TENDER NO. TCML/MGD/WS/2019/02

TENDER FOR THE PROPOSED CONSTRUCTION OF SINGIRAINI BOREHOLE PIPELINE AND FENCING WORKS

MAY, 2019

CLIENT: TATA CHEMICALS MAGADI LIMITED P.O. BOX 1-00205	THE HEAD OF PROCUREMENT TATA CHEMICALS MAGADI LTD. P.O. BOX 1-00205	TATA TATA CHEMICALS MAGADI

SCOPE OF WORK

The scope of works shall be as described in the BoQ and tender document.

QUALIFICATION FOR TENDERING

Mandatory Requirements

The following must be submitted together with bid:

i) **Certified** copy of Certificate of incorporation

ii) Copy of Registration certificate for National Construction Authority (NCA) in category **NCA 7 and above**

iii) Copy of Valid Tax Compliance Certificate

iv) **Certified** copy of **Current** Single business permit

v) **Certified** copy of CR 12 form

Other Requirements

The Bidder shall submit information which will enable the technical team to evaluate their capability to undertake the works. For the purpose of these works, it is required that the firms should provide the following: -

i) Proof of similar previous experience (attach evidence)

ii) Attach Professional and technical staff (attach CV's and Practicing license)

iii) Attach a detailed work schedule Gantt Chart

All information in the attached forms should be provided in full and failure to do so will constitute grounds for disqualification.

There shall be a mandatory pre-tender site visit as specified in the table below:

Date	23th May 2019
Time	9.30 a.m
Venue	TCML Magadi Offices

NOTE: Every bidder shall be represented by one person bearing a letter from the company participating in tendering and to come complete with 4x4 vehicles for use to access the borehole site.

BID SUBMISSION

Bidders must submit the Technical and The Financial proposals separately.

A TECHNICAL PROPOSAL

Two (2) copies in sealed envelopes clearly marked **"TECHNICAL PROPOSAL FOR TENDER NO: TCML/MGD/WS/2019/02-Tender for THE PROPOSED CONSTRUCTION OF SINGIRAINI PIPELINE AND FENCING WORKS" One copy** marked as **"ORIGINAL"** and One other copy marked as **"COPY"**. All to be finally put in one sealed envelope. (The bidder will ensure that there is no reference at all on their financial proposal within the technical proposal envelope)

TATA CHEMICALS MAGADI

B FINANCIAL PROPOSAL

Two (2) copies in sealed envelopes clearly marked **"FINANCIAL PROPOSAL FOR TENDER NO: TCML/MGD/WS/2019/02-Tender for THE PROPOSED CONSTRUCTION OF SINGIRAINI PIPELINE AND FENCING WORKS" One copy** marked as **"ORIGINAL"** and One other copy marked as **"COPY"**. All to be finally put in one sealed envelope. (The financial proposal shall include all taxes applicable)

Addressed to:

The Head of Procurement,
TATA Chemicals Magadi Limited,
P.O. Box 1-00205,
MAGADI.

The same will be deposited in the tender box situated in Administration Block, Magadi OR Collection Centre, and Enterprise Road – Avon house, Industrial area so as to reach him/her on or before **5.00 p.m.** on 31ST May, 2019.

The Management reserves the right to accept or reject any bids and does not bind itself to any reasons for doing so.

EVALUATION CRITERIA

- The information provided by interested firms will be weighed by the following criteria: -

	MANDATORY REQUIREMENT	
	Bidder to provide copies of following which shall form minimum requirement. • Certificate of Registration, • NCA Registration category 7 and above, • Valid Tax Compliance certificate • VAT • Valid trading licence • Written power of attorney	
	TECHNICAL REQUIREMENT	
1	**General Experience**	**10 Marks**
	Experience as a contractor in water related works for the last 6 years – Project works undertaken with supporting documentation (maximum **5 project** to be considered) – 2 marks for each	
2	**Experience in Similar works**	**40 marks**
	Experience as a contractor in the construction of at least 3 (3 No.) Projects of Similar nature and complexity. The project must have been undertaken within the last 6 years. To comply with this requirement, works cited should be 100% complete and cost to be not less than 2 Million.	
3	**Critical Equipment**	**10 Marks**
	Essential minimum equipment to be available for the contract by the successful bidder through ownership, lease, hire etc. (provide proof) shall be (2 marks for each);	

	1 No excavator/backhoe 1No. concrete mixer (capacity 150 litres) and a porker vibrator 1 No. Tipper/lorry (Capacity 7 tonnes) 1 No Butt welding machine (max pipe size - 250 mm) Hydrostatic Pressure testing equipment	
4	**Staff Requirement**	**40**
	10 marks for each **Site Agent** – Minimum 5 Year experience in works of equivalent nature and volume with Bsc, in Civil/Water Engineering or Minimum of 7 Year experience in works of equivalent nature and volume with Diploma in Civil/water Engineering **Site Surveyor** – Diploma in Survey and 3 years' experience in water engineering survey **Site foreman** – At least full craftsman with experience as a foreman for at least 5 years **Environmentalist/social expert** – with 3 years' experience in construction projects	

PART A

TENDER AND CONTRACT

CONDITIONS OF TENDER AND INSTRUCTION TO TENDERS

1 INSTRUCTIONS TO TENDERS

a) The tender validity period shall be sixty (60) days from the tender opening date with an option of extension by further thirty (30) days from expiry of tender validity period.

b) The Employer is not bound to accept any tender and can nullify the whole tender and call fresh tenders. Until and unless a written acceptance or a formal agreement is signed, this tender does not form a binding contract between the tenderer and the Employer.

c) Tenderer shall satisfy himself before submitting his tender as to the nature of the ground, the subsoil, the topography of the site, the means of access to site, the accommodation as to risks, contingencies and other circumstances which may influence or affect the sufficiency of theirs tenders. Tenderers MUST visit the site or cause it to be visited by a competent and reliable representative in order to obtain information that may be necessary for preparing a bid and enter into contract. Whilst satisfying that condition the tenderer shall be responsible for his traveling and accommodation arrangements.

d) Any failure by the tenderer to obtain all necessary information for the purposes of making his tender or fixing the several rates of prices therein shall not relieve him from any risks or liabilities in connection with or for the fulfillment of the contract.

e) The Contractor MUST understand and shall comply with the Employer's site rules and statutory requirements on Safety, Health and Environmental (SHE). The Employer reserves the right to enforce this requirement.

f) If it is found on examination of a tender that there is a discrepancy between the tender Sum and the amount arrived at by the valuing the quantities at the rates or prices set against them by the tenderer, then the Tender Sum shall remain unaltered. The necessary corrections to adjust the revised total to correspond with the Tender Sum shall be made by means of a compensating percentage increase or decrease. Any such percentage increase or decrease shall apply to all rates in the Bills of Quantities excluding Contingency, Prime Cost and Provisional Sums. This percentage correction factor will be applied to rates for work measured in Certificate valuations and the measurement of variations when preparing the final account.

g) Should the tenderer notice any discrepancy or conflict between any of the Tender Documents he must inform the Employer, in writing prior to the date of submission of the tenders. Should any discrepancy or conflict between sections of the Tender Documents continue to exist without notice by either party after signing of the contract, then the Employer will give his ruling in writing indicating the overriding clause or section.

h) Any recipient of the documents for the proposed Contract for the purpose of submitting a tender (whether he submits a tender or not) shall treat the details of this document as "Private and Confidential".

i) In no case shall the expenses incurred during the preparation of the tender be reimbursed to the tenderer.

J) The tenders shall be submitted in plain sealed opaque envelope and shall be endorsed ''

THE PROPOSED .....:-

THE HEAD OF PROCUREMENT
TATA CHEMICALS MAGADI LIMITED
P O Box 1 - 00205
MAGADI

k) Tenderers will not be permitted to alter their bids after they have been opened and only those clarifications which will not change the substance of the tenders will be permitted.

l) On receipt of the written notification that his tender has been accepted the successful tenderer shall make all the necessary preparations for commencing work pending execution of the formal agreement.

m) Any tender may be disqualified if it is not complete and accompanied by all the items required to be submitted with the bid in compliance with these Instructions to Tenders.

n) The Contractor's terms do not form part of this contract unless expressly agreed and documented in writing beforehand. It is his responsibility to perform the work/services to the highest standard of workmanship. The Contractor's occupancy of the site shall not restrict authorized entry by other parties.

o) The Contractor must avoid any social conduct that is unacceptable to the community and which could prejudice the interest and reputation of the Employer (This will include misconduct both in public and private places).

p) The Contractor and his/her employees involved in this contract MUST be inducted on safety by the Employer before commencement of the works. **No Contractor must work on the Employer's site without first being inducted and wearing the correct safety equipment.** It is the responsibility of the Contractor to make timely arrangements for safety induction with the Employer.

q) The Contractor shall equip workers with the appropriate safety gear, tools and equipment unless specified that the Employer shall supply these or some of the items. The safety gear must be approved and the Employer reserves the right to reject substandard safety gear. The Contractor must immediately report to the Employer any accident or incident which may occur during his performance of the contract.

r) The Contractor shall not burn items or keep explosives/inflammables material on site unless authorized by the Employer in writing. Any such authority shall not relieve the Contractor from any liability or obligation under this Contract and he shall be responsible for all his actions.

s) The Contractor shall be responsible for disposal of all rubbish and waste from his/her work site. The work site must be kept neat and tidy at all times.

t) The Contractor must ensure workers are fully fit and are not a health /safety risk to other site workers. No worker is allowed on site under the influence of alcohol or drugs. The Employer reserves the right to ban such workers from working any of the Employer's sites.

TATA CHEMICALS MAGADI

FORM OF TENDER

NAME OF CONTRACT: **PROPOSED CONSTRUCTION OF SINGIRAINI BOREHOLE PIPELINE AND FENCING WORKS**

To: **THE HEAD OF PROCUREMENT,**
TATA CHEMICALS MAGADI LTD.,
P. O. BOX 1-00205,
MAGADI

1. Having examined the Terms and Conditions of Contract, the Specifications and the Bills of Quantities attached for the provision/execution of the above-named service/work, we, the undersigned, offer to enter into a contract to provide and execute fully such Services/work and remedy any defects therein in full conformity with the Conditions of Contract.

2. The Tender sum (in Figures) Kshs. .....

3. The tender sum (in Words) Kenya Shillings .....

.....
(*or such other sum as may be ascertained in accordance with the said Conditions*)

4. We undertake, if our Tender is accepted, to commence the Works within seven (7) days of receipt of the order to commence and to complete and deliver the whole of the works within **Eight (8) Calendar weeks (contract period).**
5. We agree to abide by this Tender for a period of sixty (60) days from the date set for submission of the Tender and it will remain binding upon us and may be accepted at any time before the expiry of that period.
6. We acknowledge that this document containing 24 numbered pages is complete in every respect for the purposes of setting rates.
7. We undertake to provide within seven (7) days of the acceptance of our tender and before signing of the Contract Agreement **a third party insurance** (See Conditions of Contract Clause 22) covering all the works including the work force and to be approved by the Employer.
8. We further agree that until and unless a formal Contract Agreement is executed, this Tender, together with your Purchase Order (PO) thereof, shall constitute a binding contract between us
9. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this ..... day of .....

Signature ..... in the capacity of .....

duly authorized to sign tenders for and on behalf of .....

.....

(NAME OF BIDDER IN BLOCK LETTERS)

Address .....

.....

Witness ..... Signature .....

Address .....

.....

TATA CHEMICALS MAGADI

APPENDIX TO FORM OF TENDER

	Clause	
Amount of Security (if any)	10.1	Ten (10) percent of the Contract Price
Minimum amount of third party insurance (insurance per occurrence, with the number of occurrences unlimited)	23.2	0.5% of the total contract sum
Time for issue of notice to commence	41.1	Seven (7) days
Time for Completion	43.1	Five (10) Calendar Weeks
Amount of Liquidated Damages	47.1	Kshs 5,000.00 per day
Defect Liability Period	49.1	Six (6) Months
Percentage of Retention	60.2	Ten percent (10%) of certified amount
Limit of Retention	60.2	Five percent (5%) of Tender Sum
Minimum Amount of Interim payment Certificates	60.2	One Million Shillings (Kshs 500,000.00)
Release of Retention Monies	60.2	On completion of defect liability period
Time within which payment is to be made after receipt of invoices.	60.2	Ninety (30) days
Appointment of Arbitrator	67.1	Chairman of the Engineer's Registration Board
Initials of Signatory of Tender		.....

(**Notes:** Missing detail(s) in the list above shall be inserted before issue of Tender documents. Where a number of days are to be inserted, it is desirable, for consistency with the Conditions, that the number should be a multiple of seven.

CONTRACTOR CAPACITY

PLANT AND EQUIPMENT TO BE DEPLOYED TO THE WORKS

Item	Plant/Equipment	Registration No.	Ownership Status (tick)	
			Owned	Hired

TECHNICAL STAFF TO BE DEPLOYED TO THE WORKS

ITEM	NAME	ACADEMIC & TECHNICAL QUALIFICATIONS (Attach documents)

TATA CHEMICALS MAGADI

FORM OF AGREEMENT

This Agreement made the _____ day of _____ 2018

Between **TATA CHEMICALS MAGADI LTD**

of **P.O BOX 1 – 00205 MAGADI** (*hereinafter called "the Employer"*) of the one part and

_____

of _____ (*hereinafter called "the Contractor"*) of the other part

Whereas the Employer is desirous that certain Works should be executed by the Contractor, viz **THE PROPOSED CONSTRUCTION SINGIRAINI BOREHOLE PIPELINE AND FENCING WORKS.** and has accepted a Tender by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

Now this Agreement Witnesseth as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read and construed as part of the Agreement, viz:
   The Letter of Acceptance; The said Tender; The Conditions of Contract (Parts I and II); The Technical Specifications; The Drawings (if any); The Bill of Quantities; and Addendum (if any) issued by the Employer
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any 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.

In Witness whereof the parties hereto have caused this Agreement to be executed the day and year first before written in accordance with their respective laws.

Signed Sealed and Delivered by the .....

Signature ..... in the capacity of .....

duly authorized to sign tenders for and on behalf of **TATA CHEMICALS MAGADI LTD**

In the presence of ..... Signature .....

Signed Sealed and Delivered by the .....

Signature ..... in the capacity of .....

duly authorized to sign tenders for and on behalf of .....
(NAME OF CONTRACTOR IN BLOCK LETTERS)

Witness ..... Signature .....

Address ....

PART B

CONDITIONS OF CONTRACT

General Conditions of Contract applicable in this contract shall be "The Conditions of Contract (International) for works of Civil engineering Construction Latest Edition, published by the *Federation International Des Ingenieurs – Conseils* (FIDIC)".

These conditions shall be read together with the "Conditions of Particular Application" stipulated hereafter

Conditions of Particular Application shall be as defined in this contract and all Purchasing and Procurement conditions of the Client.

Conditions contained in the Conditions of Particular Application shall be deemed to prevail in the event of any contradiction with a condition contained in the General Conditions of Contract.

CONDITIONS OF PARTICULAR APPLICATION OF THE CONTRACT

NOTE: The conditions of Particular Application listed hereinafter shall amend or supplement the appropriate Clauses in the General Conditions of Contract and where reference is made herein to specific Clauses or Sub-Clauses reference must also be made to these Clauses in the General Conditions. Where contradictions exist between these Conditions of Particular Application and the General Conditions of Contract Clauses, these Conditions shall prevail.

CLAUSE 1.1 : DEFINITIONS

(i)	Employer:	TATA CHEMICALS MAGADI Ltd P O Box 1, 00205 Magadi.
(ii)	Employer's Representative:	Any technical person appointed by the Employer, and notified to the Contractor.
(iii)	Tenderer:	Any individual, joint venture, or legal entity, tendering for the execution of the Works
(iv)	Successful Tenderer:	The Tenderer whose Tender has been accepted by the Employer but still has not been assigned the execution of the Works.
(iv)	Material:	Shall be all materials to be permanently incorporated into the Contract Works.

CLAUSE 14 : PROGRAMME TO BE SUBMITTED

(Supplement) Notwithstanding anything contained in this clause the Tenderer shall submit his detail programme within Seven (7) days of the date of acceptance of his tender.

CLAUSE 22 : INSURANCE OF WORKS, ETC

The contractor shall insure in the joint names of the Employer and the Contractor a against all loss or damage from whatever cause arising (other than the excepted risks) for which he is responsible under the terms of contract and in such a manner that the Employer and the Contractor are covered during the period of construction of the works and are also covered during the period of Maintenance for loss or damage arising from a cause occurring prior to the commencement of the Period of Maintenance and for any loss or damage occasioned by the contractor in the course of any operations carried out by him for the purpose of complying with this obligations;-

a) The works and the Temporary Works to the full value of such works executed from time to time.
b) The materials, constructional plants and other things brought to the site by the contractor to the full value of such materials and other things.

CLAUSE 42 : POSSESSION OF SITE

Add the following:-

"The Employer shall provide right of access to the Site and the Contractor shall bear all expenses and charges for any additional rights of way required

by him. The Contractor shall also provide at his own cost any additional accommodation required by him for the purposes of the Works".

CLAUSE 43 : TIME FOR COMPLETION

Add the following:-

The construction and completion of the works will be phased. Liquidated damages as provided for under Clause 48 (1) of the Conditions of Contract will be assessed and charged on the basis of delay caused to each phase.

CLAUSE 48 : CERTIFICATE OF COMPLETION OF WORKS

(Supplement) "Should the Employer wish to take over any portion of the works after completion of such portion and before completion of the whole works the Employer shall have the power to do so provided that the normal progress of the Works is not impeded or otherwise by agreement between the Contractor and the Employer's Representative.

In addition to the foregoing the Contractor shall comply with the stipulated periods for Sectional Completion of the Works.

CLAUSE 49: PERIOD OF MAINTENANCE

(Supplement) The period of Maintenance as defined shall be six (6) Calendar per months.

(a) It should be noted that parts of completed Works may be commissioned for use by the public and /or other Contractors and staff on site. Pending the adoption of the work by the Employer the Contractor shall be liable for care and maintenance of works.

(b) If the permanent reinstatement of such work is to be carried out by the Employer or by some person other than the Contractor or any Sub-Contractor to him the Contractor shall at his own cost and independently of any requirement of or notice from the Employer's Representative be responsible for the making good of any subsidence or shrinkage or other defect, imperfection or fault in the temporary reinstatement of such Works and for the execution of any necessary repair or amendment thereof from whatever cause the necessity arises until the end of the period of Maintenance in respect of the works beneath such Works until the Employer or other period as aforesaid shall have taken possession of the Site for purpose of carrying out permanent reinstatement whichever is the earlier and shall indemnify, and save harmless the Employer against and from any damage or injury to the Employer to third parties arising out of or in consequences of any neglect or failure of the Contractor to comply with the foregoing obligations or any of them and against and from all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto. As from the end of such Period of Maintenance or the taking of possession as aforesaid whichever shall first happen, the employer shall indemnify and save harmless the Contractor against and from any damage or injury as aforesaid arising out or in-consequences of or in connection with the said permanent reinstatement or any defect, imperfection or failure of or in such work of permanent reinstatement and against and from all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto. Where Employer or other person as aforesaid shall take possession of the Site as aforesaid in sections or lengths the responsibility of the Contractor under paragraph (a) of this Sub-Clause shall cease in regards to any such section or length at the time possession thereof into taken but shall during the continuance of the said Period of Maintenances continue in regard to any length of which possession has not been so taken and the indemnities given

by the Contractor and the Employer respectively under the said paragraph shall be construed and have effect accordingly.

CLAUSE 60: CERTIFICATES AND PAYMENT

1. PAYMENT

(a) The Contractor shall submit to the Employer's Representative after the end of assignment or completion of works for checking and certification of statement showing the estimated value of the permanent work executed up to the end of the works (if such value shall justify the issue of a final Certificate) of the Contractor will be paid at the end of the works, on the certificate of the Employer's Representative the amount due to him on account of the estimated value of permanent work executed up together with the cost of materials for permanent work delivered by the Contractor on the Site and approved by the Employer's Representative, and in addition such amount as the Employer's Representative may consider fair and reasonable for temporary works for which separate amounts, if any, are provided in the Bills of Quantities subject to a retention as specified in the Appendix to the Conditions on the full amount of payment.

Provided that no Interim Certificate shall be issued for a less sum than that named in the Tender at any one time.

(b) The final release of all retention money shall become due and paid to the Contractor thirty (30) days after the completion of the "Maintenance Period" notwithstanding that at such time there may be outstanding claims by the Contractor against the Employer.

If at such time there shall remain to be executed by the Contractor any work ordered during such period pursuant to Clauses 49 or 50 hereof the employer shall be entitled to withhold payment until the completion of such works of so much of the retention money as shall in the opinion of Employer represent the cost of the works remaining to be executed. In the event of different maintenance periods having become applicable to different parts of the works pursuant to Clause 49 hereof the expression "expiration of the period of maintenance" shall for the purpose of this Sub-Clause be deemed to mean the expiration of the latest of such periods, notwithstanding that should the Employer's Representative decide that the Contractor has fulfilled all of his obligations under the part of the Contract which bears the shorter maintenance period then the Employer's Representative may decide to release a proportion of the retention money held upon expiration of this shorter maintenance period in an amount pro data to the cost of these works against the total cost of the works.

CORRECTION AND WITHHOLDING OF CERTIFICATE

(c) The Employer's Representative may by any certificate make any correction or modification in any previous certificate which shall have been issued by him and shall have power to withhold any certificate if the works or any part thereof is not being carried out to his satisfaction.

TIME OF PAYMENT

(d) Payment upon each of the Employer's Representative's Certificates shall be made within Ninety (90) days after such Certificates have been signed by the Employer's Representative.

CLAUSE 68 : NOTICES

This clause is replaced by the followings:

(1) The Contractor shall furnish the Employer with an address in Kenya and any notice to be given to the Contractor shall be served by sending the same to such address or by delivering the same to the Contractor's office or his Site office.

(2) Any notice to be given to the Employer under the terms of the Contract shall be served by sending the same or leaving the same at the office of the Employer, Tata Chemicals Magadi Limited, or by delivering the same to a place approved by the Employer.

CLAUSE 70 : INCREASE OR DECREASE OF COSTS

(1) The Contract Sum, and a subsequently added to or deducted from in accordance with provisions of this Contract, shall be deemed to have been calculated to include all duties on materials to be incorporated into the finished works. If at any time during the period of the Contract the duties shall be varied and in the opinion of the Employer's Representative this shall affect the cost to the Contractor of such materials, then the Employer's Representative after due consultation with the Employer, shall ascertain the net difference in cost of such materials. Any amount from time to time so ascertained shall be added to or deducted from the Contract Sum as the case may be. In the purpose of this clause, 'duties' shall include all customs and excise charges, tariffs, taxes and other duties imposed by statutory or other authority in the country where the Works are being carried out.

CLAUSE 72 : TAXES

Notwithstanding any relief from prescribed dues and charges including customs duties which may be allowed on Plant, materials or other things imported for the purpose of the Contract, the Contractor shall pay all prescribed dues and charges including customs duties on all such plant, material or other things which he disposes of in Kenya during the currency of this Contract or after termination thereof.

CLAUSE 73 : LAW

This Contract shall be construed in accordance with and is subjected to the Laws of the Republic of Kenya.

The Contractor shall comply with all Government Laws, Ordinances and Regulations, all Local Authority By-Laws and Regulations and Works. He shall pay all fees and give all notices required by the said Laws, or ordnance.

GIFTS, INDUCEMENTS AND REWARDS

(a) The Employer shall be entitled to cancel the Contract and to recover from the Contractor the amount of any loss resulting from such cancellation, if the Contractor or any person employed by him or acting on his behalf (with or without the knowledge of the Contractor) shall have offered or given or agreed to give to any person any gift or consideration of any kind as an inducement or reward for doing, forbearing to do, or for having done or forborne to do any action in relation to obtaining or execution of the Contract.

(b) **ADVERTISING AND NON-DISCLOSURE OF INFORMATION**

The Contractor or his Representative shall not exhibit photographs of the Works or advertise the works without the prior approval of the Employer's Representative. In addition the Contractor or his Representative shall not disclose any information concerning the works to any party or parties not connected with the Contract nor shall he or his Representatives issue press releases relating to the Works to any media.

