



**PRE-FEASIBILITY REPORT FOR THE
PROVISION OF CIVIL STORMWATER MANAGEMENT
SERVICES FOR THE PROPOSED DEVELOPMENT OF
PROPERTIES IN CATO RIDGE FOR THE CATO RIDGE
DEVELOPMENT COMPANY**

MAY 2023

K&T PROJECT REFERENCE: 20207/ SWM O

REVISION 1



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Engineering African Development



Details of this report

Client Name	CATO RIDGE DEVELOPMENT COMPANY
Document Title	PRE-FEASIBILITY REPORT FOR THE PROVISION OF CIVIL STORMWATER MANAGEMENT SERVICES FOR THE PROPOSED DEVELOPMENT OF PROPERTIES IN CATO RIDGE FOR THE CATO RIDGE DEVELOPMENT COMPANY
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Prepared by	R. Keppler

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1	29/05/2023	Amendments to the Report

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For and on behalf of	
Kantey & Templer (Pty) Ltd	
Approved by:	Kevin Hohls
Signed:	
Position:	Professional Engineer
Date:	29 May 2023

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1. EXECUTIVE SUMMARY

Kantey & Templer PTY LTD has been appointed by the Cato Ridge Development Company (CRDC) to compile a Pre-Feasibility Engineering Services Report in order to obtain preliminary approval from the service authorities for the proposed bulk service provision for the new Cato Ridge Development. This report documents the Proposed Stormwater Management Plan for the Proposed Development.

The greater Cato Ridge area has been considered for a number of years as a major metropolitan industrial growth node within eThekweni as well as fulfilling the role of “back of port” logistics along the N3 [SIP2] logistics corridor between Gauteng and Durban

The proposed development has been programmed to be implemented in 3 Priority Phases

Due to the future road upgrades required and planned upgrade of the bulk trunk water and sewer lines by the eThekweni Municipality in 2031/2032 this proposed development will be unlocked in an incremental approach as follows:-

PHASE 1

Phase 1 is programmed to be unlocked within the next 18 months and will be phased in over the next 10 year period as and when the demand arises.

PHASE 2

Phase 2 will be implemented over the next 11 to 20 years

PHASE 3

Phase 3 will be implemented over the next 21 to 25 years

2. INTRODUCTION

Kantey & Templer PTY LTD was appointed by the Cato Ridge Development Company (CRDC) to compile a Pre-Feasibility Engineering Services Report in order to obtain preliminary approval from the service authorities for the proposed bulk service provision for the new Cato Ridge Development in KwaZulu-Natal in support of the Environmental Impact Assessment Application update as per the Executive Summary. This report provides details of the Proposed Stormwater Management Plan for the proposed development

2.1 Location & Access

The proposed development is 351 hectares in extent and is located in Cato Ridge which is located on a greenfields site.

The site locality plan is attached in Annexure A of this document.

The development has been programmed to be implemented in three (3) Phases. The co-ordinates (centre) of each Phase are as follows:

Table 1: Phase 1, 2 & 3 co-ordinates		
Phases	Y- CORDINATES	X- CORDINATES
Phase 1	+37 068	+3 289 114
Phase 2	+36 175	+3 286 829
Phase 3	+37 224	+3 290 057

Access to the development is via the R103 and Eddie Hagen Road.

3. DEVELOPMENT PHASING

The Cato Ridge Development is divided into three (3) separate development phases.

The timeframes above is dependent on a fluctuating economy, market trends and property demands which may change.

Due to the future road upgrades required and planned upgrade of the bulk trunk water and sewer lines by the eThekweni Municipality in 2031/2032 this proposed development will be unlocked in an incremental approach as follows:-

3.1 PHASE 1

Phase 1 is 131 Ha and is programmed to be unlocked within the next 18 months and will be phased in over the next 10 year period as and when the demand arises which will be carried out as follows:-

- 1) The lower section of Phase 1 along the R103 and up to the Assmang turnoff along Eddie Hagan Drive is to be phased in over the next 5 years.
- 2) The upper section of Phase 1 from the Assmang Turn-off upto the Macro Turn-off along Eddie Hagan Drive is to be phased in over the next 5 to 10 years.

3.2 PHASE 2

The total proposed area for Phase 2 is 174 Ha.

It is proposed to develop Phase 2 into two sections which are as follows:-

- 1) The first section of Phase 2 will include up to the high point of the site, which is approximately 400metres of the southern section of Phase 2.
 - As there is sufficient water supply in the area it is proposed that this southern section of Phase 2 is developed in conjunction with Phase 1.
 - This first section of Phase 2 is programmed to be unlocked within the next 18 months and will be phased in over the next 10 years
- 2) The second section of Phase 2 will include the balance of Phase 2 from the high point northwards which will only be unlocked after the service infrastructure has been completed in the Cato Ridge Area. This planned implementation is as follows:-
 - The eThekweni Municipality is currently programming to upgrade the bulk water & sewer reticulation in 2031/ 2032. It will not be economically viable to develop the northern portion of Phase 2 prior to the upgrade of the bulk water & sewer being carried out by Municipality.
 - The roads and electrical reticulation will need to be upgraded.

As a result the northern portion of Phase 2 will only be implemented over the next 11 to 20 years.

3.3 PHASE 3

There has been interests from the surrounding land owners to purchase land in close proximity to their existing properties and they will therefore be responsible to install their own services.

The remaining land for development is relatively minor and has been considered within this report.

Phase 3 will be implemented over the next 21 to 25 years

3.4 General

The proposed development is zoned as follows:-

- 1) Phase 1 & 2 are presently zoned "General Industry 2"
- 2) Phase 3 is presently zoned "Residential Small Holding 3"

The Bulk & Internal services will be designed according to accepted engineering specifications and principles as well as acceptable environmental requirements and specifications, as provided in approved environmental scoping and impact assessment reports. The following engineering services for the development of the area are proposed and are based on the following assumptions:-

- a) The level of service will cater for light industry logistics and warehouses, on the proposed development site.
- b) Where possible, the services will be designed to connect to the existing and proposed new Municipal, SANRAL & Department of Transport services infrastructure.
- c) The provision of services to the proposed development will be designed to ministerial norms and standards and generally in accordance with the "Guidelines for the Provisions of Engineering Services and Amenities in Residential Townships" (Red Book).

4. BULK INFRASTRUCTURE

4.1 Existing Road & Stormwater Infrastructure

Existing Roads

The present road network to the site and within the site is via the R103 and Eddie Hagan Road

Existing Stormwater

The existing R103, Eddie Hagan Drive, District Road 1022 and other minor existing roads do have existing stormwater that discharges into low points and valley lines.

5. PROPOSED BUILDING DEVELOPMENT

5.1 Cato Ridge Phased Development

The table below indicates the three (3) Phases for the proposed development.

Table 2 Warehouse/ Industrial Net Land Area		
Phases	Warehouse Nett land area (HA)	Industrial Nett Land Area (HA)
Phase 1	60.305	60.305
Phase 2	74.015	74.015
Phase 3	19.31	19.31
TOTAL	153.63	153.63

Please refer to Paragraph 3 for the Development Phasing which is on page 3 of this report which provides details of Phase 1, Phase 2 & Phase 3 for the proposed development

6. NEW INFRASTRUCTURE

6.1 Road Network

Roads will be constructed to:-

- 1) Red Book - Guidelines for Human Settlement Planning and Design
- 2) SANS 1200 – Standardized Specification for Civil Engineering Construction
- 3) Local Municipal Standards

A Traffic Impact Assessment was carried out by David McFarlane and Associates which is attached in Annexure D (Revision 5 dated 13 March 2023) and is summarised as follows:-

6.2 Phasing of Road Infrastructure

There is an opportunity to make an initial start of developing the first few sites as the current road network does have spare capacity so the development could start without any initial interventions.

Between the initial start of developing the first sites and full development there is clearly opportunity to phase in the required infrastructure to match the take-up of the development. The potential sequence of events is as listed below for the upgrades to the R103 and Eddie Hagan:-

- a) The current road network has spare capacity, so the development could make a start with no initial interventions.
- b) The N3 Cato Ridge Interchange will need to be signalised as the capacity is reached.
- c) Once the N3 Cato Ridge Interchange reaches capacity then the N3 KwaXimba Interchange will need to be constructed which will occur around 40% of the full development of this project.
- d) The identified upgrades to Eddie Hagen Drive could also be phased in to match the progress on the development. The upgrade of Eddie Hagan Drive to 2 + 2 lanes could be as far as Eddie Hagan/ Assmang intersection as the first phase of the development, which can then be extended further north for phase 2 of the project.

6.3 Internal Roads

The design criteria will generally be based on the design standards of the Guidelines for the Provision of Engineering Services and Amenities in Residential Township Development.

The following criteria will be used in the geometric design of the roads.

Main Street Roads	:	7.0 m wide
Design Speed	:	Between 40 to 60 km/h
Crossfall	:	2.5%
Min. K Value	:	4
Min V L length	:	20 m
Right of Way Servitude width	:	15.24m
Cut slopes in-situ soil	:	1:1,5
Cut slopes in bedrock	:	1:0,1 (almost vertical depending on specific bedrock characteristics)
Fill slopes	:	1:1,5 (maximum)
Longitudinal gradient	:	Close to natural ground (maximum 10%)

6.4 Road Recommendations

Our recommendation [from a traffic impact view point only] is that the proposed development be allowed to proceed, provided the various mitigation measures identified are timeously

6.5 Stormwater piping & Attenuation Ponds

- 1) The stormwater pipes vary in size from 450 Diameter to 900 diameter which will be constructed as per drawing No 20207 –DSW 01 Revision I
- 2) Please refer to the attached stormwater pipe size & length of pipe spreadsheet which is attached in Annexure E.
- 3) The Stormwater attenuation ponds are indicated on drawing No 20207- DSW 01 Rev I

7. STORMWATER MANAGEMENT SYSTEM

7.1 Introduction

The stormwater design concept for the proposed development in Cato Ridge must comply to all Environmental and eThekweni Municipality requirements and specifications.

The traditional design of storm water drainage systems collects and confines storm water runoff as rapidly as possible to a suitable location where it can be discharged. This traditional design can however result in drainage and flooding problems downstream unless erosion protection measures are implemented.

The road network stormwater management system will be designed to accommodate both the 351 hectare development footprints and the roads.

7.2 Objective

The objective of a storm water management plan should be to manage the storm water resources of the collective watersheds to:

- Prevent erosion and flood damage
- Preserve the natural and beneficial functions of the natural drainage system
- Preserve and enhance storm water quality.

The storm water management strategy will be to collect all surface runoff, pass it through an attenuation detention system before discharging the water into the natural drainage systems.

The storm water drainage network system will be kept separate from the waste water.

7.3 Stormwater Design

The stormwater management principles applied to the proposed Cato Ridge development to accommodate the stormwater run-off is separated into two sections which are as follows:-

7.3.1 All developable Erf/ Sites to be responsible for their own stormwater design and attenuation infrastructure.

A standard condition will be incorporated in all Purchase or Rental Agreements for each erf/stand that the Developer/ Landowner/ Tenant will be responsible to submit a stormwater management plan to the eThekweni Municipality for approval. This shall include:-

- a) a stormwater design to attenuate the infrastructure into attenuation ponds or attenuation within the hardstands/ parking area. Other local on-site attenuation may be considered which includes grass-lined drains and swales, storm water infiltration systems undulations, landscaping etc. The attenuation volume will be designed for a 1 in 50 year event.
- b) A throttling manhole will be designed and sized accordingly at the attenuation outlet to cater for the pre and post stormwater flows with an appropriately sized outlet pipe (refer to Annexure I for the throttling pipe size and outlet pipe size).
- c) stormwater reticulation pipelines, channels, energy dissipation measures etc.
- d) Erosion protection where required.
- e) Details of the stormwater discharge tie into point into the bulk Municipal road stormwater system
- f) All internal stormwater pipes will be gravity reticulated via the sub-catchments across the site.

7.4 Roads Stormwater

7.4.1 Stormwater inlet at attenuation ponds

The bulk stormwater has been designed for a minimum 1 in 50 year event

Storm water from the roads and surface channels will be collected through inlets and piped across or parallel to the roads, which shall be within the road reserve, to points where the water will be discharged into attenuation ponds in an efficient, safe and environmental acceptable manner. Please refer to Drawing no 20207-DSW 01 Revision I in Annexure B for details of the stormwater reticulation system and proposed attenuation ponds.

Each attenuation pond will be designed accordingly and constructed with throttling manholes at the outlets to restrict the outlet flow in the event of a heavy storm. The design will cater for the pre and post stormwater flows from the roads prior to discharging into the valleys and low lying areas.

The attenuation ponds will be dry and will only be a temporary storage in the event of heavy rainfall. The discharge from the attenuation pond will be restricted by the throttling manhole.

The velocity and energy of the stormwater discharge will be reduced when entering the stormwater attenuation ponds by carrying out the following:-

- 1) Constructing the inlet headwall with dissipator blocks.
- 2) Gabion baskets/ rip rap at the inlet to prevent erosion.
- 3) vegetating around the entire pond.

7.4.2 Stormwater discharge points at attenuation pond outlets:-

Where the stormwater outlets discharge into the drainage line or wetland buffer they will be managed with the construction of a headwall with dissipator blocks, a gabion structure to dissipate the flow (Please see detail Annexure C for details).

This is highlighted in more detail in the Method Statement for Construction Activities for the Proposed Development of Properties in Cato Ridge. Please refer to Annexure F for details. Additional erosion protection measures will be required where necessary.

7.4.3 Environmental sensitive Area

There are 6 specific areas in the table below which describe the storm water runoff and sewer crossing that discharge within the watercourse that require a Method Statement:-

Point Number	Description	Watercourse
1	Stormwater discharge point , plus stormwater pipeline	S6
2	Stormwater discharge point , plus stormwater pipeline	S11
3	Effluent Discharge Point	Within R3 drainage line
4	Stormwater discharge point , plus stormwater pipeline	R3 and R4 drainage line and within the 33m drainage buffer
5	Stormwater discharge point , plus stormwater pipeline	R2 and drainage buffer
6	Stormwater discharge point , plus stormwater pipeline	R2 Drainage line

The 6 specific areas are indicated in blocks on the attached Master Layout of the Water Uses associated with the project which is attached in Annexure G.

7.4.3.1 Sewer Outlet

There is one sewer outlet that requires a method statement as it discharges within the R3 drainage line.

Please refer to the Civils Sewer Services Report for the headwall detail and erosion protection.

As indicated above the storm water runoff and sewer will be discharged via 6 outlets into the watercourses or wetland buffer zones. Where possible, these discharge points will be further managed with the construction of swales that will retain, sink and spread the storm water runoff. This construction work will be undertaken within the wetland buffer and drainage lines.

Please refer to Annexure H for the delineated wetlands and low impact mixed use combined watercourses.

7.5 Method Statement for Construction Activities

Please refer to Annexure F for the Method Statement for Construction Activities for the Proposed Development of Properties in Cato Ridge for the 5 stormwater discharge outlets that require a method statement.

7.6 Additional Erosion Protection Measures

In addition to paragraph 7.4.3 Environmental sensitive Area the following additional erosion protection measures will be implemented where required:-

- 1) Grass lined open drains will be installed which will assist in retaining sediment and reduce the velocity of the flows.

- 2) Where applicable concrete channels or concrete pipes will be installed from the attenuation pond outlets which will be directed within the existing road network to avoid further impact on the environment. This will reduce the registration of servitudes through tribal authority areas. Road Servitudes will be registered where required in the remaining disturbed areas.
- 3) The drains and stormwater pipe network will prevent flooding of houses and reduce the safety risk within the area.
- 4) Where there are no structures or erf/stands the outlet will discharge directly onto the site with erosion protection where deemed necessary.
- 5) The design measures incorporated will take measures into account to reduce the impact on disturbing the biodiversity in the area. Where possible, stormwater discharge points will be directed to follow areas that have already been disturbed by the existing road footprint.
- 7) Where possible, the stormwater will discharge into an open area to allow water to dissipate before entering into the river systems.
- 8) It is essential that appropriate erosion control measures be taken into consideration at the various storm water discharge points located throughout the site to limit erosion on the receiving environment e.g. at headwalls and culverts.
- 9) Steep water courses may require additional protection from erosion through the use of lined channels, controlled drops etc. in order to dissipate flow energy.
- 10) Road intersections should be designed to prevent localised flooding
The storm water system must be kept separate from the wastewater (sewer) drainage system
- 11) Suitable erosion protection measures will be installed at all discharge points. At each attenuation pond dissipator blocks with a gabion retaining structure (see attached detail in Annexure C) will be constructed after each throttling manhole/headwall outlet to reduce the stormwater velocity at the outlet which will reduce erosion.
- 12) On completion of the construction work, the site will be contoured to ensure free flow of runoff and to prevent ponding of water. Drainage will be controlled to ensure that runoff from the site will not culminate in off - site pollution or result in damage to properties downstream of any storm water discharge.
- 13) During final design stages erosion protection will be designed to comply to Municipal standards. Special precautions will be carried out to ensure that a designed storm water discharge route is approved to prevent erosion or flooding in the valleys and low lying areas which also have residential houses in areas.
- 14) The attenuation ponds are a temporary storage facility and will only fill up in the event of heavy rainfall event.

7.7 Stormwater pipe specifications & standards

The standards for the storm water infrastructure to be installed with the proposed road development can be summarised as follows:

- Flood occurrence interval : 50 years
- Pipe Material : Concrete
- Pipe class : Minimum 75D in road reserve and 100D at road crossings.
Each Site Developer will be responsible for their own stormwater within the sites to be developed
- Pipe diameters : minimum 450φmm diameter within the road reserve and discharging from the road reserve. Each developer will be

- responsible for their own stormwater within the sites to be developed
- Bedding : Class C
 - Inlets : Manhole
 - Junctions : Points of deflections on pipelines
 - V-drains : Concrete lined open channels
 - Cut-off drains : Grass lined channels and berms

7.8 Planning Construction

In the planning for the design phase, cognizance is taken of the following reference documents:-

- 1) Red Book - Guidelines for Human Settlement Planning and Design
- 2) SANS 1200 – Standardized Specification for Civil Engineering Construction
- 3) Local Municipal Standards

KANTEY AND TEMPLER CONSULTING ENGINEERS

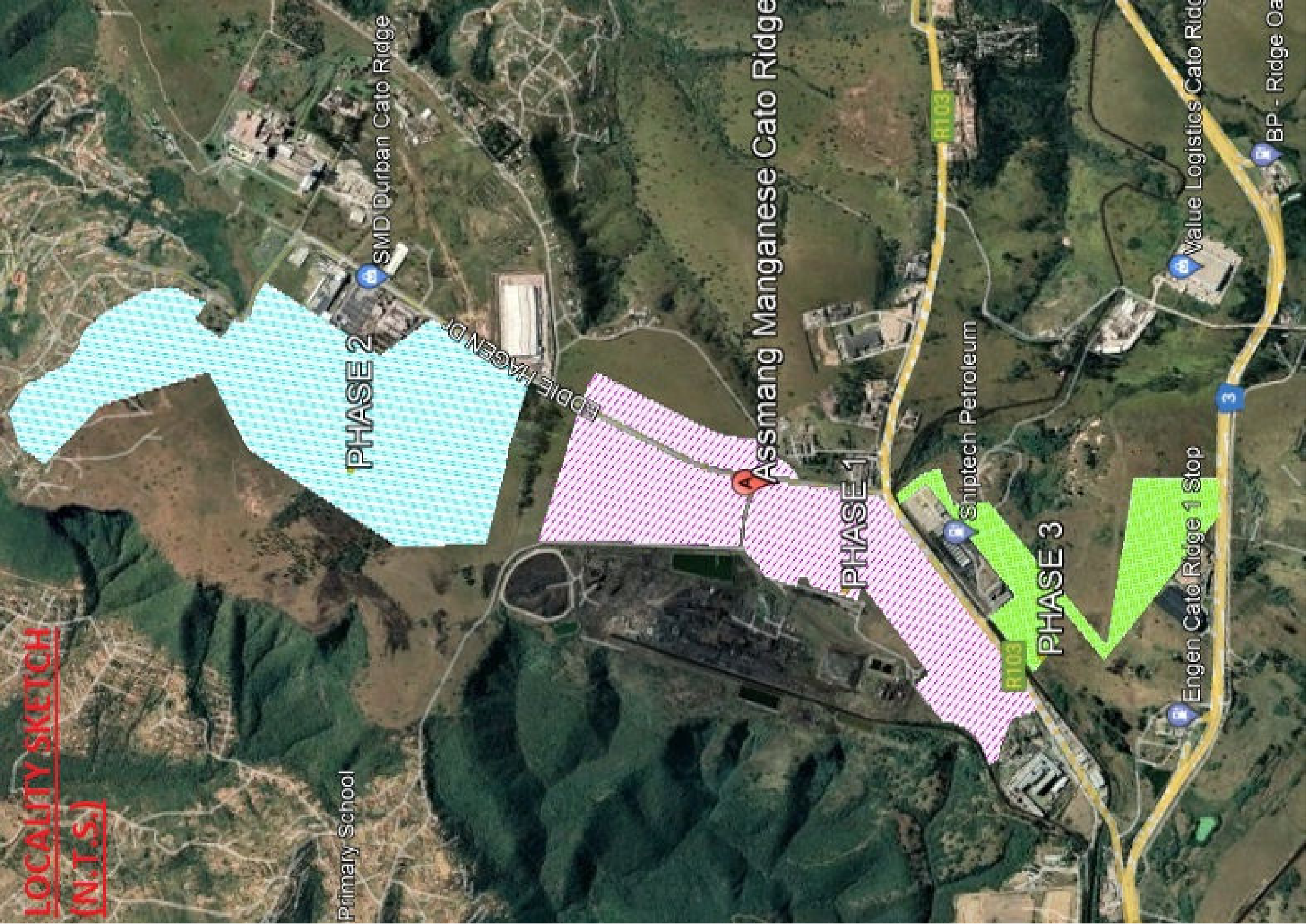


KEVIN HOLHS
Pr. Eng. 20060264
EXECUTIVE ASSOCIATE

ANNEXURES

ANNEXURE A – SITE LOCALITY PLAN

LOCALITY SKETCH
(N.T.S.)



