CIVIL ENGINEERING SERVICES REPORT FOR THE CONSTRUCTION OF WATER, SEWER, ROADS AND STORMWATER SYSTEMS AT THE PROPOSED FILLING STATION ON ERF 425 & 426, PIENAARSRIVIER

Report Number :	2161/02
Revision Number :	0
Date :	AUGUST 2021
Design Engineer :	J JANSEN VAN RENSBURG
Project Leader :	J JANSEN VAN RENSBURG

APPROVED FOR RELEASE

..... 11 November 2021

SIGNATURE **DATE**

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VIP CONSULTING ENGINEERS (Pty) Ltd

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1. INTRODUCTION

1.1 TERMS OF REFERENCE

VIP Consulting Engineers (Pty) Ltd has been appointed by MDV Developments as Consulting Civil Engineers for the planning of water and sewer connections for the proposed Filling station on Erf 425 & 426, Pienaarsrivier.

The appointment and this report includes :

- Civil engineering services report
- Floodline Certification (no floodline)
- Stormwater management plan

1.2 DEVELOPER

The developer of the proposed Filling station is MDV Developments.

The information of the developer is as follows :

Physical address: Block C, Ground Floor, Newlands Office Park
261 Lois Ave
PRETORIA
0049

Postal address: Post Net Suit 86, Private Bag X4
Wierda Park
CENTURION
0149

Telephone number: (012) 653 8080

E-mail: antonv@mdvdevelopments.co.za

The appointment letter is attached in **Annexure A.**

The contact person for the Client is Mr Anton van Vuuren

1.3 LOCALITY AND EXTENT

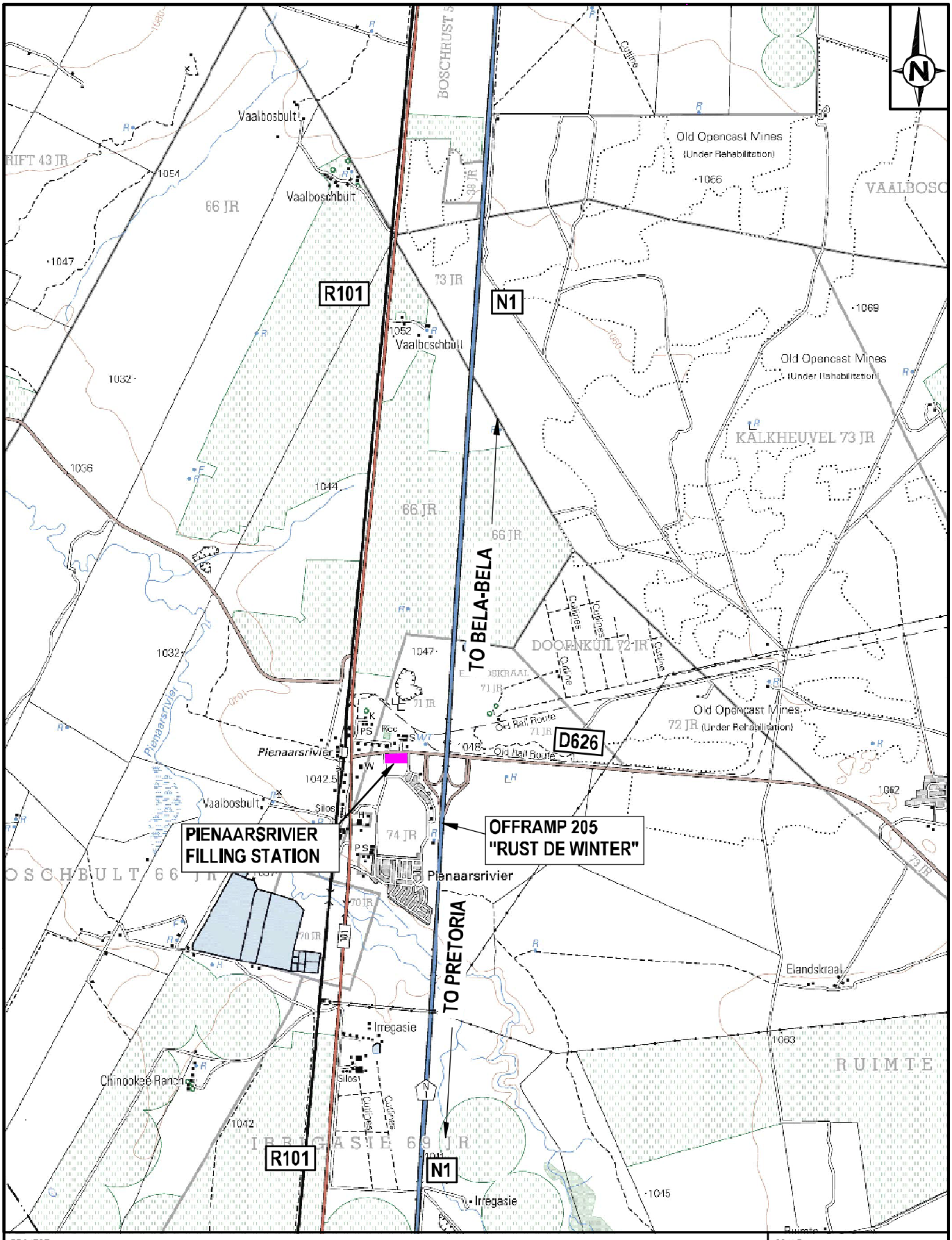
The proposed site is situated on Erf 425 & 426, Pienaarsrivier, approximately 25km South of Bela-Bela right next to the N1 highway. Access to the site is via the D626 (Offramp number 205 – Rust de Winter) which intersects with the N1 highway. The GPS co-ordinates to the entrance of the site are: S - 25°12'18'' E- 28°17'59''.

The locality of the proposed development is shown on **Figure 1.**

1.4 LOCAL AUTHORITY

The proposed development falls within the area of jurisdiction of the Bela-Bela Local Municipality.

The entire civil engineering infrastructure required for the proposed development will be installed to the required standards of the Bela-Bela Local Municipality.



PROJECT :

CIVIL ENGINEERING SERVICES FOR
ERVEN 425 & 426, PIENAARSRIVIER

SCALE :

1 : 50 000

SERVICE DETAIL :

LOCALITY PLAN

DRAWING No. :

FIGURE 1

2. PHYSICAL PROPERTIES

2.1 TOPOGRAPHY

The site is located at the southwestern extend of the Springbok flats and is generally characterised by a relatively flat landscape The site is rectangular in shape, with a flat downward slope of 1% towards the West. The Pienaars River is approximately 1,5 Km south of the site. The site is covered with short veld grass and some medium sized trees. It is currently not utilized for farming activities.

2.2 CLIMATE

The Pienaarsriver area generally has hot summer and cold winter temperatures. The Mean Annual Precipitation (MAP) is 507mm (Weather station Pienaarsrivier (SAWB nr. 0550522 W) from the TR102 data set) with high precipitation during the summer months. Frost is not common.

2.3 ENGINEERING GEOLOGY

2.3.1 Regional Geology

The 1:250 000 geological map, 2528 Pretoria 1978, as supplied by the Council of Geoscience, shows that the site is underlain by :

- do (Bright Pink) : Dolerite.

The surrounding areas are underlain by :

- P-TR (Light Green) : Multi-coloured siltstone, sandstone, marl, mudstone and shale, of the Irrigasie Formation, Karoo Sequence.
- Pe (Dark Green) : Shale, Shaly sandstone, grit, sandstone, conglomerate. Coal in places near base and top, of the Ecca Formation, Karoo Sequence.
- Tr (Light Pink) : Fine-grained sandstone, of the Clarens Formation, Karoo Sequence.

The geological map was overlaid on Google Earth to illustrate the expected geology of the site:

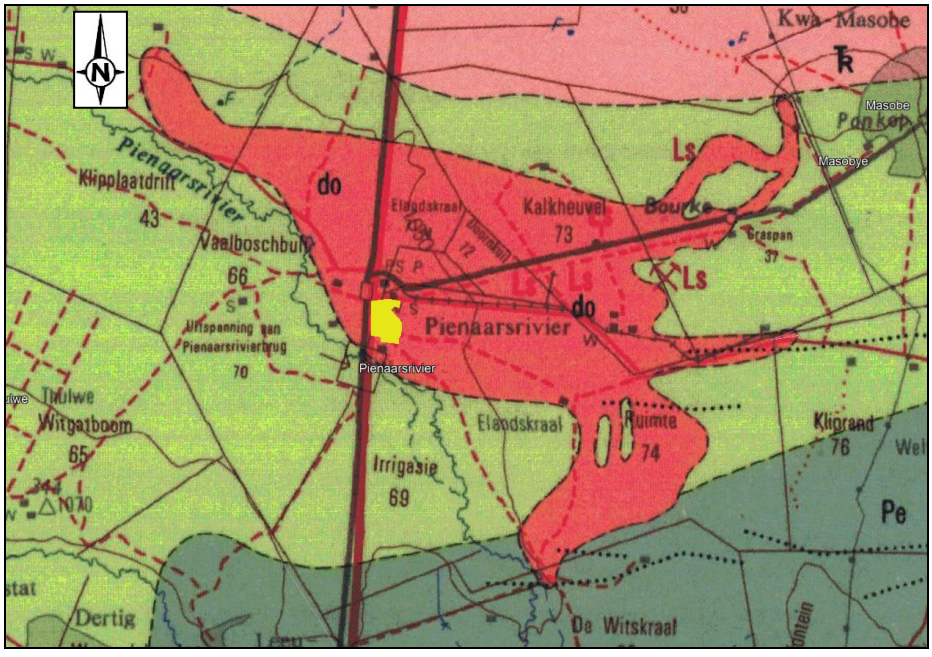


Figure 2: The 1 : 250 000 Geological Map of Pienaarsrivier, 2528 Pretoria.

A Geohydrological Study was conducted for this site by Accurate Trading 47 (Pty)Ltd and is attached in **Annexure C**.

"*The soil profile encountered in the monitoring borehole correlated well with the soil profiles and drilling done during the geotechnical investigation: The profile consists of up to 2m thick reworked residual dolerite, overlying a 8m thick zone with highly weathered weak rock dolerite. From 10m the staining on fractures in the dolerite indicated that the weathering grade increased to moderately weathered strong rock. A weak groundwater intersection was encountered at 17m on the contact with competent bedrock no other water strikes were encountered to 24m where the borehole was terminated.*"

The contractor will still be responsible to conduct investigations and analysis of road foundation material as requested by the engineer and as is necessary for the design of the pavement layers.

2.3.3 Water Table

During the geotechnical investigation "*The local perched water table associated with the bedrock contact occurred at 17m. The phreatic surface that developed in the borehole indicated a static water level of 4,57m below the collar of the monitoring borehole*."

3. INFRASTRUCTURE

3.1 WATER

The water supply would be via the existing Pienaarsrivier internal water reticulation. The water supply will be by means of a 90mm diameter uPVC class 9 water pipe connecting to the existing 90mm diameter uPVC class 9 water pipe on the southern boundary.

The proposed water network is shown on Drawing No 2161-A-AA-01 (**Annexure B**).

The proposed water details are shown on Drawing No 2161-B-AA-02 (**Annexure B**).

3.1.1 Water Demand

The water demand expressed as annual average daily demand (AADD) for the proposed development is estimated at 14.89 kℓ/day for all the facilities with an instantaneous peak demand of 0,266 l/s.

The determination of the annual average daily demand is shown in **Table 1**.

TABLE 1 : WATER DEMAND

LAND USE	QTY	UNIT	UNIT DEMAND (kℓ/100m²)	TOTAL (kℓ/day)
Garage / Filling Station	1241m²	12,41	1,2	14,89
Annual average daily demand				**14,89**
Peak Daily Demand (excl fire flow) (1.5 x AADD)				23,06

Based on a normal requirement of 48 hours AADD a 30 kℓ water storage tank will be provided on site.

3.1.2 Fire Requirements

Fire Requirements will be catered for by an external fire specialist and is therefore not included in this report.

3.2 SANITATION

The sewage discharge would be via the existing Pienaarsrivier internal sewer reticulation. The sewage discharge will be by means of a 110mm diameter uPVC structured wall sewer pipe connection to the existing sewer manhole on the southern boundary.

The proposed sewer network is shown on Drawing No 2161-A-AA-01 (**Annexure B**).

The proposed sewer details is shown on Drawing No 2161-C-AA-02 (**Annexure B**)..

3.2.3 Sewer Discharge

The annual average daily discharge (AADD) for the proposed development will be 5.443 kℓ/day for all the facilities with an instantaneous peak discharge of 0,095 l/s.