(c) **RECOVERY OF SUMS DUE FROM CONTRACTOR**

When under the Contract any sum of money shall be recoverable from or payable by the Contractor the same may be deducted from any Sum then due or which any time thereafter may become due to the Contractor under the Contractor.

(d) **LANGUAGE**

The ruling language shall be in English.

PART C

TECHNICAL SPECIFICATIONS

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

GENERAL

Description of the works

The contract works include:

a) Construction of 5.1 Km HDPE pipeline,
b) Construction of a chain-link fence and an access gate

The site is located about 40 kilometres from the Magadi. At Elangatawaus (Mile 46 trading centre) where the tank is located, and the connecting borehole is 5.1 Km away.

Provision of equipments material and labour

The contractor shall provide all equipments, transport consumable materials and labour necessary for the satisfactory completion of the works in compliance with the specifications herein. The Client Engineer reserves the right to inspect plant and materials prior to contractor selection, and may reject plant or material that in his/her opinion is substandard or inappropriate. The contractor shall provide full descriptions of all plants to be deployed for these works. The contactor shall present method statements describing in detail the proposed approach to work.

The contactor shall provide summary detail of the experience of key personnel to be deployed for these works.

Occupation of site

The employer will provide land on which the works shall be constructed. The contractor shall be given possession of such parts of the site that he requires for activities related to construction works including storage of raw materials, equipment and setting up of camp during the period of contract provided his operation does not interfere with the daily activities of the employer.

The Contractor shall not enter upon or occupy with men, tools, equipment and materials any land other than the land or right of way provided by the employer

Diligent performance

The contractor shall at all times perform the Works diligently and in accordance with sound professional practice. He/she shall not proceed from one stage of works to another without the express permission of the Client Engineer

Decisions regarding Temporary halt, discontinuing of any element or part of any element of these works, or abandonment of these works, shall be discussed jointly between the contractor and the Client Engineer before any further actions are authorized by the Engineer. The Client Engineer's decision shall be final.

The Engineer will require a written submission justifying any steps taken by the successful bidder taken without the Client Engineer's approval. An unsatisfactory explanation shall lead to non-payment for works undertaken without prior agreement, and may be included for consideration as liquidated Damages.

Drawings

The project drawings shall comprise

a) The drawings attached to tender documents
b) Such other drawings and/or sketches as are issued from time to time by the Client representative to deal with design modifications in response to on-site conditions.

Record drawing

As the work proceeds the Contractor shall mark up 'As Built' details on a set of prints of the contract Drawings modified to portray the works as actually constructed and issue to the Client Engineer for approval within 7 days of completion of the works covered by each drawing.

Level datum

The Client representative will establish on site temporary benchmark and will assign a value to it. The Contractor shall establish and maintain such additional benchmarks as are necessary; the form of such benchmarks shall be approved by the Client Engineer.

Contractor's staff, communication, offices etc

General

The contractor shall advice the Client representative at which of his offices any notices may be served in accordance with the conditions of contract.

Language of correspondence and records

All communication from contractor to the Client and the client representative shall be in English language.

All site books, time sheets, records, notes drawings, documents, specifications etc. shall be in English language

Contractor's duty staff & offices

At least one responsible senior representative of the contractor shall be immediately available at all times and he shall be on site during normal working hours.

To such representative shall be delegated full authority to confer with Client Engineer and to take all steps and to issue all those instructions which may be required in an emergency to ensure the safety of all personnel of the works and of all the Employer's and other property on the site and in the immediate vicinity thereof. The Client Engineer may from time to time at his

discretion after taking into consideration all the prevailing conditions allow some relaxation of this clause but such relaxation shall be made only with his written permission and subject to any special conditions which he may then require.

If deemed necessary and upon request by the Client, the contractor shall provide and maintain at the site, offices for the use of representative and to which written instructions by the Client Engineer can be delivered. Any instructions delivered to such offices shall be deemed to have been delivered to the contractor.

Public Relations

The contractor shall designate within his site organization competent staff whose responsibility shall be to ensure good relations.

The location of all yards, stores, workshops, offices, etc. shall be agreed beforehand with the Client Engineer and shall be such as to avoid obstruction and nuisance to public and/or the client.

The contractor shall provide and maintain at or near the site suitable and sufficient shelters, mess rooms, washrooms, latrines etc. as are necessary and customary, to the satisfaction of the Client Engineer Client Engineer and in accordance with the law and regulations of the relevant authorities.

Accommodation for workmen

Where the contractor wishes to construct camp to accommodate his labour, the following requirements shall be adhered to and shall also be subject to the requirement made by the area administration or any local Authority.

Demolition of contractor's temporary structures

The Client Engineer may at any time before the end of the period of maintenance give the contractor notice in writing to demolish and remove those buildings and works which are no longer required, whereupon the title to such buildings and works and materials connected therewith shall revert to the contractor. After the demolition and removal of building and works as required by the Client Engineer and contractor shall level, clear, restore and make good the sites and surrounding ground and fill in and compact all latrines, drains, pits and similar works leaving the satisfaction of the Client Engineer.

First aid outfits

The contractors shall provide and maintain in an easily accessible place at the site o f the works adequate first aid outfits for the whole duration of the contract, to the satisfaction of the Client Engineer. The contractor shall have available at all times a suitable vehicle for conveyance of the sick or injured people to hospital.

Protective clothing

The contractor shall provide all protective or any other special clothing or equipment for his employees that may be necessary.

Inspection by Client Engineer during period of defects liability

The Client Engineer will give the contractor due notice of his intention to carry out any inspection during the period of Defects Liability and the contractor shall hereupon arrange for a responsible representative to be present at the times and dates named by the Client Engineer. This representative shall render all necessary assistance and take note all matters and things to which his attention is directed by the Client Engineer.

Advertisement

No advertisements shall be placed on any boarding or scaffolding erected for any purpose connected with the contract without the written permission of the Client Engineer.

Site investigations

a. Ground levels shown on the drawings are believed to be correct. Should the contractor consider the levels shown to be inaccurate he must draw the attention of the Client Engineer to the discrepancy before interfering with the existing ground.
b. The Contractor must make such site investigations as he thinks fit and satisfy him/her as to the nature of the ground and availability of materials.

Work Programme

The contractor shall submit a work programme showing the sequence and timing of the various stages in the execution of the works as per the conditions of contract.

Facilities for the Client Engineer

In need be and upon request by the client, the Contractor shall provide for the Client Engineer or his representative:

a. Such instruments as are necessary to enable the Client Engineer to check the setting out and make such inspections as he may deem necessary.
b. Such labour and assistance as may be required.
c. Any facilities necessary to enable the Engineer to take samples
d. Provide a temporary site office during the contract period.

Testing facilities

(i) The Contractor shall provide laboratory facilities on site suitable for carrying out tests as shown:-

(ii) Concrete

- Slump
- Crushing strength

(iii) Aggregates

- Particle Size
- Impurities

Should the contractor so wish he may make arrangements for the necessary tests to be carried out by a Laboratory to be approved by the Client Engineer?

Water supply

The contractor will arrange to provide water for use in the camps and on the works. The Contractor must provide any treatment necessary to ensure it is suitable for use as in accordance to health regulations.

Electrical supply

The Contractor must provide his own source of electricity if he so requires.

Security

The Contractor will be responsible for the security of the Works and of site installations during the Contract period. He must provide such fencing, watching & lighting as he deems necessary.

Description of the materials and workmanship

The following apply to all sections hereafter.

a) Materials

Materials, commodities, components and equipment are to be new and unused unless otherwise specified. Handle, store, fix and protect all commodities with care to ensure that they are in perfect condition when incorporated into the work and handed over on completion.

b) Manufacturer's recommendation

Handle, store and fix every commodity strictly in accordance with the printed or written recommendations of the manufacturer and/or supplier. Supply the Client Engineer with copies of the manufacturer's recommendations. Inform the Client Engineer if the manufacturer's recommendations conflict with any other specified requirements, and obtain his instructions before proceeding.

c) Standards

Where commodities or workmanship are specified by reference to Kenya Bureau of Standards (K.S.), or British Standards (B.S.) or Codes of Practice (C.P.) or International (I.S.O.), or other standards, such standards are deemed to be the latest published at the time of tendering. The Contractor will be deemed to have read and understood the standards specified, and no claim for want of knowledge will be allowed. The substitution of commodities or standards of workmanship complying with other standards may be allowed at the discretion of the Client Engineer, but application for permission for such substitution must be made in writing in sufficient time to allow adequate investigation. Obtain Certificates of Compliance with standards and supply to the Client Engineer on request.

d) Local conditions

All materials, commodities, components and equipment must be suitable for use in tropical climates.

Samples

The Contractor shall submit to the Client Engineer samples of materials to be used in the works, the samples must be fairly representative of the bulk to be supplied. Samples should be subject to relevant tests before submission and Test Certificates should accompany the samples.

Clearing site on completion

The site, including borrow pits and spoil dumps shall be carefully tidied up on completion, and shaped to avoid ponding, holes, and dangerous slopes. The borrow pits and spoil dumps must be covered with topsoil neatly trimmed and the whole site left in a tidy and satisfactory condition.

PIPEWORKS

Site Clearance and Grubbing

If and where required, the Site, including the width of the working strip, as agreed by the Engineer shall be cleared of all trees, shrubs, and other vegetation, rubbish, buildings and other obstructions, hard surfacing and rubbish, and other objectionable material of any kind, which, if left in place, would interfere with the proper performance or completion of the contemplated work, would impair its subsequent use, or would form obstructions therein.

After clearance it should be possible to travel the full length of the working strip without difficulty so as to agree on ground level for excavation.

Trees, shrubs, hedges, walls, buildings and other items which are to be preserved as indicated on the Drawings or instructed by the Engineer shall be protected from injury or damage arising from the operations of the Contractor, his subcontractors and other persons under his control and from any other injury or damage which is the responsibility of the Contractor under the Contract.

Where underground structures, manholes, wells and similar items are discovered, their presence shall be reported immediately to the Engineer and they shall not be further disturbed until the Engineer has given his instructions for their disposal.

Where such underground structures, manholes, wells and similar items are demolished and removed from areas which are to be occupied by the Permanent Works, any holes or depressions resulting from such removal shall be filled with similar material as that in the surrounding ground and compacted to a density equal to that of the surrounding ground unless other treatment is shown on Drawings or instructed by the Engineer.

Combustible material arising from site clearance shall not be burned on Site without the written consent of the Engineer. Non-combustible material and material which the Engineer does not permit to be burnt on Site shall be disposed of as spoil. The consent of the Engineer to the burning of material on Site shall not relieve the Contractor of his responsibilities under the Contract.

Organic material from clearing and grubbing operations will not be incorporated in the trench backfill and shall be removed from the project site or retained and incorporated into the topsoil as directed by the Engineer.

All removable items which are to be preserved in accordance with the Drawings, the Specification or the instructions of the Engineer shall be stored on Site in a place of safety and in a manner appropriate to their nature. All such an items shall remain the property of the Employer.

Bituminous or concrete pavements, curbs, and sidewalks which have to be dug up to permit trench excavation shall be removed and replaced in accordance with the requirements of the road Authority having jurisdiction. The sections shall be reinstated in exactly similar construction to the original and shall be maintained throughout the period of the Contract and the Maintenance Period to the satisfaction of the Engineer.

Should any failure occur in a reinstated section, the Contractor will be required to remove the reinstated material and backfilling to a depth to be decided by the Engineer and replace these to the Engineer's satisfaction?

The Contractor shall inspect the Site to determine the extent of work under this item.

Setting Out for Pipeline

Details of pipeline alignment and minimum cover requirements for pipes are given on the Drawings. The Contractor shall ensure that at any point the width of the pipe trench is sufficient to permit the pipe to be laid and protection and backfilling to be placed around the pipe in a manner to the Engineer's satisfaction. The minimum width of excavation which will be allowed in pipe trenches will be as shown on the Drawings.

The Contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position, levels, dimensions and alignment of all parts of the works and for the provision of all necessary instruments, appliances and labour in connection therewith.

If at any time during the progress of the works any error shall appear or arise in the positional levels, dimensions or alignment of any part of the works, the Contractor, on being required to do so by the Engineer, shall at his own expense rectify such error to the satisfaction of the Engineer unless such error is based on incorrect data supplied in writing by the Engineer in which case the expense of rectifying the same shall be borne by the Employer.

The checking of any setting out by the Engineer shall not in any way relieve the Contractor of his responsibility for the correctness thereof.

The Contractor shall carefully protect and preserve all bench marks, sight-rails, pegs and other things used in setting out the works.

After sight-rails have been erected and before excavations are commenced, the alignment and levels thereof will be checked by the Engineer or his representative. The Contractor shall give at least 24 hours notice to the Engineer when sight-rails are read for checking.

In setting out sight-rails, the Contractor shall transfer levels from bench marks which have been established by the Contractor and checked by the Engineer.

Excavation

General Requirements for Excavation and Earthworks

(a) Construction Plant

Before any Constructional Plant for excavtion and earthworks is ordered or delivered to Site, the Contractor shall submit to the Engineer full details of the Plant he proposes to use and the arrangements he propose to make.

(b) Ground Levels

Before any excavation or earthworks is commenced, the site of the excavation or earthworks shall be surveyed by the Contractor in a manner and to the extent required by the Engineer. Drawings recording the survey shall be signed by the Contractor and the Engineer as a true record and the Contractor shall then supply two prints and softcopy the drawings to the Engineer.

Such records shall not be altered in any way unless such alterations are agreed and signed by the Contractor and the Engineer.

(c) Excavated Surfaces

All excavated surfaces shall be finished neatly to the lines and levels shown on the Drawings unless such lines and levels are shown as nominal.

When such lines and levels are stated as nominal, the final lines and levels will be instructed by the Engineer to take into account the conditions of the ground as the excavation nears the nominal lines and levels shown on the Drawings and the Contractor may be required to carry out the excavation in more than one stage in order to arrive at the final lines and levels.

Excavations shall be trimmed and leveled by hand and the bottom layer of 150 mm above trench formation level shall not be removed until immediately prior to the commencement of pipe laying or bedding operations in order to minimize disturbance and deterioration of the bottom of the excavation.

Excavated surfaces which will remain permanently exposed on completion of the Permanent Works shall be cleared of all loose material, pieces of rock, debris, rubbish and the like and left neat and tidy.

(d) Supports to Excavation

All excavation shall be executed within such properly close timbered and sheeted sides as may be necessary and so that any existing structures and the excavations themselves shall be secured against the risk of subsidence and injury.

Where necessary, the sides of excavations shall be properly shored up and supported with proper strutting, planking and wallings, and shall be close sheeted where necessary to prevent the entry of mud, etc., or to ensure the safety of workmen. The Contractor's design and installation of shoring shall be subject to approval by the Engineer.

Care shall be exercised in the moving or removal of trench shields, sheeting, and shoring to prevent the caving or collapse of the excavation faces being supported.

The cost of all such shoring, planking, sheeting, etc., shall be included by the Contractor in his rates for excavation. The cost of any of the above left in the excavation by the Contractor either for the safety of his workmen or because of any difficulty there may be in its removal

shall be deemed to be included in the rates for excavation, and no extra price will be allowed except where ordered by the Engineer No greater length of trench shall be opened at one time than is approved by the Engineer.

(e) Buttresses

The Contractor shall obtain the Engineer's approval before leaving buttresses in excavation

Generally in soft material buttresses left for the purpose of supporting the sides of excavations and maintaining access to premises shall be broken down as refilling proceeds.

(f) Slips and over-excavation

The Contractor shall avoid excavating beyond the lines and levels shown on the Drawings, disturbing ground adjacent to excavations, or damaging material beyond the limits of the required excavation except to provide the minimum adequate working space.

Slippages, excavation for working space, over-excavation and damaged areas shall be made good to the satisfaction of the Engineer. In the case of surfaces on which or against which Permanent Works are to be constructed, this remedial work shall comprise replacing the slipped, over-excavated or damaged material with suitable filling material or with concrete as instructed by the Engineer.

Slips, falls, subsidences and other damage which have the effect of removing or reducing support to existing or proposed structures, services and the like shall be made good in concrete or otherwise in a manner acceptable to the Engineer.

In the case of permanently exposed surfaces, remedial works shall comprise replacing and compacting material similar to that which has been removed in order to provide a surface not less satisfactory than adjacent correctly excavated surfaces. If this is not possible, remedial works shall be as instructed by the Engineer.

No additional payment will be made for the overbreaks and the costs involved in the restoration works.

(g) Records of Excavation

After completion of each section of Permanent Works excavation, the Contractor shall provide the Engineer with a record of the excavation. The record shall comprise all relevant information including the following:

- The location of the excavation;
- The elevation of the original ground and of any groundwater which is encountered during the excavation;
- The measures taken to deal with groundwater;
- The elevation, thickness and classification of all strata encountered;
- The instructed actual levels of excavation. From the time that any portion of the Works shall be commenced, until the end of the Maintenance Period, the Contractor shall be

responsible for protecting the public from anything dangerous to persons or property and the safe and easy passage of pedestrians and vehicular traffic.

The whole responsibility for the efficient barricading, lighting and watching of Works for the proper protection of foot and vehicular traffic and property rests with the Contractor. Every vehicular or road crossing over an open trench shall be protected on both sides by a stout wooden barricade, the uprights being at least 75 mm in least dimension, of minimum length 1.8 m and projecting at least 1.2 m above the ground with two horizontal rails at least 110 mm wide. The Maximum spacing of uprights shall be 4 metres.

Where boards are used to form bridges, they shall be battened together on the underside to prevent sliding and tipping. At least four lamps are to be placed at every footbridge crossing and at every road bridge crossing between the hours of sunset and sunrise.

All trenches and manhole excavations in the vicinity of foot and vehicular traffic must be fenced on all sides. The fences shall consist of at least three 20 mm diameter hemp ropes or no 8 gauge wire strands stretched tightly together between poles or fencing standards securely fixed in solid ground, well clear of the excavation and also enclosing the spoil. The poles or standards shall not be more than 6.0 m apart and the ropes or wires shall be stretched tightly at heights of approximately 0.45 m, 0.75 m and 1.2 m above the ground. Red flags shall be fixed to the barricades at distances of not more than 15 metres apart on both sides of the excavation and also at the ends of the excavations.

All barricades must be erected prior to commencement of the excavations.

At night between the hours of sunset and sunrise, at least two red lights shall be placed at each end of the trench where vehicular traffic is affected.

When a road or street is closed or partially closed to traffic, warning boards to be in accordance with the prevailing traffic regulations, shall be placed on either side of the obstruction and also at distances of approximately 90 metres on either side of the obstructions or at the closest road intersection, as circumstances require. Two red lights and two white lights shall be placed on each warning board at night.

The Contractor shall light and barricade all materials of any description obstructing roads and footpaths. The Contractor shall employ watchmen to guard the works both by night and by day to ensure that barricades and lights are kept in good condition and function efficiently.

Access to Premises

The Contractor shall provide at all times, by means of headings, temporary bridges, etc., access for vehicles and pedestrians to their premises for owners and occupiers of land along the route of the work. Provision must be made to allow the sanitary services to operate without obstruction

All filthy or offensive matter met with during the execution of the works shall not be deposited on the surface of any street road or footpath, but shall at once be carted away to an appropriate dump.

Drains and Services

The Contractor shall remove or divert drains and services as shown on the Drawings or instructed by the Engineer. Each diversion shall be complete before the original drain or service is cut and shall be connected into the original line with the least possible interruption to its operation.

Drains and services that are to be removed shall be cut and stopped off at points instructed by the Engineer in a manner acceptable to the Engineer. Such cuttings and stopping off shall be carried out upon receipt of a written notification from the Engineer.

The Contractor shall maintain the flow in all ditches, channels and other surface waterways at all times including times during which diversions are being carried out. Where such diversions are temporary, the Contractor shall reinstate both the original ditch, channel or other waterway and the site of temporary diversion in a manner acceptable to the Engineer.

Control of Water in Excavations and Earthworks

Unless otherwise required or permitted by the Contract, excavation and earthworks shall be carried out in the dry. The Contractor shall at all times maintain control of water entering excavations from any source.

Water shall not be allowed to flow across or down any excavated surface that is liable to erode. Water emerging on to excavated surfaces shall be trapped and led away by suitable means before any Permanent Works are placed on or against such surfaces.

The Contractor shall provide enough sumps to deal with all flows encountered and shall by pumping or otherwise keep the water level in such sumps at least 0.5 metre below the lowest excavated surface for as long as may be required for the purpose of constructing the Permanent Works.

The Contractor shall repair to the approval of the Engineer any foundations damaged by water.

No water shall be allowed to flow on to earthfill and the surface of msuch fill shall at all times be maintained at a gradient adequate to shed rainwater. Formations or soil structures that deteriorate under ranfall shall either be covered to prevent damage by rainfall or left at least 150mm above formation levels and trimmed immediately before being concreted.

Foundation Stabilization

When unsuitable soil materials are encountered, the unsuitable material shall be removed to the depth determined necessary in the field by the Engineer. The sub-grade shall be restored with compacted Imported Granular Material or crushed rock as recommended by the Engineer. The appropriate bedding or base material will be placed on this restored foundation.

When rock encroachment is encountered, the rock shall be removed to a point below the intended trench or excavation sub-grade as determined necessary in the field by the Engineer. The sub-grade shall be restored with compacted Imported Granular Material as directed by the Engineer. The appropriate bedding or base material shall be placed on this restored foundation.

When excessively wet, soft, spongy, or similarly unstable material is encountered at the surface upon which the bedding or base material is to be placed, the unsuitable material shall be removed to the depth determined necessary in the field by the Engineer. The trench shall then be restored with Imported Granular Material enclosed in filter fabric as directed by the Engineer. Larger size rocks, up to 75mm (3"), with appropriate gradation, may be used as recommended by the Engineer. The appropriate bedding or base material shall be placed on this restored foundation.

Pipe Laying, Jointing and Fittings

General

All pipes and fitting shall be examined for defects prior to laying and defective pipes shall be rejected and removed from site. Pipes must be handled by approved methods of lifting at every point of loading and unloading.

Every pipe shall be 'laid separately. When laid on granular bedding the bed material shall be dug at pipe socket so that the pipe rests on the full length of the barrel. When the pipe is to be laid with a concrete bed and haunch or surround, the pipes shall be packed up at each joint. Precast concrete cradles are to be used to support the Pipe. A minimum of two cradles shall be used per pipe.

The trench shall be inspected, by the Engineer after excavation have been completed to formation level and after bedding material has been compacted, but prior to laying of the pipes.

Properly fitted stoppers shall be provided and constantly used to close the ends of all incomplete pipelines. The stoppers are only to be removed immediately in advance of pipes being laid and jointed.

After laying to the correct line and level pipes shall be jointed. All joints shall be assembled to the satisfaction of the Engineer and strictly in accordance with the manufacturer's instruction.

Pipeline alignment and gradients

The pipes are to be laid to the alignment and gradients shown on the Drawings, but subject to any modifications ordered by the Engineer in writing.

Sight-rails are to be set up where directed and the pipes shall be to correct line and level in a perfect straight line between adjacent sight-rails except where otherwise permitted by the Engineer. The sight-rails are to be provided, fixed and maintained until the pipes have been

laid and tested by the Contractor at his own expense. The Contractor will be held responsible for any errors which may occur in the execution of the works through the sight-rails being disturbed, faulty setting out, or any other cause whatsoever and he shall make the works good at his own expense.

Sight-rails shall consist of a horizontal bar not less than 150 mm deep painted in white with top edge planned true and smooth, firmly nailed to the vertical posts. The posts having a minimum of 75 mm diameter shall be firmly planted, one on either side of the trench.

The top-edge of the sight-rail is to be accurately fixed to a definite height (in half metre) above the level of the pipeline to be constructed. The centre line of the pipeline shall be indicated on each sight-rail, both back and front, by a vertical black 15 mm wide line drawn thereon. The depth of the pipeline below the sight-rail shall be marked on the rail.

Boning rods are to be used in conjunction with the sight-rails and are to be accurately made to the various lengths in half metre.

In the event obstructions not shown on the plans are encountered during the progress of the work, and which will require alterations to the plans, the Engineer shall have the authority to change the plans and order the necessary deviation from the line and grade. The Contractor shall not deviate from the specified line and grade without prior written approval by the Engineer.