Primary School

PHASE 2

SMD Durban Cato Ridge

EDDIE HAGEN DR

Assmang Manganese Cato Ridge

PHASE 1

Shiptech Petroleum

PHASE 3

Engen Cato Ridge 1 Stop

Value Logistics Cato Ridge

BP - Ridge Oa

R103

3

ANNEXURE B – STORMWATER LAYOUT DRAWING



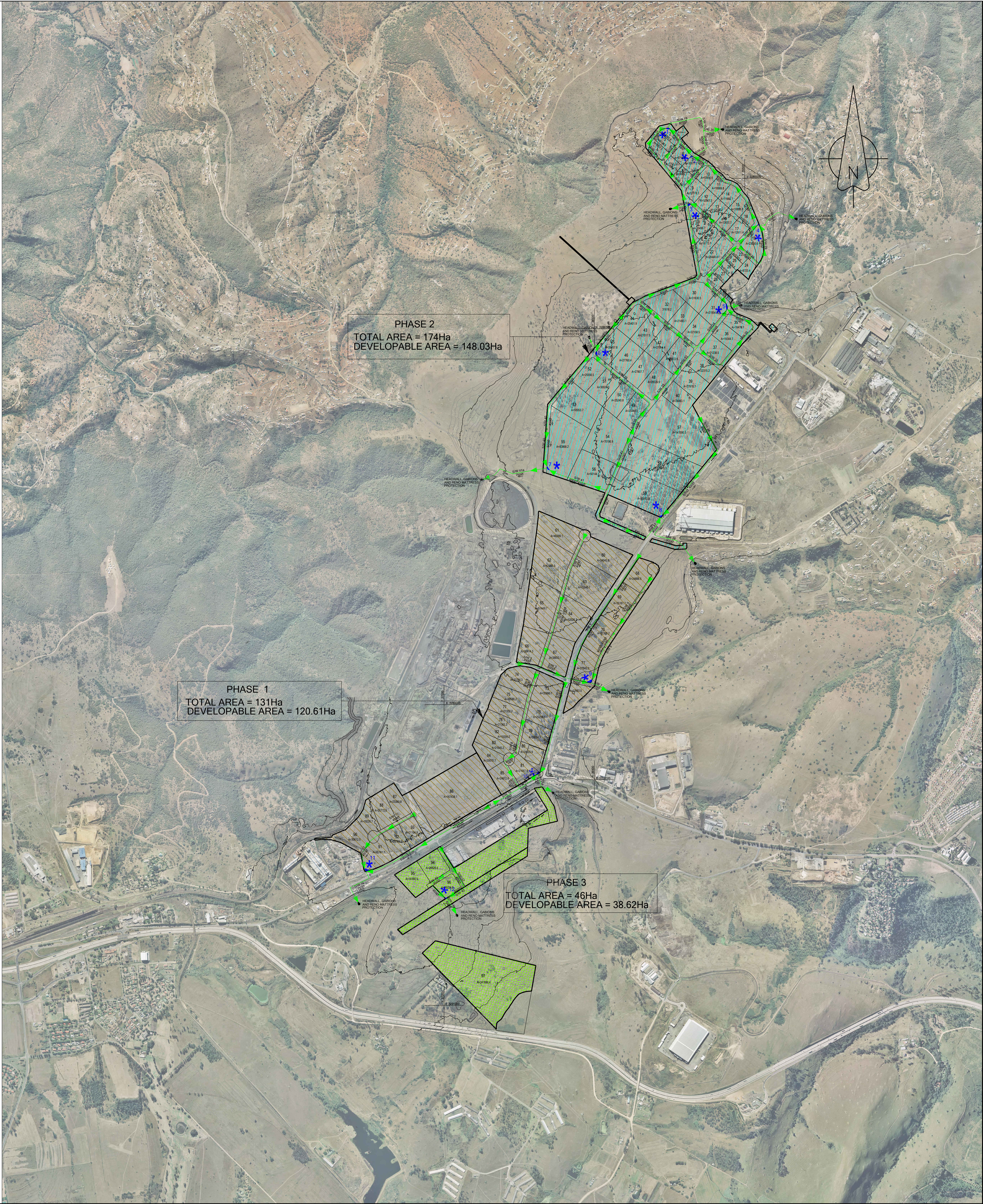
LOCALITY SKETCH
N.T.S

PONDS:		
POND NUMBER	ROAD LENGTH (m)	VOLUME (m³)
1	1127	130
2	877	101
3	1508	174
4	509	59
5	2233	257
6	1708	197
7	1067	123
8	1260	145
9	3456	398
10	1720	198
11	1712	197
12	896	71

LEGEND:
STORMWATER LINE:

STORMWATER LINE	PIPE SIZE (mm dia.)	LENGTH (m)	STORMWATER LINE	PIPE SIZE (mm dia.)	LENGTH (m)	STORMWATER LINE	PIPE SIZE (mm dia.)	LENGTH (m)
1	450	567.639	16	450	174.748	34	600	259.083
	600	382.737	17	450	124.125	35	450	484.236
2	450	167.040	18	450	72.430	600	191.654	
3	600	217.522	19	600	330.318	35a	750	40.067
4	450	586.781	20	900	81.966	36	450	312.789
	600	364.289	21	450	421.944	600	205.670	
5	450	563.021	22	450	211.531	37	450	648.853
	600	209.391	23	600	37.218	38	900	443.112
6	900	78.142	24	600	229.235	39	450	515.375
7	900	84.000	25	450	380.635	600	178.237	
8	450	559.864	26	450	596.343	39a	450	211.623
	600	307.655	26a	600	483.504	39b	450	98.861
9	450	604.002	750	66.777	40	450	580.825	
10	450	205.469	26b	450	135.596	600	161.652	
11	600	127.218	27	450	295.602	41	450	589.106
12	450	516.044	28	450	151.648	600	158.654	
13	450	640.347	29	450	407.525	41a	750	414.603
	600	264.950	30	600	235.390			
14	750	264.082	31	450	165.117	42	450	399.639
15	450	444.429	32	450	375.217	43	450	230.159
	600	145.262	33	450	468.960	44a	600	78.567

PIPE SIZES & LENGTHS (m)	
450mm dia.	12917.203
600mm dia.	4568.346
750mm dia.	785.529
900mm dia.	687.220
TOTAL PIPE SIZE LENGTHS (m)	18958.798



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REFERENCE DRAWING

I	PIPE SIZES & LENGTHS REVISED	SKM	KH	01/06/23
H	PHASES & LAYOUT REVISED	SKM	KH	14/04/23
G	S/WATER LAYOUT AMENDED AND	SKM	KH	04/04/23
PIPE SIZES ADDED				
F	S/WATER LAYOUT AMENDED	SKM	KH	03/02/23
E	S/WATER LAYOUT AMENDED	SKM	KH	23/01/23
D	S/WATER LAYOUT AMENDED	SKM	KH	25/10/22
C	S/WATER LAYOUT AMENDED TO SUITS	SKM	KH	06/10/22
LAYOUT CHANGES-FOR DISCUSSION				
B	ISSUED FOR DISCUSSION	ZC	RK	22/08/22
A	ISSUED FOR DISCUSSION	ZC	KH	02/08/22
REV	DESCRIPTION	DR	APP	DATE
		INITIALS	SIGN	DATE
DESIGNED		RK		
DRAWN		ZC		
PROJECT ENG.		KH		
APPROVED				

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CLIENT
CATO RIDGE
DEVELOPMENT COMPANY(Pty) Ltd

PROJECT
CATO RIDGE
PHASED DEVELOPMENT

TITLE
PROPOSED
STORMWATER LAYOUT

SCALE : 1:10000

DRAWING No. 20207-DSW 01

REV 1

KT-print-A0.dwg (SCALE) A0 SHEET



LOCALITY SKETCH
N.T.S

PONDS:			
POND NUMBER	ROAD LENGTH (m)	VOLUME (m³)	
1	1127	130	
2	877	101	
3	1508	174	
4	509	59	
5	2233	257	
6	1708	197	
7	1067	123	
8	1260	145	
9	3456	398	
10	1720	198	
11	1712	197	
12	896	71	

LEGEND:

STORMWATER LINE:

STORMWATER LINE	PIPE SIZE (mm dia.)	LENGTH (m)	STORMWATER LINE	PIPE SIZE (mm dia.)	LENGTH (m)	STORMWATER LINE	PIPE SIZE (mm dia.)	LENGTH (m)
1	450	567.619	16	450	174.748	34	600	259.083
	600	382.737	17	450	124.125	35	450	484.236
2	450	167.040	18	450	72.430	600	191.694	
3	600	217.532	19	600	330.318	35a	750	40.057
4	450	596.781	20	900	81.966	36	450	312.789
	600	364.289	21	450	421.944	600	205.870	
5	450	563.021	22	450	211.531	37	450	648.853
	600	209.391	23	600	37.218	38	900	443.112
6	900	78.142	24	600	229.235	39	450	515.375
7	900	84.000	25	450	380.635		600	178.237
8	450	559.864	26	450	596.343	39a	450	211.623
	600	307.655		600	483.504	39b	450	98.861
9	450	604.002	26a	750	66.777	40	450	580.825
10	450	205.469	26b	450	135.596		600	161.652
11	600	127.218	27	450	295.602	41	450	580.106
12	450	516.044	28	450	151.648		600	158.654
13	450	640.547	29	450	407.525	41a	750	414.603
	600	264.950	30	600	235.330			
14	750	264.082	31	450	165.117	42	450	399.639
15	450	444.429	32	450	375.217	43	450	230.159
	600	145.262	33	450	468.900	44a	600	78.567

PIPE SIZES & LENGTHS (m)	
450mm dia.	12917.703
600mm dia.	4568.346
750mm dia.	785.529
900mm dia.	687.220
TOTAL PIPE SIZE LENGTHS (m)	18958.798

PHASE 1
TOTAL AREA = 131Ha
DEVELOPABLE AREA = 120.61Ha

PHASE 2
TOTAL AREA = 174Ha
DEVELOPABLE AREA = 148.03Ha

PHASE 3
TOTAL AREA = 46Ha
DEVELOPABLE AREA = 38.62Ha

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REFERENCE DRAWING

I	PIPE SIZES & LENGTHS REVISED	SKM	KH	01/06/23
H	PHASES & LAYOUT REVISED	SKM	KH	14/04/23
G	S/WATER LAYOUT AMENDED AND	SKM	KH	04/04/23
PIPE SIZES ADDED				
F	S/WATER LAYOUT AMENDED	SKM	KH	03/02/23
E	S/WATER LAYOUT AMENDED	SKM	KH	23/01/23
D	S/WATER LAYOUT AMENDED	SKM	KH	25/10/22
C	S/WATER LAYOUT AMENDED TO SUIT	SKM	KH	06/10/22
LAYOUT CHANGES-FOR DISCUSSION				
B	ISSUED FOR DISCUSSION	ZC	RK	22/08/22
A	ISSUED FOR DISCUSSION	ZC	KH	02/08/22
REV	DESCRIPTION	DR	APP	DATE
		INITIALS	SIGN	DATE
DESIGNED		RK		
DRAWN		ZC		
PROJECT ENG.		KH		
APPROVED				

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CONSULTING ENGINEERS
Engineering African Development
PO BOX 290 HILTON SOUTH AFRICA 3245 TEL +27 33 347 5453

CLIENT LOGO



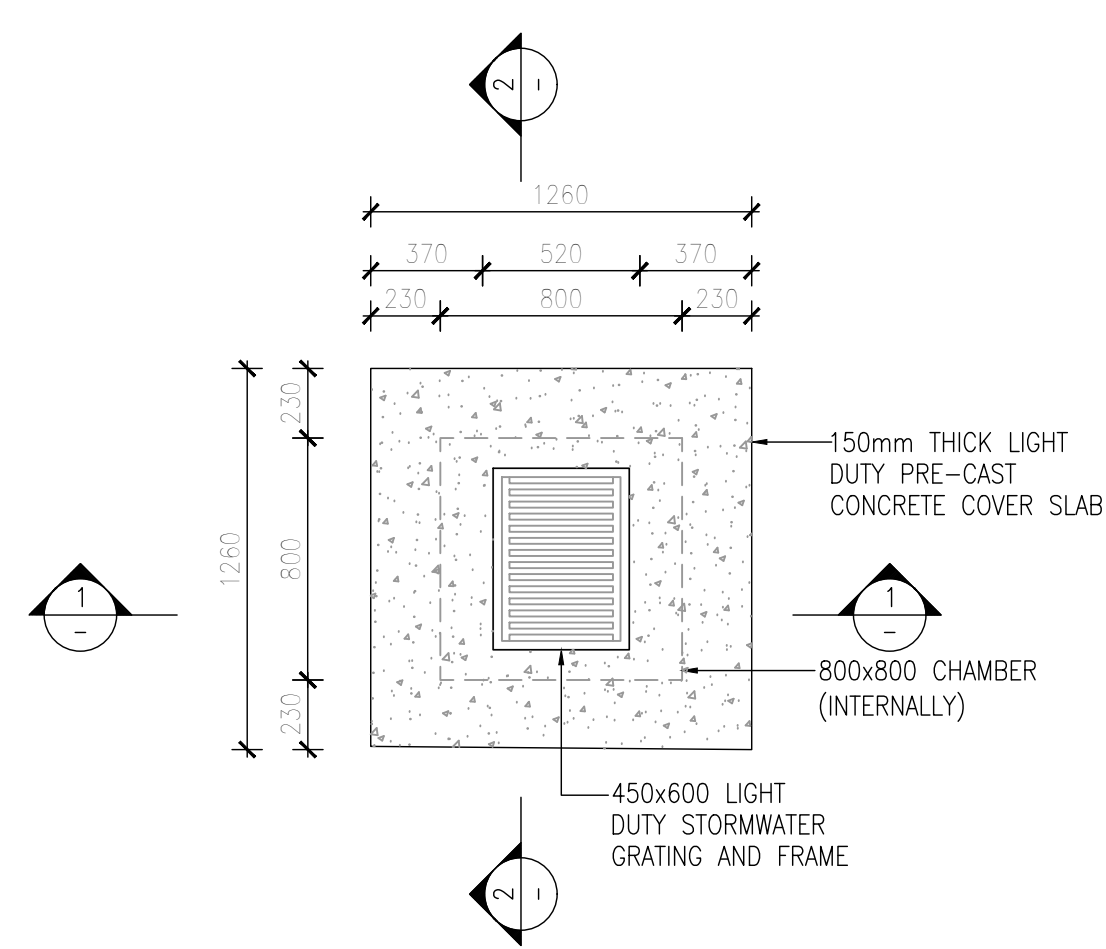
CLIENT
CATO RIDGE DEVELOPMENT COMPANY(Pty) Ltd
PROJECT
CATO RIDGE PHASED DEVELOPMENT

TITLE
PROPOSED STORMWATER LAYOUT

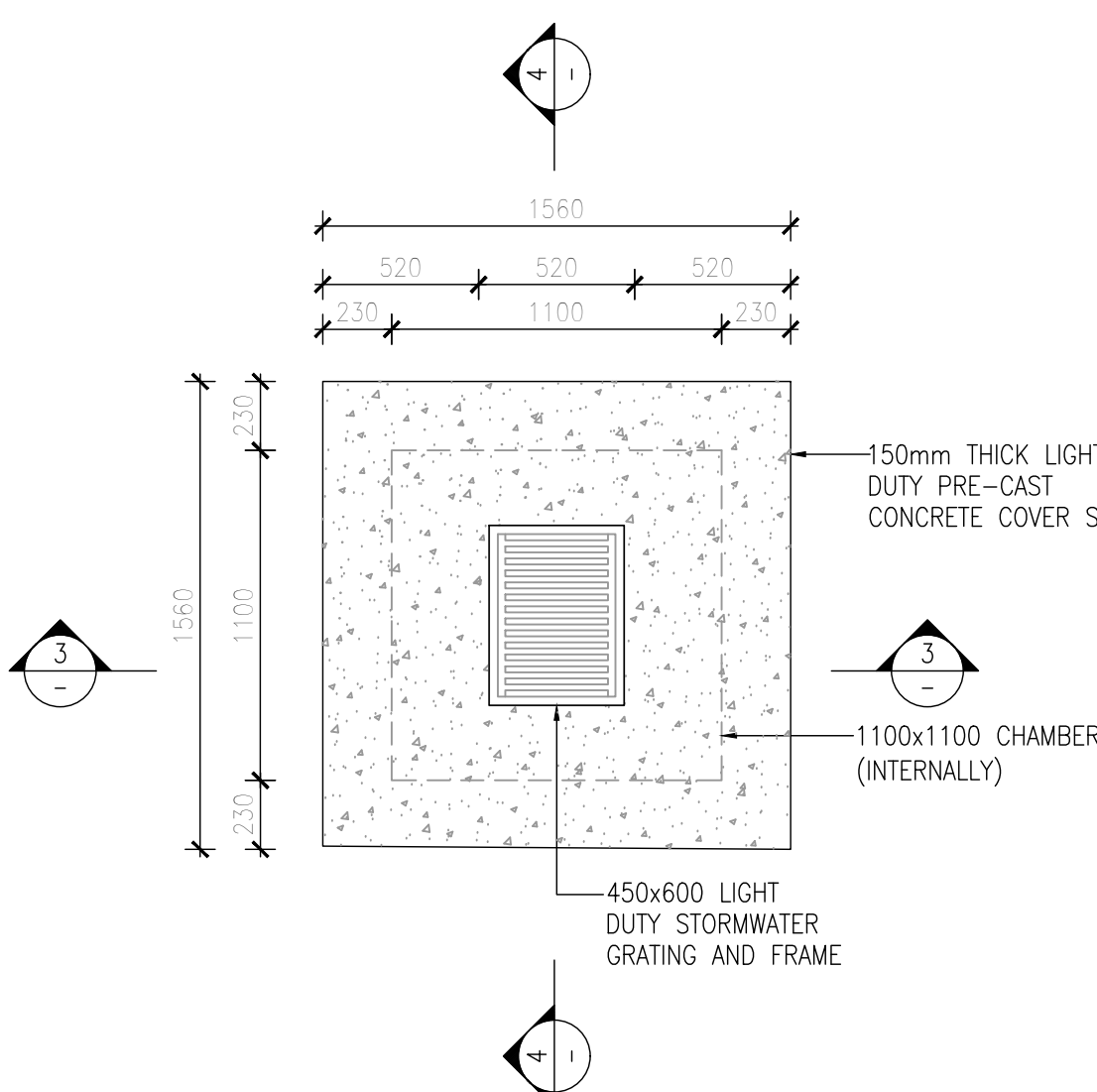
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DRAWING No. 20207-DSW 02
REV 1

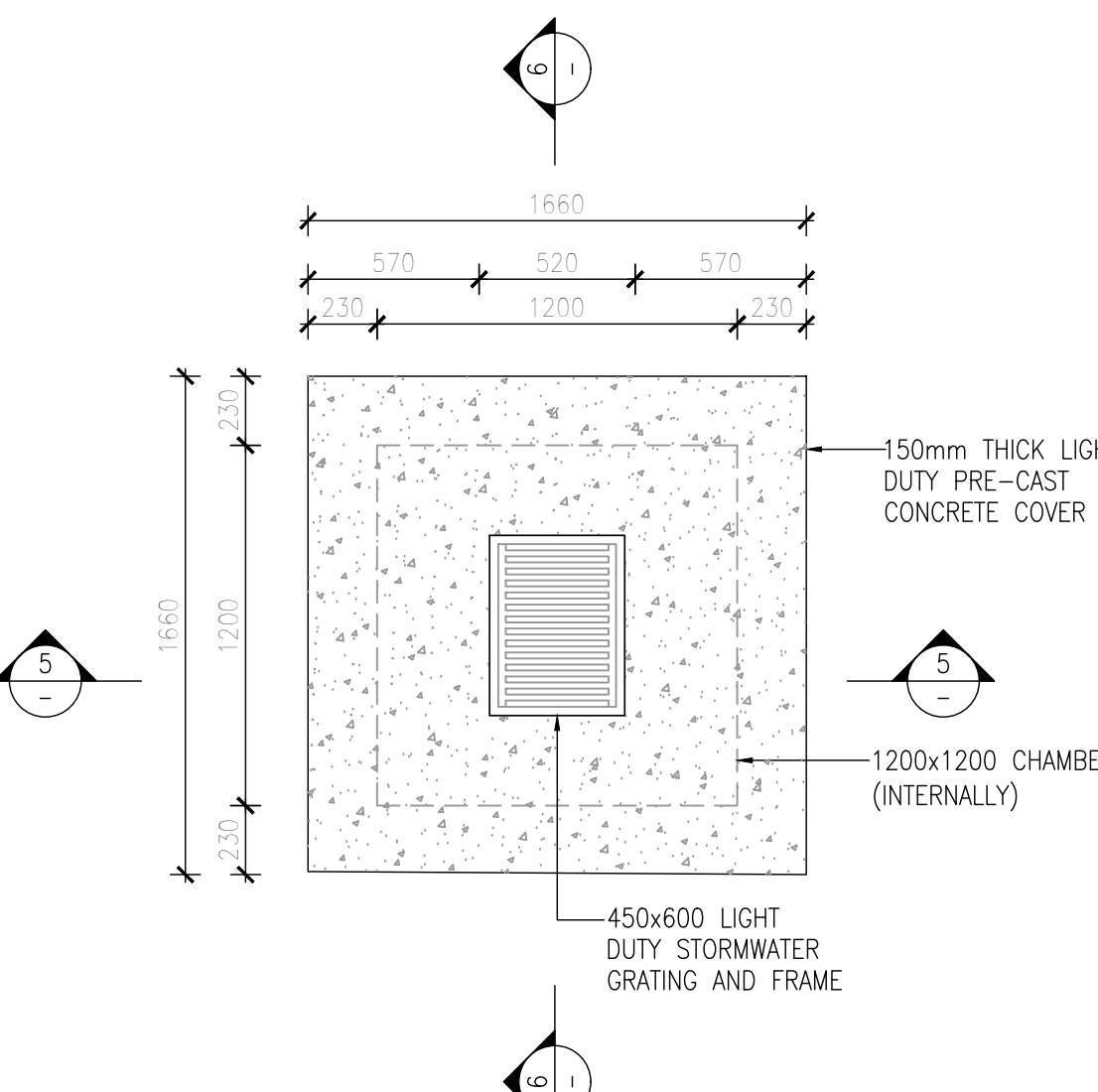
ANNEXURE C – STORMWATER GABION DETAIL AND STANDARD DETAILS



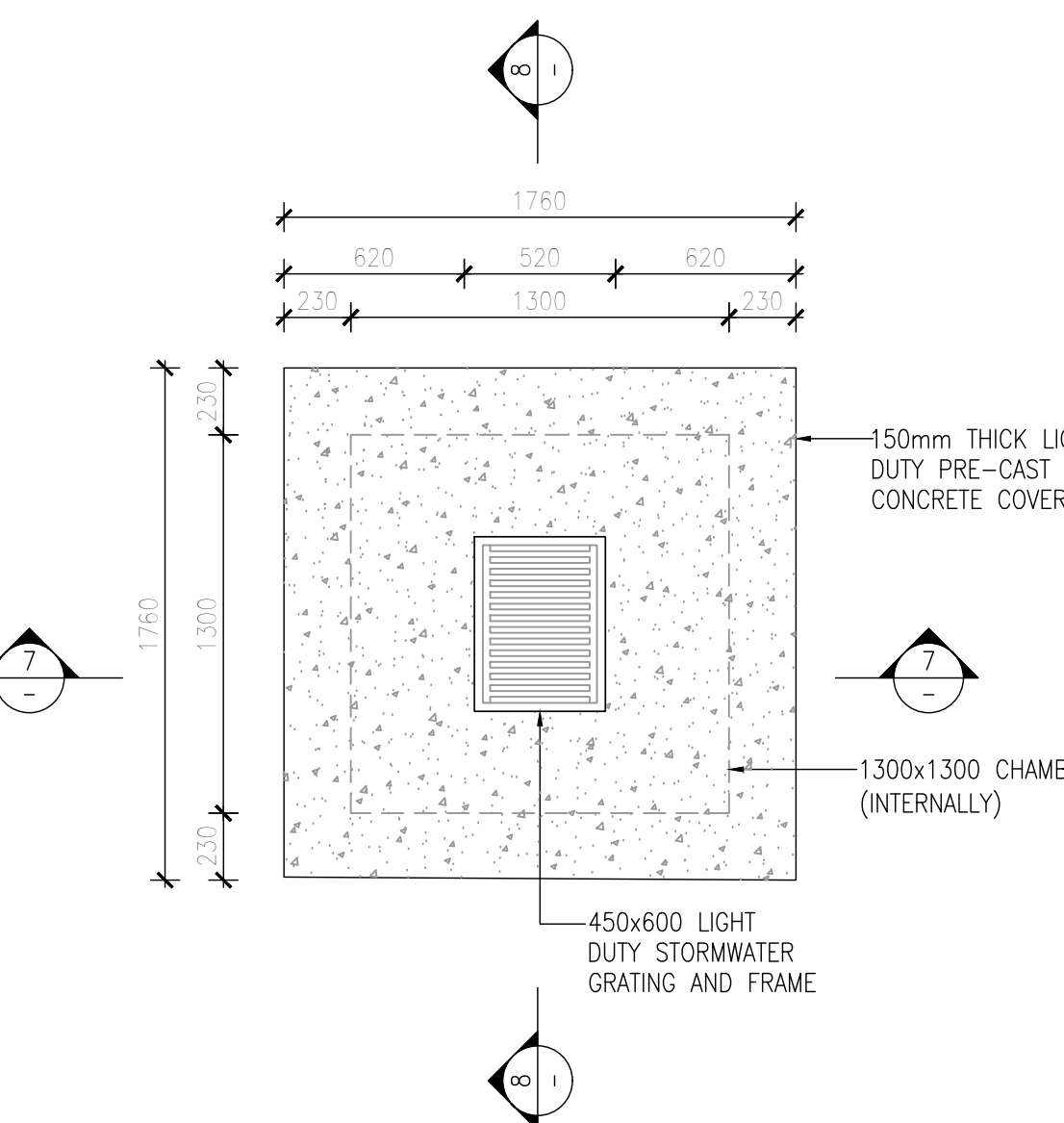
PLAN : GRID INLET TYPE 1 (LIGHT DUTY)
SCALE 1:25