The determination of the annual average daily discharge is shown in **Table 2**.

TABLE 2 : SEWAGE EFFLUENT

LAND USE	QTY	UNIT	UNIT DEMAND (kℓ/day)	TOTAL (kℓ/day)
Garage/Filling Station	1241m2	12,41	1,0	12,41
Total annual average demand (AADD)				**12,41**
Instantaneous Peak sewage flow rate				0.215 ℓ/s

The effluent generated will gravitate via the existing internal sewer reticulation to the existing Sewer pumpstation in the southern portion of Pienaarsrivier. The typical details are shown on Drawing No 2161-C-AA-03 **(Annexure B)**.

3.3 ACCESS ROUTES AND PARKING AREA

The proposed development can be accessed via the D626 between the N1 freeway and the R101 (old Pretoria Road). An additional access would be via the internal road network(Catanhos Street) in Pienaarsrivier as shown on Drawing No 2161-A-AA-01 (**Annexure B**).

The access routes are discussed in the Traffic Impact Study (Attached in **Annexure E**).

3.3.1 Design Principles

The design standards for roads are as follows :

- UTG1 – Guidelines for the Geometric Design of Urban Arterial Roads.
- TRH4 – Structural Design of Interurban and Rural Road Pavements.
- TRH14 – Guidelines for Road Construction Materials.
- Guidelines for Services and Amenities in Developing Communities, as prepared by the Department of Development Aid.

- UTG 2 – Structural Design of Segmental Block Pavements for Southern Africa.

3.3.2 Road Classification

The D626 which gives access to the development and can be classified as a District Distributor (Class 3) and additional lanes would be added in terms of the Traffic Impact Assessment and shown on Drawing No 2161-A-AA-01 (**Annexure B**).

The Internal roadway and parking areas of the development can be classified as a District Collector (Class 4) and is in line with the Architects drawings as shown on Drawing No 2161-A-AA-01 (**Annexure B**).

The geometrical and structural pavement design classification for the functional classes for the relevant streets is shown in **Table 3**.

Table 3 : Geometrical and Structural Design Classification

No.	Street Name	Road Class	Road Category	Traffic Class	Lane Widths	Cumulative equivalent traffic
1	D626	3	UB	ES3	3,5m	1,0 – 3,0 x 10^6
1	Internal & Parking areas	4	UC	ES3	N/A	1,0 – 3,0 x 10^6

3.3.2 Traffic Impact

The Traffic Impact Study have been incorporated in **Annexure E**.

All the roads will be designed to the specifications of the TIS and Architects internal layout.

3.3.3 Pavement Design

The proposed pavement design for the road classes are as follows :

3.3.3.1 *Road Class 3 (3,5m lane widths) – D626*

- 30mm Continuously graded TPA medium asphalt
- 150mm Crushed stone base (G3) compacted to 98% Mod. AASHTO density (PI < 6)
- 150mm Natural gravel subbase (G5) compacted to 95% Mod. AASHTO density (PI < 10)
- ONLY REQUIRED if CBR of roadbed is between 7 and 15
  150mm Upper Selected gravel subgrade (G7) - 93% Mod. AASHTO density (PI < 12)
- ONLY REQUIRED if CBR of roadbed is between 3 and 7
  150mm Lower Selected gravel subgrade (G9) - 90% Mod. AASHTO density (PI < 12)
- 150mm Insitu roadbed (G10) rip and compacted to 90% Mod. AASHTO density (compacted to 93% Mod. AASHTO density if Subgrade is not required)
- Semi-mountable kerbing with channel in bellmouths.

3.3.3.2 *Road Class 4 – Internal Streets and parking (where Asphalt is required)*

- 30mm Continuously graded TPA medium asphalt
- 150mm Crushed stone base (G3) compacted to 98% Mod. AASHTO density (PI < 6)
- 150mm Natural gravel subbase (G5) compacted to 95% Mod. AASHTO density (PI < 10)
- ONLY REQUIRED if CBR of roadbed is between 7 and 15
  150mm Upper Selected gravel subgrade (G7) - 93% Mod. AASHTO density (PI < 12)
- ONLY REQUIRED if CBR of roadbed is between 3 and 7
  150mm Lower Selected gravel subgrade (G9) - 90% Mod. AASHTO density (PI < 12)
- 150mm Insitu roadbed (G10) rip and compacted to 90% Mod. AASHTO density (compacted to 93% Mod. AASHTO density if Subgrade is not required)
- 300mm mountable kerbing on all edges

3.3.3.3 *Road Class 4 – Internal Streets and parking (where Paving blocks is required)*

- 60mm Concrete type S-A Interlocking paving blocks on 20mm bedding sand
- 125mm stabilized gravel base (C4) compacted to 98% Mod. AASHTO density
- ONLY REQUIRED if CBR of roadbed is between 7 and 15
  150mm Upper Selected gravel subgrade (G7) - 93% Mod. AASHTO density (PI < 12)
- ONLY REQUIRED if CBR of roadbed is between 3 and 7
  150mm Lower Selected gravel subgrade (G9) - 90% Mod. AASHTO density (PI < 12)
- 150mm Insitu roadbed (G10) rip and compacted to 90% Mod. AASHTO density (compacted to 93% Mod. AASHTO density if Subgrade is not required)
- 300mm mountable kerbing on all edges

All traffic signs and markings will be in accordance with the most recent volumes of specifications for traffic signs as prescribed and made available by the Department of Transport.

3.3.4 General details

The general details of the streets will be in accordance with the Standard Construction Details issued by the Division Service Delivery: Roads and Stormwater of the Bela-Bela Local Municipality. All traffic signs and markings will be in accordance with the most recent volumes of specifications for traffic signs as prescribed and made available by the Department of Transport.

The general details is shown on Drawing No's 2161-D-AA-02, 03 and 04 (**Annexure B**).

3.4 STORMWATER MANAGEMENT PLAN

The main storm water management objectives and criteria that are considered to be relevant to the design and planning of storm water drainage systems include :

- Minimising the threat of flooding;
- Minimising public inconvenience caused by frequent storms;
- Protecting the public and preventing the loss of life due to severe storms and/or malfunctioning drainage systems;
- Preventing erosion and siltation;
- Protection of receiving water bodies;
- Minimising costs;
- Sustainability of storm water management systems; and
- Environmental and water pollution considerations.

3.4.1 Modeling

The run-off that is generated within a catchment through precipitation will depend on various factors that will include:

- characteristics of the storm event (highveld thunderstorms during summer)
- the response characteristics of the catchment area (size, slope, shape and stream patterns)
- the influence of temporal storage and infiltration on the run-off (vegetation, soil type and geology).

The temporal distribution of the run-off is reflected in a hydrograph. The flood peak (QP) is reached as soon as the entire catchment contributes to the flood, which is also referred to as the time of concentration (TC).

3.4.2 Model Selection

VIP Consulting Engineers used the Drainage Manual from SANRAL as basis of all Hydrological Calculations. Summarised descriptions of the different flood calculation processes are provided below, followed by a description of the catchment area and the runoff calculation.

3.4.2.1 The Rational Methods

The Rational Method is based on a simplified representation of the law of conservation of mass. Rainfall intensity is an important input in the calculations. Because uniform spatial and temporal distributions of rainfall are assumed, the method is normally only recommended for catchments smaller than approximately 15 km². There are some historical methods of determining the rainfall intensity, depth-duration–frequency relationships, or the modified recalibrated Hershfield equation for storm durations up to 6 hours, and the Department of Water Affairs' Technical Report TR102 for durations from 1 to 7 days. There is also Design Rainfall estimation methodology developed by Smithers and Schulze (2003), to determine the point design rainfall for the catchment. Only flood peaks and synthetic hydrographs can be determined by means of the Rational Method. The methods which were considered in these analyses are:

- **Alternative 1** - Using a Depth-Duration-Frequency Diagram (a shortcoming of this procedure is that it is based on a short, aged rainfall database published in 1978.)
- **Alternative 2** - The TR102 representative rainfall data and the modified Hershfield equation is used (similar shortcoming with an outdated rainfall database published in1981).

3.4.2.2 Catchment area and Characteristics

The catchment area and longest watercourse was determined using the Surveyed information. The catchment is shown in **Figure 3**. The catchment's characteristics were determined and are summarized in **Table** and the TR102 data is provided in **Table 4-2**.

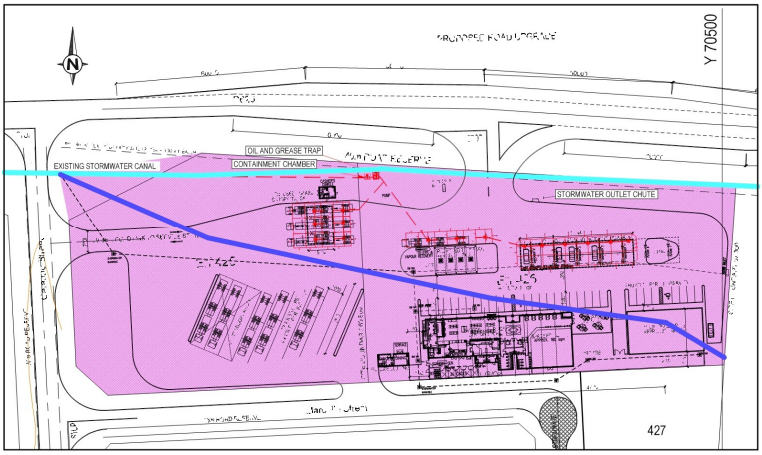


Figure 3: Definition of catchment area.

Table 4-1: Catchment Characteristics

Description of characteristic	Area
Catchment area	0,015km²
Length of longest watercourse	0,229km
Flow of Water	Overland flow
R value for overland flow	0,4 (Moderate grass)
Height difference (total)	0,5m
Rainfall region	Inland
Average catchment slope (Total Overland)	0,218%
Time of concentration	49,6 min.
Mean Annual Rainfall (SA Weather Service)	507mm
Dolomitic area	0%
Regional Maximum Flood region	K5(K=5.0)
Description of catchment run-off characteristics	Pre-Development (Rural): Pan to Flat areas with permeable soil Light bush and grasslands Post-Development (Urban): Flat lawns/landscaping in heavy soil, Suburban with roads and parking areas
Combined C value	0,262 (Pre-Dev) an 0,621(Post-Dev)
Days on which thunder was heard	60 days/year

Table 4-2: TR102 data for 0550522 W @ Pienaarsrivier rainfall station

Weather Services station			Pienaarsrivier				
Weather Services stationnr			0550522 W				
Mean annual precipitation			507 mm				
Coordinates			25°12' & 28°17'				
Duration (days)	**Returnperiod**						
	2	**5**	**10**	**20**	**50**	**100**	**200**
1day	54	75	90	107	131	151	173
2days	66	91	109	129	157	180	206
3days	74	103	125	148	182	210	240
7days	91	128	154	182	222	255	290

3.4.2.3 Runoff Calculations

The Utility Programs for Drainage software program (UPD) was used for calculating the flood peaks utilising the deterministic and empirical methods applicable to the catchment. These results are attached in **Annexure D**. A summary of the calculated results is shown in **Table 4-3.**

The slope as provided in **Table** was calculated for overland type flow. The calculated time of concentration for the catchment is: T_C = 49,6 minutes.

Table 4-3: Summary of calculated peak flows

Return period	**Calculated peak flows (m^3/s)**					
	2 y	**5 y**	**10 y**	**20 y**	**50 y**	**100 y**
Pre-development Rational – Alt. 1	0,046	0,067	0,091	0,118	0,163	0,211
Pre-development Rational – Alt. 2	0,058	0,104	0,144	0,189	0,250	0,303
Post-development Rational – Alt. 1	0,071	0,097	0,123	0,152	0,198	0,243
Post-development Rational – Alt. 2	0,089	0,150	0,196	0,242	0,303	0,349

3.4.2.4 Design Peak Flood

Rational methods 1 and 2 fall within a similar range, and were considered over the Unit Hydrograph and Empirical method due to the small catchment area (smaller than 15 km^2). The Alternative 2 method obtained slightly more conservative results than the Alternative 1 method and was used for the design flow peaks.

The design flow peaks for pre and post conditions are summarised in **Table 4-4**. All the Hydrological designs is attached in **Annexure D**.

Table 4-4: Design peak flows

Return period	**Design peak flows (m^3/s)**					
	2 y	**5 y**	**10 y**	**20 y**	**50 y**	**100 y**
Pre-development Rational – Alt. 2	0,058	0,104	0,144	0,189	0,250	0,303
Post-development Rational – Alt. 2	0,089	0,150	0,196	0,242	0,303	0,349

3.4.3 Stormwater Conclusion

A minor stormwater reticulation system for the development will consist of standard grid inlets and underground stormwater pipes. The parking area will be designed to form part of this system and will intercept the major part of surface water for rainfall events of up to a 1:5 year occurrence interval.

