CIVIL CONCEPTS
Consulting Civil and Structural Engineers

RAND WATER DETAIL DESIGN REPORT: APPLICATION FOR THE PROPOSED NEW MUNICIPAL CIVIL ENGINEERING SERVICES CROSSING RAND WATER AT KAGISO DEVELOPMENT SITUATED ON PORTION 232 OF THE FARM WITPOORTJIE 245

July 2025

C1426/2.13/DR1

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RAND WATER	STRATEGIC ASSET MANAGEMENT SHEQ MANAGEMENT SYSTEM PRELIMINARY/ DETAIL DESIGN REPORT	
TITLE: PRELIMINARY/ DETAIL DESIGN REPORT		DOC. No: C1426/2.13
SECTION DESIGN OFFICE	EFFECTIVE DATE: JULY 2025	REV. No: 01

PROJECT No. C1426

KAGISO DEVELOPMENT SITUATED ON PORTION 232 OF THE FARM WITPOORTJIE 245

WAYLEAVE PRELIMINARY/DETAIL
DESIGN REPORT GUIDELINE

Prepared for:
Rand Water-Strategic Asset Management
Design Section
522 Impala Road
Glenvista
2058

Prepared by:
Civil Concepts (Pty) Ltd
Roads Department
50 15th Street
Menlo Park
0102

RAND WATER	STRATEGIC ASSET MANAGEMENT SHEQ MANAGEMENT SYSTEM PRELIMINARY/ DETAIL DESIGN REPORT	
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CONTRACT NUMBER: **C1426**

CONSULTANT: CIVIL CONCEPTS (PTY) LTD

_____	_____	_____
Name (Print)	Signature	Date
Design Engineer	PR No. _____	
_____	_____	_____
Name (Print)	Signature	Date
Project Manager	PR No. _____	
_____	_____	_____
Name (Print)	Signature	Date
Client/Developer/Owner	PR No. _____	
_____	_____	_____
Name (Print)	Signature	Date
Affected Stakeholder 1		
_____	_____	_____
Name (Print)	Signature	Date
Affected Stakeholder 2		
_____	_____	_____
Name (Print)	Signature	Date
Affected Stakeholder 3		

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INTRODUCTION

1.1 Project Location and Description

The proposed development is situated on Part of Remainder of Portion 2 and 40 of the farm Witpoortjie 245-IQ.

The proposed development is more or less bounded by:

Randfontein Street (R41) and Leratong Hosipital to the north;
Kagiso X13 to the east;
New Railway servitude to the south; and
Adcock Street (R558) to the west.

Refer the Site Locality Plan in **ANNEXURE A**.

1.2 Project Background

Civil Concepts is appointed by Trendville Investments (Pty) Ltd as the Consulting Engineers for a proposed mixed-use development. The development is hereinafter referred to as *Leratong Development* or just *Development*.

1.3 Project Objective

The Leratong Development total site area is ±237 hectares with a developable area of 71 ha. The overall development consisting of a number of precincts, neighborhoods and anchors that will be developed in phases.

The following municipal civil engineering services will be constructed and installed as part of the Development:

1. Roads
2. Pedestrian and cycle lanes
3. Stormwater pipe network and outlets
4. Sewer pipe network and bulk sewer pipes connecting to the existing municipal infrastructure,
5. Water reservoir and bulk water pipe connecting to municipal infrastructure
6. Water pipe network
7. Sleeves for electrical and data cables.

The above mentioned municipal civil engineering services will cross the existing 940mm Dia Rand Water Pipe F32, 1100mm Dia Rand Water Pipe F44, 610mm Dia Rand Water pipe F28, and 610/7100mm Dia Rand Water pipe F15 at one (1) instances.

The project objective are to:

- Present information on the project and of the existing pipes.
- Provide proposals for the crossing of the Rand Water pipes by the services to be constructed.
- Illustrate the compliance of the proposed protective culverts.
- To obtain the wayleave approval to proceed with the works.

1.4 Project Team

The project team consist of the following:

Developer

Trendville Investments (Pty) Ltd
Reg No: 2008/0008467/07
P.O Box 12169
Centurion, 0014

Physical Address:
204
Von Willich Avenue
Clubview, Centurion, 0157

Tel: 012 654 6731
Mail: peterw@mccormick-property.co.za

Responsible person: Mr. Peter Wefelmeier

Trendville Investments (Pty) Ltd is hereinafter referred to as the *Developer*.

Consulting Engineer

Civil Concepts (Pty) Ltd
Reg. No : 95/12428/07
P O Box 36148
Menlo Park
0102

Physical Address:
50, 15th Street
Menlo Park
0081

Tel: 012 460 0008
Fax: 012 460 0005
Mail: werner@civilconcepts.co.za

The responsible person is: Mr W Stander (Reg no 20060017).

Civil Concepts (Pty) Ltd is hereinafter referred to as the *Engineer*.

Environmental Consultant

The project does not have an environmental consultant as there is no environmental listings triggered on this project.

2 ASSESSMENTS AND INVESTIGATIONS

2.1 Existing and Planned Services

The Leratong Development is situated on farmland with little or no existing services.

Existing Services

The known services are as follows:

1. Existing 940mm Dia Rand Water Pipe F32, Witpoortjie steel pipeline,
2. Existing 1100mm (ID) Rand Water Pipe F44, Witpoortjie steel pipeline,
3. Existing 610mm (ID) Rand Water Pipe F28, Witpoortjie steel pipeline,
4. Existing 610/7100mm (ID) Rand Water Pipe F15, Witpoortjie steel pipeline,
5. Existing K198 Road – Randfontein Street (R41), situated along the northern boundary of the Development,
6. Servitude SG No 183/2002 (Rand Water)
7. Servitude SG No 184/2005(Rand Water)
8. Servitude SG No 186/2002 (Rand Water)
9. Servitude SG No 6123/2002 (Rand Water)

Planned Services

The following municipal civil engineering services are planned for the Development:

8. Roads
9. Pedestrian and cycle lanes
10. Stormwater pipe network and outlets
11. Sewer pipe network and bulk sewer pipes connecting to the existing municipal infrastructure,
12. Water reservoir and bulk water pipe connecting to the municipal infrastructure
13. Water pipe network
14. Sleeves for electrical and data cables.

2.2 Geotechnical Investigation

A Geotechnical Investigation Report was compiled by Messrs. JD Geotechnical Services cc, reference Report number JS6157-01 dated November 2007 titled '*Report on Geotechnical Site Investigation of the Mogale City Development – Kagiso X17 – City of Joburg Municipality, Gauteng Province*.'

The Geotechnical Investigation Report state that according to the 1:250 000 geological maps, the site is underlain by the following:

1. Quartzite and conglomerate of the Turffontein and Johannesburg Subgroups underlie much of the site
2. Narrow north-west to south-east trending diabase dyke.
3. The north-western corner is underlain by shale of the Jeppestown Subgroup.

According to the Geotechnical Investigation Report there is some undermining that has taken place, however no dolomitic soil conditions was encountered on site during the investigation and no specialized geotechnical engineered solutions are required.

Refer the Geotechnical Investigation Report in **ANNEXURE B**.

2.3 Topographical Survey

The Development survey consist of a DTM strip survey conducted in November 2011.

No anomalies were noted on the Survey.

2.4 Consultation with Stakeholders

The following Stakeholders are identified and associated with the Sammy Marks Development:

1. Trendville Investments (Pty) Ltd, i.e. the Developer,
2. Civil Concepts (Pty) Ltd i.e. the Engineer,
3. Mogale City, i.e. the End User,
4. Rand Water, i.e. affected Service Provider,
5. GDRT , i.e. affected Service Provider,
6. Transnet pipelines, i.e. affected Service Provider.

Herewith a brief summary of the consultations with the above affected Stakeholders:

1. Trendville Investments (Pty) Ltd
   - Trendville Investments (Pty) Ltd is the Developer.

2. Civil Concepts (Pty) Ltd
   - Civil Concepts (Pty) Ltd is the Engineer.

3. Mogale City
   - Mogale City is the End User.
   - Internal Construction Drawings to be submitted for approval.

4. Rand Water
   - 03 February 2025 – Online wayleave application submitted.
   - 26 February 2025 – Rand Water issued the *For Information Only* Letter dated 26 February 2025.
   - 13 May 2025 – A site meeting with Messrs Refentse Matene were held.
   - 22 May 2025 – Design drawings requested. Civil Concepts submitted the requested documentation 26 May 2025.
   - 19 June 2025 – Classified as a Class 3 application. Design report requested.

5. GDRT
   - K198 Road – 5. Existing K198 Road – Randfontein Street (R41), situated along the northern boundary of the Development,
   - 10 September 2024 – Online wayleave application approved.

6. Transnet
   - 17 February 2025 – the Wayleave Applications to cross the Transnet Petrol Pipe with a new water service was submitted to Transnet.
   - 18 February 2025 – Transnet approved the Wayleave Application.

2.5 Constraints and Requirements

2.5.1 Design Constraints

The Leratong Development is situated on *farm land* and is considered a green field development. Little or no existing service traverses the Development, except for the existing Rand Water pipelines mentioned in paragraph 2.1 above.

The following design constraints are applicable to the Development:

- Rand Water — Requirements to install culverts at the crossing
- Geotechnical — None (possible hard)
- Environmental — None
- Social — None
- Local Authority — To comply with the local authority standards
- Provincial Authority — To comply with the provincial authority standards (GDRT)
- Service Provider(s) — (Rand Water) To comply with the '*Requirements and* Standard Conditions for crossing Rand Water services'

The above mentioned '*Rand Water Requirements and Standard Conditions for crossing Rand Water services*' document stipulate various conditions and requirements for crossing existing Rand Water Services. Attention is drawn to the following conditions which have constraint on our design approach and construction drawings, among others:

- The protection of the Rand Water pipeline,
- Minimum distances and clearance for various service when crossing a Rand Water pipeline, i.e. some services had to redesigned to cross the Rand Water pipelines either above or below, taking the minimum clearances into account,
- Protecting the new services in the Rand Water servitudes, i.e. encasement of certain services in concrete, i.e. sleeves and sewer pipelines,
- Refer to the proposed Construction Drawings in **Annexure D** for details.

2.5.2 Construction Constraints

As mentioned above, the Sammy Marks Development is situated on *farm land* and is considered a green field development.

The following constraints expected during construction phase of the Development:

- Service Provider(s) — (Rand Water) To comply with the '*Requirements and* Standard Conditions for crossing Rand Water services'

The above mentioned '*Rand Water Requirements and Standard Conditions for crossing Rand Water services*' document stipulate various conditions and requirements for crossing existing Rand Water Services. Attention is drawn to the following constraints expected during construction activities by the contractor, among others:

- The protection of the Rand Water pipeline,
- Notify Rand Water Superintendent Pulumo Ranyathole at the time intervals as stated on the Wayleave Approval document.

- No explosions within 500m of Rand Water pipelines will be done unless written approval is obtained from Rand Water.
- Excavation will be restriction to hand excavation within 0.5m of Rand Water services,
- Restrictions of the movement of construction equipment over the Rand Water pipes lines will be limited to approved temporary crossing points. The position of the proposed temporary crossing point(s) will be consulted with Rand Water Superintendent Pulumo Ranyathole before any commencement of construction near the Rand Water servitude(s).
- Maintaining the minimum cover during the installation of the services as per the Construction Drawings.
- No material, construction activities and or equipment will be allowed inside the Rand Water servitudes, unless specifically indicated on the proposed Construction Drawings in **Annexure D**.

2.5.3 Environmental Impact Assessment (EIA)

None to be recorded. No environmental triggers.

2.5.4 Water Use Licence (WULA)

None to be recorded. No environmental triggers.

2.5.5 Record of Decision (ROD)

None to be recorded. No environmental triggers.

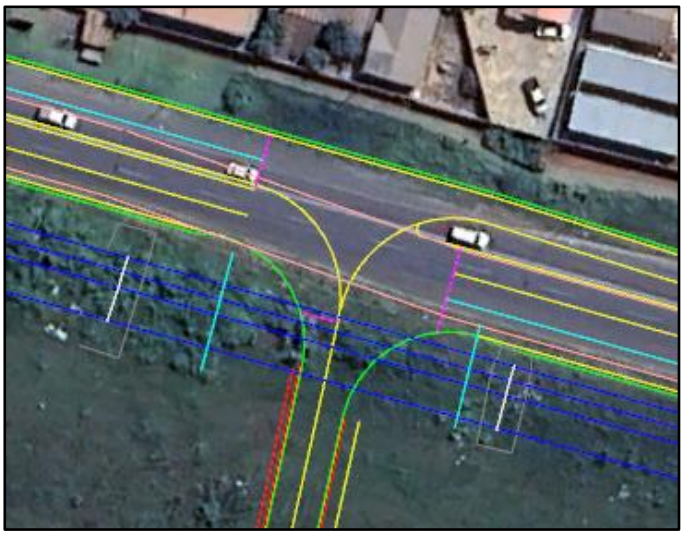
2.6 Cross Cuts

Cross cuts were done to expose the existing Rand Water pipelines F32, F44, F28, and F15 on 07 July 2023. Four (4) cross-cuts where done. No. 3 and 4 is where the proposed new road will cross the pipes.

The following are recorded:

Rand Water Crossing:

- Location / Coordinate: 26°10'26.19"S 27°48'12.22"E (No. 3 & 4)
- 940mm Dia Rand Water Pipe F32 1.40m
- 1100mm Dia Rand Water Pipe F44 1.60m
- 610mm Dia Rand Water Pipe F28 0.90m
- 610/7100mm Dia Rand Water Pipe F15 0.70m



Refer to the Cross Cut Report in **Annexure C**.

3 PIPELINE DESIGN GUIDELINES

3.1 Guidelines

The conditions in the Rand Water document titled “Requirements and Standard Conditions for Crossing of Rand Water Services” for the crossings and the protective measures are followed.

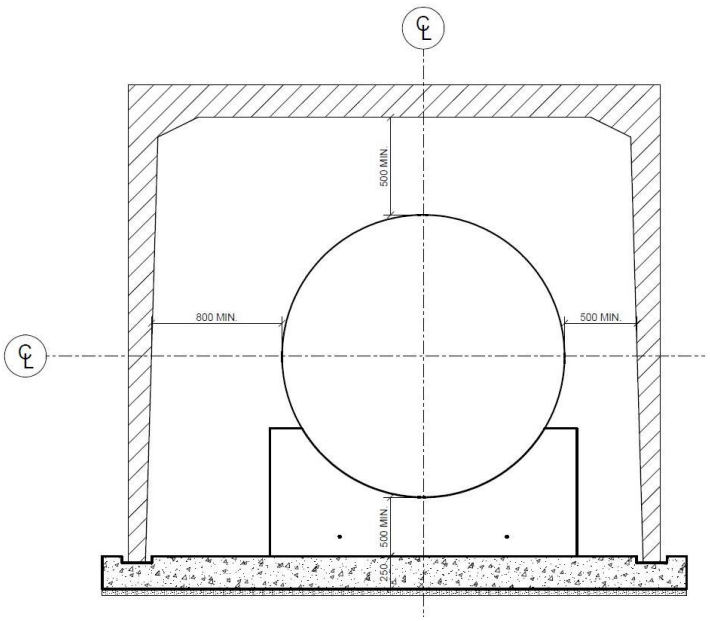
3.2 Design Criteria

Culvert protection proposed at the Rand Water pipe crossing, require a design and/or design verification for the following structural elements:

- Reinforced concrete floor slabs;
- Masonry and/or reinforced concrete walls and/or precast concrete culverts;
- Reinforced concrete roof slabs;
- Reinforced concrete access panel slabs

All existing pipes will be provided with a reinforced concrete floor, designed to distribute loads imposed by the pipe on the soil below. It is here assumed that an allowable bearing pressure of 200 kPa will be appropriate for the purposes of design.

The existing pipes are also to be provided with a roof over that is supported by walls on either side of such existing pipes. This will be achieved by providing precast concrete culverts. All precast culverts will be checked against minimum pipe clearance requirements (as seen below) to ensure the culverts are of adequate size.



In all cases where precast concrete culverts are prescribed, it is specified that such culverts are to comply with SANS 986. Using the prescribed testing method and proof loads as given in SANS 986, a verification will be made in Section 4: Analysis and Detail Design Calculations to verify that the anticipated loads at positions in which the precast culverts are specified are less than or equal to the proof loads as stated. In the current case, a specification of 75S is specified.

3.3 Specifications

3.3.1 Pipe Material

Not Applicable.

3.3.2 Valves and Chambers

Not Applicable.

New culverts will be constructed over the existing Rand Water Pipes F32, F44, F28, and F15. Refer to Section 5 of this report.

4 PIPELINE DESIGN

4.1 Design Philosophy

Not Applicable.

4.2 Physical Design

Not Applicable.

5 CATHODIC PROTECTION DESIGN

5.1 General

Cross cuts were done on 07 July 2023 and no existing cathodic protection was found during the cross cuts and it is assumed that the cathodic protection may be exposed later during the construction phase. Also refer to the Construction Metode Statement in **Annexure D**.

The construction phase of the Rand Water Pipe crossings will be closely monitored and if any existing cathodic protection services are exposed, Rand Water Electrolysis Section (011 682 0239) and Superintendent Mr. Paul Mahlangu will be contacted. The existing cathodic protection services will then be surveyed and indicated on the As Built drawings.

No new cathodic protection are proposed or will be installed as part of the pipe crossings.

6 CIVIL DESIGN

6.1 General Arrangement Drawings

The following drawings form part of the Design Report:

- C1426-RW-01 Rand Water Crossing

- C1426-310 Rand Water Crossing F44 – Concrete Layout
- C2634-311 Rand Water Crossing F32 – Concrete Layout
- C2634-312 Rand Water Crossing F28 – Concrete Layout
- C2634-313 Rand Water Crossing F15 – Concrete Layout
- C2634-314 Typical Sections and Details
- C2634-315 Construction Method

Refer to the Construction Drawing in **Annexure D**.

6.2 Design Assumptions

The following design assumptions are made:

General:

- The soil cover over the Rand Water pipes as measured during the cross cuts phase, will remain constant and no abrupt changes in the cover depths over Rand Water pipes, are expected,
- No other water pipes other than the existing 940mm steel Rand Water Pipe F32, 1100mm steel Rand Water Pipe F44, 610mm steel Rand Water Pipe F28, and 610mm steel Rand Water Pipe F15 are expected to be present inside Rand Water Servitudes.
- No cathodic protection was exposed during the cross cut phase and it is assumed that the cathodic protection may be exposed later during the construction phase. Rand Water Electrolysis Section (011 682 0239) and Superintendent Pulumo Ranyathole will be contacted if and when any cathodic protection services are exposed on site,
- Geotechnical: no adverse soil conditions, other than indicated in the Geotechnical Report, is expected,
- No water table was encountered during the Geotechnical investigation in the vicinity of the Rand Water pipe crossings and it is assumed that normal 'dry' construction conditions will be encountered at the crossings. In the event that the conditions differ from the Geotechnical Report, the Engineer will assess the conditions and act accordingly. Rand Water Superintendent Pulumo Ranyathole will also be informed.

Design Assumptions:

Lateral horizontal forces are considered to act in equal and opposite directions on culvert walls, thereby negating non-zero net horizontal forces. As such, sliding actions are assumed to be negligible and not explicitly designed for.

With the above background, the following assumptions are made and applied to all structural elements:

i.	Concrete strength	=	f_{cu}	=	30 MPa
ii.	High yield reinforcement	=	f_y	=	450 MPa
iii.	Concrete density	=	γ_{con}	=	24 kN/m^3
iv.	Soil density (saturated)	=	γ_{soil}	=	24 kN/m^3
v.	Soil cohesion	=	c'	=	0°
vi.	Soil Friction Angle	=	φ'	=	30°
vii.	Water density	=	γ_{water}	=	10kN/m^3
viii.	Surcharge	=	q_{sur}	=	5 kPa
ix.	Allowable bearing pressure	=	p_{allow}	=	200 kPa
x.	ULS permanent load factor			=	1.2
xi.	ULS imposed load factor			=	1.6
xii.	Foundation Modulus	=	K	=	40 000kN/m³

In all cases, the culverts were designed for the worst-case scenario, i.e. for a maximum soil fill height over each culvert.

6.3 Site Investigation Report

Cross cuts were done to expose the existing Rand Water pipelines F32, F44, F28, and F15 on 07 July 2023.

The following were recorded:

Rand Water Crossing :

- Location / Coordinate: 26°10'26.19"S 27°48'12.22"E (No. 3 & 4)
- 940mm Dia Rand Water Pipe F32 1.40m
- 1100mm Dia Rand Water Pipe F44 1.60m
- 610mm Dia Rand Water Pipe F28 0.90m
- 610/7100mm Dia Rand Water Pipe F15 0.70m

Refer to the Cross Cut Report in **Annexure C**.

6.4 Design Codes

The following Design Codes are applicable to the Design Report:

i.	SABS 1200		
ii.	TRH		
iii.	COTO Specifications		
iv.	SANS 677		Concrete stormwater Pipes
v.	SANS 927		Concrete kerbs
vi.	SANS 966		uPVC pipes
vii.	SANS 1058		Paving blocks
viii.	SANS 10268		HDPE pipes
ix.	SANS 62386		HDPE sleeves
x.	SABS 0100	–	The Structural Use of Concrete
xi.	SANS 10164		Structural Masonry
xii.	SANS 2001 Part CC1		Construction Works – Concrete Works (Structural)
xiii.	SANS 2001 Part CM1		Construction Works – Masonry Walling
xiv.	SANS 282	–	Bending Dimensions and Scheduling of Reinforcement
xv.	SANS 920	–	Steel Bars for Concrete Reinforcement
xvi.	SANS 986	–	Precast Reinforced Concrete Culverts

6.5 Design Loads

Civil Engineering Services:

Melba Street:

- EVU 220 ≤ 700
- CBR ≥ 15%
- Design Pavement Design according to TRH 4 Granular Base (Moderate or Dry regions)
- Subgrade and Roadbed according to TRH 4 Table 22 (Moderate or Dry regions)

Structural Loads - Rand Water Pipe Culverts:

The loads used to design the various culvert structures, can be summarized as follows:

- Soil fill (saturated) = 24kN/m³
- 1.1m Ø water pipe per meter length = 19.5kN/m
- 0.9m Ø water pipe per meter length = 16.7kN/m
- 0.61m Ø water pipe per meter length = 13.1kN/m
- Imposed load from road surface usage = 10kPa
- Imposed load on culvert floor slab = 1.5kPa

6.6 Analysis and Detailed Design Calculation

Civil Engineering Services:

The following proposed services will cross the Rand Water pipes at **Melba Street**:

Road

- 30mm Asphalt continuously graded medium grade asphalt
- 150mm G1 Base compacted to 88% Apparent Density
- 150mm C4 Subbase stabilized with 2.5% cement and compacted to 95% MDD
- 150mm In-situ Roadbed rip and recompact to 93% MDD

Structural - Rand Water Pipe Culverts:

Culverts have to be supplied for the F32 – 940mm Ø, F44 – 1100mm Ø, F28 – 610mm Ø, and F15 – 610mm Ø pipes. The design calculations for the precast culverts are here below:

Precast culverts: 2400mm span for all the culverts

The design verification of the precast culverts is as follows:

- Soil fill weight = 24kN/m³ x 1.8m height x 2.4m width = 104kN/m
- Imposed load from road surface usage = 10kPa x 2.4m width = 24kN/m
- Total = 128kN/m

The unfactored proof load on a 2.4m span culvert of class 75S, is 180kN/m. This culvert is of adequate strength.