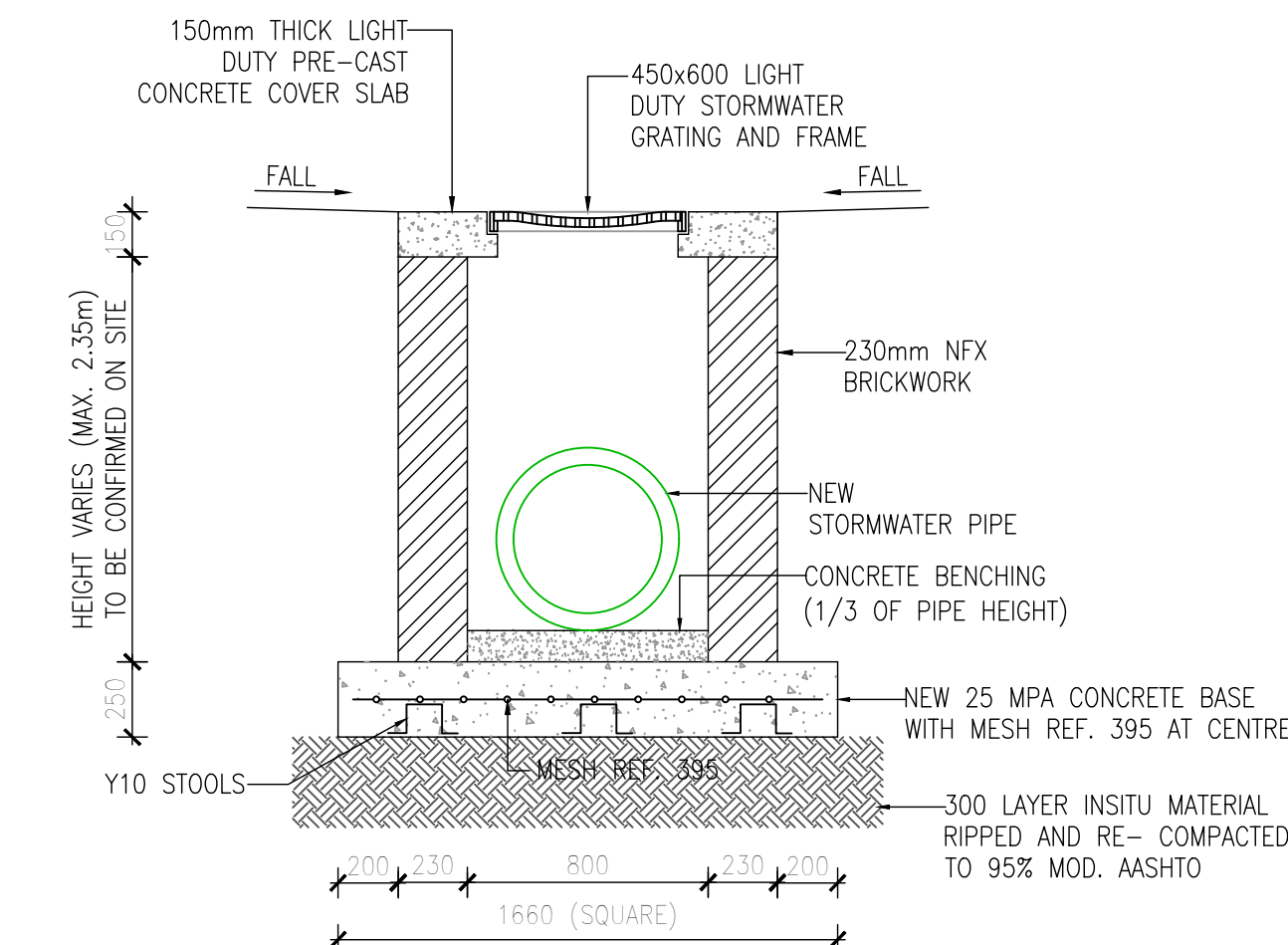
PLAN : GRID INLET TYPE 2 (LIGHT DUTY)
SCALE 1:25



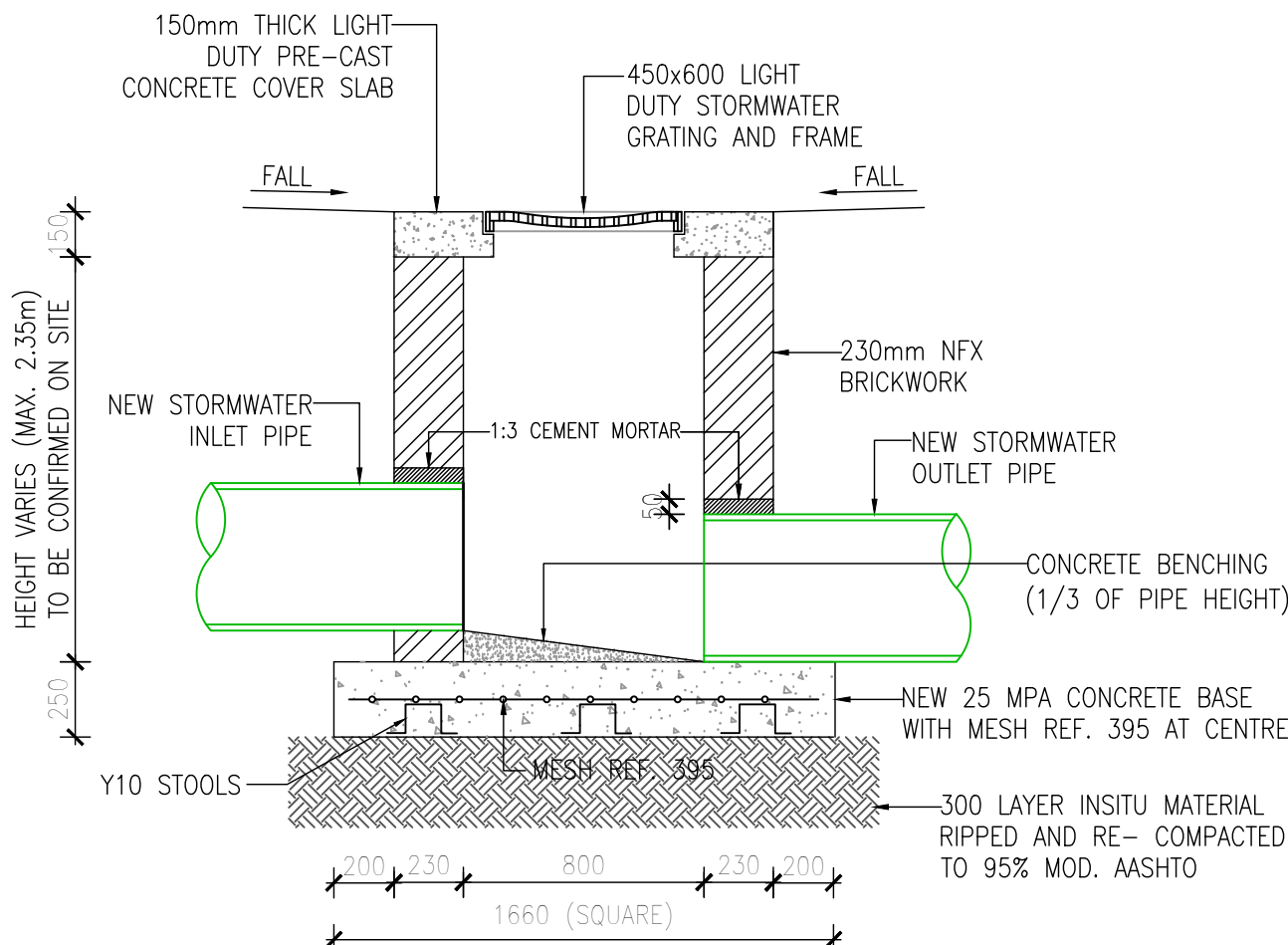
PLAN : GRID INLET TYPE 3 (LIGHT DUTY)
SCALE 1:25



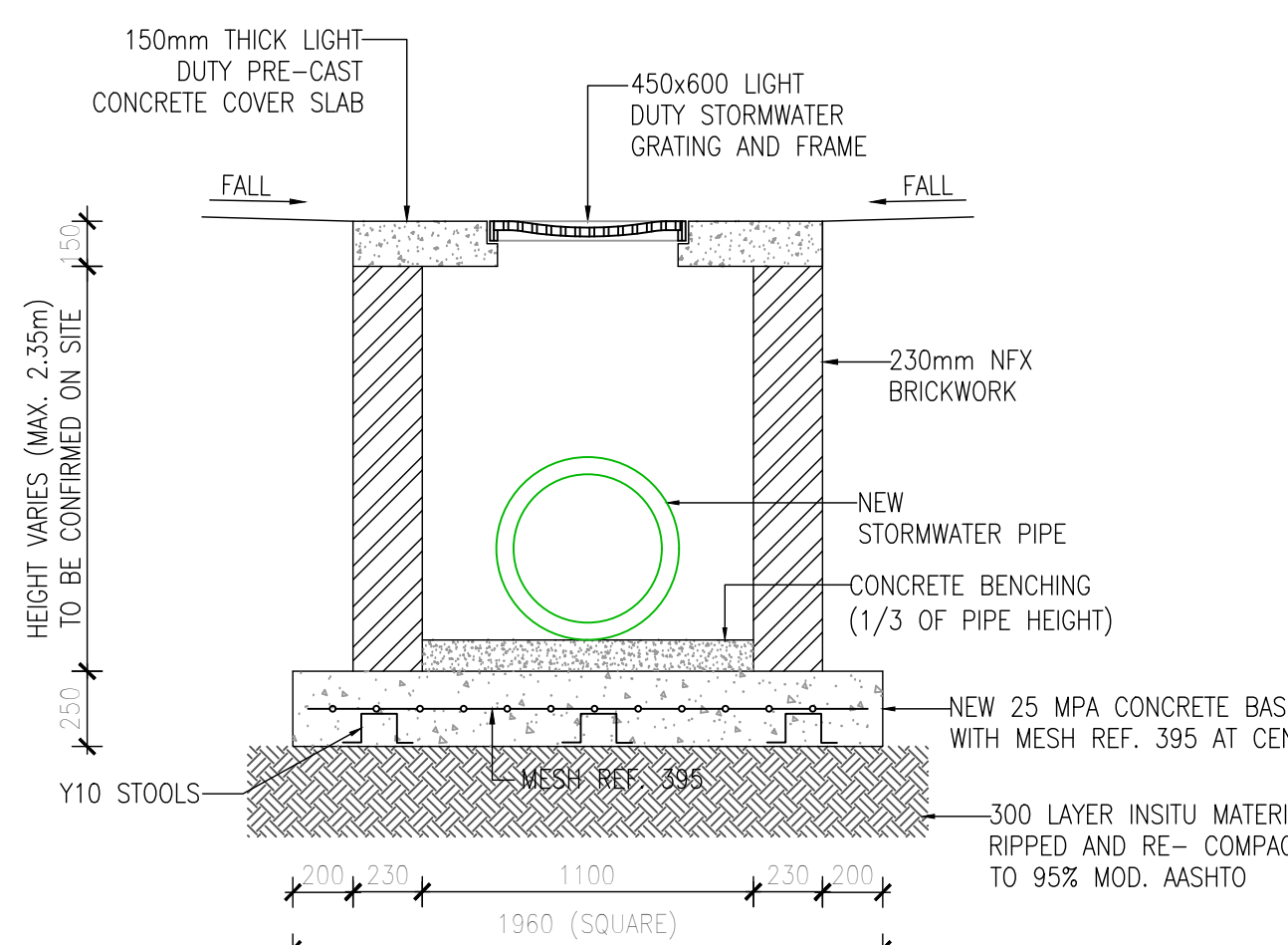
PLAN : GRID INLET TYPE 4 (LIGHT DUTY)
SCALE 1:25



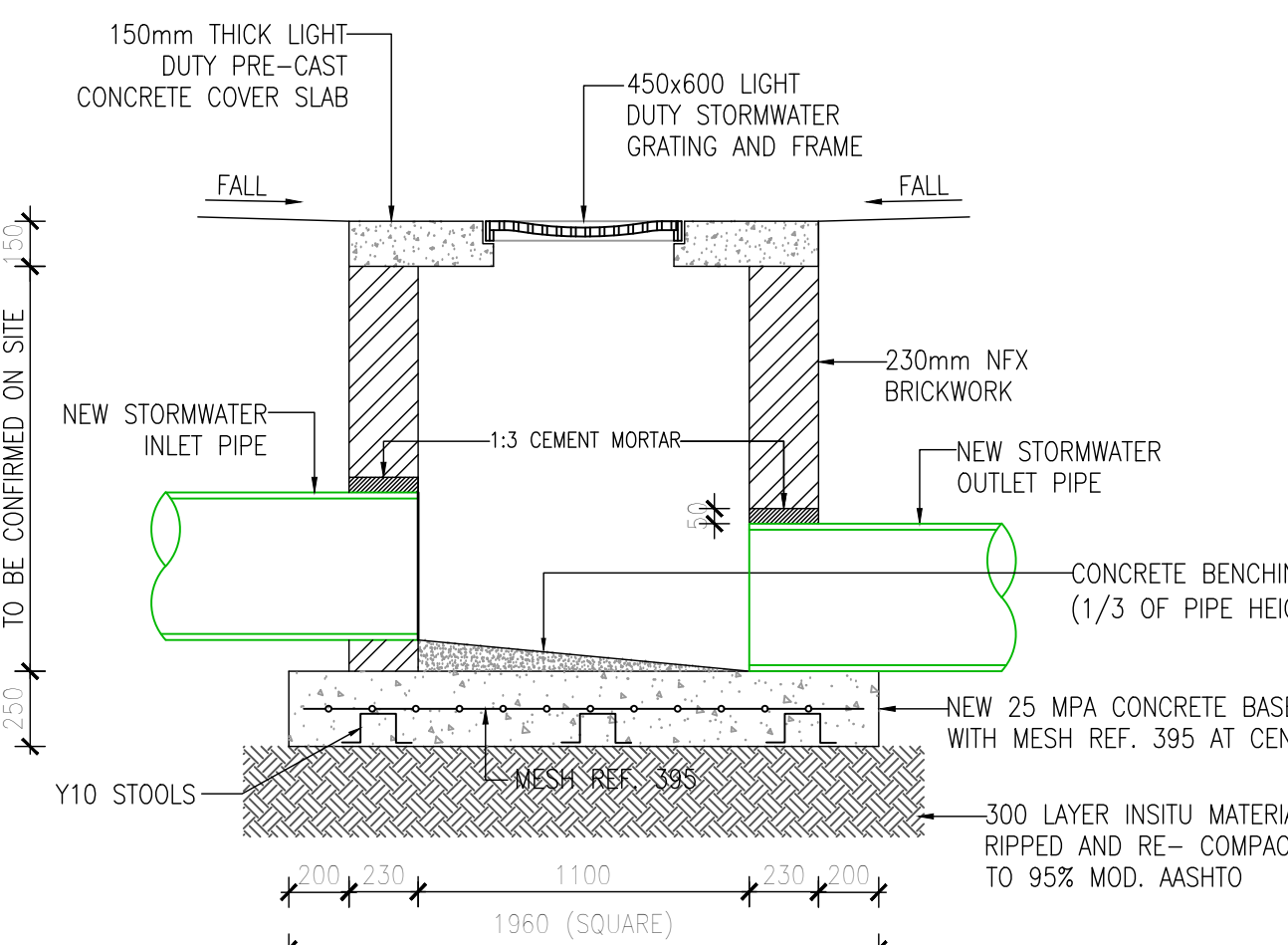
SECTION 1-1
TYPICAL SECTION THROUGH GRID INLET TYPE 1 (LIGHT DUTY)
SCALE 1:25



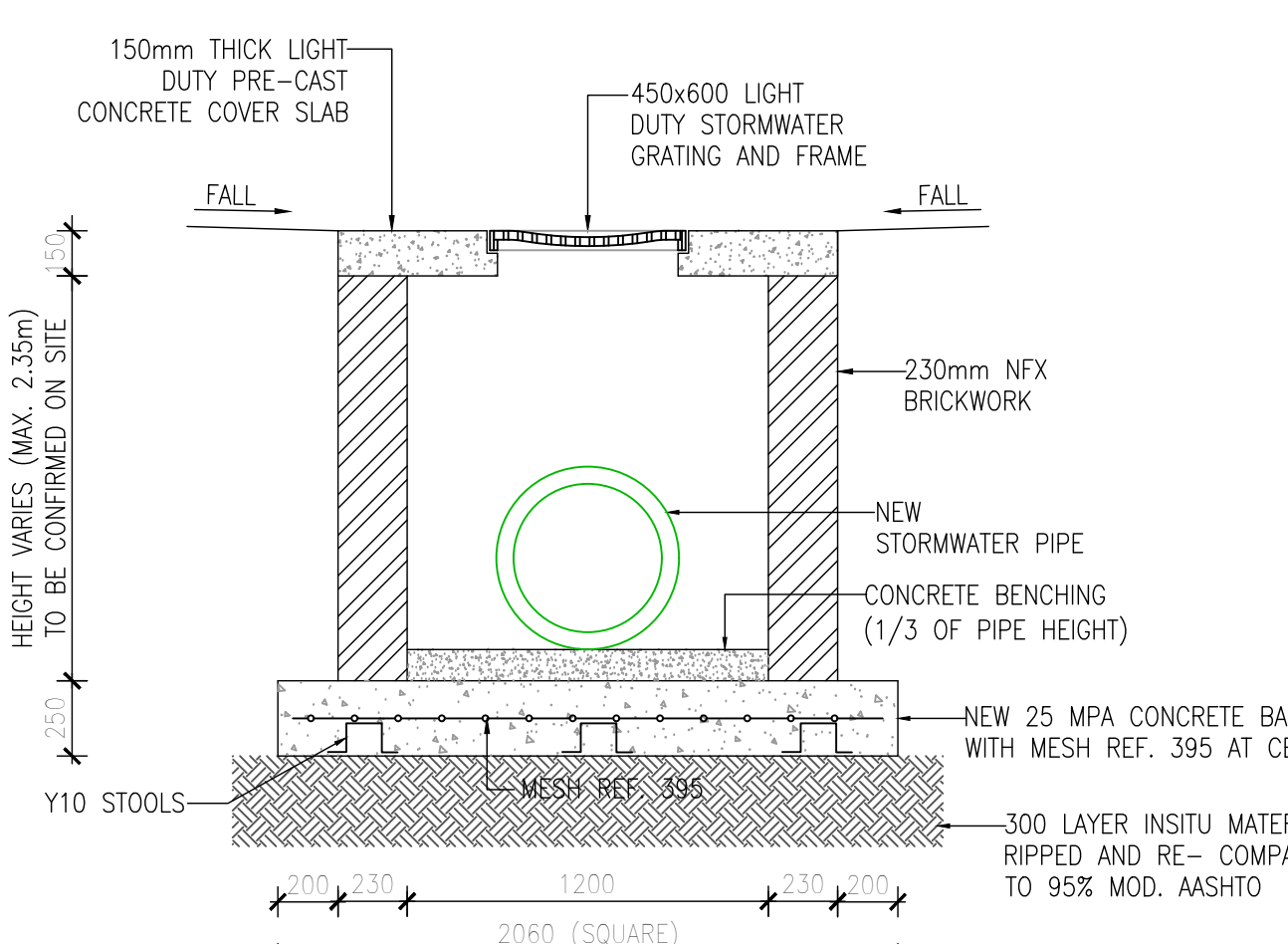
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TYPICAL SECTION THROUGH GRID INLET TYPE 1 (LIGHT DUTY)
SCALE 1:25