Intercepted run-off is conveyed through the underground pipe system (and along the paved surfaces) and will discharge into the existing stream on the northern boundary of the development.

The rate of discharge from the pipe system is fairly low and energy dissipaters have been included in all outlet structures.

Stormwater should be regularly tested before exiting the site and entering the exiting streams, to ensure that the quality of Stormwater outflow complies to General Limit Values of the National Water Act (No.36 of 1998) (NWA).

3.4.4 Separation of Potentially Contaminated Stormwater

3.4.4.1 Bulk Refuelling Area

As part of the normal operations for this facility, a fuel tanker will be required to fill the fuel stocks in the underground fuel tanks located on site. The risks of pollution during this procedure should a spill incident occur are considered significant. Therefore, appropriate design standards to afford mitigation are considered essential.

As part of the refuelling procedure, a dished refuelling station is to be provided within the lay by area located on the site, on which the tanker will park while decanting fuel to the underground fuel storage tanks.

The dished refuelling station will consist of a reinforced concrete apron with positive falls towards centrally located catch-pits.

These catch-pits will drain to an underground storm water pollution containment chamber. An isolation valve will be provided downstream of this chamber. During all refuelling events, the operator is to close the isolation valve to ensure that should a major spillage occur, all fuel is then contained within the chamber for later cleaning up operations.

In all other circumstances besides refuelling events, the isolation valve is to remain open to convey stormwater (due to the area being uncovered) to a Calcamite sand, oil and grease trap. Once the containment chamber has been “cleaned” the valve downstream of the chamber is opened and any residual spillage on the apron or in the chamber will be piped with the runoff to the Calcamite sand, oil and grease trap located downstream of the isolation valve.

The residual hydrocarbons will be separated out from the clean water based on the principal of specific gravity in the Calcamite sand, oil, and grease trap. The outlet pipe of the trap is to connect to the nearest sewer manhole of the existing sewer system which discharges to the wastewater treatment works (Package Plant). There must be regular maintenance and inspections in accordance with the Operational Environmental Management Program (EMP).

3.4.4.2 Forecourt Dispensing Area

The forecourt is to be covered and any wash water from this area will be directed via a concrete graded slab, with positive falls towards a centrally located catch-pits.

The centrally located catch-pits shall drain into a pollution containment chamber i.e. an approved oil/water separator system. Once the wash water has passed through the system, the separated oil must be collected regularly by an approved waste contractor and removed to an approved hazardous waste disposal facility. The remaining effluent water is to discharge to the sewer system.

3.4.5 Floodline Certification

It is hereby certified that in terms of the specifications laid down by section 169A of the National Water act (54/ 1956), as amended by section 18 of the Water amendment act (36/1998) the abovementioned Holding is not affected by floodlines with an expected frequency of 1 : 50 or 1: 100 years.

4. TOWN PLANNING

The proposed development is on Erf 425 & 426 and were accommodated in the existing Pienaarsrivier Township.

5. SOLID WASTE MANAGEMENT

The solid waste generated from the convenience store and other on-site amenities will be accumulated and stored on site in the prescribed bins provided by a Contracted Private Waste Removal Company. These bins will be collected at regular intervals and or on request and disposed of at registered landfill facility with the required capacity.

Chemicals and hazardous waste will be catered for according to the prescribed requirements in legislation. This hazardous waste would be collected by a registered Waste Group with a permit to transport the waste to an appropriate facility (See attached in **Annexure F**).

6. ELECTRICITY SUPPLY

The electricity supply will be dealt with in a separate report.

7. CONCLUSION

We herewith recommend that MDV Developments submit the draft Layout plans to the Bela-Bela Local Municipality in order to have the layout plan approved.

We trust that the services report will meet your approval. We still remain open for any proposals or feedback.

J JANSEN VAN RENSBURG Pr Tech Eng

ANNEXURE A

APPOINTMENT LETTER

johan@vipconsulting.co.za

From: norman@mdvdevelopments.co.za
Sent: Thursday, 11 November 2021 8:24 AM
To: johan@vipconsulting.co.za
Cc: 'Anton Van Vuuren'; Gwen Conrade; 'Rory McGuirk'
Subject: RE: 2161: Erf 425 & 426, Pienaarsrivier

Good morning Johan

Thank you for your revised quotation to complete the Pienaarsrivier, Services Report, Flood line Analysis Report and Stormwater Management Plan for the proposed Filling Station.

We would like to acknowledge that we accept the quotation to the value of R69,000 (Incl. VAT).

Please proceed ASAP and submit the report to us and the Professional Team.

Many thanks.

Regards

Norman Cleaver
MDV Professional Consultant
Cell: 0828966924
Email:norman@mdvdevelopments.co.za
Web: www.mdvdevelopments.co.za

From: johan@vipconsulting.co.za <johan@vipconsulting.co.za>
Sent: 10 November 2021 14:37
To: norman@mdvdevelopments.co.za
Cc: 'Anton Van Vuuren' <antonv@mdvdevelopments.co.za>
Subject: RE: 2161: Erf 425 & 426, Pienaarsrivier

Hi Norman

Find attached the revised quote that is in line with the Empangeni quote of 2019.

Kind regards / Vriendelike groete

Johan Jansen van Rensburg
Pr Tech Eng MIPET MSAICE
Director

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PO Box 11211, Silver Lakes, 0054
Coordinates : 25°47'7,48"S 28°21'20,39"E
Website : www.vipconsulting.co.za

ANNEXURE B

DRAWINGS

Y 70800

Y 70500

PROPOSED ROAD UPGRADE

60000 60000 60000 60000

D626

STOP

EXISTING STORMWATER PIPE CULVERT

APPROXIMATE LIVE TELKOM O/H LINES REFER - GOOGLE EARTH

OIL AND GREASE TRAP

CONTAINMENT CHAMBER

EXISTING STORMWATER CANAL

40m ROAD RESERVE

60000

STOP

PROPOSED STORMWATER PIPE CULVERT

60000 60000

EXISTING STORMWATER CANAL

STORMWATER OUTLET CHUTE

CASHIER'S CIRCLE

PROPOSED M.U.D.

PUMP

PROPOSED 2 ISLAND CANOPY (TRUCKS)

PHASE 1 ROAD LINK TO SERVICE STATION

7000

STORMWATER MANHOLE

TANKER ROUTE

8440

Erf 425

Erf 426
+/- 6770 sqm

PROPOSED TANK FARM

VAPOUR RECOVERY

ISLAND

37244

PROPOSED 4 ISLAND CANOPY (FUTURE)

CANOPY

ISLAND

PROPOSED PARKING (33 BAYS)

BYPASS LANE

4 x REFRIGERATION

6 x TRUCK PARKING BAYS

TRUCK STOP AREA

5000

25000

SITE BOUNDARY 69 800

SITE BOUNDARY 57 300

20m ROAD RESERVE

Catania Street

PROPOSED SERVICE STATION SHOP

SPACE FOR S.R.

APPROX. 180 sqm

5000

FUTURE BUILDING APPROX 350 sqm

1411.10

YARD AREA

YARD

5000

TERRACE

CHANGE ROOMS

DINING

STANDBY GEN

SUMP

RETAIL

SL CAGES

YARD AREA

TRUCKER'S BUILDING

6430

47770

Marcelle Street

20m ROAD RESERVE

STOP

MAIN STORMWATE

427

428

429

433

434

435

430

431

485

496

486

487

495

488

494

489

493

432

424

X 2789100

X 2789100

999.50

EXIST. 3m WIDE PAVED ROAD

EXISTING 2,8m WIDE STORMWATER CHANNEL

999.00

999.00

999.50

BM1

1

4 3 2

LEGEND

EXISTING WATER
EXISTING SEWER
PROPOSED CLEAN STORMWATER
PROPOSED CONTAINED STORMWATER
EXISTING ASPHALT/PAVED ROADS
PROPOSED UPGRADE ON D626

NO	REVISIONS	DATE

mdv developments

SKAAL / SCALE 1:500 on A1

VIP

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Reg No 97/05698/07

PROJEK / PROJECT

CIVIL ENGINEERING SERVICES FOR ERVEN 425 & 426, PIENAARSRIVIER

DIENSDETAIL / SERVICE DETAIL

LAYOUT PLAN

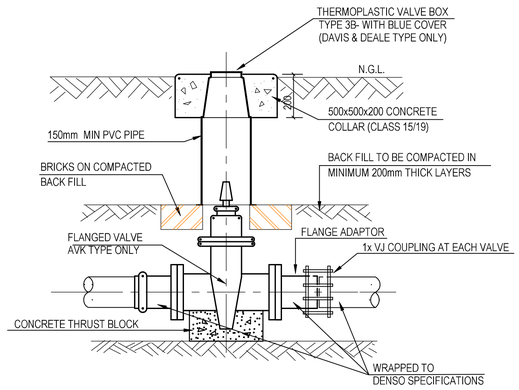
VERWYSINGS NOMMER / REFERENCE NUMBER

OPGEMEET / SURVEYED	ONTWERP / DESIGNED	GETEKEN / DRAWN
	JJvR	JJvR
NAGESIEN / CHECKED	DATUM / DATE	ORIGINAL PAPER SIZE
JJvR	MAY 2021	A1

DIREKTEUR / DIRECTOR	RAADGEWENDE ING. / CONSULTING ENG.
JJvR	Pr. Eng. 930532

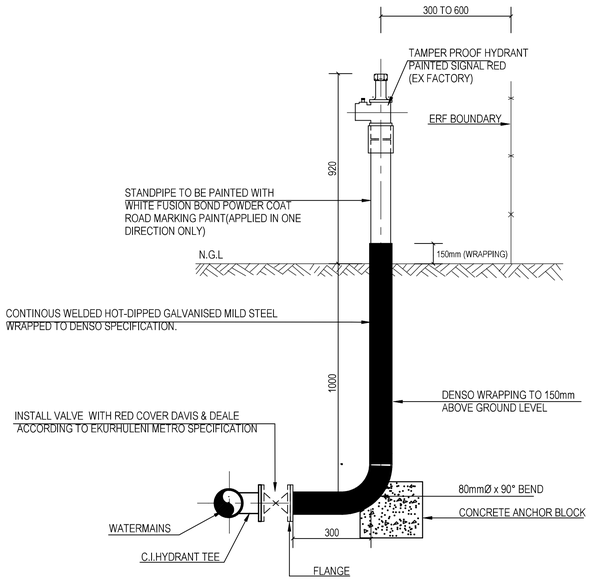
ING. TEKENINGNOMMER / ENG. DRAWING NUMBER

TEKENINGNOMMER / DRAWING NUMBER	REVISION
2161-A-AA-01	0



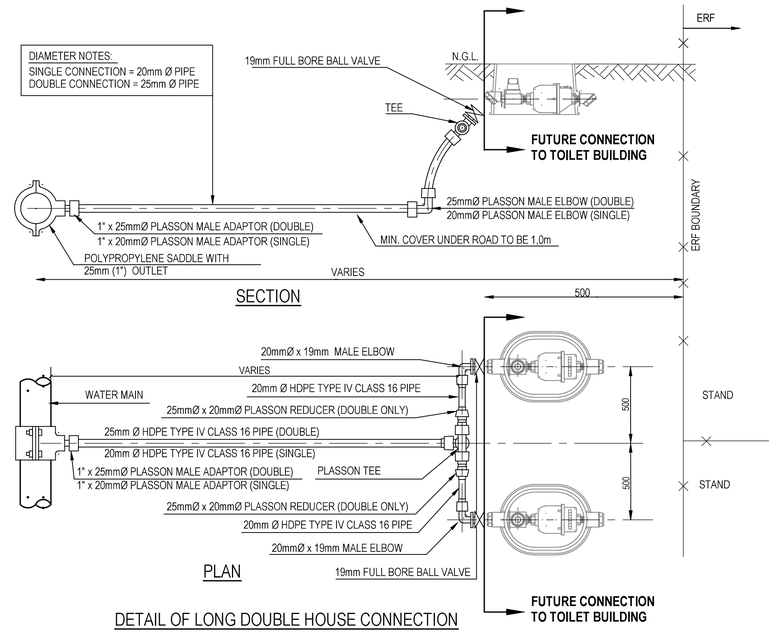
TYPICAL DETAIL : VALVE WITH VALVE BOX.