In situ floor slab: F32, F44, F28, and F15

The floor slabs of the in situ culverts are designed as beams on elastic foundations. The spacing of the plinths are 3.7m and the loads are calculated accordingly. The loads on the slabs used for the “beam on elastic foundation” analysis and design are as follows:

- 1.1m ø water pipe (3.7m long) = 73kN
- 0.9m ø water pipe (3.7m long) = 62kN
- 0.61m ø water pipe (3.7m long) = 49kN
- The plinth’s self-weight is automatically added by the design software.
- 3.4m wide precast culvert reaction = 63kN
- 3.0m wide precast culvert reaction = 46kN

250mm Thick access chambers

In-situ cast concrete access chambers are provided at each end of the culverts. Access is gained to the culverts for the purposes of maintenance. A typical slab will be designed and universally applied to all culverts. The geometry of this slab is based on the slab for the 1100mm Ø pipe culvert as it is deemed to be the critical position. The loads on the slab are as follows:

- Self-weight will be automatically added by the design software
- Soil fill weight = 24kN/m³ x 1.6m height (assumed) = 39kPa
- Allowance for brick walls = 5kPa

170mm Access manhole

Each culvert has a 1000x800mm access manhole that leads to the culvert. These manholes are also in-situ cast concrete elements and form part of the access chamber.

6.7 Design Summary: Reinforced Steel Bars

The design summary with regards to the reinforcing required is currently estimated at 120kg/m^3

6.8 Design Summary: Structural Steel

No Structural Steel is used at the Rand Water pipe crossing.

7 IMPLEMENTATION

7.1 Procurement Stage

The Tender process is currently underway.

The appointment of a Contractor will be finalised by by end July.

7.2 Construction

The construction duration is eight (8) months with the following anticipated dates:

- Start Date 25 August 2025
- Completion Date 16 June 2026

8 CONCLUSION AND RECOMMENDATION

The design report addresses the requirement to provide access manholes at the existing Rand Water pipes F32, F44, F28, F15.

It is recommended that:

- all works as mentioned in this report to protect Rand Water pipes and accommodate future pipes must be carried out by the appointed contractor; and
- the Wayleave Application be approved.

We trust you will find the contents of the report to be in order.

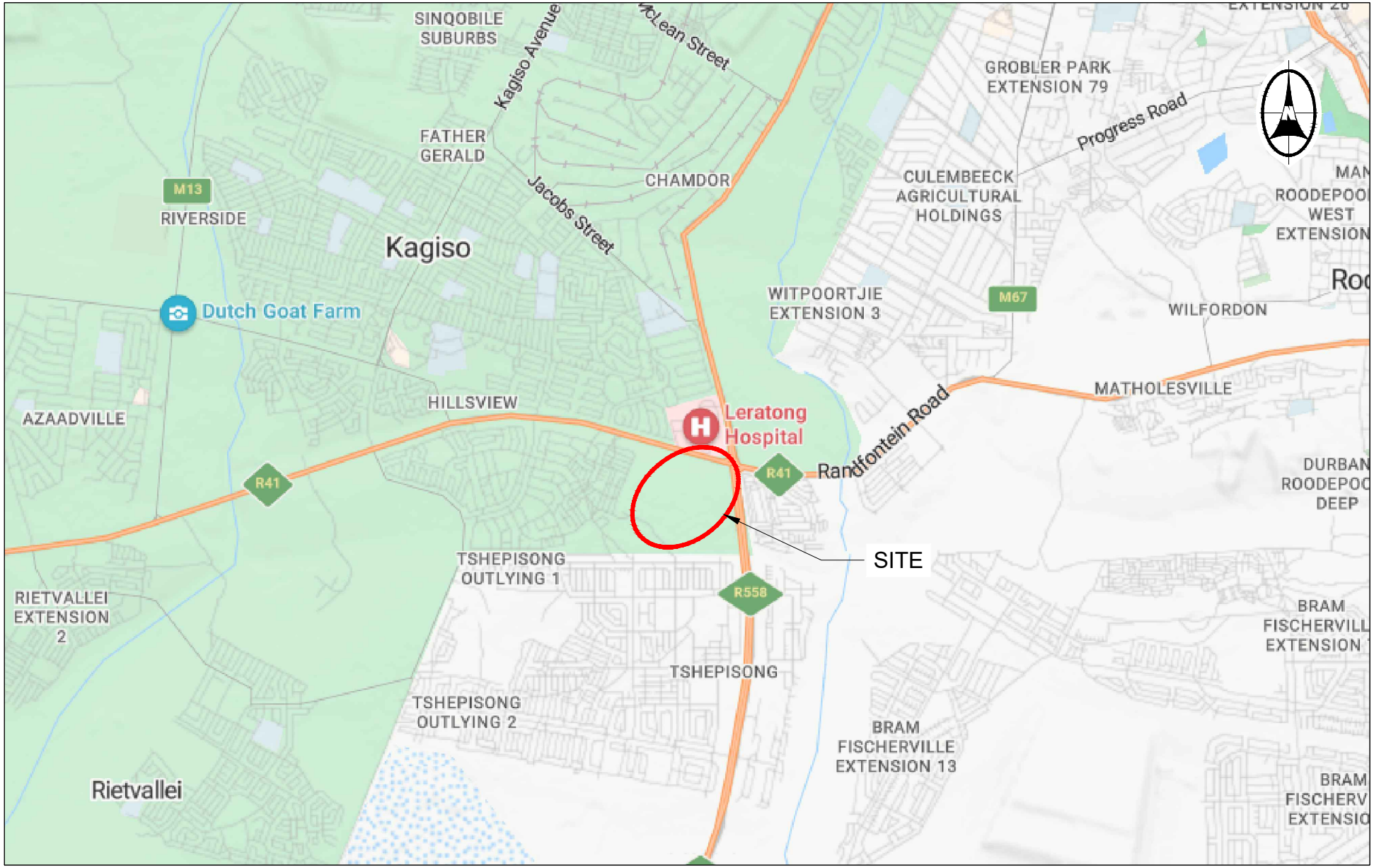
Compiled by:

JN Btotha Pr Eng
For: CIVIL CONCEPTS (PTY) LTD
July 2025

9 ANNEXURES

ANNEXURE A	LOCALITY PLAN
ANNEXURE B	GEOTECHNICAL INVESTIGATION REPORT
ANNEXURE C	CROSS CUT REPORT
ANNEXURE D	CONSTRUCTION DRAWINGS

Annexure A – Locality Plan



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LOCALITY PLAN

DATE	SCALE
MAY 2023	N.T.S.

C1426-FIG-1

Annexure B – Geotechnical Report

REPORT ON THE GEOTECHNICAL INVESTIGATION OF THE MOGALE CITY DEVELOPMENT - KAGISO X17 – CITY OF JOBURG MUNICIPALITY – GAUTENG PROVINCE

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Report no: JS6157-01
Project no: 6157-JD
November 2010

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REPORT ON THE GEOTECHNICAL INVESTIGATION OF THE MOGALE CITY DEVELOPMENT - KAGISO X17 – CITY OF JOBURG MUNICIPALITY – GAUTENG PROVINCE

1. INTRODUCTION AND TERMS OF REFERENCE

McCormick Property Development appointed JD Geotechnical Services CC to carry out a detailed geotechncal investigation of a site for the proposed Mogale City Development located in Kagiso in the City of Johannesburg Municipality and to be known as Kagiso Ext. 17. The site is located on Portion 40 as well as a Portion of the remainder of Portion 2 of the farm Witpoortje 245 IQ and encompasses an area of approximately 127 ha. The intended development is mixed residential and commercial land uses.

The purpose of the investigation is to assess the geotechnical suitability of the site for retail and residential land-use purposes. It is understood that the intended development involves the construction of, at most, double storey structures for commercial and residential use on the site.

The investigation involved an assessment of the undermining status of the site as well as a geotechnical investigation to characterise geotechnical site conditions for the intended development.

The investigation commenced a desk study followed by a fieldwork phase during which test pits were excavated. The desk study involved the consultation of published topographic, geological maps and data sources on the site as well enquiries at the Council for Geoscience with regard to undermining. A site visit for the fieldwork phase was made on the 15th and 16th June 2010.

The aim of the geotechnical investigation is to characterise the ground conditions with regard to the nature of the soil horizon, the depth of excavation and geotechnical characteristics of the soils underlying the site.

This report presents and discusses the results of the assessment of the potential undermining and the detailed geotechnical investigation carried out. A map demarcating development zones and indicating the positions of test pits is presented and geotechnical recommendations made regarding foundations for the intended structures and mitigating measures required for site development.

2. LOCALITY AND SITE DESCRIPTION

The site is located on the south western quadrant of the intersection of the R41 (Randfontein Road) and the R558. The site is bounded to the

south by the residential township of Tshepisong and by a narrow sliver of vacant land on which a municipal reservoir is located. The location of the site is illustrated on **Plan 6157-JD/01 Proposed Mogale City Development: Locality Plan** attached in **Appendix A**.

The site is positioned near the crest on the convex east facing slope, which descends towards a non perennial water course which leads into the upper reaches of what becomes the the Klip River further downstream. The site has a moderate gradient of 1:30 descending from an elevation of 1721masl in the west to 1680masl in the south eastern corner.

The site is vacant and there are currently no structures to be seen. There is evidence of disturbance of the surface in the form of a series of roughly north-south trending trenches which relate to gold exploration trenches excavated half a century ago. There are a couple of shallow borrow areas in the eastern portion of the site and a number of small heaps from illegal dumping across the site. The vegetation comprises predominantly grassland, with very few scattered trees.

3. AVAILABLE INFORMATION

The following geological and topographic maps were consulted:
1:250 000 Geological series 2626 West Rand sheet.
1:50 000 Topographic Map 2627BB.
Banzi Geotechnics – Wits Water Ingress Project: Reefs and Reef Contours, Risk Ratings with respect to surface failure, 2004.
South African Rail Commuter Association – Luipaardsvlei-Krugersdorp and Rietvallei-Roodepoort Rail Corridors: Route and Station Location.
Council for Geoscience – Orthophoto showings mining activity.
Geotechnical Report: Proposed Township Development: Approximately 1700 subsidy housing units in Kagiso: Randfontein Local Municipality. Zwa Mavu Geotechnical Engineers, November 2008.

4. CLIMATE

The climate is typical of the Transvaal Highveld. The summers are mild to hot and the winters mild. It is a summer rainfall region with a mean annual precipitation of approximately 758mm. The Moisture Index is between 0 – 20, indicating a sub-humid area. The Weinert N-value is approximately 2,4, which indicates that chemical decomposition is the predominant form of weathering of rock.

5. GEOLOGY

According to the available 1:250 000 geological maps the site is underlain by rock formations of the Witwatersrand Supergroup. Quartzite and conglomerate of the Turffontein and Johannesburg

Subgroups underlie the majority of the site. The Turffontein Subgroup underlying the south western and the Johannesburg Subgroup the north eastern portions of the site respectively separated by a narrow north west to south east trending diabase dyke. The north western western corner is underlain by shale of the Jeppestown Subgroup and is brought into contact with the afore mentioned formations by virtue of the south west to north east trending Roodepoort Fault. The regional geological setting of the site is iluustrated in **Plan 6157-JD/02 Proposed Mogale City Development: Regional geological setting** attached in **Appendix A**.

The quartzite and conglomerate of the Witwatersrand Supergroup typically give rise to shallow, silty sandy soil and the Jeppestown shale a clayey gravelly soil of low plasticity. The residual diabase soils are typically clayey silty soils of medium to low plasticty and are typically deeply weathered in this setting.

6. UNDERMINING

The site is located in the Central Rand mining belt which has a long history of mining activity. The Turffontein and Johannesburg Subgroups have been the target for the mining of the various gold reefs that occur in these rock formations. The trenches, which are evident on the site, are decades old and are testimony of the exploration activities for the gold mining prospecting that has has taken place. The available information gained suggest that only the Kimberley Reef outcrops on site, but does not appear to have been mined near surface. The scale of the available maps are such that accurate demarcation is not possible. The South African Rail Commuter Association map indicates a shallow undermined zone in the southern part of the site. This shallow undermined zone is also indicated on the Banzi Geotechnics Risk Map and shows the zone to be undermined at a depths of less than 90m. The Banzi Geotechnics map indicates the the zone to have 'negligible risk to structures, minor elastic deformation – condition would change significantly were mining to reoccur'. This area is demarcated as Zone 4 in the central southern area of the site on **Plan 6157-JD/03 Proposed Mogale City Development: Test pit position and zonation map** attached in **Appendix A**. A further undermined zone, also demarcated Zone 5, occurs in the south western corner of the site, but is undermined at a depth of greater than 240m and is of negligible consequence to the intended surface development.

7. METHODOLOGY

The site was investigated by excavating test pits with a New Holland tractor loader backhoe (TLB) on a regular spacing across the site to assess the variability of conditions across the site. The positions of the test pits are indicated on **Plan 6157-JD/03 Proposed Mogale City**

Development: Test pit position and zonation map included in **Appendix A** to this report**.** A registered engineering geologist inspected and logged the ground profiles as recommended by SAICE (2002). Detail soil profiles are attached in **Appendix B: Soil Profiles**.

A total of ten disturbed soil samples were collected from representative soil horizons and were submitted to Civilab Civil Engineering Testing Laboratories for testing. Foundation indicator tests were performed on all of the disturbed samples to determine the particle size distributions and Atterberg limits. Three bulk sample was taken of the upper soil horizons to determine the Mod AASHTO moisture density relationship and CBR of the subgrade on the site. The detailed test results are given in **Appendix C: Soil Test Results**.

8. RESULTS

8.1 Field work

Table 7.1 Test pit summary: Depths of various horizons (m).

TP no	Transported (depth to)	Pebble marker/ ferricrete (depth to)	Residual (depth to)	End of hole	Water Seepage
MTP01	0.20m	-	2.30m (shale)	At refusal (soft rock shale)	None
MTP02	0.20m	0.45m	2.30m (shale)	At refusal (soft rock shale)	None
MTP03	-	0.3	1.15m (quartzite)	At refusal (soft rock quartzite)	None
MTP04	0.30m	0.55m	1.50m (quartzite)	At refusal (soft rock quartzite)	None
MTP05	0.60m	1.05m	2.20m	At refusal (soft rock quartzite)	None
MTP06	0.35m	0.70m	2.20m (diabase)	Near reach	None
MTP07	0.35m	0.75m	1.25m	At refusal (soft rock quartzite)	None
MTP08	0.20m	-	0.60m (quartzite)	At refusal (soft rock quartzite)	None
MTP09	0.40m	0.85m	2.05m (quartzite)	At refusal (med hard rock quartzite)	None
MTP10	0.30m	0.55m	1.45m (quartzite)	At refusal (soft rock quartzite)	None
MTP11	0.15m	0.50m	0.70m (quartzite)	At refusal (med hard rock quartzite)	None
MTP12	-	0.45m	2.20m (quartzite)	At refusal (soft rock quartzite)	None
MTP13	0.30m	0.70m	1.50m (quartzite)	At refusal (soft rock quartzite)	None
MTP14	0.45m	-	1.30m (quartzite)	At refusal (soft rock quartzite)	None
MTP15	0.95m	1.50m	1.65m (diabase)	Near refusal (fer. residual diabase)	None
MTP16	0.30m	0.65m	1.35m (quartzite)	At refusal (soft rock quartzite)	None

TP no	Transported (depth to)	Pebble marker/ ferricrete (depth to)	Residual (depth to)	End of hole	Water Seepage
MTP17	0.40m	0.65m	1.35m (quartzite)	At refusal (med hard rock quartzite)	None
MTP18	0.15m	-	0.85m (quartzite)	At refusal (med hard rock quartzite)	None
MTP19	0.20m	0.45m	1.35m (quartzite)	At refusal (soft rock quartzite)	None
MTP20	0.30m	1.60m	2.10m (diabase)	Near refusal (fer. residual diabase)	None
MTP21	0.35m	0.70m	1.75m (quartzite)	At refusal (soft rock quartzite)	None
MTP22	0.30m	0.55m	1.65m (quartzite)	At refusal (soft rock quartzite)	None
MTP23	0.35m	0.45m	0.85m (quartzite)	At refusal (med hard rock quartzite)	None
MTP24	0.20m	0.45m	1.35m (quartzite)	At refusal (soft rock quartzite)	None
MTP25	1.60m	1.90m	2.70m (diabase)	Near refusal (fer. residual diabase)	None
MTP26	0.25m	0.60m	1.30m (quartzite)	At refusal (soft rock quartzite)	None

The contrasting geology of the site allows the typical ground profiles to be grouped into three areas based on the underlying geology of the site.

The north western corner of the site, underlain by Jeppestown shale reveals a thin transported (hillwash), topsoil horizon to a depth of 0.2m overlying a pebble marker and nodular ferricrete to a depth of 0.45m. This is underlain by firm clayey silt, which is residual from shale and is reworked in the upper part of this horizon. At the base of this horizon at a depth of between 1.75m and 2.25m highly weathered, soft rock shale is encountered. Refusal occurs at a depth of 2.30m.

The majority of the site is underlain by sandy, silty soils derived from the quartzites and conglomerates of the Turffontein and Johannesburg Subgroups. A typical profile shows a thin transported horizon to a maximum depth of 0.60m, but which is typically between 0.15m and 0.40m in thickness and consists of loose sandy silt with gravel. A pebble marker consisting of silty sandy gravel commonly underlies it to a depth of between 0.5m and 0.7m. Sandy gravel derived from completely weathered quartzite and conglomerate extends to a depth of between 0.6m and 2.20m, but is typically less than 1.5m.

A typical profile in the narrow area underlain by diabase consists of a thicker tranported horizon consisting of loose silty sand to a depth of between 0.3m upslope becoming as thick as 1.60m in the lower slope area. This is underlain by a residual diabase horizon consisting of firm to stiff clayey silt which typically well ferrugenised. No refusal occurred

in the test pits excavated in this horizon but test pits MTP15 and MTP20 were near refusal on ferrugenised clayey silt.

No groundwater seepage was encountered in any of the test pits, but the ferrugenisation evident in many of the test pits is indicative of a seasonally elevated water table, particularly in the area underlain by diabase.

8.2 Laboratory test results

The ten disturbed samples were submitted to Civilab Civil Engineering Testing Laboratories for foundation indicator testing, which includes three bulk samples for Mod AASHTO density and CBR testing. The results are summarised in **Table 7.1** and **Table 7.2** and the detailed results are presented in **Appendix C.**

The residual quartzite, shale and diabase horizons were sampled. The bulk samples were taking from the thin tranported horizon at separate locations across the site. The samples are numbered in accordance with the test pit positions from which they were taken.

The samples of residual quartzite show a low clay percentage ranging from 1 to 3 percent, a liquid limit (LL) ranging from non-plastic to 21 percent and a plasticity index (PI) of non-plastic to 7. The resultant heave potential classifies as low according to the Van der Merwe method and no heave potential is predicted for this horizon.

The samples of diabase show a slightly higher clay percentage ranging from 6 to 10 percent, a liquid limit (LL) in a narrow range of between 24 and 33 percent and a low plasticity index (PI) of between 8 and 13. The resultant heave potential also classifies as low according to the Van der Merwe method.

A sample taken from a residual shale horizon show a higher clay percentage of 12 percent, a liquid limit of 38 percent and a plasticity index of 14. These soils also classify as having mostly a low plasticity, and a low heave potential according to the Van der Merwe method.

The bulk samples taken at three locations of the shallow transported horizon give an indication of the subgrade quality of the site. This horizon has a low clay percentage of between 1 and 3 percent, a LL from non-plastic to 25 percent and a PI of non-plastic to 9. The moisture/density and CBR results for this material indicate the upper soil horizons to provides a good to excellent quality subgrade and classifies as a G5 grade material according to TRH4 and is suitable for use in subbase road pavement structural layers.The results from the sample taken at MTP22 gave poor CBR results due to a poorly graded particle size distribution.

TABLE 8.1 : Summary of laboratory indicator test results.

Sample no	Depth (m)	Description	Soil composition				Atterberg Limits		GM	LS %	USCS	Activity	PRA Classification
			Clay %	Silt %	Sand %	Gravel %	LL %	PI %					
MTP01/1	0 -0.5	Transported	1	11	36	52	25	9	1.97	3.5	GC	Low	A-2-4 (0)
MP01/2	1.6	Residual shale	12	28	36	24	38	14	1.15	8	SC	Low	A-6 (4)
MTP05	1.5	Residual quartzite	3	21	58	18	21	7	1.29	2.5	SC-SM	Low	A-2-4 (0)
MTP06	1.8	Residual diabase	6	21	52	20	33	13	1.13	6	SC	Low	A-6 (2)
MTP13	0 -1.0	Nodular ferricrete	1	10	43	46	NP	NP	1.57	0	SM	Low	A-1-b (0)
MTP15	1.6	Nodular ferricrete	4	16	46	35	29	11	1.57	5.5	SC	Low	A-2-6 (0)
MTP21	1.0	Residual quartzite	4	17	69	10	SP	SP	1.08	1	SM	Low	A-2-4 (0)
MTP22	0–0.8	Transported	3	16	79	1	NP	NP	0.93	0	SM	Low	A-2-4 (0)
MTP25/1	1.8	Nodular ferricrete	8	21	67	4	22	9	0.8	3.5	SC	Low	A-4 (2)
MTP25/2	2.6	Residual diabase	10	31	58	2	24	8	0.68	4	SC	Low	A-4 (3)

% Gravel > 2mm, % Sand 0,06mm – 2,0mm, % Silt 0,002mm – 0,06mm, %Clay <0,002mm
LL – Liquid limit; PI – Plasticity index; LS – Linear shrinkage; GM – grading modulus
USCS – Unified Soil Classification System
PRA – Public Roads Administration classification

TABLE 8.2 : Summary of laboratory CBR test results.