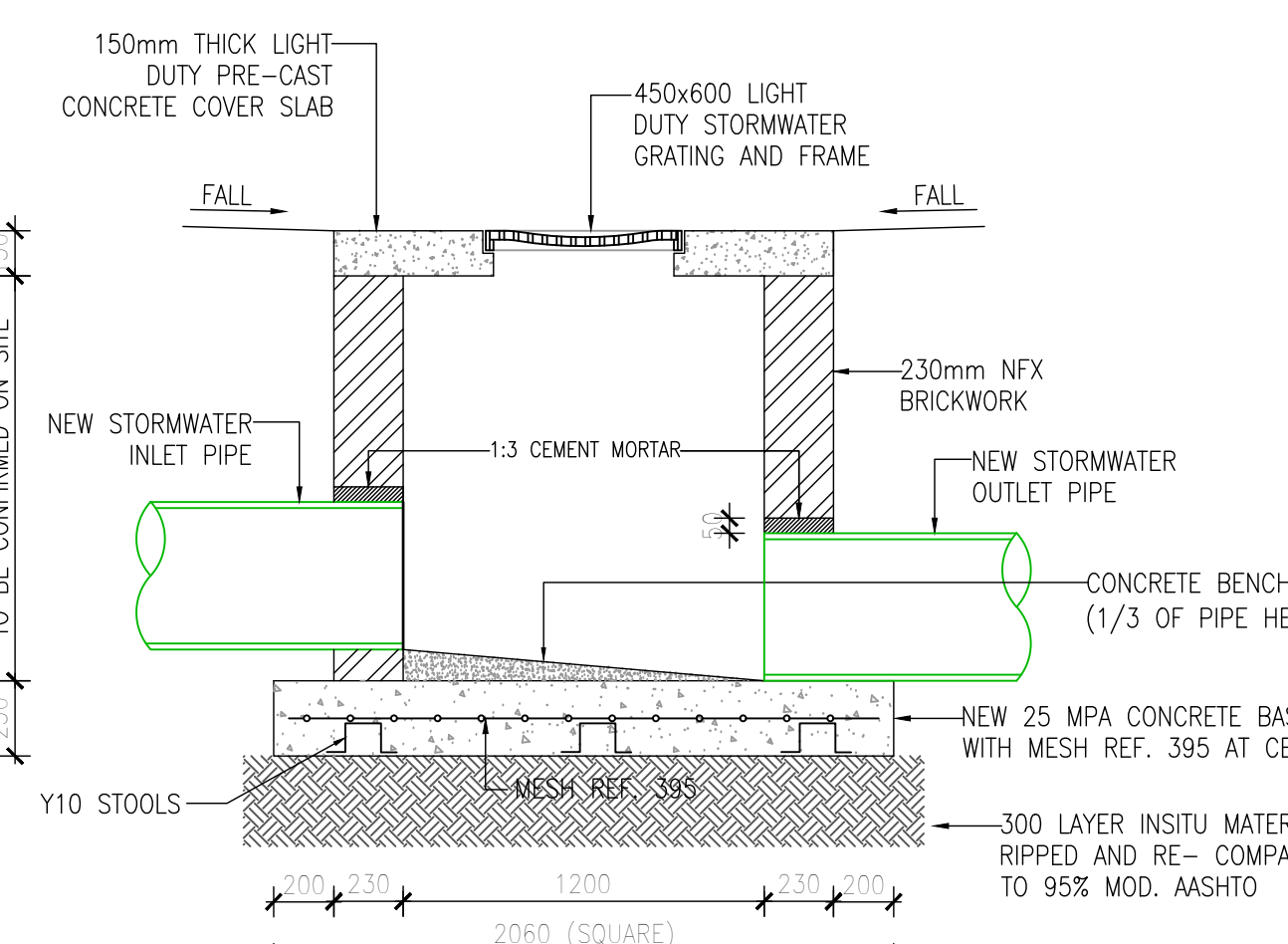
SECTION 3-3
TYPICAL SECTION THROUGH GRID INLET TYPE 2 (LIGHT DUTY)
SCALE 1:25



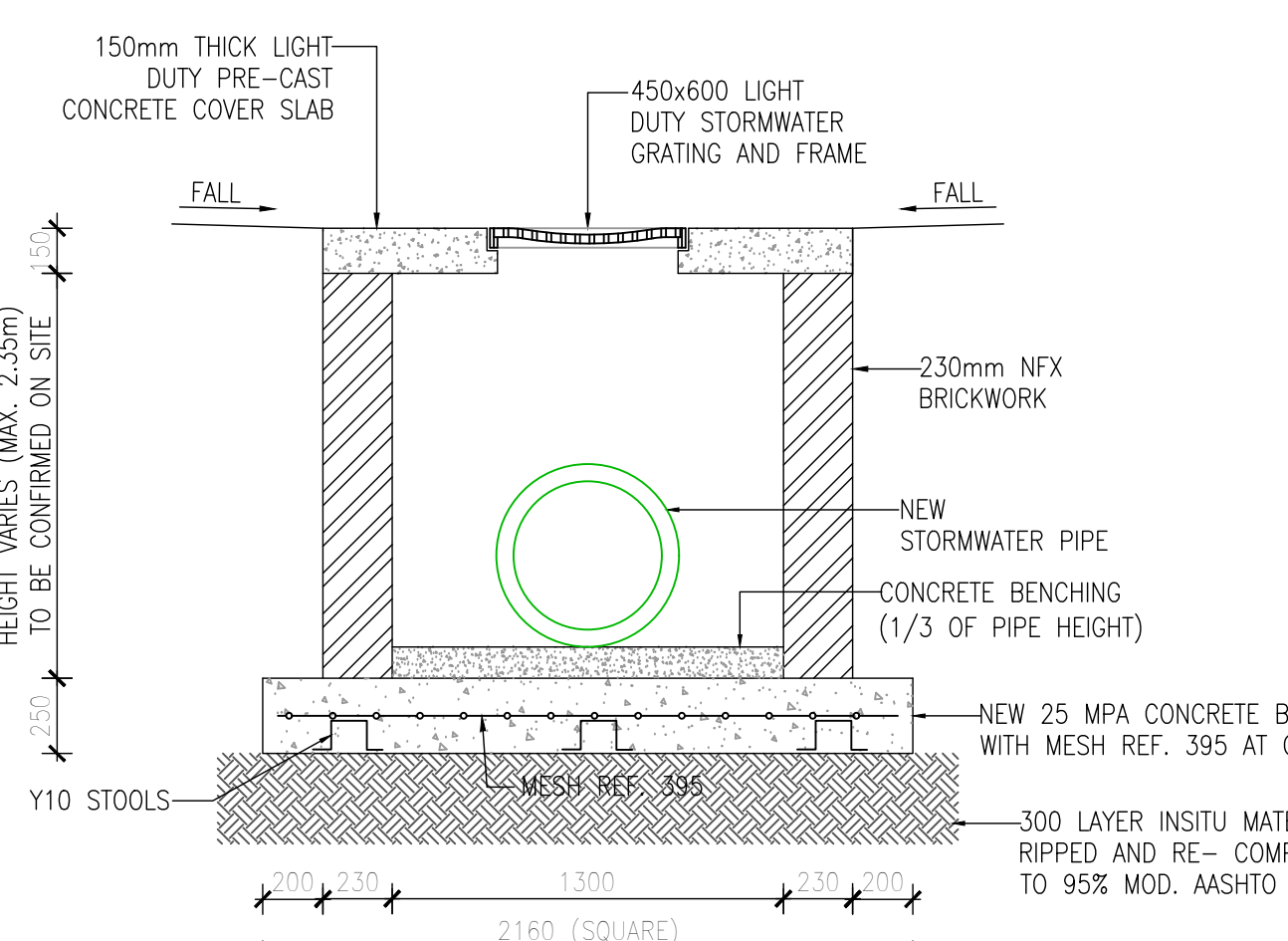
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TYPICAL SECTION THROUGH GRID INLET TYPE 2 (LIGHT DUTY)
SCALE 1:25