Backfilling of Trenches

Backfilling of trenches that have been timbered shall be carried out with utmost care and constant supervision. Where in the opinion of the Engineer there is a risk of collapse, the timber shall be carefully withdrawn one at a time. Any voids behind the timbering shall be filled with approved material. The rate of lifting the timber shall not be in advance of the backfilling by more than 150 mm.

Pipe Zone Backfill

The pipe zone shall include the full width of the trench from 150mm (6") below the bottom of the pipe to 300mm (12") above the top of the pipe and extends into manhole or vault excavations to the point of connection to or penetration of such structure.

The backfill to pipe zone shall be done in two layers as follows:

Imported Granular bedding

This material shall be evenly spread and carefully compacted up to the underside of the pipe barrel and the surface trued to the required gradient. This area shall be mechanically compacted to attain 90% relative density.

After laying the pipe, the granular material shall be brought up to spring line of the pipe barrel.

Care shall be taken in placing the imported granular backfill material simultaneously around the main pipeline and appurtenance pipes so that the pipe barrel is completely

supported and that no voids or uncompacted areas are left beneath the pipe or on the sides of the pipe. Care shall be taken to place and compact material simultaneously on both sides of the pipe to prevent lateral movement and to prevent the crushing or denting of the pipes.

Soils tests may be taken on this layer of backfill as directed by the Engineer.

2.4.6.3 Selected backfill material in pipe surround

After the spring line backfill has been approved by the Engineer, backfill of the remainder of the pipe zone may proceed up to a level of 300-mm above the top of the pipe with suitable and approved fine material which shall be compacted at its optimum moisture content in 150 mm layers.

Care shall be taken not to drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe. Sand cone tests shall be taken on this layer of backfill.

The use of a backhoe-mounted compaction wheel is prohibited within the pipe zone to 300mm above the top of the pipe.

Under no circumstances shall consolidation by water settling or water-setting methods (i.e. jetting, diking, etc.) be permitted.

Where pipes are surrounded by concrete and the Contractor elects to use shuttering to the sides of the concrete surround, the void between the concrete and the side of the trench shall be backfilled with approved granular non-plastic material which shall be saturated with water and well compacted before backfilling above the concrete surround is commenced. No backfilling shall be commenced within 72 hours of the pouring of concrete surround or haunches unless otherwise directed by the engineer.

2.4.6.4 Trench Zone Backfill

The trench zone includes the portion of the trench from the top of the pipe zone to the bottom of the pavement zone in paved areas, or to the existing surface in unpaved areas, and extends into manhole or vault excavations above the pipe zone.

The backfilling of trenches other than in roadways shall be completed in 150 mm layers to a level of 75 mm above the surrounding ground with selected material which shall be free from boulders having any one dimension greater than 100 mm

Trench Compaction Requirements

Each backfill layer shall be separately compacted by a vibrating roller or diesel operated frog rammer. Consolidation by water settling methods such as jetting or flooding or use of hand rammers shall be prohibited.

Compaction tests shall be performed at random depths, and at random intervals not to exceed 50m, as directed by the Engineer. Relative compaction shall be determined by the field density tests in accordance with ASTM D 1557 / AASHTO T180.

Unless otherwise shown on the drawings or otherwise described in the Specifications for the particular type of pipe installed, relative compaction in pipe trenches shall be as follows:

- Pipe zone - 90% relative compaction.
- Trench zone - 90% relative compaction.
- Structural section in paved areas - per roads Authority requirements, 95% minimum.
- Imported Granular Material for over excavation or foundation stabilization - 90% relative density.

If the backfill fails to meet the specified relative compaction requirements; the backfill shall be reworked until the requirements are met. The requirements of the roads Authority having jurisdiction shall prevail on all public roads.

Compaction of each layer shall be approved before the next layer is placed. Strict attention shall be paid to the moisture content of the backfill material to ensure maximum density of the compacted material. If necessary, water shall be added during spreading of the material.

All excavations are subject to compaction tests.

The Contractor shall include in its rate for backfilling requirements for refilling trenches. It is necessary for the Contractor to import suitable backfill materials if so required.

Hydrostatic Pressure Testing for Pipeline

After completion of the pipeline installation, including partial backfill, the Contractor shall conduct, in the presence of the Engineer, concurrent hydrostatic pressure and leakage tests in accordance with AWWA C600.

The Contractor shall provide all personnel, equipment, corporation stops, gauges, pumps, standpipes, temporary blocking and other necessary apparatus required to perform the leakage and hydrostatic pressure tests. Standpipes shall be a minimum of 4” in diameter.

Tests shall be made on sections not exceeding 300 m in length. Dead ends, bends and other fittings shall be properly restrained before testing. The test pressure shall not be less than 150 psi at the highest point. Along the test section, the test pressure shall not exceed pipe or thrust-restraint design pressure, shall be of at least 2 hour duration, and shall not vary by more than 5 psi for the duration of the test.

Before testing, all air shall be expelled and all caps, plugs and fittings shall be properly braced. Air shall be expelled by opening air release vents or corporation cocks at the high points of the line. All valves shall be closed once all the air is released. Pressure shall then be slowly applied to the portion of the pipeline being tested by means of a motor driven pump and the system shall be allowed to stabilize prior to conducting the test.

The pipeline shall be pressurized to 150 psi and held at this test pressure for at least two (2) hours duration, with the leakage and pressure recordings being conducted simultaneously. Any make-up water shall be carefully measured by a meter or by pumping the water from a vessel of known volume.

After every five (5) psi drop (in the event the psi drop should occur) the pressure shall be returned to 150 psi and leakage recorded.

The Leaks shall be repaired and the system re-tested.

No pipeline installation will be approved if the pressure varies by more than 5 psi during the duration of the test. All exposed piping, fittings, valves, hydrants, and joints shall be examined carefully during the hydrostatic pressure test. Any damaged or defective materials discovered following the pressure test shall be repaired or replaced with sound material at Contractor's own cost, and test shall be repeated to the satisfaction of the Engineer.

The "testing allowance" is defined as the quantity of water necessary to return post-test pipe pressure to the specified test pressure. The testing allowance shall not be measured by a drop in pressure over a period of time.

No pipeline installation shall be approved if the testing allowance is greater than that determined by the following formula:

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

Where
:

L = testing allowance (allowable leakage), in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = test pressure during hydrostatic test, in pounds per square inch

If the testing allowance exceeds the amount as determined in Equation above, the source of the failure shall be located and necessary repairs shall be made to the satisfaction of the Engineer.

Disposal of Excess Excavated Material

The Contractor shall remove and legally dispose of all excess excavated material and demolition debris. Unless areas within the Site have been designated in the Contract or agreed by the Engineer as spoil areas, all spoil shall be deposited in areas to be found by the Contractor outside the Site. It is the intent of these Specifications that all surplus material shall be legally disposed of by the Contractor. Before acceptance of the work by the Engineer, the Contractor shall provide the Engineer with written releases signed by all property owners with whom the Contractor has entered into agreements for disposing of excess excavated material, absolving the Employer from any liability connected therewith.

In depositing spoil, care must be taken not to damage adjoining fences, hedges, gardens or buildings. Any claims to this respect will be the liability of the Contractor.

All spoil tips shall be formed with side slopes which will remain stable under all conditions to which they will be subject and the tops shall be graded to prevent the ponding of water. When tipping of spoil has been completed, spoil tips shall be trimmed and graded to present a neat and tidy appearance.

Temporary stockpiles of materials for later use in the Works shall be formed with side slopes which will remain stable under all conditions to which they will be subject and the tops shall be graded to prevent the ponding of water.

Different materials shall be placed in separate spoil tips or stockpiles unless otherwise agreed by the Engineer.

Spoil tips and stockpiles shall be placed so that there is no risk of material obstructing or polluting watercourses.

Borrow Areas

Borrow areas within the Site which are required to be backfilled shall be excavated with side slopes which will remain stable under all conditions to which they may be subject. On completion of excavation, surfaces shall be cleared of all loose material, pieces of rock, debris, rubbish and the like and left neat and tidy.

If the born area was originally grassed, topsoil shall be replaced and the area replanted with the same type of grass as previously unless otherwise instructed by Engineer.

Sowing, watering control of weeds and re-sowing if necessary shall be carried out efficiently until the end of maintenance period.

MISCELLANEOUS

FENCING

The fencing shall be as detailed on the Drawings, and in general shall follow the recommendations set out in BS 1722, unless otherwise indicated.

Straining posts shall be 100 mm x 100 mm x 3 m long of reinforced concrete, and struts shall be 100 mm x 100 mm x 2.6 m long of reinforced concrete.

Straining posts to be provided at all ends, corners and changes of direction or acute changes of level and at intervals not exceeding 60 m in straight lengths, each shall be strutted in each line of fence.

Holes for straining posts shall be 450 mm square in plan and for struts 500 mm x 300 mm. All straining posts shall be set in foundation concrete for the full size of hole in plan and half the depth of the hole.

GATES

The gates shall be as detailed on the Drawings. They shall be complete with a sliding padbolt locking device and gate stops.

The gates shall be primed with calcium plumbate and painted with three coats of approved oil paint.

SPECIAL SPECIFICATIONS

1) **Location of Works and Access to Site**
The works site is located about 40 kilometers from the Magadi. At Elangatawaus (Mile 46 trading center)

2) **Scope and nature of Works**
As attached in the BOQ the scope of works include;
   1. Conducting a hydrogeological and EIA study and permit application
   2. Drilling of borehole approximate depth 200m
   3. Equipping of Borehole (pump running on solar)
   4. Construction of 20m^3 steel storage tank, 8 m high
   5. Construction of cattle watering trough and two number stand pipes

3) **Work Procedure**
   i. The Contractor should submit a detailed program of works to the Engineer before commencement of the works.
   ii. For any shift working the contractor must ensure there is adequate professional supervision that will guarantee quality workmanship and safety of personnel.

4) **Price, Measurement**
   i. The Contractor rates are assumed to cover all preliminaries anticipated in the works including provision for client's safety requirements, site offices, workmen accommodation & transport and insurance cover. It fixing his rates, the contractor may wish to take note of a 3% withholding tax chargeable on each invoice submitted.
   ii. The rates quoted by the contractor shall be deemed to cover all costs of works as specified and/or as shown on the drawings, including the cost of delivery to site or other agreed place(s) and making good the site after the works.
   iii. Prices shall include for erection, labour, scaffolding and other erection equipment/plant necessary and covering the cost of additional requirements to properly execute the works to the satisfaction of the client.
   iv. Payment for drilling works shall be subject to the bidder having obtained a productive borehole based on his hydro-geological report.

5) **Assessment of Contractors Personnel**
   i. The Engineer will require the Contractor to submit a list of professional and sub-professional personnel to be employed on the site, stating their qualifications and experience. The Contractor shall notify the Engineer at least 14 days in advance on any key personnel transfer or replacement. No transfer of staff shall be effected unless the Engineer grants permission in writing authorizing such transfers or replacement.
   ii. The Engineer reserves the right to determine suitability of persons employed by the Contractor and may request replacement at any time of any members of Contractor's team if in the opinion of the Engineer; the presence of such a person is detrimental to the execution of the Contract. The Engineer shall give written notice to the Contractor stating his reasons substantiating the request for removal of such persons. The Engineer's decision shall be final and binding.

6) **Plant and Equipment**
If in the opinion of the Engineer the plant or equipment used by the Contractor for any specific item of work does not fulfill the requirements of the specification, in respect of workmanship, quality and safety of structures, such item of plant shall be replaced with the same or equivalent item to the satisfaction of the Engineer. No extra payment shall be made in respect of such replacement.

7) **Notice of Operations**

The Contractor shall from time to time supply to the Engineer in writing full information with respect to locations in which any material for the work is being prepared. Such general notices will enable arrangements for checking the works.

8) Working Hours

At the commencement of the Contract, the Contractor shall submit to the Engineer in writing the hours that shall be considered normal working hours. When approved, the working hours shall be maintained throughout the continuance of the Contract. Where the Contractor wishes to work outside these hours, he shall obtain written permission from the Engineer at least 24 hours in advance to enable the Engineer make a provision for proper inspection of the works.

9) Faulty Works

Any work that fails to comply with the specifications shall be rejected and the Contractor will at his expense make good any default as directed by and to the satisfaction of the Engineer.

10) Communication

i. All instructions and communications relating to this contract shall flow from the Employer or a person to whom the Employer delegates the authority to issue such communication. Instruction given by the Employer shall be in writing, provided that if for any reason the Employer considers it necessary to give any such instruction orally, the Contractor shall comply with such instruction. Confirmation in writing of such oral instruction given by the Employer, whether before or after the carrying out of the instruction, shall be deemed to be an instruction within the meaning of this Sub-Clause. Provided further that if the Contractor, within 7 days, confirms in writing to the Employer any oral instruction of the Employer and such confirmation is not contradicted in writing within 7 days by the Employer, it shall be deemed to be an instruction of the Employer.

ii. All communication to the Contractor will be directly to the Contractor or through a nominated contact person(s). The name(s) of the contact person(s) should be advised prior to awarding of the contract.

- The Contractor's nominated person must be capable of communicating in both English and Kiswahili languages
- There will be regular meetings between both parties to review the progress of the contract and address all issues outstanding. Each meeting must be properly documented in writing and circulated to both parties.
- Inspection of the works/services being provided will be undertaken by the Employer in the presence of the Contractor at a time mutually agreed.

11) Payment Terms

i. The basis for actual payment of any item shall be measured quantity of work actually done multiplied with the rate for the said item. Any variation from the original quantity on which the quotation was made which results in either an increase or decrease in the measured quantity of work as completed shall cause appropriate additions or deductions to the quotation.

ii. Any written instructions from the Engineer that may result in additional work over and above that for which the Contractor quoted will be considered as extras and shall be paid for on the basis of measured additional quantity based on the prevail contract rate.

iii. The Contractor shall be paid the agreed sum for services rendered provided the services have been completed to the satisfaction of the Employer. No payment will be made if the work has not been completed to the agreed standards.

iv. The Contractor must submit his/her invoice against which the Employer shall effect payment. Payment will be made within thirty (30) days from the date of the invoice.

v. No advance payment will be made and payment will only against an invoice submitted by the contractor on the basis of an agreed and signed payment certificate for work satisfactorily completed.

PART D

BILLS OF QUANTITIES

PREAMBLE TO SCHEDULE OF PRICES

1. General

A

1.1 The Schedules of prices are for the purpose of recording the rates and prices upon which the contract price is determined and are not to be taken as descriptive of the extent of Works to be executed or the extent of the Contractor's obligations.

1.2 The rates and prices in the schedule of prices shall be the full consideration for the Contractor's obligations under the Conditions of Contract. Specification and Drawings as reasonably could have been anticipated at the time of tender.

1.3 The rates and prices shall be deemed to include allowance for all the materials, equipment, labour, superintendence, services and all other things necessary to complete the Works, render them functional as intended, and remedy any defects therein, in accordance with the contract.

1.4 The contractor rates are assumed to cover any preliminaries anticipated in the works including provision for client's safety requirements, site offices, workmen accommodation & transport and insurance cover. It fixing his rates, the contractor may wish to take note of a 3% withholding tax chargeable on each invoice submitted.

1.5 The rates and prices in the Schedule of Price will be used for valuing the work executed and the Engineer will measure the whole of the Works executed in accordance with the Contract.

2. Completion of Schedule of Prices

2.1 The Schedule of prices shall be completed in conformity with Instructions to Tenders and clause 15 of the Preamble to Bills of Quantities above. Tenderers are advised to peruse and carefully consider the requirements of the Instructions to Tenders before making any entries in the Schedule of Prices.

2.2 The rates and prices inserted by the tenderer in the Schedule of Prices are to be the full inclusive costs of the Works, compete in place and in accordance with the Specifications and Drawings, including all costs and expenses for the construction of the works described, together with the costs of Contractor's Equipment and of any temporary installations which may be necessary and all general risks, liabilities and obligations set forth or implied in the documents on which the Contract is based.

2.3 No alternation shall be made to the Schedule of Prices and no extra item shall be inserted. The tenderer shall satisfy himself that the Tender Price arrived at and the pricing given is sufficient compensation for completing the whole of the works and remedying any defects therein in accordance with the Tender Documents.

2.4 The rates and prices entered by the tenderer shall be deemed to include for the cost of any price increases which may affect the works and which may occur during the validity of the Tender and any extended period of validity thereof, and during the execution of the Works.

PREAMBLE TO DAY WORK

The Client may if in his opinion, it is necessary or desirable, issue an instruction that any varied work shall be executed on a day work basis. The Contractor shall then be paid for such varied work under the terms set out in the day work schedule included in the Contract and at the rates and prices affixed thereto by him in the tender.

In respect of such works executed on a day work basis, the Contractor shall, during the continuance of such work, deliver each day to the Client or Client's Representative, an exact list in duplicate of names, occupation and time of all workmen employed on such work and a statement also in duplicate, showing all equipment used. Client or Client's Representative shall, on the copies of each list and statement, record in writing, signed by him, the extent to which he agrees with the accuracy thereof and return one copy to the Contractor.

The Contractor shall deliver to the Client a priced statement of the labour and equipment used and the Contractor shall not be entitled to any payment unless and until such statement has been properly rendered and supported by one copy of each of the signed lists and statements. Provided always that the Client considers that for any reason the sending of such lists or statement by the Contractor, in accordance with the foregoing provision, was impracticable he shall nevertheless be entitled to authorize payment for such work as day work on being satisfied as to the time employed and the labour deployed.

In the absence of a Day work Schedule, the Contractor shall be paid the aggregate of the gross remuneration of the workmen and of any foremen for the time they are actually engaged on the work concerned and the net cost of the materials actually used.

PREAMBLE TO BILLS OF QUANTITIES

1. The Contractor is required to check the numbers of the pages and should any be found to be missing or in duplicate or the figures or writing indistinct he must inform the Engineer at once and have the same rectified. Should the Contractor be in doubt about the precise meaning of any item, word or figure, for any reason whatsoever, or observe any apparent omission of words or figures, he must inform the Engineer in order that the correct meaning may be decided upon before the date for the submission of the Tender.

2. No liability whatever will be admitted nor claim allowed in respect of errors in the Contractor's Tender due to mistakes in the Bills of Quantities which should have been rectified in the manner described above.

3. These Bills are to be read and priced in conjunction with the Conditions of Contract, the Specification, the Drawings and Schedules.

4. The quantities set forth in the Bills of Quantities are believed to be approximately correct, and to represent substantially the work to be carried out, and are given for the purpose of enabling the Employer to compare Tenders on an equal basis.

5. The prices and rates inserted in the Bills of Quantities will be used for valuing the work executed, and the Engineer will re-measure the whole of the works executed in accordance with this contract.

6. The prices and rates inserted in the Bills of Quantities are to be the full inclusive values of the work described under the items, including all costs and expenses which may be required in and for the construction of the work described, together with any temporary works and installations which may be necessary, and all general risks, liabilities and obligations set forth or implied in the documents on which the tender is based.

7. The brief description of the items given in the Bills of Quantities is purely for the purpose of identification, and in no way modifies of supersedes the details descriptions given in the Conditions of Contract and Specification. When pricing items, reference is to be made to the Conditions of Contract, and Specifications for the full directions and description of work and materials.

8. A price or rate is to be inserted, in ink, against each item in the Bills of Quantities and Schedule of materials, whether quantities are stated or not, and if the Tender includes the cost of a particular item elsewhere in his rates or prices, he shall insert the word "**Nil**" against both the rate and extensions of that particular item. Should the Tenderer omit to price an item, then it will be assumed that he has included the cost of the item elsewhere in his rates or prices.

9. No alteration shall be made to the Bills of Quantities or Schedule of materials and no extra item shall be inserted. The Tenderer shall satisfy himself that the Tender sum arrived at by pricing and quantities and items given is sufficient compensation for constructing and maintaining the whole of the works in accordance with these contract documents.

10. The Bills of Quantities have been prepared generally in accordance with the Standard Method and Measurement – Institution of Civil Engineers (U.K) Variations have been made in some cases to suit local practice.

11. All quantities are measured net (unless otherwise stated) in accordance with the Drawings and no allowance has been made for cutting or waste. The Tenderer must allow in his rates accordingly.

12. Where other Contractors engaged by the employer are working in the same area, the Contractor shall give way and clearance as required and shall programme his work to give a minimum of interference to other contractors. Under these conditions the Contractor must ensure that such back-filling and

surplus soil as he is responsible for are kept rigidly separate from that of other Contractors also employed. The prices and rates given must include for compliance with this requirement.

13. The Contractor must note that materials should be ordered for the Contract from the working Drawings, checked where necessary from Site measurements. They may not be ordered from either the Bills of Quantities or the Tender Drawings. The contractor is solely responsible for accurate ordering of materials in accordance with the Drawings and no claim for any loss or expense will be entertained for orders for materials based upon the Bills of Quantities.

14. Metrication – All quantities are given in Metric Dimensions. However, where the changeover of production sizes has not yet taken place the Contractor may use equivalent goods manufactured to Imperial Dimensions at no extra cost to the Employer.

15. The Bills of quantities must be priced in Kenya currency, i.e. Shillings and Cents. All items in the Bills of Quantities MUST be priced and entered in "INK" against each item of work given. The word "NIL" is to be entered if no rate is required. Items not priced will be deemed to be included in other rates.

