILE

	No.	APPROVAL	DATE	REFERENCE	PROJECT TITLE	TITLE OF DRAWING	DESIGNER	DATE
					NATIONAL AGRICULTURE VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP) KIAMBU COUNTY	SEEN (SCALE)	ENG. SIMON GICHUKI	MARCH 2024
						DRAWN BY	ENG. SIMON GICHUKI	MARCH 2024
						CHECKED BY	ENG. ALLAN S. MUMOH	MARCH 2024

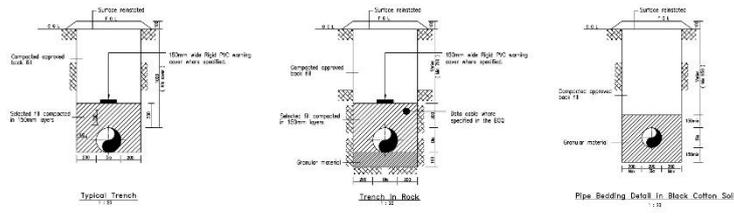


NO.	REVISION	DATE	BY / FOR	REMARKS

PROJECT TITLE
NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)
KIAMBU COUNTY

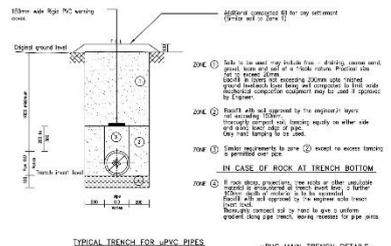
TITLE OF DRAWING	
STANDARD DETAILS - MARKER POSTS	
DATE OF PREPARATION	
SHEET NO.	

DRAWING TO BE FILED IN AS SIZE	
DESIGNED BY	ENG. SIMON GICHUKI
DATE	MARCH 2024
CHECKED BY	MWANGI MUKIA
DATE	MARCH 2024
APPROVED BY	ENG. SIMON GICHUKI
DATE	MARCH 2024
SCALE	ENG. ALLI O. K. MISHI
DATE	MARCH 2024

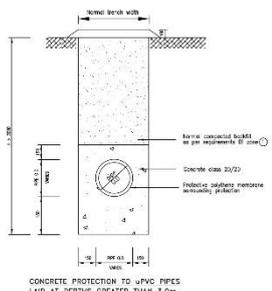


STEEL MAIN TRENCH DETAILS

- NOTES
1. All dimensions are in mm unless otherwise stated.
 2. All pipes to be laid with a minimum cover of 1m and minimum slope of 1:500.
 3. Trench side slope to be at contractor's discretion depending on stability of excavated surfaces and ensuring safety of labour at work. However, it is to be measured based on normal trench width.
 4. Excavation material to be approved by the engineer and shall not have any stones of size greater than 10mm and fines less than 0.075mm.
 5. For purposes of trench Backfilling all excavated trenches with good material of the bed shall be considered as rock.



uPVC MAIN TRENCH DETAILS



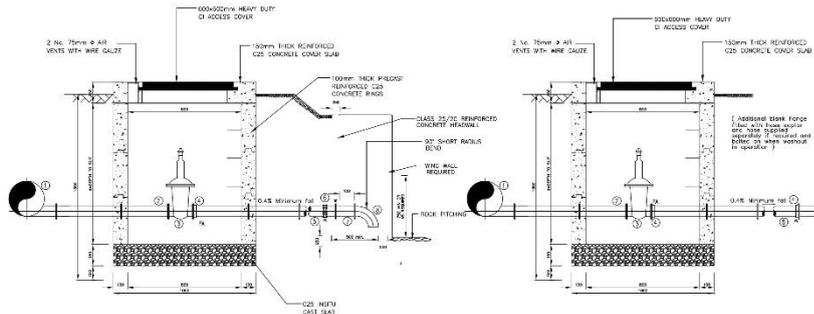
CONCRETE PROTECTION TO uPVC PIPES LAID AT DEPTHS GREATER THAN 3.0m



NO.	REVISION	DATE	BY	FOR

PROJECT TITLE
NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)
 KIAMBU COUNTY

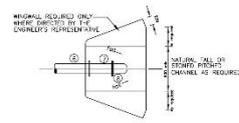
DRAWING TITLE AND SCALE		DATE
TITLE OF DRAWING	TYPICAL BACKFILLING DETAILS	MARCH 2024
DESIGNED BY	ENG. SIMON GICHUAI	MARCH 2024
CHECKED BY	ENG. SIMON GICHUAI	MARCH 2024
APPROVED BY	ENG. ALI A.C. MURSHI	MARCH 2024



- NOTES
1. All dimensions are in mm unless otherwise stated
 2. Surface does to chapters to be of cast iron
 3. All external edges to be chamfered (25x25mm)
 4. Refer to clause to Code 36/10

WASHOUT TYPE 1
ARRANGEMENT WITH NATURAL DRAINAGE

WASHOUT TYPE 2
ARRANGEMENT WITHOUT NATURAL DRAINAGE

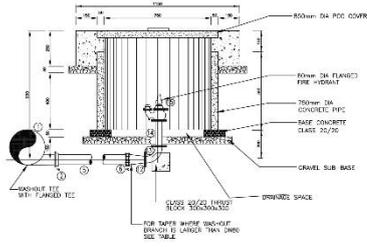


SCHEDULE OF FITTINGS

NO.	DESCRIPTION
1	WIND WALL
2	WIND WALL
3	WIND WALL
4	WIND WALL
5	WIND WALL
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7	WIND WALL
8	WIND WALL
9	WIND WALL
10	WIND WALL
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99	WIND WALL
100	WIND WALL

TABLE OF WINDMILL BRANCH SIZES

WINDMILL BRANCH SIZE	WINDMILL BRANCH SIZE (mm)
100 - 120	80
120 - 150	100
150 - 200	150
200 - 250	200



WASHOUT TYPE 3
WHERE VERTICAL SPACING IS NOT POSSIBLE AND THE WASHOUT LOCATED IN RAISED UP AREAS WHERE IT COULD BE USED FOR FIRE FIGHTING 3 FOR WIND SPEED CLASS 100-150 km/h

DRAWING TO SCALE IN A2 SIZE

<p>NATIONAL AGRICULTURAL VALUATION DEVELOPMENT PROJECT KIAMBU COUNTY</p>	NO.	APPROVAL	DATE	BY	PROJECT TITLE	SCALE	DATE
					NATIONAL AGRICULTURAL VALUATION DEVELOPMENT PROJECT KIAMBU COUNTY	WASH-OUT DETAILS	ENG. SIMON GICHUKI MARCH 2024
							ENG. SIMON GICHUKI MARCH 2024
							ENG. SIMON GICHUKI MARCH 2024
							ENG. ALAN K. MURSE MARCH 2024



**NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT
(NAVCDP)
Kiambu County Project Coordination Unit (CPCU)**

P.o. Box 2344-0900 Kiambu
Email: navcdpkiambu@gmail.com

TENDER NO; KE-KIAMBU COUNTY-508068-CW-RFB. Construction and Expansion of Nyamuku Irrigation Project.

Tender document comprises of three volumes as follows:

1. INVITATION TO TENDER AND CONDITIONS OF CONTRACT *VOLUME I.*
2. TENDER BOOK OF DRAWINGS *VOLUME II*
3. TENDER SPECIFICATIONS *VOLUME III*

**CONSTRUCTION AND EXPANSION OF NYAMUKU
IRRIGATION PROJECT TENDER DOCUMENT
*VOLUME I.***

PART 1 – BIDDING PROCEDURES

- Section 1 - Instructions to bidders
- Section 2 - Bid data sheet
- Section 3 - Evaluation and qualification criteria
- Section 4 - Bidding forms
- Section 5 - Eligible countries

PART 2 – EMPLOYER’S REQUIREMENTS

- Section 6 – Requirements

PART 3 – CONDITIONS OF CONTRACT AND CONTRACT FORMS

- Section 7 – General conditions
- Section 8 – Particular condition
- Section 9 – Contract forms

OCTOBER 2025



**NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT
(NAVCDP)
Kiambu County Project Coordination Unit (CPCU)**

P.o. Box 2344-0900 Kiambu
Email: navcdpkiambu@gmail.com

**NATIONAL AGRICULTURAL VALUE CHAIN DEVELOPMENT PROJECT (NAVCDP)
DEPARTMENT OF AGRICULTURE, LIVESTOCK AND COOPERATIVE
DEVELOPMENT
COUNTY GOVERNMENT OF KIAMBU
P.O. Box 2344-00900
KIAMBU**

**CONSTRUCTION AND EXPANSION OF NYAMUKU IRRIGATION
PROJECT KIAMBU COUNTY**

(a) (WORLD BANK FUNDED PROGRAMME)

(a) TENDER NO; KE-KIAMBU COUNTY-508068-CW-RFB

TENDER DOCUMENT *VOLUME I*

National Competitive Bidding
Instruction to bids, conditions of Contract & Bills of Quantities

Launched: 31st October 2025

Closing: 1st December 2025 at 12.00 noon.

Pre-bid meeting: 20th November 2025 from 10.00 am to 1.00 pm **(NB: For bidders who did not attend the pre-bid meeting previously).**

Venue: Thika Sub County – County Hall Chambers- at 10:00 am, then proceed to the site.
(Mang'u Ward)

PROJECT ID NO.: KE-KIAMBU COUNTY-508068-CW-RFB
 CONSTRUCTION AND EXPANSION OF NYAMUKU IRRIGATION
 PROJECT IN KIAMBU COUNTY
INVITATION TO TENDER NOTICE

The County Government of Kiambu has received funding through NAVCDP for the Construction and Expansion of Nyamuku Irrigation Project under component 2.0 on Climate Smart Value Chain Ecosystem Investments to undertake the project mentioned below. This is, therefore, to invite qualified contractors to submit sealed Bids for the tenders as shown below;

Tender no.	Project name	Project scope	County
Tender No: KE-KIAMBU COUNTY- 508068-CW- RFB	Construction and Expansion of Nyamuku Irrigation Project Kiambu County	<ul style="list-style-type: none"> ✓ Construction of intake works. ✓ Construction of sedimentation basin. ✓ Installation of pipe network ✓ Implementation of ESMP 	KIAMBU

Obtaining bidding documents

Interested bidders may download Tender documents from the County website www.kiambu.go.ke or the Public Procurement Information Portal www.tenders.go.ke. Those who wish to participate may send their details to Email: navcdpkiambu@gmail.com for any clarifications or communications by the Procuring Entity.

Submission

Completed tender documents enclosed in plain envelopes must be physically deposited **in the Tender Box at the County Government of Kiambu headquarters (Kiambu Town)** on or before **1st December 2025** at **12.00 noon**. Tenders will be opened thereafter in the presence of Bidders or their representatives who choose to attend.

The Tenders should be clearly marked with the tender number and the project name.

Interested and eligible bidders may obtain further information and inspect the bidding documents at the office of the **County Project Coordinator (NAVCDP)** or **through the email; navcdpkiambu@gmail.com**

1. The provisions in the Instructions to Bidders and in the General Conditions of Contract are the provisions of the World Bank Standard Bidding Document: Procurement of Works.
2. Bids should be clearly marked **CONSTRUCTION AND EXPANSION OF NYAMUKU IRRIGATION PROJECT IN KIAMBU COUNTY**, Tender No. **KE-KIAMBU COUNTY-508068-CW-RFB** and deposited at the **Tender Box at the County Government of Kiambu Headquarters (Kiambu Town)**, so as to be received on or before **1st December 2025** at 12.00 noon local time and **MUST** be accompanied by a tender security as indicated in this tender document.

Bulky bid documents that cannot fit in the tender box should be dropped and registered at the reception area at **Kiambu County Headquarter offices**.

(b) **PART 1 – BIDDING PROCEDURES**

Section I. Instructions to Bidders (ITB)

This section provides relevant information to help Bidders prepare their bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of Contracts.

Section II. Bid Data Sheet (BDS)

This Section consists of provisions that are specific to each procurement and that supplement the information or requirements included in Section I, **Instructions to Bidders**.

Section III. Evaluation and Qualification Criteria

This Section contains the criteria to determine the lowest evaluated bid and the qualifications of the Bidder to perform the contract.

Section IV. Bidding Forms

This Section contains the forms which are to be completed by the Bidder and submitted as part of his/her Bid

Section V. Eligible Countries

This Section contains information regarding eligible countries.

(c) **PART 2 – EMPLOYER’S REQUIREMENTS**

Section VI. Requirements

This Section contains the Specification, the Drawings, and supplementary information that describe the Works to be procured. (Reference to volume II and volume III)

(d) **PART 3 – CONDITIONS OF CONTRACT AND CONTRACT FORMS**

Section VII. General Conditions (GC)

This Section contains the general clauses to be applied in all contracts.

This Section consists of Contract Data and Specific Provisions which contains clauses specific to each contract. The contents of this Section supplement the General Conditions and shall be prepared by the Employer.

Section IX. Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for **Performance Security** and **Advance Payment Security**, when required, shall only be completed by the successful Bidder after contract award.

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(i) **PART 1 – Bidding Procedures**

Section I. Instructions to Bidders

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Section I. Instructions to Bidders

General

1. **Scope of Bid**
 - 1.1 The Employer indicated in Section II, **Bid Data Sheet (BDS)** issues this Bidding Document for the procurement of Works, as specified in Section VI, Requirements. The name, identification, and number of lots are provided in the **BDS**.
 - 1.2 Unless otherwise stated, throughout this Bidding Document definitions and interpretations shall be as prescribed in Section VII, **General Conditions**.
2. **Source of Funds**
 - 2.1 The Borrower or Recipient (hereinafter called “Borrower”) indicated in the **BDS** has applied for or received financing (hereinafter called “funds”) from the African Development Bank¹ (hereinafter called “the Bank”) toward the cost of the project named in the **BDS**. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.
 - 2.2 Payments by the Bank will be made only at the request of the Borrower and upon approval by the Bank in accordance with the terms and conditions of the financing agreement between the Borrower and the Bank (hereinafter called the Loan Agreement), and will be subject in all respects to the terms and conditions of that Loan Agreement. No party other than the Borrower shall derive any rights from the Loan Agreement or have any claim to the funds.
3. **Fraud and Corruption**
 - 3.1 It is the Bank’s policy to require that Borrowers (including beneficiaries of Bank Financing), as well as bidders, suppliers, and contractors, and their agents (whether declared or not), subcontractors, sub-consultants, service providers or suppliers, and any personnel thereof, under Bank-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts². In pursuance of this policy, the Bank:
 - (a) defines, for the purposes of this provision, the terms set forth below as follows:

¹ The specific financing institution shall be as stipulated in the **BDS**.

² *In this context, any action to influence the procurement process or contract execution for undue advantage is improper.*

- (i) “Corrupt Practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party³;
- (ii) “Fraudulent Practice” any act or omission, including a misrepresentation that knowingly or recklessly misleads, or attempts to mislead, a party to obtain financial or other benefit or to avoid an obligation;
- (iii) “Collusive Practice” is an arrangement between two or more parties⁴, designed to achieve an improper purpose, including to influence improperly the actions of another party; and
- (iv) “Coercive Practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party⁵;
- (v) “Obstructive practice” is
 - (v.1) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
 - (v.2) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under paragraph 3.1(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees has, directly or indirectly, engaged in Corrupt, Fraudulent, Collusive, Coercive, or Obstructive Practices in competing for the contract in

³ For the purpose of this sub-paragraph, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes Bank staff and employees of other organizations taking or reviewing procurement decisions.

⁴ For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non- competitive levels, or are privy to each other’s bid prices or other conditions.

⁵ For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

question;

- (c) will declare misprocurement and cancel the portion of the Financing allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of such Financing engaged in Corrupt, Fraudulent, Collusive, Coercive or Obstructive Practices during the procurement or the implementation of that contract, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures⁶ including by publicly declaring such firm or individual ineligible to bid for, or to be awarded Bank-financed contracts either indefinitely or for a stated period of time, (i) to be awarded a Bank-financed contract; (ii) to be a nominated⁷ sub-contractor, consultant, supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and
- (e) will require that a clause be included in bidding documents and in contracts financed by the Bank, requiring bidders, suppliers and contractors and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts and records and other documents relating to the submission of bids and contract performance and to have them audited by auditors appointed by the Bank.

3.2 Furthermore, Bidders shall be aware of the provisions stated in Section VII, **General Conditions**.

4. Eligible Bidders 4.1 A Bidder may be a natural person, private entity, government-owned entity—subject to **ITB 4.5**—or any combination of such entities

⁶ A firm or an individual may be declared ineligible to be awarded a Bank financed contract: (i) upon completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross- debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, or otherwise decided by the Bank; and through the application of the Proposal for the Implementation of a Sanctions Process within the World Bank Group; and (ii) as a result of temporary suspension or early temporary suspension in connection with an on-going sanction proceeding. See footnote 18 and paragraph 9 of Appendix 1 of the Rules and Procedures for Procurement of Goods and Works.

⁷ A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding documents) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirement for the particular bid; or (ii) appointed by the Borrower."

supported by a letter of intent to enter into an agreement or under an existing agreement in the form of a joint venture, consortium, or association (JVCA). In the case of a joint venture, consortium, or association:

- (a) unless otherwise specified in the **BDS**, all partners shall be jointly and severally liable, and
- (b) the JVCA shall nominate a Representative who shall have the authority to conduct all businesses for and on behalf of any and all the partners of the JVCA during the bidding process and, in the event the JVCA is awarded the Contract, during contract execution.

4.2 A Bidder, and all parties constituting the Bidder, shall have the nationality of an eligible country, in accordance with the Bank's **Rules and Procedures for Procurement of Goods and Works**, and as listed in Section V, Eligible Countries.⁸ A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, incorporated, or registered and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including Related Services.

4.3 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:

- (a) they have controlling partners in common; or
- (b) they receive or have received any direct or indirect subsidy from any of them; or
- (c) they have the same legal representative for purposes of this bid; or
- (d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
- (e) a Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all Bids in which it is involved. However, this does not limit the inclusion of the same subcontractor, not otherwise participating as a Bidder, in more than one bid; or
- (f) a Bidder participated as a consultant in the preparation of Section VI, Requirements that are the subject of the bid.
- (g) a Bidder or any of its affiliates has been hired, or is proposed to be hired, by the Employer or the Borrower for the

⁸ Including eligibility criteria for participation in the supply of goods, works and related services.

supervision of the contract.

- 4.4 A Bidder that is under a declaration of ineligibility by the Bank in accordance with **ITB** Clause 3, at the date of the deadline for bid submission or thereafter, shall be disqualified.
 - 4.5 Government-owned entities in the Borrower's country shall be eligible only if they can establish that they (i) are legally and financially autonomous, (ii) operate under the principles of commercial law, and (iii) are not dependent agencies of the Employer or the Borrower.
 - 4.6 Bidders shall not be under execution of a Bid–Securing Declaration in the Employer's Country.
 - 4.7 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.
 - 4.8 Firms from an eligible country shall be excluded if:
 - (a) as a matter of law or official regulation, the Borrower's country prohibits commercial relations with that country; or
 - (b) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of Goods from that country or any payments to persons or entities in that country.
 - 4.9 In case a prequalification process has been conducted prior to the bidding process, this bidding is open only to prequalified Bidders.
 - 4.10 A firm sanctioned by the Bank in accordance with the above ITB Clause 3.1 (d), or in accordance with the Bank's policies on anti-corruption and fraud and Bank's sanctions procedures⁹, shall be ineligible to be awarded a Bank-financed contract, or to benefit from a Bank-financed contract, financially or in any other manner, during the period of time determined by the Bank
- 5. Eligible Goods and Related Services**
- 5.1 All Goods and Related Services to be supplied under the Contract and financed by the Bank, shall have as their country of origin an eligible country of the Bank in accordance with the Bank's **Rules and Procedures for Procurement of Goods and Works**, as listed in Section V, Eligible Countries.
 - 5.2 For purposes of this Clause, the term "Goods" includes commodities, raw material, machinery, equipment, and industrial plants; and "Related Services" includes services such as insurance, transportation, installation, and commissioning, training, and initial maintenance.
 - 5.3 The term "country of origin" means the country where the Goods

⁹ See the Proposal for the Implementation of a Sanctions Process within the World Bank Group and the Bank's Whistleblowing and Complaints Handling Policy. The Bank's sanctions procedures are publicly disclosed on the Bank's external website."

have been mined, grown, cultivated, produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its imported components.

- 5.4 The nationality of the firm that produces, assembles, distributes, or sells the Goods shall not determine their origin.

Contents of Bidding Document

6. Sections of Bidding Document

- 6.1 The Bidding Document consists of Parts 1, 2, and 3, which include all the Sections indicated below and should be read in conjunction with any Addenda issued in accordance with **ITB 8**.

PART 1 Bidding Procedures

- Section I. Instructions to Bidders (**ITB**)
- Section II. Bid Data Sheet (**BDS**)
- Section III. Evaluation and Qualification Criteria
- Section IV. Bidding Forms
- Section V. Eligible Countries

PART 2 Employer's Requirements

- Section VI. Requirements

PART 3 Conditions of Contract and Contract Forms

- Section VII. General Conditions (**GC**)
- Section VIII. Particular Conditions (**PC**)
- Section IX. Contract Forms

- 6.2 The Invitation for Bids issued by the Employer is not part of the Bidding Document.
- 6.3 The Bidder shall obtain the Bidding Document from the source stated by the Employer in the Invitation for Bids; otherwise the Employer is not responsible for the completeness of the Bidding Document.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.