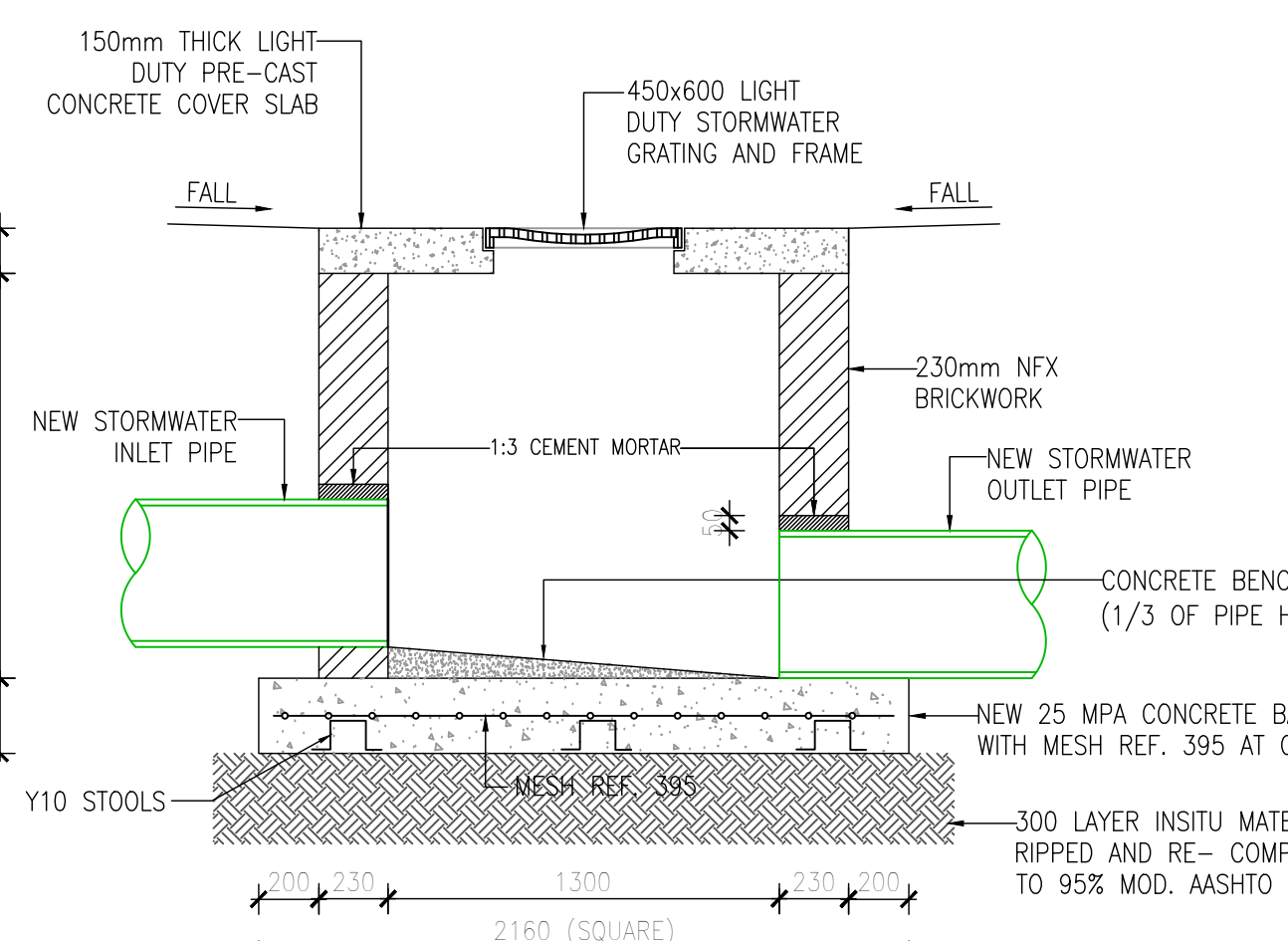
SECTION 5-5
TYPICAL SECTION THROUGH GRID INLET TYPE 3 (LIGHT DUTY)
SCALE 1:25



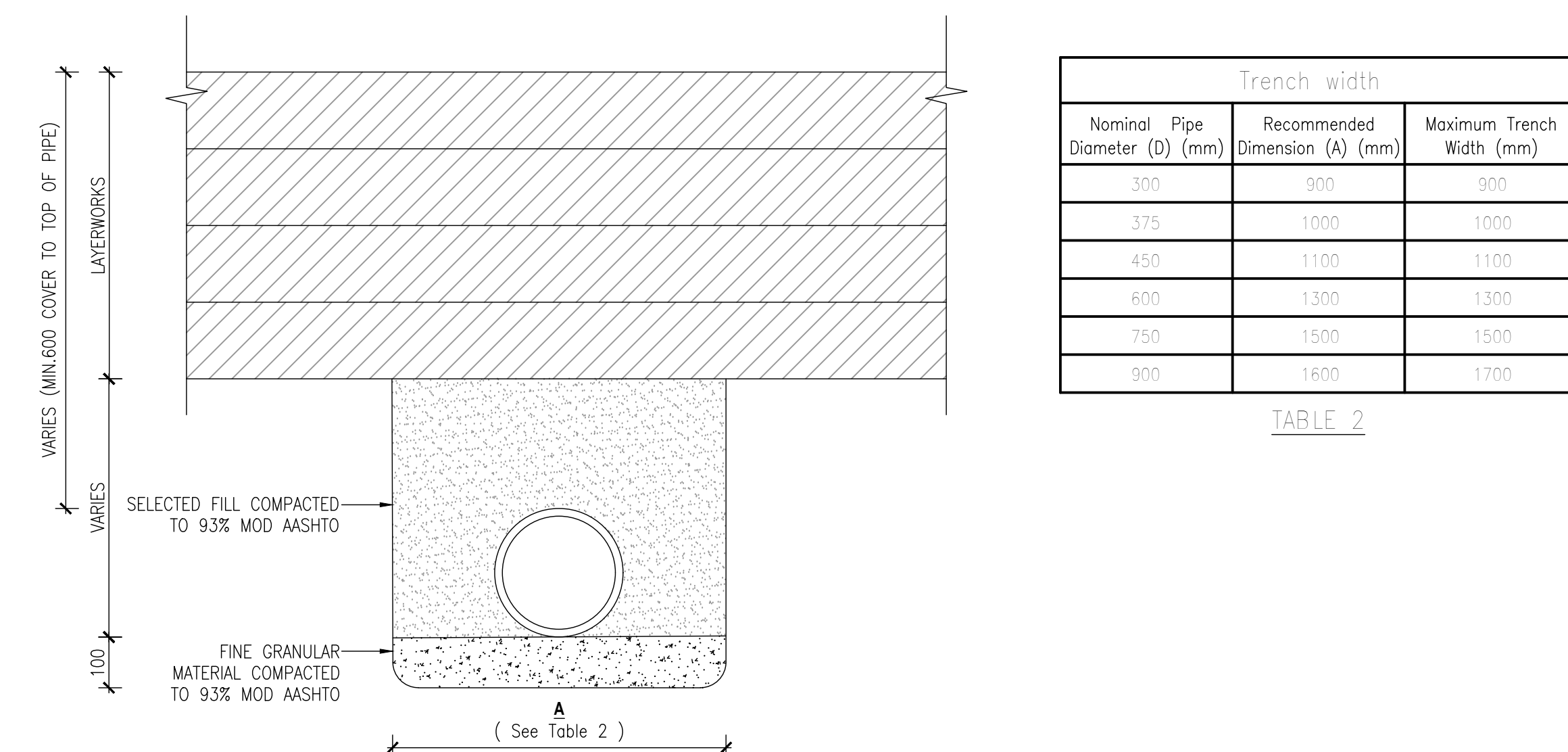
SECTION 6-6
TYPICAL SECTION THROUGH GRID INLET TYPE 3 (LIGHT DUTY)
SCALE 1:25



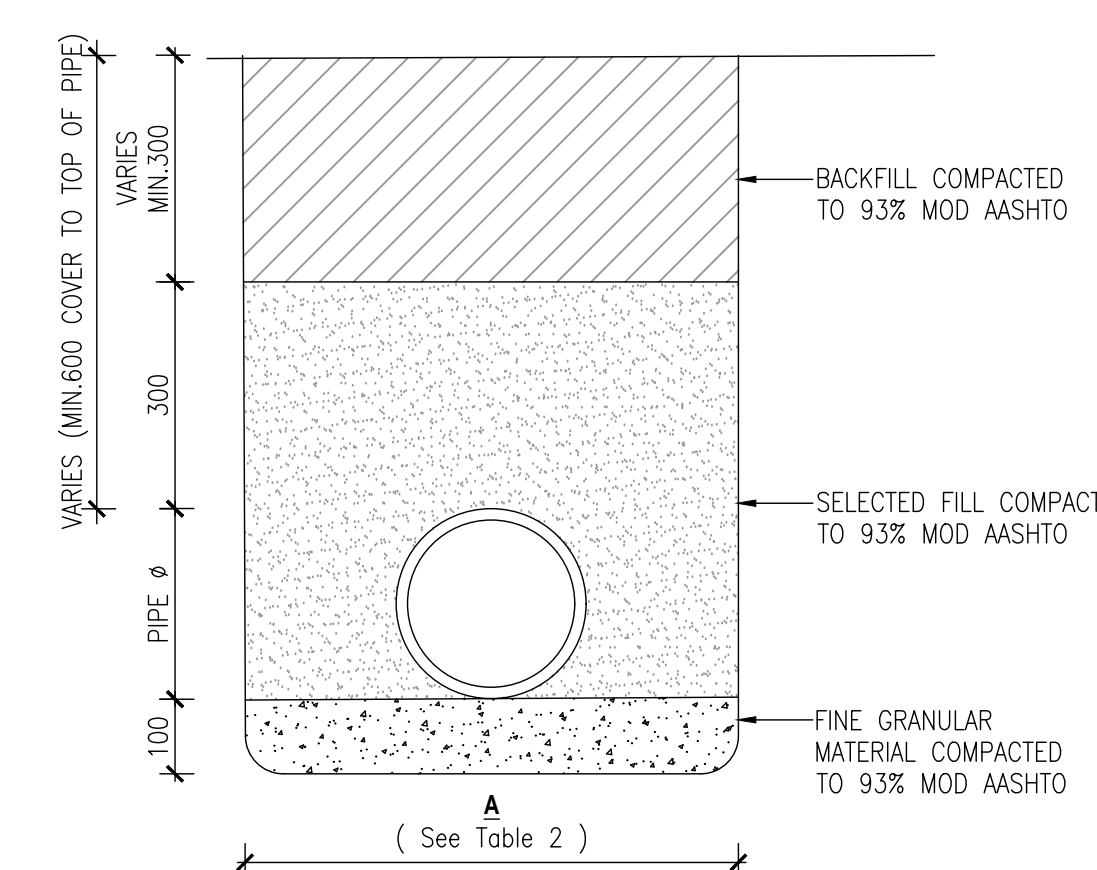
SECTION 7-7
TYPICAL SECTION THROUGH GRID INLET TYPE 4 (LIGHT DUTY)
SCALE 1:25



SECTION 8-8
TYPICAL SECTION THROUGH GRID INLET TYPE 4 (LIGHT DUTY)
SCALE 1:25

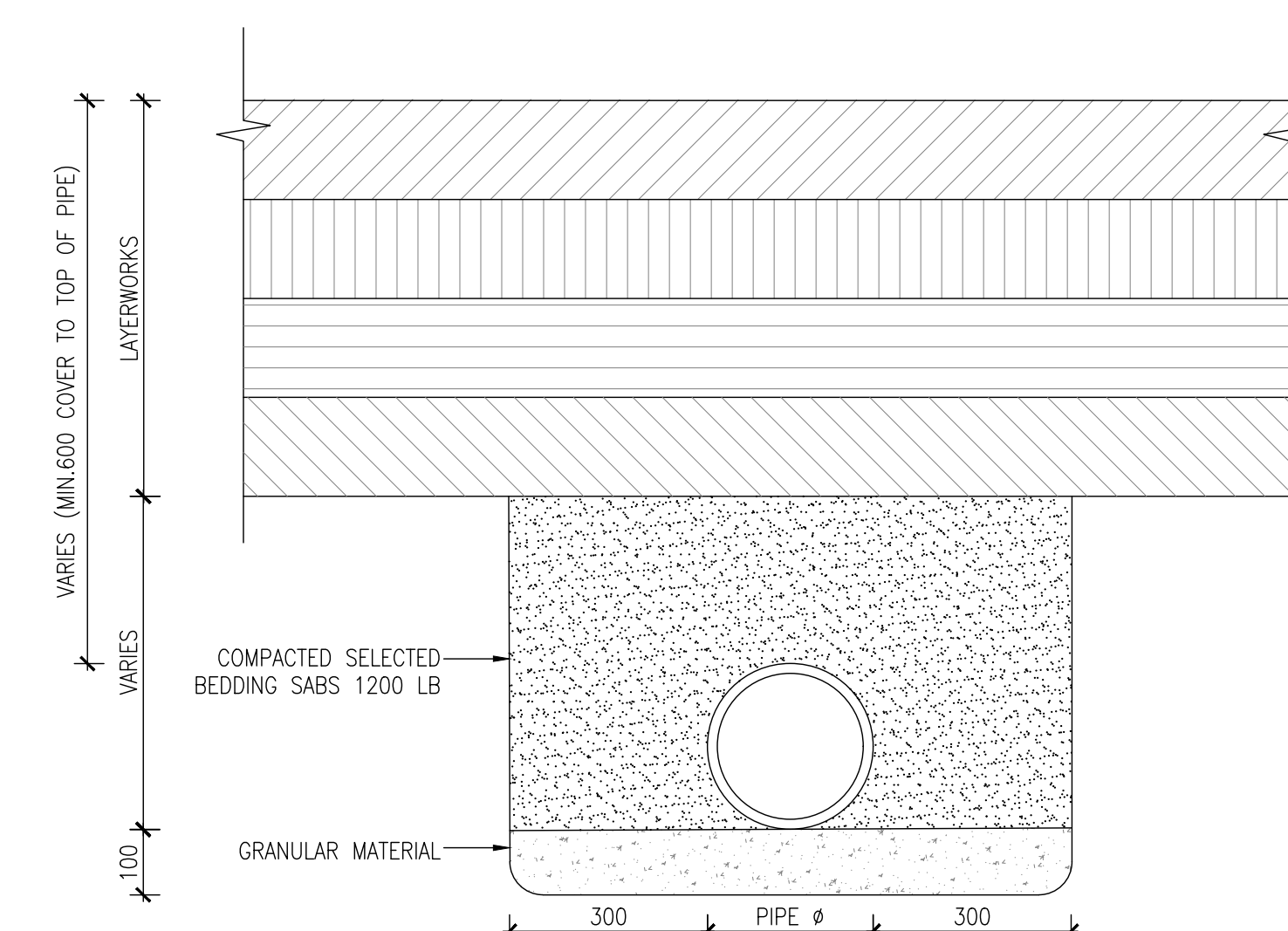


CLASS C BEDDING
TYPICAL PIPE TRENCH DETAIL FOR CONCRETE PIPES WITHIN ROADWORKS 1: 10

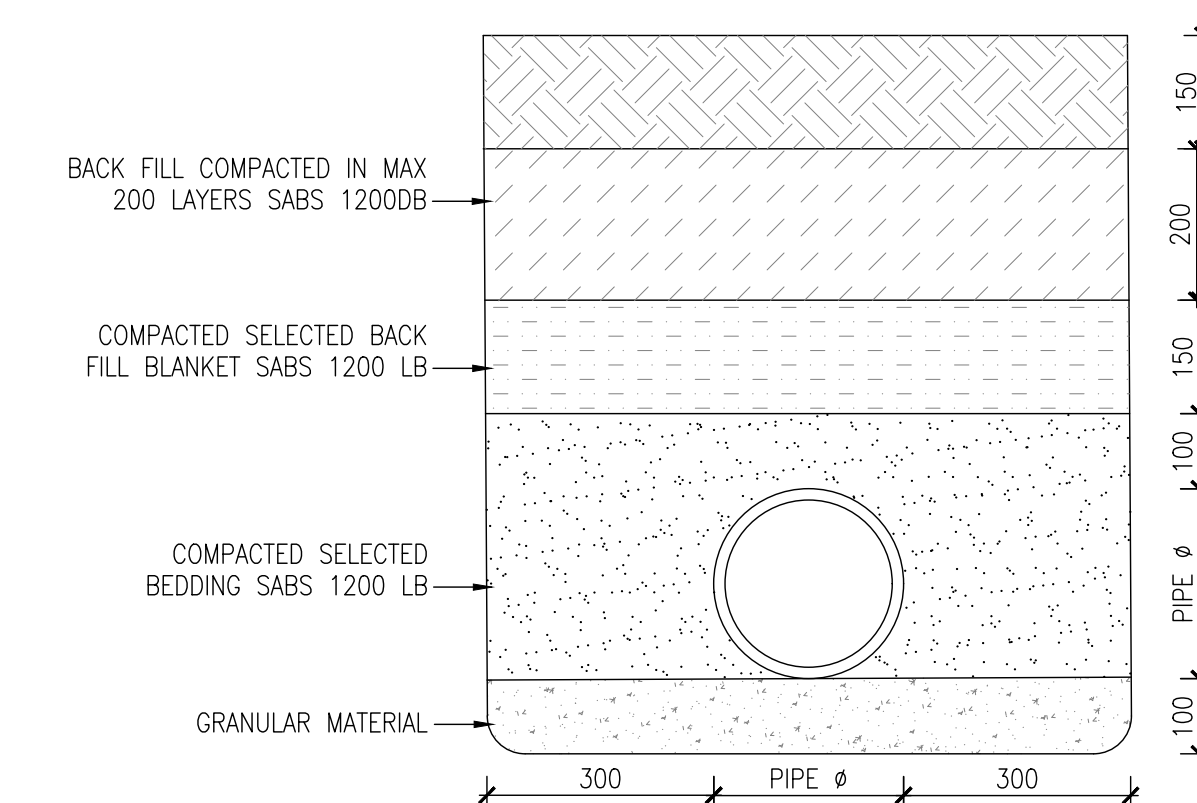


CLASS C BEDDING
TYPICAL PIPE TRENCH DETAIL FOR CONCRETE PIPES NOT IN ROADWORKS 1: 10

- NOTES:
- 1) ALL SETTING OUT DETAILS AND LEVELS TO BE CHECKED AND CONFIRMED ON SITE.
 - 2) LENGTHS OF PIPE TO BE CONFIRMED ON SITE PRIOR TO ORDERING OF PIPES.
 - 3) MINIMUM COVER OF 600mm FOR ALL PIPES UNLESS OTHERWISE SPECIFIED BY ENGINEER.
 - 4) STEP IRONS WHERE REQUIRED ARE TO BE TO MUNICIPAL SPECIFICATIONS.
 - 5) SUBSOIL DRAINAGE TO BE PLACED IF NECESSARY AS DIRECTED BY THE ENGINEER.
 - 6) THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT CIVIL & STRUCTURAL DRAWINGS.
 - 7) ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.



TYPICAL PIPE TRENCH DETAIL 1: 10
FOR PIPES uPVC WITHIN ROADWORKS



TYPICAL PIPE TRENCH DETAIL 1: 10
FOR PIPES uPVC NOT WITHIN ROADWORKS

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REFERENCE DRAWING

REV	DESCRIPTION	DR	APP	DATE
A	ISSUED FOR INFORMATION	SKM	KH	03/05/23
DESIGNED		INITIALS	SIGN	DATE
DRAWN				
PROJECT ENG.				
APPROVED				

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CLIENT LOGO

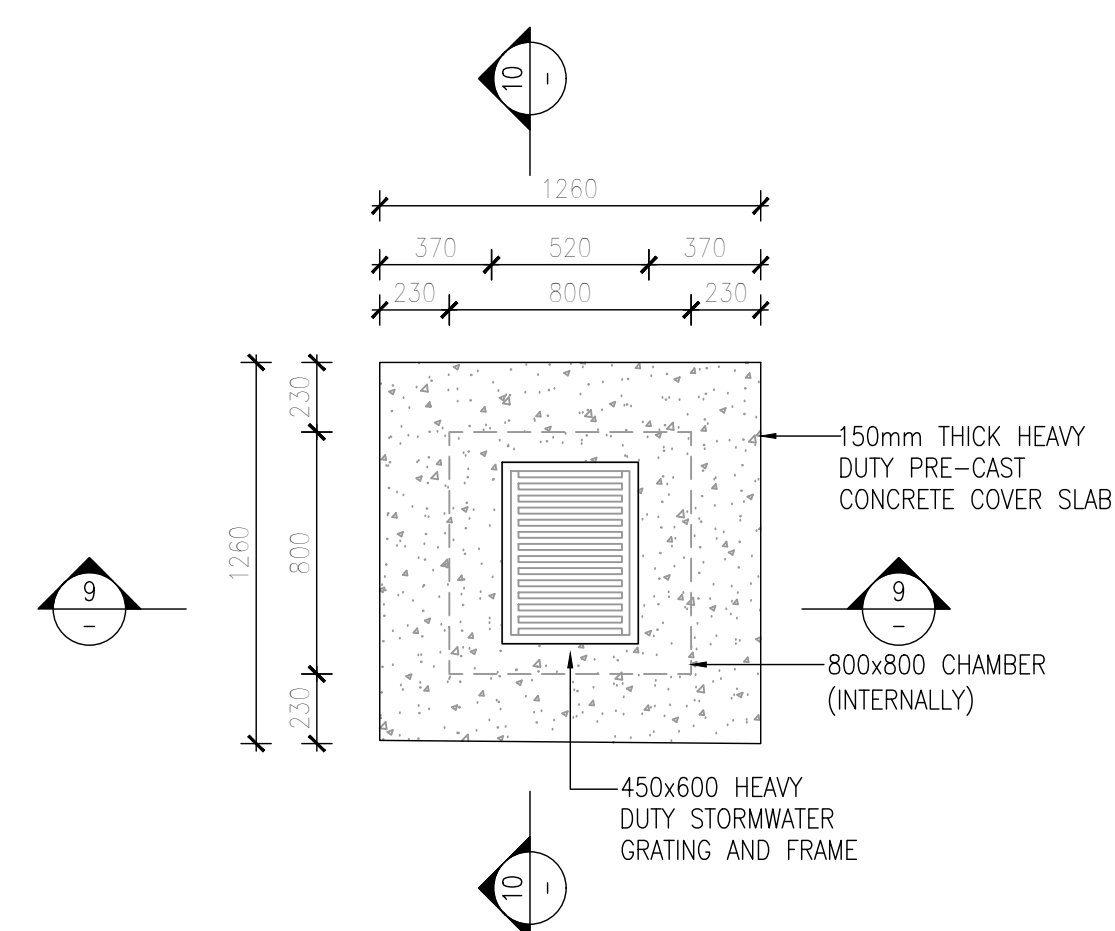
CRDC ASSMANG
CRDC ROAD DEVELOPMENT COMPANY
Pty Ltd

CLIENT
CATO RIDGE DEVELOPMENT COMPANY(Pty) Ltd
PROJECT
CATO RIDGE PHASED DEVELOPMENT

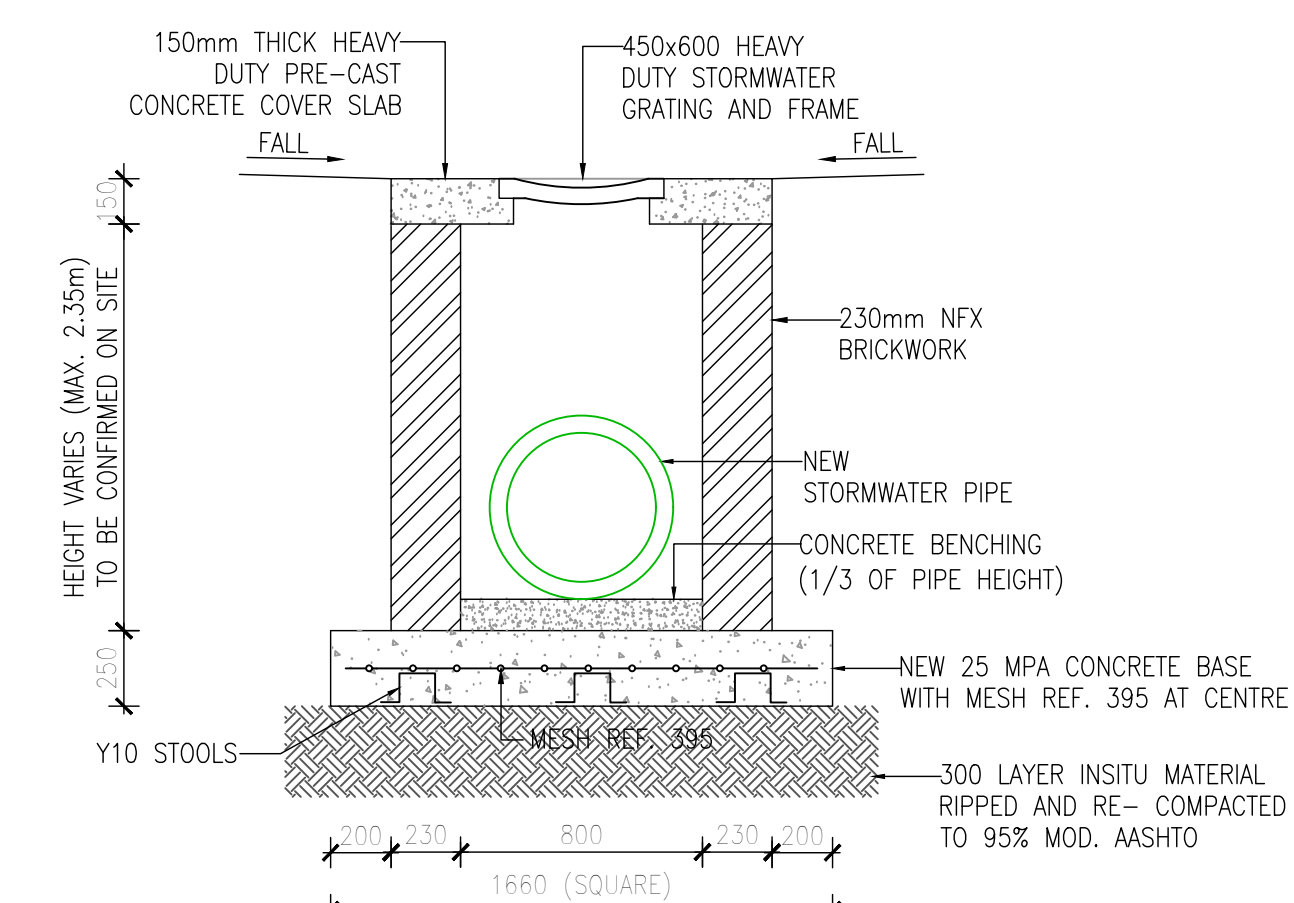
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STORMWATER MANOLE DETAILS
SHEET 1 OF 3

SCALE : AS SHOWN

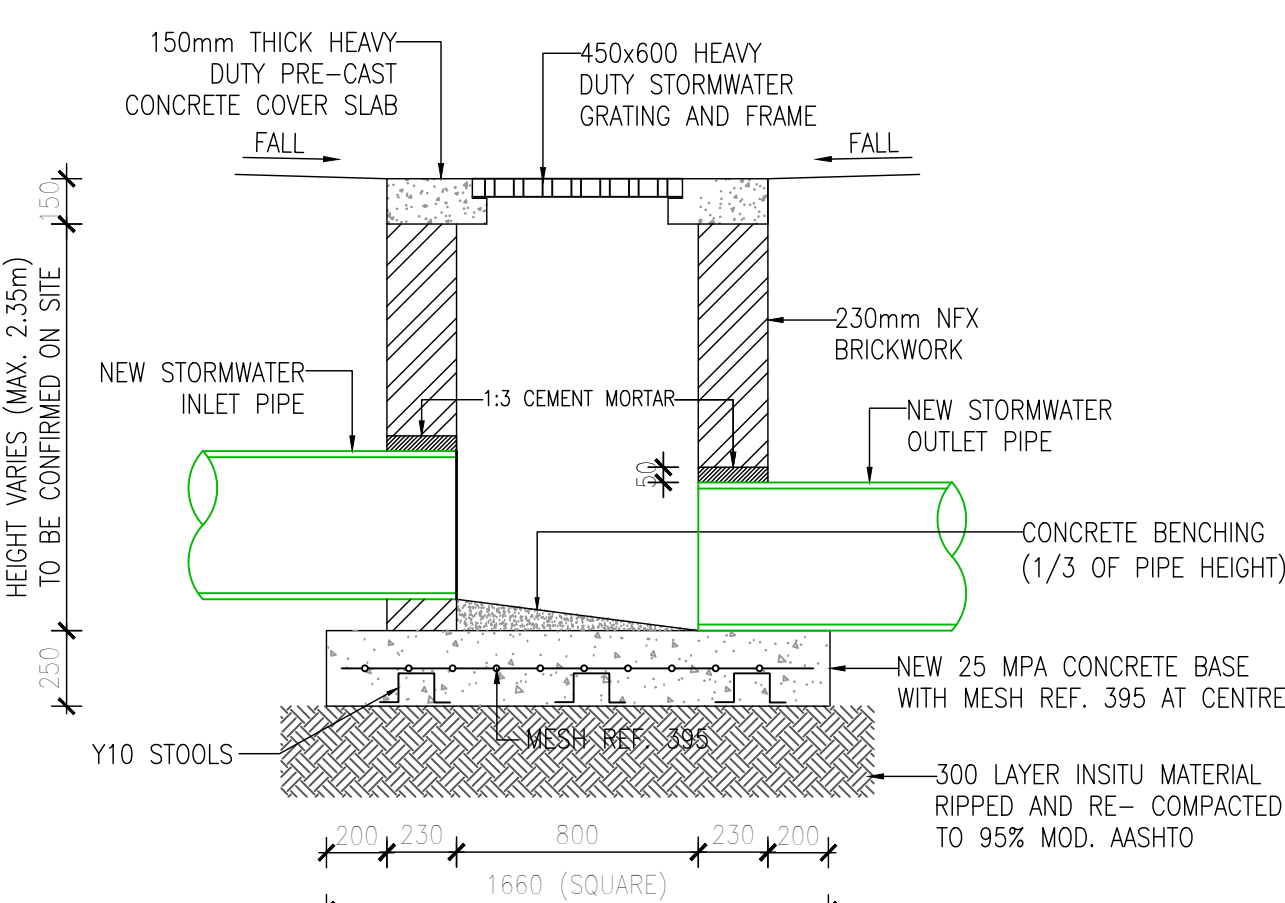
DRAWING No. 20207-CSW 01



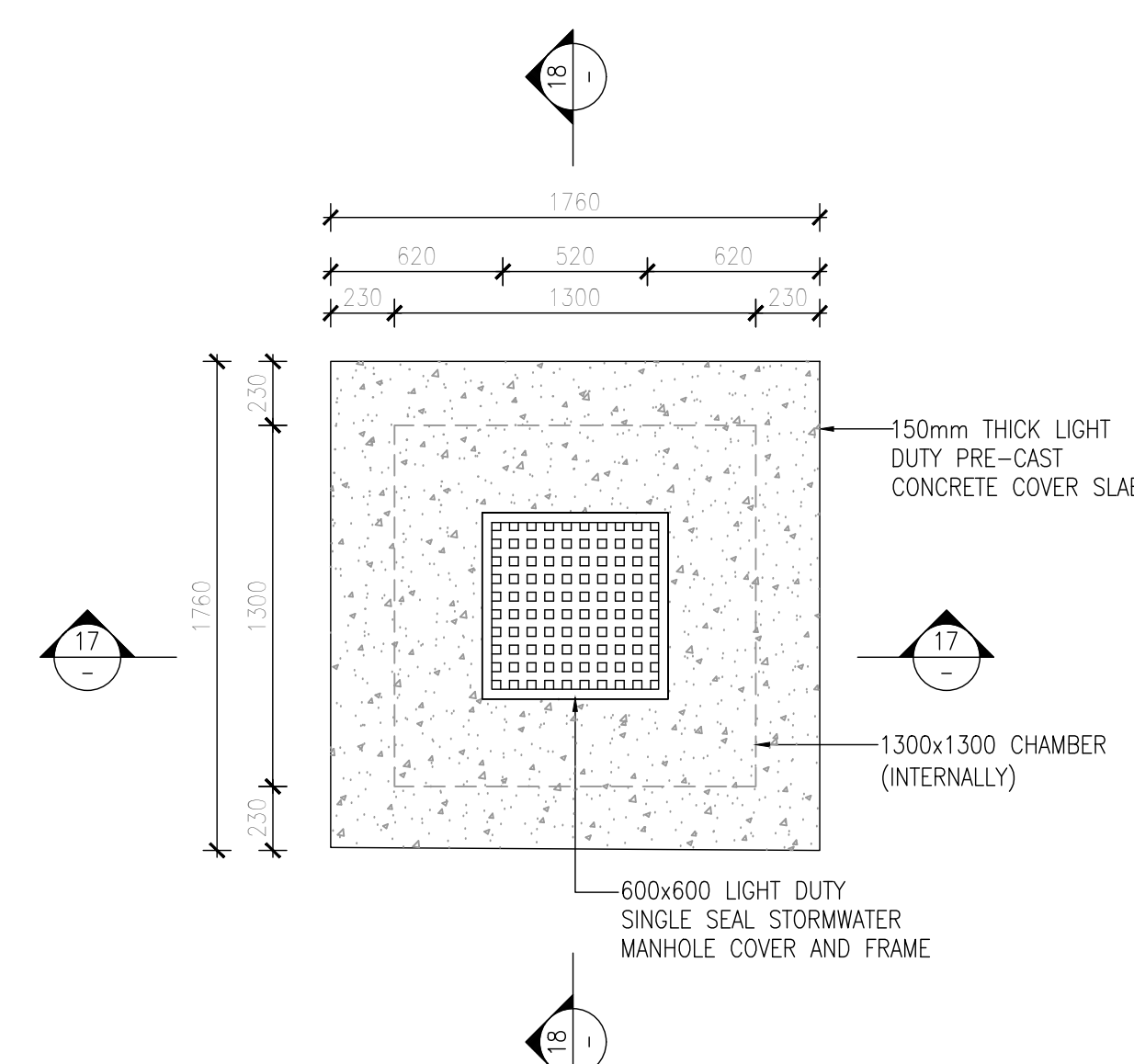
PLAN : GRID INLET TYPE 1a (HEAVY DUTY)
SCALE 1:25



