CONSTRUCTION OF MAKATHINI BLOCK 6A INFRASTRUCTURE

1. CONCRETE BUTTRESS WEIR OUTLET STRUCTURE

- 2. AGRICULTURAL INFIELD SUBSURFACE DRAINAGE
- 3. 2 x VEHICLE CULVERT CROSSINGS
- 4. REMEDIAL REPAIRS TO EXISTING CONCRETE STORMWATER CANAL

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	agriculture & rural development Department: agriculture & rural development PROVINCE OF KWAZULU-NATAL	No	Notes & Reference drawings No. Description		Project : MAKATHINI BLOCK 6A SUBSURFACE DRAINAGE Drawing description DRAWING LIST		
DISTRICT : - UMKHANYAKUDE Local office :- JOZINI DIRECTORATE : ENGINEERING & SOIL CONSERVATION PRIVATE BAG X9059, PIETERMARITZBURG, 3200 TEL: 033-3559331, FAX: 033-3559330		* DO NO * ALL DI ATTENT MANAG	Nov 2019 JM Van Der Merwe T SCALE THIS DRAWING - USE FIGURED DIMENSIONS ONLY. MENSIONS TO BE CHECKED ON SITE PRIOR TO WORK COMMENCING. SCREPANCIES ON THE DRAWINGS MUST BE BROUGHT TO THE TION OF THE ENGINEERS, DESIGN TEAM AND INTRASTRUCTURE ERS AND RECORDED IN THE SITE MINUTES THEREOF.	Scale Drawin	NTS ng number KZNDARD/MA	Date 20/01/2020 K/BL6/000	



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	Department: agriculture & rural development PROVINCE OF KWAZULU-NATAL	No. [Amendment Date Checked By		Drawing de	scription Y MAP
DISTRICT : Local office	- UMKHANYAKUDE :- JOZINI	\leq	Nov 2019 [* JM Van Der Merwe	Scale	NTS	Date 20/01/2020
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Scale





NOTES :-

Ideally, all construction should follow a definite plan that has been prepared in advance in consultation with the project engineer.

The plan should include profiles and construction notes for all mains and submains and a map showing the locations, sizes, and grades of all lines and other components. The map also should show physical features so that components of the system can be readily located in the future for repairs and maintenance.

The location of buried cables, pipelines, or other utilities also should be noted (long before construction begins, the contractor should obtain any necessary permission or easements that might be required to cross the land of other owners, roads, etc.).

The contractor should carefully examine the plan before work is begun and should not proceed with installation until the authorities have marked the location of any buried obstacles at points where drains are to be constructed. As the work proceeds, the contractor should be careful to note on the plan and map any modifications in the design that are necessitated in the field, especially any changes in grade. Once the job is completed, the contractor should provide the engineer with an as-built plan.

Safety

Observe safety standards for persons and machines. Persons working in trenches should be protected from cave-ins, and they should not work alone. Moving parts of machinery should be protected by proper guards. Persons observing the work should not be permitted to come close to the excavating operation.

Trench method of installation Construction of the trench should begin at the outlet and proceed upgrade. Align trenches in such a way that the drain can be laid in straight lines or in smooth curves. The width of the trench at the top of the drain should be the minimum required to permit installation and enable the bed to support the load on the drain. But there should be at least 150mm of clearance on either side of the drain.

Tile should be bedded in an earth foundation that is shaped to fit the lower part of the pipe The foundation can be shaped in this way with most trenching machines. If you dig the trench with a backhoe, you will have to hand grade and shape the trench bottom to fit the pipe.

If the drain is to be laid in a rock-cut, the trench should be overexcavated to a depth of 150mm below grade level; this space should be filled with graded sand and gravel or well-pulverized soil and tamped enough to provide a firm foundation. Then, the bottom of the trench should be shaped and leveled to grade. The trench should be filled with designed bedding or envelope material to the top of the rock-cut. Where the trench bottom is unstable, as in fine sandy soils be extremely careful to keep sediment from entering the drain and to provide a firm foundation for the drain. foundation for the drain.