7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting

- 7.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the Employer in writing at the Employer's address indicated in the **BDS** or raise his enquiries during the pre-bid meeting if provided for in accordance with **ITB 7.4**. The Employer will respond to any request for clarification, provided that such request is received prior to the deadline for submission of bids, within the number of days specified in the **BDS**. The Employer response shall be in writing with copies to all Bidders who have

acquired the Bidding Document in accordance with **ITB 6.3**, including a description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under **ITB 8** and **ITB 22.2**.

- 7.2 Where applicable, the Bidder is advised to visit and examine the project site and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for the provision of the Requirements. The costs of visiting the site shall be at the Bidder's own expense.
 - 7.3 Pursuant to **ITB 7.2**, where the Bidder and any of its personnel or agents have been granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the visit.
 - 7.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for in the **BDS**. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage. If so provided for in the **BDS**, the Employer will organize a site visit.
 - 7.5 The Bidder is requested, as far as possible, to submit any questions in writing, to reach the Employer not later than one week before the meeting.
 - 7.6 Minutes of the pre-bid meeting, including the text of the questions raised without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with **ITB 6.3**. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to **ITB 8** and not through the minutes of the pre-bid meeting.
 - 7.7 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.
- 8. Amendment of Bidding Document**
- 8.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Document by issuing addenda.
 - 8.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with **ITB 6.3**.
 - 8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at its discretion, extend the deadline for the submission of bids, pursuant to **ITB 22.2**

Preparation of Bids

- 9. Cost of Bidding** 9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 10. Language of Bid** 10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language specified in the **BDS**. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in that language, in which case, for purposes of interpretation of the Bid, such translation shall govern.
- 11. Documents Comprising the Bid** 11.1 The Bid shall comprise the following:
- (a) Letter of Bid
 - (b) Completed Schedules as provided in Section IV, Bidding Forms;
 - (c) Bid Security or Bid-Securing Declaration, in accordance with **ITB 19**;
 - (d) at the Bidder's option, alternative proposals, if permissible, in accordance with **ITB 13**;
 - (e) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with **ITB 20.2**;
 - (f) documentary evidence establishing the eligibility of the Goods and Related Services offered by the Bidder, in accordance with **ITB 17.1**;
 - (g) documentary evidence establishing the Bidder's qualifications in accordance with the requirements of Section III, Evaluation and Qualification Criteria, using the relevant forms furnished in Section IV, Bidding Forms;
 - (h) documentary evidence as specified in the **BDS**, establishing the conformity of the Technical Proposal offered by the Bidder with the Bidding Document, using the relevant forms furnished in Section IV, Bidding Forms;
 - (i) in the case of a bid submitted by a JVCA, JVCA agreement, or letter of intent to enter into a JVCA including a draft agreement, indicating at least the parts of the Requirements to be executed by the respective partners;
 - (j) any other document required in the **BDS**.
- 12. Letter of Bid and Price Schedules** 12.1 The Bidder shall submit the Letter of Bid using the form furnished in Section IV, Bidding Forms. This form must be completed without any alterations to its format, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.
- 13. Alternative** 13.1 Unless otherwise indicated in the **BDS**, alternative proposals shall

Bids

not be considered. If alternative proposals are permitted, their method of evaluation shall be as stipulated in Section III, Evaluation and Qualification Criteria.

13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the **BDS**, as well as the method of evaluating different times for completion.

13.3 Except as provided under **ITB** 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the bidding document must first price the Employer's requirements as described in the bidding document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed Rehabilitation and Expansion methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Bidder conforming to the basic technical requirements shall be considered by the Employer.

13.4 When specified in the **BDS**, Bidders are permitted to submit alternative technical solutions for specified parts of the requirements, and such parts shall be identified in the **BDS**, as will the method for their evaluation, and described in Section VI, Requirements.

14. Bid Prices and Discounts

14.1 The prices and discounts quoted by the Bidder in the Letter of Bid and in the Price Schedules shall conform to the requirements specified in **ITB** 14.2.

14.2 Unless otherwise provided in the **BDS** and the **General Conditions (GC)**, the prices quoted by the Bidder shall be fixed.

14.3 The Bidder shall submit a bid for the whole of the works described in **ITB** 1.1 by filling in prices for all items of the Works, as identified in Section IV, Bidding Forms. In case of admeasurement contracts, the Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.

14.4 The price to be quoted in the Letter of Bid shall be the total price of the Bid, excluding any discounts offered.

14.5 Unconditional discounts, if any, and the methodology for their application shall be quoted in the Letter of Bid, in accordance with **ITB** 12.1.

14.6 If, pursuant to **ITB** 14.2, prices are adjustable, the Bidder shall furnish the indices and weightings for the price adjustment formula in the Schedule of Adjustment Data in Section IV (Bidding Forms) and the Employer may require the Bidder to justify its proposed indices and weightings.

14.7 If so indicated in **ITB** 1.1, bids are invited for individual contracts or for any combination of contracts (packages). Bidders wishing to

offer any price reduction for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with **ITB** 14.5, provided the bids for all contracts are submitted and opened at the same time.

14.8 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total bid price submitted by the Bidder.

15. Currencies of Bid and Payment

15.1 The currency(ies) of the bid and the currency(ies) for payment shall be as specified in the **BDS**.

16. Documents Establishing the Qualifications of the Bidder

16.1 To establish its qualifications to perform the Contract in accordance with Section III, Evaluation and Qualification Criteria, the Bidder shall provide the information requested in Section IV, Bidding Forms.

16.2 Bidders, individually or in joint ventures, applying for eligibility for margin of preference, if such margin applies pursuant to **ITB** 31.2, shall supply all information required to satisfy the criteria for eligibility as described in **ITB** 31.2.

17. Documents Establishing the Eligibility of the Goods and Related Services

17.1 To establish the eligibility of the Goods and Related Services in accordance with **ITB** Clause 5, Bidders shall complete the forms, included in Section IV, Bidding Forms.

18. Period of Validity of Bids

18.1 Bids shall remain valid for the period specified in the **BDS** after the bid submission deadline date prescribed by the Employer. A bid valid for a shorter period shall be rejected by the Employer as non-responsive.

18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with **ITB** 19, the Bidder granting the request shall also extend the bid security for twenty-eight (28) days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its bid, except as provided in **ITB** 18.3.

18.3 In the case of fixed price contracts, if the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial bid validity, the Contract price shall be adjusted as specified in the request for extension. Bid evaluation shall be based on the Bid Price without taking into consideration the above correction.

19. Bid Security

19.1 The Bidder shall furnish as part of its bid, at the option of the

Employer, and as stipulated in the **BDS**, the original of either a Bid-Securing Declaration or a bid security using the relevant form included in Section IV, Bidding Forms. In the case of a bid security, the bid security amount and currency shall be as specified in the **BDS**.

- 19.2 A Bid-Securing Declaration shall use the form included in Section IV, Bidding Forms.
- 19.3 If a bid security is specified pursuant to **ITB** 19.1, the bid security shall be a demand guarantee in any of the following forms at the Bidder's option:
- (a) an unconditional guarantee issued by a bank or surety;
 - (b) an irrevocable letter of credit; or
 - (c) a cashier's or certified check;
- from a reputable source from an eligible country. If the unconditional guarantee is issued by an insurance company or a bonding company located outside the Employer's Country, the issuer shall have a correspondent financial institution located in the Employer's Country to make it enforceable. In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section IV, Bidding Forms or in another substantially similar format approved by the Employer prior to bid submission. In either case, the form must include the complete name of the Bidder. The bid security shall be valid for thirty days (30) beyond the original validity period of the bid, or beyond any period of extension if requested under **ITB** 18.2.
- 19.4 Pursuant to the option stipulated at **ITB** 19.1, any bid not accompanied by a substantially responsive bid security or Bid-Securing Declaration shall be rejected by the Employer as non-responsive.
- 19.5 If a bid security is specified pursuant to **ITB** 19.1, the bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's furnishing of the performance security pursuant to **ITB** 38.
- 19.6 The bid security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required performance security.
- 19.7 The bid security may be forfeited or the Bid-Securing Declaration executed:
- (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder in the Letter of Bid or
 - (b) if the successful Bidder fails to:
 - (i) sign the Contract in accordance with **ITB** 37; or
 - (ii) furnish a performance security in accordance with

ITB 38.

19.8 The Bid Security or the Bid Securing Declaration of a JVCA shall be in the name of the JVCA that submits the bid. If the JVCA has not been legally constituted into a legally enforceable JVCA at the time of bidding, the Bid Security or the Bid Securing Declaration shall be in the names of all future partners as named in the letter of intent referred to in **ITB 4.1**.

19.9 If a Bid-Securing Declaration is executed in accordance with **ITB 19.7**, the Employer will declare the Bidder ineligible to be awarded a contract by the Employer for the period of time stated in the Form of Bid-Securing Declaration.

20. Format and Signing of Bid

20.1 The Bidder shall prepare one original of the documents comprising the bid as described in **ITB 11** and clearly mark it "ORIGINAL." In addition, the Bidder shall submit copies of the bid, in the number specified in the **BDS** and clearly mark them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.

20.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the **BDS** and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid where entries have been made shall be signed or initialled by the person signing the bid.

20.3 A bid submitted by a JVCA shall comply with the following requirements:

(a) Unless not required in accordance with **ITB 4.1 (a)**, be signed so as to be legally binding on all partners and

(b) Include the Representative's authorization referred to in **ITB 4.1 (b)**, consisting of a power of attorney signed by those legally authorized to sign on behalf of the JVCA.

20.4 Any amendments, interlineations, erasures, or overwriting shall be valid only if they are signed or initialled by the person signing the bid.

Submission and Opening of Bids

21. Submission, Sealing and Marking of Bids

21.1 Bidders may always submit their bids by mail or by hand. If so specified in the **BDS**, bidders shall have the option of submitting their bids electronically. Procedures for submission, sealing and marking are as follows:

(a) Bidders submitting bids by mail or by hand shall enclose the original and copies of the Bid in separate sealed envelopes. If so permitted in accordance with **ITB 13**, alternative proposals, and copies thereof, shall also be placed in separate envelopes.

The envelopes shall be duly marked as "ORIGINAL," "ALTERNATIVE," "ORIGINAL COPY," and "ALTERNATIVE COPY" These envelopes shall then be enclosed in one single package. The rest of the procedure shall be in accordance with **ITB 21.2** and **21.3**.

(b) Bidders submitting bids electronically shall follow the electronic bid submission procedures specified in the **BDS**.

21.2 The inner and outer envelopes shall:

(a) bear the name and address of the Bidder;

(b) be addressed to the Employer in accordance with **ITB 22.1**;

(c) bear the specific identification of this bidding process pursuant to **ITB 1.1**; and

(d) bear a warning not to open before the time and date for bid opening

21.3 If envelopes and packages are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

22. Deadline for Submission of Bids

22.1 Bids must be received by the Employer at the address and no later than the date and time indicated in the **BDS**.

22.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with **ITB 8**, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23. Late Bids

23.1 The Employer shall not consider any bid that arrives after the deadline for submission of bids, in accordance with **ITB 22**. Any bid received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.

24. Withdrawal, Substitution, and Modification of Bids

24.1 A Bidder may withdraw, substitute, or modify its bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with **ITB 20.2**, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the bid must accompany the respective written notice. All notices must be:

(a) prepared and submitted in accordance with **ITB 20** and **ITB 21** (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," "MODIFICATION;" and

(b) received by the Employer prior to the deadline prescribed for submission of bids, in accordance with **ITB 22**.

24.2 Bids requested to be withdrawn in accordance with **ITB 24.1** shall be returned unopened to the Bidders.

24.3 No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

- 25. Bid Opening**
- 25.1 The Employer shall conduct the bid opening in public, in the presence of Bidders' designated representatives and anyone who choose to attend, and at the address, date and time specified in the **BDS**. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with **ITB 21.1**, shall be as specified in the **BDS**.
- 25.2 First, envelopes marked "Withdrawal" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "Substitution" shall be opened and read out and exchanged with the corresponding bid being substituted, and the substituted bid shall not be opened, but returned to the Bidder. No bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked "Modification" shall be opened and read out with the corresponding bid. No bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at bid opening. Only bids that are opened and read out at bid opening shall be considered further.
- 25.3 The Employer shall open all other envelopes one at a time and read out: the name of the Bidder, the Bid Price(s), any discounts and their application methodology, alternative bids, the presence or absence of a bid security or Bid-Securing Declaration; and any other details as the Employer may consider appropriate. Only discounts and alternative bids read out at bid opening shall be considered for evaluation. No bid shall be rejected at bid opening except for late bids, in accordance with **ITB 23.1**.
- 25.4 The Employer shall prepare a record of the bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, substitution, or modification; the Bid Price, per lot if applicable, including any discounts and alternative proposals; and the presence or absence of a bid security or a Bid-Securing Declaration. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted bids in time, and posted online when electronic bidding is permitted.

Examination of Bids

- 26. Confidentiality**
- 26.1 Information relating to the evaluation of bids shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on Contract award is communicated to all Bidders.
- 26.2 Any attempt by a Bidder to influence improperly the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.
- 26.3 Notwithstanding **ITB** 26.1, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it should do so in writing.
- 27. Clarification of Bids**
- 27.1 To assist in the examination, evaluation, and comparison of the bids, and qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its bid, allowing a reasonable time for response. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change in the prices or substance of the bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids, in accordance with **ITB** 29.
- 27.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid may be rejected.
- 28. Determination of Responsiveness**
- 28.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in **ITB** 11.
- 28.2 A substantially responsive bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission.
- (a) "Deviation" is a departure from the requirements specified in the Bidding Document;
- (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and
- (c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.
- 28.3 A material deviation, reservation, or omission is one that,
- (a) if accepted, would:
- (i) affect in any substantial way the scope, quality, or performance of the Schedule of Requirements as

specified in Section VI; or

(ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract; or

(b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.

28.4 The Employer shall examine the technical aspects of the bid in particular, to confirm that all requirements of Section VI have been met without any material deviation, reservation, or omission.

28.5 If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

28.6 Provided that a bid is substantially responsive, the Employer may waive any quantifiable nonconformity in the bid that does not constitute a material deviation, reservation or omission.

28.7 Provided that a bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the price of the bid. Failure of the Bidder to comply with the request may result in the rejection of its bid.

28.8 Provided that a bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of the non-conforming item or component. The adjustment shall be made using the methodology indicated in Section III, Evaluation and Qualification Criteria.

Bid Evaluation and Comparison

29. Correction of Arithmetical Errors

29.1 The Employer shall use the criteria and methodologies indicated in Section III, Evaluation and Qualification Criteria. No other evaluation criteria or methodologies shall be permitted

29.2 Provided that the bid is substantially responsive, the Employer shall correct arithmetical errors as indicated in Section III, Evaluation and Qualification Criteria

29.3 If a Bidder does not accept the correction of errors, its bid shall be declared non-responsive and its Bid Security shall be forfeited or the Bid-Securing Declaration executed.

- 30. Conversion to Single Currency** 30.1 For evaluation and comparison purposes, the currency(ies) of the bid shall be converted into a single currency as specified in Section III, Evaluation and Qualification Criteria.
- 31. Bid Adjustments**
- 31.1 For evaluation and comparison purposes the Employer shall adjust the bid prices using the criteria and methodology specified in Section III, Evaluation and Qualification Criteria.
- 31.2 Unless otherwise specified in the **BDS**, no margin of domestic or regional preference shall apply. If a margin of preference applies, the application methodology shall be as specified in Section III, Evaluation and Qualification Criteria, and in accordance with the provisions stipulated in the Bank's **Rules and Procedures for Procurement of Goods and Works**.
- 31.3 If in the opinion of the Employer the bid which results in the lowest Evaluated Bid, is seriously unbalanced or front loaded or substantially below the Employer's estimates, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.
- 32. Qualification of the Bidder**
- 32.1 The Employer shall determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated and substantially responsive bid meets the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.
- 32.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to **ITB 16**.
- 32.3 An affirmative determination shall be a prerequisite for award of the Contract to the Bidder. A negative determination shall result in disqualification of the bid, in which event the Employer shall proceed to the next lowest evaluated bid to make a similar determination of that Bidder's qualifications to perform satisfactorily.
- 32.4 The capabilities of the manufacturers and subcontractors proposed in its Bid to be used by the lowest evaluated Bidder for identified major items of the Requirements will also be evaluated for acceptability in accordance with the criteria and methodologies defined in Section

III, Evaluation and Qualification Criteria. Their participation should be confirmed with a letter of intent between the parties, as needed. Should a manufacturer or subcontractor be determined to be unacceptable, the Bid will not be rejected, but the Bidder will be required to substitute an acceptable manufacturer or subcontractor without any change to the bid price.

- 33. Comparison of Bid** 33.1 Subject to **ITB** 29, 30 and 31, the Employer shall compare all substantially responsive bids to determine the Bidder whose Bid has been determined to be the Most Advantageous Bid.
- 34. Employer's Right to Accept Any Bid, and to Reject Any or All Bids** 34.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

Award of Contract

- 35. Award Criteria** 35.1 Subject to **ITB** 34.1, the Employer shall award the Contract to the Bidder whose offer has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.
- 36. Notification of Award** 36.1 Prior to the expiration of the period of bid validity, the Employer shall notify the successful Bidder, in writing, that its bid has been accepted. The notification letter (hereinafter and in the Conditions of Contract and Contract Forms called the "Letter of Acceptance") shall specify the sum that the Employer will pay the Contractor in consideration of the execution and completion of the Works (hereinafter and in the Contract Forms called "the Contract Price").

36.3 At the same time, the Employer shall also notify all other Bidders of the results of the bidding process, and shall publish online in the official county website (www.kiambu.go.ke) or the Public Procurement Information Portal (www.tenders.go.ke), the results identifying the bid and lot numbers and the following information: (i) name of each Bidder who submitted a Bid; (ii) bid prices as read out at bid opening; (iii) name and evaluated prices of each Bid that was evaluated; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning Bidder, and the price it offered, as well as the duration and summary scope of the contract awarded. After publication of the award, unsuccessful bidders may request in writing to the Employer for a debriefing seeking explanations on the grounds on which their bids were not selected. The Employer shall promptly respond in writing to any unsuccessful Bidder who, after Publication of contract award, requests a debriefing.

37. Signing of Contract

- 37.1 Promptly upon notification, the Employer shall invite the successful Bidder to negotiate the Contract Agreement.
- 37.2 Within thirty (30) days of negotiation of the Contract Agreement, both parties shall execute the contract.
- 37.3 Upon the successful Bidder's furnishing of the signed Contract Agreement and Performance Security pursuant to **ITB 38**, the Employer will discharge its Bid Security, pursuant to **ITB 19**.
- 37.4 Notwithstanding **ITB 37.2** above, in case signing of the Contract Agreement is prevented by any import restrictions attributable to the Employer, to the country of the Employer, or to the use of the products/goods, systems or services to be supplied, where such import restrictions arise from trade regulations from a country supplying those products/goods, systems or services, the Bidder shall not be bound by its bid, always provided, however, that the Bidder can demonstrate to the satisfaction of the Employer and of the Bank that signing of the Contract Agreement has not been prevented by any lack of diligence on the part of the Bidder in completing any formalities, including applying for permits, authorizations and licenses necessary for the import of the products/goods, systems or services under the terms of the Contract Agreement.

38. Performance Security

- 38.1 Within thirty (30) days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, subject to **ITB 31.3**, using for that purpose the Performance Security Form included in Section IX, Contract Forms, or another form acceptable to the Employer. If the performance security furnished by the successful Bidder is in the form of a bond, it shall be issued by a bonding or

insurance company that has been determined by the successful Bidder to be acceptable to the Employer. A foreign institution providing a bond shall have a correspondent financial institution located in the Employer's Country.

38.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or sign the Contract in accordance with **(38.1)** above shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security, or execution of the Bid-Securing Declaration. In that event the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily.

Section II. Bid Data Sheet

A. General	
ITB 1.1	The number of the Invitation for Bids is: KE-KIAMBU COUNTY-508068-CW-RFB. Construction and Expansion of Nyamuku Irrigation Project.
ITB 1.1	The Employer is: County Government of Kiambu
ITB 1.1	The name of the bidding process is: National Competitive Bidding The identification number of the bidding process is: KE-KIAMBU COUNTY-508068-CW-RFB The number and identification of lots comprising this bidding process are: N/A
ITB 2.1	The Borrower is: Republic of Kenya
ITB 2.1	The specific Bank financing institution is: IDA / World Bank
ITB 2.1	The name of the project is: National Agricultural Value Chain Development Project (NAVCDP)
ITB 4.1(a)	Incase of individuals or firms in a joint venture, consortium, or association, the procuring entity shall deal with the designate lead
ITB 4.4	A list of debarred firms is available at http://www.afdb.org/debarred
B. Contents of Bidding Document	
ITB 7.1	Attention: Chief Officer- Crop Production, Irrigation and Marketing Physical Address Sub-County Agriculture offices, Kiambu, P.O. Box 2344-00900 KIAMBU, Kenya Floor/Room number: 1st floor City: KIAMBU ZIP Code: 00900 Country: KENYA Electronic mail address: procurement@kiambu.go.ke Cc navcdpkiambu@gmail.com Requests for clarifications should be received via the above email not later than four(4) business days prior to the deadline for submission of Bids.