FOR VALVES 200mm DIAMETER AND SMALLER.
NTS.



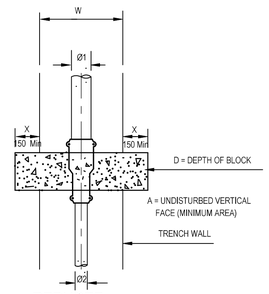
TYPICAL DETAIL : WOODLANDS TYPE FIRE HYDRANT.

N.T.S.

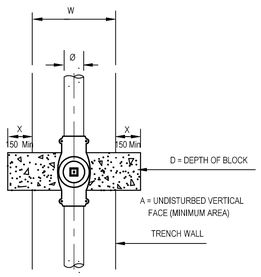


DETAIL OF LONG DOUBLE HOUSE CONNECTION WITH QUICK-RELEASE COUPLINGS

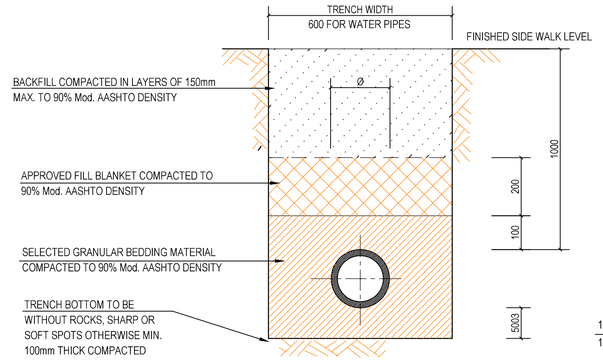
NTS.



REDUCER

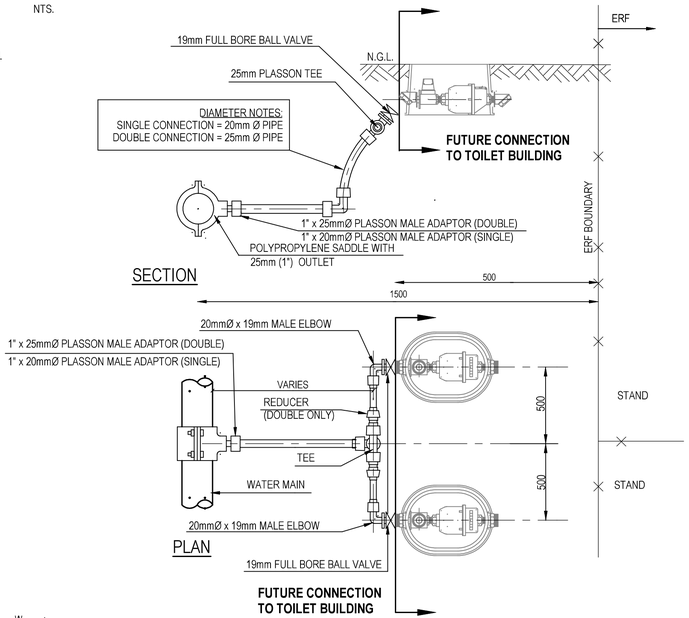


GATE VALVE



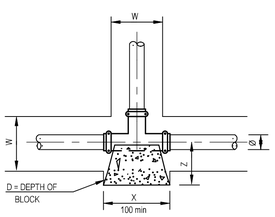
TYPICAL DETAIL : BEDDING FOR FLEXIBLE PIPES.

N.T.S.

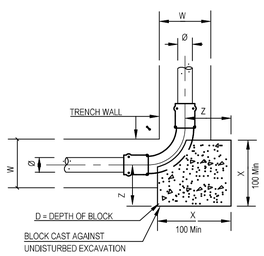


DETAIL OF SHORT DOUBLE HOUSE CONNECTION WITH QUICK-RELEASE COUPLINGS

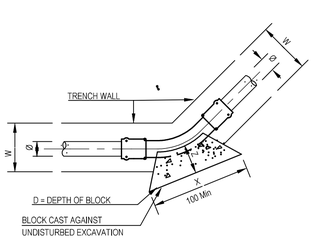
NTS.



T - JUNCTION



90° BEND



11¼°,22½° & 45° BENDS

THRUST BLOCKS FOR REDUCERS

NOMINAL DIAMETER Ø1 (mm)	NOMINAL DIAMETER Ø2 (mm)	DEPTH OF BLOCK D (mm)	MAXIMUM TESTING PRESSURE 900 kPa X (mm)	900 kPa A (m²)	1350 kPa X (mm)	1350 kPa A (m²)	1800 kPa X (mm)	1800 kPa A (m²)
350	300/250	750	300	0,43	450	0,64	600	0,85
300	250/200	700	250	0,35	400	0,53	550	0,71
250	200/150	650	250	0,29	350	0,43	450	0,57
200	150/100	600	200	0,22	300	0,32	400	0,43
150	100/75	500	150	0,12	200	0,18	250	0,24
100	75/50	400	150	0,06	150	0,08	150	0,11
75	50	300	100	0,03	150	0,04	150	0,05

THRUST BLOCKS FOR GATE VALVES

NOMINAL DIAMETER Ø (mm)	DEPTH OF BLOCK D (mm)	MAXIMUM TESTING PRESSURE 900 kPa X (mm)	900 kPa A (m²)	1350 kPa X (mm)	1350 kPa A (m²)	1800 kPa X (mm)	1800 kPa A (m²)
300	500	500	0,64	850	0,96	1150	1,27
250	450	350	0,45	600	0,67	850	0,89
200	400	250	0,29	400	0,43	600	0,57
150	300	150	0,16	200	0,24	350	0,32
100	300	150	0,07	150	0,11	150	0,14
75	250	150	0,04	150	0,06	150	0,08
50	200	150	0,02	150	0,03	150	0,04

THRUST BLOCKS FOR TEES

NOMINAL DIAMETER Ø (mm)	DEPTH OF BLOCK D (mm)	MAXIMUM TESTING PRESSURE 900 kPa X (mm)	900 kPa A (m²)	1350 kPa X (mm)	1350 kPa A (m²)	1800 kPa X (mm)	1800 kPa A (m²)
300	1200	550	0,64	800	0,96	1100	1,27
250	1000	450	0,44	700	0,67	900	0,89
200	800	350	0,29	550	0,43	700	0,57
150	600	300	0,16	400	0,24	550	0,32
100	400	200	0,07	300	0,11	350	0,14
75	300	150	0,04	200	0,06	300	0,08
50	200	100	0,02	150	0,03	200	0,04

THRUST BLOCKS FOR 90° BENDS

NOMINAL DIAMETER Ø (mm)	DEPTH OF BLOCK D (mm)	MAXIMUM TESTING PRESSURE 900 kPa X (mm)	900 kPa A (m²)	1350 kPa X (mm)	1350 kPa A (m²)	1800 kPa X (mm)	1800 kPa A (m²)
300	1200	750	0,90	1150	1,35	1550	1,81
250	1000	650	0,63	950	0,94	1250	1,26
200	800	500	0,40	750	0,60	1000	0,81
150	600	400	0,23	600	0,34	750	0,46
100	400	250	0,10	400	0,15	500	0,20
75	300	200	0,06	300	0,09	400	0,12
50	200	150	0,03	200	0,04	250	0,05

THRUST BLOCKS FOR 45° BENDS

NOMINAL DIAMETER Ø (mm)	DEPTH OF BLOCK D (mm)	MAXIMUM TESTING PRESSURE 900 kPa X (mm)	900 kPa A (m²)	1350 kPa X (mm)	1350 kPa A (m²)	1800 kPa X (mm)	1800 kPa A (m²)
300	1200	450	0,49	650	0,74	850	0,98
250	1000	350	0,34	550	0,51	700	0,68
200	800	300	0,22	450	0,33	550	0,44
150	600	250	0,13	350	0,91	450	0,25
100	400	150	0,06	250	0,09	300	0,11
75	300	100	0,03	150	0,05	200	0,06
50	200	100	0,02	100	0,02	150	0,03

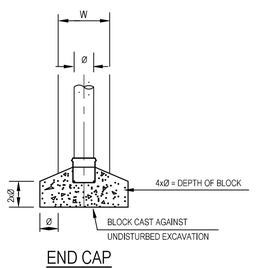
THRUST BLOCK FOR 22½° AND 11¼° BENDS

NOMINAL DIAMETER Ø (mm)	DEPTH OF BLOCK D (mm)	MAXIMUM TESTING PRESSURE 900 kPa X (mm)	900 kPa A (m²)	1350 kPa X (mm)	1350 kPa A (m²)	1800 kPa X (mm)	1800 kPa A (m²)
300	1200	250	0,25	350	0,38	450	0,50
250	1000	200	0,18	300	0,26	350	0,35
200	800	150	0,11	250	0,17	300	0,22
150	600	100	0,06	200	1,00	250	0,13
100	400	100	0,04	100	0,04	150	0,06
75	300	100	0,03	100	0,03	100	0,03
50	200	100	0,02	100	0,02	100	0,02

NOTE : X AND A TO BE HALVED FOR 11 ¼° BENDS

TYPICAL DETAILS & SIZES FOR THRUST BLOCKS.

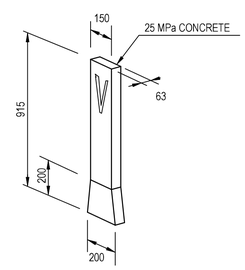
N.T.S.



END CAP

NOTES :

1. CONCRETE IN THRUST BLOCKS IS CLASS 10/19
2. THIS TABLE IS VALID FOR 100 kPa EARTH BEARING PRESSURE
3. X-DIMENSION MAY BE REDUCED FOR HIGHER EARTH BEARING PRESSURES
4. Z SHALL BE THE MINIMUM OF X/2 OR W/2
5. HALF OF THE DEPTH OF THE BLOCK SHALL BE BELOW THE PIPE AXIS
6. KEEP COUPLINGS AND FLANGES 25mm CLEAR OF CONCRETE



DETAIL : VALVE MARKER

NOTAS / NOTES :

1. WATER PIPES MUST BE uPVC CLASS 9 EXCEPT ROAD CROSSINGS WHICH SHOULD BE uPVC CLASS 12
   ALL ERF CONNECTIONS MUST BE CONSTRUCTED WITH HDPE TYPE V, CLASS PN 12.5, PE80 PRESSURE PIPES
2. GATE VALVES UP TO 300mm DIA. MUST BE FLANGED GATE VALVES CLASS PN-16, ANTI-CLOCKWISE CLOSING STAINLESS STEEL, NON-RISING SPINDLE WITH A CAP TOP TO SABS 664.
3. ALL VALVES TO BE MOULD MARKED AND PAINTED TO EKURHULENI STANDARDS ON THE KERB WITH A "V" AND WITH A VALVE MARKER
4. A BLUE CAT EYE WITH BLUE BACKING TO BE INSTALLED ON THE ROAD & OPPOSITE EVERY FIRE HYDRANT.

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR.

mdv developments

SKAAL / SCALE: AS SHOWN (ON A1)

VIP CONSULTING ENGINEERS (Pty) Ltd
Consulting Civil and Structural Engineers
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PROJEK / PROJECT
CIVIL ENGINEERING SERVICES FOR ERVEN 425 & 426, PIENAARSRIVIER

DIENSDETAIL / SERVICE DETAIL
WATER RETICULATION: GENERAL DETAILS

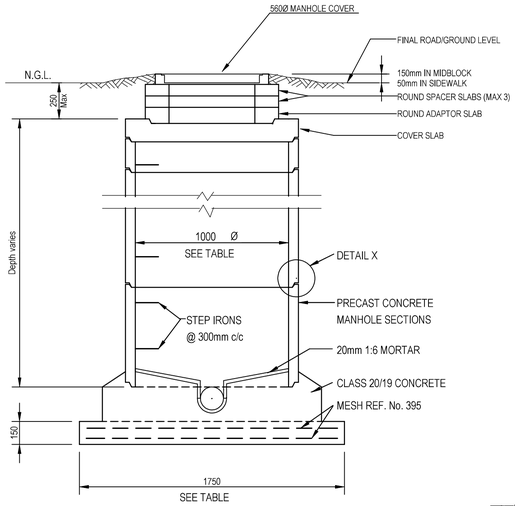
VERWYSINGS NOMMER / REFERENCE NUMBER: F:\2161\DRAWINGS\

OPGEMEET / SURVEYED	ONTWERP / DESIGNED	GETEKEN / DRAWN
	J.J.v.R.	J.J.v.R.
NAGESIEN / CHECKED	DATUM / DATE	SKAAL / SCALE
S.P.	AUG 2021	

DIREKTEUR / DIRECTOR: S.P.
RAADGEWENDE ING. / CONSULTING ENG.