Sample no.	Depth (m)	Description	Soil composition			Atterberg Limits		GM	LS %	MDD/OMC (Mod. AASHTO)	CBR/UCS (Mod AASHTO)	TRH4 and PRA Classification
			Gravel %	Sand %	Fines %	LL %	PI %					
MTP01	0.0 -0.5	Transported	52	36	19	25	9	1.97	3.5	1981 kg/m^3 @15.6%	50.6 @ 93% 65.9 @95% 68.4 @ 98% 70.1 @ 100%	G5 A-2-4(0)
MTP13	0.0 -1.0	Nodular ferricrete	46	43	14	NP	NP	1.57	0	2121 kg/m^3 @7.9%	42.5 @ 93% 52.2 @95% 69.4 @ 98% 83.9 @ 100%	G5 A-1-b(0)
MTP22	0.0 -0.8	Transported	1	79	25	NP	NP	0.93	0	2008 kg/m^3 @9.4%	0.8 @ 93% 0.9 @95% 2.1 @ 98% 3.5 @ 100%	- A-2-4(0)

9. DEVELOPMENT ZONES

Based on the undermining and the underlying geological formations the site can be divided in the following development zones:

Zone 1:
Zone 1 covers a large proportion of the site and is the area that is underlain by quartzite and conglomerate. It is characterised by thin soils silty sandy soils of low expansive and low compressibility soil overlying bedrock.
Competant founding conditions occur within 1.5m where bedrock is typically encountered. The overling soils are of low compresibility and heave potential and conventional foundation design for single and double storey structures will suffice. Excavation to depths below 1.5m will be hard excavation and may require blasting. The near surface ground horizons provide an excellent subgrade for road and parking area construction.

Zone 2:
Zone 2 comprise the narrow zone through the centre of the site underlain by a diabase dyke. The dyke was only encountered in a few of the test pits so the geological map was used to infer the approximate boundaries of this zone. Thicker transported soils and a deeper weathering profiles contrast with Zones 1. The transported and residual horizons do not have expansive properties but their loose consistency observed in profile confirm that they will have moderately compressible properties.
The previous investigation carried out on this site showed moderate to high collapse potential for these soils.
Ground improvement or foundation improvement is recommended for structures on this horizon, especially where the footprint of the structure straddles Zone 1 and Zone 3.
Easy excavation to a depth of at least 3.0m is predicted for this zone.
The subgrade conditions for road construction are likely to be fair to poor in this zone requiring importation of road structural layers.

Zone 3:
The area underlain by shale occupies the northern corner of the site. The zones is characterised by a thin transported horizon overlying residual shales of low expansive potential.
Competant founding conditions occur within 1.0m where completely weathered shale is typically encountered. The overling soils are of low compresibility and heave potential and conventional foundation design for single and double storey structures will suffice. Excavation to depths below 1.5m will show hard excavation. The near surface ground horizons provide an excellent subgrade for road and parking area construction.

Zone 4:
Zone 4 denotes an area which is undermined at a depth of greater than 240m. The near surfaces ground are the same as that described in Zone 1. Negligible risk of undermining related subsidence is predicted and the recommendation given for Zone 1 can be followed.

Zone 5:
This area is indicated to be undermined at a depth of potentially less than 90m. The boundaries indicated are approximate as they have been determined from a larger scale map. It is recommended that no development of this zone only be considered until follow-up percussion drilling confirms the presence or absence of, and the depth of undermining.

10. SITE DRAINAGE

No subsurface seepage was encountered in the test pits excavated. The topography of the site will ensure that good stormwater runoff will occur provided that good stormwater mangement is provided.

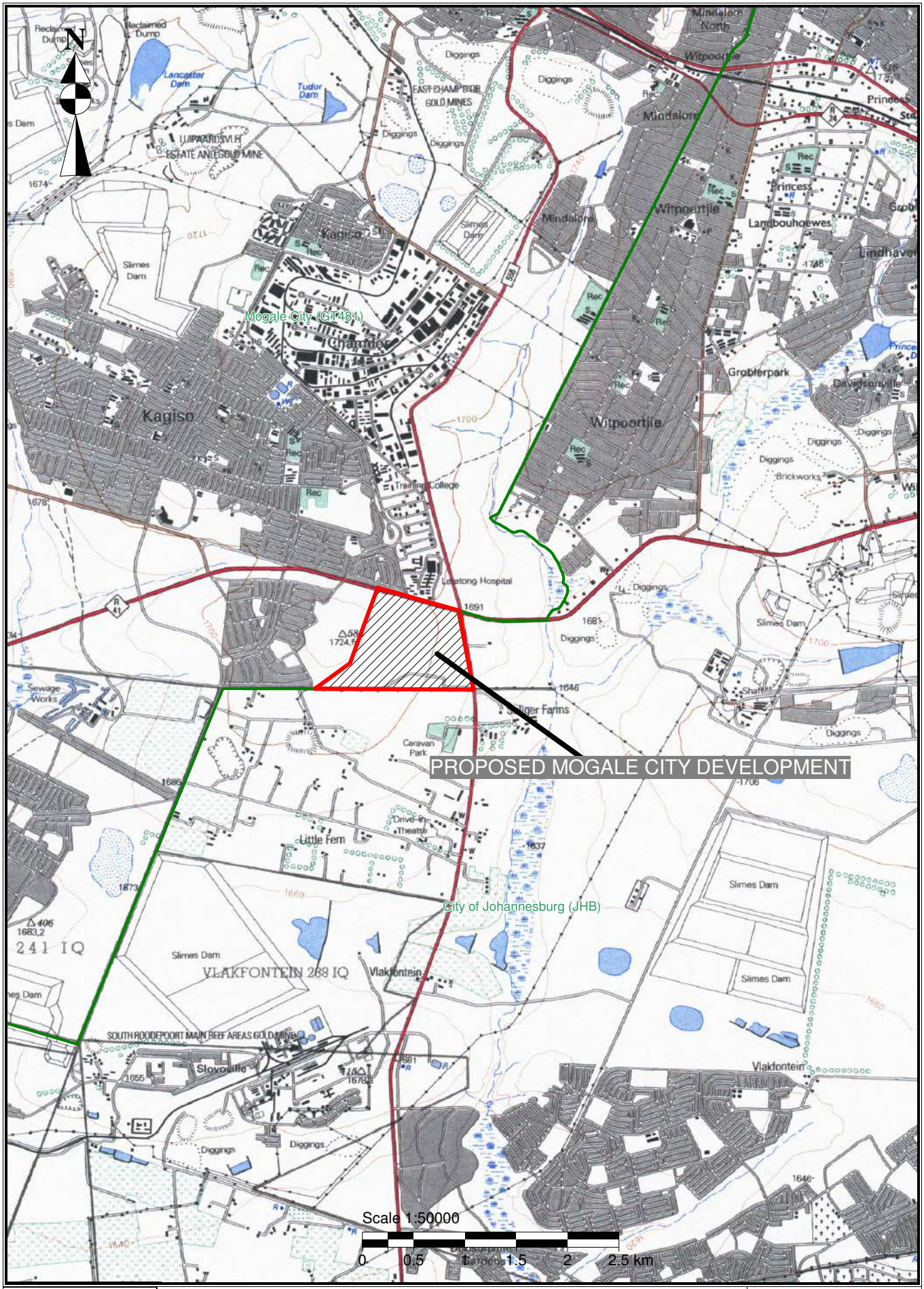
11. CONCLUSIONS

A geotechnical investigation and preliminary undermining study was carried out on the site for the Mogale City Development.

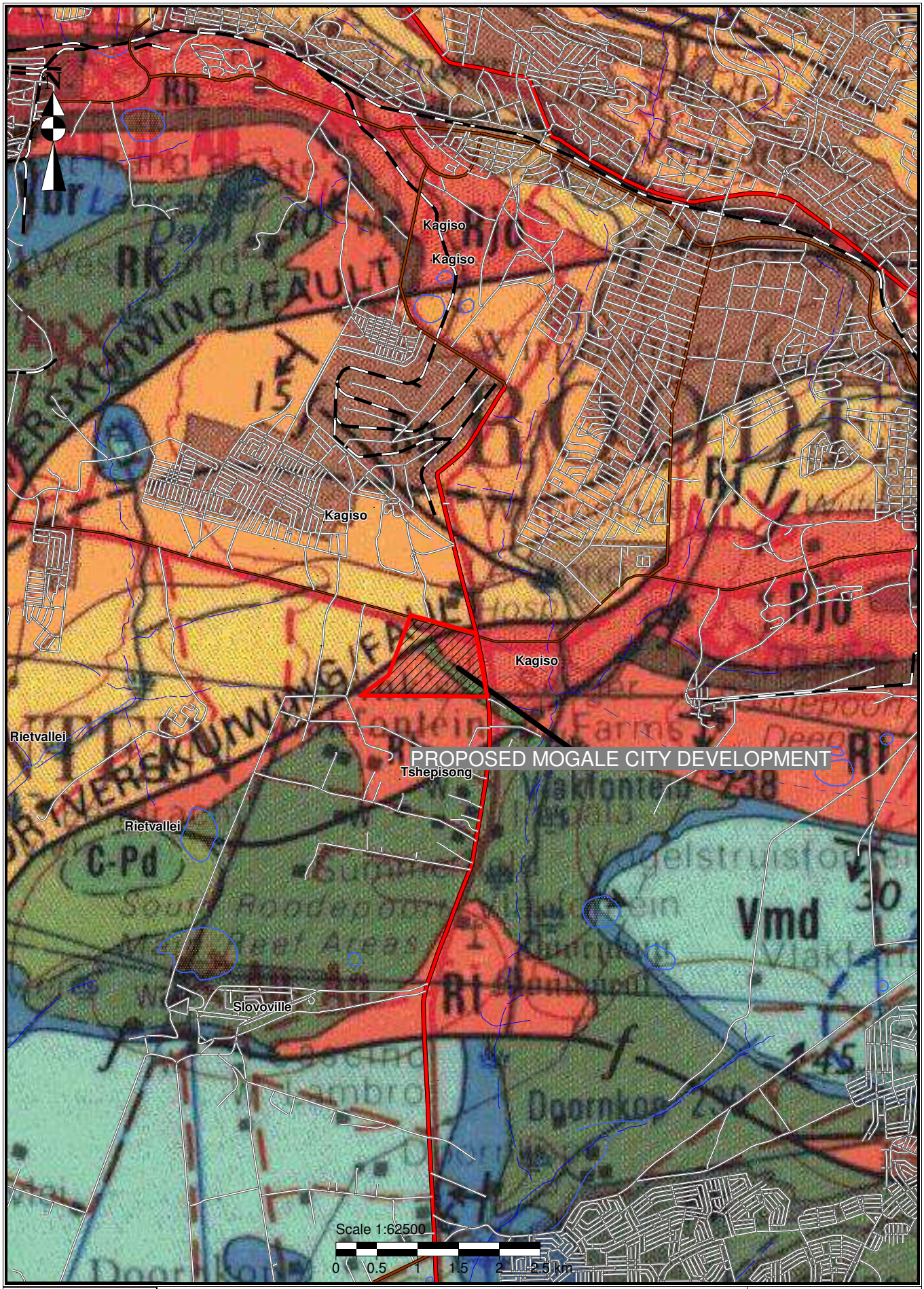
Twenty six test pits were excavated and ten samples taken for laboratory testing. The results of the field investigation and laboratory testing of soil sample are presented.

On the basis of the information gained the site has been discussed and geotechnical recommendations made for site development. A portion of the southern section of the site is suspected to have shallow undermining at a depth of less than 90m. Additional percussion drilling in this zone is recommended to confirm the boundaries and extent of the undermning prior to development being considered in this area.

Appendix A : Figures/Drawings



JD GEOTECHNICAL SERVICES CC	**PROPOSED MOGALE CITY DEVELOPMENT - LOCALITY PLAN**	**PLAN NO.: 6157-JD/01**



JD GEOTECHNICAL SERVICES CC

PROPOSED MOGALE CITY DEVELOPMENT - REGIONAL GEOLOGICAL SETTING

PLAN NO.: 6157-JD/02

MOGALE CITY DEVELOPMENT: TEST PIT POSITION AND ZONATION MAP

Plan No.:
6157-JD/03

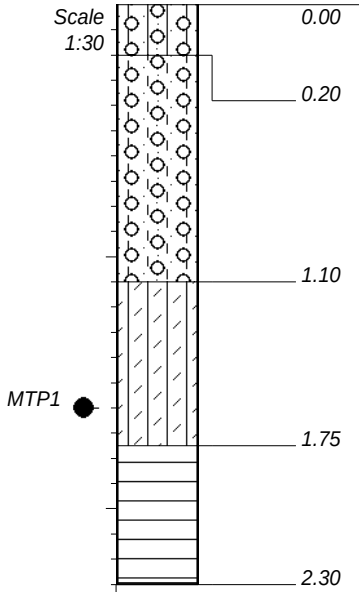
Appendix B : Ground profiles

dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP1
Sheet 1 of 1

JOB NUMBER: 6157-JD



0.00	Moist, orange brown, loose, sandy SILT with gravel. Topsoil with abundant fine roots.
0.20	Moist, orange red, loose, silty sandy GRAVEL. Reworked residual shale.
1.10	Moist, red, firm, microshattered, clayey SILT. Residual shale.
1.75	Red stained yellow on joints, highly jointed, highly weathered, very soft rock SHALE. Jeppestown Subgroup.
2.30	

NOTES

1) End of hole at refusal on soft rock shale.

2) No groundwater encountered.

3) Disturbed sample MTP1 taken at 1,6 m.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP1

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

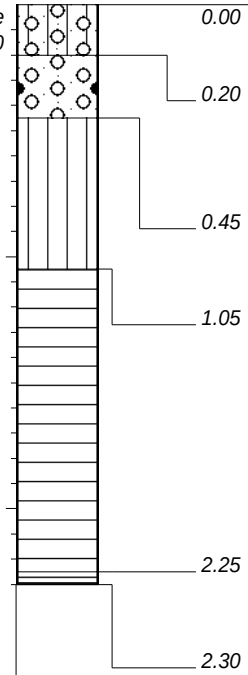
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP2
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, orange brown, loose, sandy SILT with gravel. Topsoil with abundant fine roots.
0.20	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.45	Moist, firm, microshattered, clayey SILT. Residual shale.
1.05	Red stained yellow on joints, highly jointed, highly weathered very soft rock SHALE with quartz vein. Jeppestown Subgroup.
2.25	Orange yellow, highly weathered, soft rock, highly jointed SHALE. Jeppestown Subgroup.
2.30	

NOTES

1) End of hole at refusal.

2) No groundwater encountered.

3) No samples taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
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ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP2

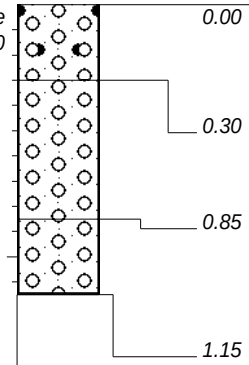
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP3
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00 – 0.30	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.30 – 0.85	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
0.85 – 1.15	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Johannesburg Subgroup.

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP3

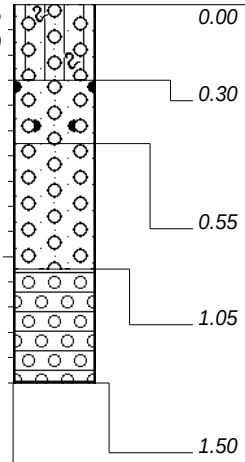
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP4
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, brown, loose, sandy silt with GRAVEL. Topsoil with abundant fine roots.
0.30	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.55	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite.
1.05	Purplish grey, highly weathered to very soft rock quartzitic CONGLOMERATE. Johannesburg Subgroup.
1.50	

NOTES

1) End of hole at refusal.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
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ELEVATION :
X-COORD :
Y-COORD :

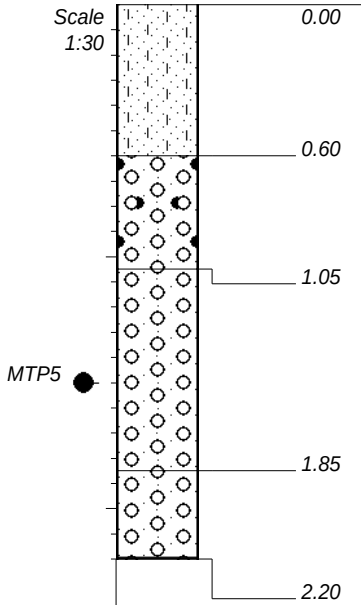
HOLE No: MTP4

dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP5
Sheet 1 of 1

JOB NUMBER: 6157-JD



0.00	Moist, brownish orange, loose, silty SAND. Topsoil and Hillwash.
0.60	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
1.05	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
1.85	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Johannesburg Subgroup.
2.20	

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) Disturbed sample MTP5 taken at 1,5 m.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP5

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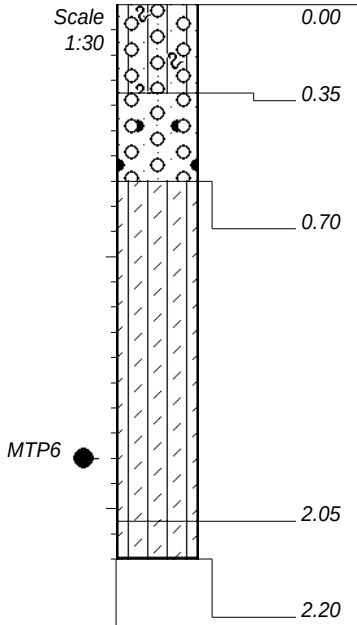
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP6
Sheet 1 of 1

JOB NUMBER: 6157-JD



0.00	Moist, orange brown, loose, sandy SILT with gravel. Topsoil with abundant fine roots.
0.35	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.70	Moist, dark mottled black and orange, stiff, fissured, clayey SILT. Residual diabase.
2.05	Moist, yellow stained red on joints, stiff, jointed clayey SILT. Completely weathered diabase.
2.20	

NOTES

1) End of hole near reach of excavator.

2) No groundwater encountered.

3) Disturbed sample MTP6 taken at 1,80 m.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP6

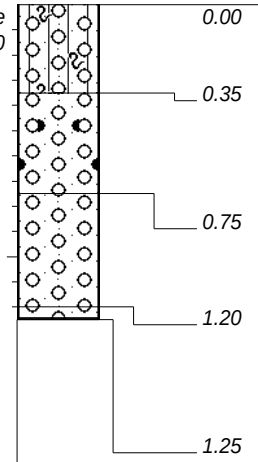
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP7
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, orange brown, loose, sandy SILT with gravel. Topsoil with abundant fine roots.
0.35	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.75	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
1.20	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Johannesburg Subgroup.
1.25	

NOTES

1) End of hole at refusal on medium hard rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP7

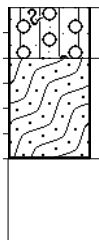
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP8
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00

Moist, orange brown, loose, sandy SILT with gravel.
Topsoil with abundant fine roots.

0.20

Light grey stained brown on joints, highly jointed, highly weathered, soft rock QUARTZITE.
Johannesburg Subgroup.

0.60

NOTES

1) End of hole at refusal on medium hard rock quartzite.

2) No groundwater encountered.

3) No sample taken.

4) Outcrop of quartzite in vicinity of hole.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP8

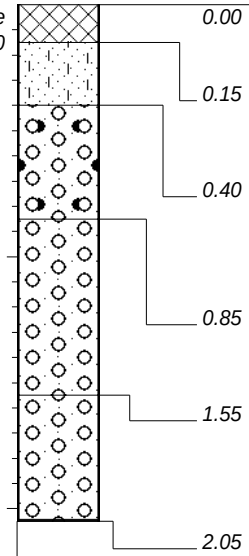
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP9
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Slightly moist, dark grey ash and bricks. FILL.
0.15	Moist, brownish orange, loose, silty SAND. Topsoil and hillwash.
0.40	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.85	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
1.55	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Johannesburg Subgroup.
2.05	

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP9

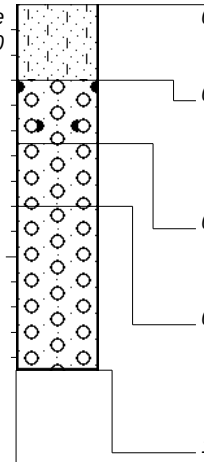
dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP10
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, brownish orange, loose, silty SAND. Topsoil and hillwash.
0.30	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.55	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
0.80	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Johannesburg Subgroup.
1.45	

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP10

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

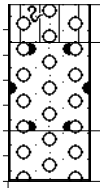
dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP11
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, orange brown, loose, sandy SILT with gravel. Topsoil with abundant fine roots.
0.15	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.50	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Turffontein Subgroup.
0.70	

NOTES

1) End of hole at refusal on hard rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP11

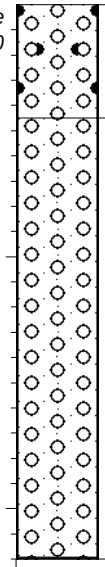
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP12
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00

Moist, orange red, loose, sandy GRAVEL.
Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.

0.45

Slightly moist, orange and yellow, medium dense, sandy GRAVEL.
Completely weathered quartzite with relic jointing.

2.20

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

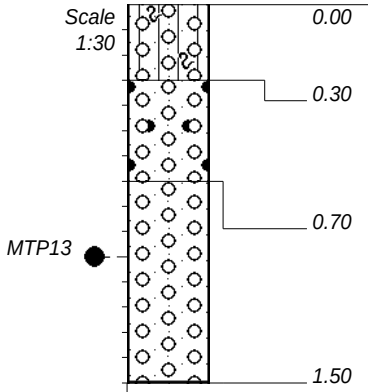
HOLE No: MTP12

dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP13
Sheet 1 of 1

JOB NUMBER: 6157-JD



0.00 – 0.30: Moist, orange brown, loose, sandy SILT with gravel.
Topsoil with abundant fine roots.

0.30 – 0.70: Moist, orange red, loose, sandy GRAVEL.
Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.

0.70 – 1.50: Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL.
Completely weathered very soft rock quartzite.
Turffontein Subgroup.

NOTES

1) End of hole at refusal.

2) No groundwater encountered.

3) Bulk disturbed sample MTP13 taken 0.0 -- 1,0 m.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF
TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14
DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP13

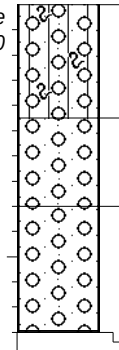
dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP14
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00 Moist, orange brown, loose, sandy SILT with gravel.
Topsoil with abundant fine roots.

0.45 Slightly moist, orange and yellow, medium dense, sandy GRAVEL.
Completely weathered quartzite with relic jointing.

0.80 Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL.
Completely weathered very soft rock quartzite.
Johannesburg Subgroup.

1.30

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP14

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

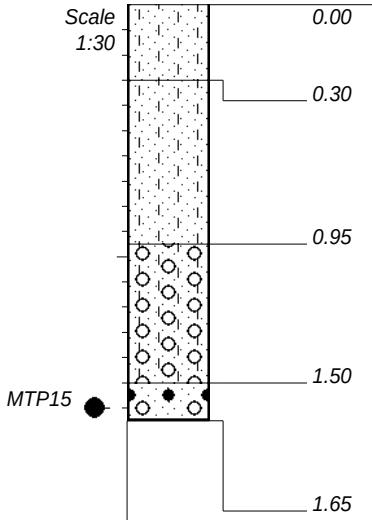
DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP15
Sheet 1 of 1

JOB NUMBER: 6157-JD



0.00	Slightly moist, pale brown, very loose, silty SAND. Topsoil.
0.30	Moist, yellow, very loose, silty SAND. Hillwash.
0.95	Moist, yellow mottled red, loose, silty sand with GRAVEL. Pebble marker with soft ferricrete concretions.
1.50	Moist, dark red speckled grey, very dense, gravelly SAND. Ferrugenised nodular ferricrete with grit-sized quartzite and quartzite gravel.
1.65	

NOTES

1) End of hole near refusal.