ITB 7.4	A Pre-Bid site visit and meeting “shall” take place on Thursday 20th November 2025 prospective bidders will first assemble for a brief meeting in Thika Sub County - County Hall Chambers at 10:00 am, then proceed to the site. (Mang’u Ward) (NB: for bidders who did not attend the Prebid site visit previously)
C. Mandatory Preparation of Bids	
ITB 10.1	The language of the bid is: English
ITB 11.1 (h)	<p>The Bidder must provide the following Mandatory Documentary Evidence to establish the conformity of the Technical Proposal with the Bidding Document:</p> <ul style="list-style-type: none"> • Certificate of Registration/Incorporation • CR12 Form/CR13 Form duly signed • A valid Tax Compliance Certificate (verifiable) • Copy of Bidders KRA PIN • A valid Single Business Permit • National Construction Authority Registration (NCA 1,2, 3,4 and 5) Certificate (water works category) • A certificate of registration for water development contractor in the Ministry of Water, Sanitation and Irrigation (Category A or B) • Duly filled and signed Form of tender and Confidential Business Questionnaire in the company letterhead and in the format attached. • Two copies of tender documents marked Original and Copy and have all bid documents serialized and bound. • Tender Security of Ksh. 1,000,000.00 (One Million Only) of the bid price in the form of a bank guarantee valid from a bank registered in Kenya which must remain valid for 30 days after the tender validity period. (Both Original and Copy) <p><i>Failure to comply with any of the above SHALL cause the bid to be rejected and not considered for further evaluation</i></p>
ITB 11.1 (j)	<p>The Bidder shall submit with the bid the following additional documents for technical evaluation:</p> <ul style="list-style-type: none"> • Written authorization for the person signing the documents from the company/Power of Attorney • Lead designate agreement, for those submitting bids as joint venture • Evidence of similar works undertaken in the last five years • List of proposed personnel including signed CV’s and precise proposed positions/tasks for each • List of equipment proposed for the works (provide proof of ownership, lease, or hire) reference to table 2.8 on qualification criteria below • Clear work program/plan • Certified audited financial statements for the last two years

ITB 13.1	Alternative bids are not permitted.
ITB 13.2	Alternatives to the Times for Completion “ shall be ” permitted. If alternatives to the Times for Completion are permitted, the evaluation method

	will be as specified in Section III, Evaluation and Qualification Criteria.
ITB 13.4	Alternative technical solutions shall be permitted for the following parts of the Works, as further detailed in the Specification:
ITB 14.2	Prices “ shall be ” fixed. Prices are inclusive of all taxes.
ITB 14.6	The prices quoted by the Bidder “ shall not be ” subject to adjustment during the performance of the Contract.
ITB 15.1	The currency of the bid and payment shall be: Kenya Shilling (KES)
ITB 18.1	The bid validity period shall be: 180 days.
ITB 19.1	The Bidder shall furnish a bid security of Ksh. 1,000,000.00 (One Million Only) of the bid price in form of a bank guarantee
ITB 20.1	In addition to the original of the Bid, the number of copies is: 1 Copy.
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall indicate: <ul style="list-style-type: none"> (a) The name and description of the documentation required to demonstrate the authority of the signatory to sign the Bid such as a Power of Attorney, authorization letter in company stationery; and (b) In the case of Bids submitted by an existing or intended JVCA an undertaking signed by all parties (i) stating that all parties shall be jointly and severally liable, if so required in accordance with ITB 4.1(a), and (ii) nominating a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JVCA during the bidding process and, in the event the JV is awarded the Contract, during contract execution.”
D. Submission and Opening of Bids	
ITB 21.1	Bidders “ shall not ” have the option of submitting their bids electronically.
ITB 21.1 (b)	The electronic bidding submission procedures shall be: None
ITB 22.1	For bid submission purposes only, the Employer’s address is: Attention: Chief Officer- Crop Production, Irrigation and Marketing Drop Off Point: Tender Box at Kiambu County Headquarters Physical Address: Kiambu County Headquarters Floor/Room number: Ground floor City: Kiambu

	ZIP Code: P.O. Box 2344-00900 KIAMBU Country: KENYA The deadline for bid submission is: Date: 1st December 2025 Time: 12.00 noon
ITB 25.1	The bid opening shall take place at: Physical Address: Kiambu County Headquarters boardroom Floor/Room number: Ground floor City: Kiambu Country: Kenya Date: 1st December 2025 Time: 12.00 noon
ITB 25.1	The electronic bid opening procedures shall be: None
F. Bid Evaluation and Comparison	
ITB 31.2	A margin of domestic or regional preference “ shall not ” apply.

Section III. Evaluation and Qualification Criteria

1. Evaluation Criteria and Methodology

1.1 Alternative Proposal (If permitted in accordance with ITB 13.1)

Technical Alternative **None**

1.2 Correction of Arithmetical Errors (In accordance with ITB 29.1)

- (a) Where there are errors between the total of the amounts given under the column for the price breakdown and the amount given under the Total Price, the former shall prevail and the latter will be corrected accordingly
- (b) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected;
- (c) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
- (d) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.

1.3 Conversion to a Single Currency (In accordance with ITB 30)

Not applicable.

1.4 Discounts (In accordance with ITB 14.5)

The Employer will adjust the Bid Price, using the methodology prescribed by the Bidder in its Letter of Bid, to take account of the Discounts offered by the Bidder in its Letter of Bid, as read out at the Bid Opening.

1.5 Quantifiable Nonmaterial Nonconformities (In accordance with ITB 28.8)

The adjustment shall be made using the following methodology: **[none]**

1.6 Margin of Domestic or Regional Preference (If permitted in accordance with ITB 31.2)

None

1.7 Any other Criteria or Methodology

See Section II & Section VIII

2. Qualification Criteria

2	Qualification (Without Prequalification)
2.1	Eligibility (TABLE)
2.2	Historical Contract Non-Performance (TABLE)
2.3	Financial Situation (TABLE)
2.4	Experience (TABLE)
2.5	Personnel (TABLE)
2.6	Financial situation (TABLE)
2.7	Experience (TABLE)
2.8	Equipment (TABLE)

2. Qualification Tables (Without Prequalification)

Factor	2.1 Eligibility					
Sub-Factor	Criteria					Documentation Required
	Requirement	Single Entity	Bidder			
			Joint Venture, Consortium or Association		At least one partner	
			All partners combined	Each partner		
2.1.1 Nationality	Nationality in accordance with ITB 4.2.	Must meet requirement	Existing or intended JVCA must meet Requirement	Must meet requirement	N / A	Form ELI –1.1 and 1.2, with attachments
2.1.2 Conflict of Interest	No- conflicts of interests as described in ITB 4.3.	Must meet requirement	Existing or intended JVCA must meet requirement	Must meet requirement	N / A	Letter of Bid
2.1.3 Bank Ineligibility	Not having been declared ineligible by the Bank as described in ITB 4.4.	Must meet requirement	Existing JVCA must meet Requirement	Must meet requirement	N / A	Letter of Bid
2.1.4 Government Owned Entity	Compliance with conditions of ITB 4.5	Must meet requirement	Must meet requirement	Must meet requirement	N / A	Form ELI –1.1 and 1.2, with attachments

Factor	2.1 Eligibility					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
			All partners combined	Each partner	At least one partner	
2.1.5 Ineligibility based on a United Nations resolution or Borrower's country law	Not having been excluded as a result of the Borrower's country laws or official regulations, or by an act of compliance with UN Security Council resolution, in accordance with ITB 4.8	Must meet requirement	Existing JVCA must meet requirement	Must meet requirement	N / A	Letter of Bid

Factor	2.2 Historical Contract Non-Performance					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
			All partners combined	Each partner	At least one partner	

Factor	2.2 Historical Contract Non-Performance					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
All partners combined			Each partner	At least one partner		
2.2.1 History of non-performing contracts	Non-performance of a contract did not occur within the last twelve (12) months prior to the deadline for application submission, based on all information on fully settled disputes or litigation. A fully settled dispute or litigation is one that has been resolved in accordance with the Dispute Resolution Mechanism under the respective contract, and where all appeal instances available to the bidder have been exhausted.	Must meet requirement by itself or as partner to past or existing JVCA	N / A	Must meet requirement by itself or as partner to past or existing JVCA	N / A	Form CON - 2
2.2.2 Failure to Sign Contract	Not being under execution of Bid-Securing Declaration pursuant to ITB 4.6 for twelve (12) months	Must meet requirement	N / A	Must meet requirement by itself or as partner to a JVCA	N / A	Letter of Bid
2.2.3 Pending Litigation	All pending litigation history shall disqualify the Bidder.	Must meet requirement by itself or as partner to past or existing JVCA	N / A	Must meet requirement by itself or as partner to past or existing JVCA	N / A	Form CON – 2

Factor	2.3 Financial Situation					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
All partners combined			Each partner	At least one partner		
2.3.1 Historical Financial Performance	Submission of audited balance sheets or, if not required by the law of the bidder's country, other financial statements acceptable to the Employer for the last three [3] years to demonstrate the current soundness of the bidders financial position and its prospective long-term profitability. (a) Audited accounts in comparative form (b) Letter of credit worthiness from your banker (c) Bank statements	Must meet requirement	N / A	Must meet requirement	N / A	Form FIN – 3.1 with attachments
2.3.2. Average Annual Turnover	Minimum average annual turnover of KES 30 million , calculated as total certified payments received for contracts in progress or completed within the last two (2) years	Must meet requirement	Must meet requirement	Must meet fifty percent (50%) of the requirement	Must meet fifty percent (50%) of the requirement	Form FIN –3.2

Factor	2.3 Financial Situation					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
All partners combined			Each partner	At least one partner		
2.3.3. Financial Resources	<p>The Bidder must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet:</p> <p>(i) the following cash-flow requirement:</p> <p style="text-align: center;">Current ratio = $\frac{\text{Liquid Assets}}{\text{Liquid liabilities}}$ Greater than 1</p> <p>and</p> <p style="text-align: center;">Debt Ratio = $\frac{\text{Total Debt}}{\text{Total Assets}}$ Less than 1</p> <p>and</p> <p>(ii) the overall cash flow requirements for this contract and its current commitments.</p>	Must meet requirement	Must meet requirement	Must meet fifty percent (50%) of the requirement	Must meet seventy five percent (75%) of the requirement	Form FIN –3.3 + Form CCC

Factor	2.4 Experience					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
				All partners combined		Each partner
2.4.1 General Experience	Experience under contracts in the role of contractor, subcontractor, or management contractor for at least two (2) completed within the last five [5] years prior to the applications submission deadline	Must meet requirement	N / A	Must meet requirement	N / A	Form EXP-2.4.1
2.4.2 Specific Experience	a)Participation as the contractor, management contractor, or subcontractor, in at least three (3) Water, irrigation, or civil works Contracts within the last six (6) years , each with a cumulative value of at least fifty million (KES 50 Million.), that have been successfully completed and that are similar to the proposed Works. The similarity shall be based on the physical size, complexity, methods/technology, or other characteristics as described in Section VI, Requirements.	Must meet requirement	Must meet requirements for all characteristics	N / A	Must meet requirement for one characteristic	Form EXP 2.4.2(a)

Factor	2.4 Experience					
Sub-Factor	Criteria					Documentation Required
	Requirement	Bidder				
		Single Entity	Joint Venture, Consortium or Association			
All partners combined			Each partner	At least one partner		
2.4.2 Specific Experience	b) For the above or other contracts executed during the period stipulated in 2.4.2(a) above, a minimum experience in the following key activities: 1. Intake weir and Sedimentation Basin works on a permanent river 2. Pipe installation works especially in HDPE /GI or uPVC. 3. Water spillway excavation and stabilization. 4. Water draw-off system installation 5. Plumbing works. 6. Masonry works	Must meet requirements	Must meet requirements	N / A	Must meet requirements	Form EXP-2.4.2(b)

2.5 Personnel

The Bidder must demonstrate that it will have the personnel for the key positions that meet the following requirements:

S/No	Staff Position	Minimum Qualifications	Total Specific experience (years)	Weighted Score
1	Site Engineer	BSc.(Civil /Agricultural Engineering) and registered with EBK	10 years supervising Irrigation/water infrastructural works	5 <i>(loose 0.5 marks for every year not achieved)</i>
2	Surveyor	B.Sc/ HND in Survey /Photogrammetry or its equivalent and registered with their professional body (conversant in AUTOCAD/CIVIL 3D)	5 years in surveying for Irrigation/water infrastructural projects	5 <i>(loose 1 mark for every year not achieved)</i>
3	Concrete Foreman	Diploma (Civil Engineering /Agricultural Engineering) or building Rehabilitation and Expansion	5 years in construction of Irrigation/water infrastructural projects	5 <i>(loose 1 mark for every year not achieved)</i>
4	Plumber	Certificate in plumbing works	5 years in construction of Irrigation/water infrastructural projects	5 <i>(loose 1 mark for every year not achieved)</i>
5	Environmental/Safety Expert	B.Sc. In environmental science/ natural science or its equivalent and be registered by NEMA as a lead expert	3years in ESIA/EA reports development for irrigation related projects and 2 years in ESMP implementation supervision	5 <i>(3 marks- ESIA/EA reports development for irrigation related projects (loose 1 mark for every year not achieved) (2 marks-ESMP Implementation supervision (loose 1 mark for every year not achieved)</i>
Total Score				25 marks

The Bidder shall provide details of the proposed personnel and their experience records in the relevant Forms included in Section IV, Bidding Forms.

2.6 Financial Situation

S/no.	Description	Our Requirement	Tender Reference	Weighted Score
6	Historical Financial Performance	<p>Audited financial statement for the last three years 2024, 2023 and 2022 demonstrating</p> <p>(a) Three years' average turnover of 50 million and above</p> <p>(b) Letter of credit worthiness from a reputable bank of Ksh 100 million and above</p> <p>(c) Positive cash flow</p> <p>(d) asset base of not less than 20 million</p> <p>Prepare signed and stamped by licensed practitioner (attach valid ICPAK membership license)</p>	2.3.1	<p>20 Marks</p> <p><i>(4 marks for each turn over statements)</i></p> <p><i>(4 marks for Letter of credit worthiness)</i></p> <p><i>(2marks for cash flow)</i></p> <p><i>(2 marks asset base)</i></p>
8	Financial Resources	<p>The Bidder must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet:</p> <p>(i) the following cash-flow requirement:</p> <p style="padding-left: 40px;">Current ratio = <u>Liquid Assets</u></p> <p style="padding-left: 80px;">Liquid liabilities Greater than 1</p> <p>and</p> <p style="padding-left: 40px;">Debt Ratio = <u>Total Debt</u></p> <p style="padding-left: 80px;">Total Assets Less than 1</p> <p>and</p> <p>(ii) the overall cash flow requirements for this contract and its current commitments.</p>	2.3.3.	<p>12 Marks</p> <p><i>(4 marks for Current ratio greater than 1)</i></p> <p><i>(4 marks for Debt ratio less than 1)</i></p> <p><i>(4 marks for proof/ statement that bidder has the overall cash flow requirements for this contract and its current requirements)</i></p>

Total Score	32 Marks
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2.7 Experience

S/no.	Description	Our Requirement	Tender Reference	Weighted Score
9	General Experience	Experience under contracts in the role of contractor, subcontractor, or management contractor for at least two (2) completed within the last five [5] years prior to the applications submission deadline	2.4.1	6 Marks <i>(3 marks for each that qualify)</i>
10	Specific Experience	(a) Participation as the contractor, management contractor, or subcontractor, in at least three (3) Water, irrigation, or civil works Contracts within the last six (6) years , each with a value of at least fifty million (KES 50 Million), that have been successfully completed and that are similar to the proposed Works. The similarity shall be based on the physical size, complexity, methods/technology, or other characteristics as described in Section VI, Requirements.	2.4.2	6 Marks <i>(2 marks for each that qualify)</i>
		b) For the above or other contracts executed during the period stipulated in 2.4.2(a) above, a minimum experience in the following key activities: 1. Intake works on a permanent river. 2. Pipe installation works especially in HDPE /GI or uPVC. 3. Water spillway excavation and stabilization. 4. Water draw-off system installation 5. Plumbing works. 6. Concrete/Masonry works	2.3.3.	6 Marks <i>(1 marks for each activity)</i>
Total Score				18 Marks

2.8 Equipment

The Bidder must demonstrate that it will have access to the key Contractor's equipment listed hereafter: (attach ownership documents / hire agreement)

S/no.	Description	Minimum (Rating/capacity)	Minimum Quantity Required	Weighted Score
11	Van or Utility vehicle	1 tonne	1	2 Marks
12	Excavator	1.0 m ³	1	4 Marks
13	Concrete mixer	1 m ³	2	2Marks
14	Dewatering Pumps	100 mm dia. Delivery	1	1 Marks
15	Concrete Vibrators (poker)	3 KVA (Output)	2	1 Marks
16	Generator	9 - 10 kw	1	3 Marks
17	Butt Fusion Machine	8.7KW – pipe Welding range upto 450mm	1	4 Marks
18	Micro Tunnelling Boring Machine (MTBM)	Excavation Diameter of 2 – 4m	1	4 Marks
19	Survey Equipment	Total Station with all the Accessories (or superior survey equipment)	1	4 Marks
Total Score				25 Marks

Technical Qualification

Bidders will be evaluated based on the above criteria and ranked based on their scores out of 100 marks. The pass mark for technical qualification is 80 marks

Commercial Evaluation

The commercial evaluation and final ranking of the bids will take into consideration the scope of the works in relation to the financial proposal and other pertinent terms and conditions of tender.

The evaluation committee will determine whether the financial proposals are complete. The cost of items not priced shall be assumed to be included in other costs in the proposal. In all cases, the total price of the financial proposal as submitted shall prevail.

Bids will be ranked and the lowest evaluated bid with the highest score shall be recommended for award.

Post Qualification

The Employer may use this to determine whether the bidder who submitted the lowest evaluated responsive bid is qualified to perform the contract effectively in accordance with Section 83 of the *Public Procurement and Asset Disposal Act, 2015* and Regulation 80 of the *Public Procurement and Asset Disposal Regulations, 2020*

Negotiations

The lowest evaluated bidder may be invited for best and final offer.

Contract Award

The contract will be awarded to the lowest evaluated bidder after negotiations.

Section IV. Bidding Forms

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FORM OF TENDER

Date

Tender No.....

To:
[Name and address of procuring entity]

Gentlemen and/or Ladies:

1. Having examined the tender documents, including Addenda Nos. [Insert numbers]. the receipt of which is hereby duly acknowledged, we, the undersigned, offer to supply deliver, install and commission (..... (Insert equipment description) in conformity with the said tender documents for the sum of (total tender amount in words and figures) or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Tender.

2. We undertake, if our Tender is accepted, to deliver, install and commission the equipment in accordance with the delivery schedule specified in the Schedule of Requirements.

3. If our Tender is accepted, we will obtain the guarantee of a bank in a sum of equivalent to the percent of the Contract Price for the due performance of the Contract, in the form prescribed by(Procuring entity).

4. We agree to abide by this Tender for a period of [Number] days from the date fixed for tender opening of the Instructions to tenderers, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

5. This Tender, together with your written acceptance thereof and your notification of award, shall constitute a Contract, between us. Subject to signing of the Contract by the parties.

6. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this day of
..... month..... year.....
[Signature] [In the capacity of]
Duly authorized to sign tender for and on behalf of.....

CONFIDENTIAL BUSINESS QUESTIONNAIRE FORM

You are requested to give the particulars indicated in Part 1 and either Part 2(a), 2(b) or 2 (c), whichever applied to your type of business

You are advised that it is a serious offence to give false information on this form

Part 1 – General:

Business Name
Location of business premises.
Plot No..... Street/Road
Postal Address Tel No. FaxE mail
.....
Nature of Business
Registration Certificate No.
Maximum value of business which you can handle at any one time – Kshs.
Name of your bankers Branch

Part 2 (a) – Sole Proprietor

Your name in full Age
Nationality Country of origin
• Citizenship details

Part 2 (b) Partnership

Given details of partners as follows:

Name Nationality Citizenship Details Shares
1.
2.
3.
4.

Part 2 (c) – Registered Company

Private or Public

.....

State the nominal and issued capital of company-

Nominal Kshs.

Issued Kshs...

Given details of all directors as follows

Name Nationality Citizenship Details Shares
1.....
2.....
3.....
4.....
5.....

Date Signature of Candidate

If a Kenya Citizen, indicate under “Citizenship Details” whether by Birth, Naturalization or Registration.