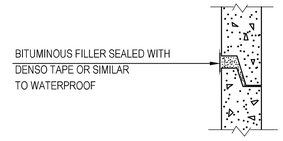
ING. TEKENINGNOMMER / ENG. DRAWING NUMBER: 2161-B-AA-02

TEKENINGNOMMER / DRAWING NUMBER
GETAL VELLE / No. SHEETS



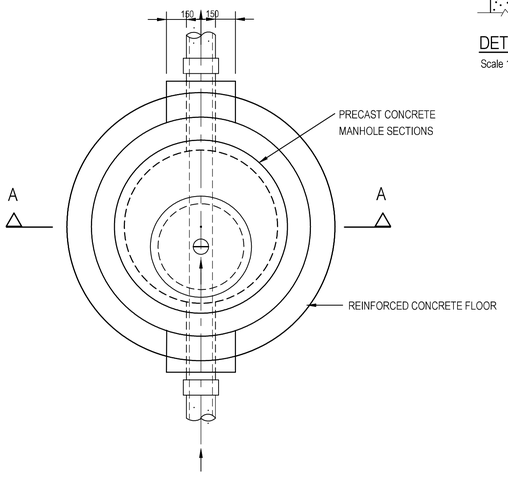
SECTION A-A

SCALE 1 : 20



DETAIL X

Scale 1 : 5



PLAN

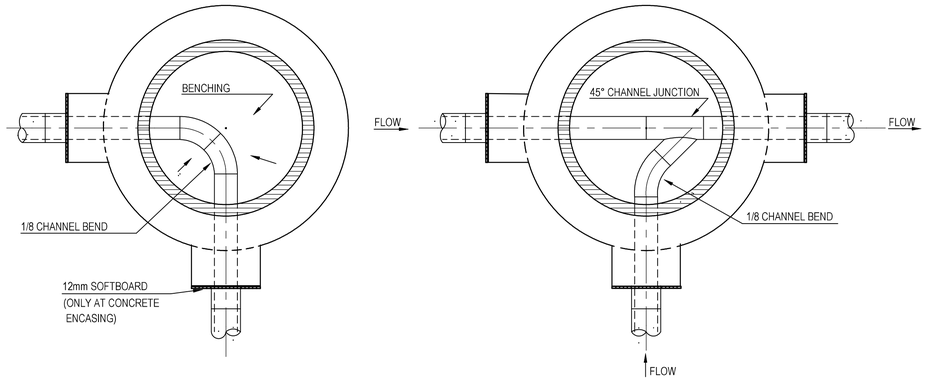
DETAIL : CONCRETE SEWER MANHOLE

SCALE 1 : 20

NOTE:

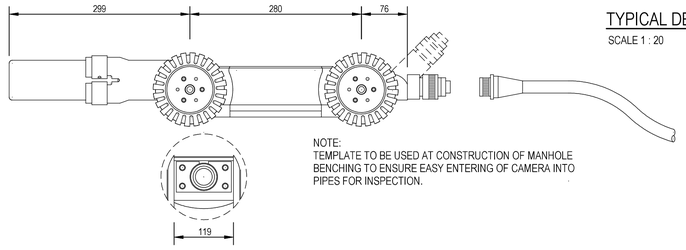
1. DIMENSIONS FOR SEWER MANHOLE ON DETAIL IS AS FOR TYPE 1

MANHOLE INSIDE DIMENSIONS		
TYPE	DEPTH	DIAMETER
1	0,0m to 3,0m	1000mm
2	3,0m to 4,5m	1250mm
3	Deeper than 4,5m	1500mm



TYPICAL DETAILS : BENDS AND CONNECTIONS IN MANHOLES.

SCALE 1 : 20

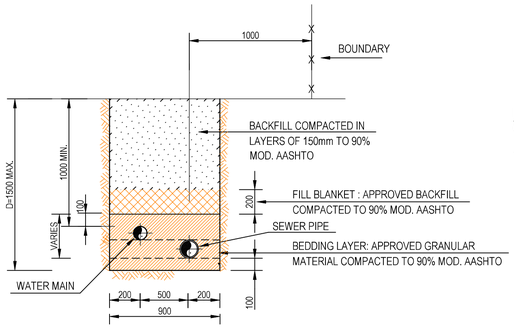


NOTE:
TEMPLATE TO BE USED AT CONSTRUCTION OF MANHOLE BENCHING TO ENSURE EASY ENTERING OF CAMERA INTO PIPES FOR INSPECTION.

TEMPLATE FOR INSPECTION CAMERA

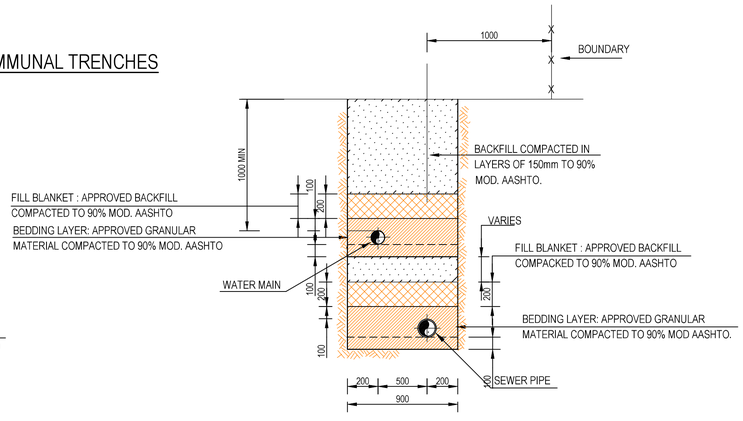
NTS

COMMUNAL TRENCHES



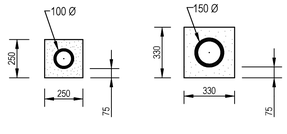
TYPICAL PIPE TRENCH D < 1500

1: 25



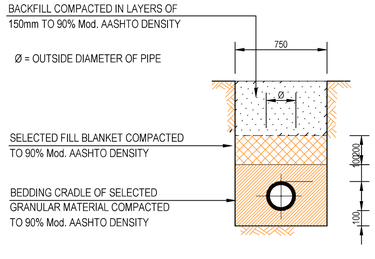
TYPICAL PIPE TRENCH D > 1500

1: 25



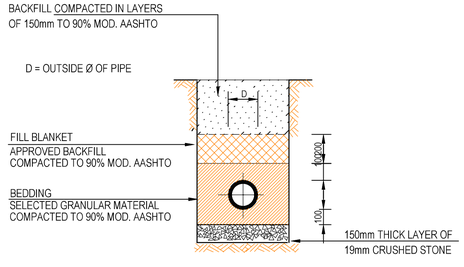
CONCRETE : FULLY ENCASED

SCALE 1 : 20



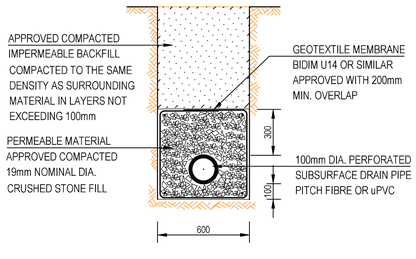
BEDDING DETAILS : FLEXIBLE PIPES.

SCALE 1 : 20



BEDDING FOR PIPE TRENCH DRAINAGE

SCALE 1 : 20



TYPICAL DETAIL : SUBSURFACE DRAIN

SCALE 1 : 20

AMENDMENTS				
NR.	DATE	APPROVED	DESCRIPTION	PAR

mdv developments

SKAAL / SCALE: AS SHOWN (ON A1)

VIP

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VIP CONSULTING ENGINEERS (Pty) Ltd
Consulting Civil and Structural Engineers
Reg No 97/05698/07

PROJEK / PROJECT

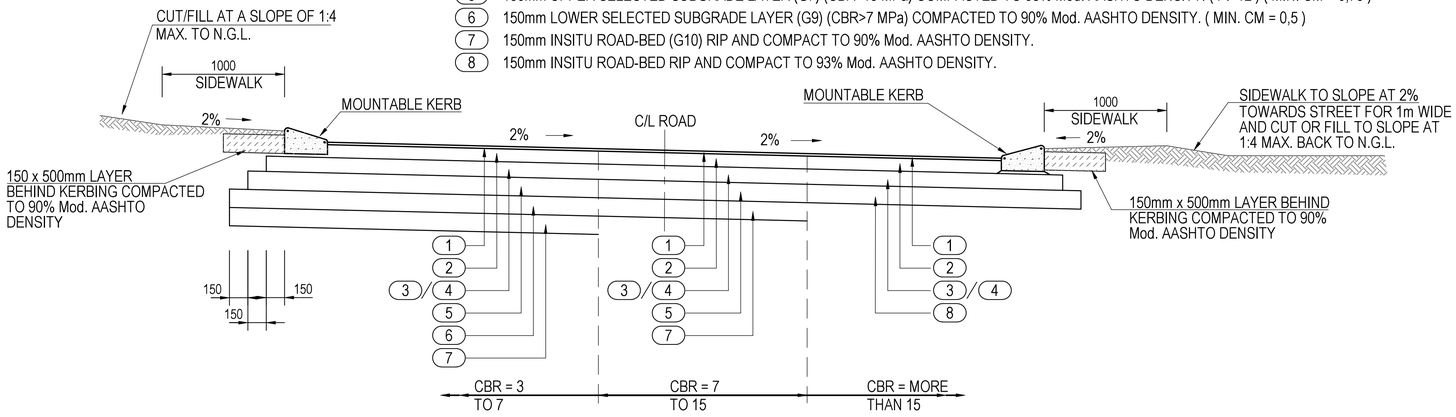
CIVIL ENGINEERING SERVICES FOR ERVEN 425 & 426, PIENAARSRIVIER

DIENSDETAIL / SERVICE DETAIL

SEWER RETICULATION: GENERAL DETAILS

VERWYSINGS NOMMER / REFERENCE NUMBER: F:\2161\DRAWINGS\		
OPGEMEET / SURVEYED	ONTWERP / DESIGNED: J.J.v.R.	GETEKEN / DRAWN: J.J.v.R.
NAGESIEN / CHECKED: S.P.	DATUM / DATE: AUG 2021	SKAAL / SCALE
DIREKTEUR / DIRECTOR: S.P.	RAADGEWENDE ING. / CONSULTING ENG.	
ING. TEKENINGNOMMER / ENG. DRAWING NUMBER: 2161-C-AA-02		
TEKENINGNOMMER / DRAWING NUMBER	GETAL VELLE / No. SHEETS	

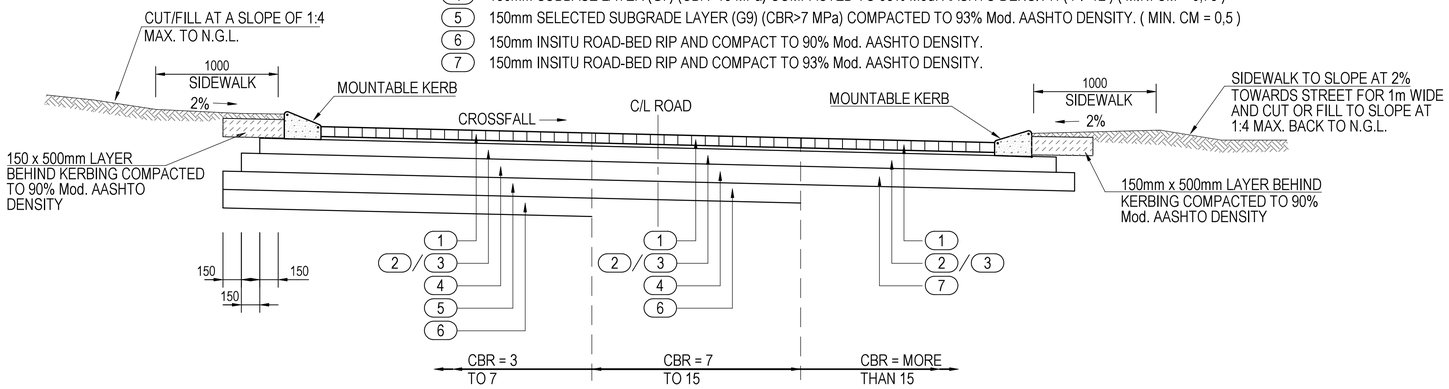
1. 30mm Min. CONTINOUSLY GRADED TPA MEDIUM ASPHALT.
2. 150mm GRADED CRUSHED STONE BASE (G3) (CBR>45 MPa) COMPACTED TO 98% Mod.AASHTO DENSITY. (PI < 6) (MIN. CM = AS PER TRH 14)
3. 150mm NATURAL GRAVEL SUBBASE (G5) (CBR>45 MPa) COMPACTED TO 95% Mod.AASHTO DENSITY. (PI < 10) (MIN. CM = 1,5)
4. 150mm STABILIZED NATURAL GRAVEL SUBBASE (C4) (UCS>0,75 MPa) COMPACTED TO 95% Mod.AASHTO DENSITY. (3% CEMENT OR 60kg/m3)
5. 150mm UPPER SELECTED SUBGRADE LAYER (G7) (CBR>15 MPa) COMPACTED TO 93% Mod. AASHTO DENSITY. (PI<12) (MIN. CM = 0,75)
6. 150mm LOWER SELECTED SUBGRADE LAYER (G9) (CBR>7 MPa) COMPACTED TO 90% Mod. AASHTO DENSITY. (MIN. CM = 0,5)
7. 150mm INSITU ROAD-BED (G10) RIP AND COMPACT TO 90% Mod. AASHTO DENSITY.
8. 150mm INSITU ROAD-BED RIP AND COMPACT TO 93% Mod. AASHTO DENSITY.