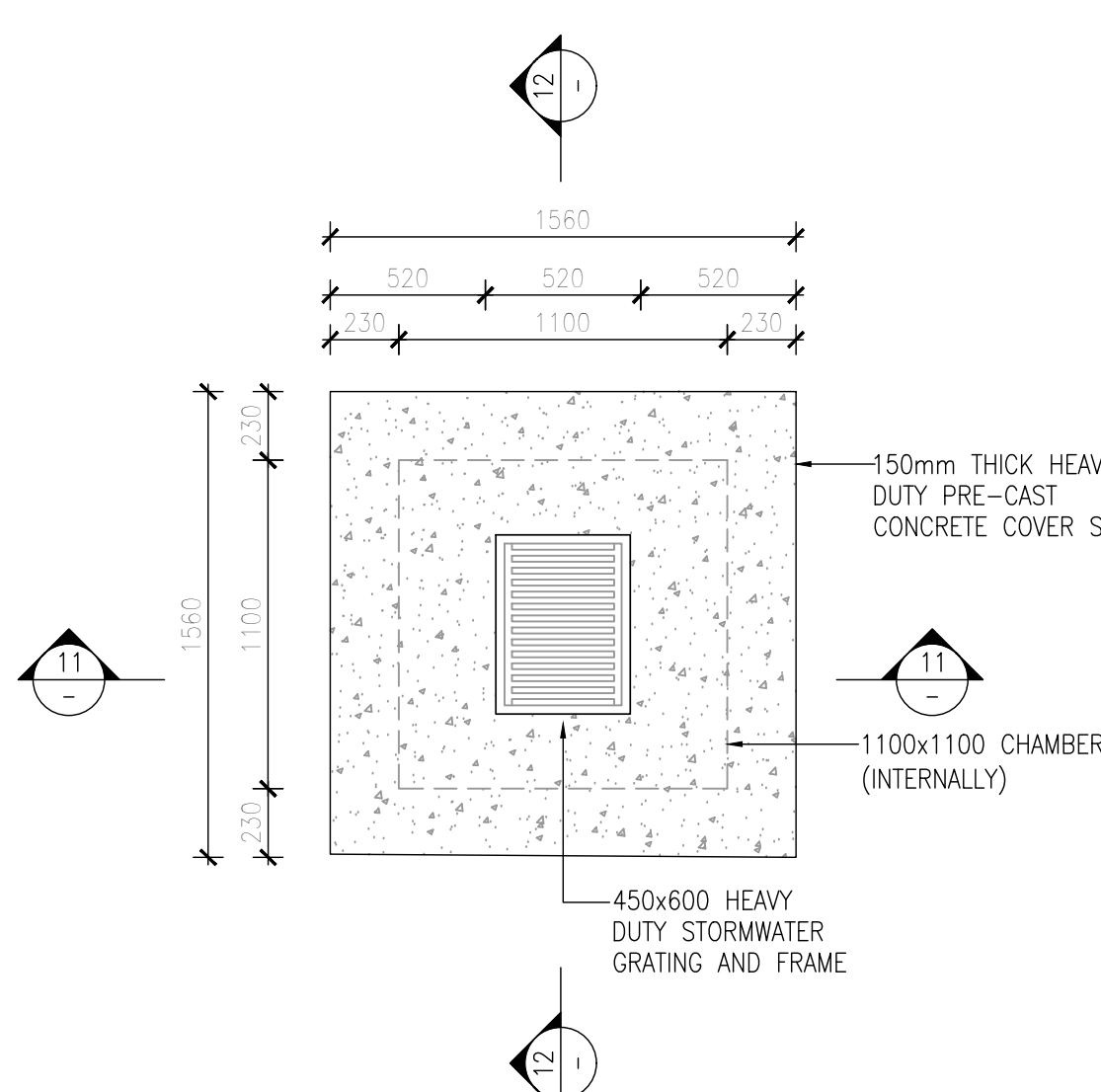
SECTION 9-9
TYPICAL SECTION THROUGH GRID INLET TYPE 1a (HEAVY DUTY)
SCALE 1:25



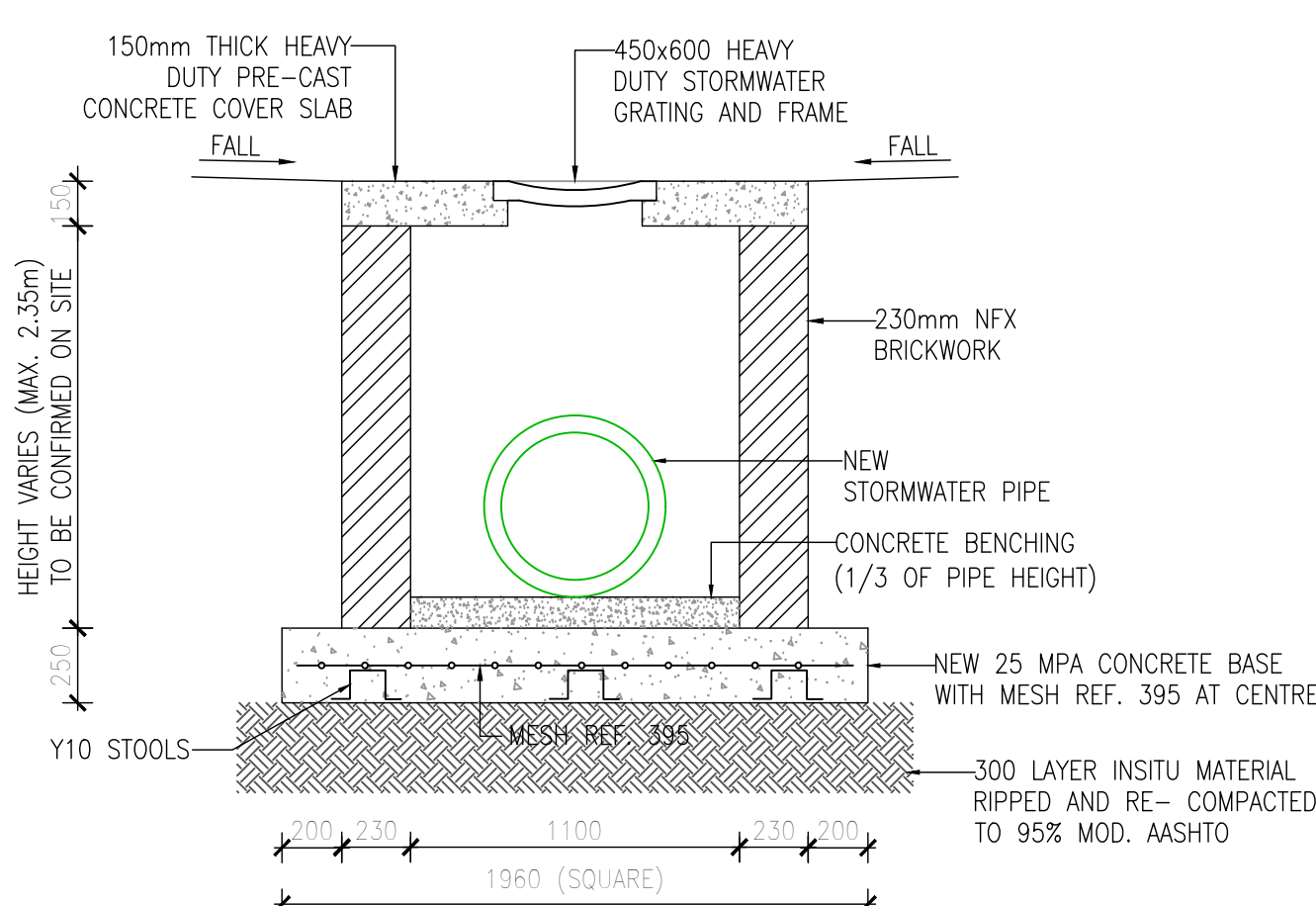
SECTION 10-10
TYPICAL SECTION THROUGH GRID INLET TYPE 1a (HEAVY DUTY)
SCALE 1:25



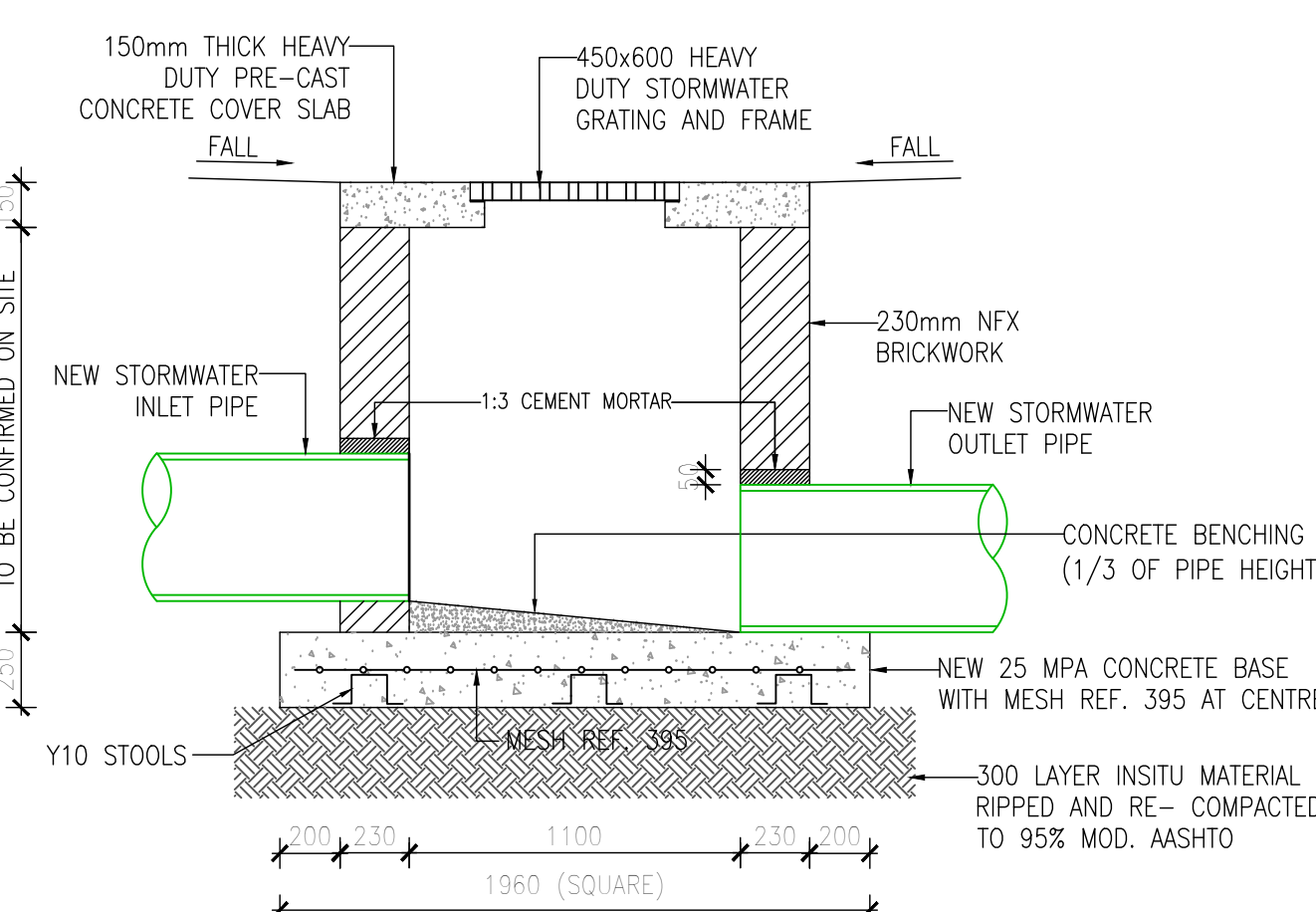
PLAN : MANHOLE TYPE 4 (LIGHT DUTY)
SCALE 1:25



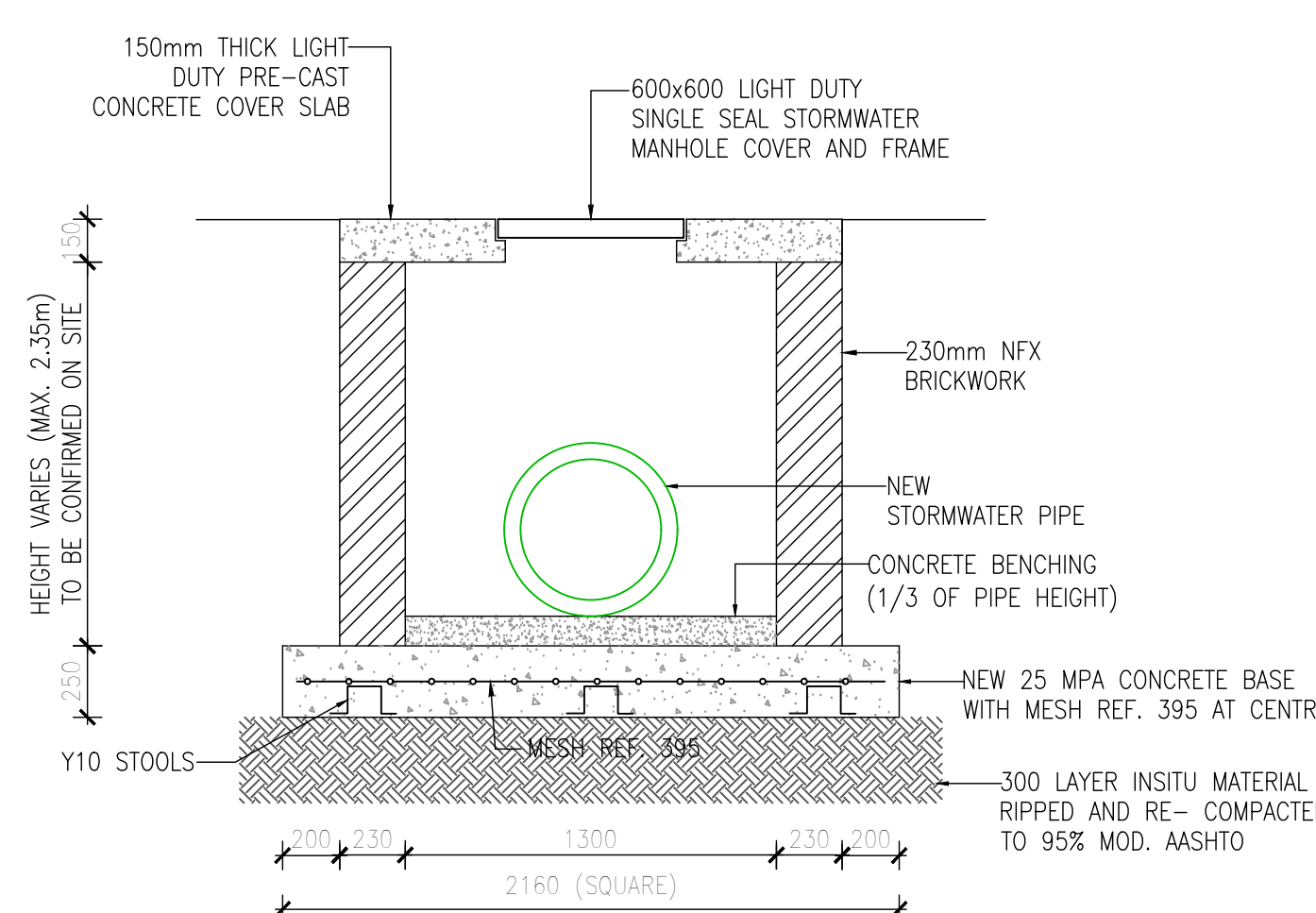
PLAN : GRID INLET TYPE 2a (HEAVY DUTY)
SCALE 1:25



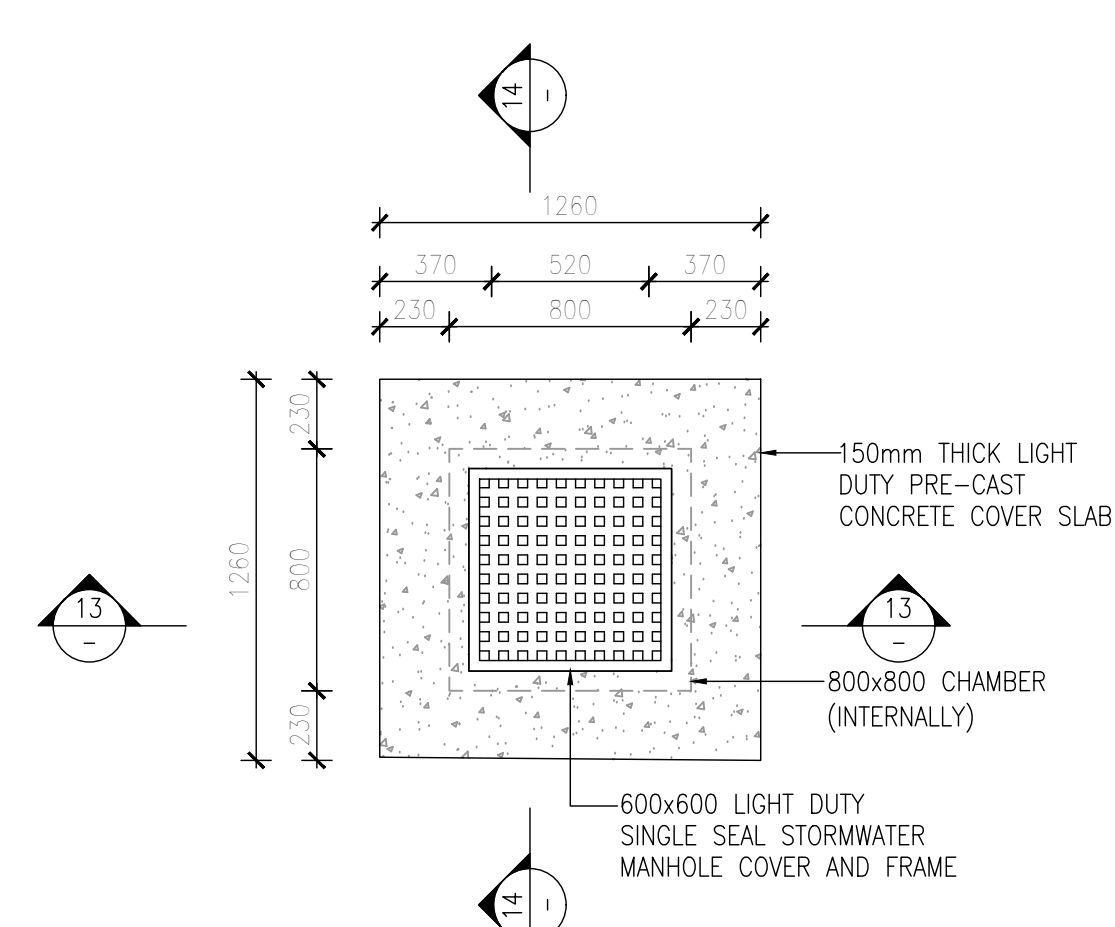
SECTION 11-11
TYPICAL SECTION THROUGH GRID INLET TYPE 2a (HEAVY DUTY)
SCALE 1:25



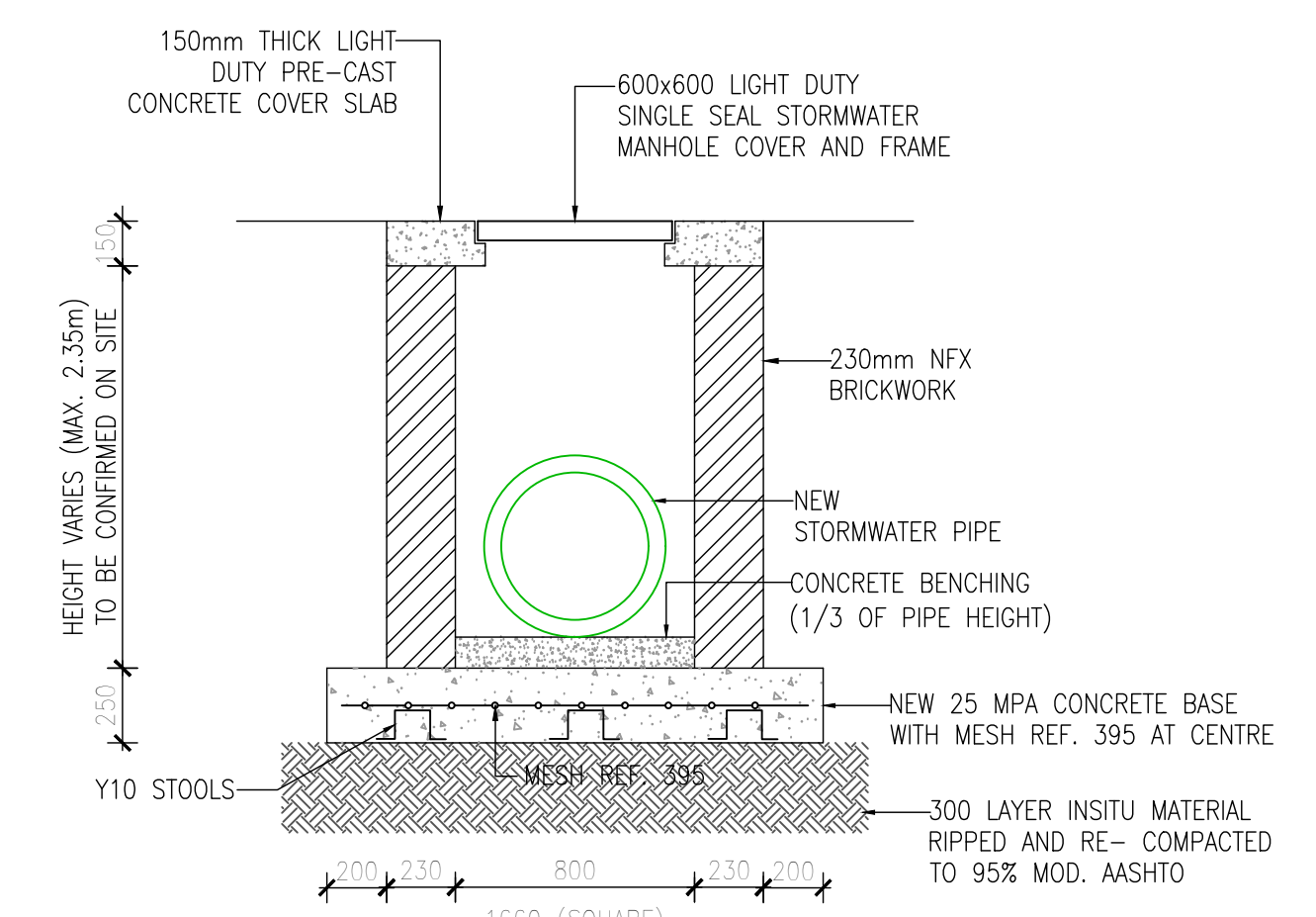
SECTION 12-12
TYPICAL SECTION THROUGH GRID INLET TYPE 2a (HEAVY DUTY)
SCALE 1:25