Bill of Quantities/Schedules of Prices

GRAND SUMMARY OF BILLS

Bill No.	Description	Total Amount
1	Preliminaries and Generals	
2	Intake Works	
2_1	Intake chamber and fittings	
3	Sedimentation Basin (SB)	
4	Conveyance bill	
5	ML1 & ML1P	
6	ML2 & ML2-P	
7	Sub-mains (SM1, SM1-L2, SM5-ML2, SM2-ML2, SM4-ML2, SM3-ML2)	
8	Feeders (F2-SM1-1, M2-F1, M2-F1-P, F2-SM1-P, F1-SM1-2, ML2-F2, ML2-F1)	
	Sub-total	
	Contingency (5% of sub-total)	
	Contractual fee (3% of sub-total)	
	Grand Total	

Bill No. 1: P & G

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (Kshs)
1.1	Contractual Requirements				
1.1.1	Allow for Mobilization and Demobilization	LS	1		
1.1.2	Insurance of Works	LS	1		
1.1.3	Third Party Insurance	LS	1		
1.1.4	Insurance of Workmen	LS	1		
1.2	Stamp Charges				
1.2.1	The contractor shall allow for the payment of all stamp charges in connection with the contract agreement	LS	1		
1.3	Water				
	All water shall be fresh, clean and pure free from earthly vegetable or organic matter, acid or alkaline substance in solution or suspension. The contractor shall provide at his own risk and cost all water for use in connection with the works, including the work of sub-contractors, make arrangements with the relevant authorities for the instalation of a separate meter or permit for all water used by him throughout the contract period, provide temporary storage, pipings etc, as he may deem necessary for the completion of the works.				

1.3.1	Provide for and ensure connection to local water supply (Provider) for portable water for use by the workers on site during the contract period. The rate to include for the service meter and connection fee	No	1		
1.3.2	Provide for monthly water bills to the water service provider for the amount of water consumed during the contract period	Months	8		
1.4	Temporary works, offices, and sheds				
	The contractor shall erect and maintain temporary office accommodation for his use and ample temporary water tight sheds for the proper storage of materials and for use of artisans including removal when ordered. Floors, sheds shall be at least 150mm above ground level.	LS	1		
1.5	Sanitation				
	The contractor shall provide the necessary latrine for staff and workmen to the requirements and satisfaction of the health authorities and maintain the same in a thorough clean and sanitary condition and pay all consrvancy fees during the period of the works and remove when no longer required.				
1.5.1	Provide for two eco-toilets (for use by gents and ladies separately) at the intake works for use by the workers during the construction phase. The facility to be demolished upon completion of works.	No	2		

	Rates to include for mobilization and demobilization at the intake and professional disposal of the waste to the satisfaction of the Project Manager				
1.5.2	Provide for eco-toilets along the pipe lines for use by workers during the construction phase. Rates to include for mobilization and demobilization and movement along the pipelines and professional disposal of the waste to the satisfaction of the Project Manager	No	2		
1.6	Security				
	The contractor must take all precautions necessary for the safe custody of the works, material, and public and employers' property on site.				
1.6.1	Provide for security of materials and equipment's on camp site and at the various active working points in collaboration to the local security establishment as outlined in the security management plan. Rates to include for wages to watchmen as required, security lights and the gear to the watchmen	Months	8		
1.70	Concrete Strength Tests				
1.7.1	Provisional Sum for additional concrete tests, as directed by the Resident Engineer	Prov. Sum	1		
1.7.2	Contractor's mark-up for profit and overheads in respect to Item 1.7.1	%	8%		
1.80	Training (<i>refer to O&M Training guide attached</i>)				
1.8.1	Farmers training on Project O&M	Prov. Sum	1		

1.8.2	Contractor's mark-up for profit and overheads in respect to Items 1.8.1	%	8%		
1.9	Signboards				
	Provision, erection and maintenance of project signboards in accordance with Clause 102 of the general and specifications.	No.	3		
1.10	Project Operation				
1.10.1	Allow provisional sum for preparation of operation and maintenance manual	Prov. Sum	1		
1.10.2	Operate completed project for 14 days prior to handing over including all costs	Days	14		
1.11	Environmental and Social Management Plan (ESMP) Implementation (See attached ESMP Guide below the BoQ)				
1.11.1	Provisional sum for Contractor ESMP implementation.	Prov. Sum	1		
TOTAL CARRIED OVER TO GRAND SUMMARY					

Bill No. 2 - INTAKE WORKS

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (KShs)
2.1	SITE CLEARANCE AND SETTING OUT				
2.1.1	Clear site of all trees (less than 500 mm diameter), bushes, shrubs, etc and dispose as specified with respect to weir and intake locations	m2	32		
2.1.2	Removal of trees of girth greater than 1500 mm (provisional)	No.	5		
2.2	RIVER DIVERSION/ACCESS TO INTAKE SITE				
2.2.1	Provide for river diversion works and/or coffer dam. Price to include for all labor, materials and superintendence during the construction period, and reinstatement at the end.	Lump Sum	1		
2.2.2	Provide access road to site and temporary camp/storage area at intake.	Sum	1		
2.3	EXCAVATION/EARTHWORKS				
	To include for all bush clearing, trimming to levels, backfilling with approved selected spoil, compacting, disposal of surplus material and reinstatement.				
2.3.1	In rock to take weir and wing-walls to depth n.e 3.0 m and form sections as specified.	m3	50		

2.3.2	Ditto for intake chamber	m3	25.00		
2.3.3	In normal material under wing walls, chambers, retaining walls	m3	7.00		
2.4	CONCRETE WORKS				
	Provide, place and treat the following concrete mixes including all form-work.				
2.4.1	RC concrete grade 25/20 to weir body and intake chamber	m3	41.00		
2.4.2	Ditto in weir retaining and wing walls (including base)	m3	10.00		
2.4.3	Ditto for separating wall (for sluiceway) and base	m3	7.00		
2.4.4	Ditto for breast wall and aprons	m3	27.00		
2.4.5	Ditto for deck slabs as shown	m3	2.00		
2.4.6	Ditto for offtake pipe supports (anchor blocks) and weir key	m3	9.00		
2.4.7	Blinding concrete grade 15/40, 75 mm thick to weir body, intake chambers, retaining walls and wing walls	m3	26.00		
2.5	Reinforcement				
	Provide support and fix the following reinforcement, including all cutting, bending and supports for weir body, floors, walls, slabs, etc as shown in the drawings				
2.5.1	High yield bars - TMT diameter 12mm	Kg	2,405.00		

2.5.2	High yield bars - TMT diameter 10mm	Kg	3,191.00		
2.6	PROTECTION WORKS				
2.6.1	Provide all materials, lay and place mass concrete grade 25/20 on the downstream apron of the weir. Thickness not exceeding 0.5m	m3	24		
2.6.2	Supply and install galvanized steel trash rack complete with all fixing ironmongery to intake as specified.	No.	1		
2.6.3	100x100x10 mild steel angle with 300 mm long 120 mm mild steel tangs welded at 500 mm c/c and cast into concrete at crest of weir as shown in the drawing.	sum	1		
2.6.4	Supply and install metal slide gate to intake chamber as shown	No.	1		
2.6.5	Supply and install galvanized sluice gate to sluiceway as specified / shown in the drawings	No.	1		
2.6.6	Supply and install 1200x1500mm Screen (30mm c/c) at inlet of main pipe	No	2		
2.6.7	Provide and install MS cover plate complete with frames/hinges/lockable steel cover (G-16) 600mm x 600mm	Sum	2		
2.6.8	Scour pipes dia 200mm x 4.0 m long GI pipe (weir body)	No.	2		
	TOTAL CARRIED OVER TO GRAND SUMMARY				

Bill No. 2_1 - INTAKE CHAMBER

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (KShs)
2_1	SITE CLEARANCE AND SETTING OUT				
2_1.1	Clear site of all trees (less than 500 mm diameter), bushes, shrubs, etc and dispose as specified with respect to weir and intake locations	m2	4		
2_1.2	Removal of trees of girth greater than 1500 mm (provisional)	No.	3		
2_3	EXCAVATION/EARTHWORKS				
	To include for all bush clearing, trimming to levels, backfilling with approved selected spoil, compacting, disposal of surplus material and reinstatement.				
2_3.1	In rock to take weir and wing-walls to depth n.e 0.5 m and form sections as specified.	m3	2		
2_3.3	In normal material to a depth not exceeding 1.5m	m3	6.00		
2_4	CONCRETE WORKS				
	Provide, place and treat the following concrete mixes including all form-work.				

2_4.1	RC concrete grade 25/20 to the base of chamber and walls	m3	5.00		
2_5	Reinforcement				
	Provide support and fix the following reinforcement, including all cutting, bending and supports for the walls				
2_5.1	High yield bars - TMT diameter 12mm	Kg	49.00		
2_5.2	High yield bars - TMT diameter 10mm	Kg	34.00		
2_7	INTAKE CHAMBER PIPEWORK AND FITTINGS				
	Provide, handle, install and test the following steel pipes and fittings, valves and specials. Rates shall include for completion and pipe protection at all pipe joints as specified in specifications and drawings				
2_7.1	Dia 250 mm GI 22.5 deg double flanged elbow (short radius bend)	No.	1		
2_7.2	Dia 250 mm x 0.4m length double flanged spigot pipe	No.	1		
2_7.3	250 mm dia double flanged sluice valve	No	1		
2_7.4	Scour pipes dia 200 mm x 4.5 m long GI pipe, single flanged	No.	3		
2_7.5	65 mm dia.,0.5m long GI pipe for intake chamber scour	No.	2		
2_7.6	200mm dia meter sluice valve, double	No	3		

	flanged for te scour pipes				
2_7.7	120mm double flaged spigot pipe,0.5m long for domestic water supply as shown in the drawing	No	1		
2_7.8	120mm diameter long radius steel elbow steel, double flanged	No	1		
2_8	Miscellaneous				
2_8.1	Provide treated hardwood stoplogs to Sluiceway as shown	No.	15		
2_8.2	Supply and install cast in step irons (high tensile 16 mm dia) as shown in the drawings	m	40		
2_8.3	Provision for guardrails 25mm dia GI pipe	m	80		
	TOTAL CARRIED OVER TO GRAND SUMMARY				

Bill No. 3 - SEDIMENTATION TANK

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (KShs)
3.1	EXCAVATION				
	To include for all trimming to levels, backfilling with approved selected spoil, compacting, disposal of surplus material and reinstatement for sedimentation basin, drainage chambers and washout structure.				
3.1.1	Strip topsoil average 200 mm and dispose	m2	325		
3.1.2	In normal soil (material) to a depth not exceeding 3.0	m3	195		
3.1.3	E.O. for excavation in rock (provisional).	m3	20		
3.1.4	Backfilling and disposal of soil material	m3	150		
3.2	CONCRETE WORKS				
3.2.1	Provide, place and treat the following concrete mix including all form work.				
3.2.2	Blinding concrete grade 15/40 - 75 mm thick	m3	13		
3.2.3	Reinforced concrete grade 25/20 as shown on drawings	m3	65		
3.2.4	Form work for structures and blinding concrete	m2	338		
3.3	REINFORCEMENT				

3.3.1	Provide, support and fix the following high tensile ribbed reinforcement, including all cutting, bending and supports.				
3.3.2	High yield bars TMT 12	kg	3,120		
3.3.3	High yield bars TMT 10	kg	2,080		
3.3.4	High yield bars TMT8	Kg	36		
	Inlet and Outlet Pipe work and Fittings				
	The rates inserted should cover supplying of fittings including all jointing accessories, handling, fixing, jointing and testing and painting the fittings with primer and gloss paints to resist corrosion. All fittings to be capable of operating at a minimum pressure of 60m				
3.4	Inlet Chamber				
3.4.1	Dia 250 mm Ductile Iron/GI/Steel 45/90 deg double flanged elbow (short radius bend)	No.	2		
3.4.2	Dia 250 mm double flanged spigot pipe x 0.5 m long,with puddle flange	No.	1		
3.5	Outlet Chamber				
3.5.1	Dia 250 mm Ductile Iron/GI/Steel 90 deg double flanged bend (long radius bend)	No.	2		
3.5.2	Dia 250 x 250 mm Ms flanged bell mouth	No.	1		
3.5.3	Dia 250 mm double flanged spigot pipe x 0.5 m length	No.	3		

3.5.4	Dia 250 mm Sluice valve	No.	1		
3.5.5	Dia 250 mm dia HDPE Flange Adaptor	No.	2		
3.5.6	Provision for saddle clamp with 50mm dia HDPE pipe (2m long) air vent to outlet pipe after offtake sluice valve	No.	1		
3.6	Scouring Chamber Piping				
3.6.1	Dia 200 mm butterfly valve.	No	1		
3.6.2	Dia 200 mm flanged adaptor	No.	1		
3.6.3	Dia 200 mm HDPE pipe	m	15		
3.6.4	Supply and Install Manhole covers as shown	No.	1		
3.7	Sedimentation Basin Cover				
3.7.1	Provide and install MS cover plate complete with frames/hinges/locks as shown in the drawings and directed by the Engineer	Sum	8		
3.8	Offtake chamber				
3.8.1	Excavate for , provide all materials and construct complete master meter chamber,1500x1500x1200mm, as specified/shown in the drawings. Rates to include for all thrust blocks, lockable covers, pipe supports,steps etc.	No.	1		

	Provide, handle, install and test GI pipes and fittings, valves and specials to water meter chamber, rates to include completion of all joints as specified. All fittings to be painted with primer and gloss paints to resist corrosion to the satisfaction of the Project Manager				
3.8.2	Water Master meter to fit 630 mm dia pipe capable of operating at a minimum pressure of 60m and should be capable of providing real-time pressure data and volumetric flows	No.	1		
3.9	Miscellaneous				
3.9.1	Provision for guardrails 38mm dia GI pipe	m	150		
3.9.2	Provision for 16mm dia mild steel steps to SB as shown in the drg.	m	40		
	TOTAL CARRIED OVER TO GRAND SUMMARY				

Bill No. 4: CONVEYANCE PIPELINE

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (KShs)
4.1	Excavation and Backfilling				
	Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations with the specifications.				
4.1.1	Excavation and backfilling in trench normal material for Dia 450mm pipe for depth not exceeding 2.2 m	m3	367		
4.1.2	E.O for excavation in soft rock (provisional)	m3	37		
4.1.3	E.O for excavation in hard rock (provisional)	m3	18		
4.2	Pipework				
	Provide, lay, install and test the following PE100 (High Density Polyethylene - HDPE) pipes and fittings. Rates to include for all jointly materials, cutting wastage.				
	Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to ISO4427-2:2007 PE 100 Pipes.				
	Class	Working Pressure (m)			
	PN6	60			
	PN8	80			
	PN10	100			

	PN12	120			
	HDPE PE100 Pipes				
	Class PN6				
4.2.1	250mm diameter	m	2,352		
	Connecting the existing pipe to the new intake works				
4.2.2	250mm dia , HDPE pipe, PN6	m	200		
4.2.3	250mm by 250mm dia HDPE and uPVC adaptor	No	1		
4.3	BLOCK CHAMBER (Section valve chambers)				
4.3.1	Excavate for, provide all materials and construct complete inspection valve chambers at the pipe junctions. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings. All fittings to be painted with primer and gloss paints to resist corrosion.	No.	5		
	1 No. Section Chamber at end of conveyance				
4.3.2	250mm flange adaptors	No	6		
4.3.3	250mm diameter flanges	No	6		
4.3.4	250mm diameter double flanged GI piece, 30cm long	No	6		
4.3.5	200mm diameter flanged sluice valve capable of standing a mininum operating pressure of 60m	No	1		

4.3.6	250mm x 250mm x 90mm Tee complete with flanges	No	2		
4.3.7	250mm x 250mm x 160mm T	No	1		
4.3.8	250mm x 250mm x 200mm T	No	1		
4.3.9	90mm dia double flanged sluice valve capable of operating at a minimum pressure of 60m	No	1		
4.4	AIR VALVES				
4.4.1	Excavate for, provide all materials and construct complete air valve chambers. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings.	No.	2		
	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be properly painted with primer and gloss paints to resist corrosion				
	2 No. Double Air Valves (DAV) at specified Chainages in the drawings				
4.4.2	250mm x 50mm dia saddle clamp	No	2		
4.4.3	50mm dia, 0.3 m long double flanged GI pipe	No.	4		
4.4.4	50mm Double air valve capable of withstanding 60m of operating pressure	No.	2		
4.4.5	50mm diameter couplers	No	2		
4.5	WASHOUTS (W/O)				

4.5.1	Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1200 x 1200 x 1200 mm. Rates to including thrust blocks, pipe supports as shown in the drawings.	No.	2		
	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be properly painted with prime and gloss paints to avoid corrosion				
	5 No. Washouts (W/Os) at specified chainages in the drawings				
4.5.2	250 x 110mm dia underscour saddle clamp	No	2		
4.5.3	110 mm dia HDPE elbow	No.	4		
4.5.4	110 mm HDPE pipe Class PN8	m	60		
4.5.5	110 x 110mm dia HDPE flanged adapter	No	8		
4.5.6	110 mm dia Flanges	No	8		
4.5.7	100mm dia sluice valve capable of operating at 60m of operating pressures	No.	2		
4.5.8	100mm GI pipe 500 mm long with a flap valve	No.	2		
4.6	ROAD CROSSING FOR PIPES at chainage 3906				

	Provide for road crossings as per drawings and in accordance with specifications. Rates to include for excavation and backfilling, culvert, concrete surround and all jointing materials and other fittings as per the specifications.				
4.6.1	Excavate for the road crossing to take pipe, 350mm dia, culvert rings and concrete surround reinforced with BRC class A to a depth not exceeding 2m	m3	20		
4.6.2	Provide, lay and join culvert rings across the road	m	9		
4.6.3	Provide lay join HDPE pipes across the road inside the culverts as specified in the profiles	m	12		
4.6.4	Provide concrete 25/20 to surround the entire road crossing to cover all the culverts	m3	4		
4.6.5	Provide and install BRC, A142 to reinforce the above concrete	m2	5		
4.6.6	Allow for micro tunnelling and associated costs	Ls	1		
4.7	Pipeline Anchoring				
	Provide anchor for pipeline at specified intervals of 20m complete with bolts and steel strips as directed by the engineer				
	Provide, place and test the following concrete:				
4.7.1	grade 20/20 reinforced concrete	m3	30		
4.7.2	bolts and nuts, size 19mm or above, four bolts and nuts per pier	No	200		

4.8	Master meters to the two systems				
4.8.1	provide, fix and install master meters, 250mm diameter double flanged	No	2		
4.8.2	Provide, fix and test GI double flanged spigot, 0.4m long	No	4		
4.8.3	Provide, fit and test two HDPE flanged adaptors	No	5		
4.9	Sluice valves				
4.9.1	provide, fix and install sluice valves, 250mm diameter double flanged	No	2		
4.9.2	Provide, fix and test GI double flanged spigot, 0.4m long	No	4		
4.9.3	Provide, fit and test two HDPE flanged adaptors	No	4		
5.0	Marker Posts				
5.1	Excavate for include for supply and fixing of indicator posts for water main route, road crossings, change of direction, air valves, washouts, and valve chambers.	No.	16		
	TOTAL CARRIED OVER TO GRAND SUMMARY				-

5.2.5	90mm dia	m	1,507		
5.2.6	75mm dia	m	596		
5.2.7	63mm dia	m	1,633		
5.2.8	32mm dia	m	761		
5.2.9	20mm dia	m	133		
5.2.9	20mm end caps	No	2		
5.2.10	63mm end caps	No	2		
	HDPE Reducers, Nipples, valves and Tees				
5.2.11	180mm x 110mm	No	1		
5.2.12	110mm x 90mm	No	1		
5.2.13	90mm x 75mm	No	1		
5.2.14	90mm x 63mm	No	11		
5.2.15	63mm x 32mm	No	1		
5.2.16	32mm x 20mm	No	1		
5.2.17	63mm dia Hex nipple	No	20		
5.2.18	63mm dia Gate valves	No	12		
5.2.18	75mm dia HDPE Ts	No	10		
5.3	BLOCK CHAMBER (Section valve chambers)				

5.3.1	Excavate for, provide all materials and construct complete inspection valve chambers at the pipe junctions. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings. All fittings to be painted in primer and gloss paints to withstand corrosion. Valves and gates to withstand mininum operating pressure of 60m	No.	3		
	3 No. Section Chamber at end of conveyance. All fittings to be capable of operating at a mininum pressure of 60m and to be painted in primer and gloss paints to withstand corrosion				
5.3.2	180mm flange adaptors	No	6		
5.3.3	180mm x 180mm x 110mm T, complete with flanges	No	1		
5.3.4	180mm diameter double flanged GI piece, 30cm long	No	1		
5.3.5	250mm diameter flanged sluice valve	No	1		
5.3.6	90mm dia double flanged reducers	No	6		
5.3.7	90mm dia GI spigot, double flanged	No	6		
5.3.8	90mm dia double flanged sluice valve	No	3		
5.3.9	160 x 160 x 110mm all flanged Tee	No	2		
5.3.10	110mm dia flanged gate valve	No	1		
5.3.11	140mm x 140mm x 90mm Tee	No	2		
5.3.12	90mm dia double flanged Sluice valve	No	2		
5.4	AIR VALVES				
5.4.1	Excavate for, provide all materials and construct complete air valve chambers. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings.	No.	4		