TYPICAL LAYERWORKS FOR PARKING AREAS AND ACCESS ROADS (ASPHALT SURFACE)

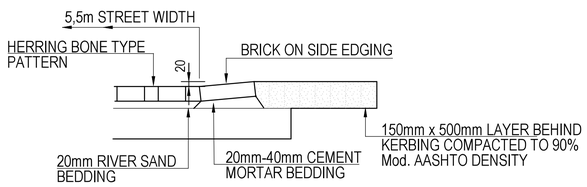
SCALE 1 : 25

1. 60mm CONCRETE TYPE S-A INTERLOCKING PAVING BLOCKS ON 20mm BEDDING SAND
2. 125mm STABILIZED NATURAL GRAVEL BASE (C4) (UCS>0,75 MPa) COMPACTED TO 98% Mod.AASHTO DENSITY. (3% CEMENT OR 60kg/m3)
3. 150mm NATURAL GRAVEL BASE (G5) (CBR>45 MPa) COMPACTED TO 98% Mod.AASHTO DENSITY. (PI < 10) (MIN. CM = 1,5)
4. 150mm SUBBASE LAYER (G7) (CBR>15 MPa) COMPACTED TO 95% Mod. AASHTO DENSITY. (PI<12) (MIN. CM = 0,75)
5. 150mm SELECTED SUBGRADE LAYER (G9) (CBR>7 MPa) COMPACTED TO 93% Mod. AASHTO DENSITY. (MIN. CM = 0,5)
6. 150mm INSITU ROAD-BED RIP AND COMPACT TO 90% Mod. AASHTO DENSITY.
7. 150mm INSITU ROAD-BED RIP AND COMPACT TO 93% Mod. AASHTO DENSITY.



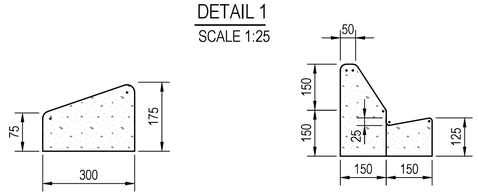
TYPICAL LAYERWORKS FOR PARKING AREAS AND ACCESS ROADS (BLOCK PAVING SURFACE)

SCALE 1:25



DETAIL 1

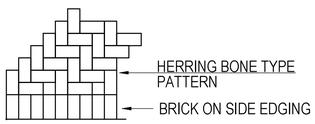
SCALE 1:25



MOUNTABLE KERB : FIGURE 8B

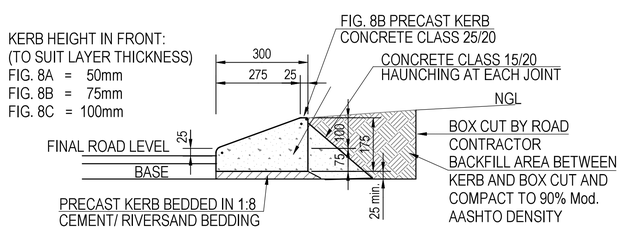
SEMI MOUNTABLE KERB (FIG. 7) WITH INSITU CHANNEL

NOTE :
ALL CONCRETE KERBS MUST HAVE A MINIMUM STRENGTH OF 25MPa AT 28 DAYS.
ALL SHARP LONGITUDINAL EDGES ON KERBS MUST BE CHAMFERED WITH A 20mm RADIUS.
MOUNTABLE KERBS MUST HAVE A WOOD FLOAT FINISH



TYPICAL PAVING PATTERN

SCALE 1:25



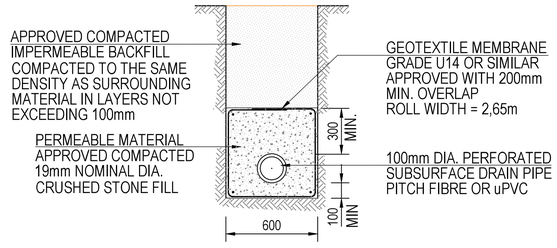
300mm PRECAST MOUNTABLE KERB (FIG.8)

GENERAL NOTES:

1. ALL MATERIAL AND WORKMANSHIP MUST COMPLY WITH THE REQUIREMENTS OF THE LATEST RELEVANT SANS REQUIREMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETERS. (UNLESS OTHERWISE SPECIFIED)
3. DO NOT SCALE FROM THESE DRAWINGS.
4. ALL DIMENSIONS MUST BE CHECKED AND APPROVED ON SITE.
5. ALL CONSTRUCTION TO BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR MUNICIPAL CIVIL ENGINEERING WORKS, THIRD EDITION 2005 AND THE STANDARD CTMM DETAIL DRAWINGS
6. THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH THE ARCHITECTS DRAWINGS. (IF APPLICABLE)
7. THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE STANDARD SPECIFICATIONS FOR MUNICIPAL CIVIL ENGINEERING WORKS, SERIES 4.
8. THE SIGNATURE OR INITIALS ON THIS DRAWING, OF ANY MANAGER OF THE TRANSPORT DEPARTMENT, IN NO WAY REMOVES ANY RESPONSIBILITY WHATSOEVER FROM THE CONSULTANT.
9. THE CONSULTANT REMAINS RESPONSIBLE TO ENSURE THAT ALL THE GUIDELINES, STANDARD DRAWINGS, STANDARDS AND SPECIFICATIONS OF THE TRANSPORT DEPARTMENT HAVE BEEN MET AND ARE COMPLIED WITH.
10. FINAL POSITION OF SERVICES TO BE DETERMINED ON SITE.

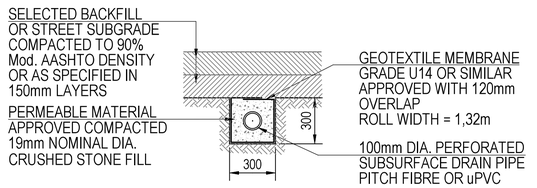
NOTES

SEE CITY OF TSHWANE METROPOLITAN MUNICIPALITY'S STANDARD DETAILS FOR STORMWATER AND ROADS.



DETAIL : 600 x 600mm SUBSURFACE DRAIN.

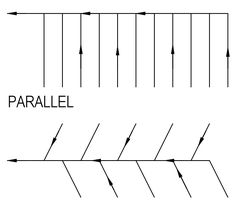
SCALE 1 : 20



DETAIL : 300 x 300mm SUBSURFACE DRAIN.

SCALE 1 : 20

DRAIN SPACING (m)			
DEPTH	1,0m	1,3m	1,6m
SAND	73	95	120
SILTY SAND	66	78	98
SANDY SILT	47	62	77
SILT	18	25	30
ORGANIC CLAY	5	6	8
SILTY CLAY	3	4	6



TYPICAL DRAIN LAYOUT

NOTE :
THESE DRAWINGS AND NOTES MUST BE READ WITH THE RELEVANT SPECIFICATIONS

AMENDMENTS

NR.	DATE	APPROVED	DESCRIPTION	PAR

mdv developments

SKAAL / SCALE: AS SHOWN (ON A1)

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Reg No 97/05698/07

PROJEK / PROJECT
CIVIL ENGINEERING SERVICES FOR ERVEN 425 & 426, PIENAARSRIVIER

DIENSDETAIL / SERVICE DETAIL
ROADS AND STORMWATER: GENERAL DETAILS #1

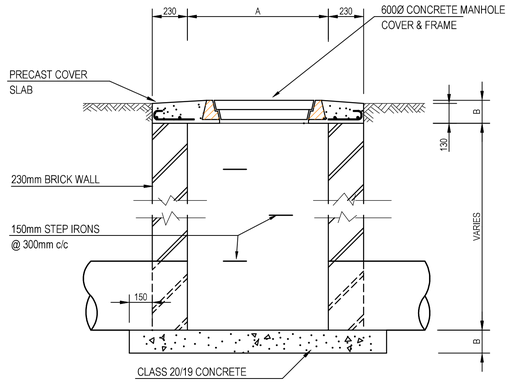
VERWYSINGS NOMMER / REFERENCE NUMBER: F:\2161\DRAWINGS\

OPGEMEET / SURVEYED	ONTWERP / DESIGNED	GETEKEN / DRAWN
	J.J.v.R.	J.J.v.R.
NAGESIEN / CHECKED	DATUM / DATE	SKAAL / SCALE
S.P.	AUG 2021	

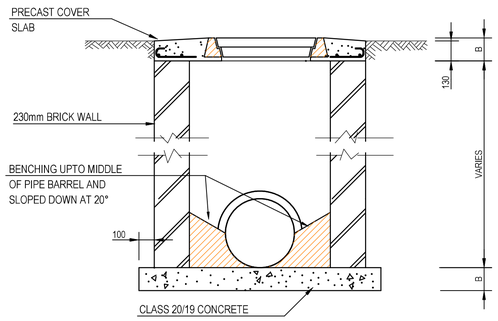
DIREKTEUR / DIRECTOR: S.P.
RAADGEWENDE ING. / CONSULTING ENG.

ING. TEKENINGNOMMER / ENG. DRAWING NUMBER: 2161-D-AA-02

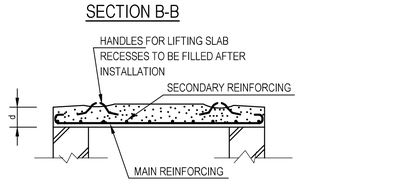
TEKENINGNOMMER / DRAWING NUMBER
GETAL VELLE / No. SHEETS



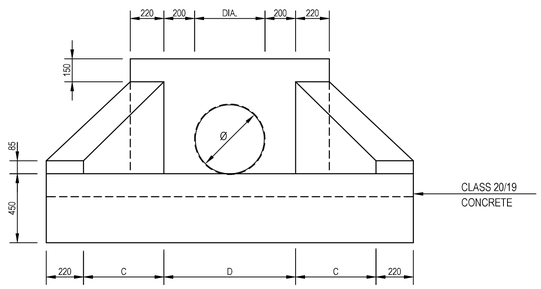
SECTION A-A



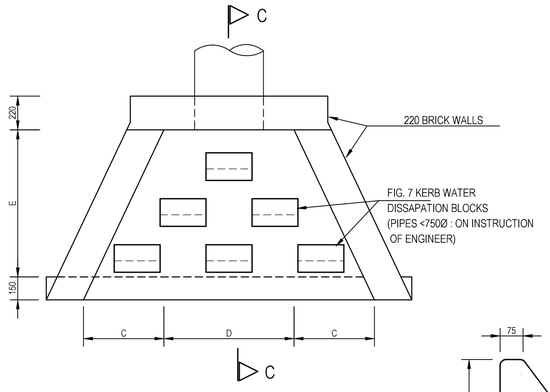
SECTION B-B



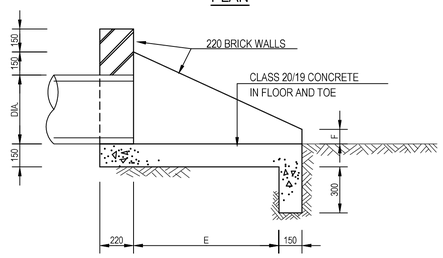
SECTION C-C (MANHOLE COVER SLAB)



ELEVATION



PLAN



SECTION C-C

DETAIL : IN- OR OUTLET STRUCTURE.