Installing the subsurface drains

Listed below are some guidelines to follow when installing drains:

- 1. Remove all soil or debris inside drains before installation.
- 2. Make sure the drain is free from clinging wet material that could hinder laying the drain on grade.
- Begin laying tile or tubing at the outlet and progress upgrade. If possible, place the drain inside the shoe casing of the trencher during the trenching operation.
- 4. Automatic drain-laying devices are acceptable, provided that they can lay the drain according to the requirements stated in this publication.
- 5. Lay bedding in the groove and pipe on a firm bed that is free of loose soil on the planned grade
- 6. Hold plastic tubing in position on grade immediately after installation by careful placement of blinding material.
- Where lengths of plastic tubing are to be joined, cut the ends square and remove all ragged or burred edges. Use a plastic coupling to
- 8. secure the ends of the tubing in proper alignment and to prevent the joint from
- 9. separating during installation.
- 10. Before work is suspended for the day, blind and backfill all drains laid in trenches.
- 11. Close any open ends tightly with an end plug. areas closer than 30 meters of trees. Use continuous pipe when in
- 12. Any stretch that occurs during installation of pipe will decrease its strength somewhat and may pull perforations open wider than is desirable. The amount of stretch that occurs during installation depends on the temperature of the tubing at the time it is installed, the amount and duration of drag that occurs when the Pipe is fed through the installation equipment, and the stretch resistance of the tubing. The drainage pipe should not be stretched so much that its stiffness is reduced to less than the minimum allowable pipe stiffness. Stretch, which is expressed as a percentage increase of length, should not exceed

5 percent.

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Inspection of materials

The contractor should inspect construction materials before and during installation. All materials should be satisfactory for the intended use and should meet the requirements described in the Materials section of this publication, and any additional requirements of the contract. Reject any defective or damaged drain pipe; remove defective or damaged sections of plastic pipe. Make sure that the perforations in the plastic drainage pipe are of the proper size.

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Storage of materials

Drainage or materials should be protected from damage during handling and storage. The storage area should be dry, well drained, and free of rodents, vegetation, and fire hazards,

Take more precautions to protect plastic tubing. Where rodents could be a problem, we recommend that you use end caps. Since pipe can be harmed by excessive exposure to ultraviolet rays, protect it from sunlight when it is to be stored outside for a long period.

TRENCH AND EXCAVATION SAFETY MANAGEMENT Collapse :-

Excavation sides can be protected by battering the sides to a safe angle, supporting them with shuttering and sheeting, the use of trench boxes or hydraulic support systems.

People falling in :-

Substantial barriers (guardrail, intermediate rail, toe board), warning tape and signs should be provided where there is a risk of persons falling.

Materials falling in :-

Excavated soil, materials and effluent should be placed at a safe distance from the excavations as the extra weight can contribute to a collapse.

Vehicles on the rim :-

Stop-blocks should be placed about 1.5 metres from an excavation to prevent vehicles falling or surcharging (collapse due to weight pressure).

rvice line risks :

Electrical cables, water piping, telecom lines, manholes and other services must be located. Safe digging practice must be used, including metal detection.

Hazardous atmospheres :-

Noxious or flammable gases could occur naturally in an excavation, Methane is odourless but could cause severe cramps on inhalation. Stop the work if cramps occur.

Undermining adjacent structures :

If there is any doubt that an excavation could undermine an adjacent structure, an engineer should be consulted prior to starting work.

MORE TRENCH SAFETY MEASURES

- The sides of the trench should be more than 15 degrees from vertical
- Bench or batter the sides.
- Excavator operators must be supervised.
- Supervisors must have the authority and means to prevent workers from entering the trench.
- Responsibilities for inspection of excavation must be clearly designated.
- A work permit system must be fully applied.
- Risk assessment for excavation must be extensive, including
- soil conditions, equipment and experience. Workers must be trained on their jobs and on the risks.
- Competency of plant operators must be assessed and permitted. - Regular inspections and audits must include compliance to
- excavation laws and all aspects of operational procedures.
- Managerial and disciplinary procedures must be consistent.
 When new risks are identified, work must not proceed until a review of the risk assessment is completed by specialists, and the recommended measures are taken.

TRENCH WORK LAWS

OHS Act , 8 (2)(b) Employers must take steps to eliminate hazards. Section 14 on General Duties of Employees at work; Every employee has a duty to (a) take reasonable care of themselves,

(c) obey health and safety rules. Construction Regulations; CR 7 Risk assessment; (4) ensure that employees are informed, instructed and trained by a competent person regarding hazards and related work procedures.

	agriculture & rural development	No.	Notes & Reference drawings Description	Project : MAKATHINI BLOCK 6A SUBSURFACE DRAINAGE		
	Department: agriculture & rural development PROVINCE OF KWAZULU-NATAL	No. D	Amendment rate Checked By		Drawing des	cription NOTES
DISTRICT : Local office DIRECTORATE : EN PRIVATE BAG X: TEL : 033	- UMKHANYAKUDE :- JOZINI GINEERING & SOIL CONSERVATION 059, PIETERMARITZBURG, 3200 -35593310	* DO NO * ALL DII * ANY DI ATTENT	Nov 2019 JM Van Der Merwe I scale this brawing - use figured dimensions only. Mensions to be checked on sitte mrok to work commencing. Screpancies on the Drawings must be brought to the bit of the engineers, design team and infrastructure	Scale Drawing	NTS 9 number KZNDARD/MAK	Date

ENVELOPE MATERIAL NOTES :

The following envelope criteria is to be used in conjunction with the perforated subsurface pipes to improve the internal drainage of the soil.