	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification . All fittings to be capable of operating at a minimum pressure of 60m and to be painted in primer and gloss paints to resist corrosion				
	4 No. Double Air Valves (DAV) at specified Chainages in the drawings				
5.4.2	180mm x 50mm dia saddle clamp	No	4		
5.4.3	50mm dia, 0.3 m long double flanged GI pipe	No.	8		
5.4.4	50mm Double air valve	No.	8		
5.4.5	50mm diameter couplers	No	4		
5.5	WASHOUTS (W/O)				
5.5.1	Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1200 x 1200 x 1200 mm. Rates to including thrust blocks, pipe supports as shown in the drawings.	No.	4		
	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be capable of operating at a minimum pressure of 60m and to be painted in primer and gloss paints to withstand corrosion.				
	4 No. Washouts (W/Os) at specified chainages in the drawings				
5.5.2	180 x 90mm dia underscour saddle clamp	No	4		
5.5.3	90 mm dia HDPE elbow	No.	8		
5.5.4	90 mm HDPE pipe Class PN8	m	60		
5.5.5	110 x 90mm dia HDPE flanged adapter	No	8		
5.5.6	180 mm dia Flanges	No	8		
5.5.7	180mm dia sluice valve	No.	4		

5.5.8	180mm GI pipe 500 mm long with a flap valve	No.	4		
5.7	ROAD CROSSING FOR PIPES				
	Provide for road crossings as per drawings and in accordance with specifications. Rates to include for excavation and backfilling, culvert, concrete surround and all jointing materials and other fittings as per the specifications.				
5.7.1	Excavate for the road crossing to take specified pipe dia, culvert rings and concrete surround reinforced with BRC class A to a depth not exceeding 2m	m3	20		
5.7.2	Provide, lay and join culvert rings across the road	m	9		
5.7.3	Provide lay join HDPE pipes across the road inside the culverts as specified in the profiles	m	12		
5.7.4	Provide concrete 25/20 to surround the entire road crossing to cover all the culverts	m3	4		
5.7.5	Provide and install BRC, A142 to reinforce the above concrete	m2	5		
5.7.6	Provide for micro tunnelling and fixing of culverts across the road	No.	2		
5.8	Pipeline Anchoring				
	Provide anchor for pipeline at specified intervals of 20m complete with bolts and steel strips as directed by the engineer				
	Provide, place and test the following concrete:				
5.8.1	reinforced concrete, grade 20/20	m3	25		
5.8.2	bolts and nuts, size 19mm or above, four bolts and nuts per pier	No	200		
5.9	Marker Posts				

5.9.1	Excavate for include for supply and fixing of indicator posts for water main route, road crossings, change of direction, air valves, washouts, and valve chambers.	No.	59		
	TOTAL CARRIED OVER TO GRAND SUMMARY				

Bill No. 6: ML2 &ML2-P

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (KShs)
6.1	Excavation and Backfilling				
	Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations with the specifications.				
6.1.1	Excavation and backfilling in trench normal material for Dia 280mm pipe for depth not exceeding 2.2 m	m3	3,144		
6.1.2	E.O for excavation in soft rock (provisional)	m3	314		
6.1.3	E.O for excavation in hard rock (provisional)	m3	157		
6.2	Pipework				
	Provide, lay, install and test the following PE100 (High Density Polyethylene - HDPE) pipes and fittings. Rates to include for all jointly materials, cutting wastage.				

	Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to ISO4427-2:2007 PE 100 Pipes.				
	Class	Working Pressure (m)			
	PN8	80			
	PN10	100			
	PN12	120			
	HDPE PE100 Pipes				
	Class PN6				
6.2.4	110mm dia		M	606	
6.2.5	90mm dia		M	1,745	
6.2.6	75mm dia		M	1,012	
6.2.7	50mm dia		M	1,307	

6.2.8	40mm dia	M	570		
6.2.8	40mm dia end cap	No	4		
	HDPE reducers				
6.2.9	110mm x 90mm	No	1		
6.2.10	90mm x 75mm	No	2		
6.2.11	50mm x 40mm	No	1		
6.2.12	32mm x 20mm	No	1		
6.2.13	50mm dia Hex nipple	No	6		
6.2.14	50mm dia Gate valves	No	6		
6.2.15	50mm dia HDPE Ts	No	6		
6.3	BLOCK CHAMBER (Section valve chambers)				

6.3.1	Excavate for, provide all materials and construct complete inspection valve chambers at the pipe junctions. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings. All fittings to be capable of withstanding a mininum operating pressure of 60m and to be painted in primer and gloss paints to resist corrosion.	No.	3		
	3 No. Section Chamber at end of conveyance				
6.3.2	110mm flange adaptors	No	3		
6.3.3	110mm x 110mm x 180mm T, complete with flanges	No	1		
6.3.4	110mm diameter double flanged GI piece, 30cm long	No	1		
6.3.5	110mm diameter flanged sluice valve	No	1		
6.3.6	90mm dia double flanged reducers	No	6		
6.3.7	90mm dia GI spigot, double flanged	No	6		
6.3.8	90mm dia double flanged sluice valve	No	3		

6.3.9	90 x 90 x 110mm all flanged Tee	No	2		
6.3.10	110mm dia flanged gate valve	No	1		
6.3.11	110mm x 110mm x 90mm Tee	No	2		
6.3.12	90mm dia double flanged Sluice valve	No	2		
6.4	AIR VALVES				
6.4.1	Excavate for, provide all materials and construct complete air valve chambers. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings.	No.	3		
	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be capable of withstanding a mininum pressure of 60m and to be painted in primer and gloss paints to withstand corrosion				
	3 No. Double Air Valves (DAV) at specified Chainages in the drawings				
6.4.2	110mm x 50mm dia saddle clamp	No	3		

6.4.3	50mm dia, 0.3 m long double flanged GI pipe	No.	6		
6.4.4	50mm Double air valve	No.	6		
6.4.5	50mm diameter couplers	No	3		
6.5	WASHOUTS (W/O)				
6.5.1	Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1200 x 1200 x 1200 mm. Rates to including thrust blocks, pipe supports as shown in the drawings.	No.	3		
	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be capable of operating at a minimum pressure of 60m and to be painted with primer and gloss paints to withstand corrosion.				
	3 No. Washouts (W/Os) at specified chainages in the drawings				
6.5.2	110 x 90mm dia underscour saddle clamp	No	3		
6.5.3	90 mm dia HDPE elbow	No.	6		
6.5.4	90 mm HDPE pipe Class PN8	M	60		

6.5.5	110 x 90mm dia HDPE flanged adapter	No	6		
6.5.6	110 mm dia Flanges	No	6		
6.5.7	110mm dia sluice valve	No.	4		
6.5.8	110mm GI pipe 500 mm long with a flap valve	No.	4		
6.6	ROAD CROSSING FOR PIPES				
	Provide for road crossings as per drawings and in accordance with specifications. Rates to include for excavation and backfilling, culvert, concrete surround and all jointing materials and other fittings as per the specifications.				
6.6.1	Excavate for the road crossing to take specified pipe dia, culvert rings and concrete surround reinforced with BRC class A to a depth not exceeding 2m	m3	20		
6.6.2	Provide, lay and join culvert rings across the road	M	9		
6.6.3	Provide lay join HDPE pipes across the road inside the culverts as specified in the profiles	M	12		

6.6.4	Provide concrete 25/20 to surround the entire road crossing to cover all the culverts	m3	4		
6.6.5	Provide and install BRC, A142 to reinforce the above concrete	m2	5		
6.6.6	Allow for micro tunneling and laying and fixing of culverts	Ls	1		
6.7	Pipeline Anchoring				
	Provide anchor for pipeline at specified intervals of 20m complete with bolts and steel strips as directed by the engineer				
	Provide, place and test the following concrete:				
6.7.1	reinforced concrete, grade 20/20	m3	25		
6.7.2	bolts and nuts, size 19mm or above, four bolts and nuts per pier	No	200		
6.8	Marker Posts				
6.8.1	Excavate for include for supply and fixing of indicator posts for water main route, road crossings, change of direction, air valves, washouts, and valve chambers.	No.	30		

	TOTAL CARRIED OVER TO GRAND SUMMARY				

Bill No. 7: Sub-mainlines (SM1, SM1-L2, SM5-ML2, SM2-ML2, SM4-ML2, SM3-ML2)

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (KShs)
7.1	Excavation and Backfilling				
	Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations with the specifications.				
7.1.1	Excavation and backfilling in trench normal material for Dia 110mm pipe for depth not exceeding 2.0 m	m3	1,643		
7.1.2	E.O for excavation in soft rock (provisional)	m3	164		
7.1.3	E.O for excavation in hard rock (provisional)	m3	82		
7.2	Pipework				
	Provide, lay, install and test the following PE100 (High Density Polyethylene - HDPE) pipes and fittings. Rates to include for all jointly materials, cutting wastage.				
	Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to ISO4427-2:2007 PE 100 Pipes.				
	Class Working Pressure (m)				
	PN6 60				
	PN8 80				
	PN10 100				

	PN12	120			
	HDPE PE100 Pipes				
	Class PN6				
7.2.1	110mm dia	m	101		
7.2.2	90mm dia	m	704		
7.2.3	75mm dia	m	1,934		
7.2.4	HDPE reducers				
7.2.5	110mm x 90mm	No	1		
7.2.6	90mm x 75mm	No	2		
7.3	BLOCK CHAMBER (Section valve chambers)				
7.3.1	Excavate for, provide all materials and construct complete inspection valve chambers at the pipe junctions. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings. All the fittings to be painted in primer and gloss paint and to be capable of withstanding a mininum operating pressure of 60m.		No.	6	
	3 No. Section Chamber at end of conveyance				
7.3.2	110mm flange adaptors	No	12		
7.3.3	110mm diameter flanges	No	12		
7.3.4	110mm diameter double flanged GI piece, 30cm long	No	12		
7.3.5	110 mm diameter flanged sluice valve	No	12		

7.3.6	90mm dia double flanged reducers	No	6		
7.3.7	90mm dia GI spigot, double flanged	No	6		
7.3.8	90mm dia double flanged sluice valve	No	3		
7.4	AIR VALVES				
7.4.1	Excavate for, provide all materials and construct complete air valve chambers. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks, pipe supports, inspection covers, etc as detailed in the drawings.	No.	12		
	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be capable of withstanding a minimum operating pressure of 60m and to be painted in primer and gloss paints to resist corrosion.				
	12 No. Double Air Valves (DAV) at specified Chainages in the drawings				
7.4.2	110mm x 50mm dia saddle clamp	No	12		
7.4.3	50mm dia, 0.3 m long double flanged GI pipe	No.	24		
7.4.4	50mm Double air valve	No.	12		
7.4.5	50mm diameter couplers	No	12		
7.5	WASHOUTS (W/O)				

7.5.1	Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1200 x 1200 x 1200 mm. Rates to including thrust blocks, pipe supports as shown in the drawings.	No.	4		
	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be capable of withstanding a minimum operating pressure of 60m and to be painted in primer and gloss paints to resist corrosion.				
	4 No. Washouts (W/Os) at specified chainages in the drawings				
7.5.2	110 x 90mm dia underscour saddle clamp	No	4		
7.5.3	90 mm dia HDPE elbow	No.	8		
7.5.4	90 mm HDPE pipe Class PN8	m	60		
7.5.5	110 x 90mm dia HDPE flanged adapter	No	8		
7.5.6	110 mm dia Flanges	No	8		
7.5.7	110mm dia sluice valve	No.	4		
7.5.8	110mm GI pipe 500 mm long with a flap valve	No.	4		
7.6	ROAD CROSSING FOR PIPES at chainage 3906				
	Provide for road crossings as per drawings and in accordance with specifications. Rates to include for excavation and backfilling, culvert, concrete surround and all jointing materials and other fittings as per the specifications.				

7.6.1	Excavate for the road crossing to take pipe, 350mm dia, culvert rings and concrete surround reinforced with BRC class A to a depth not exceeding 2m	m3	20		
7.6.2	Provide, lay and join culvert rings across the road	m	9		
7.6.3	Provide lay join HDPE pipes across the road inside the culverts as specified in the profiles	m	12		
7.6.4	Provide concrete 25/20 to surround the entire road crossing to cover all the culverts	m3	4		
7.6.5	Provide and install BRC, A142 to reinforce the above concrete	m2	5		
7.7	Pipeline Anchoring				
	Provide anchor for pipeline at specified intervals of 20m complete with bolts and steel strips as directed by the engineer				
	Provide, place and test the following concrete:				
7.7.1	reinforced concrete, grade 20/20	m3	25		
7.7.2	bolts and nuts, size 19mm or above, four bolts and nuts per pier	No	200		
7.8	Marker Posts				
7.8.1	Excavate for include for supply and fixing of indicator posts for water main route, road crossings, change of direction, air valves, washouts, and valve chambers.	No.	18		
TOTAL CARRIED OVER TO GRAND SUMMARY					

Bill No. 8: Feeders (F2-SM1-1, M2-F1, M2-F1-P, F2-SM1-P, F1-SM1-2, ML2-F2, ML2-F1)

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (KShs)
8.1	Excavation and Backfilling				
	Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations with the specifications.				
8.1.1	Excavation and backfilling in trench normal material for Dia 110mm pipe for depth not exceeding 2.0 m, excavation width not exceeding 0.4m	m3	1,981		
8.1.2	E.O for excavation in soft rock (provisional)	m3	198		
8.1.3	E.O for excavation in hard rock (provisional)	m3	99		
8.2	Pipework				
	Provide, lay, install and test the following PE100 (High Density Polyethylene - HDPE) pipes and fittings. Rates to include for all jointly materials, cutting wastage.				
	Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to ISO4427-2:2007 PE 100 Pipes.				
	Class	Working Pressure (m)			
	PN6	60			

	PN8	80			
	PN10	100			
	PN12	120			
	HDPE PE100 Pipes				
	Class PN6				
8.2.2	75mm dia	m		51	
8.2.4	50mm dia	m		293	
8.2.5	40mm dia	m		314	
8.2.6	32mm dia	m		1,780	
	HDPE Reducers				
8.2.7	75mm x 40mm dia				
		No		1	
8.3	BLOCK CHAMBER (Section valve chambers)				
8.3.1	Excavate for, provide all materials and construct complete inspection valve chambers at the pipe junctions. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks, pipe supports, inspection covers, etc as detailed in the drawings.		No.	10	
	3 No. Section Chamber at end of conveyance				
8.3.2	110mm flange adaptors		No	20	
8.3.3	110mm diameter flanges		No	20	
8.3.4	110mm diameter double flanged GI piece, 30cm long		No	20	
8.3.5	110 mm diameter flanged sluice valve		No	10	

8.3.6	90mm dia double flanged reducers	No	20		
8.3.7	90mm dia GI spigot, double flanged	No	20		
8.3.8	90mm dia double flanged sluice valve	No	10		
8.4	AIR VALVES				
8.4.1	Excavate for, provide all materials and construct complete air valve chambers. Internal dimensions 1200 x 1200 x 1200 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings.	No.	12		
	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be capable of withstanding a minimum pressure of 60m and to be painted in primer and gloss paints to resist corrosion.				
	12 No. Double Air Valves (DAV) at specified Chainages in the drawings				
8.4.2	75mm x 50mm dia saddle clamp	No	12		
8.4.3	50mm dia, 0.3 m long double flanged GI pipe	No.	24		
8.4.4	50mm Double air valve	No.	12		
8.4.5	50mm diameter couplers	No	12		
8.5	WASHOUTS (W/O)				
8.5.1	Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1200 x 1200 x 1200 mm. Rates to including thrust blocks, pipe supports as shown in the drawings.	No.	4		

	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be capable to withstand a minimum pressure of 60m and to be painted in primer and gloss paints to resist corrosion.				
	4 No. Washouts (W/Os) at specified chainages in the drawings				
8.5.2	75 x 50mm dia underscour saddle clamp	No	4		
8.5.3	50 mm dia HDPE elbow	No.	8		
8.5.4	50 mm HDPE pipe Class PN8	m	60		
8.5.5	75 x 50mm dia HDPE flanged adapter	No	8		
8.5.6	75 mm dia Flanges	No	8		
8.5.7	75mm dia sluice valve	No.	4		
8.5.8	75mm GI pipe 500 mm long with a flap valve	No.	4		
8.6	ROAD CROSSING FOR PIPES at chainage 3906				
	Provide for road crossings as per drawings and in accordance with specifications. Rates to include for excavation and backfilling, culvert, concrete surround and all jointing materials and other fittings as per the specifications.				
8.6.1	Excavate for the road crossing to take pipe, 350mm dia, culvert rings and concrete surround reinforced with BRC class A to a depth not exceeding 2m	m3	20		

8.6.2	Provide, lay and join culvert rings across the road	m	9		
8.6.3	Provide lay join HDPE pipes across the road inside the culverts as specified in the profiles	m	12		
8.6.4	Provide concrete 25/20 to surround the entire road crossing to cover all the culverts	m ³	4		
8.6.5	Provide and install BRC, A142 to reinforce the above concrete	m ²	5		
8.7	Pipeline Anchoring				
	Provide anchor for pipeline at specified intervals of 20m complete with bolts and steel strips as directed by the engineer				
	Provide, place and test the following concrete:				
8.7.1	grade 20/20	m ³	30		
8.7.2	bolts and nuts, size 19mm or above, four bolts and nuts per pier	No	200		
8.8	PRVS				
8.8.1	Excavate for, provide all materials and construct complete PRV chambers of internal dimensions 1200 x 1200 x 1200 mm. Rates to including thrust blocks, pipe supports as shown in the drawings.	No.	7		
	Provide, handle, install and test the following steel and HDPE pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification. All fittings to be capable of withstanding a minimum pressure of 60m and to be painted in primer and gloss paints to resist corrosion.				

8.8.2	75 mm dia HDPE Flange Adaptor	No	14		
8.8.3	75 mm dia Flanges	No	14		
8.8.4	75 mm dia flanged sluice Valve	No	7		
8.8.5	75 mm dia flanged pressure reducing valve	No.	7		
8.8.6	75mm dia HDPE Flange Adaptor	No	7		
8.8.7	75 mm dia Flanges	No	7		
8.8.8	75 mm dia flanged sluice Valve	No	7		
8.8.9	75 mm dia flanged pressure reducing valve	No.	7		
8.9	END CAPS				
8.9.1	32mm dia end caps	N0	3		
8.9.2	40mm dia	No	1		
TOTAL CARRIED OVER TO GRAND SUMMARY					

Environmental and Social Management and Monitoring Plan (ESMP) Guide

I. Construction Phase				
Aspect	Proposed Mitigation	Responsibility	Monitoring Indicator	Estimate Cost
Occupational Health and Safety	Maintain safe Labor and Working Conditions as per the ESS2 and OSH 2007 regulations	Contractor	Site registration certificate	
	Provide suitable and adequate personal protective equipment/clothing.		Work Place Incidence register	
	Install Occupational Health and safety signage at the site		Use of PPEs by workers	
	Provide First aid facilities at site		Environmental health and safety personnel at site	
	Provide sanitary facilities		Provide portable toilets.	
	Secure Areas under Excavation		Warning signage and ribbons.	
	Establish emergency response plan and evacuation procedures.		Establish assembly points, training and drills on preparedness. Emergency report	
	Register the site with DOSH		Certificate.	
	Employ a full time Environmental health and safety personnel at site.		A qualified personel engaged.	
	Insure the workers		Insurance Policy.	
Air quality/Particulate matter/Dust	Observe Air quality regulations and ESS3 to minimize project-related emissions.	Contractor	Establish Air quality and dust management plan.	
Solid Waste Management	Contract NEMA registered waste handler to facilitate waste handling, and disposal from the site.	Contractor	Effluent discharge license. Solid waste management plan	
Noise Pollution Control.	Construction works will be carried out only during the specified time of 0800hrs to 1700hrs.	Contractor	Comply with section 7 of EMCA (<i>Environment Management Coordination Act 1999</i>)	
Devegetation and Soil Erosion	Minimize exposed areas by properly demarcating the project area to be affected by the construction works through minimal de vegetation. Request for permission for a way leave and laying the water pipeline from farmers. -Engage Local and professional removal of vegetation waste through: -County waste collection and disposal services - Mulching: foliage parts, grass,	Contractor	Availability of Lease agreement mulching at farm level waste collection services rendered	

	and chipped branches will be used by farmers. - wood material to be collected and used as wood fuel by the farmers at the household level			
Gender Based Violence, Sexual Harassment, and Child Abuse/Exploitation	Develop and post information materials for stakeholders to indicate that the project and/area is a GBV/SEAH free zone,	Contractor	Communication materials available	
	Training of Project staff on GBV/SEAH		Training reports	
	Capacity building on GBV/SEAH Prevention and Awareness			
	The contractor and workers to sign and implement GBV/SEAH and Child Protection Code of Conduct		Prevention and awareness creation reports	
Grievance Mechanism	Grievance reporting and resolution		Grievance Manual register	
SUB-TOTAL				

O&M TRAINING GUIDE					
No	Activity	Number of trained	Duration	Resources Required	Facilitators
1	Training IWUA committee and Key collaborators	25	4 days	Stationaries, conference Hall, Allowances, Transport, Personnel	Irrigation engineer, Finance personell, ESS personell, Project manager, CIDU personell Contractor
2	Hands-on-Training O&M Sub-committee and recruited local plumbers	6	3 days	Stationaries, Allowances, Transport, Personnel	Irrigation engineer, Finance personell, ESS personell, Project manager, CIDU personell Contractor
3	Farmer Sensitization on Project operationalisation (Block based)	1,300	12 days	Stationaries, Allowances, Transport, Personnel	Irrigation engineer, Finance personell, ESS personell, Project manager, CIDU personell Contractor

Schedule of Adjustment Data

Table A - Local Currency

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Local Currency Amount	Bidder's Proposed Weighting
	Nonadjustable	—	—	—	A: _____ B: _____ C: _____ D: _____ E: _____
Total					1.00

Table B - Foreign Currency

Name of Currency: _____

If the Bidder wishes to quote in more than one foreign currency, this table should be repeated for each foreign currency.