2) No groundwater encountered.

3) Disturbed sample MTP15 taken at 1,60 m.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP15

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

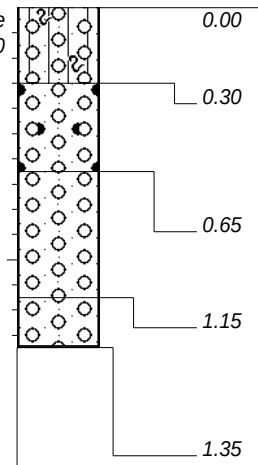
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP16
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00 – 0.30	Moist, orange brown, loose, sandy silt with GRAVEL. Topsoil with abundant fine roots.
0.30 – 0.65	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.65 – 1.15	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
1.15 – 1.35	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Turffontein Subgroup.

NOTES

1) End of hole at refusal on hard rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP16

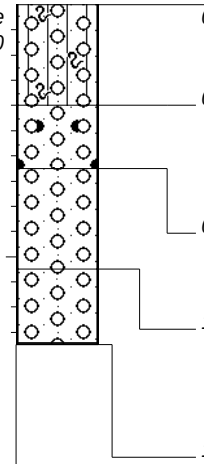
dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP17
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, orange brown, loose, sandy silt with GRAVEL. Topsoil with abundant fine roots.
0.40	Moist, orange red, loose, sandy gravel. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.65	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
1.05	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Turffontein Subgroup.
1.35	

NOTES

1) End of hole at refusal on hard rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP17

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

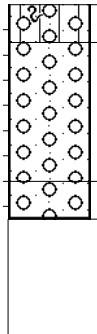
dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP18
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, orange brown, loose, sandy silt with GRAVEL. Topsoil with abundant fine roots.
0.15	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
0.70	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Turffontein Subgroup.
0.85	

NOTES

1) End of hole at refusal on medium hard rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP18

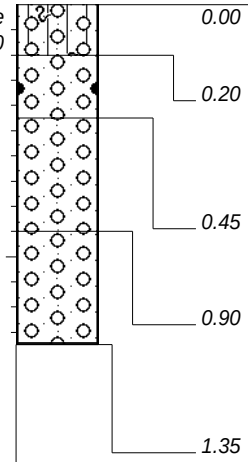
dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP19
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, orange brown, loose, sandy silt with GRAVEL. Topsoil with abundant fine roots.
0.20	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.45	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
0.90	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Turffontein Subgroup.
1.35	

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP19

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

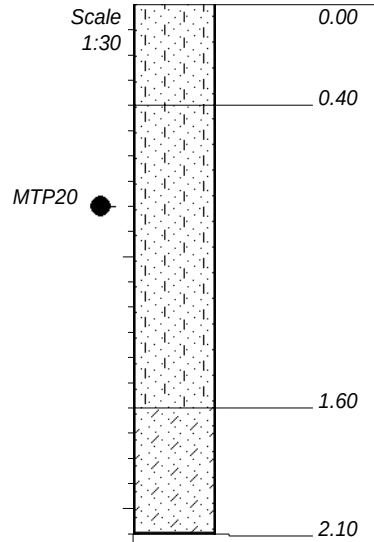
DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

dot PLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP20
Sheet 1 of 1

JOB NUMBER: 6157-JD



0.00	Slightly moist, pale brown, very loose, silty SAND. Topsoil.
0.40	Moist, yellow, very loose, silty SAND. Hillwash.
1.60	Moist, dark red blotched orange and mottled black, firm, intact, clayey SAND. Ferrugenised residual diabase.
2.10	

NOTES

1) End of hole near refusal on ferrugenised clayey sand.

2) No groundwater encountered.

3) Bulk disturbed sample MTP20 taken from 0.0 -- 0,8 m.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

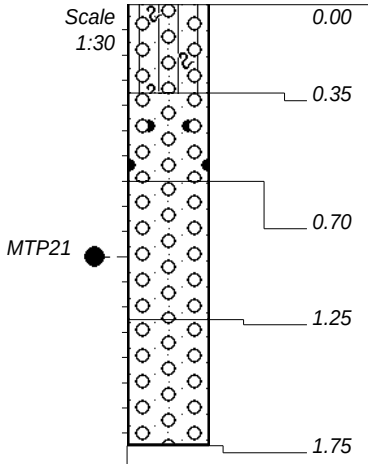
HOLE No: MTP20

dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP21
Sheet 1 of 1

JOB NUMBER: 6157-JD



0.00	Moist, orange brown, loose, sandy silt with GRAVEL. Topsoil with abundant fine roots.
0.35	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.70	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite.
1.25	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Turffontein Subgroup.
1.75	

NOTES

1) End of hole at refusal.

2) No groundwater encountered.

3) Disturbed sample MTP21 taken at 1,0 m.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF
TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14
DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP21

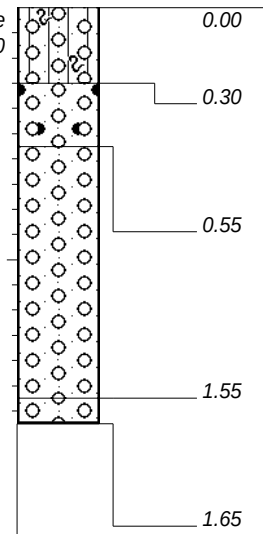
dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP22
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, orange brown, loose, sandy silt with GRAVEL. Topsoil with abundant fine roots.
0.30	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.55	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
1.55	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Turffontein Subgroup.
1.65	

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP22

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

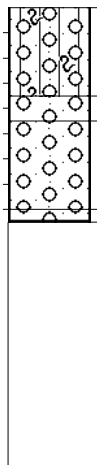
dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP23
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Moist, orange brown, loose, sandy silt with GRAVEL. Topsoil with abundant fine roots.
0.35	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.45	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
0.80	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Turffontein Subgroup.
0.85	

NOTES

1) End of hole at refusal on medium hard rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP23

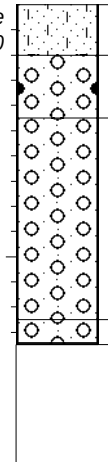
dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP24
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



0.00	Slightly moist, pale brown, very loose, silty SAND. Topsoil.
0.20	Moist, orange red, loose, sandy GRAVEL. Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.
0.45	Slightly moist, orange and yellow, medium dense, sandy GRAVEL. Completely weathered quartzite with relic jointing.
1.25	Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL. Completely weathered very soft rock quartzite. Turffontein Subgroup.
1.35	

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP24

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

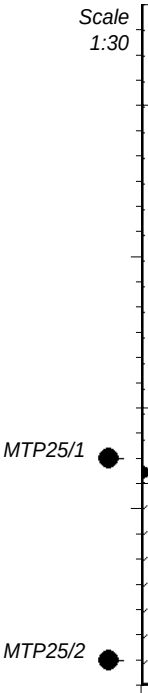
DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP25
Sheet 1 of 1

JOB NUMBER: 6157-JD



0.00 Slightly moist, pale brown, very loose, silty SAND.
Topsoil.

0.40 Moist, yellow, very loose, silty SAND.
Hillwash.

1.60 Moist, yellow blotched red and black, loose, gravelly SAND.
Pebble marker and nodular ferricrete.

1.90 Moist, dark red blotched orange and mottled black, firm, intact, clayey SILT.
Ferrugenised residual diabase.

2.70

NOTES

1) End of hole near reach of excavator.

2) No groundwater encountered.

3) Disturbed sample MTP25/1 taken at 1,80 m.

4) Disturbed sample MTP25/2 taken at 2,60 m.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF
TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14
DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP25

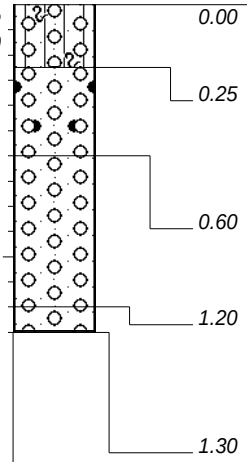
dotPLOT

McCormick Property Development (Pty) Ltd
Mogale City Development

HOLE No: MTP26
Sheet 1 of 1

JOB NUMBER: 6157-JD

Scale 1:30



Moist, orange brown, loose, sandy silt with GRAVEL.
Topsoil with abundant fine roots.

Moist, orange red, loose, sandy GRAVEL.
Pebble marker and nodular ferricrete comprising sub-angular quartzite pebbles.

Slightly moist, orange and yellow, medium dense, sandy GRAVEL.
Completely weathered quartzite with relic jointing.

Slightly moist, light grey stained red on joints, very dense, sandy GRAVEL.
Completely weathered very soft rock quartzite.
Turffontein Subgroup.

NOTES

1) End of hole at refusal on soft rock quartzite.

2) No groundwater encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : New Holland
DRILLED BY :
PROFILED BY : JS STIFF

TYPE SET BY : JS STIFF
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 2010-06-14

DATE : 11/10/10 10:28
TEXT : ..\MOGALE~1\CHIPTEST.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: MTP26

Appendix C : Soil test results

Unit 4, 144 Edward Avenue, Centurion
P O Box 7661, Centurion, 0046
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E-mail: frank@civilab.co.za • Website: www.civilab.co.za

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Civil Engineering Testing Laboratories

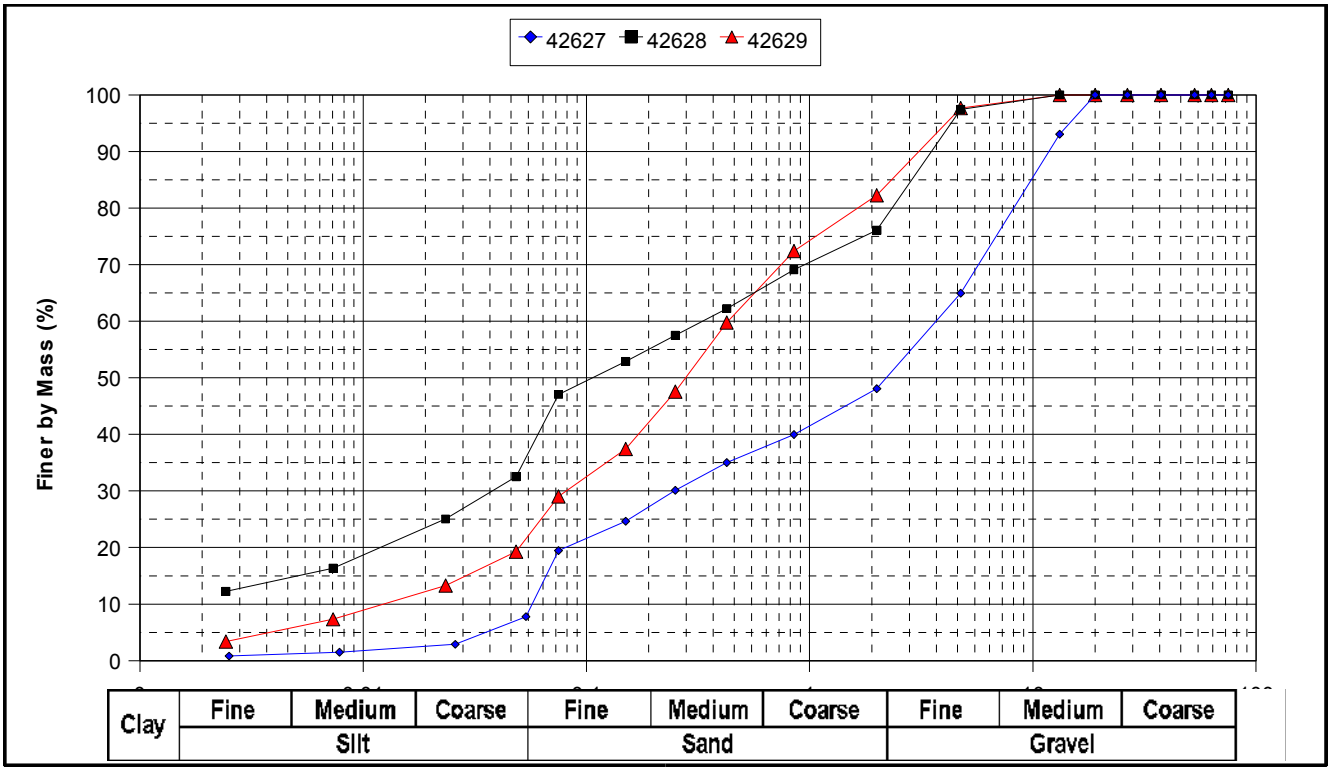
Foundation Indicator Test Data

Project	JD Geotechnical - Mogale City (MTP)		
Project No.	HP/B 269-28	Date	12 July 2010

Sample No.	42627	42628	42629
Field Ref. No.	MTP 1	MTP 1	MTP 5
Depth	0.0-0.5m	1.6m	1.5m
Sieve size	%Passing	% Passing	% Passing
75.00	100	100	100
63.00	100	100	100
53.00	100	100	100
37.50	100	100	100
26.50	100	100	100
19.00	100	100	100
13.20	93	100	100
4.75	65	97	98
2.00	48	76	82
0.85	40	69	72
0.425	35	62	60
0.25	30	58	48
0.15	25	53	37
0.075	19	47	29
0.04	6	31	17
0.02	1	23	12
0.006	1	15	6
0.002	1	12	3

Sample No.	42627	42628	42629
%Gravel	52	24	18
%Sand	36	36	58
%Silt	11	28	21
%Clay	1	12	3
NMC %	Not Tested	Not Tested	Not Tested
Liquid Limit	25	38	21
Plasticity Index	9	14	7
Linear Shrink.	3.5	8.	2.5
Overall P.I.	3	9	4
Grading Modulus	1.97	1.15	1.29
H.R.B.	A-2-4 (0)	A-6 (4)	A-2-4 (0)
Unified	GC	SC	SC-SM
Weston swell (%) at 1 kPa			

Analysis as per method D422 of ASTM of 1985
The results reported relate only to the samples tested.



Remarks:

Unit 4, 144 Edward Avenue, Centurion
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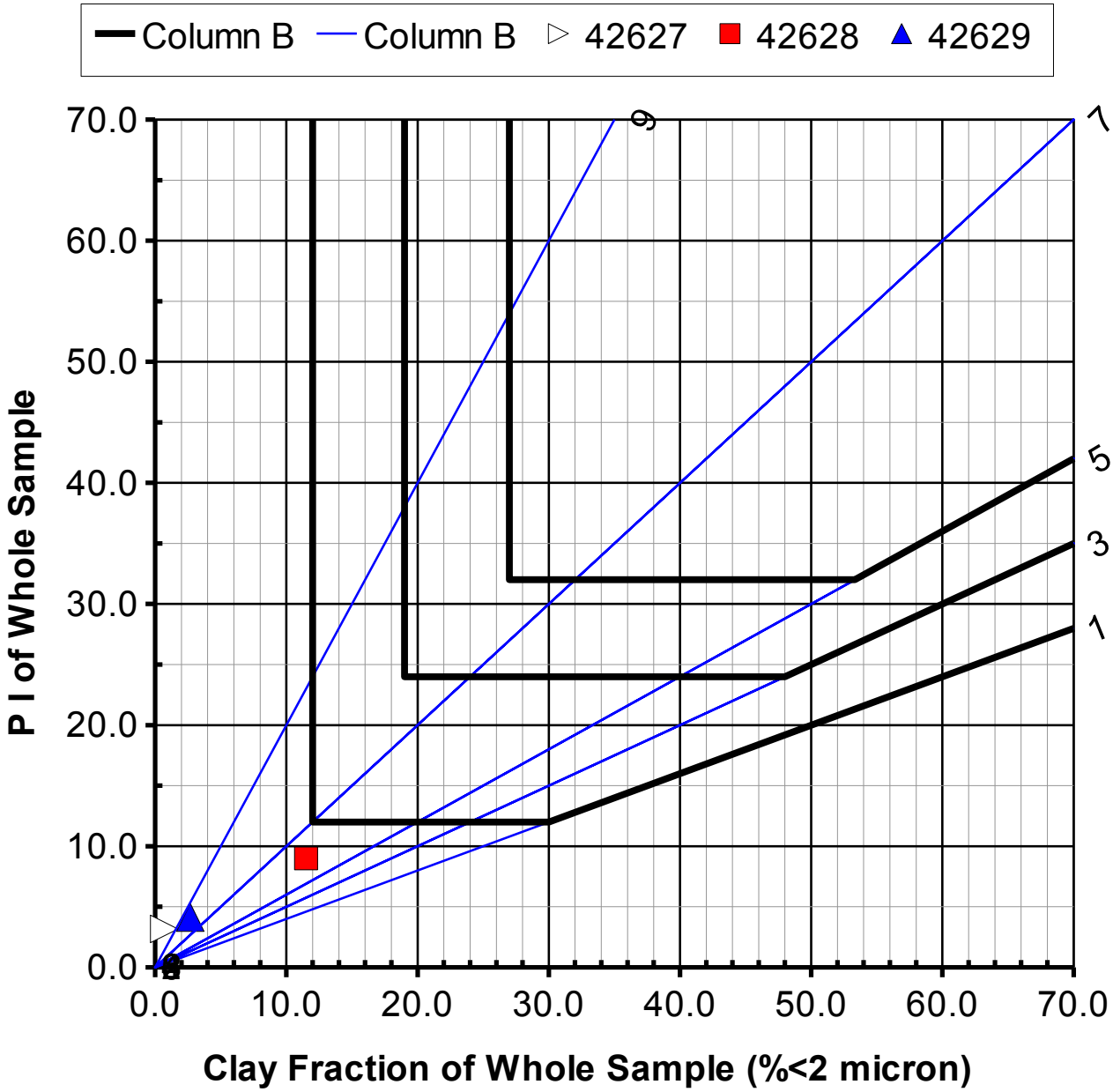
Activity Diagram After D H van der Merwe



Plotted Values:

Sample	Clay Frac	PI
42627	0.7	3.2
42628	11.5	9.0
42629	2.7	4.1

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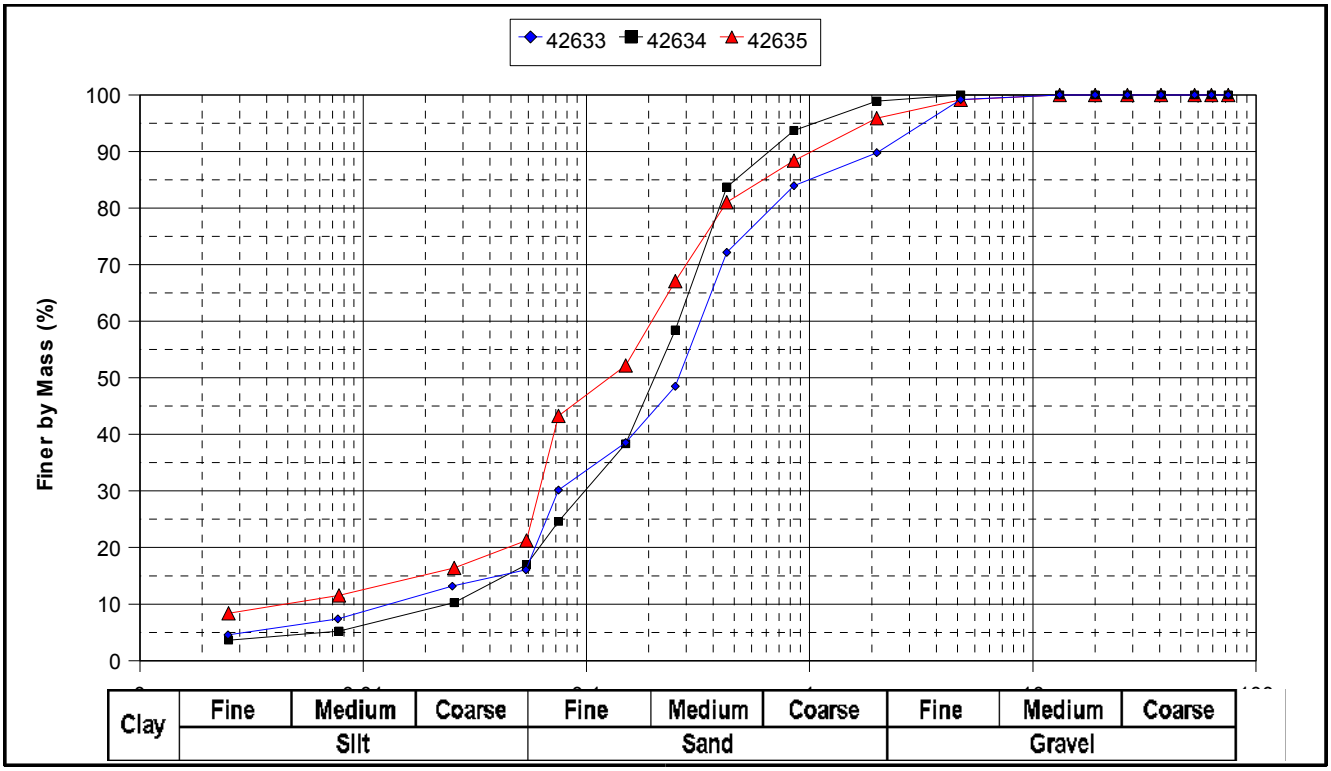
Foundation Indicator Test Data

Project	JD Geotechnical - Mogale City (MTP)		
Project No.	HP/B 269-28	Date	12 July 2010

Sample No.	42633	42634	42635
Field Ref. No.	MTP 21	MTP 22	MTP 25
Depth	1.0m	0.0-0.8m	1.8m
Sieve size	%Passing	% Passing	% Passing
75.00	100	100	100
63.00	100	100	100
53.00	100	100	100
37.50	100	100	100
26.50	100	100	100
19.00	100	100	100
13.20	100	100	100
4.75	99	100	99
2.00	90	99	96
0.85	84	94	88
0.425	72	84	81
0.25	48	58	67
0.15	39	38	52
0.075	30	25	43
0.04	15	14	19
0.02	12	8	15
0.006	6	4	11
0.002	4	3	8

Sample No.	42633	42634	42635
%Gravel	10	1	4
%Sand	69	79	67
%Silt	17	16	21
%Clay	4	3	8
NMC %	Not Tested	Not Tested	Not Tested
Liquid Limit	SP	NP	22
Plasticity Index	SP	NP	9
Linear Shrink.	1.	0.	3.5
Overall P.I.	SP	NP	7
Grading Modulus	1.08	0.93	0.80
H.R.B.	A-2-4 (0)	A-2-4 (0)	A-4 (2)
Unified	SM	SM	SC
Weston swell (%) at 1 kPa			

Analysis as per method D422 of ASTM of 1985
The results reported relate only to the samples tested.