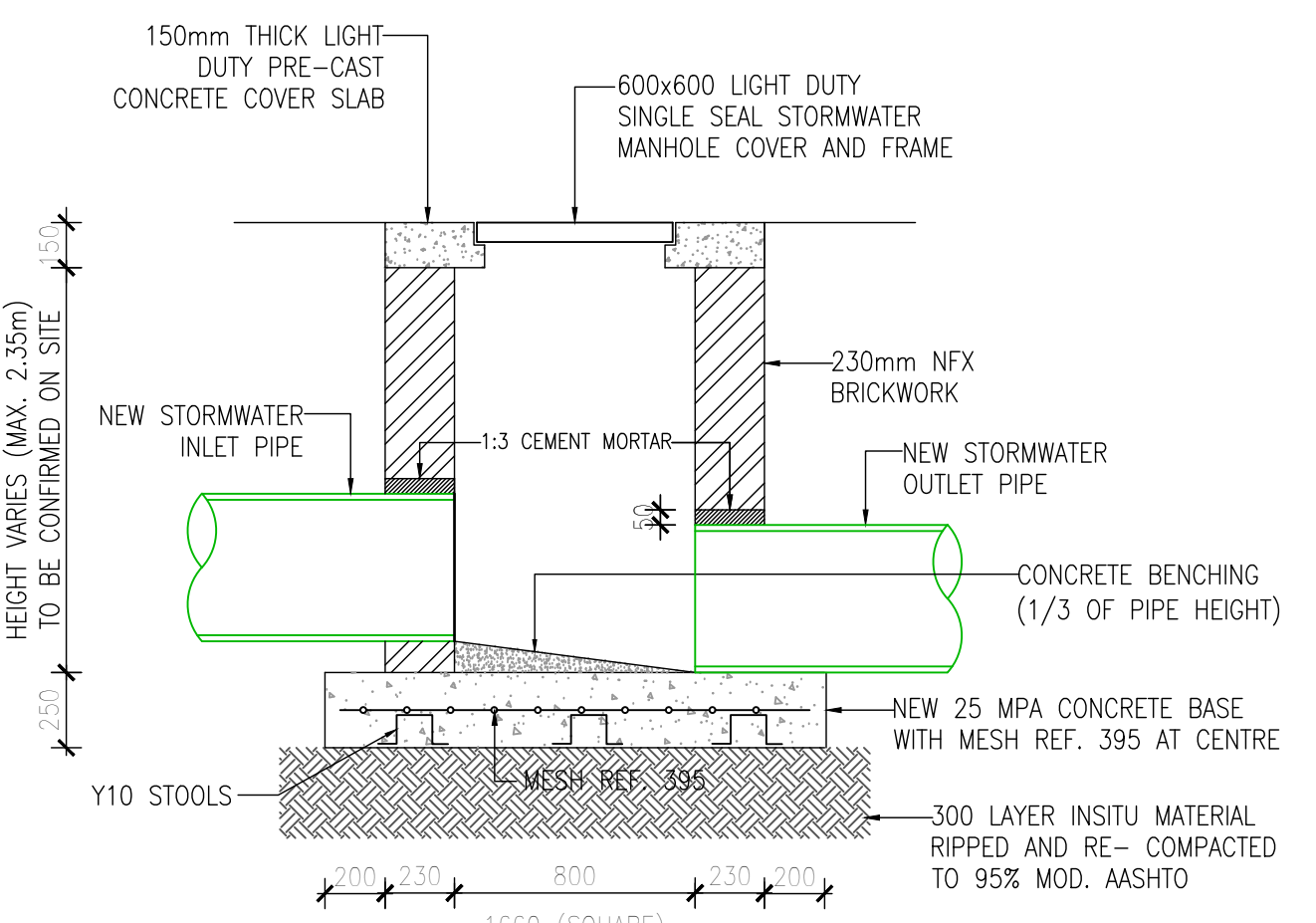
SECTION 17-17
TYPICAL SECTION THROUGH MANHOLE TYPE 4 (LIGHT DUTY)
SCALE 1:25



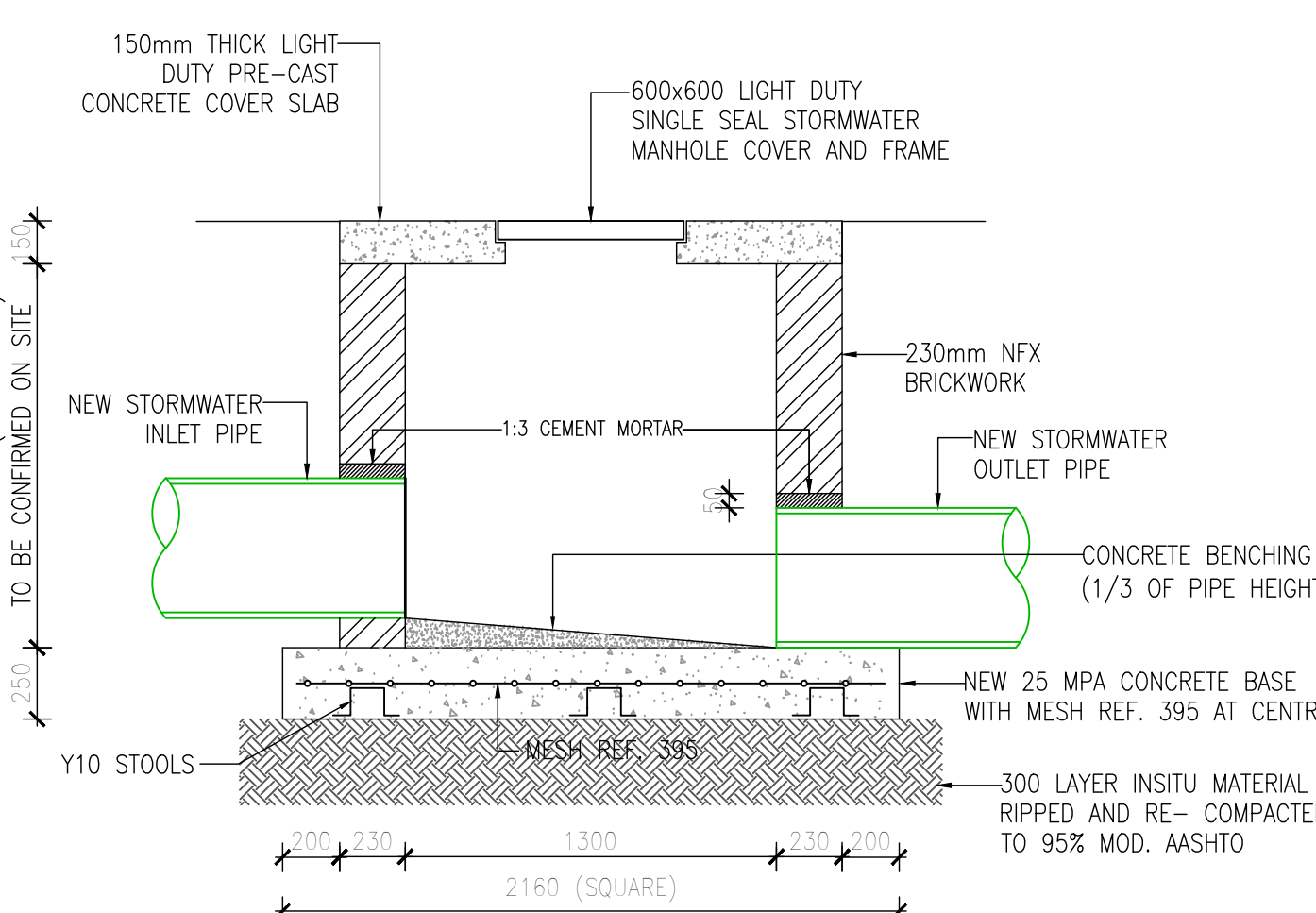
PLAN : MANHOLE TYPE 1 (LIGHT DUTY)
SCALE 1:25



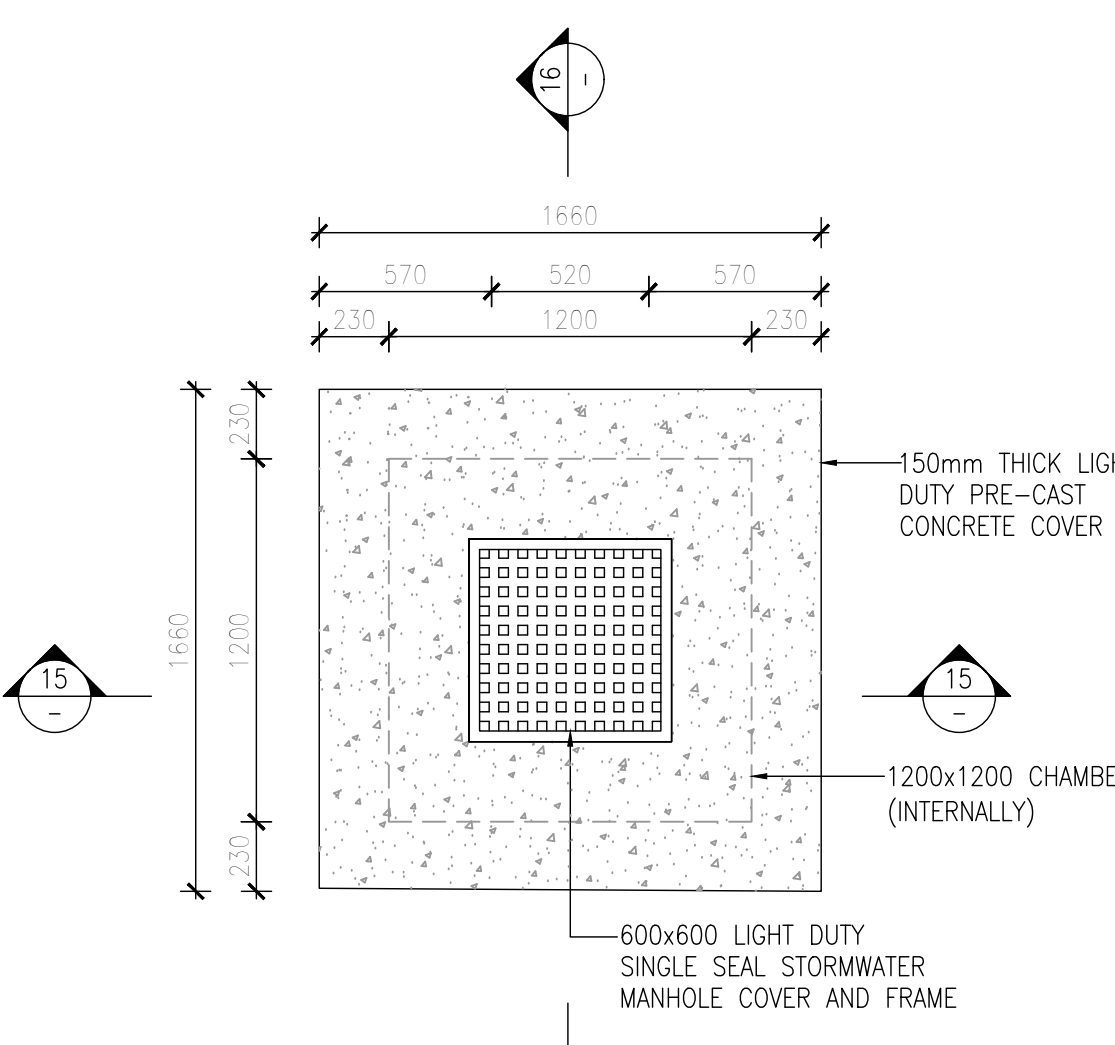
SECTION 13-13
TYPICAL SECTION THROUGH MANHOLE TYPE 1 (LIGHT DUTY)
SCALE 1:25



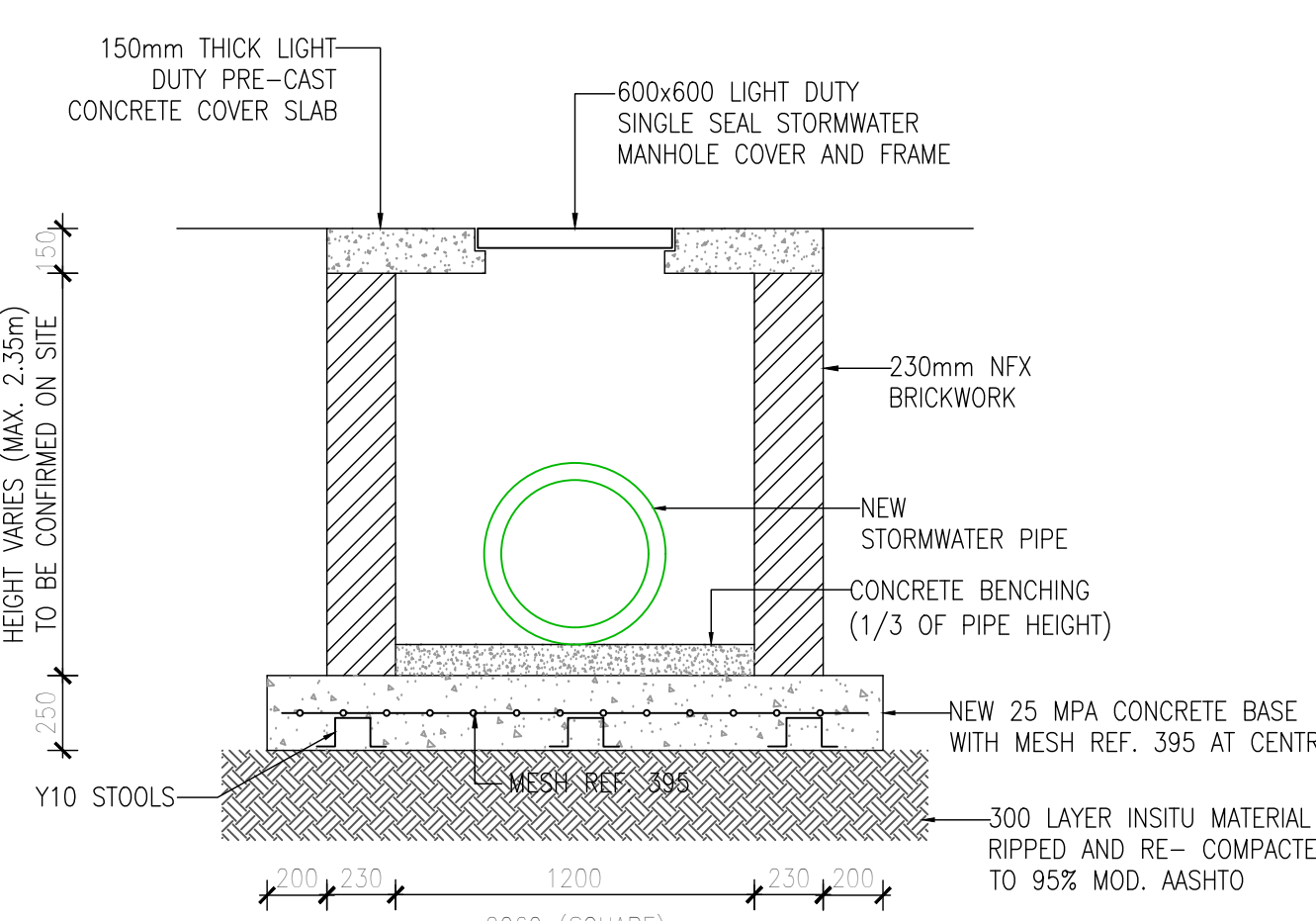
SECTION 14-14
TYPICAL SECTION THROUGH MANHOLE TYPE 1 (LIGHT DUTY)
SCALE 1:25



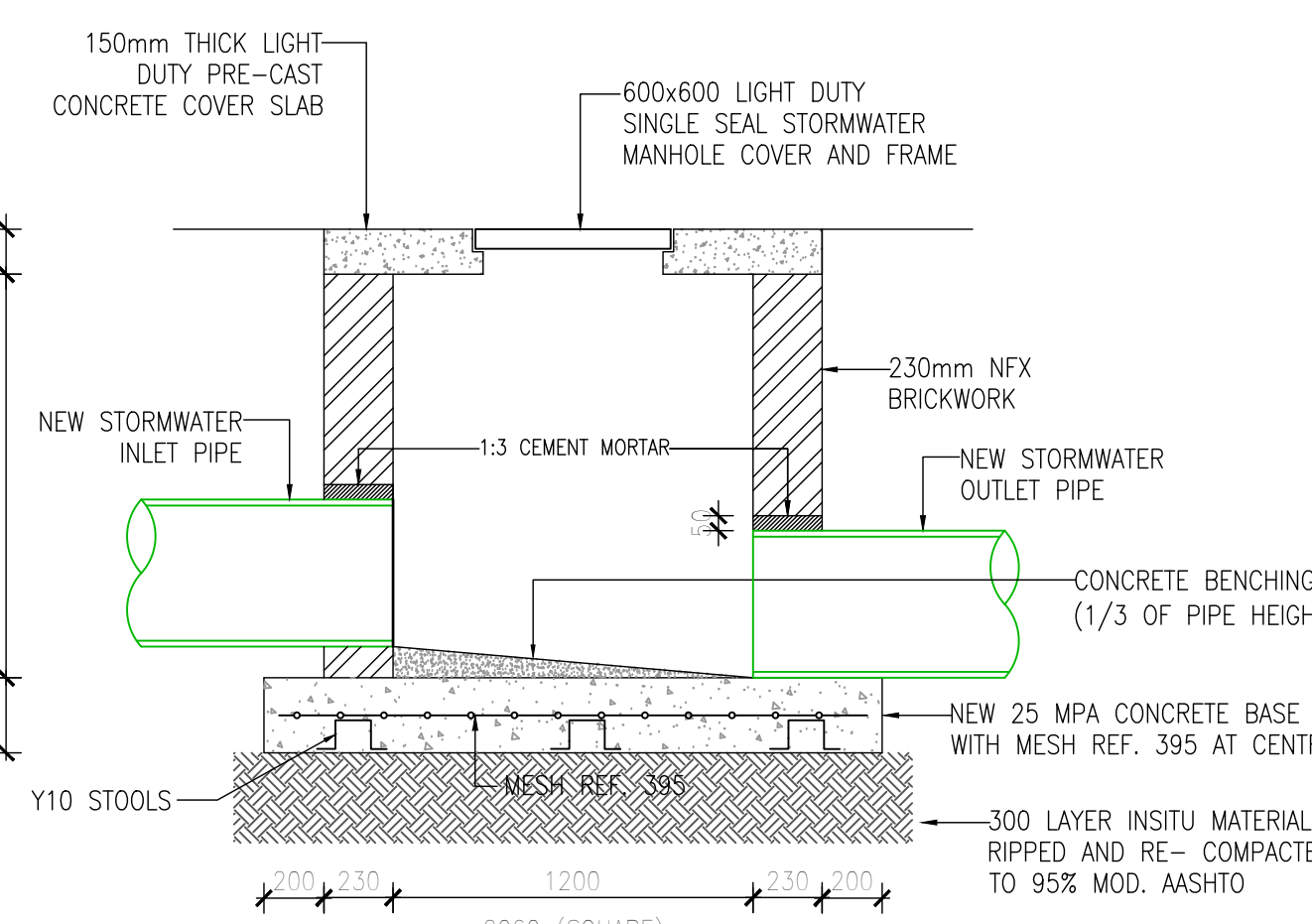
SECTION 18-18
TYPICAL SECTION THROUGH MANHOLE TYPE 4 (LIGHT DUTY)
SCALE 1:25



PLAN : MANHOLE TYPE 3 (LIGHT DUTY)
SCALE 1:25



SECTION 15-15
TYPICAL SECTION THROUGH MANHOLE TYPE 3 (LIGHT DUTY)
SCALE 1:25



SECTION 16-16
TYPICAL SECTION THROUGH MANHOLE TYPE 3 (LIGHT DUTY)
SCALE 1:25

- NOTES:
- 1) ALL SETTING OUT DETAILS AND LEVELS TO BE CHECKED AND CONFIRMED ON SITE.
 - 2) LENGTHS OF PIPE TO BE CONFIRMED ON SITE PRIOR TO ORDERING OF PIPES.
 - 3) MINIMUM COVER OF 600mm FOR ALL PIPES UNLESS OTHERWISE SPECIFIED BY ENGINEER.
 - 4) STEP IRONS WHERE REQUIRED ARE TO BE TO MUNICIPAL SPECIFICATIONS.
 - 5) SUBSOIL DRAINAGE TO BE PLACED IF NECESSARY AS DIRECTED BY THE ENGINEER.
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REFERENCE DRAWING

REV	DESCRIPTION	DR	APP	DATE
A	ISSUED FOR INFORMATION	SKM	KH	03/05/23
DESIGNED		INITIALS	SIGN	DATE
DRAWN				
PROJECT ENG.				
APPROVED				

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KANTEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development
PO BOX 290 HILTON SOUTH AFRICA 3245 TEL +27 33 347 5453

CLIENT LOGO

CRDC ASSMANG
E-CARD ROAD DEVELOPMENT COMPANY
Pty Ltd

CLIENT
CATO RIDGE DEVELOPMENT COMPANY(Pty) Ltd
PROJECT
CATO RIDGE PHASED DEVELOPMENT

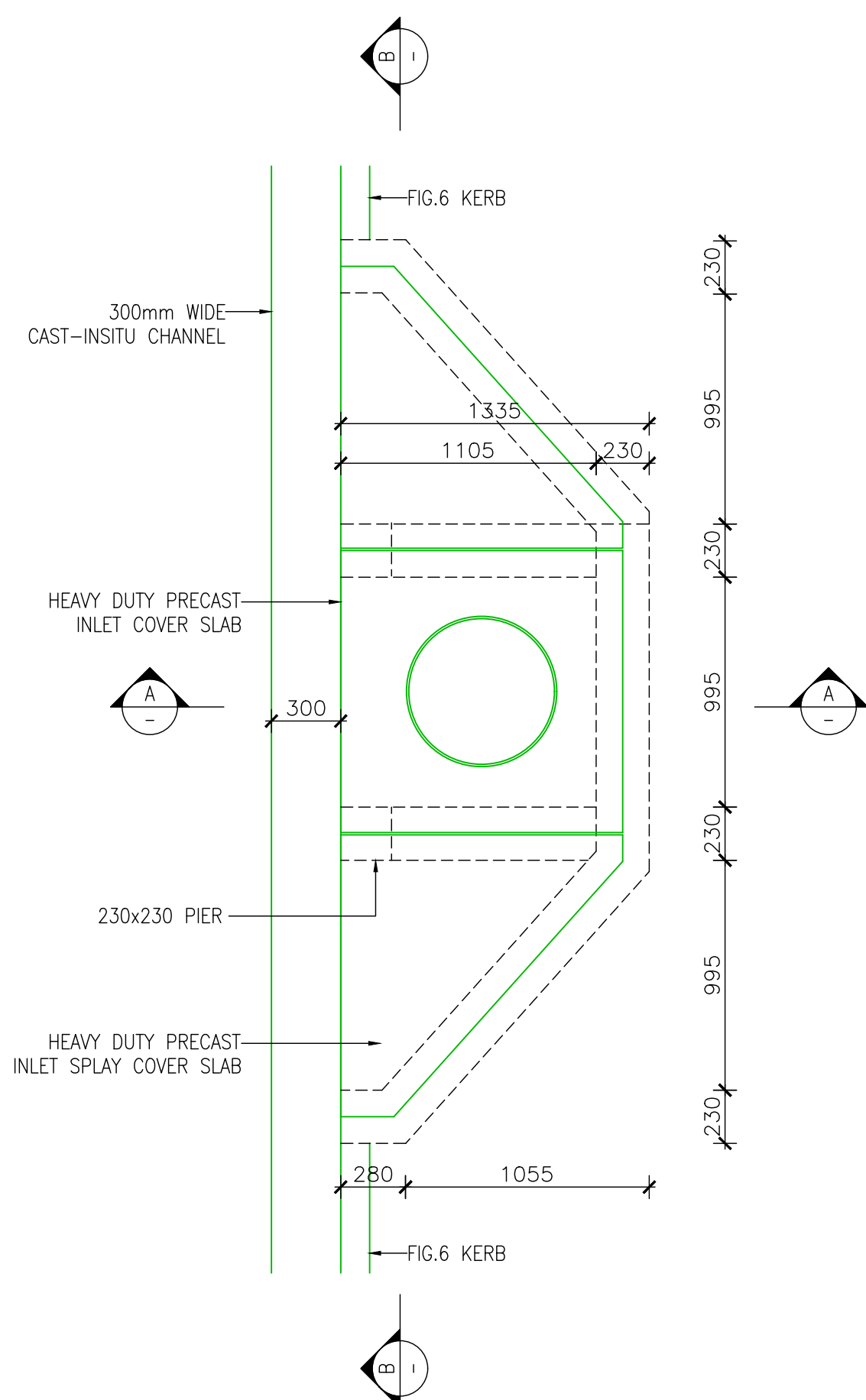
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STORMWATER MANHOLE DETAILS
SHEET 2 OF 3