16. <u>Definition of Abbreviation</u>

Abbreviations used in the Bills of Quantities shall be interpreted as follows:-

''BS'' Shall mean	the current British Standard Specification published by the British Standards Institution
''No.'' shall mean	number
''Ditto'' shall mean	the whole of the preceding description except as qualified in the section in which it occurs. Where it occurs in brackets it shall mean the whole of the preceding description which is contained within the appropriate brackets
''mm'' shall mean	millimeter
''LM.'' shall mean	linear metre
''SM'' shall mean	square metre
''CM'' shall mean	cubic metre
''n.l.t'' shall mean	not less than
''n.e.'' shall mean	not exceeding
''Kg'' shall mean	kilogramme
''ha'' shall mean	hectare
''EO'' shall mean	extra over

PROPOSED CONSTRUCTION OF

SINGIRAINI BOREHOLE PIPELINE AND FENCING WORKS

ITEM NO.	ITEM DESCRIPTION	AMOUNT (Kshs.)
1	**BILL NO. 1:** Preliminary and General Items	
2	**BILL NO. 2:** Pipeline Installation Works	
3	**BILL NO. 3:** Fencing and Gate Works	
	Subtotal	
	Add 5% Contingency	
	Add 16% VAT	
	GRAND TOTAL	

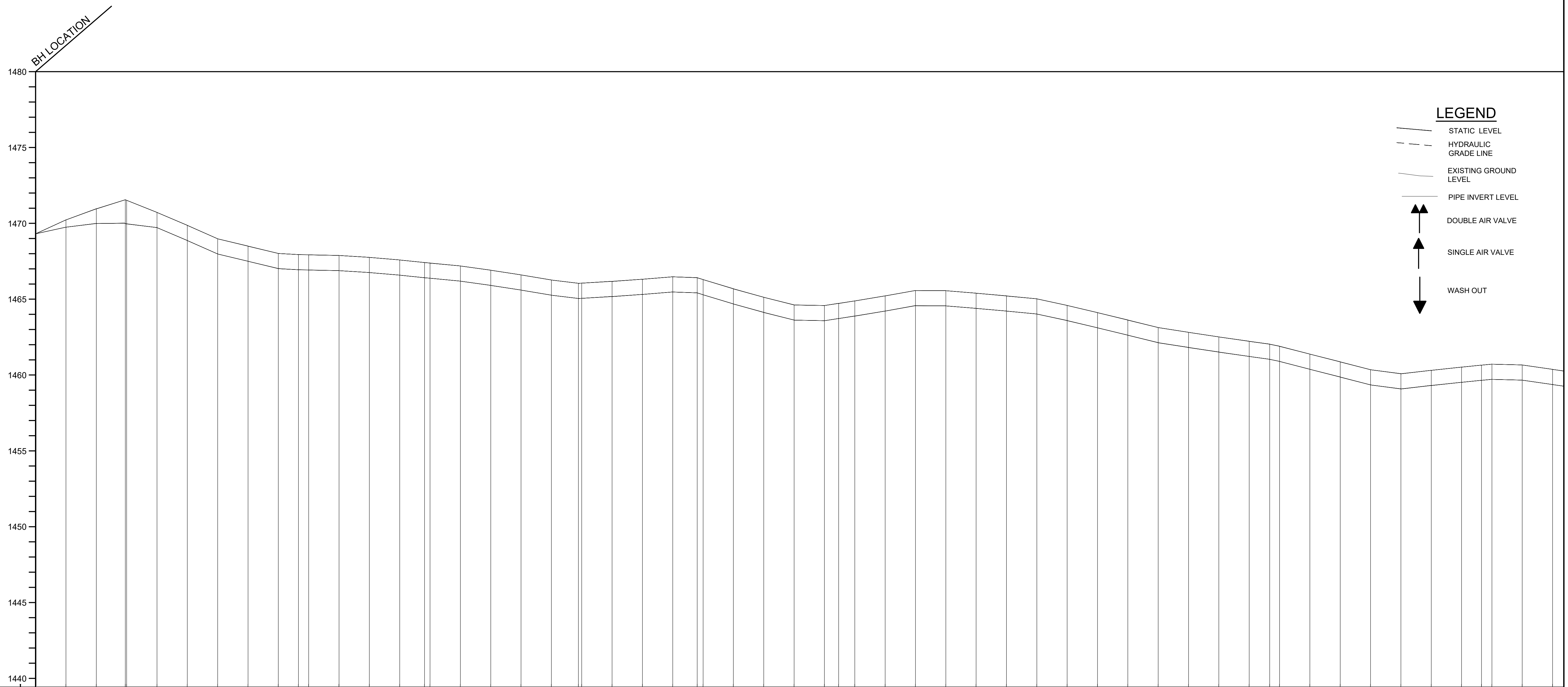
	Billl No. 1: PRELIMINARY AND GENERAL WORKS				Bill No. 1
ITEM No.	**D E S C R I P T I O N**	**UNIT**	**QUANTITY**	**RATE (KES)**	**AMOUNT (KES)**
A	**CLASS A - GENERAL ITEMS**				
1-A1	**Contractual requirements**				
1-A11	Allow for provision of contractual requirement; perfomance security, insurance of works and equipment and third party insurance, and other GoK statutes necessary to commence and proceed with the works to completion	Sum	1		
1-A31	Allow for provision for contractors overheads, accomodation, transport, security, water and power supply, safety to employer, plants and equipments, days works and other temporary works	Sum	1		
TOTAL CARRIED FORWARD TO BILL COLLECTION SHEET					

	BILL No. 2: Pipeline Works				Bill No. 2
ITEM No.	**D E S C R I P T I O N**	**UNIT**	**QUANTITY**	**RATE (KES)**	**AMOUNT (KES)**
D	**DEMOLITION & SITE CLEARANCE**				
D5	**CLEARENCE OF PIPELINE WAYLEAVES, DISPOSAL AS DIRECTED**				
	Nominal bore: 80 mm,				
D521	Pipeline only	m	5,150		
I	**CLASS I: PIPEWORK - PIPES - SUPPLY & INSTALLATION**				
I7	**HDPE Pipes.**				
	Plain ended pipe, buttfusion connection				
I722	DN 80, PN 10.washout outfall pipes	m	18		
	DN 80, PN 16. raising main pipes	m	5,150		
J	**PIPEWORK - FITTINGS AND VALVES TO HDPE PIPES**				
J8.1	Provide material and install 3 Number Air Valves, works to include locable chambers as per the drawings and specifications	nr	3		
J8.2	Provide material and install 2 Number valves, at existing tank inlet and outlet, works to include locable chambers as per the drawings and specification	nr	2		
J9.2	**Testing, sterilisation and Flushing**				
	Pressures exc.12 bar but not exc. 25 bar,				
J9.21	DN 80 pipeline	m	5,150		
K	**PIPEWORK - PIPEWORK ANCILLARIES**				
K6	**ROAD AND RAIL CROSSING IN ACCORDANCE WITH STANDARD DRAWINGS**				
K61	Provide material and construct a pipe crossing for earth road and magadi rail, on points provided by the engineer, works to include installation of a 200mm Gi sleeve.	Sum	1		
	TOTAL CARRIED TO GRAND SUMMARY				

	BILL No. 2: Fencing and Gate				Bill No. 3
ITEM No.	**D E S C R I P T I O N**	**UNIT**	**QUANTITY**	**RATE (KES)**	**AMOUNT (KES)**
	Approximate length of Fence is 80m				
A	Excavation of holes size 300mm Diameter by 500mm deep to receive posts	m^3	2		
B	200mm diameter precast concrete post as at 3 m c/c or equivatalent mortised in mass concrete (1:3:6)	nr	27		
C	100mm x 125mm precast concrete struts 2600mm long to corners of the fence and the main gate	nr	13		
D	2.4 m high by 14 gauge chainlink tied to 3 No. line wire through the post	m	80		
E	12.5 gauge x 6 strands galvanized wire through concrete posts	m	240		
F	3 strands of Barbed wire to top of concrete post	m	240		
G	Constract and install metalic Gate of avarage with of 3.5 m with using SHS installed on 2 No. 300x300x3 high reinforced concrete columns to Engineer's specifications and drawings	nr	1		
	TOTAL CARRIED TO GRAND SUMMARY				

PART E

DRAWINGS



HYDRAULIC GRADE(masl)

CHAINAGE (m)	GROUND LEVEL (m asl)	INVERT LEVEL (m asl)	TRENCH DEPTH (m)	GRADIENT (m/km)	VERTICAL ANGULAR DEVIATION
000.00	1469.315	1468.314	1.210	45.80	
020.00	1470.230	1469.230	1.210	36.40	0.5°
040.00	1470.960	1469.958	1.210	[illegible]	0.3°
059.15	1471.555	1470.557	1.210	[illegible]	[illegible]
060.00	1471.525	1470.523	1.210	-40.20	[illegible]
080.00	1470.720	1469.719	1.210	-42.55	0.1°
100.00	1469.870	1468.868	1.210	-44.35	0.1°
120.00	1468.980	1467.981	1.210	-24.15	1.2°
140.00	1468.500	1467.498	1.210	-24.10	0.0°
160.00	1468.015	1467.016	1.210	[illegible]	1.0°
173.28	1467.940	1466.939	1.210	[illegible]	0.2°
180.00	1467.925	1466.925	1.210	-2.15	0.0°
200.00	1467.880	1466.882	1.210	-6.30	0.2°
220.00	1467.755	1466.756	1.210	-8.50	0.1°
240.00	1467.585	1466.586	1.210	[illegible]	0.1°
256.40	1467.415	1466.414	1.210	[illegible]	0.1°
260.00	1467.385	1466.383	1.210	-9.70	0.1°
280.00	1467.190	1466.189	1.210	-13.95	0.2°
300.00	1466.910	1465.910	1.210	-15.40	0.1°
320.00	1466.600	1465.602	1.210	-16.95	0.1°
340.00	1466.265	1465.263	1.210	[illegible]	0.3°
357.80	1466.045	1465.045	1.210	[illegible]	1.0°
360.00	1466.055	1465.057	1.210	5.90	0.0°
380.00	1466.175	1465.175	1.210	6.95	0.1°
400.00	1466.315	1465.314	1.210	8.00	0.1°
420.00	1466.475	1465.474	1.210	[illegible]	0.7°
436.10	1466.415	1465.416	1.210	[illegible]	1.6°
440.00	1466.290	1465.292	1.210	-30.40	0.1°
460.00	1465.685	1464.684	1.210	-27.85	0.1°
480.00	1465.125	1464.127	1.210	-25.35	0.1°
500.00	1464.620	1463.620	1.210	-1.90	1.3°
520.00	1464.580	1463.582	1.210	14.94	1.0°
529.37	1464.720	1463.722	1.210	15.52	0.0°
540.00	1464.885	1463.887	1.210	16.55	0.1°
560.00	1465.220	1464.218	1.210	17.75	0.1°
580.00	1465.575	1464.573	1.210	-0.65	1.1°
600.00	1465.560	1464.560	1.210	-8.35	0.4°
620.00	1465.395	1464.393	1.210	-8.95	0.0°
640.00	1465.215	1464.214	1.210	-9.55	0.0°
660.00	1465.025	1464.023	1.210	-21.70	0.7°
680.00	1464.590	1463.589	1.210	-23.85	0.1°
700.00	1464.110	1463.112	1.210	-24.40	0.0°
720.00	1463.625	1462.624	1.210	-24.70	0.0°
740.00	1463.130	1462.130	1.210	-15.70	0.5°
760.00	1462.815	1461.816	1.210	-15.15	0.0°
780.00	1462.515	1461.513	1.210	-14.50	0.0°
800.00	1462.225	1461.223	1.210	[illegible]	0.0°
813.50	1462.035	1461.034	1.210	[illegible]	0.4°
820.00	1461.895	1460.896	1.210	-25.90	0.3°
840.00	1461.380	1460.378	1.210	-25.60	0.0°
860.00	1460.865	1459.866	1.210	-25.90	0.0°
880.00	1460.350	1459.348	1.210	-13.30	0.7°
900.00	1460.080	1459.082	1.210	11.40	1.4°
920.00	1460.310	1459.310	1.210	10.55	0.0°
940.00	1460.520	1459.521	1.210	[illegible]	0.0°
953.14	1460.650	1459.651	1.210	[illegible]	0.0°
960.00	1460.715	1459.715	1.210	-2.60	0.7°
980.00	1460.665	1459.663	1.210	-14.65	0.7°
1000.00	1460.370	1459.370	1.210		0.0°

STEADY-STATE HEAD (m)

DESIGN FLOW (l/s)

OFFTAKE (l/s)

PIPE DETAILS

BEDDING DETAILS

REV. No.	DESCRIPTION	DATE

[redacted]

CLIENT

P.O. BOX 1—00205
LAKE MAGADI, KENYA

TATA

TATA CHEMICALS MAGADI LTD.

PROJECT

DRG TITLE

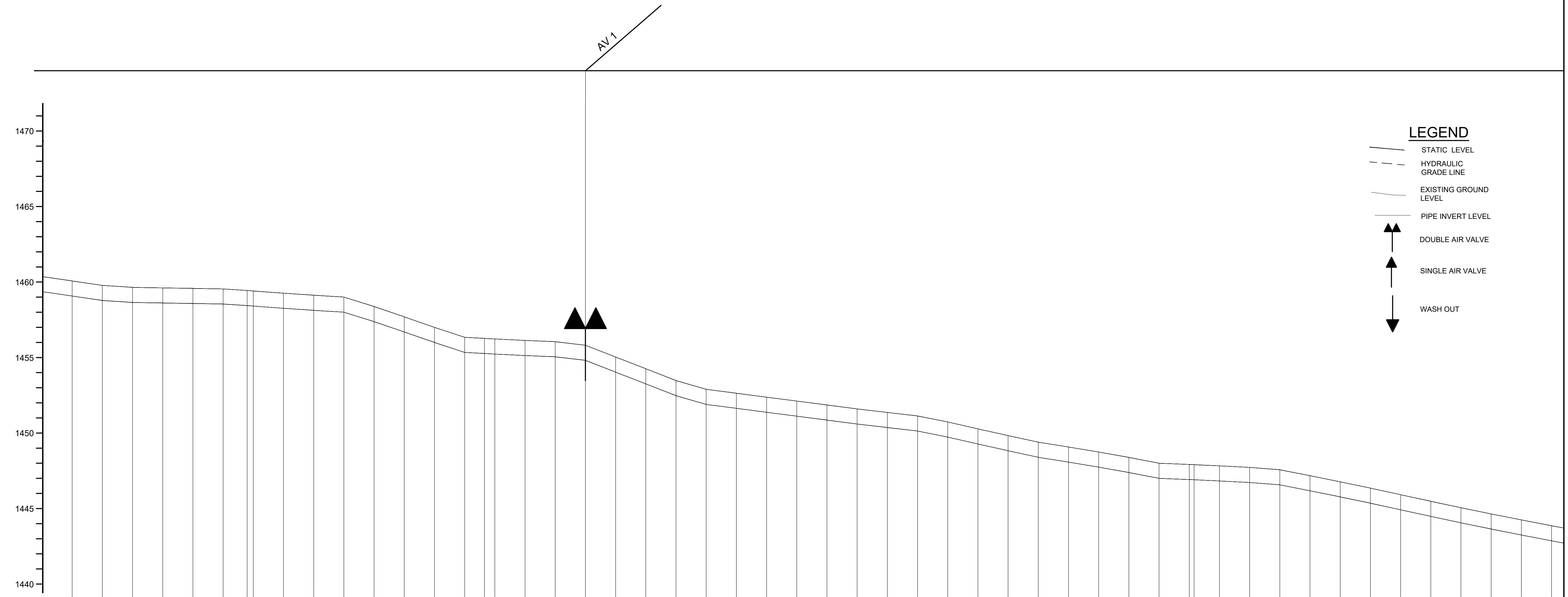
CH. 0+000.00-0+1000

SHEET 1 OF 5

Date:		JOB No.
Designed:		
Drawn:		CAD DRAWING
Checked:		
Approved:		DRG. No.
Scale:	AS SHOWN	

REV

O



CHAINAGE (m)	HYDRAULIC GRADE(masl)	GROUND LEVEL (m asl)	INVERT LEVEL (m asl)	TRENCH DEPTH (m)	STEADY-STATE HEAD (m)	VERTICAL ANGULAR DEVIATION	GRADIENT (m/km) to next chainage
1020.00		1460.075	1459.076	1.210		0.0°	-14.65
1040.00		1459.785	1458.783	1.210		0.5°	-6.55
1060.00		1459.650	1458.652	1.210		0.3°	-1.75
1080.00		1459.615	1458.617	1.210		0.0°	-1.70
1100.00		1459.585	1458.583	1.210		0.0°	-1.75
1120.00		1459.550	1458.548	1.210		0.3°	[illegible]
1135.90		1459.445	1458.445	1.210		0.1°	[illegible]
1140.00		1459.415	1458.413	1.210		0.0°	-7.35
1160.00		1459.265	1458.266	1.210		0.0°	-6.75
1180.00		1459.130	1458.131	1.210		0.0°	-6.10
1200.00		1459.010	1458.009	1.210		1.4°	-31.35
1220.00		1458.380	1457.382	1.210		0.2°	-34.15
1240.00		1457.700	1456.699	1.210		0.0°	-34.80
1260.00		1457.005	1456.003	1.210		0.1°	-33.00
1280.00		1456.345	1455.343	1.210		1.6°	[illegible]
1293.10		1456.270	1455.271	1.210		0.0°	[illegible]
1300.00		1456.235	1455.234	1.210		0.0°	-4.85
1320.00		1456.135	1455.137	1.210		0.0°	-4.15
1340.00		1456.055	1455.054	1.210		0.4°	-11.75
1360.00		1455.820	1454.819	1.210		1.6°	-39.00
1380.00		1455.040	1454.039	1.210		0.0°	-38.95
1400.00		1454.260	1453.260	1.210		0.0°	-39.00
1420.00		1453.480	1452.480	1.210		0.6°	-29.00
1440.00		1452.900	1451.900	1.210		0.9°	-13.00
1460.00		1452.640	1451.640	1.210		0.0°	-13.00
1480.00		1452.380	1451.380	1.210		0.0°	-13.00
1500.00		1452.120	1451.120	1.210		0.0°	-12.95
1520.00		1451.860	1450.861	1.210		0.0°	-13.00
1540.00		1451.600	1450.601	1.210		0.1°	-11.65
1560.00		1451.370	1450.368	1.210		0.0°	-11.65
1580.00		1451.135	1450.135	1.210		0.5°	-19.90
1600.00		1450.735	1449.737	1.210		0.2°	-22.95
1620.00		1450.280	1449.278	1.210		0.0°	-22.30
1640.00		1449.830	1448.832	1.210		0.0°	-21.60
1660.00		1449.400	1448.400	1.210		0.3°	-16.15
1680.00		1449.075	1448.077	1.210		0.0°	-16.50
1700.00		1448.745	1447.747	1.210		0.1°	-17.90
1720.00		1448.390	1447.389	1.210		0.1°	-19.30
1740.00		1448.005	1447.003	1.210		0.9°	[illegible]
1760.00		1447.925	1446.923	1.210		0.0°	[illegible]
1763.20		1447.910	1446.909	1.210		0.0°	-4.58
1780.00		1447.830	1446.832	1.210		0.0°	-5.20
1800.00		1447.730	1446.728	1.210		0.1°	-7.80
1820.00		1447.570	1446.572	1.210		0.7°	-19.60
1840.00		1447.180	1446.180	1.210		0.0°	-20.25
1860.00		1446.775	1445.775	1.210		0.0°	-20.90
1880.00		1446.355	1445.357	1.210		0.0°	-21.75
1900.00		1445.920	1444.922	1.210		0.0°	-21.90
1920.00		1445.485	1444.484	1.210		0.0°	-21.30
1940.00		1445.060	1444.058	1.210		0.0°	-20.55
1960.00		1444.645	1443.647	1.210		0.0°	-19.90
1980.00		1444.250	1443.249	1.210		0.0°	-19.20
2000.00		1443.865	1442.865	1.210		0.0°	

Gradient before 1020.00: -14.70

DESIGN FLOW (l/s)

OFFTAKE (l/s)

PIPE DETAILS

BEDDING DETAILS

REV. No.	DESCRIPTION	DATE

[redacted]

CLIENT

TATA

TATA CHEMICALS MAGADI LTD.

P.O. BOX 1-00205

LAKE MAGADI, KENYA

PROJECT

DRG TITLE

CH. 1+020.00-2+000.00

SHEET 2 OF 5

Date:	
Designed:	
Drawn:	
Checked:	
Approved:	
Scale:	AS SHOWN

JOB No.

CAD DRAWING

DRG. No.

REV

O

HYDRAULIC GRADE(masl)

CHAINAGE (m)	GROUND LEVEL (m asl)	INVERT LEVEL (m asl)	TRENCH DEPTH (m)
2020.00	1443.495	1442.494	1.210
2021.80	1443.460	1442.461	1.210
2040.00	1443.135	1442.136	1.210
2060.00	1442.685	1441.685	1.210
2080.00	1442.165	1441.166	1.210
2100.00	1441.645	1440.646	1.210
2111.20	1441.355	1440.354	1.210
2120.00	1441.125	1440.127	1.210
2140.00	1440.410	1439.411	1.210
2160.00	1439.630	1438.631	1.210
2180.00	1438.850	1437.852	1.210
2200.00	1438.075	1437.073	1.210
2220.00	1438.035	1437.037	1.210
2240.00	1438.050	1437.050	1.210
2260.00	1438.035	1437.034	1.210
2280.00	1438.005	1437.005	1.210
2300.00	1438.025	1437.024	1.210
2320.00	1438.030	1437.028	1.210
2340.00	1438.020	1437.018	1.210
2360.00	1437.945	1436.946	1.210
2380.00	1437.685	1436.686	1.210
2400.00	1437.425	1436.426	1.210
2420.00	1437.165	1436.166	1.210
2440.00	1436.855	1435.856	1.210
2460.00	1436.475	1435.475	1.210
2480.00	1436.125	1435.123	1.210
2500.00	1435.800	1434.800	1.210
2520.00	1435.505	1434.503	1.210
2540.00	1435.200	1434.199	1.210
2560.00	1434.880	1433.881	1.210
2580.00	1434.550	1433.549	1.210
2600.00	1434.280	1433.280	1.210
2620.00	1434.050	1433.048	1.210
2631.60	1433.915	1432.914	1.210
2640.00	1433.830	1432.828	1.210
2660.00	1433.625	1432.623	1.210
2680.00	1433.370	1432.370	1.210
2690.90	1433.205	1432.205	1.210
2700.00	1433.060	1432.061	1.210
2720.00	1432.685	1431.687	1.210
2740.00	1432.235	1431.234	1.210
2760.00	1431.860	1430.858	1.210
2780.00	1431.545	1430.547	1.210
2800.00	1431.240	1430.242	1.210
2820.00	1430.895	1429.897	1.210
2840.00	1430.560	1429.561	1.210
2860.00	1430.235	1429.233	1.210
2880.00	1429.905	1428.904	1.210
2900.00	1429.575	1428.576	1.210
2920.00	1429.445	1428.445	1.210
2940.00	1429.365	1428.365	1.210
2960.00	1429.285	1428.286	1.210
2980.00	1429.205	1428.207	1.210
3000.00	1428.910	1427.910	1.210

STEADY-STATE HEAD (m)

DESIGN FLOW (l/s)

OFFTAKE (l/s)

PIPE DETAILS

BEDDING DETAILS

GRADIENT (m/km): [illegible], -17.86, -22.55, -25.95, -26.00, [illegible], -35.80, -39.00, -38.95, -38.95, -1.80, 0.65, -0.80, -1.45, 0.95, 0.20, -0.50, -3.60, -13.00, -13.00, -13.00, -15.50, -19.05, -17.60, -16.15, -14.85, -15.20, -15.90, -16.60, -13.45, -11.60, [illegible], -10.25, -12.65, [illegible], -18.70, -22.65, -18.80, -15.55, -15.25, -17.25, -16.80, -16.40, -16.45, -16.40, -6.55, -4.00, -3.95, -3.95, -14.85, -16

VERTICAL ANGULAR DEVI/: 0.0°, 0.0°, 0.3°, 0.2°, 0.0°, 0.0°, 0.0°, 0.6°, 0.2°, 0.0°, 0.0°, 2.1°, 0.1°, 0.1°, 0.0°, 0.1°, 0.0°, 0.0°, 0.2°, 0.5°, 0.0°, 0.0°, 0.1°, 0.2°, 0.1°, 0.1°, 0.1°, 0.0°, 0.0°, 0.0°, 0.2°, 0.1°, 0.0°, 0.1°, 0.0°, 0.1°, 0.1°, 0.0°, 0.2°, 0.2°, 0.2°, 0.2°, 0.2°, 0.0°, 0.1°, 0.0°, 0.0°, 0.0°, 0.0°, 0.6°, 0.1°, 0.0°, 0.0°, 0.6°, 0.1°

REV. No.	DESCRIPTION	DATE

[redacted]

CLIENT

P.O. BOX 1-00205
LAKE MAGADI, KENYA

TATA
TATA CHEMICALS MAGADI LTD.

PROJECT

DRG TITLE

CH. 1+020.00-2+000.00
SHEET 2 OF 5

Date:
Designed:
Drawn:
Checked:
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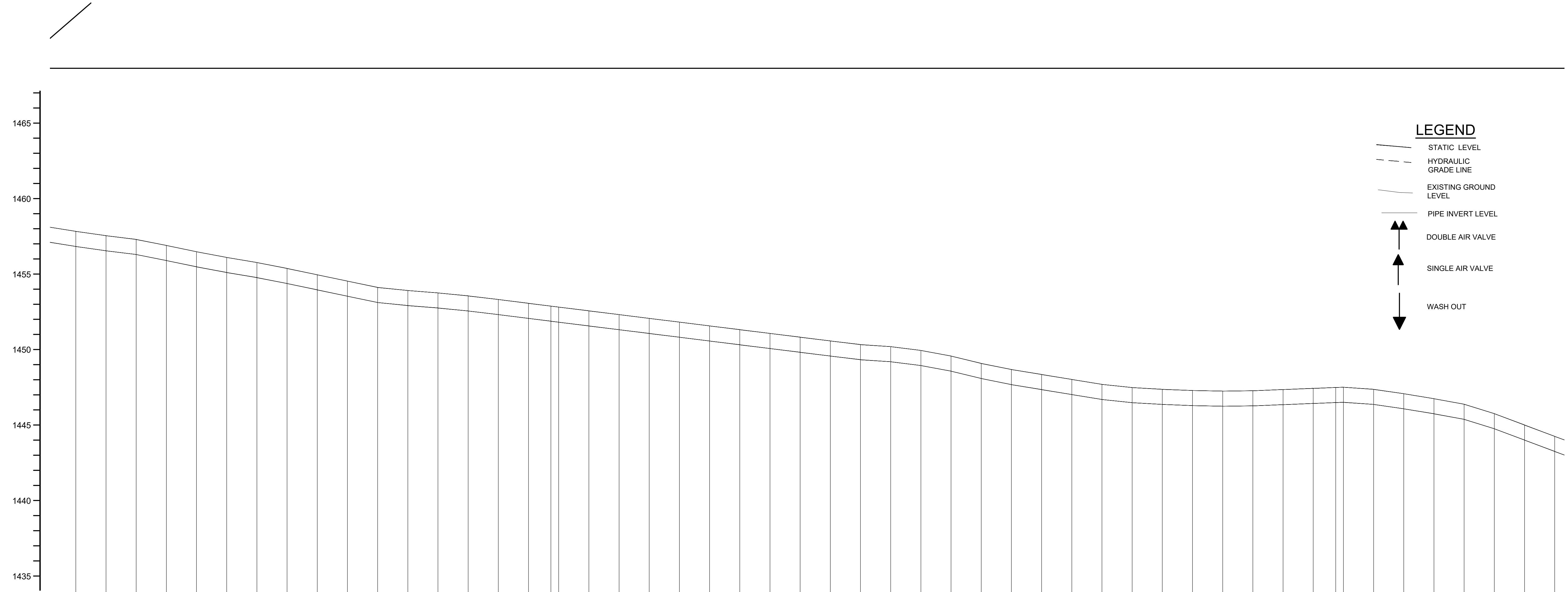
Scale: AS SHOWN

JOB No.