Remarks:

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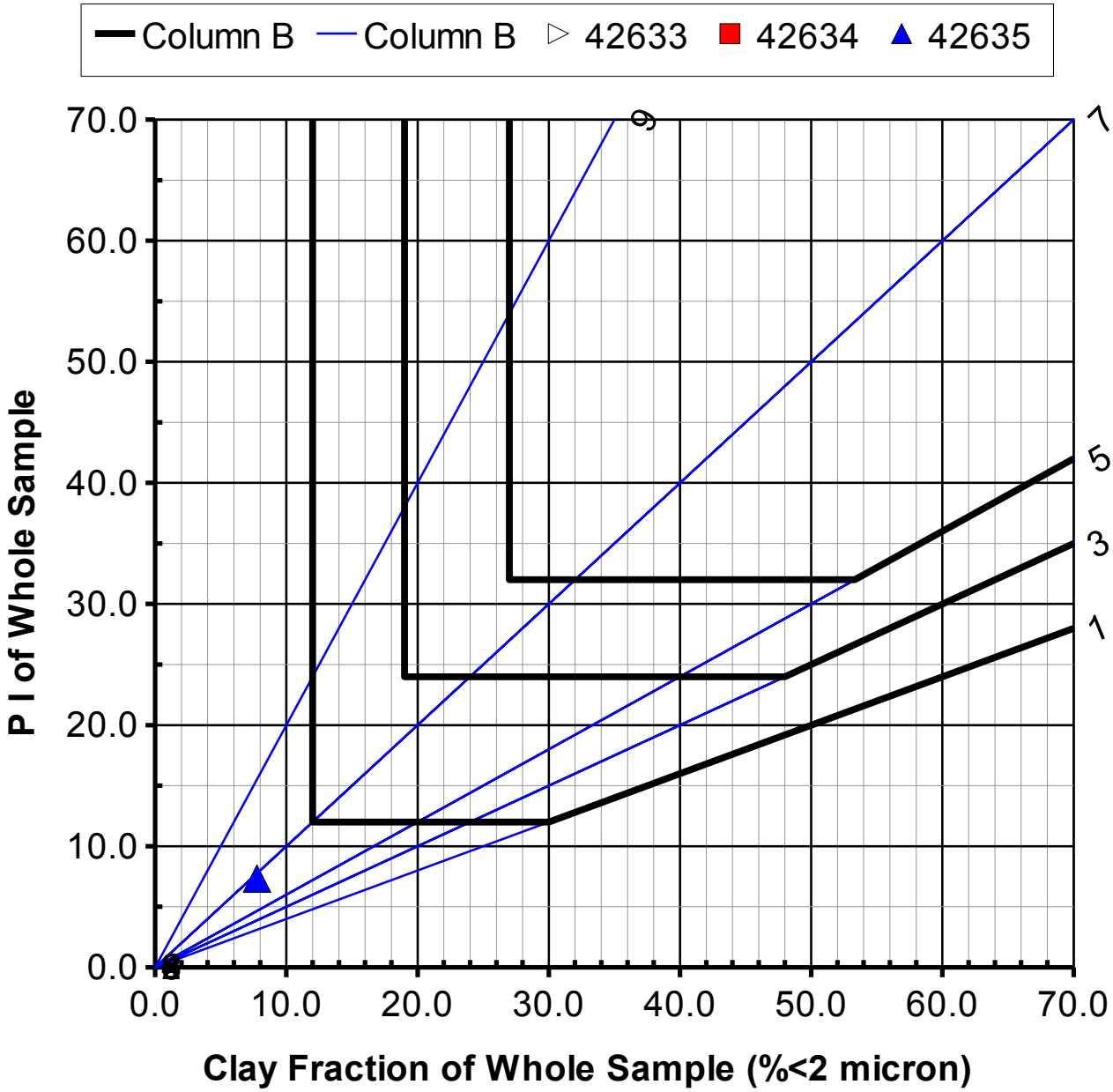
Activity Diagram After D H van der Merwe



Plotted Values:

Sample	Clay Frac	PI
42633	4.0	#VALUE!
42634	3.3	#VALUE!
42635	7.8	7.3

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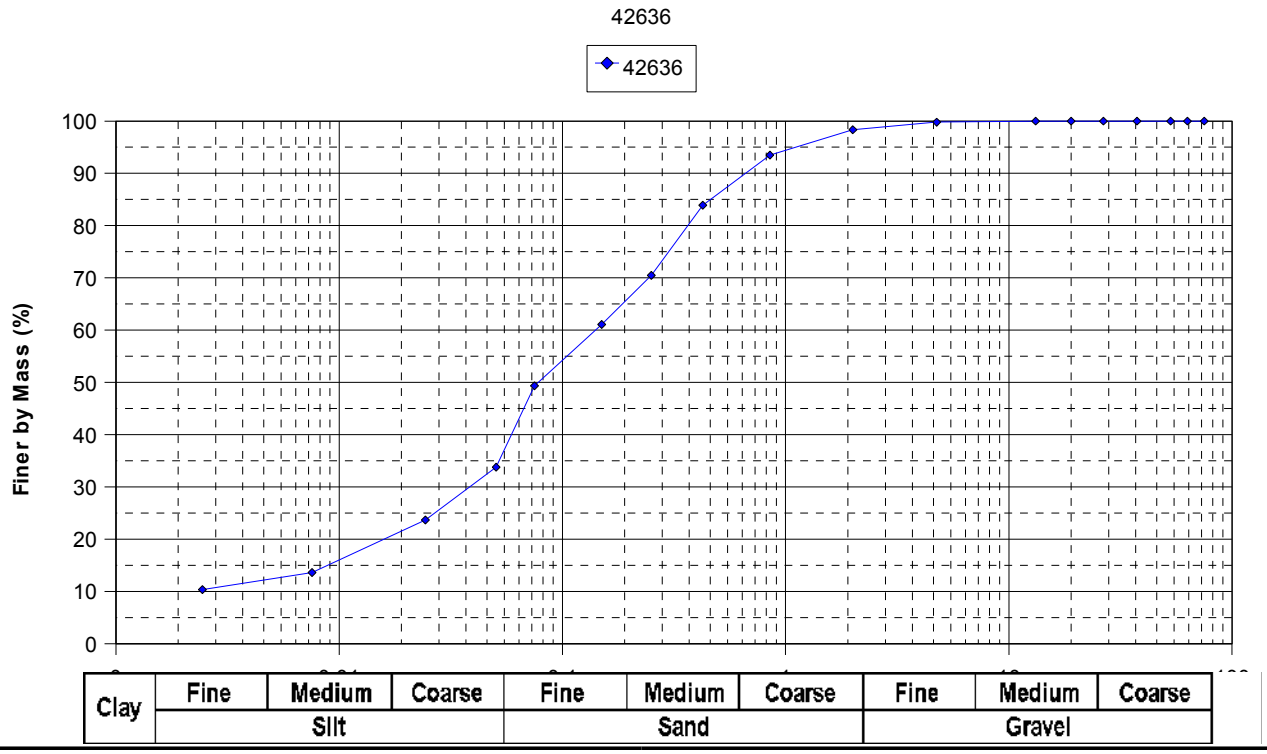
Foundation Indicator Test Data

Project	JD Geotechnical - Mogale City (MTP)		
Project No.	HP/B 269-28	Date	12 July 2010

Sample No.	42636		
Field Ref. No.	MTP 25		
Depth	2.6m		
Sieve size	%Passing	% Passing	% Passing
75.00	100		
63.00	100		
53.00	100		
37.50	100		
26.50	100		
19.00	100		
13.20	100		
4.75	100		
2.00	98		
0.85	93		
0.425	84		
0.25	70		
0.15	61		
0.075	49		
0.04	31		
0.02	21		
0.006	12		
0.002	10		

Sample No.	42636		
%Gravel	2		
%Sand	58		
%Silt	31		
%Clay	10		
NMC %	Not Tested		
Liquid Limit	24		
Plasticity Index	8		
Linear Shrink.	4.		
Overall P.I.	6		
Grading Modulus	0.68		
H.R.B.	A-4 (3)		
Unified	SC		
Weston swell (%) at 1 kPa			

Analysis as per method D422 of ASTM of 1985
The results reported relate only to the samples tested.



Remarks:

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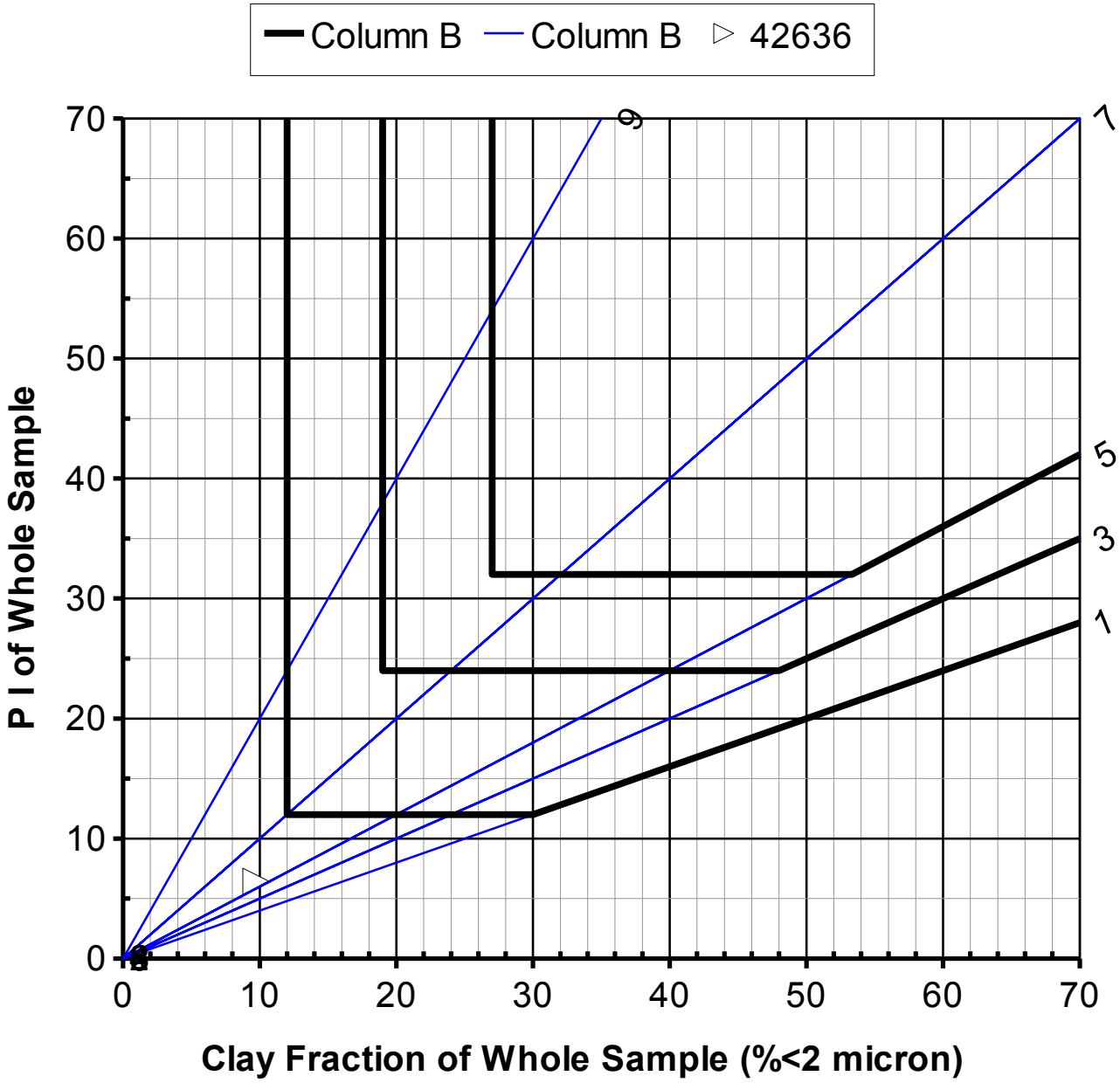
Activity Diagram After D H van der Merwe



Plotted Values:

Sample	Clay Frac	PI
42636	9.8	6.4

Unit 4, 144 Edward Avenue, Centurion
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Civil Engineering Testing Laboratories

Foundation Indicator Test Data

Project	JD Geotechnical - Mogale City (MTP)		
Project No.	HP/B 269-28	Date	12 July 2010

Sample No.	42630	42631	42632
Field Ref. No.	MTP 6	MTP 13	MTP 15
Depth	-	0.0-1.0m	1.6m
Sieve size	%Passing	% Passing	% Passing
75.00	100	100	100
63.00	100	100	100
53.00	100	100	100
37.50	100	100	100
26.50	100	100	100
19.00	100	100	100
13.20	100	89	100
4.75	97	61	95
2.00	80	54	65
0.85	73	52	56
0.425	65	47	49
0.25	55	36	41
0.15	48	23	35
0.075	42	14	29
0.04	17	8	14
0.02	15	5	9
0.006	10	2	5
0.002	6	1	4

Sample No.	42630	42631	42632
%Gravel	20	46	35
%Sand	52	43	46
%Silt	21	10	16
%Clay	6	1	4
NMC %	Not Tested	Not Tested	Not Tested
Liquid Limit	33	NP	29
Plasticity Index	13	NP	11
Linear Shrink.	6.	0.	5.5
Overall P.I.	8	NP	5
Grading Modulus	1.13	1.85	1.57
H.R.B.	A-6 (2)	A-1-b (0)	A-2-6 (0)
Unified	SC	SM	SC
Weston swell (%) at 1 kPa			

Analysis as per method D422 of ASTM of 1985
The results reported relate only to the samples tested.
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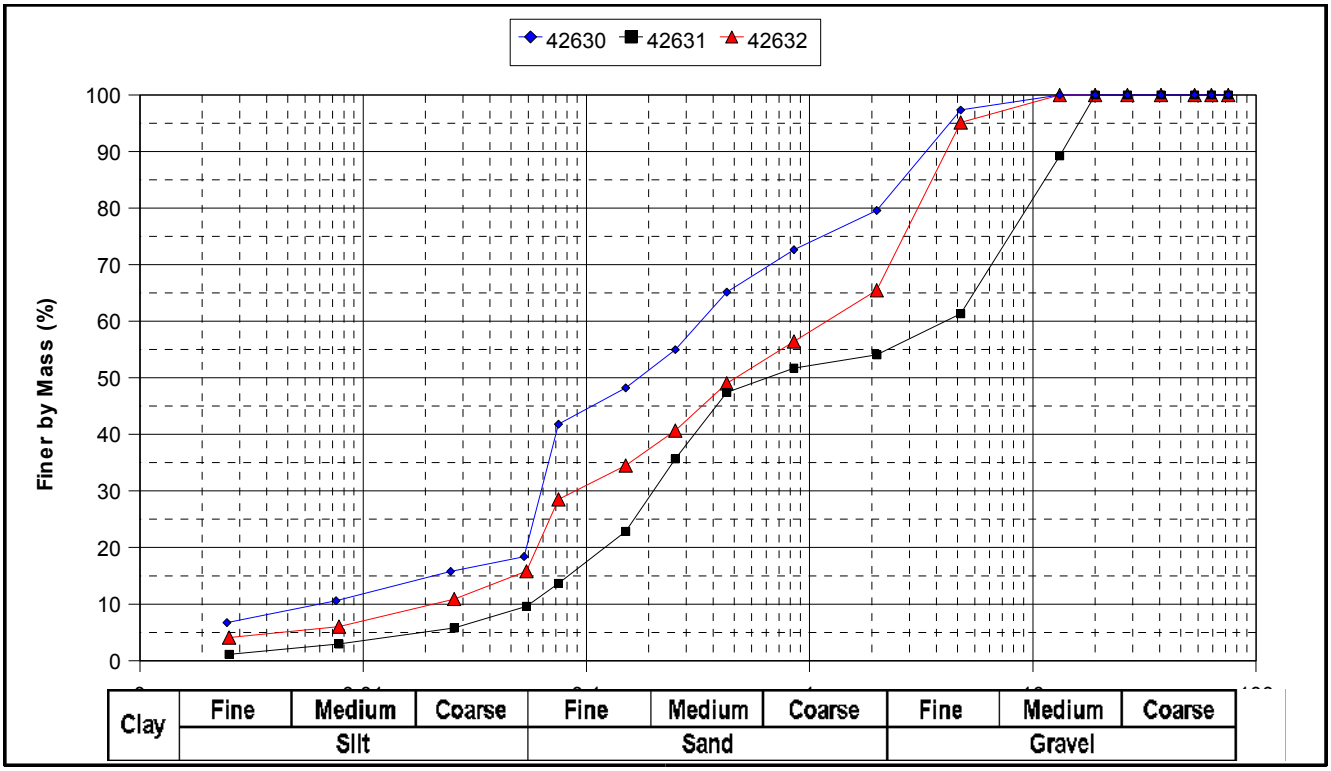

Remarks:

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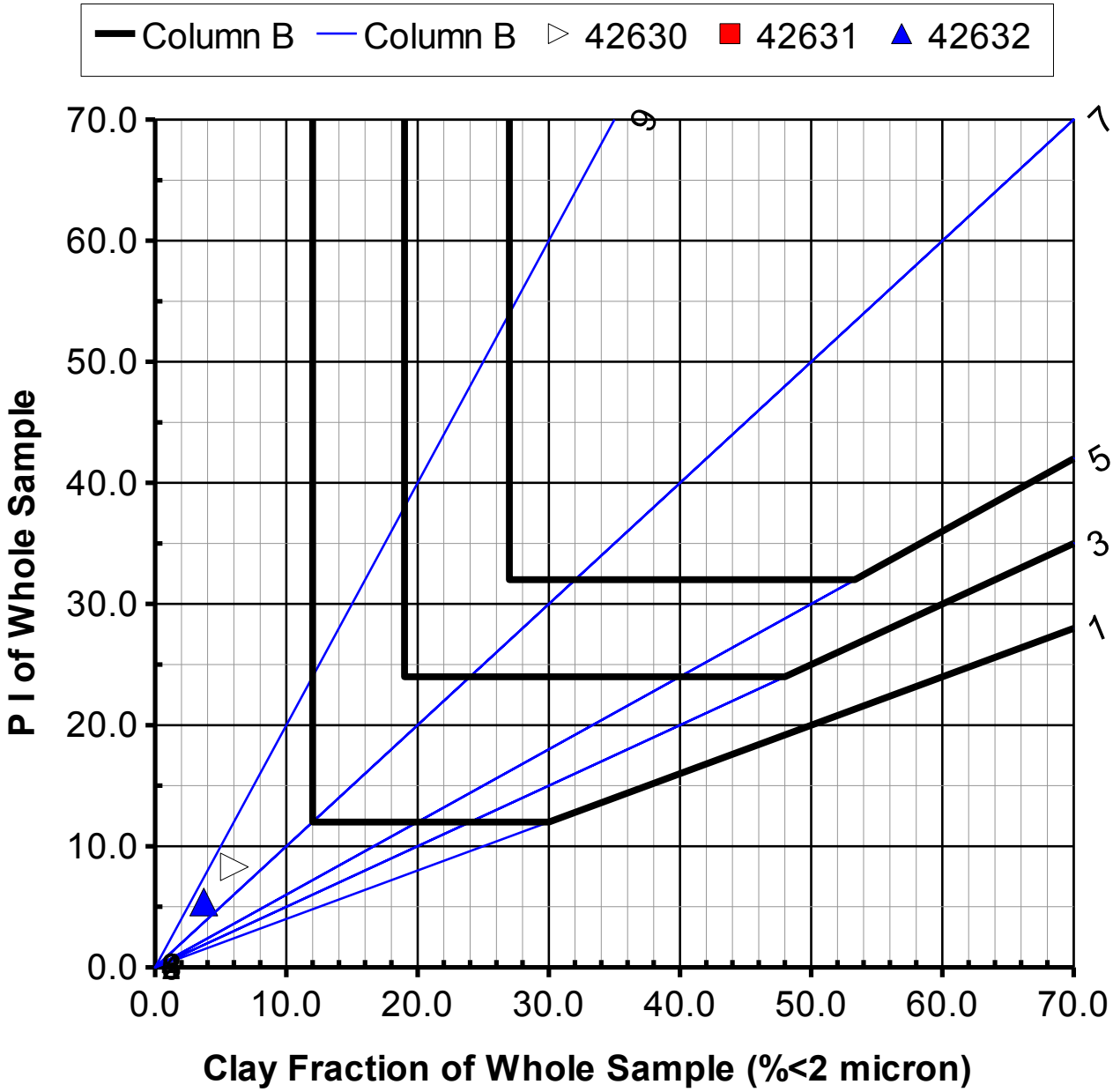
Activity Diagram After D H van der Merwe



Plotted Values:

Sample	Clay Frac	PI
42630	6.0	8.3
42631	0.7	#VALUE!
42632	3.7	5.4

Annexure C – Cross Cut Report

Cross Cut Report

For: Civil Concepts

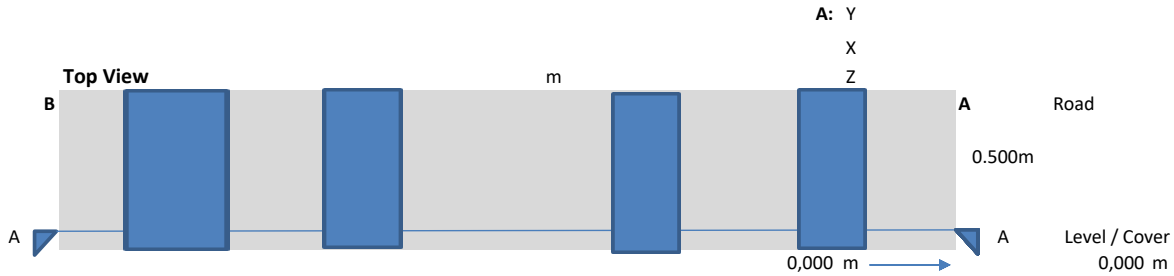
Date: 7 July 2023

Leratong Mall - Rand Water Cross Cuts

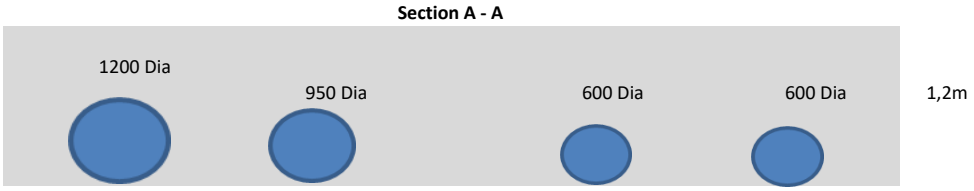
Wayleave No WL

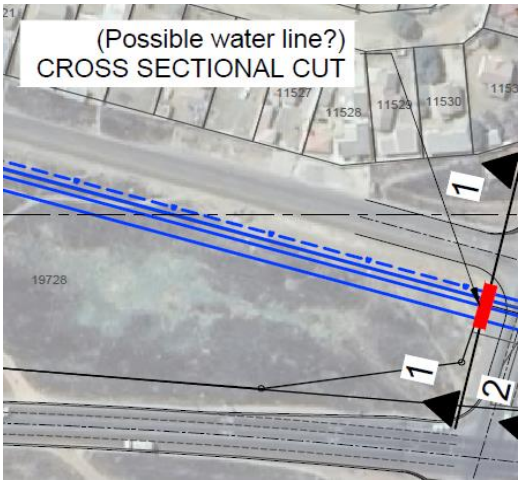
Prepared By: Albert Els

Cross Cut 1 (A-A)