SCALE 1 : 20

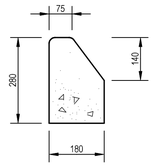
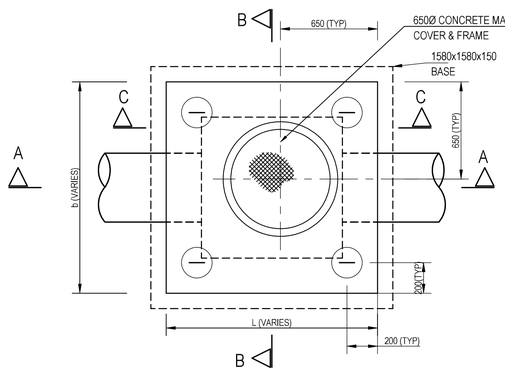


FIG. 7 (300mm LONG)



PLAN

DETAIL : MANHOLE.

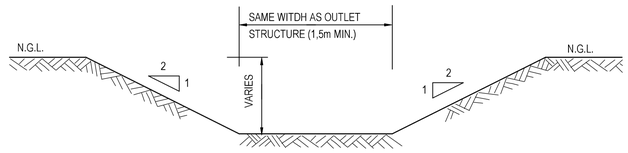
SCALE 1 : 20

DIMENTION FOR STRUCTURE WITH DIFFERENT DIA. PIPES			
	450Ø-750Ø	825Ø-900Ø	1050Ø-1350Ø
A	920mmx920mm	1270mmx1270mm	1500mmx1500mm
B	150mm	150mm	175mm
C	525mm	600mm	750mm
D	1150mm	1300mm	1450mm
E	950mm	1200mm	1500mm
F	170mm	340mm	510mm

MANHOLE COVER SLAB REINFORCING BENDING SCHEDULE				
L	b	d	MAIN	SECONDARY
1250	1250	150	R10@ 100mm	R10@ 200mm
1500	1500	175	R12@ 100mm	R12@ 200mm
2000	1500	200	R16@ 135mm	R12@ 200mm
2500	2000	225	R20@ 175mm	R16@ 200mm
CONTRETE CLASS 25/19 WITH 25mm COVER				

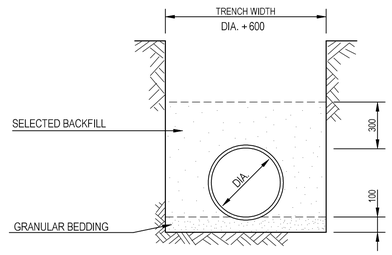
MEASUREMENTS AND REINFORCING FOR JUNCTION BOX				
L	b	d	MAIN	SECONDARY
1250	1250	150	R10@ 150mm	R10@ 200mm
1500	1250	175	R12@ 150mm	R12@ 200mm
2000	1500	200	R16@ 150mm	R12@ 200mm
2500	2000	225	R20@ 200mm	R16@ 200mm
CONTRETE CLASS 25/19 WITH 25mm COVER				

PIPE CLASSES FOR PIPES UNDER ROADWAYS.									
Ø	TRENCH WIDTH	COVER (m)							
mm	mm	0,5	1,0	1,5	2,0	2,5	3,0	4,0	
450	950	75D	75D	50D	50D	75D	75D	75D	PIPE CLASSES FOR PIPES UNDER SECONDARY STREETS, ACCESS ROADS, PARKING AREAS AND SIDEWALKS WITH A 40kN WHEEL LOAD INCLUDING THE AFFECT OF SHOCK LAODING
525	1020	75D	50D	50D	50D	75D	75D	75D	
600	1620	75D	50D	50D	75D	75D	75D	100D	
675	1710	75D	50D	50D	75D	75D	75D	100D	
750	1790	75D	50D	50D	75D	75D	75D	100D	
mm	mm	0,5	1,0	1,5	2,0	2,5	3,0	4,0	
450	950	75D	100D	100D	100D	100D	100D	75D	PIPE CLASSES FOR PIPES UNDER MAIN ROOTES FOR A HB-WHEEL TRAI WITH EIGHT 90 kN WHEEL LOADS INCLUDING THE AFFECT OF SHOCK LOADING.
525	1020	75D	100D	100D	100D	100D	100D	100D	
600	1620	75D	100D	100D	100D	100D	100D	100D	
675	1710	75D	100D	100D	100D	100D	100D	100D	
750	1790	75D	100D	100D	100D	100D	100D	100D	



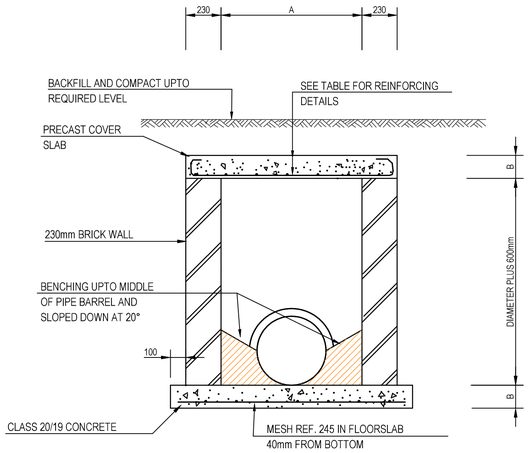
TYPICAL DETAIL : GRAVEL DRAIN.

N.T.S.



TYPICAL DETAIL : PIPE TRENCH

N.T.S.



NOTE :
PLAN AND DETAILS THE SAME AS FOR MANHOLE WHERE APPLICABLE

TYPICAL SECTION : JUNCTION BOX.

SCALE 1 : 20

NOTAS/NOTES :

1. CONCRETE IN SLABS MUST BE CLASS 25/19.
2. STORMWATER PIPES TO BE CONCRETE PIPES WITH "OGEE" TYPE JOINTS.
3. WELDED MESH REF. 245 REINFORCING TO BE USED IN FLOOR SLABS OF STRUCTURES.
4. STORMWATER MANHOLE AND OUTLET STRUCTURE DETAILS ARE SUITABLE FOR PIPES UPTO 750mm DIAMETER.
5. DETAILS FOR STRUCTURES FOR PIPES WITH A DIAMETER LARGER THAN 750mm WILL BE SUPPLIED BY THE ENGINEER ON REQUEST.
6. THE C/L OF STORMWATER PIPES TO BE PLACED 0,5m BEHIND KERBS NEXT TO STREETS.

AMENDMENTS				
NR.	DATE	APPROVED	DESCRIPTION	PAR.

mdv developments

SKAAL / SCALE: AS SHOWN (ON A1)

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PROJEK / PROJECT

CIVIL ENGINEERING SERVICES FOR ERVEN 425 & 426, PIENAARSRIVIER

DIENSDETAIL / SERVICE DETAIL

ROADS AND STORMWATER: GENERAL DETAILS #2

VERWYSINGS NOMMER / REFERENCE NUMBER: F:\2161\DRAWINGS\

OPGEMEET / SURVEYED	ONTWERP / DESIGNED	GETEKEN / DRAWN
	J.J.v.R.	J.J.v.R.
NAGESIEN / CHECKED	DATUM / DATE	SKAAL / SCALE
S.P.	AUG 2021	

DIREKTEUR / DIRECTOR	RAADGEWENDE ING. / CONSULTING ENG.
S.P.	

ING. TEKENINGNOMMER / ENG. DRAWING NUMBER: 2161-D-AA-03

TEKENINGNOMMER / DRAWING NUMBER	GETAL VELLE / No. SHEETS

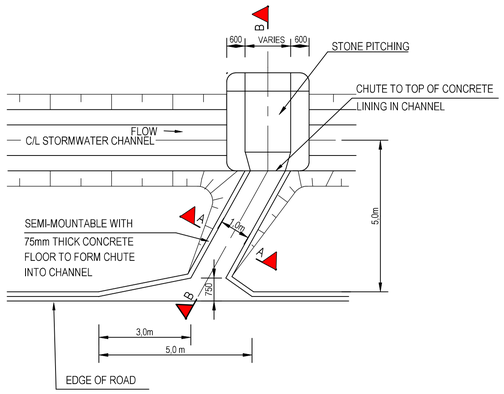
NOTE :

THESE DRAWINGS AND NOTES MUST BE READ WITH
THE RELEVANT SPECIFICATIONS

CONSTRUCTION GUIDELINES :

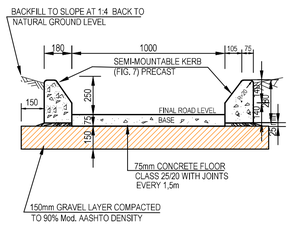
(GUIDELINE OF MAJOR TASKS TO BE USED IN DETERMINING RATE)

ORDER MATERIAL AND PROVIDE CONSTRUCTION WATER
SET OUT HORIZONTAL ALIGNMENT OF OUTLET CHUTE
SET OUT LEVELS FOR VERTICAL ALIGNMENT AND EXCAVATE
MATERIAL TO TOP OF INSITU LAYER
COMPACT INSITU MATERIAL TO 90% Mod AASHTO DENSITY
PLACE FIG. 7 PRECAST KERBS ON 1:8 CEMENT/RIVERSAND BEDDING
INSTALL SHUTTERING FOR STOP-ENDS AND CAST FLOOR WITH
CLASS 25/20 CONCRETE
FINISH WITH WOOD FLOAT, NOSING TOOL AND BLOCK BRUSH
FILL JOINTS ON KERBING WITH 1:3 CEMENT/SAND MORTAR
BACKFILL AREA BETWEEN KERB AND EDGE OF EXCAVATION
WITH SUITABLE MATERIAL TO LEVEL OF SIDEWALK
AND COMPACT TO 90% MOD. AASHTO DENSITY
CLEAN WORK AREA AND REMOVE RUBBLE



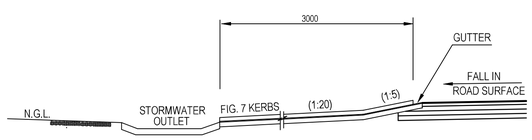
PLAN : STORMWATER OUTLET CHUTE

SCALE 1 : 100



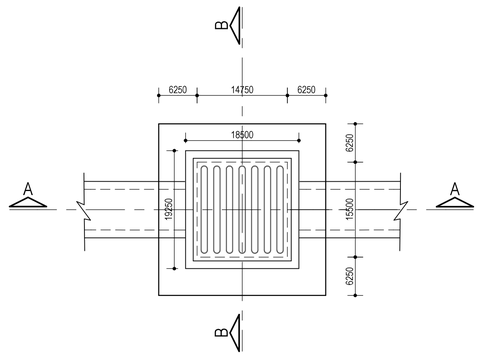
SECTION A - A

SCALE 1 : 20



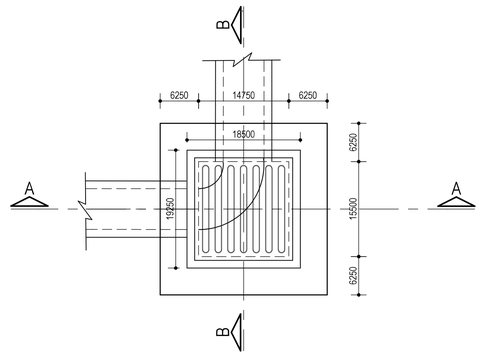
SECTION B-B

SCALE 1:100



PLAN ON STRAIGHT GRID INLET

SCALE 1 : 20



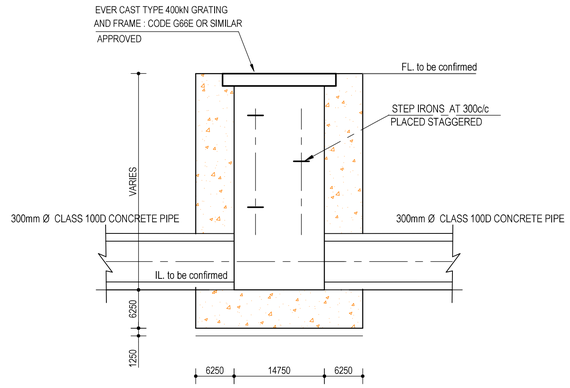
PLAN ON BEND GRID INLET

SCALE 1 : 20

NOTES / NOTAS :

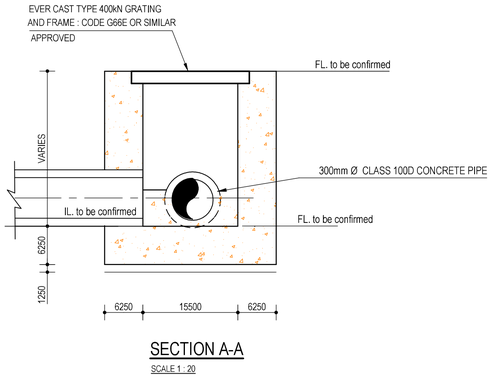
CONCRETE NOTES:

1. ALL CONCRETE SHALL HAVE A COMPRESSION STRENGTH OF 30 MPa AT 28 DAYS.
2. CONCRETE MUST BE CURED BY KEEPING IT WET FOR 7 DAYS AFTER PLACING AND BE KEPT COVERED WITH POLYTHENE SHEETING.
3. MAXIMUM SLUMP OF CONCRETE SHALL BE 50mm AND VIBRATORS SHALL BE USED DURING PLACING OF CONCRETE.
4. STRIPPING OF CONCRETE
   a. VERTICAL SIDES OF BEAMS AND SLABS = 2 DAYS
   b. SOFFITS OF SLABS AND STAIRS WITH PROPS = 7 DAYS
   c. VERTICAL SIDES OF WALLS AND COLUMNS = 3 DAYS
   d. SOFFIT OF BEAMS WITH PROPS = 14 DAYS
   e. REMOVAL OF PROPS = 21 DAYS
5. ALL EXCAVATIONS AND REINFORCING MUST BE INSPECTED BY THE ENGINEER BEFORE CONCRETING MAY COMMENCE.
6. ALL EXPOSED CONCRETE WORK MUST HAVE A SMOOTH FINISH.