CAD DRAWING

DRG. No.

REV
O



CHAINAGE (m)	GROUND LEVEL (m asl)	INVERT LEVEL (m asl)	TRENCH DEPTH (m)	HYDRAULIC GRADE(masl)	STEADY-STATE HEAD (m)	DESIGN FLOW (l/s)	OFFTAKE (l/s)	PIPE DETAILS	BEDDING DETAILS	GRADIENT (m/km)	VERTICAL ANGULAR DEVI/
										-16.25	
3020.00	1428.585	1427.585	1.210							-14.30	0.1°
3040.00	1428.300	1427.299	1.210							-12.35	0.1°
3060.00	1428.050	1427.052	1.210							-19.85	0.4°
3080.00	1427.655	1426.655	1.210							-20.85	0.1°
3100.00	1427.240	1426.238	1.210							-18.85	0.1°
3120.00	1426.860	1425.861	1.210							-16.90	0.1°
3140.00	1426.525	1425.523	1.210							-19.65	0.2°
3160.00	1426.130	1425.130	1.210							-20.95	0.1°
3180.00	1425.710	1424.711	1.210							-21.00	0.0°
3200.00	1425.290	1424.291	1.210							-20.95	0.0°
3220.00	1424.870	1423.872	1.210							-10.10	0.6°
3240.00	1424.670	1423.670	1.210							-8.00	0.1°
3260.00	1424.510	1423.510	1.210							-9.95	0.1°
3280.00	1424.310	1423.311	1.210							-11.90	0.1°
3300.00	1424.075	1423.073	1.210							-12.70	0.0°
3320.00	1423.820	1422.819	1.210							[illegible]	0.0°
3334.80	1423.635	1422.635	1.210							[illegible]	0.0°
3340.00	1423.570	1422.570	1.210							-12.45	0.0°
3360.00	1423.320	1422.321	1.210							-12.45	0.0°
3380.00	1423.070	1422.072	1.210							-12.50	0.0°
3400.00	1422.820	1421.822	1.210							-12.45	0.0°
3420.00	1422.575	1421.573	1.210							-12.45	0.0°
3440.00	1422.325	1421.324	1.210							-12.50	0.0°
3460.00	1422.075	1421.074	1.210							-12.45	0.0°
3480.00	1421.825	1420.825	1.210							-12.45	0.0°
3500.00	1421.575	1420.576	1.210							-12.50	0.0°
3520.00	1421.325	1420.326	1.210							-12.10	0.0°
3540.00	1421.085	1420.084	1.210							-6.70	0.3°
3560.00	1420.950	1419.950	1.210							-12.65	0.3°
3580.00	1420.695	1419.697	1.210							-18.55	0.3°
3600.00	1420.325	1419.326	1.210							-24.40	0.3°
3620.00	1419.840	1418.838	1.210							-20.25	0.2°
3640.00	1419.435	1418.433	1.210							-16.40	0.2°
3660.00	1419.105	1418.105	1.210							-16.40	0.0°
3680.00	1418.775	1417.777	1.210							-16.40	0.0°
3700.00	1418.450	1417.449	1.210							-10.45	0.3°
3720.00	1418.240	1417.240	1.210							-5.90	0.3°
3740.00	1418.120	1417.122	1.210							-3.90	0.1°
3760.00	1418.045	1417.044	1.210							-2.00	0.1°
3780.00	1418.005	1417.004	1.210							1.15	0.2°
3800.00	1418.025	1417.027	1.210							3.95	0.2°
3820.00	1418.105	1417.106	1.210							3.95	0.0°
3840.00	1418.185	1417.185	1.210							[illegible]	0.0°
3854.90	1418.245	1417.244	1.210							[illegible]	0.0°
3860.00	1418.265	1417.263	1.210							-7.05	0.6°
3880.00	1418.120	1417.122	1.210							-14.55	0.4°
3900.00	1417.830	1416.831	1.210							-16.40	0.1°
3920.00	1417.505	1416.503	1.210							-18.35	0.1°
3940.00	1417.135	1416.136	1.210							-31.25	0.7°
3960.00	1416.510	1415.511	1.210							-37.55	0.4°
3980.00	1415.760	1414.760	1.210							-37.55	0.0°
4000.00	1415.010	1414.009	1.210								0.0°

REV. No.	DESCRIPTION	DATE

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LAKE MAGADI, KENYA

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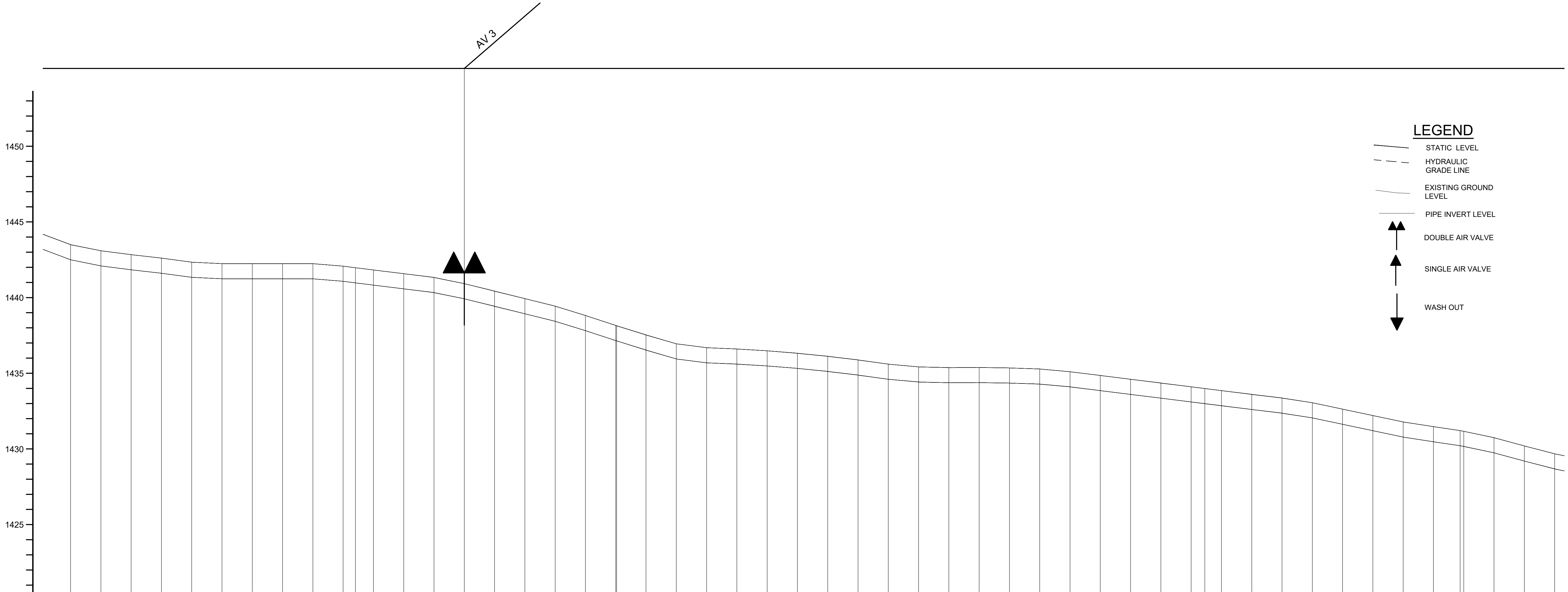
PROJECT

DRG TITLE

CH. 1+020.00-2+000.00
SHEET 2 OF 5

Date:		JOB No.	
Designed:			
Drawn:		CAD DRAWING	
Checked:			
Approved:		DRG. No.	REV
Scale:	AS SHOWN		O



HYDRAULIC GRADE(masl)

CHAINAGE (m)	GROUND LEVEL (m asl)	INVERT LEVEL (m asl)	TRENCH DEPTH (m)	STEADY-STATE HEAD (m)	VERTICAL ANGULAR DEVIA
4020.00	1414.260	1413.258	1.210		1.0°
4040.00	1413.855	1412.854	1.210		0.4°
4060.00	1413.595	1412.596	1.210		0.1°
4080.00	1413.365	1412.367	1.210		0.1°
4100.00	1413.100	1412.099	1.210		0.5°
4120.00	1413.000	1412.000	1.210		0.3°
4140.00	1413.000	1412.000	1.210		0.0°
4160.00	1413.000	1412.000	1.210		0.0°
4180.00	1413.000	1412.000	1.210		0.5°
4200.00	1412.835	1411.834	1.210		0.2°
4208.10	1412.735	1411.733	1.210		0.0°
4220.00	1412.585	1411.585	1.210		0.0°
4240.00	1412.335	1411.337	1.210		0.0°
4260.00	1412.090	1411.089	1.210		0.5°
4280.00	1411.680	1410.681	1.210		0.3°
4300.00	1411.185	1410.185	1.210		0.0°
4320.00	1410.690	1409.689	1.210		0.0°
4340.00	1410.195	1409.193	1.210		0.3°
4360.00	1409.575	1408.576	1.210		0.1°
4380.00	1408.915	1407.916	1.210		0.2°
4380.60	1408.900	1407.898	1.210		[illegible]
4400.00	1408.290	1407.291	1.210		0.1°
4420.00	1407.705	1406.705	1.210		0.9°
4440.00	1407.445	1406.447	1.210		0.5°
4460.00	1407.365	1406.363	1.210		0.1°
4480.00	1407.240	1406.241	1.210		0.1°
4500.00	1407.080	1406.079	1.210		0.1°
4520.00	1406.880	1405.878	1.210		0.1°
4540.00	1406.640	1405.638	1.210		0.1°
4560.00	1406.360	1405.359	1.210		0.3°
4580.00	1406.180	1405.179	1.210		0.4°
4600.00	1406.130	1405.130	1.210		0.2°
4620.00	1406.140	1405.140	1.210		0.1°
4640.00	1406.110	1405.110	1.210		0.1°
4660.00	1406.040	1405.042	1.210		0.3°
4680.00	1405.860	1404.859	1.210		0.2°
4700.00	1405.610	1404.610	1.210		0.0°
4720.00	1405.360	1404.360	1.210		0.0°
4740.00	1405.110	1404.111	1.210		0.0°
4760.00	1404.860	1403.862	1.210		0.0°
4769.00	1404.750	1403.749	1.210		0.0°
4780.00	1404.610	1403.612	1.210		0.0°
4800.00	1404.360	1403.362	1.210		0.0°
4820.00	1404.120	1403.121	1.210		0.2°
4840.00	1403.810	1402.810	1.210		0.3°
4860.00	1403.385	1402.387	1.210		0.0°
4880.00	1402.965	1401.963	1.210		0.0°
4900.00	1402.540	1401.540	1.210		0.3°
4920.00	1402.230	1401.230	1.210		0.0°
4937.60	1401.965	1400.967	1.210		[illegible]
4940.00	1401.925	1400.924	1.210		[illegible]
4960.00	1401.500	1400.500	1.210		0.3°
4980.00	1400.955	1399.954	1.210		0.1°
5000.00	1400.435	1399.437	1.210		0.3°

DESIGN FLOW (l/s)

OFFTAKE (l/s)

PIPE DETAILS

BEDDING DETAILS

GRADIENT (m/km): -37.55, -20.20, -12.90, -11.45, -13.40, -4.95, 0.00, 0.00, 0.00, [illegible], -12.44, -12.40, -12.40, -20.40, -24.80, -24.80, -24.80, -30.85, [illegible], -31.29, -29.30, -12.90, -4.20, -6.10, -8.10, -10.05, -12.00, -13.95, -9.00, -2.45, 0.50, -1.50, -3.40, -9.15, -12.45, -12.50, -12.45, [illegible], -12.45, -12.50, -12.05, -15.55, -21.15, -21.20, -21.15, -15.50, [illegible], -21.20, -27.30, -25.85

REV. No.	DESCRIPTION	DATE

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TATA CHEMICALS MAGADI LTD.

PROJECT

DRG TITLE

CH. 1+020.00-2+000.00
SHEET 2 OF 5

Date:		JOB No.
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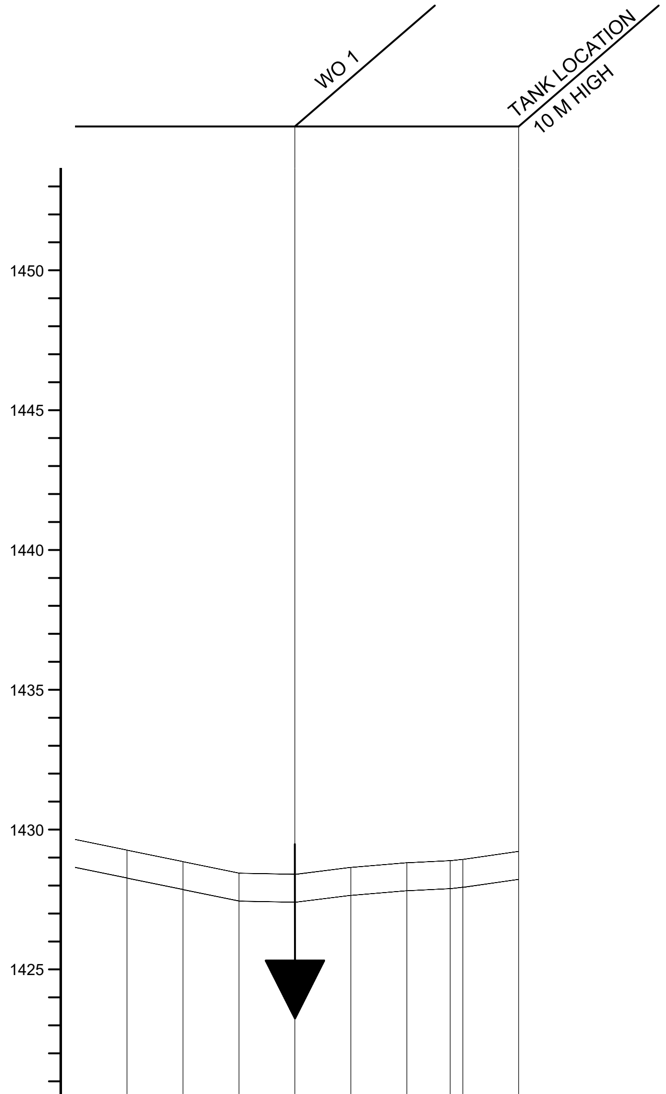
Drawn:		CAD DRAWING
Checked:		
Approved:		DRG. No.
Scale:	AS SHOWN	

REV: O



LEGEND

- STATIC LEVEL
- HYDRAULIC GRADE LINE
- EXISTING GROUND LEVEL
- PIPE INVERT LEVEL
- DOUBLE AIR VALVE
- SINGLE AIR VALVE
- WASH OUT

HYDRAULIC GRADE(masl)									
CHAINAGE (m)	5020.00	5040.00	5060.00	5080.00	5100.00	5120.00	5135.50	5140.00	5160.00
GROUND LEVEL (m asl)	1400.025	1399.615	1399.200	1399.155	1399.405	1399.570	1399.645	1399.695	1399.975
INVERT LEVEL (m asl)	1399.025	1398.613	1398.201	1398.157	1398.405	1398.572	1398.645	1398.693	1398.976
TRENCH DEPTH (m)	1.210	1.210	1.210	1.210	1.210	1.210	1.210	1.210	1.210
STEADY-STATE HEAD (m)									
DESIGN FLOW (l/s)									
OFFTAKE (l/s)									
PIPE DETAILS									
BEDDING DETAILS									
GRADIENT (m/km)	-20.60	-20.60	-20.60	-2.20	12.40	8.35	14.67		14.15
VERTICAL ANGULAR DEVI.	0.0°	0.0°	1.1°	0.8°	0.2°	0.2°	0.3°	0.2°	

REV. No.	DESCRIPTION	DATE

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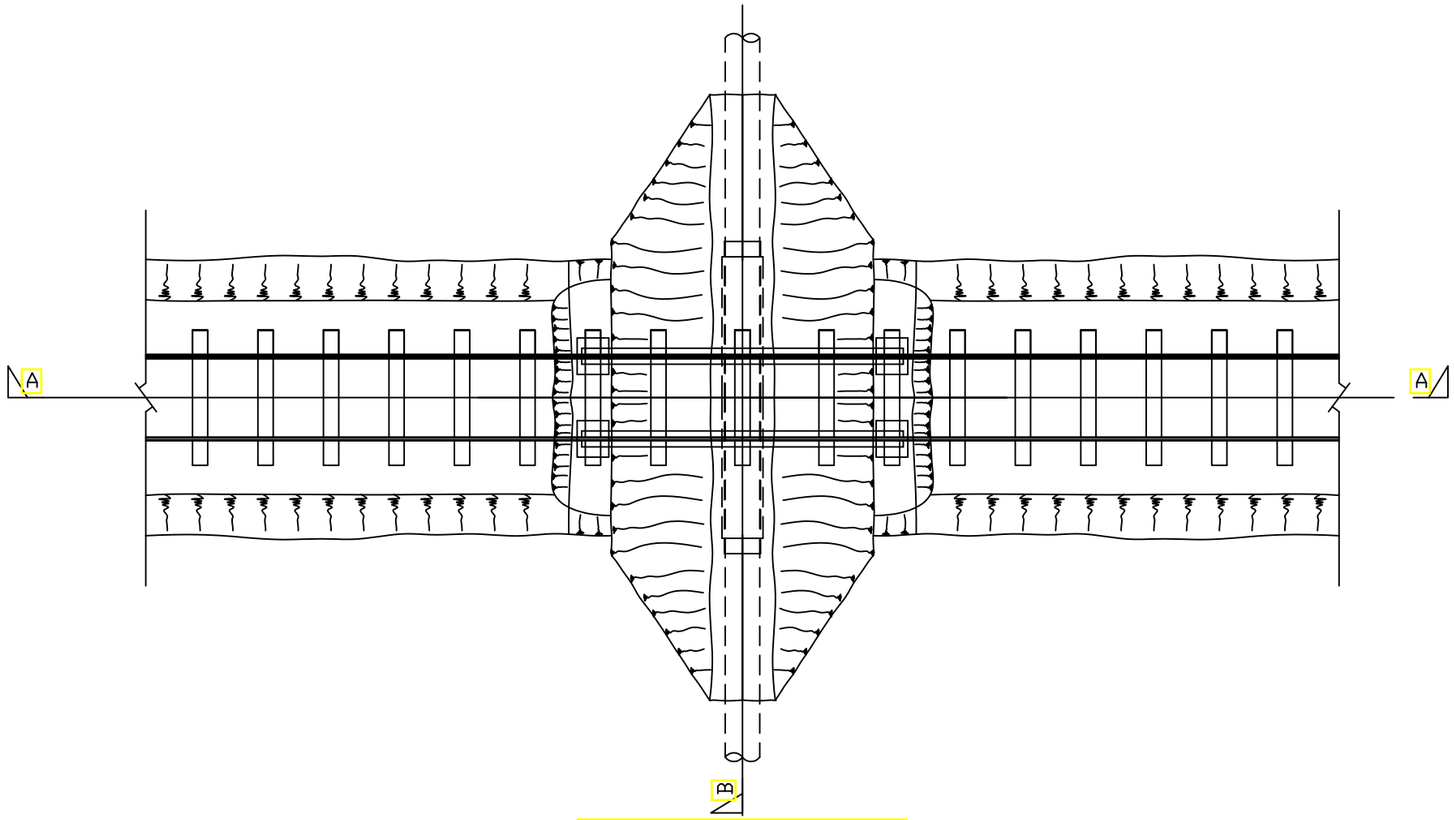
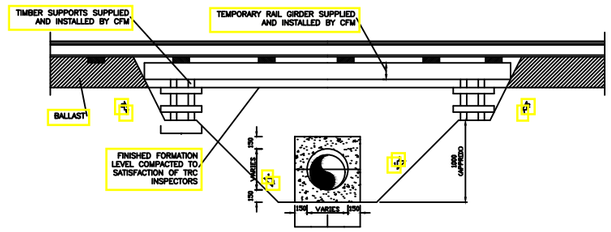
ROAD CROSSING DETAILS

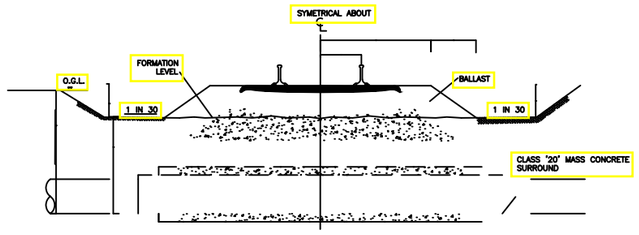


PLAN AT RAILWAY CROSSING

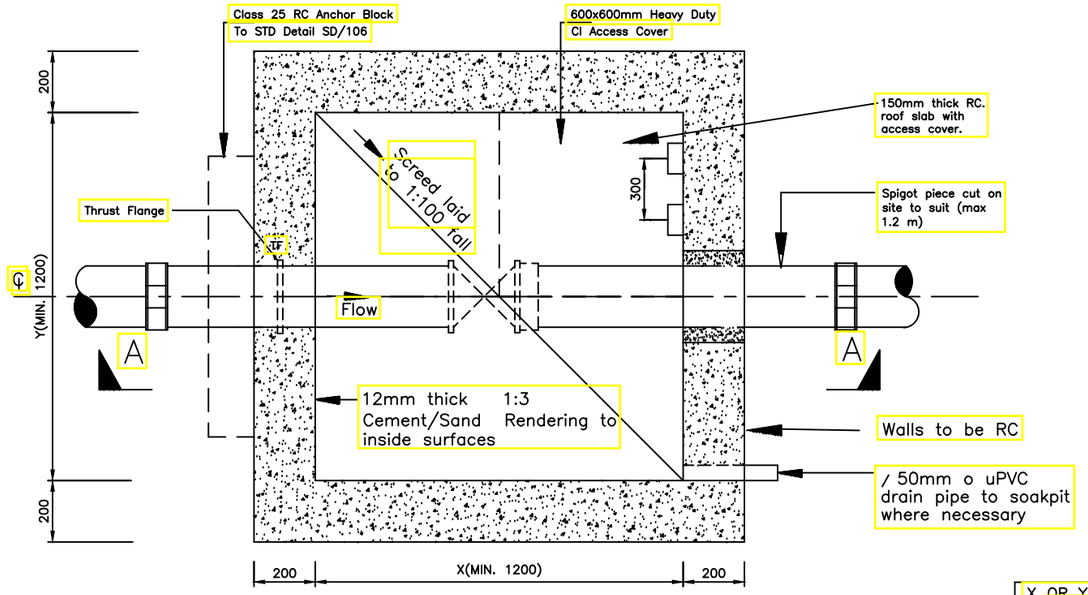


SECTION B–B

RAILWAY CROSSING DETAILS



RAILWAY CROSSING DETAILS



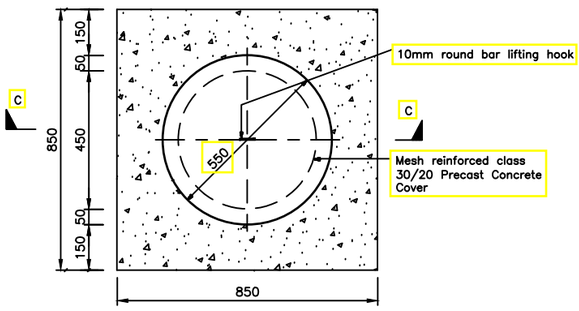
PLAN OF CHAMBER

1:20

(Cover omitted for clarity)