** Refer to survey for pipe Levels and positions





DCP TEST FORM

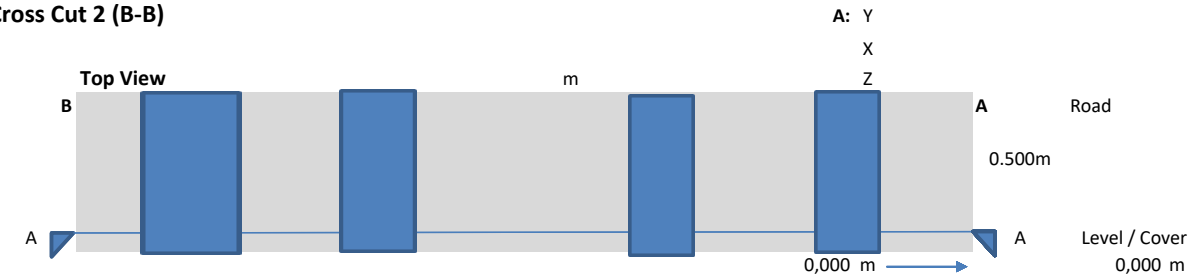
PROJECT NAME	:	Loratang Mall - Rand Water Crazz Outz
CLIENT	:	Civil Concepts
PROJECT NUMBER	:	
PRINCIPAL AGENT	:	
CONTRACTOR	:	
DESCRIPTION/SECTI	:	
DRAWING REFERENC	:	
CHAINAGE	:	CC no #1
POSITION		CHECKED BY:

Blows	Depth mm	Corrected	Depth Mm	mm /	CBR	Equ. Clas
0	10					
5	60	50	50	13	16	G7
10	130	120	70			
15	200	190	70			
20	245	235	45			
25	340	330	95	14	14	G8
30	415	405	75			
35	485	475	70			
40	520	510	35	14	14	G8
45	625	615	105			
50	700	690	75			
55	765	755	65			
60	840	830	75	13	15	G7
65	910	900	70			
70	960	950	50			
75						
80						
85						
90						
95						
100						
105						
110						
115						
120						
125						
130						
135						
140						
145						
150						
155						
160						
165						
170						
175						
180						
185						
190						
195						
200						

DCP Graph

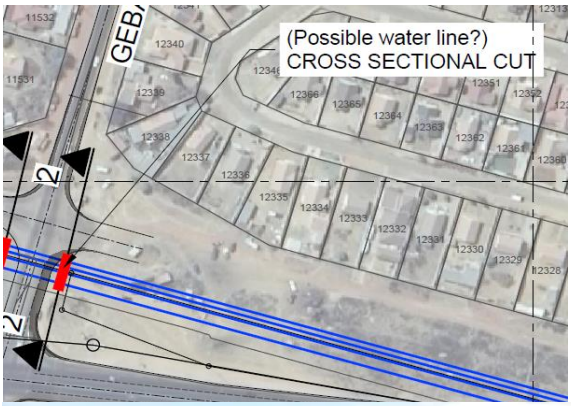
Remarks: DCP info for compaction and insitu layers

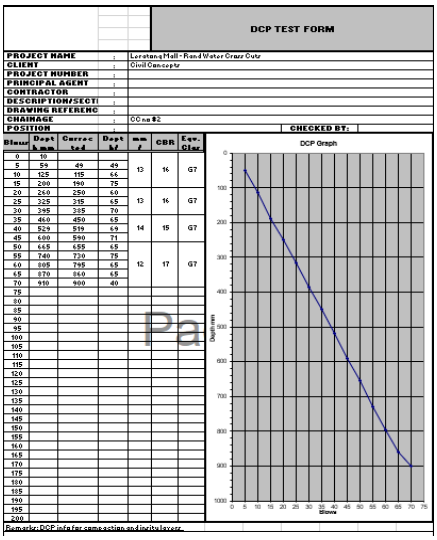
Cross Cut 2 (B-B)



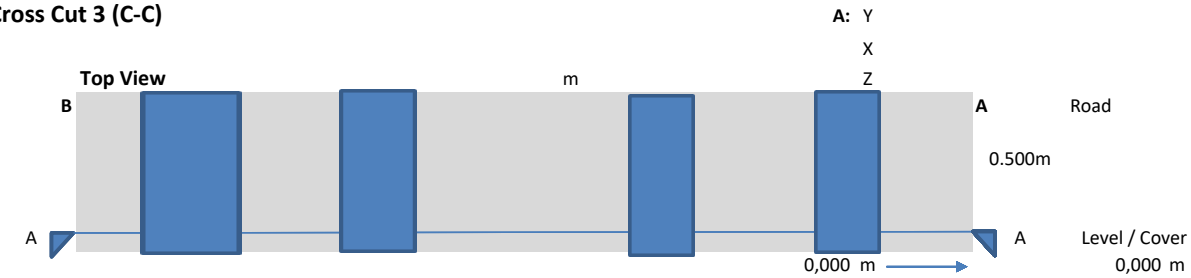
** Refer to survey for pipe Levels and positions

Section A - A



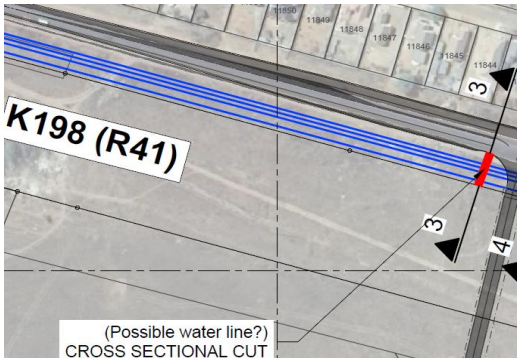


Cross Cut 3 (C-C)



** Refer to survey for pipe Levels and positions

Section A - A



DCP TEST FORM

PROJECT NAME	:	Loratang Mall - Rand Water Cross Outs
CLIENT	:	Civil Concepts
PROJECT NUMBER	:	
PRINCIPAL AGENT	:	
CONTRACTOR	:	
DESCRIPTION/SECTI	:	
DRAWING REFERENC	:	
CHAINAGE	:	CC no #3
POSITION	:	CHECKED BY:

Blows	Depth mm	Corrected	Depth hf	mm /	CBR	Equ. Class
0	0					
5	10	10	10	9	26	G6
10	70	70	60			
15	130	130	60			
20	180	180	50	12	17	G7
25	240	240	60			
30	310	310	70			
35	390	390	80	15	13	G8
40	470	470	80			
45	540	540	70			
50	610	610	70			
55	690	690	80	15	13	G8
60	770	770	80			
65	840	840	70			
70	910	860	70			
75						
80						
85						
90						
95						
100						
105						
110						
115						
120						
125						
130						
135						
140						
145						
150						
155						
160						
165						
170						
175						
180						
185						
190						
195						
200						

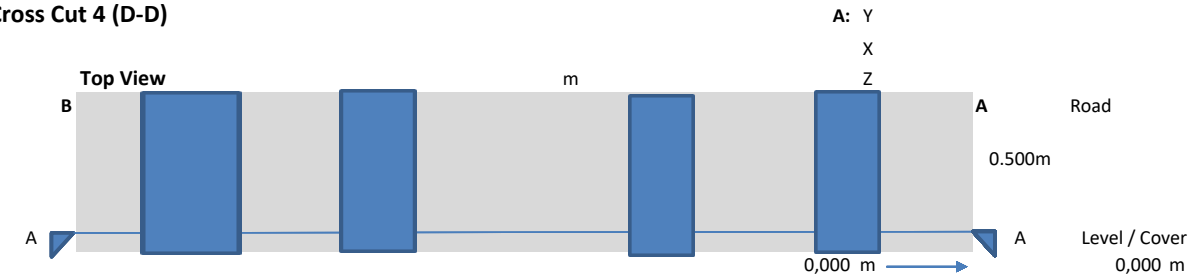
DCP Graph

Depth mm

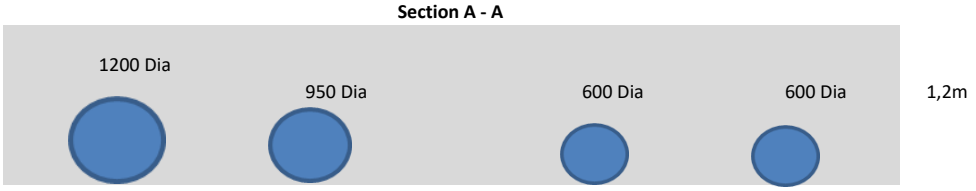
Blows

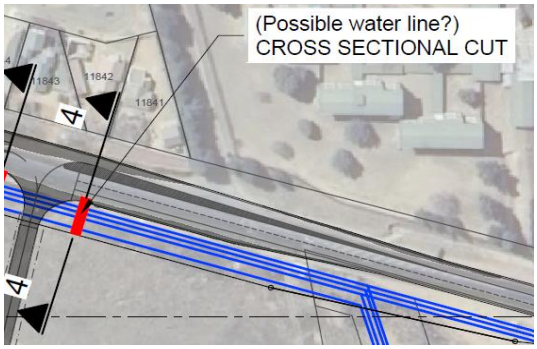
Remarks: DCP info for cross section and invitu layers

Cross Cut 4 (D-D)



** Refer to survey for pipe Levels and positions





DCP TEST FORM

PROJECT NAME	:	Loratang Mall - Rand Water Cross Cutr
CLIENT	:	Civil Concepts
PROJECT NUMBER	:	
PRINCIPAL AGENT	:	
CONTRACTOR	:	
DESCRIPTION/SECTI	:	
DRAWING REFERENC	:	
CHAINAGE	:	CC no #4
POSITION	:	CHECKED BY:

Blows	Depth mm	Corrected	Depth bf	mm /	CBR	Eqv. Clas
0	10					
5	20	10	10	6	39	>G5
10	60	50	40			
15	105	95	45			
20	145	135	40	11	20	G7
25	200	190	55			
30	270	260	70			
35	350	340	80	15	13	G8
40	420	410	70			
45	500	490	80			
50	560	550	60			
55	630	620	70	14	14	G8
60	700	690	70			
65	780	770	80			
70	860	860	80			
75						
80						
85						
90						
95						
100						
105						
110						
115						
120						
125						
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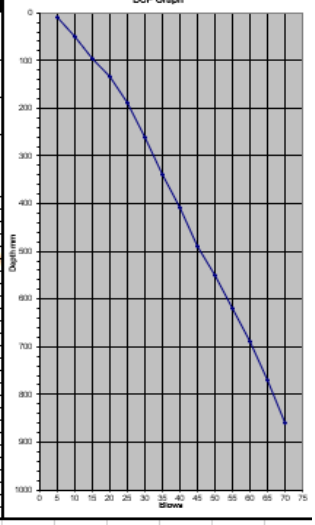
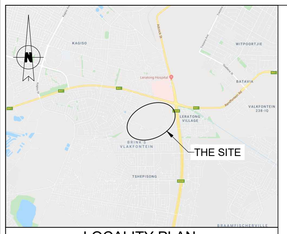
200						

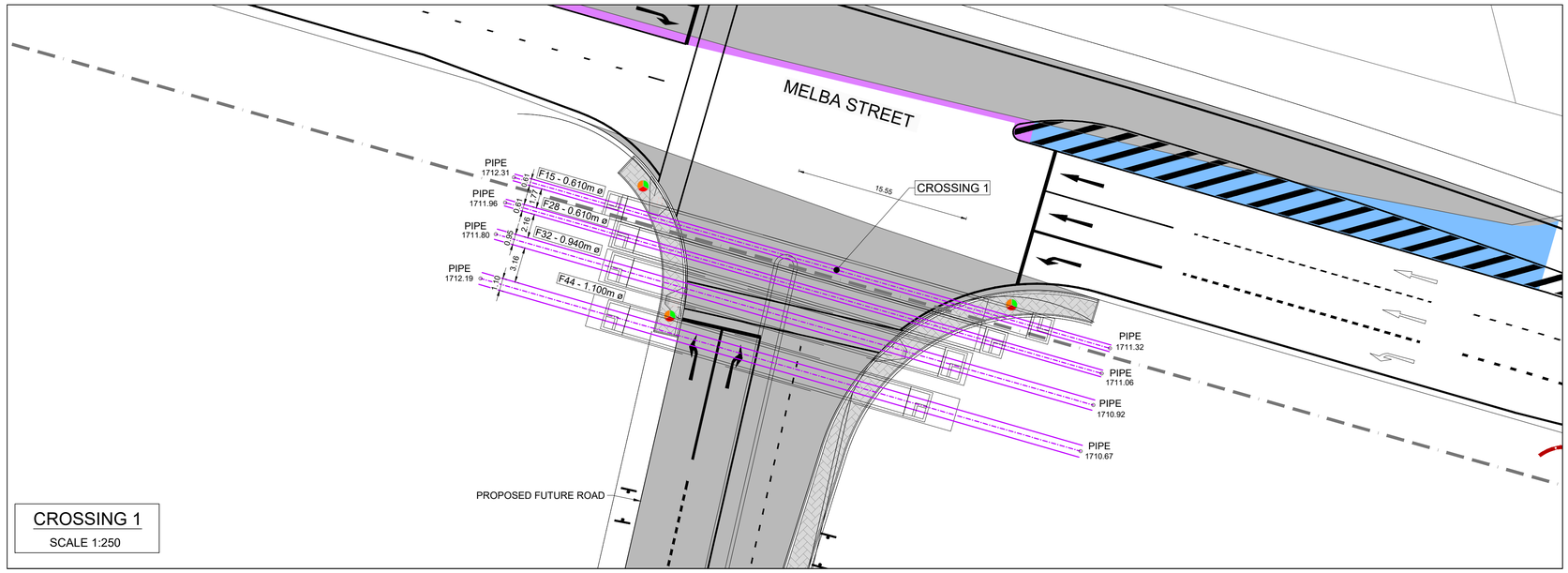


Remarks: DCP info for same section and initial layers

Annexure D – Construction Drawings



LOCALITY PLAN
N.T.S



CROSSING 1
SCALE 1:250

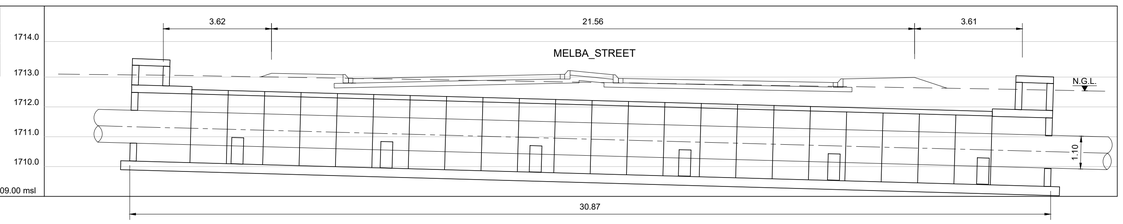
LEGEND:
- EX. CONTOURS
- BENCHMARK
- ERF BOUNDARY
- PHASING BOUNDARY
- 1:50YR FLOODLINE
- 1:100YR FLOODLINE
- NEW ROADS
- NEW STORMWATER
- NEW SEWER
- NEW WATER
- EXIST RANDWATER

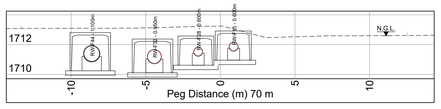
LEGEND:
- SITE BOUNDARY
- NEW SEWER PIPE
- NEW SEWER MANHOLE

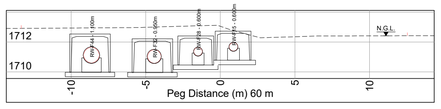
NOTES: CONTACT NUMBERS
1. RAND WATER DISTRICT SUPERINTENDENT T.B.C.
2. RAND WATER SITE INSPECTOR T.B.C.
3. RAND WATER ELECTROLYSIS SECTION (011 682 0239 OR 011 682 0240)

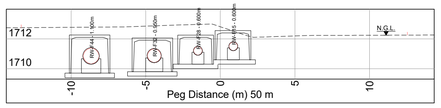
COORDINATE DATA		
REF	Y	X
F44-1	-80285.758	2896350.067
F44-2	-80339.430	2896365.502

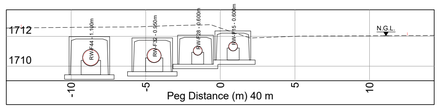
RW-F44
SCALE : Vert 1 :100
Hor 1 :100
DATUM : 1709.00 msl

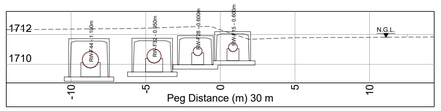












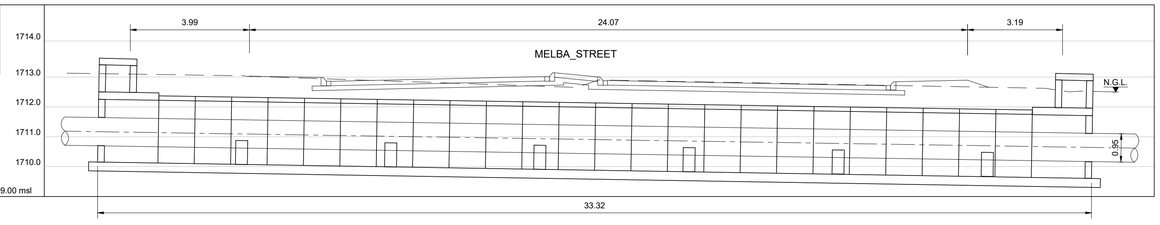
CROSS SECTION 1

RAND WATER PIPES: F15 (0.600mø), F28 (0.500mø), F32 (0.950mø), F44 (1.100m 0248)

SCALE 1: 250

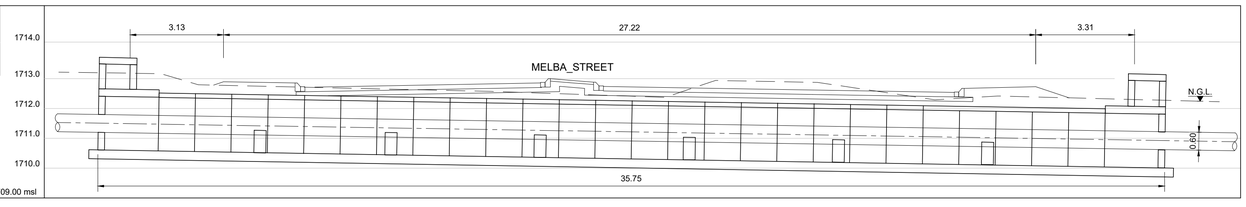
COORDINATE DATA		
REF	Y	X
F32-1	-80287.130	2896346.114
F32-2	-80340.567	2896361.380

RW-F32
SCALE : Vert 1 :100
Hor 1 :100
DATUM : 1709.00 msl



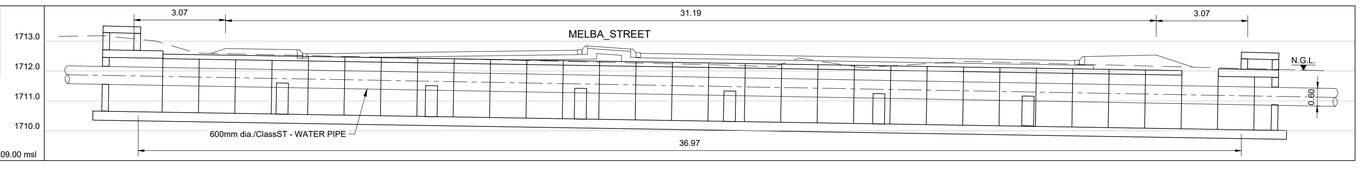
COORDINATE DATA		
REF	Y	X
F28-1	-80287.974	2896343.297
F28-2	-80341.315	2896358.560

RW-F28
SCALE : Vert 1 :100
Hor 1 :100
DATUM : 1709.00 msl



COORDINATE DATA		
REF	Y	X
F15-1	-80288.757	2896341.046
F15-2	-80342.059	2896356.313

RW-F15
SCALE : Vert 1 :100
Hor 1 :100
DATUM : 1709.00 msl



LONGITUDINAL SECTIONS:

RAND WATER PIPES: F15 (0.600mø), F28 (0.500mø), F32 (0.950mø), F44 (1.100m 0248)

DATE	NO	REVISION
03-02-2025	A	ISSUED FOR APPROVAL

CLIENT

Trendville Investments (Pty) Ltd
P O Box 12169, Clubview, 0014
Sokatumi Estate, Leyden Avenue, Clubview
Tel: 012 654 6330 Fax: 012 654 6731

Civil Concepts (Pty) Ltd
Consulting Civil & Structural Engineers
PO Box 36148, Menlo Park, 0102
Office: +27 12 460 0008
www.civilconcepts.co.za