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Currency in Type/Amount	Equivalent in FC1	Bidder's Proposed Weighting
	Nonadjustable	—	—	—		A: _____ B: _____ C: _____ D: _____ E: _____
Total						1.00

Summary of Payment Currencies

Table: Alternative A

For.....insert name of Section of the Works

Separate tables may be required if the various sections of the Works (or of the Bill of Quantities) will have substantially different foreign and local currency requirements. The Employer should insert the names of each Section of the Works.

	A	B	C	D
Name of Payment Currency	Amount of Currency	Rate of Exchange to Local Currency	Local Currency Equivalent $C = A \times B$	Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local currency _____		1.00		
Foreign Currency #1 _____				
Foreign Currency #2 _____				
Foreign Currency #3 _____				
Net Bid Price				100.00
Provisional Sums Expressed in Local Currency		1.00		
BID PRICE				

Table: Alternative B

To be used only with Alternative B Prices directly quoted in the currencies of payment.
(Clause **ITB** 15.1)

Summary of currencies of the bid for _____ [insert name of Section of the Works]

Name of currency	Amounts payable
Local currency: _____	
Foreign currency #1: _____	
Foreign currency #2: _____	
Foreign currency #3: _____	

Form of Bid Security (Bank Guarantee)

_____ [Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: _____ [Name and Address of Employer]

Date: _____

BID GUARANTEE No.: _____

We have been informed that _____ [name of the Bidder] (hereinafter called "the Bidder") has submitted to you its bid dated _____ (hereinafter called "the Bid") for the execution of _____ [name of contract] under Invitation for Bids No. _____ ("the IFB").

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Employer, we _____ [name of Bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of _____ [amount in figures] (_____) [amount in words] upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

- (a) has withdrawn its Bid during the period of bid validity specified by the Bidder in the Form of Bid; or
- (b) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Form, if required, or (ii) fails or refuses to furnish the performance security, in accordance with **ITB 38**.

This guarantee will expire: (a) if the Bidder is the successful Bidder, upon our receipt of copies of the contract signed by the Bidder and the performance security issued to you upon the instruction of the Bidder; and (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a copy your notification to the Bidder of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of the Bidder's bid.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

[signature(s)]

Form of Bid Security (Bid Bond)

BOND NO. _____

BY THIS BOND [name of Bidder] as Principal (hereinafter called “the Principal”), and [name, legal title, and address of surety], **authorized to transact business in** [name of country of Employer], as Surety (hereinafter called “the Surety”), are held and firmly bound unto [name of Employer] as Obligee (hereinafter called “the Employer”) in the sum of [amount of Bond]¹⁰ [amount in words], for the payment of which sum, well and truly to be made, we, the said Principal and Surety, bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has submitted a written Bid to the Employer dated the ___ day of _____, 20__, for the Rehabilitation and Expansion of [name of Contract] (hereinafter called the “Bid”).

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal:

- (a) withdraws its Bid during the period of bid validity specified in the Form of Bid; or
- (b) having been notified of the acceptance of its Bid by the Employer during the period of Bid validity; (i) fails or refuses to execute the Contract Form, if required; or (ii) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

then the Surety undertakes to immediately pay to the Employer up to the above amount upon receipt of the Employer’s first written demand, without the Employer having to substantiate its demand, provided that in its demand the Employer shall state that the demand arises from the occurrence of any of the above events, specifying which event(s) has occurred.

The Surety hereby agrees that its obligation will remain in full force and effect up to and including the thirty[30] days after the date of expiration of the Bid validity as stated in the Invitation to Bid or extended by the Employer at any time prior to this date, notice of which extension(s) to the Surety being hereby waived.

¹⁰ The amount of the Bond shall be denominated in the currency of the Employer’s country or the equivalent amount in a freely convertible currency.

IN TESTIMONY WHEREOF, the Principal and the Surety have caused these presents to be executed in their respective names this ____ day of _____ 20__.

Principal: _____

Surety: _____

Corporate Seal (where appropriate)

(Signature)

(Signature)

(Printed name and title)

(Printed name and title)

Form of Bid-Securing Declaration

Date: [insert date (as day, month and year)]

Bid No.: [insert number of bidding process]

Alternative No.: [insert identification No if this is a Bid for an alternative]

To: [insert complete name of Employer]

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding in any contract with the Borrower for the period of time of **[Employer to insert number of months or years]** starting on **[insert date]**, if we are in breach of our obligation(s) under the bid conditions, because we:

- (a) have withdrawn our Bid during the period of bid validity specified in the Letter of Bid; or
- (b) having been notified of the acceptance of our Bid by the Employer during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with **ITB 38**.

We understand this Bid-Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of our Bid.

Signed: [insert signature of person whose name and capacity are shown] In the capacity of [insert legal capacity of person signing the Bid-Securing Declaration]

Name: [insert complete name of person signing the Bid-Securing Declaration]

Duly authorized to sign the bid for and on behalf of: [insert complete name of Bidder]

Dated on _____ day of _____, _____ [insert date of signing]

Corporate Seal (where appropriate)

[Note: In case of a Joint Venture, the Bid-Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid.]

Technical Proposal

Technical Proposal Forms

Site Organization

Method Statement

Mobilization Schedule

Construction and Expansion Schedule

Contractor's Equipment

Personnel

Others

Site Organization

Method Statement

Mobilization Schedule

Construction and Expansion Schedule

Contractor's Equipment

Form EQU

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III, Evaluation and Qualification Criteria. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder. The Bidder shall provide all the information requested below, to the extent possible. Fields with asterisk (*) shall be used for evaluation.

Type of Equipment*	
Equipment Information	Name of manufacturer
	Capacity*
	Model and power rating
	Year of manufacture*
Current Status	Current location
	Details of current commitments
Source	Indicate source of the equipment <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> Specially manufactured

The following information shall be provided only for equipment not owned by the Bidder.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

Proposed Personnel

Form PER – 1

Bidders should provide the names of suitably qualified personnel to meet the specified requirements for each of the positions listed in Section III, Evaluation and Qualification Criteria. The data on their experience should be supplied using the Form below for each candidate.

1.	Title of position
	Name
2.	Title of position
	Name
3.	Title of position
	Name
4.	Title of position
	Name
5.	Title of position
	Name
6.	Title of position
	Name
etc.	Title of position
	Name

Others

Bidder's Qualification

To establish its qualifications to perform the contract in accordance with Section III, Evaluation and Qualification Criteria, the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.

Bidder Information Sheet

Form ELI - 1.1

Date: _____

Bidding No.: _____

Invitation for Bid No.: _____

Page _____ of _____ pages

1. Bidder's Legal Name
2. In case of Joint Venture, Consortium or Association (JVCA), legal name of each party:
3. Bidder's actual or intended Country of Registration:
4. Bidder's Year of Registration:
5. Bidder's Legal Address in Country of Registration:
6. Bidder's Authorized Representative Information Name: Address: Telephone/Fax numbers: Email Address:
7. Attached are copies of original documents of: <input type="checkbox"/> Articles of Incorporation or Registration of firm named in 1, above, in accordance with ITB Clauses 4.1 and 4.2. <input type="checkbox"/> In case of JVCA, letter of intent to form JVCA including a draft agreement, or JVCA agreement, in accordance with ITB Clause 4.1 <input type="checkbox"/> In case of government owned entity from the Employer's country, documents establishing legal and financial autonomy and compliance with the principles of commercial law, in accordance with ITB Clause 4.5.

Party to JVCA Information Sheet

Form ELI - 1.2

Date: _____
Bidding No.: _____
Invitation for Bid No.: _____
Page _____ of _____ pages

1. Bidder's Legal Name:
2. JVCA's Party legal name:
3. JVCA's Party Country of Registration:
4. JVCA's Party Year of Registration:
5. JVCA's Party Legal Address in Country of Registration:
6. JVCA's Party Authorized Representative Information Name: Address: Telephone/Fax numbers: Email Address:
7. Attached are copies of original documents of: <input type="checkbox"/> Articles of Incorporation or Registration of firm named in 1, above, in accordance with ITB Clauses 4.1 and 4.2. <input type="checkbox"/> In case of government owned entity from the Purchaser's country, documents establishing legal and financial autonomy and compliance with the principles of commercial law, in accordance with ITB Clause 4.5.

Historical Contract Non-Performance

Form CON – 2

Bidder's Legal Name: _____

Date: _____

JVCA Partner Legal Name: _____

Bidding No.: _____

Page _____ of _____ pages

Non-Performing Contracts in accordance with (Evaluation and Qualification Criteria)			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Contract non-performance did not occur during the stipulated period, in accordance with Sub-Factor 2.2.1 of Section III, Evaluation and Qualification Criteria.			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Contract non-performance during the stipulated period, in accordance with Sub-Factor 2.2.1 of Section III, Evaluation and Qualification Criteria.			
Year	Outcome as Percent of Total Assets	Contract Identification	Total Contract Amount (current value, KSH equivalent)
_____	_____	Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	_____
Pending Litigation, in accordance with Section III, Evaluation and Qualification Criteria			
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> No pending litigation in accordance with Sub-Factor 2.2.3 of Section III, Evaluation and Qualification Criteria.			
<input type="checkbox"/> Pending litigation in accordance with Sub-Factor 2.2.3 of Section III, Evaluation and Qualification Criteria, as indicated below			
Year	Outcome as Percent of Total Assets	Contract Identification	Total Contract Amount (current value, KSH equivalent)
_____	_____	Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	_____
_____	_____	Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	_____

Current Contract Commitments / Works in Progress

Form CCC

Bidders and each partner to a JVCA should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Name of contract	Employer, contact address/tel/fax	Value of outstanding work (current KSH equivalent)	Estimated completion date	Average monthly invoicing over last six months (Kshs/month)
1.				
2.				
3.				
4.				
5.				
etc.				

Financial Situation

Form FIN – 3.1

Historical Financial Performance

Bidder's Legal Name: _____ Date: _____

JVCA Partner Legal Name: _____ Bidding No.: _____

Page _____ of _____ pages

To be completed by the Bidder and, if JVCA, by each partner

Financial information in Kshs	Historic information for previous _____ () years (Kshs)						
	Year 1	Year 2	Year 3	Year ...	Year n	Avg.	Avg. Ratio
Information from Balance Sheet							
Total Assets (TA)							
Total Liabilities (TL)							
Net Worth (NW)							
Current Assets (CA)							
Current Liabilities (CL)							
Information from Income Statement							
Total Revenue (TR)							
Profits Before Taxes (PBT)							

- Attached are copies of financial statements (balance sheets, including all related notes, and income statements) for the years required above complying with the following conditions:
 - Must reflect the financial situation of the Bidder or partner to a JVCA, and not sister or parent companies
 - Historic financial statements must be audited by a certified accountant
 - Historic financial statements must be complete, including all notes to the financial statements
 - Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted)

Average Annual Turnover

Form FIN – 3.2

Bidder's Legal Name: _____ Date: _____
 JVCA Partner Legal Name: _____ Bidding No.: _____
 Page _____ of _____ pages

Annual turnover data (Rehabilitation and Expansion only)		
Year	Amount and Currency	Kshs
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
*Average Annual Rehabilitation and Expansion Turnover	_____	_____

*Average annual turnover calculated as total certified payments received for work in progress or completed over the number of years specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3.2, divided by that same number of years.

Financial Resources

Form FIN – 3.3

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total Rehabilitation and Expansion cash flow demands of the subject contract or contracts as indicated in Section III, Evaluation and Qualification Criteria.

Source of financing	Amount Kshs
1.	
2.	
3.	
4.	

General Experience

Form EXP – 2.4.1

Bidder's Legal Name: _____ Date: _____
 JVCA Partner Legal Name: _____ Bidding No.: _____
 Page _____ of _____ pages

Starting Month / Year	Ending Month / Year	Years*	Contract Identification	Role of Bidder
_____	_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____

*List calendar year for years with contracts with at least nine (9) months activity per year starting with the earliest year

Specific Experience

Form EXP – 2.4.2(a)

Bidder's Legal Name: _____ Date: _____

JVCA Partner Legal Name: _____ Bidding No.: _____

Page _____ of _____ pages

Similar Contract Number: ___[insert specific number] of ___[insert total number of contracts required].	Information		
Contract Identification	_____		
Award date	_____		
Completion date	_____		
Role in Contract	<input type="checkbox"/> Contractor	<input type="checkbox"/> Management Contractor	<input type="checkbox"/> Subcontractor
Total contract amount	_____		Kshs _____
If partner in a JVCA or subcontractor, specify participation of total contract amount	_____ %	_____	Kshs _____
Employer's Name:	_____		
Address:	_____ _____ _____		
Telephone/fax number:	_____		
E-mail:	_____		

Specific Experience (cont.)

Form EXP – 2.4.2(a) (cont.)

Bidder's Legal Name: _____ Page _____ of _____ pages
JVCA Partner Legal Name: _____

Similar Contract No. _[insert specific number] of [insert total number of contracts] required	Information
Description of the similarity in accordance with Sub-Factor 2.4.2(a) of Section III, Evaluation and Qualification Criteria:	
Amount	_____
Physical size	_____
Complexity	_____
Methods/Technology	_____
Physical Production Rate	_____

Specific Experience in Key Activities

Form EXP – 2.4.2(b)

Bidder's Legal Name: _____ Date: _____
 JVCA Partner Legal Name: _____ Bidding No.: _____
 Subcontractor's Legal Name: _____ Page _____ of _____ pages

	Information		
Contract Identification	_____		
Award date	_____		
Completion date	_____		
Role in Contract	<input type="checkbox"/> Contractor	<input type="checkbox"/> Management Contractor	<input type="checkbox"/> Subcontractor
Total contract amount	_____		Kshs _____
If partner in a JVCA or subcontractor, specify participation of total contract amount	_____ %	_____	Kshs _____
Employer's Name:	_____		
Address:	_____		
Telephone/fax number:	_____		
E-mail:	_____		

Specific Experience in Key Activities (cont.)

Form EXP – 2.4.2(b) (cont.)

Bidder's Legal Name: _____ Page _____ of _____ pages
JVCA Partner Legal Name: _____
Subcontractor's Legal Name: _____

	Information
Description of the key activities in accordance with Sub-Factor 2.4.2(b) of Section III, Evaluation and Qualification Criteria:	
Amount	
Physical size	
Complexity	
Methods/Technology	
Physical Production Rate	

Section V. Eligible Countries

Eligibility for the Provision of Goods, Works and Related Services in Bank-financed Procurement

A. Provision at Paragraph 1.6 of the Bank's Rules and Procedures for Procurement of Goods and Works

1.6 The World Bank/GOK permits firms and individuals from all countries to offer goods, works and services for World Bank funded projects.

(ii) PART 2 – Employer’s Requirements

Section VI. Requirements

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Technical specifications are provided in Tender documents volume III.

Drawings

Technical drawings form part of the tender documents and are provided as volume II

Supplementary Information

(iii)

**PART 3 – Conditions of Contract
and Contract Forms**

Section VII. General Conditions (GC)

These **General Conditions (GC)**, read in conjunction with the **Particular Conditions (PC)** and other documents listed therein, should be a complete document expressing fairly the rights and obligations of both parties.

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(b)Section VII. General Conditions

[Name of Employer] _____

[Name of Contract] _____

1. General Provisions

1.1 Definitions

In the Conditions of Contract (“these Conditions”), which include **Particular Conditions**, and these **General Conditions**, the following words and expressions shall have the meanings stated. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise.

1.1.1 The Contract

1.1.1.1 “Contract” means the Contract Agreement, the Letter of Acceptance, the Letter of Bid, these Conditions, the Specification, the Schedules, and the further documents (if any) which are listed in the Contract Agreement or in the Letter of Acceptance.

1.1.1.2 “Contract Agreement” means the contract agreement referred to in **GC** Clause 1.6 [Contract Agreement].

1.1.1.3 “Letter of Acceptance” means the letter of formal acceptance, signed by the Employer, of the Letter of Bid, including any annexed memoranda comprising agreements between and signed by both Parties. If there is no such letter of acceptance, the expression “Letter of Acceptance” means the Contract Agreement and the date of issuing or receiving the Letter of Acceptance means the date of signing the Contract Agreement.

1.1.1.4 “Letter of Bid” means the document entitled letter of bid, which was completed by the Contractor and includes the signed offer to the Employer for the Works.

1.1.1.5 “Specification” means the document entitled specification, as included in the Contract, and any additions and modifications to the specification in accordance with the Contract. Such document specifies the Works.

1.1.1.6 “Drawings” means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract.

1.1.1.7 “Schedules” means the document(s) entitled schedules, completed by the Contractor and submitted with the Letter of Bid, as included in the Contract. Such document may include the Bill of Quantities, data, lists, and schedules of rates and/or prices.

- 1.1.1.8 The Activity Schedule is a schedule of the activities comprising the Rehabilitation and Expansion, installation, testing, and commissioning of the Works in a lump sum contract. It includes a lump sum price for each activity, which is used for valuations and for assessing the effects of Variations and Compensation Events.
- 1.1.1.10 “Bid” means the Letter of Bid and all other documents which the Contractor submitted with the Letter of Bid, as included in the Contract.
- 1.1.1.11 **PC means Particular Conditions**
- 1.1.2 Parties and Persons**
- 1.1.2.1 “Party” means the Employer or the Contractor, as the context requires.
- 1.1.2.2 “Employer” means the person named as employer in the **Particular Conditions** and the legal successors in title to this person.
- 1.1.2.3 “Contractor” means the person(s) named as contractor in the Letter of Bid accepted by the Employer and the legal successors in title to this person(s).
- 1.1.2.4 “Project Manager” is the person named in the **PC** (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.
- 1.1.2.5 “Subcontractor” means any person named in the Contract as a subcontractor, or any person appointed as a subcontractor, for a part of the Works; and the legal successors in title to each of these persons.
- 1.1.2.6 “Bank” means the financing institution (if any) named in the **PC**.
- 1.1.2.7 “Borrower” means the person (if any) named as the borrower in the **PC**.
- 1.1.2.8 The “Adjudicator” is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in **GC** Clause 1.32.
- 1.1.3 Dates, Tests, Periods and Completion**
- 1.1.3.1 “Base Date” means the twenty one (21) days prior to the latest date for submission of the Bid.
- 1.1.3.2 “Commencement Date” means the date notified under the **PC**.
- 1.1.3.3 “Completion Date” means the date for completion of the Works, or a Section (as the case may be) as certified by the Project Manager, in accordance with **GC** Clause 7.1.1, and as stipulated in the **PC**.
- 1.1.3.4 “Test on Completion” means the tests (if any) which are specified in the Contract and which are carried out in accordance with the Specification for the purpose of issuing the “Certificate of Completion of the Works”.
- 1.1.3.5 “Taking-Over Certificate” or “Certificate of Completion of the Works” means a certificate issued under **GC** Clause 7.1 [Completion].
- 1.1.3.6 “day” means a calendar day and “year” means 365 days.

1.1.3.7 “Dayworks” are varied work inputs subject to payment on a time basis for the Contractor’s employees and Equipment, in addition to payments for associated Materials and Plant.

1.1.4 Money and Payments

1.1.4.1 “Contract Amount” means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects.

1.1.4.2 “Contract Price” means the price defined in **GC** Clause 4.1 [Contract Price], and includes adjustments in accordance with the Contract.

1.1.4.3 “Compensation Events” are those defined in **GC** Clause 4.7 [Compensation Events] hereunder.

1.1.5 Works and Goods

1.1.5.1 “Contractor’s Equipment” means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects. However, Contractor’s Equipment excludes Temporary Works, Employer’s Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works.

1.1.5.2 “Goods” means Contractor’s Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.

1.1.5.3 “Materials” means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.

1.1.5.4 “Permanent Works” means the permanent works to be executed by the Contractor under the Contract.

1.1.5.5 “Plant” means the apparatus, machinery and other equipment intended to form or forming part of the Permanent Works, including vehicles purchased for the Employer and relating to the Rehabilitation and Expansion or operation of the Works.