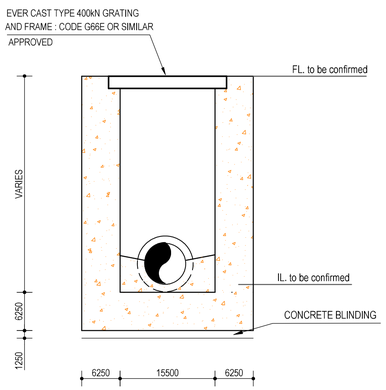
SECTION A-A

SCALE 1 : 20



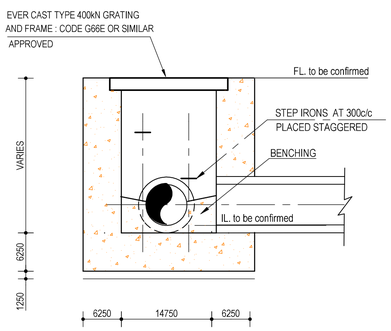
SECTION A-A

SCALE 1 : 20



SECTION B-B

SCALE 1 : 20



SECTION B-B

SCALE 1 : 20

AMENDMENTS				
NR.	DATE	APPROVED	DESCRIPTION	PAR

mdv developments

SKAAL / SCALE: AS SHOWN (ON A1)

VIP

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Reg No 97/05698/07

PROJEK / PROJECT

CIVIL ENGINEERING SERVICES FOR
ERVEN 425 & 426, PIENAARSRIVIER

DIENSDETAIL / SERVICE DETAIL

STORMWATER:
GENERAL DETAILS #2

VERWYSINGS NOMMER / REFERENCE NUMBER: F:\2161\DRAWINGS\

OPGEMEET / SURVEYED	ONTWERP / DESIGNED	GETEKEN / DRAWN
	J.J.v.R.	J.J.v.R.
NAGESIEN / CHECKED	**DATUM / DATE**	**SKAAL / SCALE**
S.P.	AUG 2021	

DIREKTEUR / DIRECTOR	RAADGEWENDE ING. / CONSULTING ENG.
S.P.	

ING. TEKENINGNOMMER / ENG. DRAWING NUMBER: 2161-D-AA-04

TEKENINGNOMMER / DRAWING NUMBER	GETAL VELLE / No. SHEETS

ANNEXURE C

GEOHYDROLOGICAL STUDY

by ACCURATE TRADING 47 (PTY)LTD

ANNEXURE D

HYDROLOGICAL CALCULATIONS

Utility Programs for Drainage
Flood calculations

Sinotech

Project name: MDV Pienaarsrivier
Analysed by: J Jansen van Rensburg
Name of river: On site
Description of site: Filling Station on Erf 425 & 426
Filename: F:\Projects\2001 - 3000\2121 - 2180\2161 MDV Pienaarsrivier -DEV\Design\Flood\Filling Station\On Site - Pre.fld
Date: 25 May 2021

Flood Frequency Analysis: Alternative Rational Method

Project	= MDV Pienaarsrivier
Analysed by	= J Jansen van Rensburg
Name of river	= On site
Description of site	= Filling Station on Erf 425 & 426
Date	= 2021/05/25
Area of catchment	= 0.015 km²
Dolomitic area	= 0.0 %
Length of longest watercourse	= 0.229 km
Flow of water	= Overland flow
Height difference	= 0.5 m
Value of r for over land flow	= Moderate grass (r=0,4)
Area distribution	= Rural: 100 %, Urban: 0 %, Lakes: 0 %

Catchment description - Urban area (%)

Lawns		Residential and industry		Business	
Sandy, flat (<2%)	0	Houses	0	City centre	0
Sandy, steep (>7%)	0	Flats	0	Suburban	0
Heavy soil, flat (<2%)	0	Light industry	0	Streets	0
Heavy soil, steep (>7%)	0	Heavy industry	0	Maximum flood	0

Catchment description - Rural area (%)

Surface slopes		Permeability		Vegetation	
Lakes and pans	70	Very permeable	35	Thick bush & forests	0
Flat area	30	Permeable	50	Light bush & cultivated land	5
Hilly	0	Semi-permeable	15	Grasslands	80
Steep areas	0	Impermeable	0	Bare	15

Days on which thunder was heard	= 60 days/year
Weather Services station number	= 550522
Weather Services station location	= PIENAARSRIVIER
Mean annual precipitation (MAP)	= 507 mm

Duration	2	5	10	20	50	100	200
1 day	54	75	90	107	131	151	173
2 days	66	91	109	129	157	180	206
3 days	74	103	125	148	182	210	240
7 days	91	128	154	182	222	255	290

The modified recalibrated Hershfield relationship was used to determine point rainfall.

Average slope	= 0.00218 m/m
Time of concentration	= 49.6 min
Run-off factor	
Rural - C1	= 0.262
Urban - C2	= 0.000
Lakes - C3	= 0.000
Combined - C	= 0.262

Return period (years)	Time of concentration (hours)	Point rainfall (mm)	ARF (%)	Average intensity (mm/h)	Factor Ft	Runoff coefficient (%)	Peak flow (m³/s)
1:2	0.83	25.59	100.0	30.94	0.75	19.7	0.026
1:5	0.83	43.17	100.0	52.19	0.80	21.0	0.046
1:10	0.83	56.46	100.0	68.27	0.85	22.3	0.064
1:20	0.83	69.76	100.0	84.34	0.90	23.6	0.084
1:50	0.83	87.34	100.0	105.60	0.95	24.9	0.111
1:100	0.83	100.64	100.0	121.67	1.00	26.2	0.135

Run-off coefficient percentage includes adjustment saturation factors (Ft) for steep and impermeable catchments

Calculated using Utility Programs for Drainage 1.1.0

Utility Programs for Drainage
Flood calculations

Sinotech

Project name: MDV Pienaarsrivier
Analysed by: J Jansen van Rensburg
Name of river: On site
Description of site: Filling Station on Erf 425 & 426
Filename: F:\Projects\2001 - 3000\2121 - 2180\2161 MDV Pienaarsrivier -DEV\Design\Flood\Filling Station\On Site - Pre.fld
Date: 25 May 2021

Summary of peak flows (m^3/s)

Method	1:2	1:5	1:10	1:20	1:50	1:100	1:200	Design year
Rational	0.026	0.037	0.050	0.066	0.090	0.117		50
Alternative rational	0.026	0.046	0.064	0.084	0.111	0.135		50
Unit hydrograph					0.017	0.023		
Standard design flood					0.858	1.069	1.291	
Empirical			0.331	0.450	0.623	0.789		50
Statistical: LN								
Statistical: LEV1								
Statistical: LP3								
Statistical: EV1								

Class of road = Class 1 Primary Distributors

Utility Programs for Drainage
Flood calculations

Sinotech

Project name: MDV Pienaarsrivier
Analysed by: J Jansen van Rensburg
Name of river: On site
Description of site: Filling Station on Stand 425 & 426
Filename: F:\Projects\2001 - 3000\2121 - 2180\2161 MDV Pienaarsrivier -DEV\Design\Flood\Filling Station\On Site - Post.fld
Date: 25 May 2021

Flood Frequency Analysis: Alternative Rational Method

Project	= MDV Pienaarsrivier
Analysed by	= J Jansen van Rensburg
Name of river	= On site
Description of site	= Filling Station on Stand 425 & 426
Date	= 2021/05/25
Area of catchment	= 0.015 km²
Dolomitic area	= 0.0 %
Length of longest watercourse	= 0.229 km
Flow of water	= Overland flow
Height difference	= 0.5 m
Value of r for over land flow	= Moderate grass (r=0,4)
Area distribution	= Rural: 0 %, Urban: 100 %, Lakes: 0 %

Catchment description - Urban area (%)

Lawns		Residential and industry		Business	
Sandy, flat (<2%)	0	Houses	0	City centre	0
Sandy, steep (>7%)	0	Flats	0	Suburban	8
Heavy soil, flat (<2%)	15	Light industry	0	Streets	45
Heavy soil, steep (>7%)	32	Heavy industry	0	Maximum flood	0

Catchment description - Rural area (%)

Surface slopes		Permeability		Vegetation	
Lakes and pans	0	Very permeable	0	Thick bush & forests	0
Flat area	0	Permeable	0	Light bush & cultivated land	0
Hilly	0	Semi-permeable	0	Grasslands	0
Steep areas	0	Impermeable	0	Bare	0

Days on which thunder was heard = 60 days/year
Weather Services station number = 550522
Weather Services station location = PIENAARSRIVIER
Mean annual precipitation (MAP) = 507 mm

Duration	2	5	10	20	50	100	200
1 day	54	75	90	107	131	151	173
2 days	66	91	109	129	157	180	206
3 days	74	103	125	148	182	210	240
7 days	91	128	154	182	222	255	290

The modified recalibrated Hershfield relationship was used to determine point rainfall.

Average slope	= 0.00218 m/m
Time of concentration	= 49.6 min
Run-off factor	
Rural - C1	= 0.000
Urban - C2	= 0.621
Lakes - C3	= 0.000
Combined - C	= 0.621

Return period (years)	Time of concentration (hours)	Point rainfall (mm)	ARF (%)	Average intensity (mm/h)	Factor Ft	Runoff coefficient (%)	Peak flow (m³/s)
1:2	0.83	25.59	100.0	30.94	0.75	62.1	0.081
1:5	0.83	43.17	100.0	52.19	0.80	62.1	0.137
1:10	0.83	56.46	100.0	68.27	0.85	62.1	0.179
1:20	0.83	69.76	100.0	84.34	0.90	62.1	0.221
1:50	0.83	87.34	100.0	105.60	0.95	62.1	0.277
1:100	0.83	100.64	100.0	121.67	1.00	62.1	0.319

Run-off coefficient percentage includes adjustment saturation factors (Ft) for steep and impermeable catchments

Calculated using Utility Programs for Drainage 1.1.0

Utility Programs for Drainage
Flood calculations

Sinotech

Project name: MDV Pienaarsrivier
Analysed by: J Jansen van Rensburg
Name of river: On site
Description of site: Filling Station on Stand 425 & 426
Filename: F:\Projects\2001 - 3000\2121 - 2180\2161 MDV Pienaarsrivier -DEV\Design\Flood\Filling Station\On Site - Post.fld
Date: 25 May 2021

Summary of peak flows (m³/s)

Method	1:2	1:5	1:10	1:20	1:50	1:100	1:200	Design year
Rational	0.082	0.111	0.141	0.174	0.226	0.278		50
Alternative rational	0.081	0.137	0.179	0.221	0.277	0.319		50
Unit hydrograph					0.768	1.078		
Standard design flood					0.354	0.449	0.549	
Empirical			0.341	0.462	0.641	0.811		50
Statistical: LN								
Statistical: LEV1								
Statistical: LP3								
Statistical: EV1								

Class of road = Class 1 Primary Distributors

ANNEXURE E

TRAFFIC IMPACT STUDY

ANNEXURE F

WASTE GROUP PERMIT

GAUTENG
PROVINCIAL GOVERMENT
REPUBLIC OF SOUTH AFRICA

CERTIFICATE OF REGISTRATION

This is to certify that

The Waste Group

Has been registered as a

Waste Transporter
General and Hazardous

With the Gauteng Department of Agriculture and Rural Development and has been issued with the following registration number for use when reporting to the Gauteng Waste Information System.

GPT-00-007

Date of Registration: **18 March 2020**

Date of Expiry: **18 March 2022**