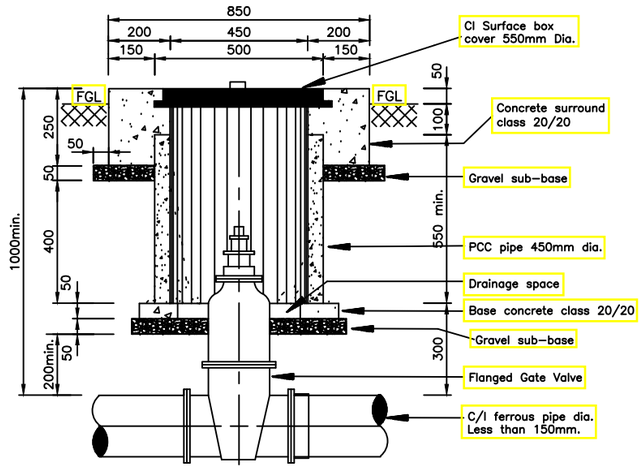
X OR Y (mm)	(mm)
A	1200
B	1500
C	1800
D	2100
E	2500
F	3000

CHAMBER DIMENSIONS



PLAN OF COVER

SCALE 1:20



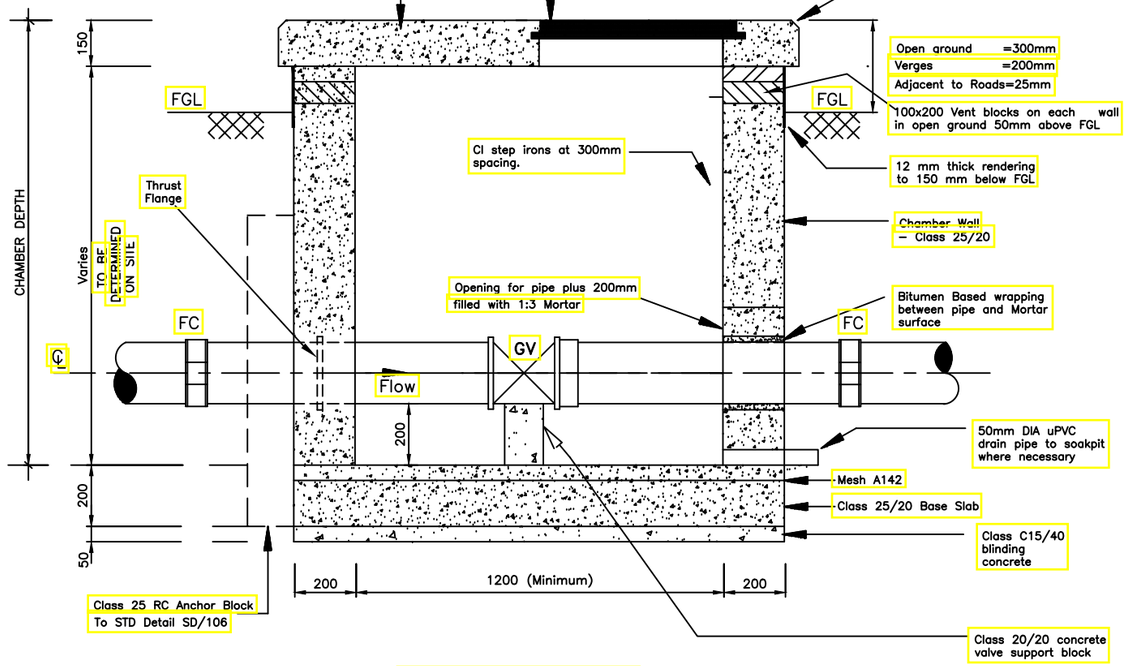
GATE VALVE SURFACE BOX

SECTION C–C

SCALE 1:20

NOTES

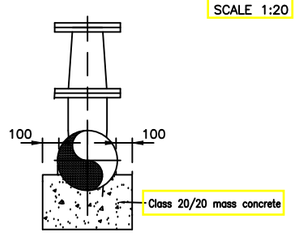
1. All dimensions are in mm unless otherwise stated
2. Where the Chamber wall is used for anchorage, the restraining to be according to Drawing SD/06.
3. Chamber wall to be backfilled wall thickness with 300mm thick granular till around walls
4. Where the chamber is along footpath in built up areas, the cover may be flushed with the footpath



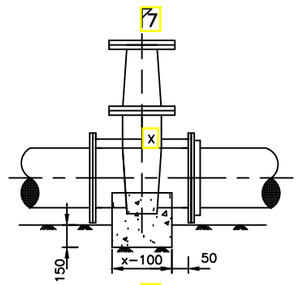
GATE VALVE CHAMBER

SECTION A–A

SCALE 1:20



Section 7 – 7



ELEVATION

Gate Valve Support Block

MAIN SIZE (mm)	GATE VALVE DIAMETER (mm)
100	100
150	150
200	200
250	250
300	300
350	300
400	300
500	400
600	500
700	600
800	600

GATE VALVE DIAMETER

GATE VALVE CHAMBER DETAILS

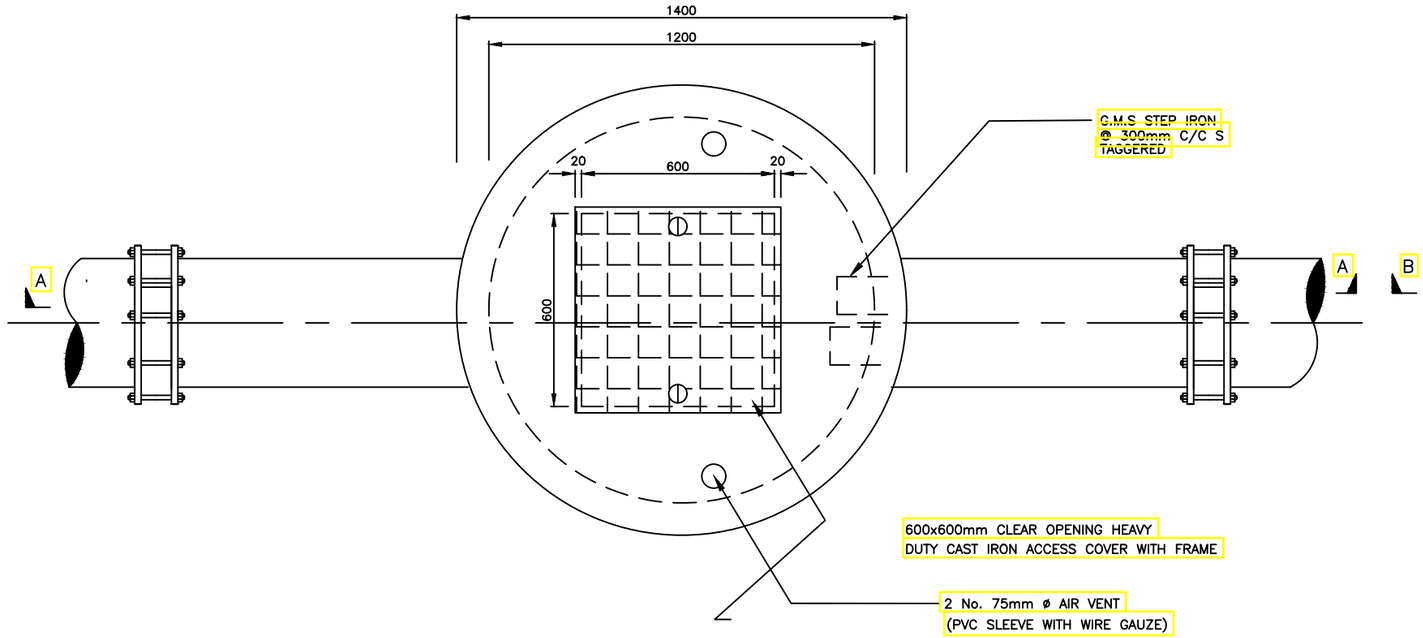
SINGIRAINI COMMUNITY BOREHOLE PIPELINE PROJECT

JOB No.		ORDER No.	No. OFF TOTAL	SUPPLIER	MATL	No. OFF PER SET

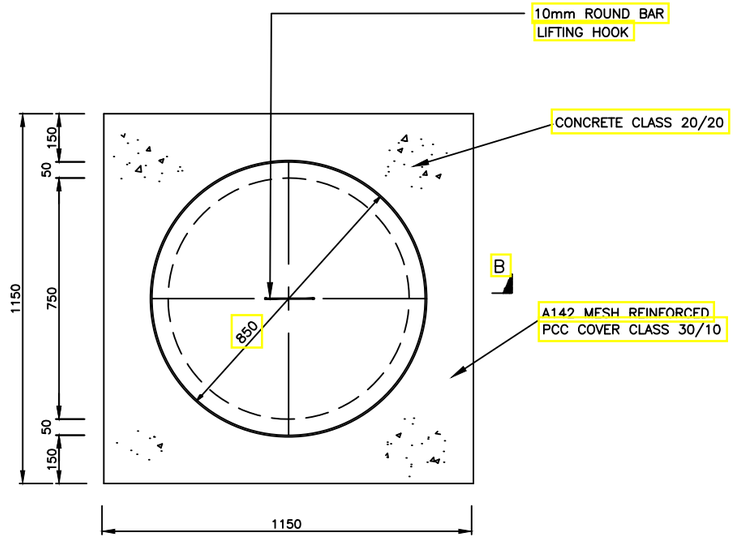
KWSP/SD/02

1

Xref ..\drawing frame v.dwg



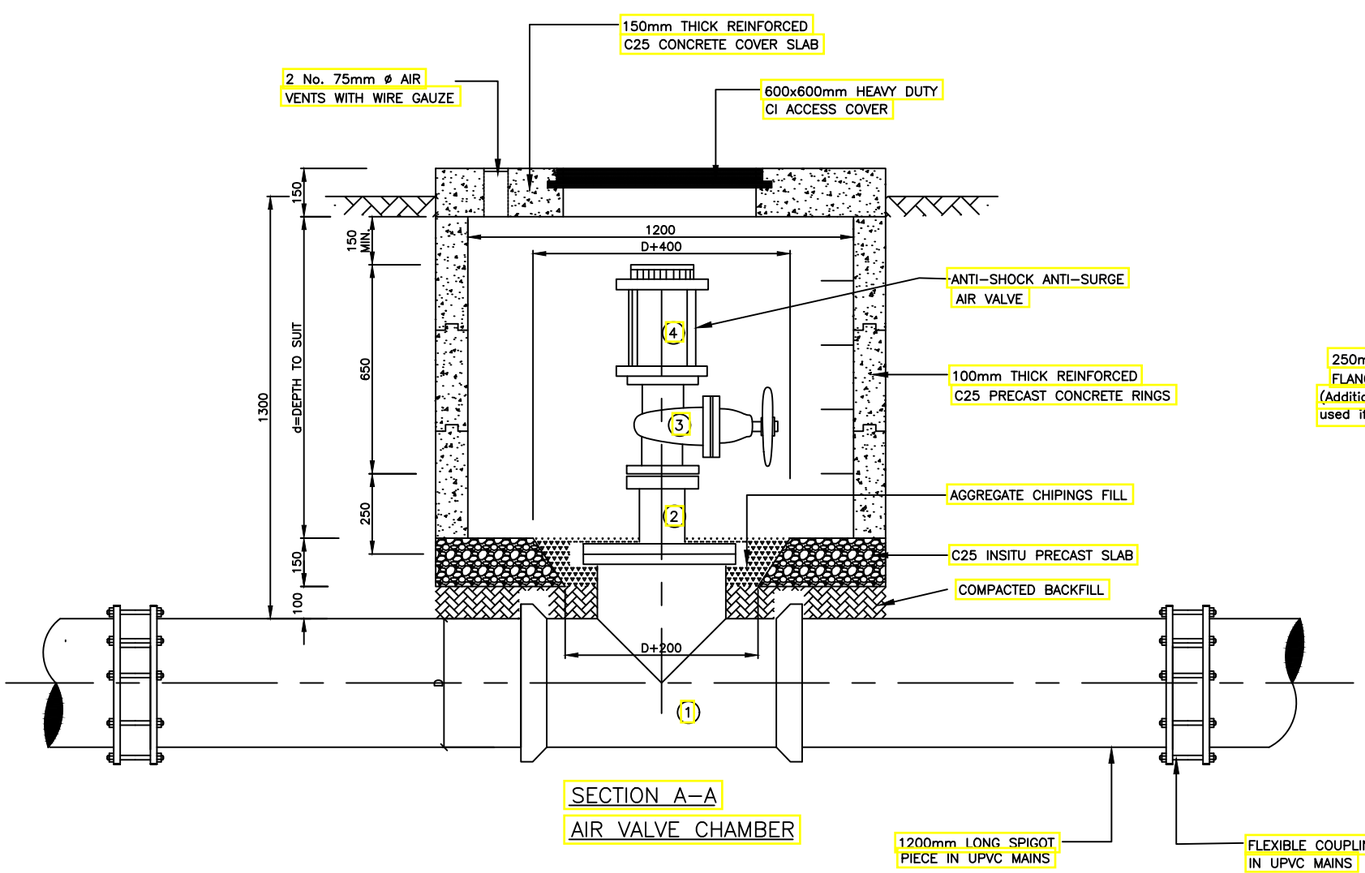
PLAN OF AIR VALVE CHAMBER



PLAN OF COVER

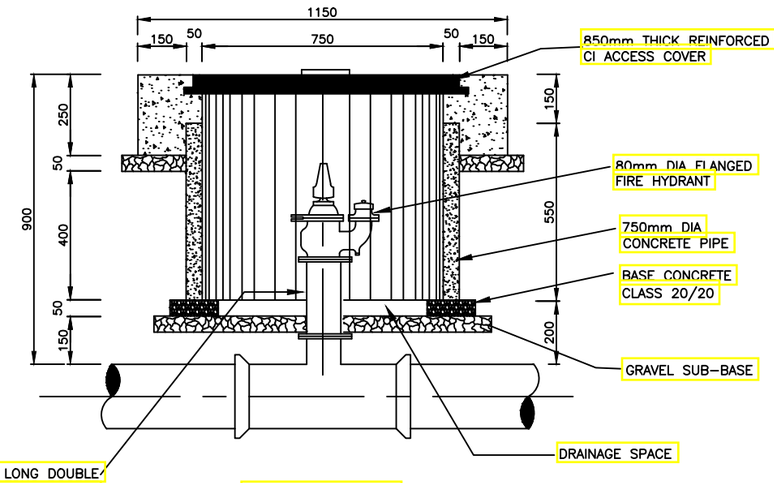
NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED
2. ALL MESH REINFORCEMENT SHOULD CONFORM TO BS 4453
3. ALL FITTINGS TO BE DUCTILE IRON TO PN10 AND FLANGES TO BS 4504 PN10
4. STEP IRONS ARE ONLY REQUIRED CHAMBER IS GREATER THAN 1000mm DEEP
5. CHAMBER TO BE BACKFILLED WITH 300mm THICK GRANULAR FILL
6. ACCESS COVERS TO BE CAST IRON
7. PRECAST CONCRETE TO BE CLASS 30/10



SECTION A–A

AIR VALVE CHAMBER



SECTION B–B

FIRE HYDRANT CHAMBER TYPE 2C

TABLE OF AIR VALVE BRANCH AND FITTINGS

MAIN SIZE (mm)	AIR VALVE BRANCH ø (mm)	AIR VALVE TEE (1)	FLANGED REDUCER (2)	VALVE (3)	AIR VALVE (4)
100	25	100X50	50X25	25	25
150	50	150X50	50X50	50	50
200	50	200X100	100X50	50	50
250	80	250X150	150X80	80	80
300	80	300X150	150X80	80	80
350	80	350X150	150X80	80	80
400	100	400X200	200X100	100	100
450	100	450X200	200X100	100	100
500	100	500X250	250X100	100	100
600	150	600X300	300X150	150	150
700	150	700X350	350X150	150	150
800	200	800X400	400X200	200	200
900	200	900X450	450X200	200	200

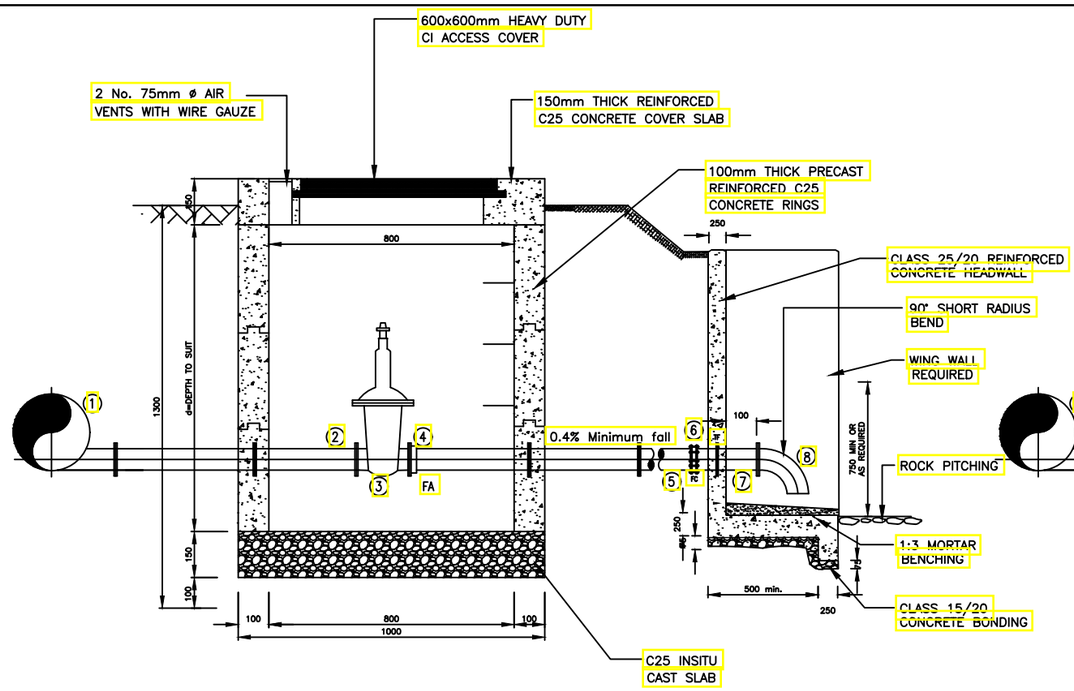
FIRE HYDRANT AND
AIRVALVE DETAILS

KWSP/SD/04

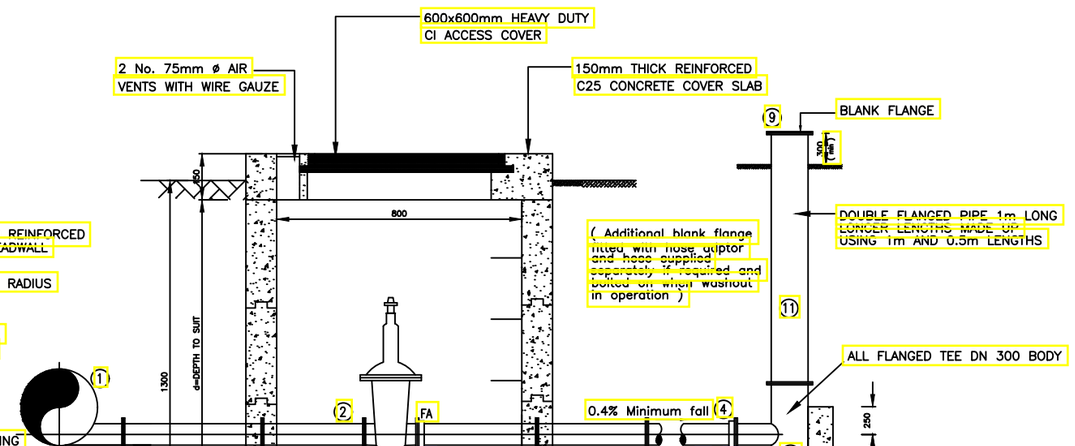
1

NOTES

1. All dimensions are in mm unless otherwise stated
2. Surface boxes to chambers to be of cast iron
3. All external edges to be chamfered (25x25mm)
4. Precast Concrete to Class 30/10

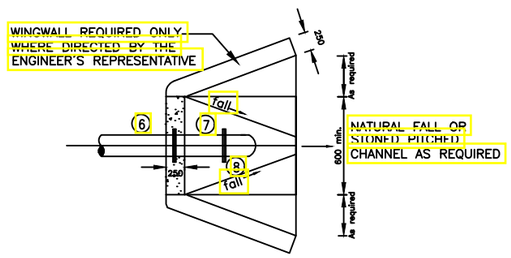


WASHOUT TYPE 1
ARRANGEMENT WITH NATURAL DRAINAGE



WASHOUT TYPE 2
ARRANGEMENT WITHOUT NATURAL DRAINAGE

SINGIRAINI COMMUNITY BOREHOLE PIPELINE PROJECT



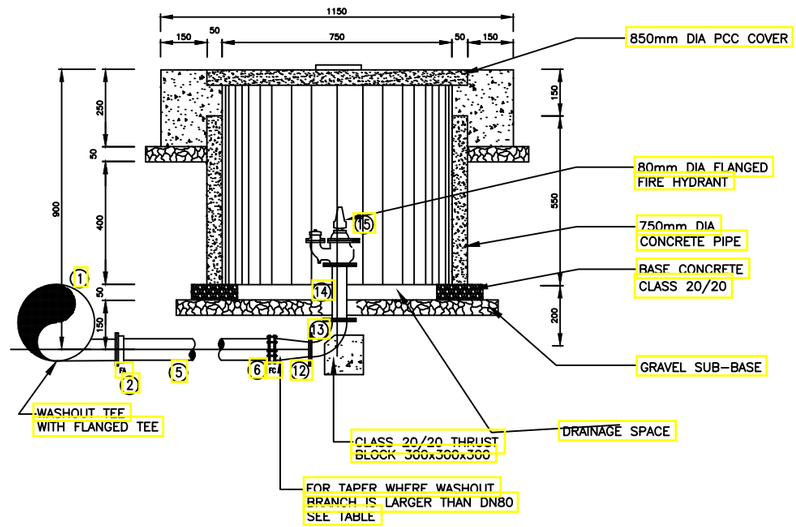
PLAN OF OUTFALL
Washout Type 1
(ARRANGEMENT WHERE NATURAL DRAINAGE IS POSSIBLE)

SCHEDULE OF FITTINGS

FITTING REF. NO.	DESCRIPTION
1	INVERT LEVEL DOUBLE SOCKETED BRANCH TEE
2	DOUBLE FLANGED SPIGOT 0.8m LONG
3	DOUBLE FLANGED GATE VALVE
4	FLANGE ADAPTOR
5	SOCKETED PIPE – 2NO.
6	FLANGED COUPLING
7	600mm LONG FLANGE SPIGOT WITH CENTRAL FLANGE
8	ONE END FLANGED 90° SHORT RADIUS BEND
9	DN300 BLANK FLANGE
10	DN300 ALL FLANGED TEE
11	DN300 DOUBLE FLANGED SPIGOT 1.0m LONG
12	ONE END FLANGED TAPER
13	DN80 DOUBLE FLANGED 90° BEND
14	DN80 DOUBLE FLANGED SPIGOT 0.5m LONG
15	DN80 FLANGED FIRE HYDRANT
UPVC MAINS ONLY	2NO. 0.8m LONG SPIGOT PIECE
	2NO. STEPPED COUPLINGS

TABLE OF WASHOUT BRANCH SIZES.