PROJECT

KAGISO EXT. 17 to 26

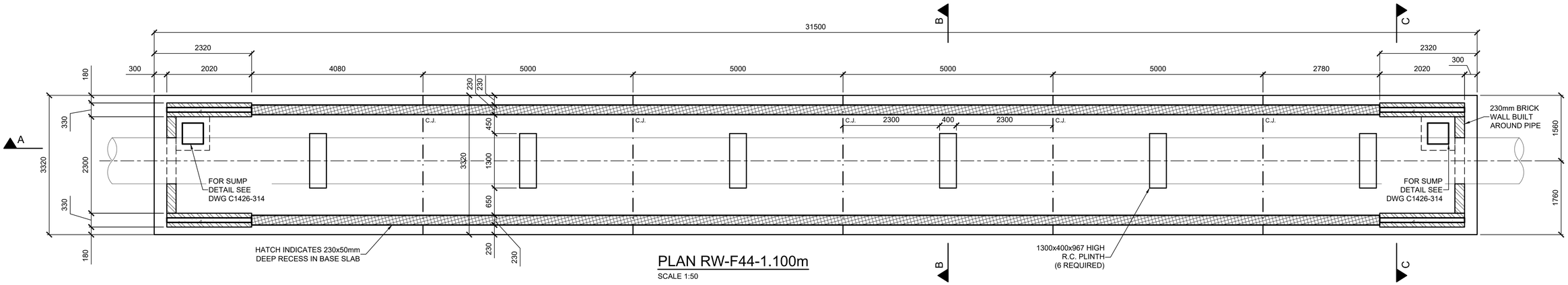
DRAWING TITLE

SEWER MASTER PLAN

DRAWING NO
C1426-RW-001

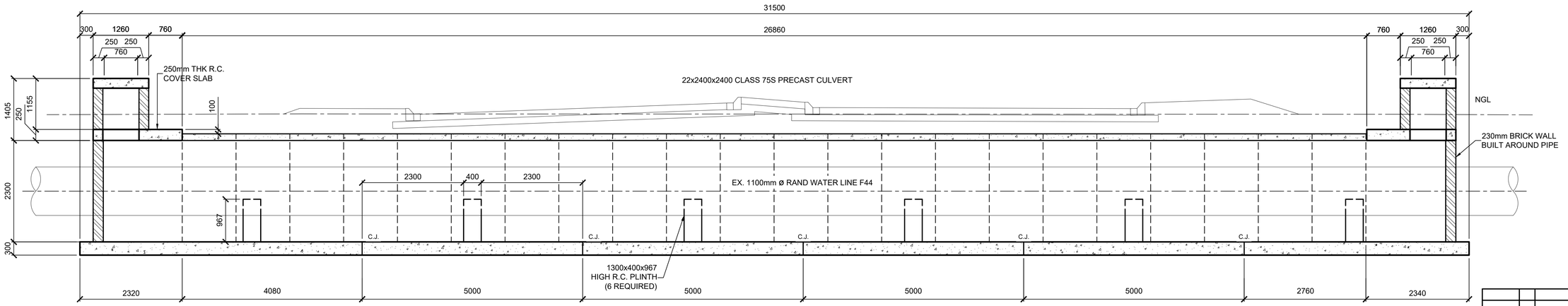
REV.NO.	A									

SCALE	1 : 2000	DESIGNED	W. STANDER
		DRAWN	R. WILLERS
DATE	MARCH 2025	CHECKED	W. STANDER



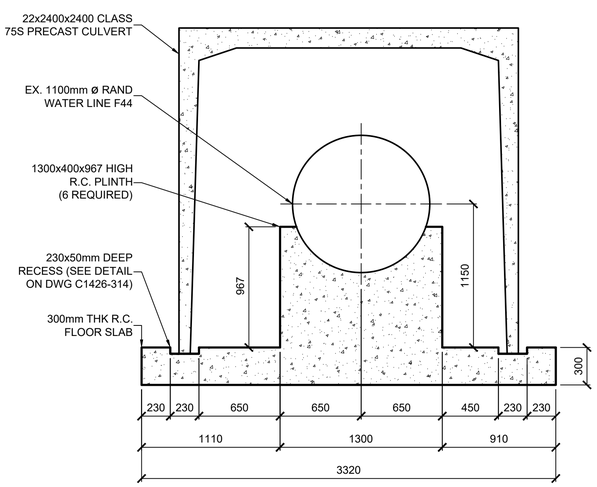
PLAN RW-F44-1.100m

SCALE 1:50



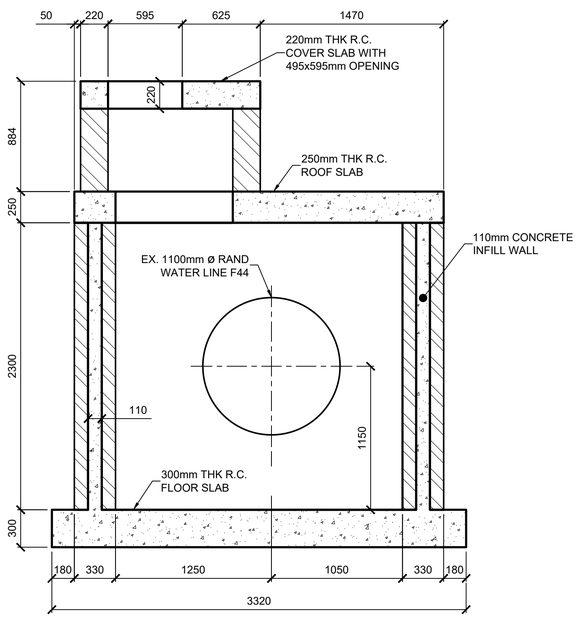
LONGINTUNAL SECTION A-A RW-F44-1.100m

SCALE 1:50



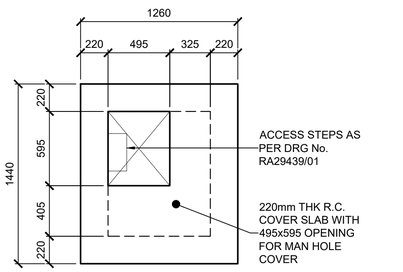
SECTION B-B RW-F44-1.100m

SCALE 1:25



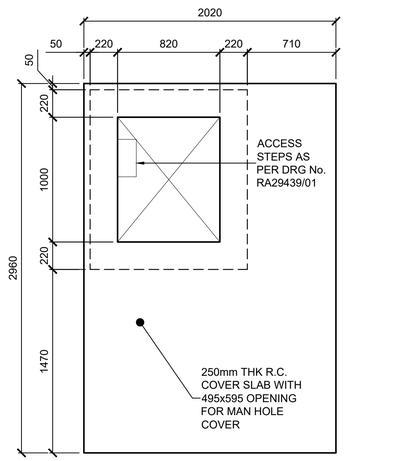
SECTION C-C RW-F44-1.100m

SCALE 1:25



220mm COVER SLAB LAYOUT

SCALE 1:25



250mm COVER SLAB LAYOUT

SCALE 1:25

11/07/2025	A	ISSUED FOR APPROVAL
DATE	NO	REVISION

CLIENT

CIVIL CONCEPTS
Consulting Civil and Structural Engineers

RAADGEWENDE SIVIELE & BOUKUNDIGE INGENIEURS
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P.O. Box 36148
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Tel (012) 460-0008
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PROJECT

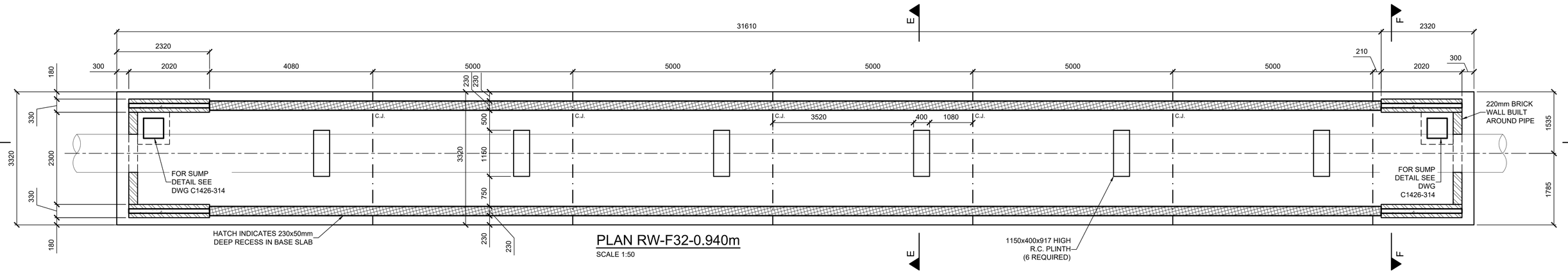
RAND WATER CULVERT

DRAWING TITLE

RW-F44-1.100m CONCRETE LAYOUT

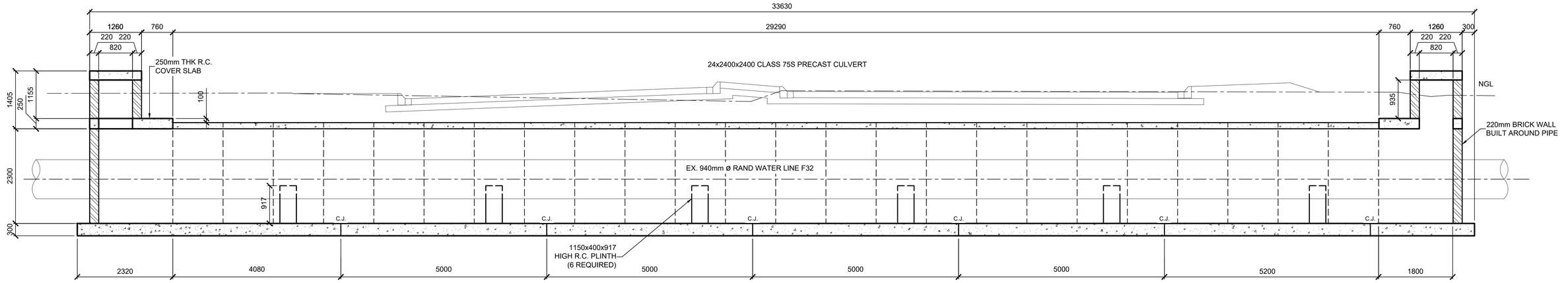
DRAWING NO. C1426-310

REV.NO.	A		
SCALE :	AS SHOWN	DESIGNED :	A. VAN WYK
SHEET :	A1	DRAWN :	S. BOSCH
DATE :	JULY 2025	CHECKED :	T. S. KRUGER



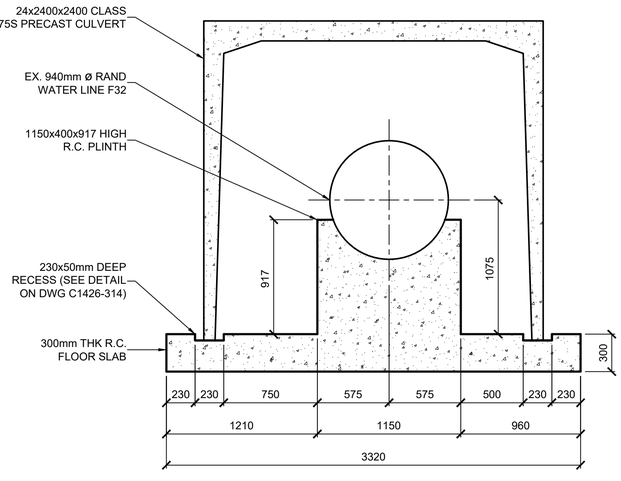
PLAN RW-F32-0.940m

SCALE 1:50



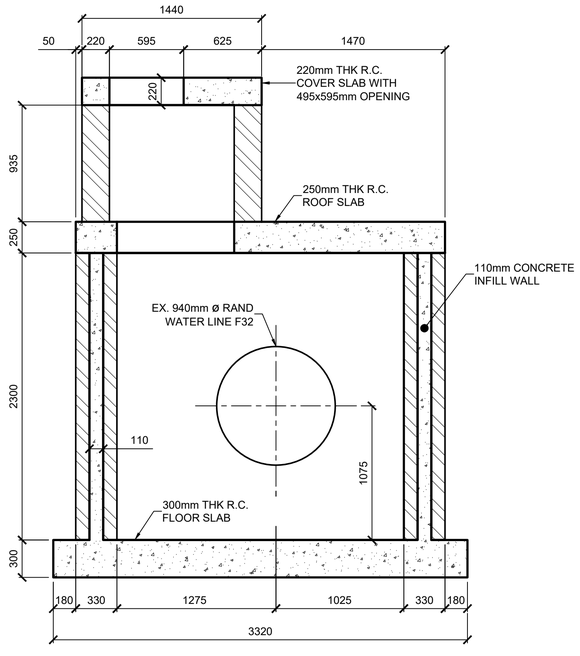
LONGINTUNAL SECTION D-D RW-F32-0.940m

SCALE 1:50



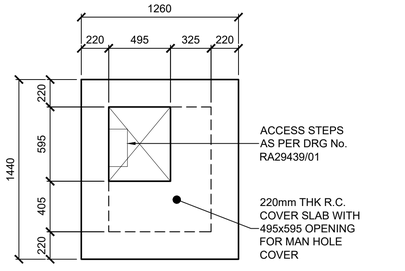
SECTION E-E RW-F32-0.940m

SCALE 1:25



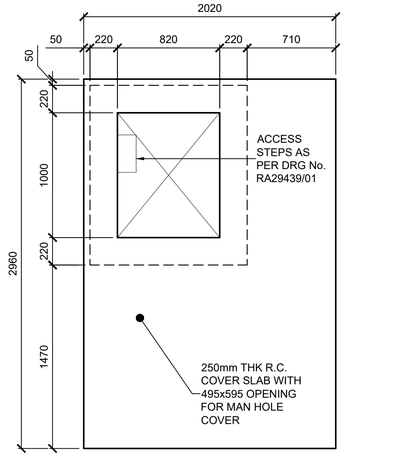
SECTION F-F RW-F32-0.940m

SCALE 1:25



220mm COVER SLAB LAYOUT

SCALE 1:25



250mm COVER SLAB LAYOUT

SCALE 1:25

DATE	NO	REVISION
11/07/2025	A	ISSUED FOR APPROVAL

CLIENT

CIVIL CONCEPTS
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Fax (012) 460-0005

PROJECT

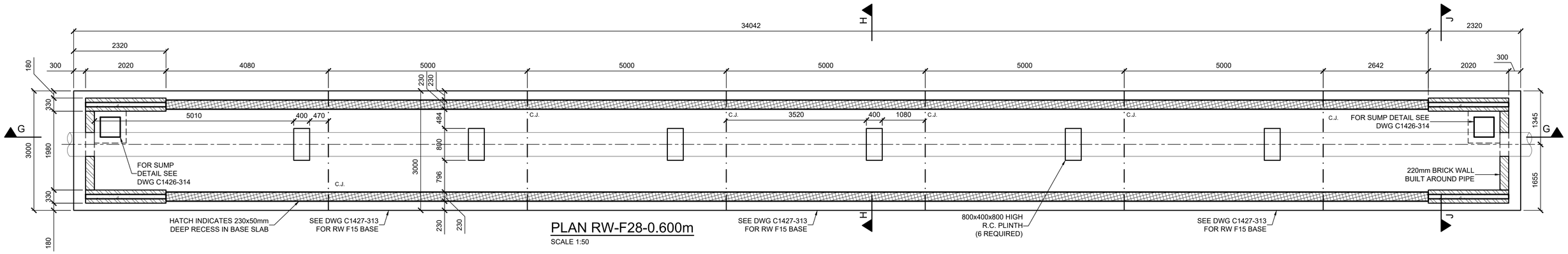
RAND WATER CULVERT

DRAWING TITLE

RW-F32-0.940m CONCRETE LAYOUT

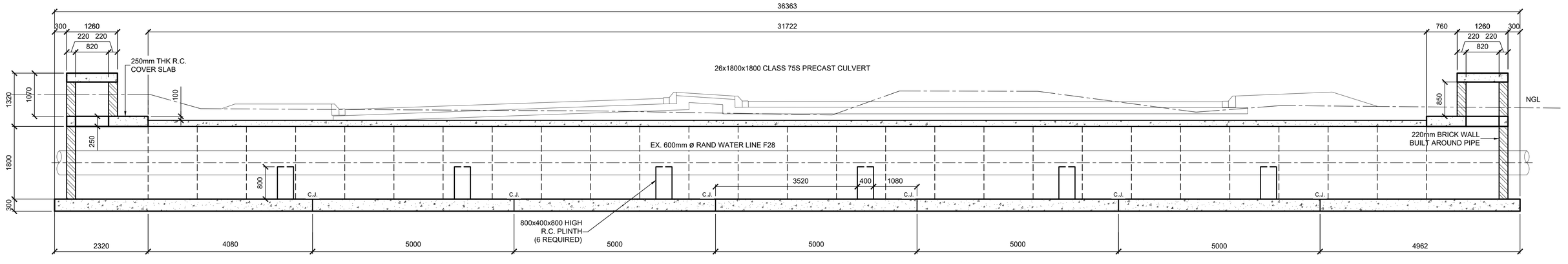
DRAWING NO. C1426-311

REV.NO.	A		
SCALE :	AS SHOWN	DESIGNED :	A. VAN WYK
SHEET :	A1	DRAWN :	S. BOSCH
DATE :	JULY 2025	CHECKED :	T. S. KRUGER



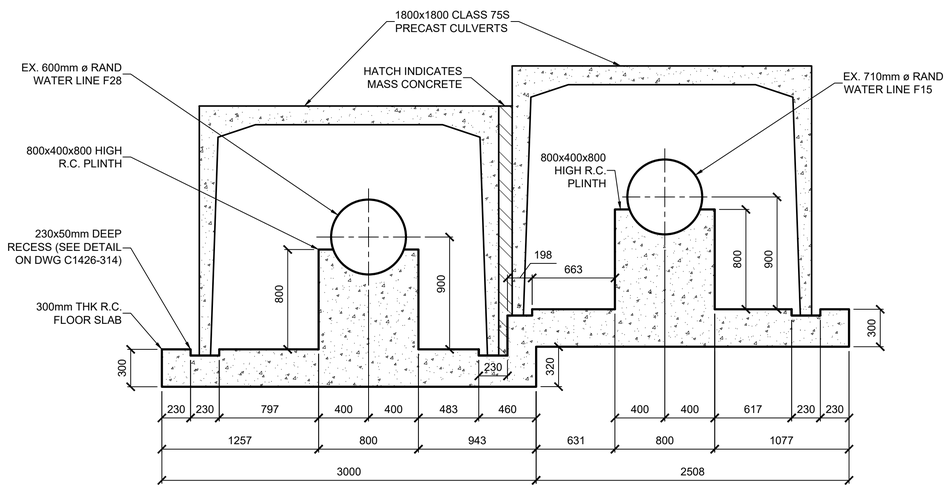
PLAN RW-F28-0.600m

SCALE 1:50



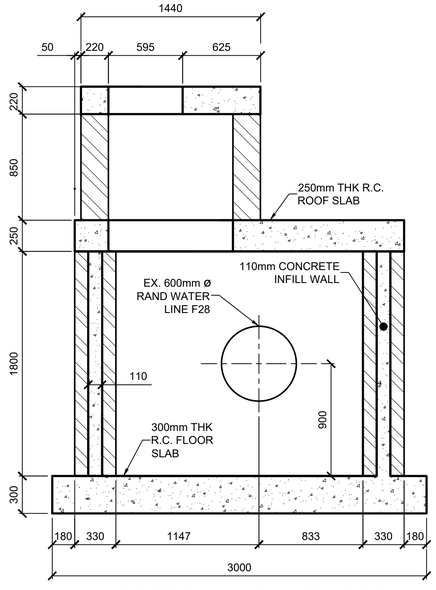
LONGINTUNAL SECTION G-G RW-F28-0.600m

SCALE 1:50



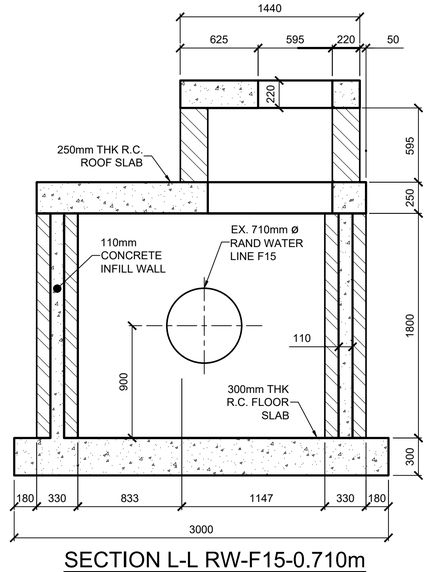
SECTION H-H RW-F28-0.600m AND RW-F15-0.710m

SCALE 1:25



SECTION J-J RW-F28-0.600m

SCALE 1:25



SECTION L-L RW-F15-0.710m

SCALE 1:25

11/07/2025	A	ISSUED FOR APPROVAL
DATE	NO	REVISION

CLIENT

CIVIL CONCEPTS
Consulting Civil and Structural Engineers
RAADGEWENDE SIVIELE & BOUKUNDIGE INGENIEURS
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PROJECT