1.1.5.6 “Section” means a part of the Works specified in the **PC** as a Section (if any).

1.1.5.7 “Temporary Works” means all temporary works of every kind (other than Contractor’s Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.

1.1.5.8 “Works” mean the Permanent Works and the Temporary Works, or either of them as appropriate, and as described in the **PC**.

1.1.6 Other Definitions

1.1.6.1 “Contractor’s Documents” means the calculations, computer programs and other software, drawings, manuals, models and other documents of a technical nature (if any) supplied by the Contractor under the Contract.

1.1.6.2 “Country” means the country in which the Site (or most of it) is located.

1.1.6.3 “Force Majeure” is defined in **GC** Clause 6.1 [Force Majeure].

- 1.1.6.4 “Laws” means all national (or state) legislation, statutes, ordinances and other laws, and regulations and by-laws of any legally constituted public authority.
- 1.1.6.5 “Performance Security” means the security (or securities, if any) under GC Clause 4.15 [Securities].
- 1.1.6.6 “Site” means the places where the Permanent Works are to be executed including storage and working areas and to which Plant and Materials are to be delivered, and any other places as may be specified in the PC as forming part of the Site.
- 1.1.6.8 “Unforeseeable” or “Unforeseen” means not reasonably foreseeable by an experienced Contractor by the Base Date.
- 1.1.6.9 “Variation” means any change to the Works, which is instructed or approved as a variation under GC Clause 4.3 [Variations].

1.2 Interpretation

- 1.2.1 Interpretation In the Contract, except where the context requires otherwise:
- (a) words indicating one gender include all genders;
 - (b) words indicating the singular also include the plural and words indicating the plural also include the singular;
 - (c) provisions including the word “agree”, “agreed” or “agreement” require the agreement to be recorded in writing;
 - (d) “written” or “in writing” means hand-written, type-written, printed or electronically made, and resulting in a permanent record;
 - (e) the word “tender” is synonymous with “bid” and “tenderer” with “bidder” and the words “tender documents” with “bidding documents”.
- 1.2.2 The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.
- 1.2.3 If sectional completion is specified in the PC, references in the GC to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

1.3 Communications

- 1.3.1 Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices, requests and discharges, these communications shall be:
- (a) in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the PC; and

- (b) delivered, sent or transmitted to the address for the recipient's communications as stated in the **PC**. However:
 - (i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and
 - (ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued

1.3.2 Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. When a certificate is issued to a Party, the certifier shall send a copy to the other Party.

1.3.3 When a notice is issued to a Party, by the other Party or the Project Manager, a copy shall be sent to the Project Manager or the other Party, as the case may be.

1.4 Law and Language

1.4.1 The Contract shall be governed by the law of the country or other jurisdiction stated in the **PC**.

The ruling language of the Contract shall be that stated in the **PC**.

The language for communications shall be that stated in the **PC**. If no language is stated there, the language for communications shall be the ruling language of the Contract.

1.4.2 Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified, in which case, for purposes of interpretation of the Contract, this translation shall govern.

The Contractor shall bear all costs of translation to the governing language and all risks of the accuracy of such translation, for documents provided by the Contractor.

1.5 Priority of Documents

1.5.1 The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

- (a) the Contract Agreement (if any),
- (b) the Letter of Acceptance,
- (c) the Bid,
- (d) the Particular Conditions
- (e) these General Conditions,

- (f) the Specification,
- (g) the Drawings, and
- (h) the Schedules and any other documents forming part of the Contract.

1.5.2 If an ambiguity or discrepancy is found in the documents, the Project Manager shall issue any necessary clarification or instruction.

1.6 Contract Agreement

1.6.1 The Parties shall enter into a Contract Agreement within 28 days after the Contractor receives the Letter of Acceptance, unless the **Particular Conditions** establish otherwise. The Contract Agreement shall be based upon the relevant form provided in Section IX, Contract Forms. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Employer.

1.7 Assignment

1.7.1 Neither Party shall assign the whole or any part of the Contract or any benefit or interest in or under the Contract.

1.8 Care and Supply of Documents

1.8.1 The Specification and Drawings shall be in the custody and care of the Employer. Unless otherwise stated in the Contract, one copy of the Contract and of each subsequent Drawing shall be supplied to the Contractor, at the cost of the employer, but any further request of subsequent copies shall be at the cost of the Contractor.

1.8.2 Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Project Manager six copies of each of the Contractor's Documents.

1.8.3 The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times.

1.8.4 If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

1.9 Confidential Details

1.9.1 The Contractor's and the Employer's Personnel shall disclose all such confidential and other information as may be reasonably required in order to verify the Contractor's compliance with the Contract and allow its proper implementation.

Each of them shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to compete for other projects.

1.9.2 Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this Clause.

1.10 Compliance with Laws

1.10.1 The Contractor shall, in performing the Contract, comply with applicable Laws.

1.10.2 Unless otherwise stated in the **Particular Conditions**:

(a) the Employer shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the Employer's Country, which (i) such authorities or undertakings require the Employer to obtain in the Employer's name, and (ii) are necessary for the execution of the Contract, including those required for the performance by both the Contractor and the Employer of their respective obligations under the Contract;

(b) the Contractor shall acquire and pay for all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the Employer's Country, which such authorities or undertakings require the Contractor to obtain in its name and which are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Employer under GC Clause 1.10.2(a) hereof and that are necessary for the performance of the Contract. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Employer or its personnel, including the Subcontractors and their personnel, but without prejudice to GC Clause 1.10.1 hereof.

1.11 Joint and Several Liability

1.11.1 If the Contractor is a joint venture, consortium, or association (JVCA) of two or more persons, the lead designate shall be solely liable to the Employer for the fulfilment of the provisions of the Contract. In the event the composition or the constitution of the JVCA is altered, the lead designate shall still remain solely liable to the employer.

1.12 Inspections and Audit by the Bank

1.12.1 The Contractor shall permit the Bank and/or persons appointed by the Bank to inspect the Site and/or the Contractor's accounts and records relating to the performance of the Contract and to have such accounts and records audited by auditors appointed by the Bank if required by the Bank.

1.12.2 The Contractor shall maintain all documents and records related to the Contract for a period of three (3) years after completion of the Works. The Contractor shall provide any documents necessary for the investigation of allegations of fraud, collusion, coercion, obstruction or corruption and require its employees or agents with knowledge of the Contract to respond to questions from the Bank.

1.13 Contractual Matter's Decisions

1.13.1 The appointed implementation team shall deliberate and recommend to the accounting officer on contractual matters between the Employer and the Contractor in the role representing the Employer.

1.14 Delegation

1.14.1 The Project Manager may delegate any of his duties and responsibilities and may cancel any delegation after notifying the Contractor.

1.15 Subcontracting

1.15.1 The Contractor may subcontract with the approval of the Project Manager, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations.

1.16 Personnel and Equipment

1.16.1 The Contractor shall employ the key personnel and use the equipment identified in its Bid, to carry out the Works or other personnel and equipment approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel and equipment only if their relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid.

1.16.2 If the Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

1.17 Other Contractors

1.17.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, as referred to in the PC. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification.

1.18 Employer's and Contractor's Risks

1.18.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

1.19 Employer's Risks

1.19.1 From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks:

- (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to
 - (i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or
 - (ii) negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.
- (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

1.19.2 From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is an Employer's risk except loss or damage due to

- (a) a Defect which existed on the Completion Date,
- (b) an event occurring before the Completion Date, which was not itself an Employer's risk, or
- (c) the activities of the Contractor on the Site after the Completion Date.

1.20 Contractor's Risks

1.20.1 From the Starting Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Employer's risks are Contractor's risks.

1.21 Insurance

1.21.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the PC for the following events which are due to the Contractor's risks:

- (a) loss of or damage to the Works, Plant, and Materials;
- (b) loss of or damage to Equipment;
- (c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and
- (d) personal injury or death.

- 1.21.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Commencement Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.
- 1.21.3 If the Contractor does not provide any of the policies and certificates required, the Employer may effect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.
- 1.21.4 Alterations to the terms of insurance shall not be made without the approval of the Project Manager.
- 1.21.5 Both parties shall comply with any conditions of the insurance policies.
- 1.22 Site Investigation Reports**
- 1.22.1 The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to in the PC, supplemented by any information available to the Bidder.
- 1.23 Contractors to Construct the Works**
- 1.23.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.
- 1.24 The Works to Be Completed by the Intended Completion Date**
- 1.24.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.
- 1.25 Approval by the Project Manager**
- 1.25.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, who is to approve them if they comply with the Specifications and Drawings.
- 1.25.2 The Contractor shall be responsible for design of Temporary Works.
- 1.25.3 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary Works.
- 1.25.4 The Contractor shall obtain approval of third parties to the design of the Temporary Works, where required.

1.25.5 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, are subject to prior approval by the Project Manager before this use.

1.26 Safety

1.26.1 The Contractor shall be responsible for the safety of all activities on the Site.

1.27 Discoveries

1.27.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.

1.28 Possession of the Site

1.28.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the PC, the Employer shall be deemed to have delayed the start of the relevant activities

1.29 Access to the Site

1.29.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

1.30 Instructions

1.30.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.

1.31 Grievance redress mechanism

1.31.1 The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.

1.31.2 If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence NAVCDP grievance redress mechanism.

1.31.3 Notwithstanding any reference to NAVCDP grievance redress mechanism herein, the parties are not limited to redress in a court of law

2.1 Programme

- 2.1.1 Within the time stated in the **PC**, after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a Programme showing the general methods, arrangements, order, and timing for all the activities in the Works. In the case of a lump sum contract, the activities in the Programme shall be consistent with those in the Activity Schedule.
- 2.1.2 An update of the Programme shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.
- 2.1.3 The Contractor shall submit to the Project Manager for approval an updated Programme at intervals no longer than the period stated in the **PC**. If the Contractor does not submit an updated Programme within this period, the Project Manager may withhold the amount stated in the **PC** from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Programme has been submitted. In the case of a lump sum contract, the Contractor shall provide an updated Activity Schedule within 14 days of being instructed to by the Project Manager.
- 2.1.4 The Project Manager's approval of the Programme shall not alter the Contractor's obligations. The Contractor may revise the Programme and submit it to the Project Manager again at any time. A revised Programme shall show the effect of Variations and Compensation Events.

2.2 Extension of the Intended Completion Date

2.2.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.

2.2.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

2.3 Acceleration

2.3.1 When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor.

2.3.2 If the Contractor's priced proposals for acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.

2.4 Delays Ordered by the Project Manager

2.4.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.

2.5 Management Meetings

2.5.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

2.5.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

2.6 Early Warning

2.6.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.

2.6.2 The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Project Manager.

3. Quality Control

3.1 Identifying Defects

3.1.1 The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.

3.2 Tests

3.2.1 If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.

3.3 Correction of Defects

3.3.1 The Project Manager shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the PC. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.

3.4 Uncorrected Defects

3.4.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager shall assess the cost of having the Defect corrected, and the Contractor shall pay this amount.

4.

Cost Control

4.1 Contract Price

4.1.1 In the case of an admeasurement contract, the Bill of Quantities shall contain priced items for the Works to be performed by the Contractor. The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work accomplished at the rate in the Bill of Quantities for each item.

4.1.2 In the case of a lump sum contract, the Activity Schedule shall contain the priced activities for the Works to be performed by the Contractor. The Activity Schedule is used to monitor and control the performance of activities on which basis the Contractor will be paid. If payment for Materials on Site shall be made separately, the Contractor shall show delivery of Materials to the Site separately on the Activity Schedule.

4.2 Changes in the Contract Price

4.2.1

In the case of an admeasurement contract:

- (a) If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change.
- (b) The Project Manager shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the prior approval of the Employer.
- (c) If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.

4.2.2 In the case of a lump sum contract, the Activity Schedule shall be amended by the Contractor to accommodate changes of Programme or method of working made at the Contractor's own discretion. Prices in the Activity Schedule shall not be altered when the Contractor makes such changes to the Activity Schedule.

4.3 Variations

4.3.1 All Variations shall be included in updated Programs, and, in the case of a lump sum contract, also in the Activity Schedule, produced by the Contractor.

4.3.2 The Contractor shall provide the Project Manager with a quotation for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven (7) days

of the request or within any longer period stated by the Project Manager and before the Variation is ordered.

- 4.3.3 If the Contractor's quotation is unreasonable, the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs.
- 4.3.4 If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.
- 4.3.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.
- 4.3.6 In the case of an admeasurement contract, if the work in the Variation corresponds to an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in GC Clause 4.2.1 or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.

4.4 Cash Flow Forecasts

- 4.4.1 When the Program, or, in the case of a lump sum contract, the Activity Schedule, is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast. The cash flow forecast shall include different currencies, as defined in the Contract, converted as necessary using the Contract exchange rates.

4.5 Payment Certificates

- 4.5.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously.
- 4.5.2 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor.
- 4.5.3 The value of work executed shall be determined by the Project Manager.
- 4.5.4 The value of work executed shall comprise:
 - (a) In the case of an admeasurement contract, the value of the quantities of work in the Bill of Quantities that have been completed; or
 - (b) In the case of a lump sum contract, the value of work executed shall

comprise the value of completed activities in the Activity Schedule.

4.5.5 The value of work executed shall include the valuation of Variations and Compensation Events.

4.5.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

4.6 Payments

4.6.1 Payments shall be adjusted for deductions for advance payments and retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 30 days of the date of each certificate but with due consideration of funds availability.

4.6.3 Unless otherwise stated, all payments and deductions shall be paid or charged in the proportions of currencies comprising the Contract Price.

4.6.4 Items of the Works for which no rate or price has been entered in shall not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.

4.7.2 If by commission or omission of the employer prevents the work being completed before the Intended Completion Date, the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Intended Completion Date shall be extended. The extension however occurring shall not affect the contract price.

4.8 Tax

4.8.1 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 28 days before the submission of bids.

4.9 Currencies

4.9.1 Where payments are made in currencies other than the currency of the Employer's country specified in the **PC**, the exchange rates used for calculating the amounts to be paid shall be the exchange rates stated in the Contractor's Bid.

4.10 Price Adjustment

4.10.1 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the **PC**. If so provided, the amounts certified in each payment certificate,

before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due in each currency. A separate formula of the type indicated below applies to each Contract currency:

$$P_c = A_c + B_c \text{ Imc/Ioc}$$

where:

P_c is the adjustment factor for the portion of the Contract Price payable in a specific currency “c.”

A_c and B_c are coefficients¹¹ specified in the **PC**, representing the nonadjustable and adjustable portions, respectively, of the Contract Price payable in that specific currency “c;” and **Imc** is the index prevailing at the end of the month being invoiced and **Ioc** is the index prevailing 21 days before Bid opening for inputs payable; both in the specific currency “c.”

4.10.2 If the value of the index is changed after it has been used in a calculation, the calculation shall be corrected and an adjustment made in the next payment certificate. The index value shall be deemed to take account of all changes in cost due to fluctuations in costs.

4.11 Retention

4.11.1 The Employer shall retain from each payment due to the Contractor the proportion stated in the **PC** until Completion of the whole of the Works.

4.11.2 Upon the issue of a Certificate of Completion of the Works by the Project Manager, in accordance with **GC** Clause 7.1.1, half the total amount retained shall be repaid to the Contractor and half when the Defects Liability Period has passed and the Project Manager has certified that all Defects notified by the Project Manager to the Contractor before the end of this period have been corrected.

4.12 Liquidated Damages

4.12.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the **PC** for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount defined in the **PC**. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor’s liabilities.

¹¹ The sum of the two coefficients A_c and B_c should be 1 (one) in the formula for each currency. Normally, both coefficients shall be the same in the formulae for all currencies, since coefficient A, for the nonadjustable portion of the payments, is a very approximate figure (usually 0.15) to take account of fixed cost elements or other nonadjustable components. The sum of the adjustments for each currency is added to the Contract Price.

4.12.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in GC Clause 4.6.1.

4.14 Advance Payment

4.14.1 The Employer shall make advance payment to the Contractor of the amounts stated in the PC by the date stated in the PC, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to the advance payment. The Guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest shall not be charged on the advance payment.

4.14.2 The Contractor is to use the advance payment only to pay for Equipment, Plant, Materials, and mobilization expenses required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.

4.14.3 The advance payment shall be repaid by deducting proportionate amounts from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses, or Liquidated Damages.

4.15 Securities

4.15.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount specified in the **PC**, by a bank or surety acceptable to the Employer, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The Performance Security shall be valid until 28 days from the date of issue of the Certificate of Completion in the case of a Bank Guarantee, and until one year from the date of issue of the Completion Certificate in the case of a Performance Bond.

4.16 Dayworks

4.16.1 If applicable, the Dayworks rates in the Contractor's Bid shall be used for small additional amounts of work only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.

4.16.2 All work to be paid for as Dayworks shall be recorded by the Contractor on forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the work being done.

4.16.3 The Contractor shall be paid for Dayworks subject to obtaining signed Dayworks forms.

4.17 Cost of Repairs

Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.

5.

Staff and Labour

5.1 Forced Labour

5.1.1 The Contractor shall not employ forced labour, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.

5.2 Child Labour

5.2.1 The Contractor shall not employ children in a manner that is economically exploitative, or is likely to be hazardous, or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Where the relevant labour laws have provisions for employment of minors, the Contractor shall follow those laws applicable to the Contractor. Children below the age of 18 years shall not be employed in dangerous work.

5.3 Workers' Organizations

5.3.1 In countries where the relevant labour laws recognize workers' rights to form and to join workers' organisations of their choosing without interference and to bargain collectively, the Contractor shall comply with such laws. Where the relevant labour laws substantially restrict workers' organisations, the Contractor shall enable alternative means for Contractor's Personnel to express their grievances and protect their rights regarding working conditions and terms of employment. In either case described above, and where the relevant labour laws are silent, the Contractor shall not discourage Contractor's Personnel from forming or joining workers' organisations of their choosing or from bargaining collectively, and shall not discriminate or retaliate against the Contractor's Personnel who participate, or seek to participate, in such organisations and bargain collectively. The Contractor shall engage with such workers representatives. Worker organisations are expected to fairly represent the workers in the workforce.

5.4 Non-Discrimination and Equal Opportunity

5.4.1 The Contractor shall not make employment decisions on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment relationship on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, promotion, termination of employment or retirement, and discipline. In countries where the relevant labour laws provide for non-discrimination in employment, the Contractor shall comply with such laws. When the relevant labour laws are silent on non-discrimination in employment, the Contractor shall meet this Clause's requirements. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on inherent requirements of the job shall not be deemed discrimination.

6.

Force Majeure

6.1 Definition of Force Majeure

6.1.1 In this Clause, "Force Majeure" means an exceptional event or circumstance:

- (a) which is beyond a Party's control,
- (b) which such Party could not reasonably have provided against before entering into the Contract,
- (c) which, having arisen, such Party could not reasonably have avoided or overcome, and
- (d) which is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

- (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (ii) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war,
- (iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,
- (iv) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and
- (v) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.

6.2 Notice of Force Majeure

6.2.1 If a Party is or will be prevented from performing its substantial obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.

6.2.2 The Party shall, having given notice, be excused performance of its obligations for so long as such Force Majeure prevents it from performing them.

6.2.3 Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract

6.3 Duty to Minimise Delay

6.3.1 Each Party shall at all times use all reasonable endeavours to minimise any delay in the performance of the Contract as a result of Force Majeure.

6.3.2 A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

6.4 Consequences of Force Majeure

6.4.1 If the Contractor is prevented from performing its substantial obligations under the Contract by Force Majeure of which notice has been given under **GC** Clause 6.2 [Notice of Force Majeure], and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to **GC** Clause 1.32.1 [Procedure for Disputes] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under **GC** Clause 2.2 [Extension of the Intended Completion Date], and
- (b) if the event or circumstance is of the kind described in sub-paragraphs (i) to (iv) of **GC** Clause 6.1 [Definition of Force Majeure] and, in the case of **GC** Clause 6.1.1(d)(ii) to (iv), occurs in the Country, payment of any such Cost, including the costs of rectifying or replacing the Works and/or Goods damaged or destroyed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in **GC** Clause 1.21 [Insurance].

6.4.2 After receiving this notice, the Project Manager shall proceed in accordance with **GC** Clause 1.13 [Project Manager's Decisions] to agree or determine these matters.

6.5 Force Majeure Affecting Subcontractor

6.5.1 If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's non-performance or entitle him to relief under this Clause.

6.6 Optional Termination, Payment and Release

6.6.1 If the execution of substantially all the Works in progress is prevented for a continuous period of 84 days by reason of Force Majeure of which notice has been given under **GC** Clause 6.2 [Notice of Force Majeure], or for multiple periods which total more than 140 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the

Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with GC Clause 7.5.5.

6.6.2 Upon such termination, the Project Manager shall determine the value of the work done and issue a Payment Certificate which shall include:

- (a) the amounts payable for any work carried out for which a price is stated in the Contract;
- (b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal;
- (c) other Costs or liabilities which in the circumstances were reasonably and necessarily incurred by the Contractor in the expectation of completing the Works;
- (d) the Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost); and
- (e) the Cost of repatriation of the Contractor's staff and labour employed wholly in connection with the Works at the date of termination.