MAIN DIAMETER (MM)	WASHOUT BRANCH SIZE (MM)
100 – 300	80
350 – 500	100
600 – 700	150
ABOVE 700	200



WASHOUT TYPE 3
WHERE NATURAL DRAINAGE IS NOT POSSIBLE AND THEN WASHOUT LOCATED IN BUILT UP AREAS WHERE IT COULD BE USED FOR FIRE FIGHTING) FOR MAIN SIZES LESS THAN 500 DN

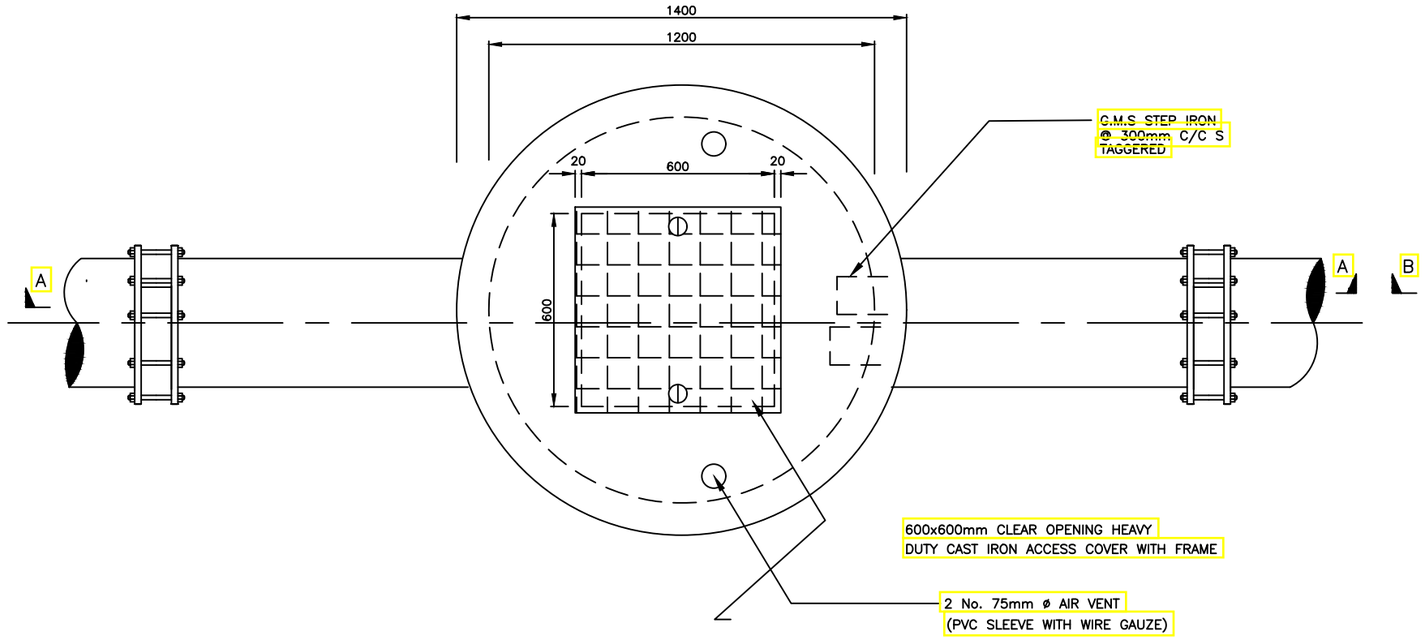
WASHOUT DETAILS

JOB No.		ORDER No.	No. OFF TOTAL	SUPPLIER	MATL	No. OFF PER SET	
PLANT/AREA	WATER SUPPLY	DRAWN	GATHAIYA	SCALE			D
SECTION	BOREHOLES	TRACED			DRAWING NUM		

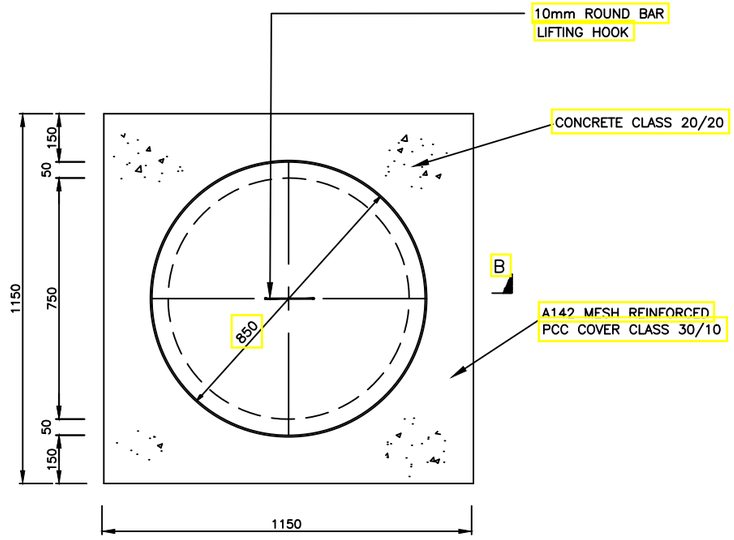
P.O. BOX 1-00205
LAKE MAGADI, KENYA.

KWSP/SD/03
1

kref ..\drawing frame v.dwg



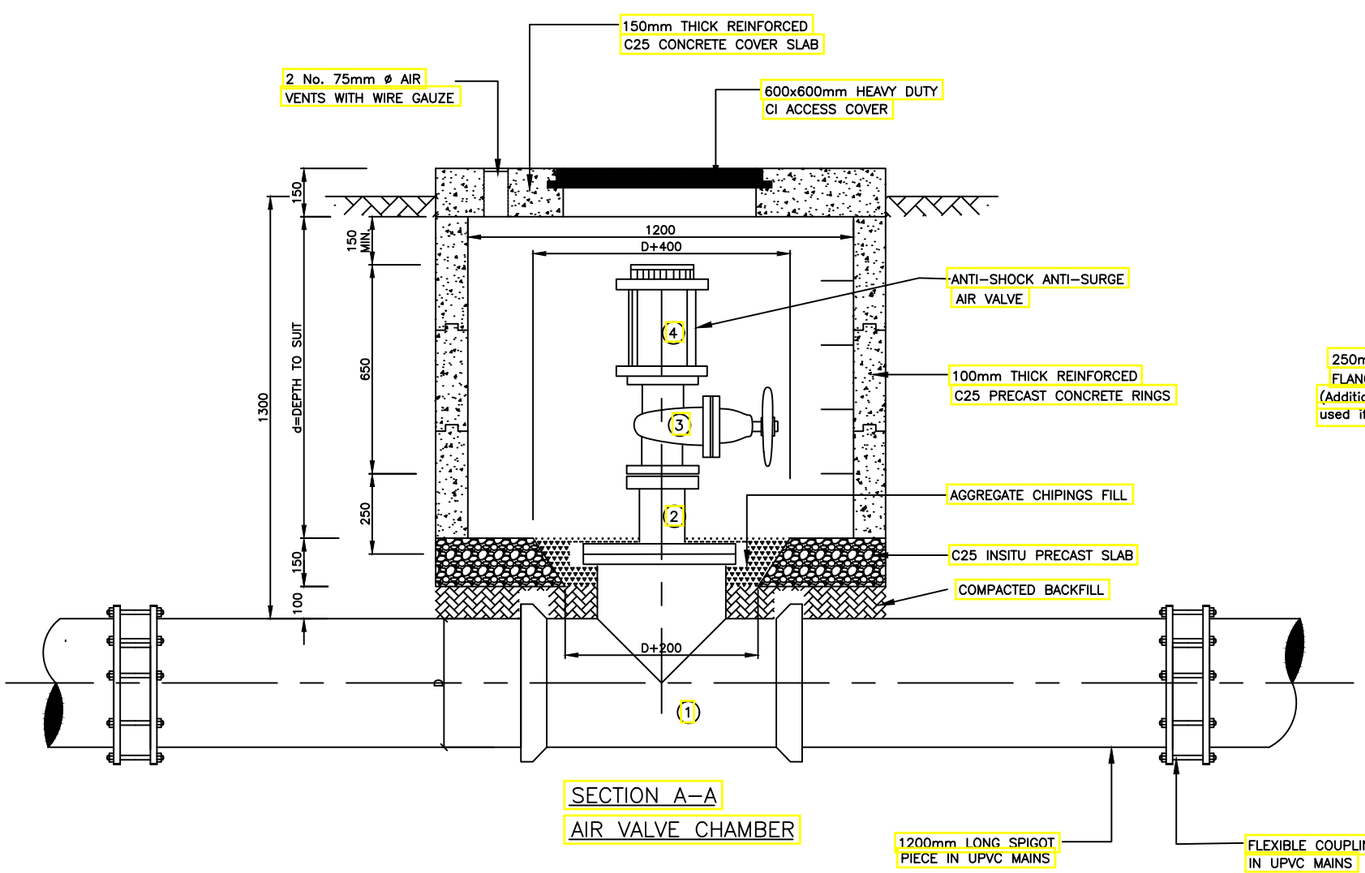
PLAN OF AIR VALVE CHAMBER



PLAN OF COVER

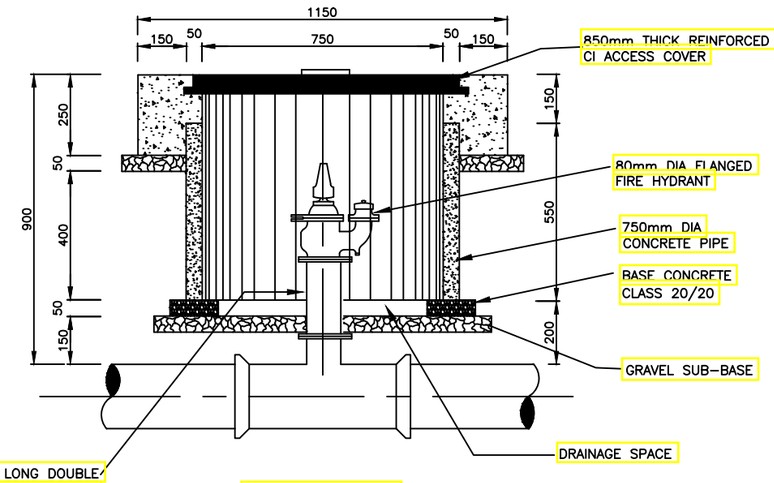
NOTES

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE STATED
2. ALL MESH REINFORCEMENT SHOULD CONFORM TO BS 4453
3. ALL FITTINGS TO BE DUCTILE IRON TO PN10 AND FLANGES TO BS 4504 PN10
4. STEP IRONS ARE ONLY REQUIRED CHAMBER IS GREATER THAN 1000mm DEEP
5. CHAMBER TO BE BACKFILLED WITH 300mm THICK GRANULAR FILL
6. ACCESS COVERS TO BE CAST IRON
7. PRECAST CONCRETE TO BE CLASS 30/10



SECTION A–A

AIR VALVE CHAMBER



SECTION B–B

FIRE HYDRANT CHAMBER TYPE 2C

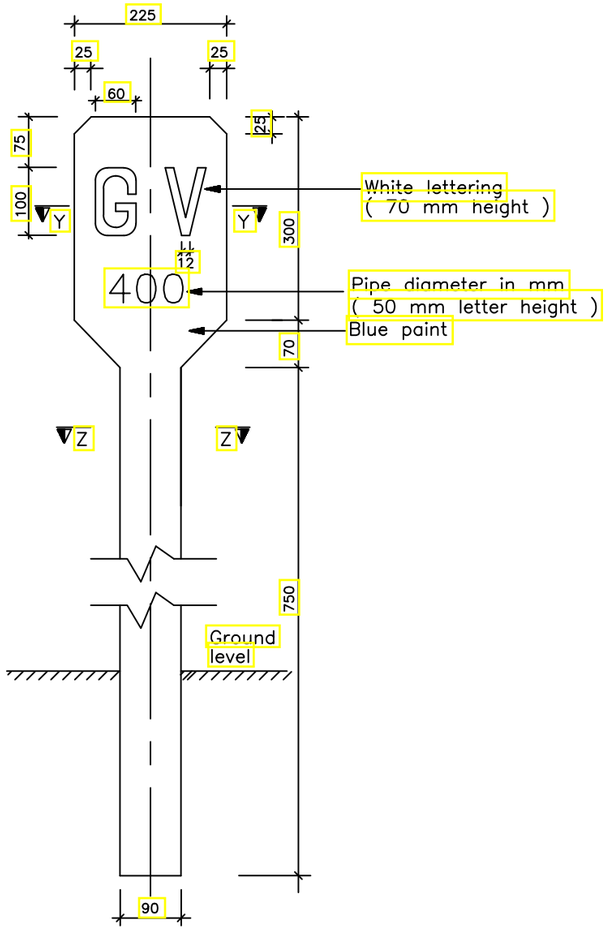
TABLE OF AIR VALVE BRANCH AND FITTINGS

MAIN SIZE (mm)	AIR VALVE BRANCH ø (mm)	AIR VALVE TEE (1)	FLANGED REDUCER (2)	VALVE (3)	AIR VALVE (4)
100	25	100X50	50X25	25	25
150	50	150X50	50X50	50	50
200	50	200X100	100X50	50	50
250	80	250X150	150X80	80	80
300	80	300X150	150X80	80	80
350	80	350X150	150X80	80	80
400	100	400X200	200X100	100	100
450	100	450X200	200X100	100	100
500	100	500X250	250X100	100	100
600	150	600X300	300X150	150	150
700	150	700X350	350X150	150	150
800	200	800X400	400X200	200	200
900	200	900X450	450X200	200	200

FIRE HYDRANT AND
AIRVALVE DETAILS

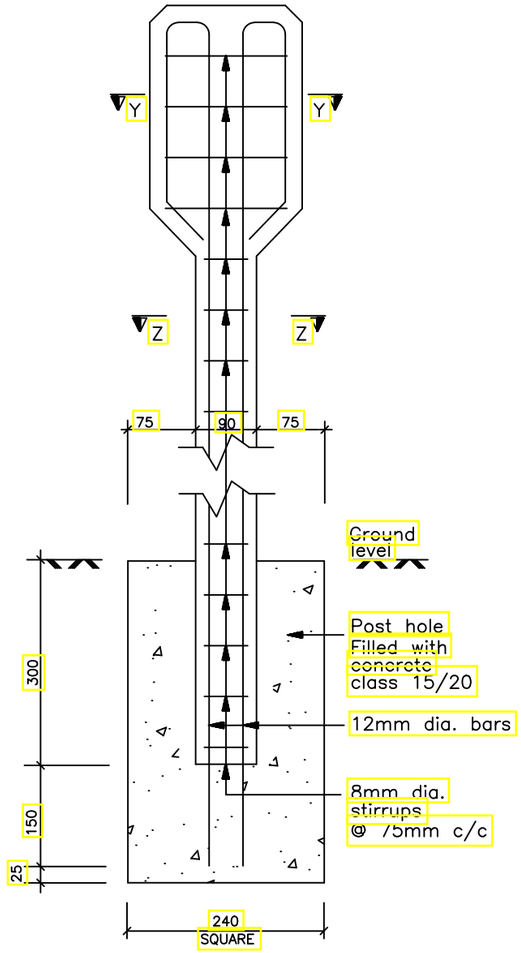
KWSP/SD/04

1



GATE VALVE INDICATOR POST

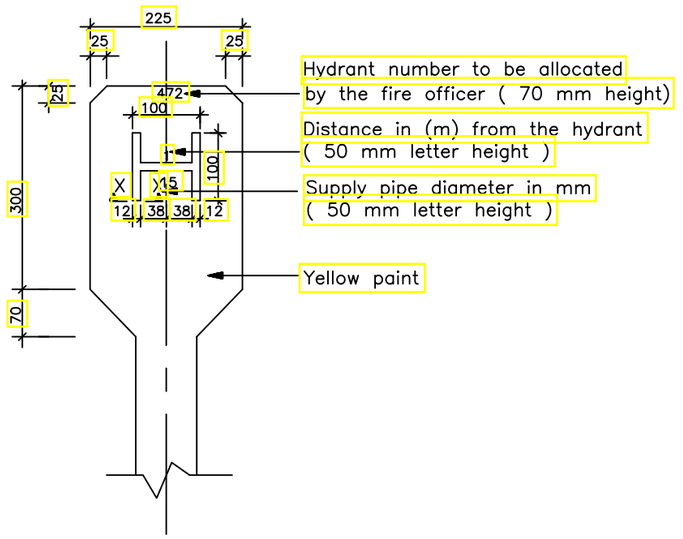
SCALE 1:10



INDICATOR POST REINFORCEMENT

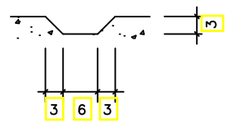
DETAILS

SCALE 1:10



FIRE HYDRANT POST

SCALE 1:10



SECTION X–X

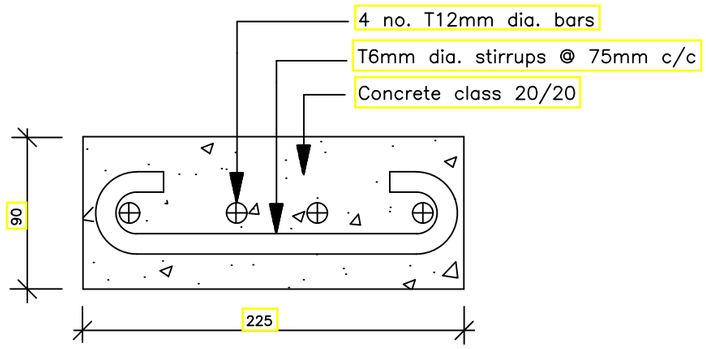
N.T.S.

NOTES

1. All dimensions are in mm unless otherwise stated.
2. Details for indicator posts to be as for gate valve but lettering to be as follows

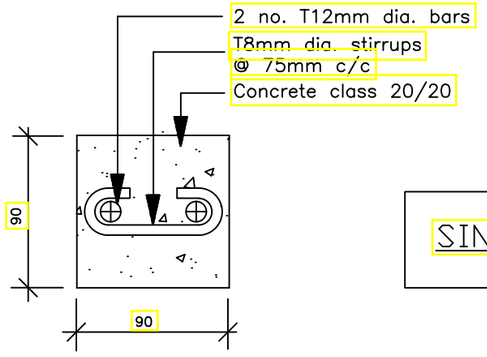
FOR	USE
gate valve	GV
air valve	AV
washout	WO
fire hydrant	H
water main	WM
bulk meter	M

3. All indicator posts except fire Hydrant posts to be painted with 2 coats blue oil based paint and lettering to engineer's approval.
4. Maker posts to be positioned in safe locations where possible against boundary of road reserve



SECTION Y–Y

SCALE 1:4



SECTION Z–Z

SCALE 1:4

SINGIRAINI COMMUNITY BOREHOLE PIPELINE PROJ

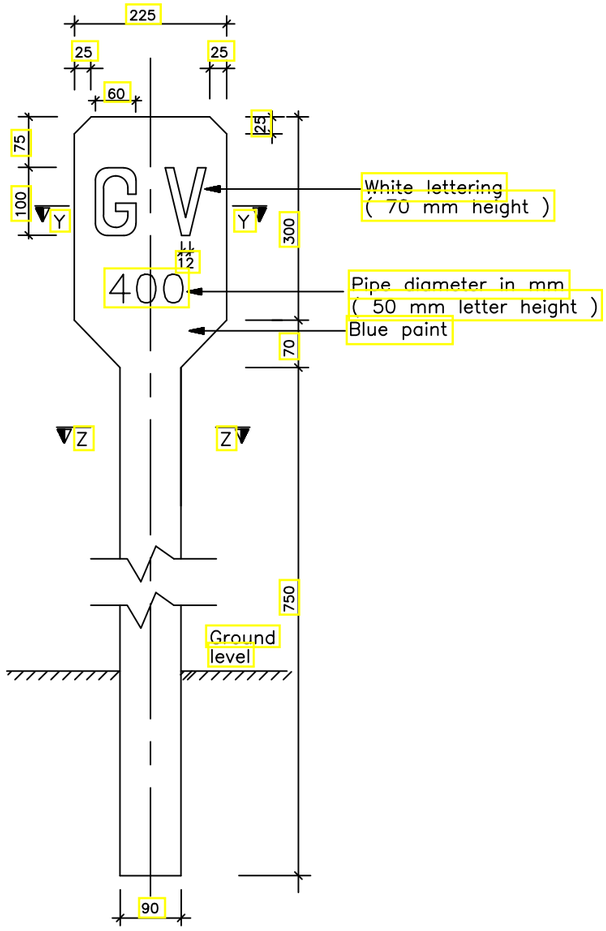
MARKER POST DETAILS

KWSP/SD/05

1

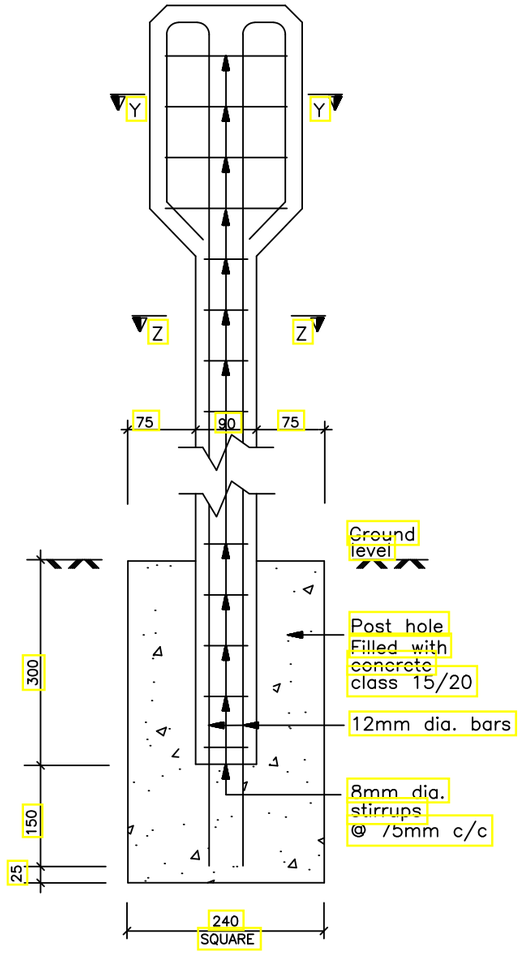
JOB No.		ORDER No.	No. OFF TOTAL	SUPPLIER	MA

Xref ..\drawing frame v.dwg



GATE VALVE INDICATOR POST

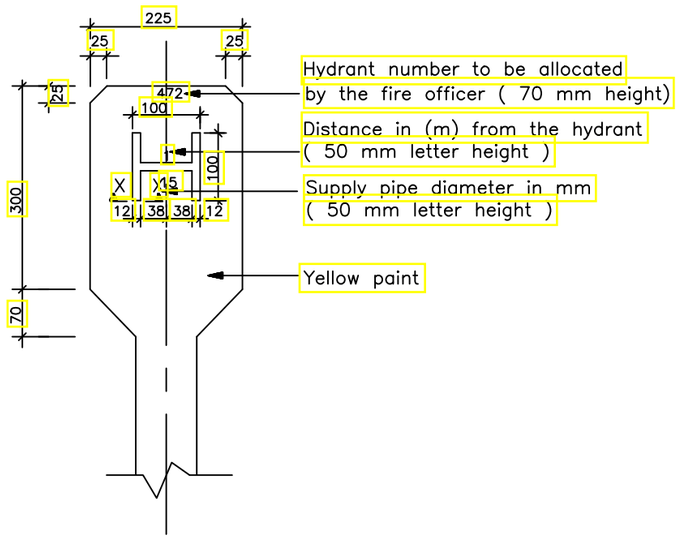
SCALE 1:10



INDICATOR POST REINFORCEMENT

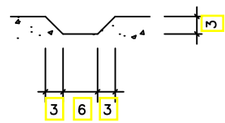
DETAILS

SCALE 1:10



FIRE HYDRANT POST

SCALE 1:10



SECTION X–X

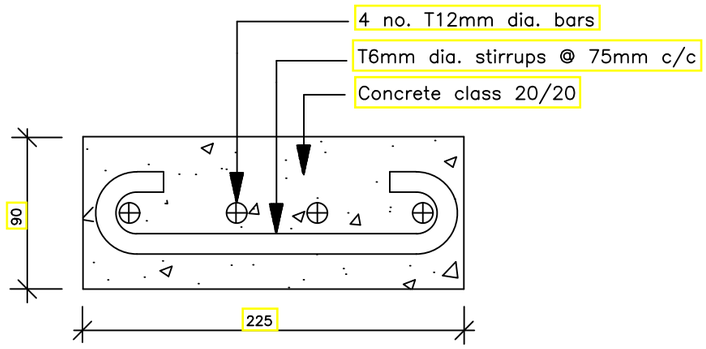
N.T.S.