Requirements that should be satisfied for the selected envelope material as tabled below.

Regular random filtermaterial samples to be analysed and results be submitted to the Engineer for approval thereof.

Requirement	Criteria		
1	<u>D₁₅ sand filter</u> D₅ soil material	\leq	5
2	<u> </u>	<	20
3	<u>D₁₅ sand filter</u> D₁₅ soil material	\geq	5
4	<u> </u>	<	5







Subsurface drainage caution Notes :

Construction to commence when the watertable is deep.

Start the excavation from the outlet onwards.

Litmit the width of the trench to reduce excavation cost.

Avoid over excavation as this then has to be re-filled with filter material and not insitu material.

Avoid compacting of the trench invert as this reduces the permeability of the subsoil.

Depth is measured from the soil surface to the bottom of the drainage pipe.

Prevent fine-grained soil particles from entering drain.

Filtermaterial to conform to the prescribed spesification. Place the course filtersand at least 100mm around the pipe. Regular random samples will be analysed by the Department of Agriculture for approval thereof.

Check the slope and depth of the pipe at regular intervals.

Due to the extent and nature of these works, regular intermediate inspections needs to be arranged. Department of Agriculture should be informed of the work progress on a weekly basis.

Regular maintenance should be done on the system after installation completion.

After installation 2 ton gypsum per hectare should be applied to the land.

General Notes

- Contractors to verify all levels, heights and site dimensions and to check same against drawings before putting any work in hand
- 2. Any discrepancies to be reported to the Engineer immediately for clarification
- 3. This drawing is not to be scaled figured dimensions to be used at all times
- 4. All work to be carried out in strict accordance with local authorities requirements, National Building Regs and relevant SABS standard
- 5. This drawing is to be read in conjunction with all relevant consultants drawings, details and specifications or schedules as applicable
- 6. Only the latest revision is to be used
- 7. COPYRIGHT AND RIGHT OF REPRODUCTION OF THIS DRAWING RESERVED

CONSTRUCTION NOTES

Excavation of trenches

A recommended alignment and grade of trench is established by the engineer in charge of the project.

The width of the trench should be kept to a minimum allowing just sufficient working area for jointing and initial compaction around the pipe.

For most purposes a trench 300mm wider than the diameter of the pipe allows enough room for jointing.

It is important that the trench is not opened too far in advance of the pipe laying operation. Pipes must be partly backfilled immediately after laying.

Trench preparation

The trench bed must be free from all stone or hard projections which are likely to cause damage to the pipe.

The bottom of the trench should be backfilled to a depth of 100mm, with suitable filter material such as free drainage coarse sand.

The bedding should be carefully placed to produce a level uniform bed onto which the pipe is directly laid.

Pipe laying

The pipeline must be laid directly on the prepared bedding in the trench and any temporary supports, bricks or other foreign hard bodies must be removed. Perforated pipe should be placed with the majority of the slotted

Perforated pipe should be placed with the majority of the slotted openings facing down.

Backfilling

It is essential that PVC pressure pipes are backfilled immediately after each pipe is installed, in order to contain the expansion and contraction to each individual pipe length where it is catered for by the socket.

Trenching, bedding and backfilling to be carried out according to SANS 2001:2010 or as specified in the contract documentation

Side-filling and Initial backfilling

Check that the pipe rotation mark is correct to ensure the majority of the openings / perforations facing down.

Selected material (as for bedding) should be placed gently and evenly in uncompacted layers of 100mm in thickness between the sides of the trench and the pipe.

Tamp each layer firmly with a hand tamper until the level of the crown of the pipe is reached, taking care to ensure that no voids are left under the pipe.

Movement of the pipe should be prevented by the simultaneous filling and even compaction of material on either side of the pipe. Filter material should be placed in even and uncompacted layers of 150mm in thickness over the entire width of the trench to a height of 600mm above the crown of the pipe.

Main backfill

The remainder of the trench should be filled in layers of 300mm thickness and excavated trench material can be used. Each layer must be firmly tamped, the first layer by hand and subsequent layers by mechanical means if so desired. Refer to SANS 2001 DP2: 2010.

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