6.7 Release from Performance

6.7.1 Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfil its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance:

- (c) the Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract, and
- (d) the sum payable by the Employer to the Contractor shall be the same as would have been payable under GC Clause 6.6 [Optional Termination, Payment and Release] if the Contract had been terminated under GC Clause 6.6.

7.

Finishing the Contract

7.1 Completion

7.1.1 The Contractor shall request the Project Manager to issue a Certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the whole of the Works is completed.

7.2 Taking Over

7.2.1 The Employer shall take over the Site and the Works within seven days of the Project Manager's issuing a certificate of Completion.

7.3 Final Account

7.3.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.

7.4 Operating and Maintenance Manuals

7.4.1 If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the **PC**.

7.4.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the **PC** pursuant to **GC** Clause 7.4.1, or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount stated in the **PC** from payments due to the Contractor.

7.5 Termination

7.5.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

7.5.2 Fundamental breaches of Contract shall include, but shall not be limited to, the following:

- (a) the Contractor stops work for 28 days when no stoppage of work is shown on the current Programme and the stoppage has not been authorized by the Project Manager;
- (b) the Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 28 days;
- (c) the Employer or the Contractor is made bankrupt or goes into liquidation other than for an Expansion or amalgamation;
- (d) a payment certified by the Project Manager is not paid by the

Employer to the Contractor after designated funds disbursement

the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;

- (e) the Contractor does not maintain a Security, which is required;
- (f) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in the PC; or
- (g) if the Contractor, as determined by the Employer, based on reasonable evidence, has engaged in corrupt or fraudulent practices in competing for or in executing the Contract, pursuant to GC Clause 7.6 [Fraud and Corruption].

7.5.3 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GC Clause 7.5.2 above, the Project Manager shall decide whether the breach is fundamental or not.

7.5.4 Notwithstanding the above, the Employer may terminate the Contract for convenience.

7.5.5 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

7.6 Fraud and Corruption

7.6.1 If the Employer determines that the Contractor has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 14 days' notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site, and the provisions of GC Clause 7.5 [Termination] shall apply as if such expulsion had been made under GC Clause 7.5.2.

7.6.2 Should any employee of the Contractor be determined to have engaged in corrupt, fraudulent, coercive or obstructive practice during the execution of the work then that employee shall be removed in accordance with GC Clause 1.16.2.

7.6.3 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank Financing), as well as bidders, suppliers, and contractors, and their agents (whether declared or not), subcontractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts¹². In pursuance of this policy, the Bank:

¹² In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
- (iv) “Corrupt Practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party¹³;
 - (v) “Fraudulent Practice” is any act or omission, including a misrepresentation that knowingly or recklessly misleads, or attempts to mislead, a party¹⁴ to obtain financial or other benefit or to avoid an obligation;
 - (vi) “Collusive Practice” is an arrangement between two or more parties¹⁵, designed to achieve an improper purpose, including to influence improperly the actions of another party; and
 - (vii) “Coercive Practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party¹⁶;
 - (viii) “obstructive practice” is
 - (v.1) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or
 - (v.2) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under clause 1.12 [Inspections and Audits by the Bank]
- (b) will reject a proposal for award if it determines that the bidder recommended for award or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly engaged in Corrupt, Fraudulent, Collusive, Coercive or Obstructive Practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the Financing allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of such Financing engaged in Corrupt, Fraudulent, Collusive, Coercive or Obstructive Practices during the

¹³ For the purpose of this sub-paragraph, “another party” refers to a public official acting in relation to the procurement process or contract execution. In this context, “public official” includes Bank staff and employees of other organizations taking or reviewing procurement decisions.

¹⁴ For the purpose of this sub-paragraph, “party” refers to a public official; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

¹⁵ For the purpose of this sub-paragraph, “parties” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

¹⁶ For the purpose of this sub-paragraph, “party” refers to a participant in the procurement process or contract execution.

procurement or the implementation of that contract, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;

- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures¹⁷, including by publicly declaring such firm or individual ineligible either indefinitely or for a stated period of time, (i) to be awarded Bank-financed contracts and (ii) to be a nominated¹⁸ sub-contractor, consultant, supplier, or service provider of an otherwise eligible firm being awarded a Bank-financed contract; and
- (e) will require that a clause be included in bidding documents and in contracts financed by the Bank, requiring bidders, suppliers and contractors and their sub-contractors, agents, personnel, consultants, service providers, or suppliers to permit the Bank to inspect all accounts and records and other documents relating to the submission of bids and contract performance and to have them audited by auditors appointed by the Bank.

7.7 Payment upon Termination

- 7.7.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered less advance payments received up to the date of the issue of the certificate and less the percentage to apply to the value of the work not completed, as indicated in the PC. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.
- 7.7.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works, and less advance payments received up to the date of the certificate.

¹⁷ *A firm or an individual may be declared ineligible to be awarded a Bank financed contract: (i) upon completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross- debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, or otherwise decided by the Bank; and through the application of the Proposal for the Implementation of a Sanctions Process within the African Development Bank Group; and (ii) as a result of temporary suspension or early temporary suspension in connection with an on-going sanction proceeding. See footnote 18 and paragraph 9 of Appendix 1 of the Rules and Procedures for Procurement of Goods and Works.*

¹⁸ *A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding documents) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirement for the particular bid; or (ii) appointed by the Borrower."*

7.8 **Property**

7.8.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's default.

7.9 **Release from Performance**

7.9.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.

7.10 **Suspension of Bank Financing**

7.10.1 In the event that the Bank suspends the Financing to the Employer, from which part of the payments to the Contractor are being made:

- (e) The Employer is obligated to notify the Contractor of such suspension within 7 days of having received the Bank's suspension notice.
- (f) If the Contractor has not received sums due it within the 28 days for payment provided for in GC Clause 4.6.1, the Contractor may immediately issue a 14-day termination notice.

7.11 **Eligibility**¹⁹

7.11.1 The Contractor shall have the nationality from an eligible country of the Bank in accordance with the Bank's **Rules and Procedures for Procurement of Goods and Works**, as listed in Section V, Eligible Countries. The Contractor shall be deemed to have the nationality of a country if the Contractor is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.

7.11.2 The materials, equipment and services to be supplied under the Contract shall have their origin in eligible source countries and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, the Contractor may be required to provide evidence of the origin of materials, equipment and services.

¹⁹ For the purposes of Eligibility, the provisions of the Bank's **Rules and Procedures for Procurement of Goods and Works** have been presented in detail at Section V, Eligible Countries.

7.11.3 For purposes of GC Clause 7.11.1, “origin” means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differs substantially in its basic characteristics or in purpose or utility from its components.

Section VIII. Particular Conditions
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1. General Provisions	
GC 1.1.2.2	The Employer is: County Government of Kiambu
GC 1.1.2.4	The Project Manager is: Appointed Irrigation ENGINEER
GC 1.1.1.2.6	The Bank is: IDA/World Bank
GC 1.1.2.7	The Borrower is: Republic of Kenya
GC 1.1.3.2	The Commencement Date shall be: Not later than 14 days after signing of the contract
GC 1.1.3.3	The Completion Date for the whole of the Works shall be: Fourteen (14) months after commencement of the works
GC 1.1.5.6	If Sections are to be used: N/A
GC 1..1.5.8	The contract works include: <ul style="list-style-type: none"> • Rehabilitation of intake works as per the drawings • Construction of sedimentation basin (SB) • Laying and fixing of pipe network plus all the accessories as specified • Implementation of contractor’s ESMP
GC 1.1.6.6	Location of the Site: Nyamang’ara and Mukurwe sub location in Mang’u ward - Gatundu North sub county, Kiambu County

GC 1.2.3	Sectional Completions shall not be applicable.
GC 1.2.4(i)	The following documents also form part of the Contract: a) Letter of Acceptance b) The Bid c) All Addenda, If Any d) Particular Conditions e) General Conditions f) Specifications g) Drawings h) Completed Schedules i) Contractors ESMP
GC 1.3.1(a)	The Electronic Transmission System is: None
GC 1.3.1(b)	The Employer's address for the purpose of communications is: Chief Officer Crop production, Irrigation and Marketing County Government of Kiambu P.O Box 2344-00900 - Kiambu Email: navcdpkiambu@gmail.com
GC 1.4.1	The governing law is that of: Republic of Kenya The ruling language is: English The language for communications is: English
GC 1.6.1	The Parties shall enter into contract within 30 days after the Contractor receives the Letter of Acceptance.
GC 1.10.2(a)	Permits, approvals and/or licenses, or public service undertakings to be acquired by the Employer: As per the specifications
GC 1.10.2(b)	Permits, approvals and/or licenses, or public service undertakings to be acquired by the Contractor: As per the specifications
GC 1.11.1	The individuals or firms in a joint venture, consortium or association shall designate a lead.
GC 1.17.1	Schedule of Other Contractors: None

GC 1.21.1	<p>The minimum insurance amounts and deductibles shall be:</p> <p>(a) for loss or damage to the Works, Plant and Materials: KES 100,000</p> <p>(b) For loss or damage to Equipment: KES 50,000</p> <p>(c) for loss or damage to property (except the Works, Plant, Materials, and Equipment) in connection with Contract KES 50,000</p> <p>(d) for personal injury or death:</p> <p>(i) of the Contractor's employees: KES 250,000 (ii) of other people: KES150,000</p>
GC 1.22.1	<p>Site Investigation Reports shall include: design report, drawings, and any other investigation as may be required by the engineer</p>
GC 1.28.1	<p>The Site Possession Date(s) shall be <i>immediately after site handing over.</i></p>
GC 1.32.4	<p>In the case of a dispute between the Purchaser and a Supplier who is a national of Kenya, the dispute shall be referred to NAVCDP grievance redress mechanism in the first instance</p>
2. Time Control	
GC 2.1.1	<p>The Contractor shall submit for approval a Program for the Works within 7 days from the date of the Letter of Acceptance.</p>
GC 2.1.3	<p>The period between Program updates is 14 days or as may need arise.</p>
3. Quality Control	
GC 3.3.1	<p>The Defects Liability Period is: <i>6months after the date of substantial completion.</i></p>
4. Cost Control	

GC 4.9.1	The currency of the Employer's country is: <i>Kenya Shillings</i>
GC 4.10.1	The Contract " shall not " be subject to price adjustment, in accordance with GC Clause 4.10.1, and the following information regarding coefficients
GC 4.11.1	The proportion of payments retained is: 10%
GC 4.12.1	The Liquidated Damages for the whole of the Works are 0.05% of the final Contract Price per day. The maximum amount of Liquidated Damages for the whole of the Works is 5% of the final Contract Price.
GC 4.13.1	The Bonus for the whole of the Works is 0% of the final Contract Price, per day. The maximum amount of Bonus for the whole of the Works is 0% of the final Contract Price.
GC 4.14.1	The Advance Payment shall be: The Contractor may be paid an advance payment of up to a maximum of 20% of the contract price against an irrevokable bank guarantee of the equivalent amount from a reputable bank recognized by the central bank of Kenya. This shall be done after contract execution;
GC 4.15.1	The Performance Security amount is: 10% of contract sum in the form of: (a) Bank Guarantee: [A Bank Guarantee shall be unconditional (on demand) (see Section IX, Contract Forms).
7. Finishing the Contract	
GC 7.4.1	The date by which operating and maintenance manuals are required is: <i>date of completion of works</i> . The date by which "as built" drawings are required is the <i>date of completion of works</i> .
GC 7.4.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required in GC Clause 7.7.1 shall be: Kenya Shillings 0.5 Million
GC 7.5.2 (g)	The maximum number of days is: as per the approved extension.

Section IX. Contract Forms

This Section contains Contract Forms which, once completed, will constitute part of the Contract. The forms for Contract Agreement, Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder, after contract award

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Letter of Acceptance

[on letterhead paper of the Employer]

..... **[date]**.....

To: **[name and address of the Contractor]**

Subject: **[Notification of Award Contract No]**.....

This is to notify you that your Bid dated **[Insert date]** for execution of the
.**[insert name of the contract and identification number]** for the amount of
. . . **[insert amount (s) in figures and words and name(s) of currency(ies)]**, as corrected and
modified in accordance with the Instructions to Bidders is hereby accepted by us.

You are requested to furnish the Performance Security in the amount of **[insert amount (s) in figures and words and name(s) of currency(ies)]** within 30 days²⁰ in accordance with the Conditions of Contract, using for that purpose the Performance Security Form included in Section IX (Contract Forms) of the Bidding Document.

We accept the appointment of **[Employer to insert full name and address of alternative appointee proposed by Bidder in Letter of Bid]** as the Adjudicator. / We do not accept the appointment of **[Employer to insert full name and address of alternative appointee proposed by Bidder in Letter of Bid]** as the Adjudicator. And, consequently, the provisions of GC Clause 1.31 shall apply.²¹

Authorized Signature:

Name and Title of Signatory:

Name of Agency:

Attachment: Contract Agreement

²⁰ Or, the alternative deadline stipulated in the **Particular Conditions**.

²¹ Use one of the two options as appropriate.

Contract Agreement

THIS CONTRACT AGREEMENT is made on the [**insert: number**] day of [**insert: month**], [**insert: year**].

BETWEEN

(1) [**insert complete name of the Employer**], a [**insert description of type of legal entity, for example, an agency of the Ministry of**] of the Government of { **insert name of Country of the Employer** }, or corporation incorporated under the laws of { **insert name of Country of the Employer** } and having its principal place of business at [**insert address of the Employer**] (hereinafter called “the Employer”),

and

(2) [**insert name of the Contractor**], a corporation incorporated under the laws of [**insert: country of Contractor**] and having its principal place of business at [**insert: address of Contractor**] (hereinafter called “the Contractor”).

WHEREAS the Employer invited bids for the Works, described as [**insert brief description of the Works**] and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein, and the Employer agrees to pay the Contractor the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.

(a) the Letter of Acceptance

(b) the Bid

(c) the Addenda Nos [**insert addenda numbers if any**].

(d) the Particular Conditions

(e) the General Conditions

(f) the Specification

(g) the Drawings; and

(h) the completed Schedules,

3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

Agreement to be executed in accordance with the laws of **[insert name of the borrowing country]** on the day, month and year indicated above.

Signed by:

Signed by:

For and on behalf of the Employer

for and on behalf the Contractor

In the presence of:

in the presence of:

Witness, Name, Signature, Address, Date

Witness, Name, Signature, Address, Date

Option I: Performance Security

[The bank, as requested by the successful Bidder, shall fill in this form in accordance with the instructions indicated]

Date: **[insert date (e.g., day, month, and year)]**

Bidding Process Reference: **[insert no. and title of bidding process]**

Bank's Branch or Office: **[insert complete name of Guarantor]**

Beneficiary: **[insert complete name of Employer]**

PERFORMANCE GUARANTEE No.: **[insert Performance Guarantee number]**

We have been informed that **[insert complete name of the Contractor]** (hereinafter called "the Contractor") has entered into Contract No. **[insert number]** dated **[insert day and month]**, **[insert year]** with you, for the execution and completion of **[insert description of the Works]** and the remedying of any defects therein (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a Performance Guarantee is required.

At the request of the Employer, we hereby irrevocably undertake to pay you any sum(s) not exceeding **[insert amount(s)²² in figures and words]** such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing declaring the Contractor to be in default under the Contract, without cavil or argument, or your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

²² The Bank shall insert the amount(s) specified in the **PC** and denominated, as specified in the **PC**, either in the currency(ies) of the Contract or a freely convertible currency acceptable to the Employer.

This Guarantee shall expire no later than the **[insert number]** day of **[insert month]**, **[insert year]**,²³ and any demand for payment under it must be received by us at this office on or before that date. This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20(a) is hereby excluded.

[Signatures of authorized representatives of the bank]

²³ Insert the date twenty-eight days after the expected completion date. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: “The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed **[six months]** **[one year]**, in response to the Employer’s written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.”

Option II: Performance Bond

By this Bond _____ as Principal (hereinafter called "the Contractor") and _____] as Surety (hereinafter called "the Surety"), are held and firmly bound unto _____] as Obligee (hereinafter called "the Employer") in the amount of _____, for the payment of which sum well and truly to be made in the types and proportions of currencies in which the Contract Price is payable, the Contractor and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Contractor has entered into a written Agreement with the Employer dated the day of ____, 20 _____, for _____ in accordance with the documents, plans, specifications, and amendments thereto, which to the extent herein provided for, are by reference made part hereof and are hereinafter referred to as the Contract.

NOW, THEREFORE, the Condition of this Obligation is such that, if the Contractor shall promptly and faithfully perform the said Contract (including any amendments thereto), then this obligation shall be null and void; otherwise, it shall remain in full force and effect. Whenever the Contractor shall be, and declared by the Employer to be, in default under the Contract, the Employer having performed the Employer's obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

- (1) complete the Contract in accordance with its terms and conditions; or
- (2) obtain a Bid or bids from qualified Bidders for submission to the Employer for completing the Contract in accordance with its terms and conditions, and upon determination by the Employer and the Surety of the lowest responsive Bidder, arrange for a Contract between such Bidder and Employer and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the Balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "Balance of the Contract Price," as used in this paragraph, shall mean the total amount payable by Employer to Contractor under the Contract, less the amount properly paid by Employer to Contractor; or
- (3) pay the Employer the amount required by Employer to complete the Contract in accordance with its terms and conditions up to a total not exceeding the amount of this Bond.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted before the expiration of one year from the date of the issuing of the Taking-Over Certificate.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Employer named herein or the heirs, executors, administrators, successors, and assigns of the Employer.

In testimony whereof, the Contractor has hereunto set his hand and affixed his seal, and the Surety has caused these presents to be sealed with his corporate seal duly attested by the signature of his legal representative, this _____ day of _____ 20 ____.

Advance Payment Security

[The bank, as requested by the successful Bidder, shall fill in this form in accordance with the instructions indicated.]

Date: **[insert date (e.g., day, month, and year) of Bid Submission]**

Bidding Process Reference: **[insert number and title of bidding process]**

[bank's letterhead]

Beneficiary: [insert legal name and address of Employer]

ADVANCE PAYMENT GUARANTEE No.: [insert Advance Payment Guarantee no.]

We have been informed that **[insert name of the Contractor]**. . . . (hereinafter called "the Contractor") has entered into Contract No. **[insert reference number of the Contract]**. . . . dated **[insert day and month], [insert year]**..... with you, for the execution of **[insert name of contract and brief description of Works]** (hereinafter called "the Contract").

Furthermore, we understand that, according to the Conditions of the Contract, an advance payment in the sum .. . **[insert currency and amount in figures]**²⁴. . . . (**[insert currency and amount in words]**) is to be made against an advance payment guarantee.

At the request of the Employer, we **[insert name of the Bank]** hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of..... **[insert currency and amount in figures]***. (. **[insert currency and amount in words]**.) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than performing his obligations under the Contract or the costs of mobilization in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on its account number **[insert Contractor's account number]**. at.....**[insert name and address of the Bank]**.

²⁴ The Guarantor shall insert an amount representing the amount of the advance payment denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Employer

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that eighty (80) percent of the Contract Price has been certified for payment, or on the . . . day of,²⁵, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20(a) is hereby excluded.

. [Seal of Bank and Signature(s)].

Note –

All italicized text (including footnotes) is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

²⁵ Insert the expected expiration date of the Time for Completion. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: “The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [insert number of months], in response to the Employer’s written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.”

Retention Money Security

Demand Guarantee

_____ [insert Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: _____ [insert Name and Address of Employer]

Date: _____ [insert date (e.g., day, month, and year)]

RETENTION MONEY GUARANTEE No.: [insert Retention Money Guarantee no.]

We have been informed that _____ [insert name of Contractor] (hereinafter called "the Contractor") has entered into Contract No. _____ [insert reference number of contract] dated _____ [insert date] with you, for the execution of _____ [insert name of contract and brief description of Works] (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, when the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified for payment, payment of [insert either "the second half of the Retention Money", or, if the amount guaranteed under the Performance Guarantee, when the Taking-Over Certificate is issued, is less than half of the Retention Money, "the difference between half of the Retention Money and the amount guaranteed under the Performance Security"] is to be made against a Retention Money guarantee.

At the request of the Employer, we _____ [insert name of Bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of _____ [insert amount in figures] () [insert amount in words]¹ upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than the costs of mobilization in respect of the Works.

¹ The Guarantor shall insert an amount representing the amount of the second half of the Retention Money or, if the amount guaranteed under the Performance Guarantee when the Taking-Over Certificate is issued is less than half of the Retention Money, the difference between half of the Retention Money and the amount guaranteed under the Performance Security and denominated either in the currency(ies) of the second half of the Retention Money as specified in the Contract, or in a freely convertible currency acceptable to the Employer.

It is a condition for any claim and payment under this guarantee to be made that the payment of the second half of the Retention Money referred to above must have been received by the Contractor on its account number **[insert Contractor's account number]** at _____**[insert name and address of the Bank]**.

This guarantee shall expire, at the latest, 21 days after the date when the Employer has received a copy of the Performance Certificate issued by the Project Manager. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

[signature(s)]

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.