NOTES

1. All dimensions are in mm unless otherwise stated.
2. Details for indicator posts to be as for gate valve but lettering to be as follows

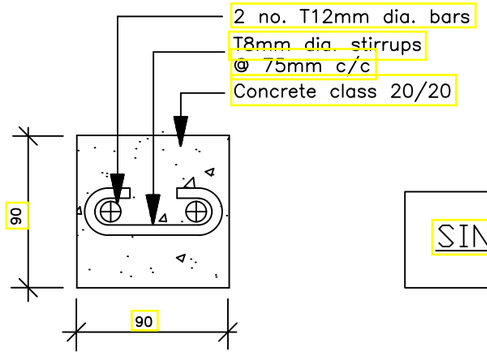
FOR	USE
gate valve	GV
air valve	AV
washout	WO
fire hydrant	H
water main	WM
bulk meter	M

3. All indicator posts except fire Hydrant posts to be painted with 2 coats blue oil based paint and lettering to engineer's approval.
4. Maker posts to be positioned in safe locations where possible against boundary of road reserve



SECTION Y–Y

SCALE 1:4



SECTION Z–Z

SCALE 1:4

SINGIRAINI COMMUNITY BOREHOLE PIPELINE PROJ

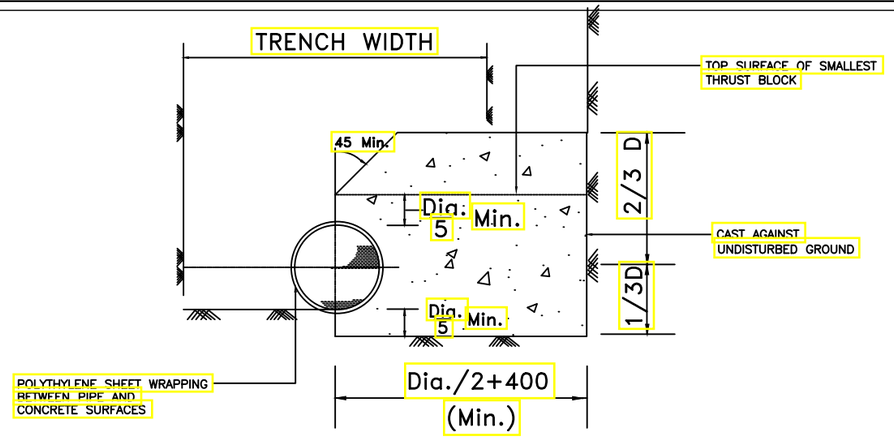
MARKER POST DETAILS

KWSP/SD/05

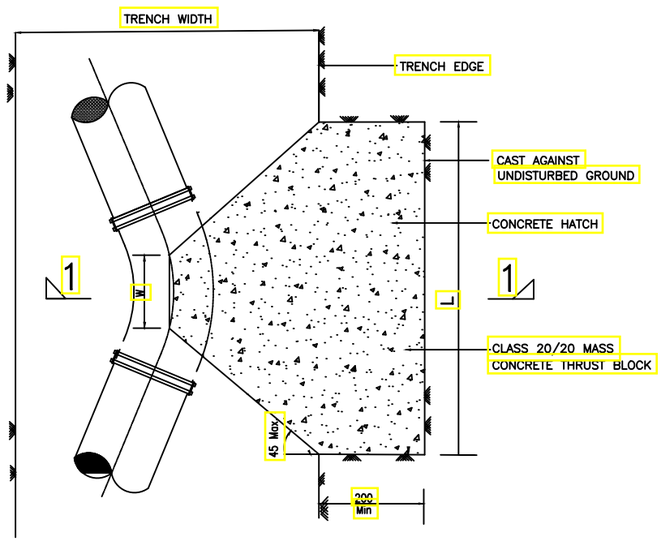
1

JOB No.		ORDER No.	No. OFF TOTAL	SUPPLIER	MA

Xref ..\drawing frame v.dwg

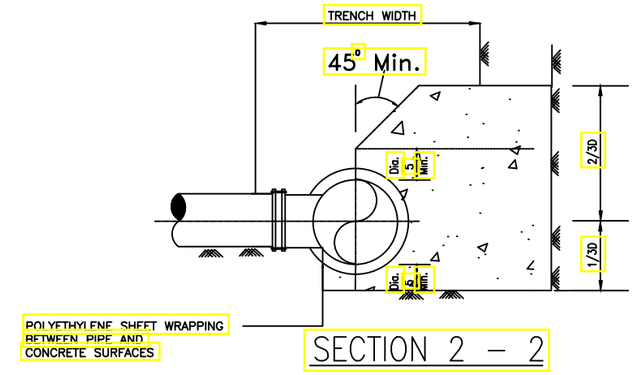


Section 1 – 1

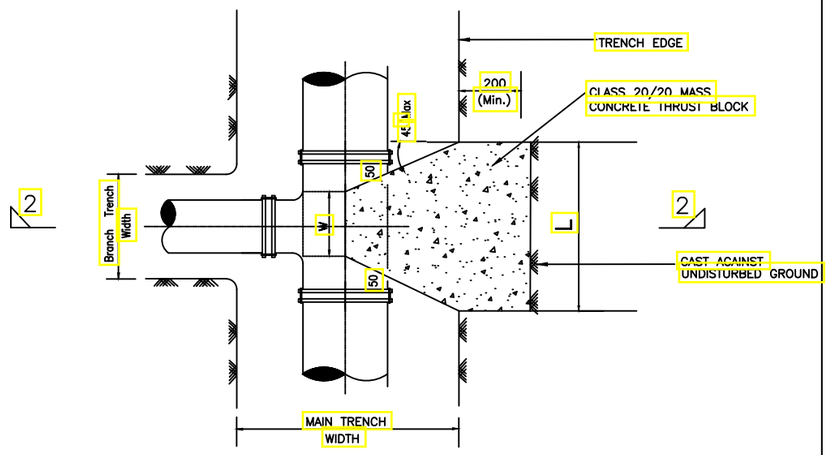


SECTIONAL PLAN

THRUST BLOCK FOR HORIZONTAL BENDS



SECTION 2 – 2



SECTIONAL PLAN

THRUST BLOCK FOR TEES

NOTES

1. All concrete thrust blocks shall be constructed on and against firm ground directly. The thrust or anchor blocks shall not be cast against black cotton soil and reference shall be made to the Engineer's Representative for further instructions
2. The concrete thrust blocks are designed to bear on the original earth surface safe bearing pressure of 100 KN/m².
3. Concrete to be class 20/20 unless otherwise stated.
4. Concrete in thrust and anchor blocks must be cast 50mm clear of joints
5. Dimensions 'W' for thrust blocks bends to suit the size of bend and clearence required for joints
6. Pipe to be wrapped with polyethylene sheeting where in contact with concrete surface
7. For thrust blocks to verticle bends refer to Drg. No. SD/08
8. The thrust block dimensions in the tables given are for test pressures indicated. For higher test pressures,the thrust dimensions are to be increased as directed by the Engineer

TABLE OF THRUST BLOCKS FOR HORIZONTAL BENDS

TEST HEAD (m)	BEND	DIMENSIONS (D)m x (L)m x V(m³) SIZE OF BEND DN (mm) 800	700	600	500	450	400	350	300	250	200	150/100
100 SEE NOTE 8	11 1/4°	1.8X0.8X0.7	1.6X0.8X0.6	1.4X0.7X0.4	1.2X0.6X0.3	1.1X0.5X0.2	1.0X0.5X0.2	0.9X0.4X0.1	0.8X0.4X0.1	0.7X0.3X0.1	0.5X0.3X0.1	0.5X0.3X0.1
	22 1/2°	1.8X1.6X1.4	1.6X1.6X1.2	1.4X1.3X0.8	1.2X1.2X0.6	1.1X1.0X0.5	1.1X0.8X0.4	1.0X0.7X0.3	0.8X0.7X0.2	0.8X0.5X0.1	0.8X0.3X0.1	0.5X0.3X0.1
	30°	1.8X2.1X1.9	1.6X2.0X1.5	1.4X1.8X1.1	1.2X1.5X0.8	1.1X1.3X0.6	1.1X1.1X0.5	1.0X0.9X0.3	0.9X0.8X0.3	0.8X0.7X0.2	0.8X0.4X0.1	0.5X0.4X0.1
	45°	1.8X3.2X2.9	1.6X3.2X2.4	1.6X2.2X1.6	1.4X1.8X1.1	1.1X2.0X0.9	1.2X1.5X0.7	1.0X1.4X0.5	1.0X1.0X0.4	0.8X1.0X0.3	0.8X0.6X0.2	0.6X0.5X0.1
	90°	2.4X4.0X4.8	2.0X3.8X3.6	1.8X3.5X2.8	1.6X2.7X1.8	1.4X2.6X1.5	1.2X2.5X1.2	1.2X2.0X0.9	1.2X1.5X0.7	1.0X1.4X0.5	1.0X0.8X0.3	0.6X0.9X0.2

Table of Thrust Blocks for Horizontal Bends

TABLE OF THRUST BLOCKS FOR TEES

TEST HEAD (m)	MAIN SIZE (mm)	DIMENSIONS (D)m x (L)m x V (m3) BRANCH SIZE (mm) 800	700	600	500	450	400	350	300	250	200	150/100
100 SEE NOTE No. 8	800	2.0x3.5x3.5	1.8x3.2x2.7	1.6x2.7x1.9	1.6x2.0x1.4	1.6x1.6x1.1	1.6x1.2x0.8	1.6x1.0x0.6	1.6x0.7x0.4	1.6x0.5x0.3	1.6x0.3x0.2	1.6x0.3x0.2
	700		1.6x3.6x2.7	1.6x2.7x1.9	1.5x2.1x1.4	1.5x1.7x1.1	1.5x1.3x0.8	1.5x1.0x0.6	1.5x0.8x0.5	1.4x0.6x0.3	1.4x0.4x0.2	1.4x0.3x0.2
	600			1.5x3.0x2.0	1.5x2.1x1.4	1.5x1.7x1.1	1.2x1.8x0.9	1.2x1.4x0.7	1.2x1.0x0.5	1.2x0.7x0.3	1.2x0.5x0.2	1.2x0.3x0.1
	500			—	1.4x2.3x1.4	1.3x2.0x1.1	1.2x1.8x0.9	1.2x1.4x0.7	1.2x1.0x0.5	1.1x0.8x0.3	1.1x0.5x0.2	1.1x0.3x0.1
	450			—	—	1.2x2.3x1.1	1.2x1.8x0.9	1.1x1.6x0.7	1.1x1.2x0.5	1.1x0.8x0.3	1.0x0.6x0.2	1.0x0.4x0.1
	400			—	—	—	1.0x1.3x0.9	1.0x1.8x0.7	1.0x1.3x0.5	1.0x0.9x0.3	1.0x0.6x0.2	1.0x0.4x0.1
	350			—	—	—	—	1.0x1.8x0.7	1.0x1.3x0.5	1.0x0.9x0.3	1.0x0.5x0.2	1.0x0.4x0.1
	300			—	—	—	—	—	0.8x1.7x0.5	0.8x1.2x0.3	0.8x0.8x0.2	0.8x0.5x0.1
	250			—	—	—	—	—	—	0.8x1.2x0.3	0.8x0.8x0.2	0.8x0.5x0.1
	200			—	—	—	—	—	—	—	0.6x1.1x0.2	0.6x0.7x0.1
	150			—	—	—	—	—	—	—	—	0.5x0.8x0.1

Table of Thrust Blocks for Tees

(CLASS 20/20 CONCRETE)

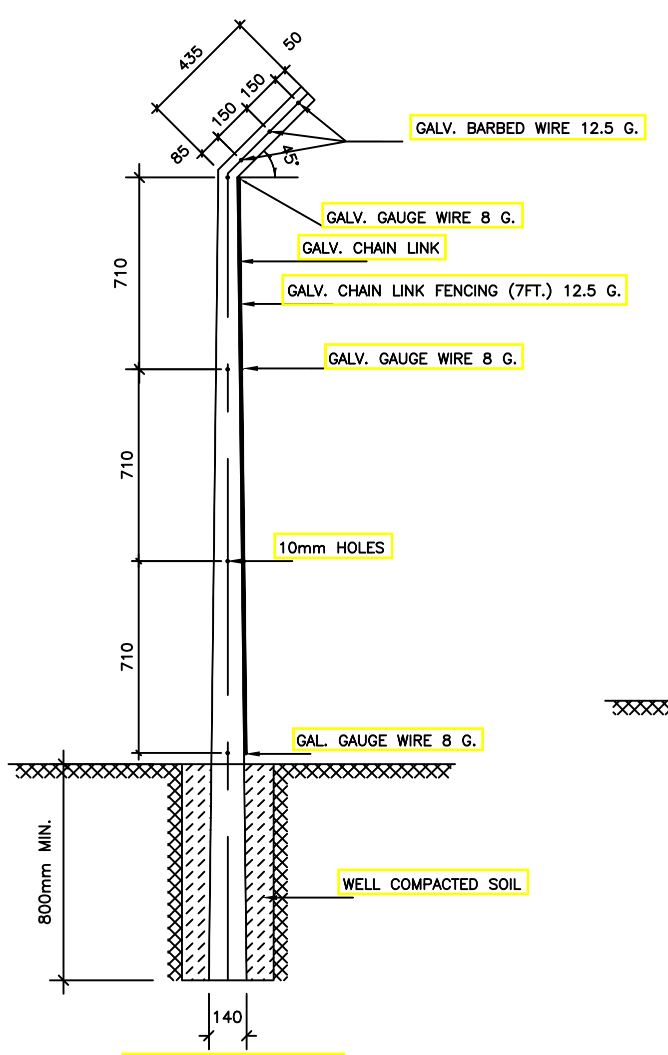
THRUST BLOCK DETAILS DETAILS

KWSP/SD/08

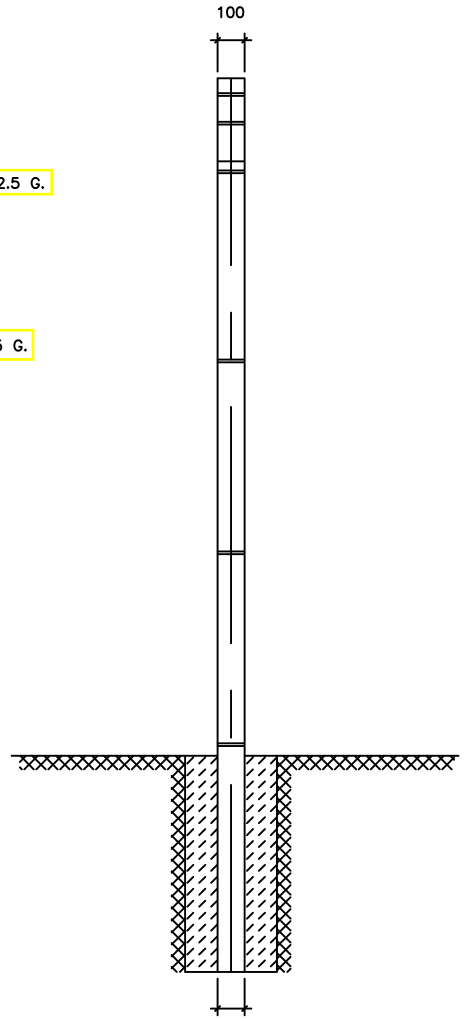
1

JOB No.		ORDER No.	No. OFF TOTAL	SUPPLIER	M

Xref ..\drawing_frame_v.dwg

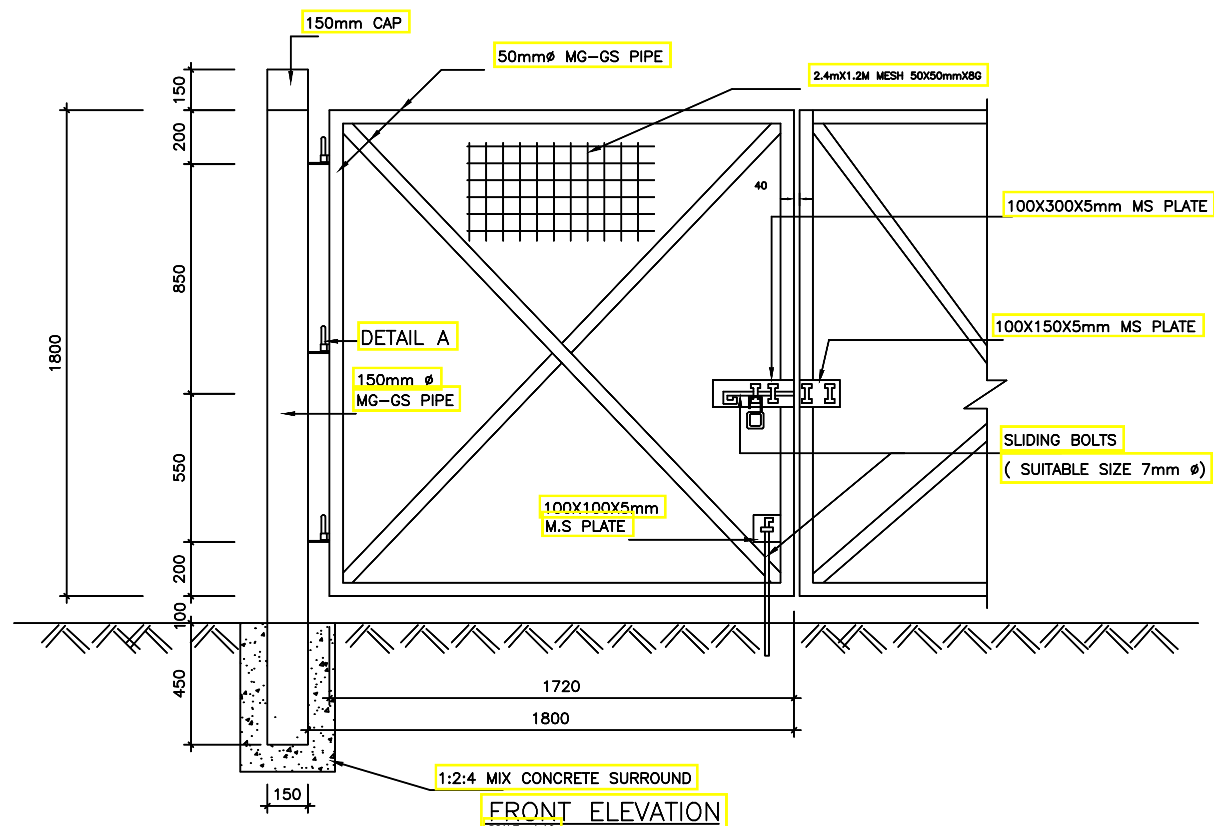


SIDE ELEVATION
SCALE 1:25

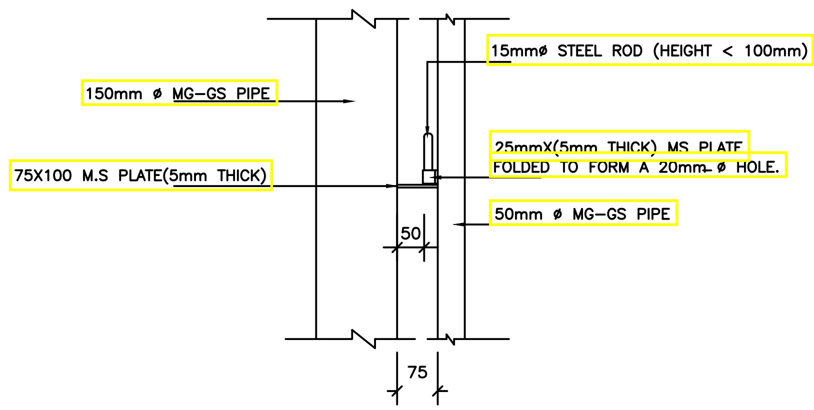


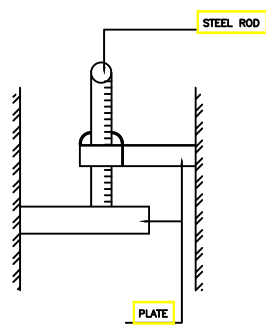
FRONT ELEVATION
SCALE 1:20

STANDARD FENCE POST



FRONT ELEVATION
SCALE 1:10





3 DIM. VIEW OF A
NOT TO SCALE

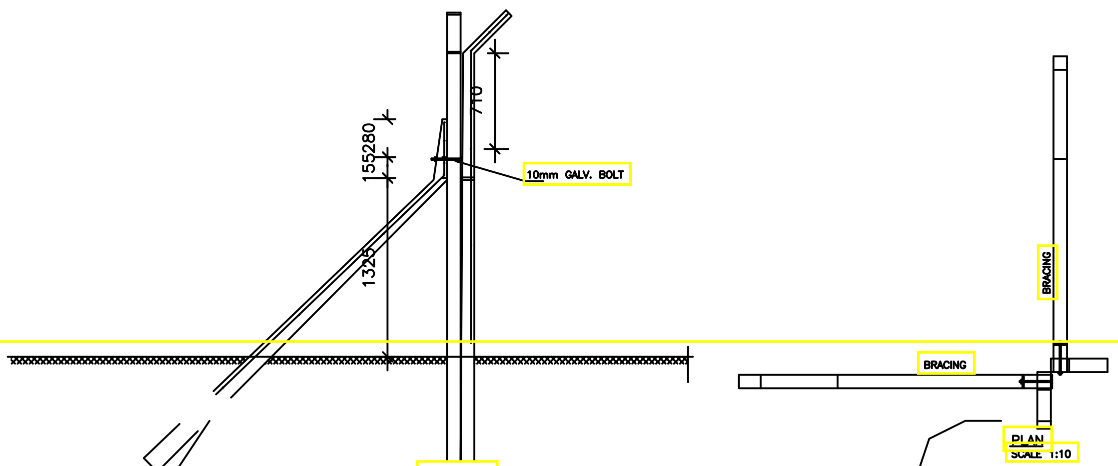
DETAIL A
NOT TO SCALE

FRONT ELEVATION

NOTES

1. THE STRUCTURE SHOULD BE WIRE BRUSHED TO GET RID OF ALL RUST SCALES
2. ONE COAT OF PRIMER PAINT AND ONE COAT OF ALUMINIUM PAINT SHOULD BE USED AS FINISH
3. ALL CONNECTIONS TO BE WELDED
4. DIMENSIONS SHOULD NOT BE SCALED
5. CONCRETE TO COMPLY WITH C.P 114 AND TO BE OF MIX. 1:2:4 WITH A MIN. WORKS CUBE STRENGTH OF 14N/mm2 AFTER 7 DAYS AND 21N/mm2 AFTER 28 DAYS
6. ALL MATERIALS TO BE HOT DIP GALVANIZED
7. CHAIN LINK FENCING TO BE FIXED TO LONGITUDINAL WIRES AT EVERY 150mm
9. BINDING WIRE TO BE OF 16 G
10. MAXIMUM DISTANCE BETWEEN THE POSTS 3.00m
10. MAXIMUM DISTANCE BETWEEN THE STRAINING POSTS 18m

LIST OF MATERIALS FENCE POST	QUANTITY	BENDING	LENGTH
CONCRETE MIX 1:2:4	0.04m3		
MILD STEEL R6 (STRRUPS)	0.82KG	11No. 60 VARIES 90 TO 40	3.70m
MILD STEEL R8 (LONGITUDINAL)	5.40KG	75 2925 400 @ 3.40m	13.60m



ELEVATION
SCALE 1:10

PLAN
SCALE 1:10

ARRANGEMENT AT CORNERS

SINGIRAINI COMMUNITY BOREHOLE PIPELINE PROJECT

GATE AND FENCING DETAILS

JOB No.	

ORDER No.	No. OFF TOTAL	SUPPLIER	MATL	No. OFF PER SET	DESCRIPTION

P.O. BOX 1-00205
LAKE MAGADI, KENYA.

PLANT/AREA WATER SUPPLY

DRAWN GATHAIYA SCALE

DATE 17/09/2(

KWSP/SD/01

1