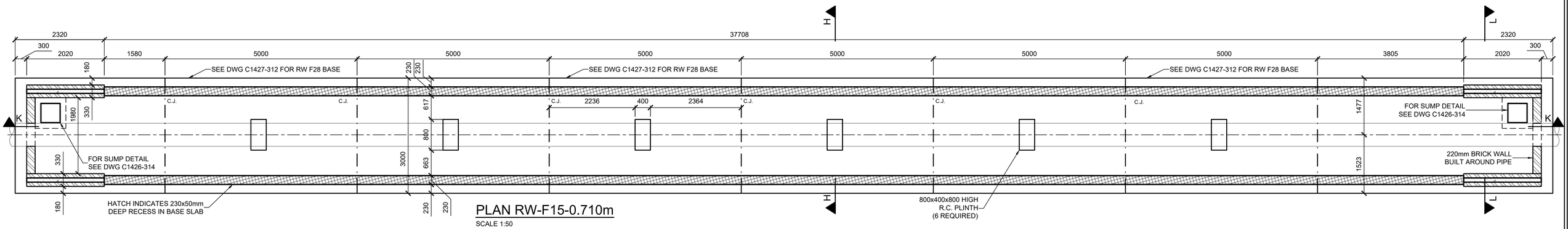
RAND WATER CULVERT

DRAWING TITLE

RW-F28-0.600m CONCRETE LAYOUT

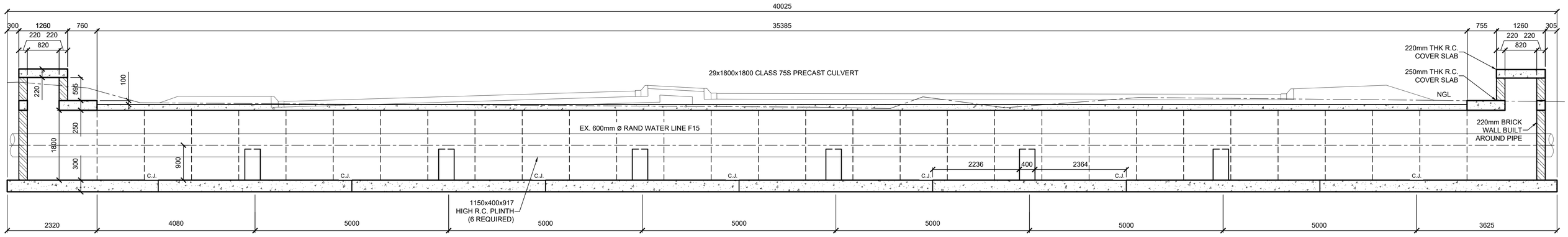
DRAWING NO. C1426-312

REV.NO.	A		
SCALE :	AS SHOWN	DESIGNED :	A. VAN WYK
SHEET :	A1	DRAWN :	S. BOSCH
DATE :	JULY 2025	CHECKED :	T. S. KRUGER



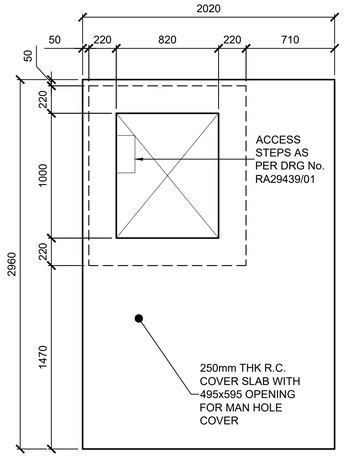
PLAN RW-F15-0.710m

SCALE 1:50



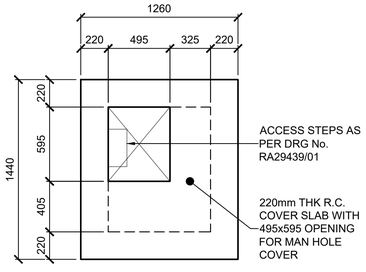
LONGINTUNAL SECTION K-K RW-F15-0.710m

SCALE 1:50



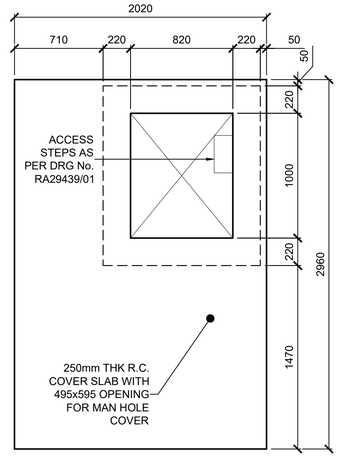
250mm COVER SLAB LAYOUT RW-F28-0.600m

SCALE 1:25



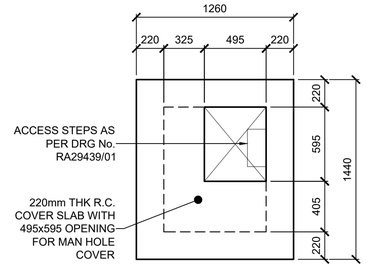
220mm COVER SLAB LAYOUT RW-F28-0.600m

SCALE 1:25



250mm COVER SLAB LAYOUT RW-F15-0.710m

SCALE 1:25



220mm COVER SLAB LAYOUT RW-F15-0.710m

SCALE 1:25

DATE	NO	REVISION
11/07/2025	A	ISSUED FOR APPROVAL

CLIENT

CIVIL CONCEPTS
Consulting Civil and Structural Engineers

RAADGEWENDE SIVIELE & BOUKUNDIGE INGENIEURS
CONSULTING CIVIL & STRUCTURAL ENGINEERS

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PROJECT

RAND WATER CULVERT

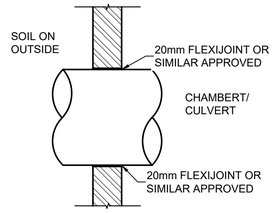
DRAWING TITLE

RW-F15-0.710m CONCRETE LAYOUT

DRAWING NO. C1426-313

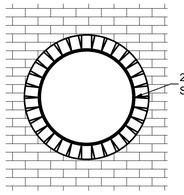
REV.NO. A

SCALE : AS SHOWN	DESIGNED : A. VAN WYK
SHEET : A1	DRAWN : S. BOSCH
DATE : JULY 2025	CHECKED : T. S. KRUGER



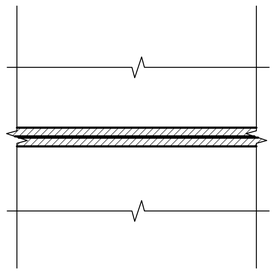
BRICK END WALL TYPICAL SECTION

SCALE 1:25



BRICK END WALL AT EXSTING PIPES

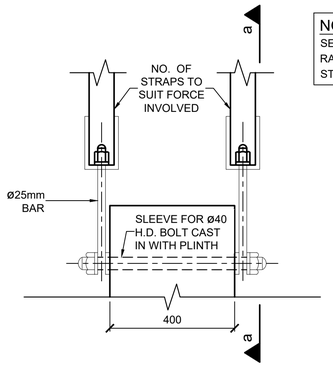
SCALE 1:25



CULVERT JOINT SEALANT DETAIL

SCALE 1:25

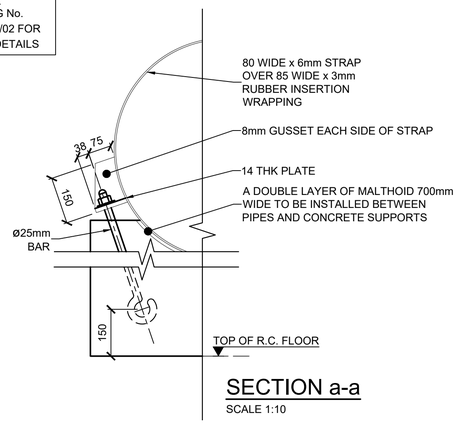
NOTE:
REFER TO DWG C1426 - 315
FORCONSTRUCTION METHOD



NOTE:
SEE DRG No.
RA29439/02 FOR
STRAP DETAILS

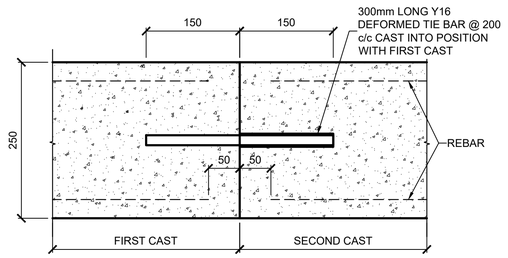
PIPE STRAP DETAIL

SCALE 1:10



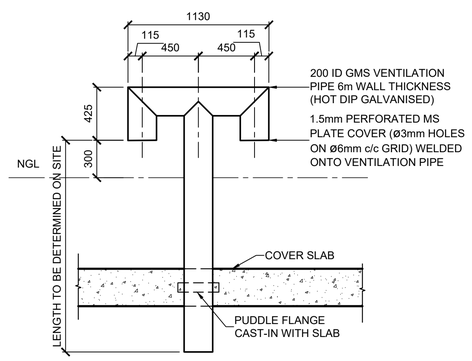
SECTION a-a

SCALE 1:10



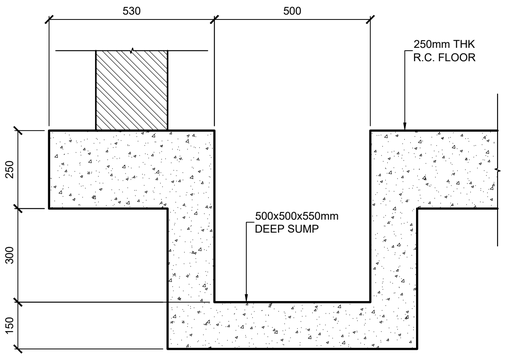
CONSTRUCTION JOINT DETAIL

SCALE 1:5



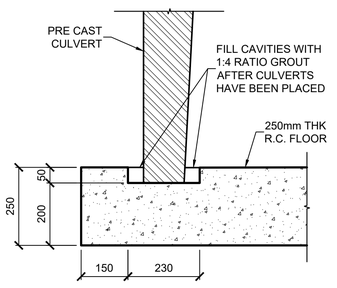
TYPICAL AIR VENTILATION PIPE

SCALE 1:25



TYPICAL SUMP DETAIL

SCALE 1:10



TYPICAL RECESS DETAIL

SCALE 1:10

LOAD BEARING BRICKWORK

1. STRUCTURAL BRICKWORK TO BE CARRIED OUT IN ACCORDANCE WITH SANS 10164 AND WHERE APPLICABLE, STANDARD DEPARTMENTAL SPECIFICATIONS.
2. MORTAR FOR STRUCTURAL BRICKWORK: CLASS 1 (10 MPa) SANS 10164 PART 1
3. BRICKS FOR STRUCTURAL APPLICATIONS MUST HAVE A NOMINAL COMPRESSIVE STRENGTH OF 10 MPa.
4. MANUFACTURING CONTROL FOR STRUCTURAL BRICKWORK MATERIALS MUST BE CATEGORY A (SANS 10164 PART 1)
5. CONSTRUCTION CONTROL OF BRICKWORK MUST BE CATEGORY 1 (SANS 10164 PART 1)
6. VERTICAL TWIST TYPE GALVANISED WALL TIES ACCORDING TO SANS 0164 PART 1, ARE TO BE PLACED AT MINIMUM 5 PER SQ METER IN ALL WALLS.
7. VERTICAL TWIST TYPE GALVANISED WALL TIE ACCORDING TO SANS 0164 PART 1 ARE TO BE PLACED AT MINIMUM 10 PER m² IN THE TOP FIVE LAYERS BENEATH SLABS OF ALL LOAD BEARING CAVITY WALLS.
8. BRICK FORCE TO BE PLACED IN EVERY THIRD LAYER OFF ALL LOAD BEARING BRICKWORK. (SEE BRICKWORK NOTES)
   - MINIMUM DIAMETER OF BRICKFORCE = 2.8mm
   - YIELD STRENGTH = 400mm MIN
   - LAP LENGTH = 400mm MIN
9. THE TOP LOAD BEARING BRICKWORK MUST BE LEVELED WITH A 1:4 CEMENT AND SAND MORTAR, AND STEEL TOWELED.
10. BEARINGS AS DETAILED MUST BE PROVIDED BETWEEN REINFORCED CONCRETE MEMBERS AND BRICKWORK.
11. LAYOUT OF ALL BRICKWALLS TO ARCHITECTS DRAWINGS.
12. PLACE 10mm SOFTBOARD ON TOP OF ALL NON-LOAD BEAING WALLS

BRICKWORK NOTES

1. OPENINGS IN LOAD-BEARING WALLS TO BE SPANNED BY PRESTRESSED LINTELS SUPPLIED BY BUILDER (U.N.O). MINIMUM 300mm SUPPORT ON LOAD BEARING WALLS.
2. ALL NON-LOAD BEARING BRICKWORK TO RECEIVE JOINTEX OR SOFTBOARD BETWEEN SLAB SOFFIT AND TOP OF WALLS.
3. PLASTER JOINT BETWEEN SLABS/COLS & BRICKWORK TO BE CUT THROUGH THE PLASTER TO CREATE A CLEAR MOVEMENT JOINT.
4. JOINTEX/SOFTBOARD TO BE INSTALLED BETWEEN COLS & BRICKWORK.
5. 2mm BRICKFORCE TO BE PLACED IN BRICKWALLS EVERY:
   - 5.1 BRICK COURSE IN FOUNDATION WALLS.
   - 5.2 BRICK COURSE IN INTERNAL WALLS FOR THE FIRST 3 BRICK COURSES, THEN EVERY FIFTH BRICK COURSE.
   - 5.3 THIRD BRICK COURSE FOR EXTERNAL BRICK COURSES.
   - 5.4 BRICK COURSE FOR THE LAST 4 BRICK COURSES BELOW ROOF LEVEL.
   - 5.5 BRICK COURSE FOR 5 COURSES BELOW ALL WINDOWS AND 5 COURSES ABOVE WINDOWS AND DOORS - TO EXTEND 800mm ON BOTH SIDES OF OPENINGS.
6. NO BRICKWORK TO CONTINUE OVER STRUCTURAL EXPANSION JOINTS.
7. WALL STIFFENERS / LATERAL SUPPORT TO BE PROVIDED AT A MINIMUM:
   - 7.1 5m c/c FOR 230mm WALLS OR WIDER (U.N.O).
   - 7.2 3m c/c FOR 110mm WALLS (U.N.O)
8. ENGINEER TO BE CONSULTED WITH REGARDS TO ADDITIONAL BRICKWORK REQUIREMENTS.

GENERAL NOTES

1. DRAWINGS NOT TO BE SCALED. DIMENSIONS ARE AS INDICATED OR MUST BE DEDUCED FROM INFORMATION SUPPLIED.
2. DRAWINGS MUST BE READ IN CONJUNCTION WITH THOSE OF THE ARCHITECT TO COMPARE DIMENSIONS, DETAILS, OPENINGS AND SLEEVES. DISCREPANCIES MUST BE REPORTED TO THE ARCHITECT/ENGINEER FOR A RULING PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. ALL MATERIAL & WORKMANSHIP MUST COMPLY WITH THE LATEST REVISED EDITIONS OF THE APPLICABLE SANS/SABS SPECIFICATIONS & CODES OF PRACTICE AND IN PARTICULAR WITH THE FOLLOWING STANDARD SPECIFICATIONS:
   SANS 2001-BE1: - EARTHWORKS
   SANS 2001-DP1: - EARTHWORKS FOR BURIED PIPELINES AND PREFABRICATED CULVERTS
   SANS 2001-CC1: - CONCRETE (STRUCTURAL)
   SANS 2001-CS1: - STRUCTURAL STEELWORK
4. NO CONCRETE MAY BE CAST WITHOUT THE PRIOR WRITTEN APPROVAL OF THE EXCAVATIONS AND THE REINFORCEMENT BY THE ENGINEER.
5. WRITTEN APPROVAL MUST BE OBTAINED FROM THE ENGINEER TO USE READY MIXED CONCRETE, TO PUMP CONCRETE, TO USE ADMIXTURES OR TO USE ANY CEMENT OTHER THAN COMMENT CEMENTS TO SANS 50197-1.
6. BUILDING TOLERANCES WITH RESPECT TO CONCRETE WORK WITH SABS SANS 2001-CC1: (TABLE 11) WITH A GRADE II DEGREE OF ACCURACY, UNLESS OTHERWISE SHOWN.
7. FORMWORK TO BE RIGIDLY CONSTRUCTED TO THE EXACT DIMENSIONS OF CONCRETE MEMBERS. UNLESS OTHERWISE SHOWN, SOFFITS OF BEAMS AND SLABS MUST HAVE A POSITIVE CAMBER OF 1,5 mm FOR EACH 1 m OF SPAN.
8. ALL CONCRETE TO ATTAIN THE MINIMUM CUBE STRENGTHS AT 28 DAYS WITH THE AGGREGATE SIZES AS DETAILED BELOW, ALL IN ACCORDANCE WITH SANS 2001-CC1:

SURFACE BEDS	30/19
SLABS	30/19

9. PROVIDE A 50 mm BLINDING LAYER UNDER ALL REINFORCED CONCRETE FOUNDATIONS (IF NECESSARY).
10. REINFORCEMENT MUST BE SECURELY FIXED IN THE CORRECT POSITIONS SUCH THAT DISPLACEMENT DOES NOT OCCUR DURING CASTING OF CONCRETE. ALL CONCRETE, UNLESS OTHERWISE SPECIFIED, MUST BE COMPACTED TO SANS 2001-CC1: CLAUSE 4.7.11.
11. CONSTRUCTION JOINT POSITIONS TO BE APPROVED BY THE ENGINEER PRIOR TO CASTING.
12. BRICK WALLS SHOWN SHADED ON THE DRAWINGS ARE LOAD BEARING AND MUST BE BUILT TO SOFFIT LEVEL BEFORE CONCRETE IS CAST. PROVIDE ONE LAYER BRICK FORCE IN EVERY FIVE BRICK COURSES. BEARINGS AS DETAILED MUST BE PROVIDED BETWEEN REINFORCED CONCRETE MEMBERS AND BRICKWORK.
13. IN THE EVENT OF CONFLICT BETWEEN THE VARIOUS SPECIFICATIONS, THE CONSECUTIVE ORDER OF THE SPECIFICATIONS LISTED IN THE FOLLOWING
    LIST SHALL TAKE PRECEDENCE:
    A. ENGINEERS DETAILED DRAWINGS
    B. PROJECT AND/OR ADDITIONAL SPECIFICATIONS
    C. STANDARD SPECIFICATIONS SANS 2001
    D. QUANTITY SURVEYORS PREAMBLES (BILL OF QUANTITIES)
14. THE DESIGN CODES ARE : (WHERE APPLICABLE)
    A. SANS 10160 - BASIS OF STRUCTURAL DESIGN AND ACTIONS FOR BUILDINGS
    B. SANS 10161 - FOUNDATIONS
    C. SANS 10162 - STRUCTURAL STEEL
    D. SANS 10163 - STRUCTURAL TIMBER
    E. SANS 10164 - STRUCTURAL MASONRY
    G. SABS 10100 - STRUCTURAL USE OF CONCRETE
15. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN, MAINTANANCE AND SAFETY OF ALL TEMPORARY WORKS.
16. CONTRACTOR IS TO ENSURE SAFETY OF ALL EXCAVATIONS BY PROVIDING ADEQUATE SUPPORT TO ALL SIDES OF EXCAVATIONS DURING CONSTRUCTION.
17. CASTING CONCRETE IN EXCESS OF 3,5m HIGH IS NOT PERMITTED WITHOUT PRIOR APPROVAL OF THE ENGINEER.

DATE	NO	REVISION
11/07/2025	A	ISSUED FOR APPROVAL

CLIENT

RAADGEWENDE SIVIELE & BOUKUNDIGE INGENIEURS
CONSULTING CIVIL & STRUCTURAL ENGINEERS
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P.O. Box 36148
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PROJECT

RAND WATER CULVERT

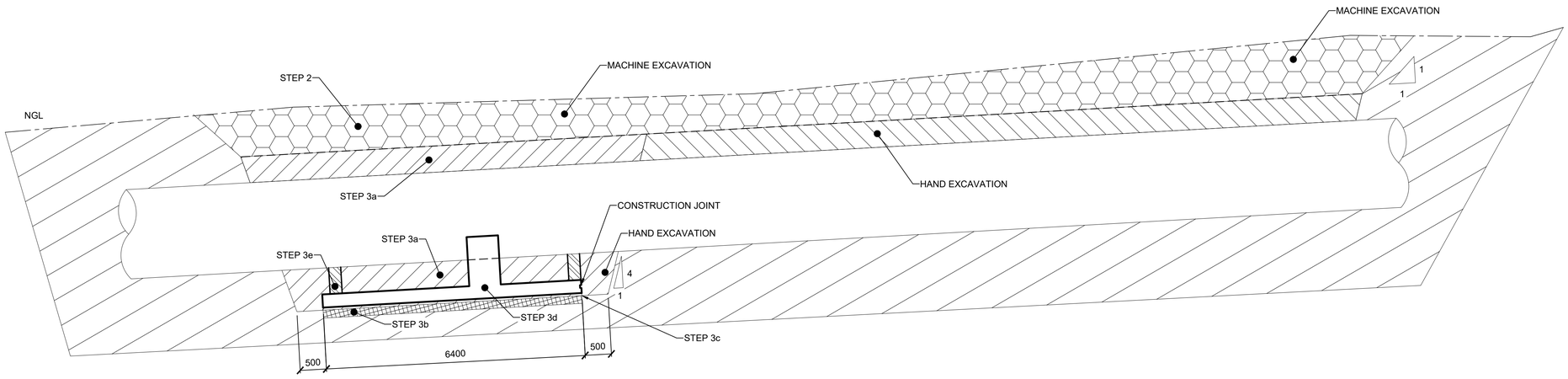
DRAWING TITLE

TYPICAL SECTIONS AND DETAILS

DRAWING NO.

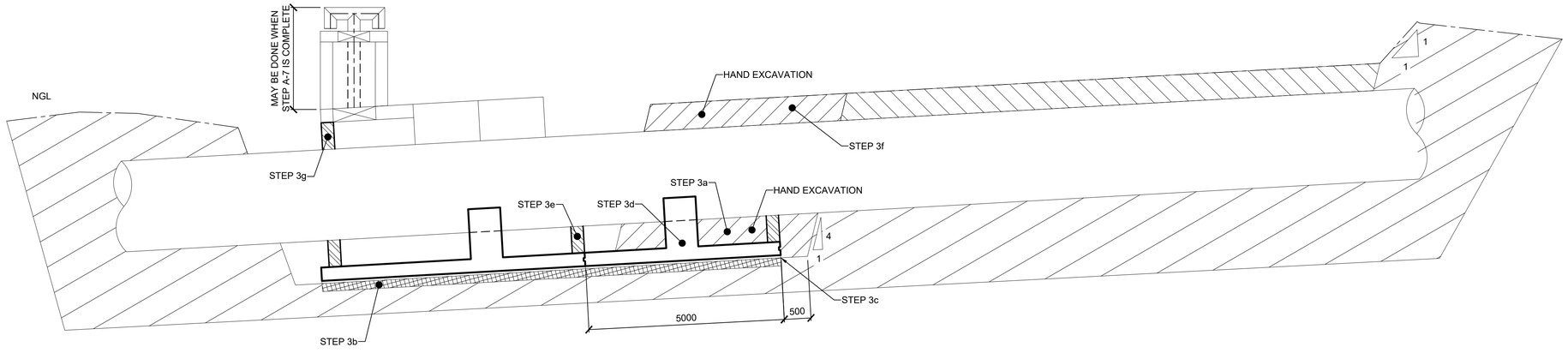
C1426-314

REV.NO.	A
SCALE : AS SHOWN	DESIGNED : A. VAN WYK
SHEET : A1	DRAWN : S. BOSCH
DATE : JULY 2025	CHECKED : T. S. KRUGER



CONSTRUCTION METHOD STEPS 1 - 3

N.T.C.



CONSTRUCTION METHOD SEQUENTIAL REPETITION OF STEPS 1 - 3

N.T.C.

METHODOLOGY FOR EXCAVATION AROUND EXISTING RAND WATER PIPES AND INSTALLING NEW FLOORS AND PLINTHS BENEATH SUCH PIPES

The following procedure must be followed when executing work to install new reinforced concrete floors and plinths beneath existing Rand Water pipes. Care must be taken at all times to ensure that no damage is inflicted on existing Rand Water pipes. Under no circumstances are exposed pipes to span more than 4000 mm.

STEP 1	Identify the area (width and length) in which the new reinforced concrete floors, plinths and culverts are to be installed. Hand excavate a 1000mm X 1000mm section over the existing pipe on the two far ends of each pipe in the area identified so as to determine the depth of the pipe on each side.The depth so determined is to be communicated to the engineer for verification and approval. Work may only commence when the engineer has received and approved the depth and level of the existing pipe.
STEP 2	On approval of the depths, machine excavate the ground over the entire area identified in Step 1 to a level of 500mm above the shallowest pipe as verified and approved by the engineer. The sides of the excavation are to be at a 1:1 slope.
STEP 3	Commence work at the lowest end of the existing pipes and execute the following steps sequentially between construction joints until the highest point of the existing pipe is reached:
3a)	Hand excavate the ground around the existing pipe at a slope of 1:4 to achieve the working space below and next to the existing pipe indicated on the relevant drawing;
3b)	Rip and recompact a 150mm layer of the in-situ material at the bottom of the excavation to 93% Maximum Dry Density (MDD) AASHTO density. The engineer is to verify the founding conditions before reinforcement is fixed and concrete cast
3c)	Cast a 50mm thick blinding layer of 10 MPa
3d)	Fix the reinforcement and wrap all pipes with a double layer of malthoid at each plinth position. Upon instruction to cast, cast the concrete of the first section of the new floor and the first plinth as per detail
3e)	Build a brick support on each end of the newly installed floor to support the pipe
3f)	Allow 7 days for curing of the concrete before excavating below and exposing the bottom of the existing pipe in the next section to receive a floor and plinth. Excavation at the top and sides of the next section may be hand excavated
3g)	The pre-cast culverts may be placed and the brickwork constructed when steps '3e' and '3f' are completed
STEP 4:	Backfill to future roadbed level with minimum G6 material (backfill specification by others) once step 3 has been completed over the entire length of the proposed culvert

DATE	NO	REVISION
11/07/2025	A	ISSUED FOR APPROVAL

CLIENT

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PROJECT

RAND WATER CULVERT

DRAWING TITLE

RAND WATER CROSSING CONSTRUCTION METHOD

DRAWING NO. C1426-315

REV.NO.	A		
SCALE :	AS SHOWN	DESIGNED :	A. VAN WYK
SHEET :	A1	DRAWN :	S. BOSCH
DATE :	JULY 2025	CHECKED :	T. S. KRUGER