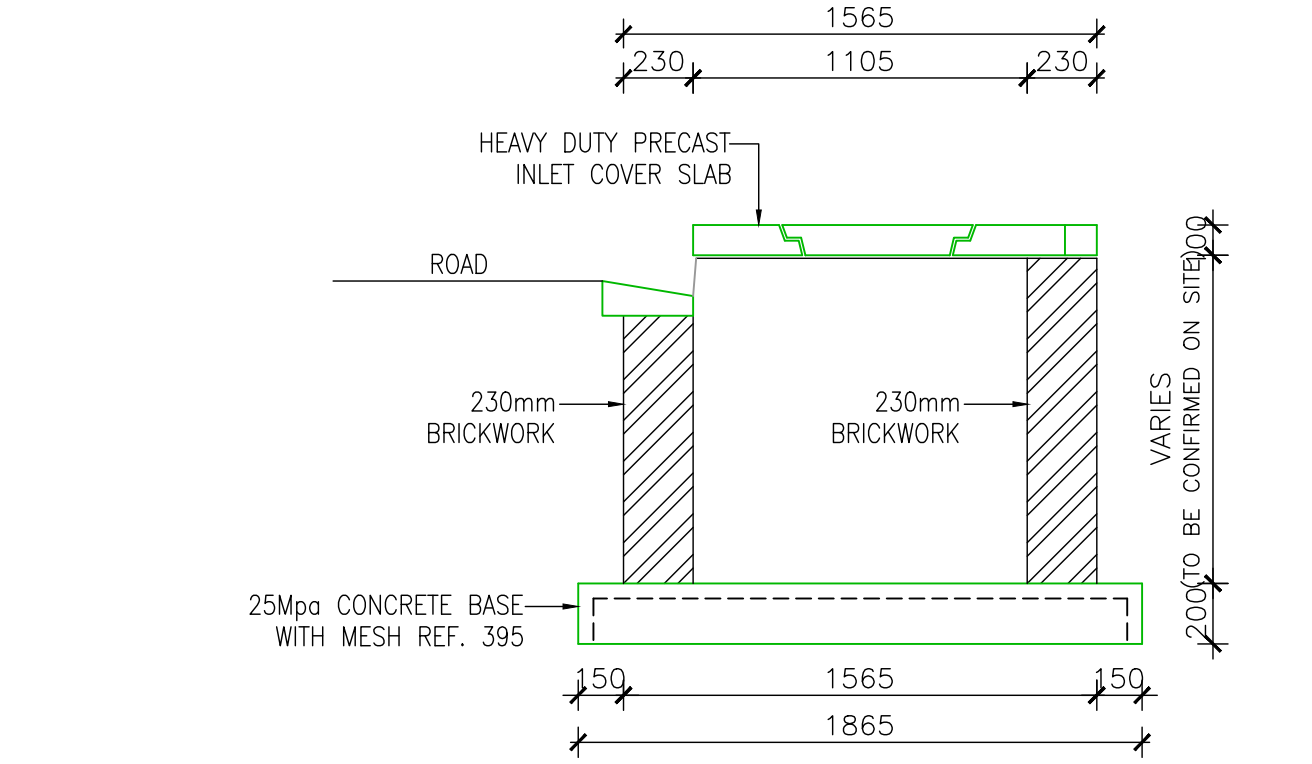
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DRAWING No. 20207-CSW 02

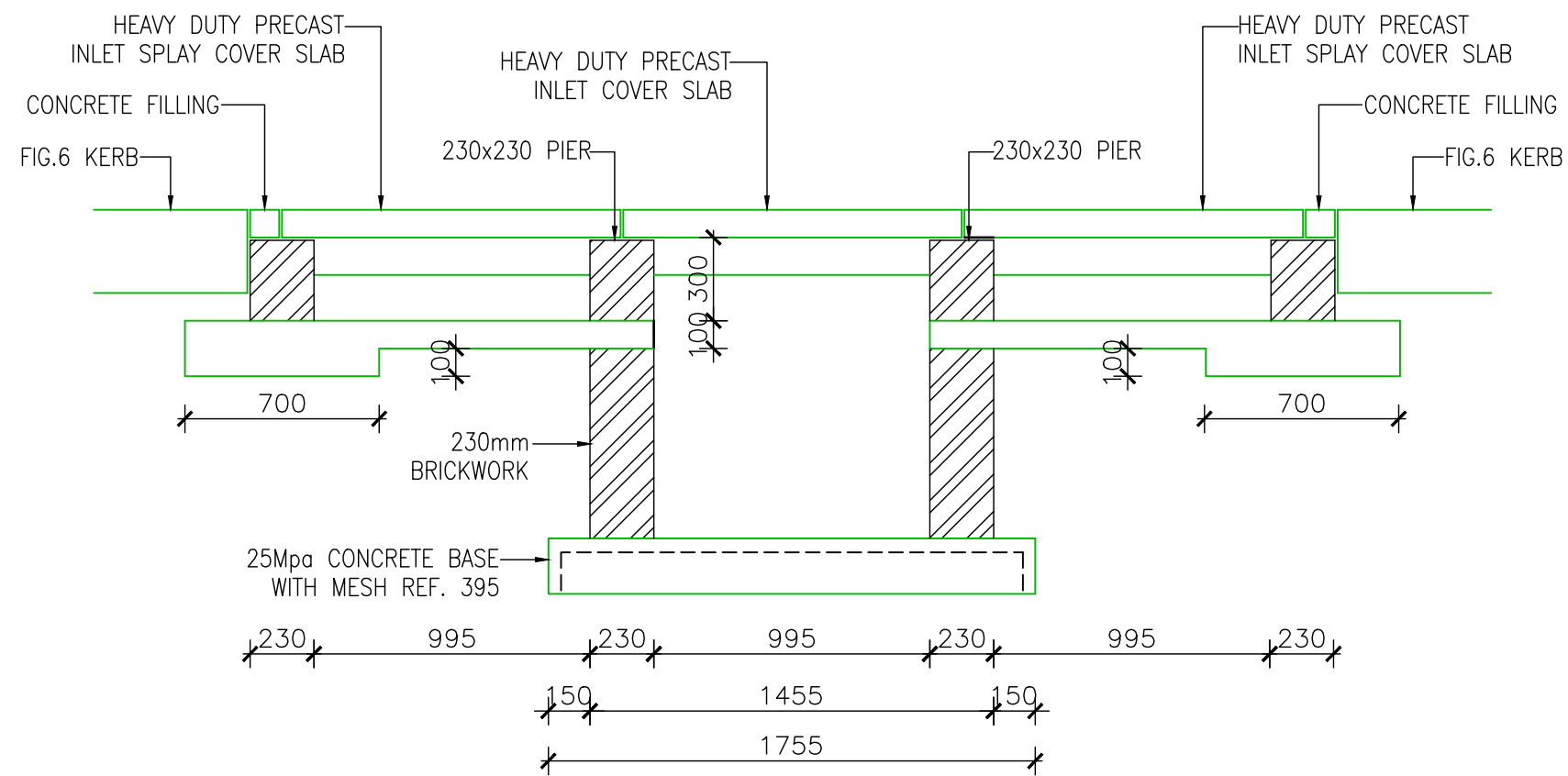
REV A



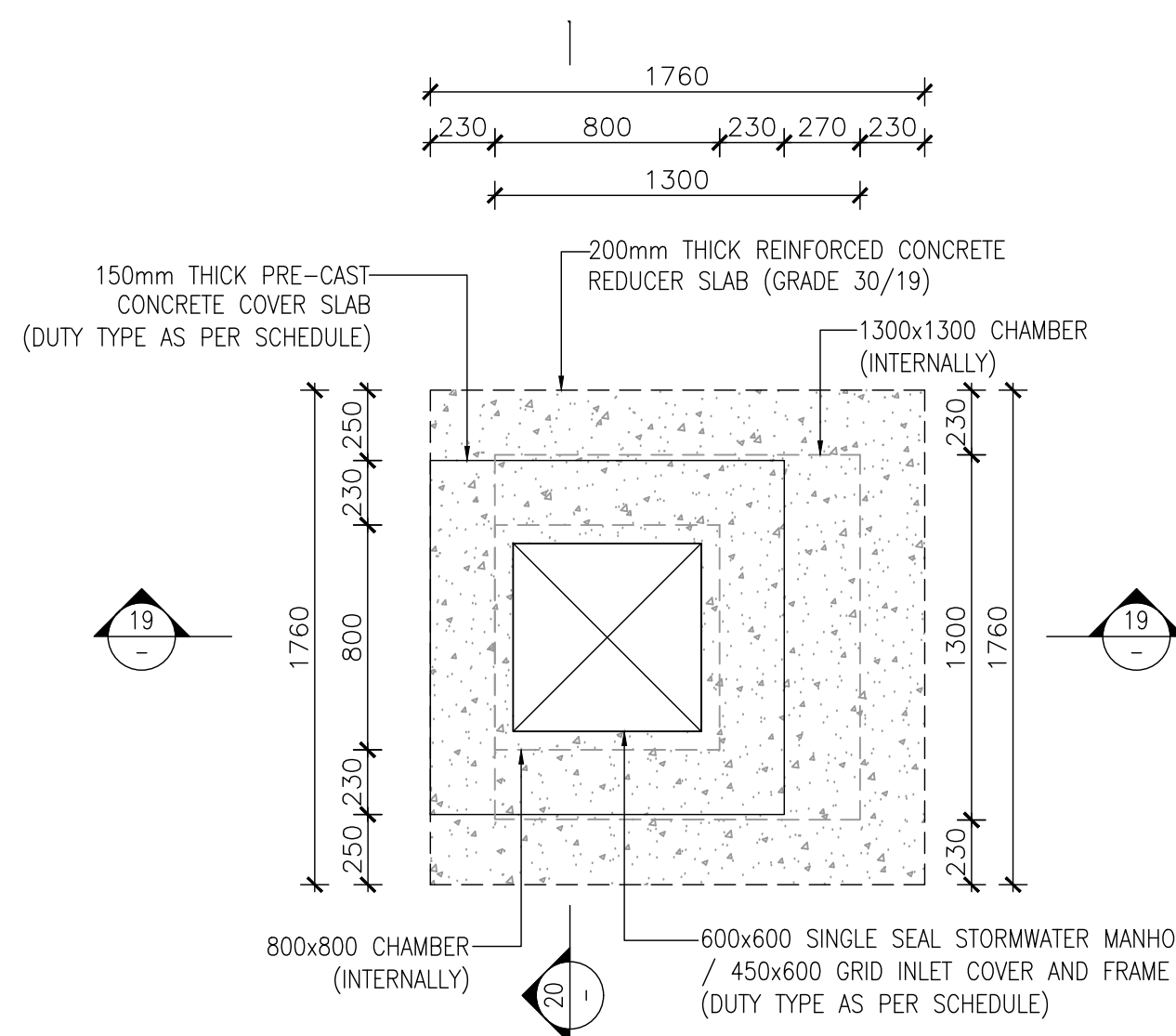
PLAN : SIDE ENTRY CATCHPIT TYPE 1a (HEAVY DUTY)
SCALE 1:25



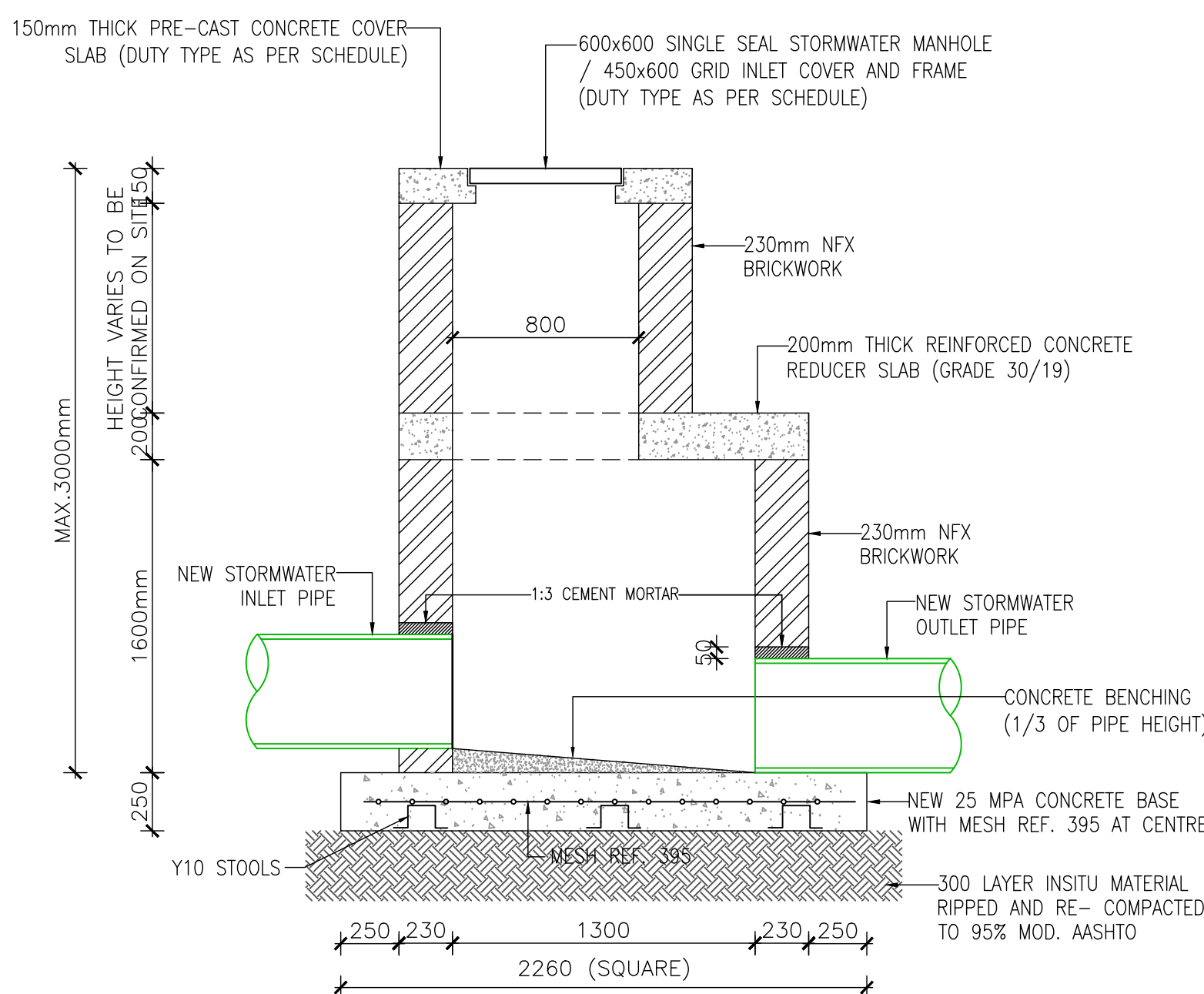
SECTION A-A
TYPICAL SECTION THROUGH SIDE
ENTRY CATCHPIT TYPE 1a (HEAVY DUTY)
SCALE 1:25



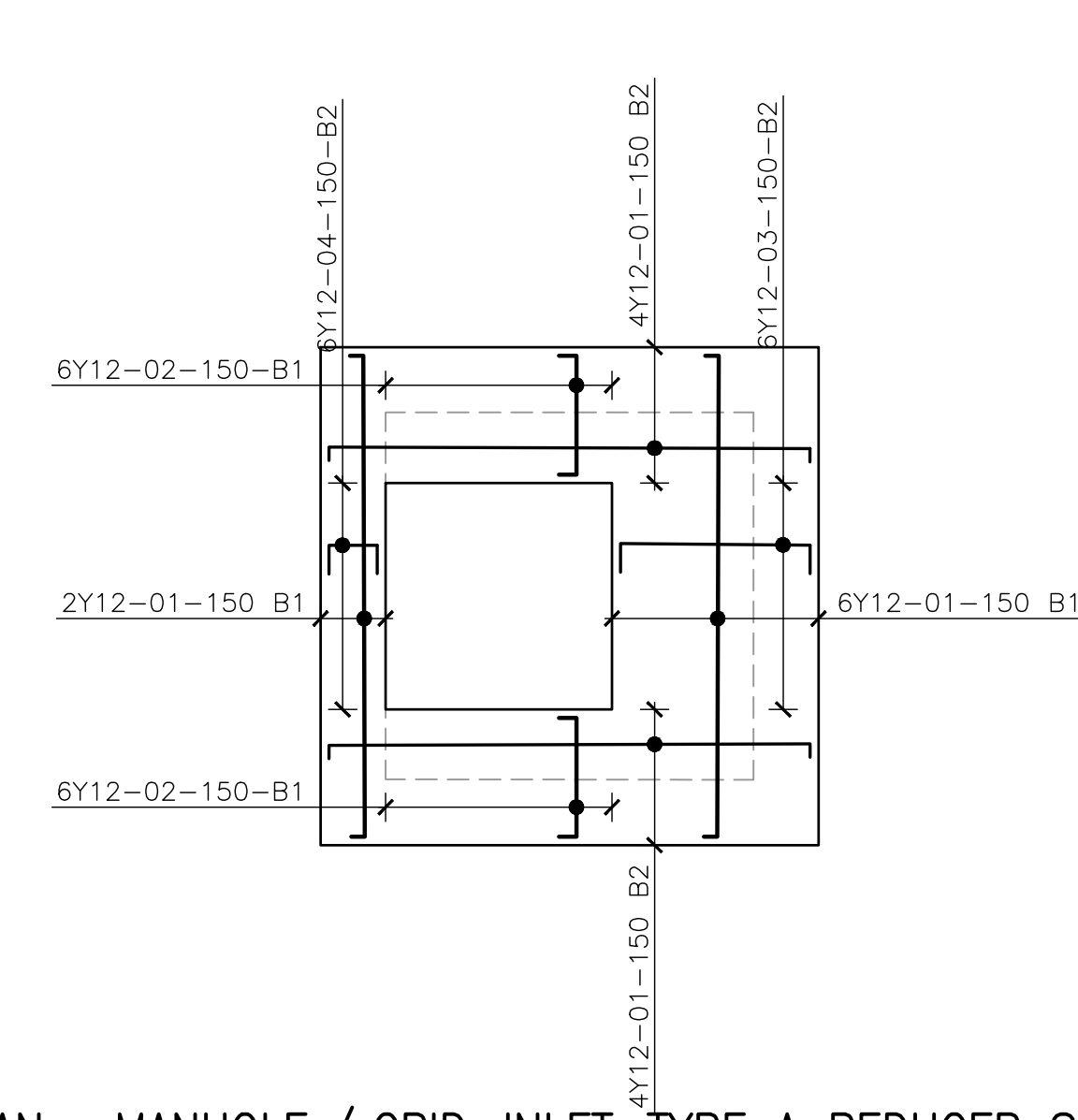
SECTION B-B
TYPICAL SECTION THROUGH SIDE
ENTRY CATCHPIT TYPE 1a (HEAVY DUTY)
SCALE 1:25



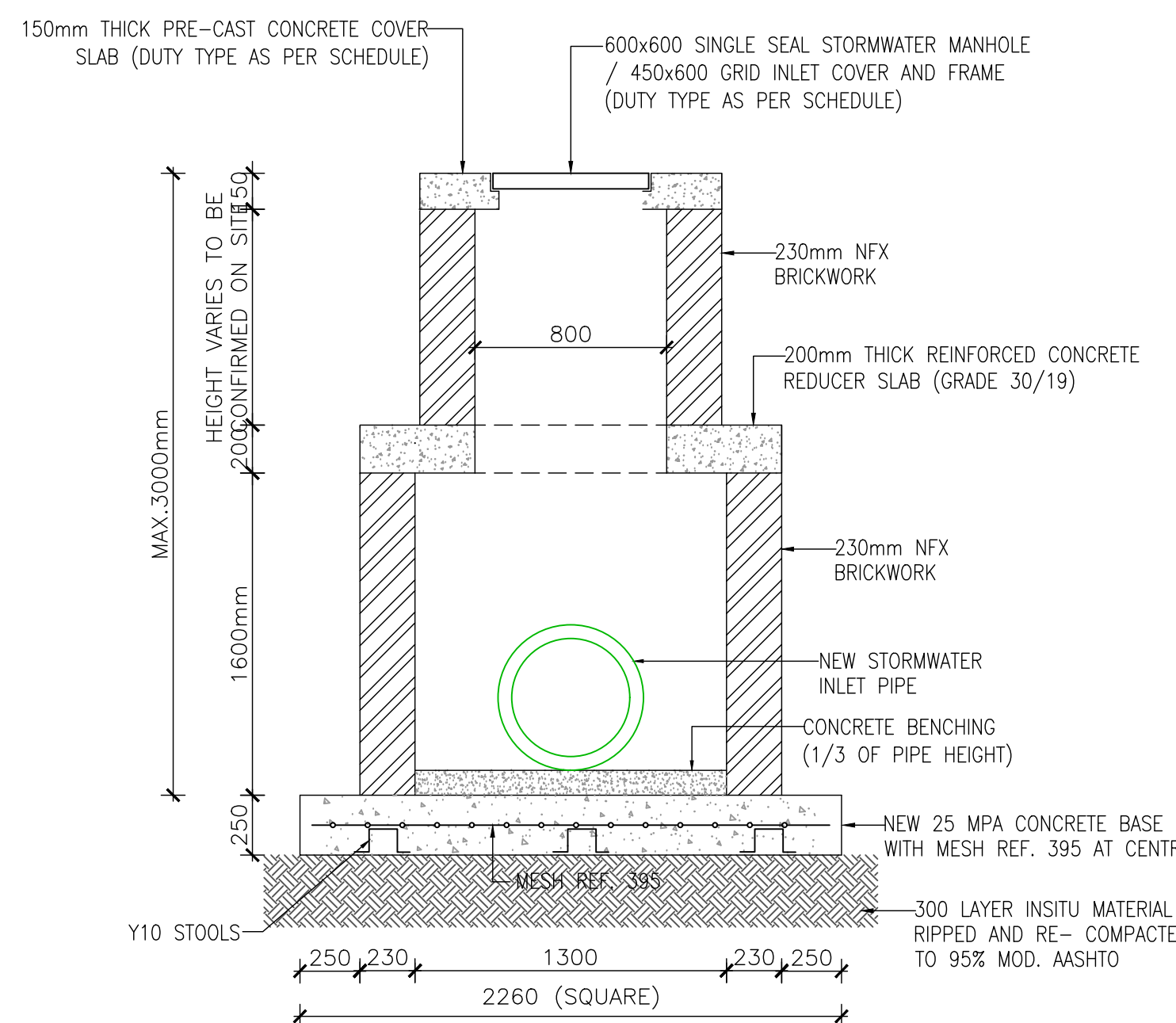
PLAN : MANHOLE / GRID-INLET TYPE A (2.5m TO 3m DEEP)
SCALE 1:25



SECTION 19-19
TYPICAL SECTION THROUGH MANHOLE / GRID-INLET TYPE A
(2.5m TO 3m DEEP)
SCALE 1:25



PLAN : MANHOLE / GRID-INLET TYPE A REDUCER SLAB
(REINFORCING DETAILS)
SCALE 1:25



SECTION 20-20
TYPICAL SECTION THROUGH MANHOLE / GRID-INLET TYPE A
(2.5m TO 3m DEEP)
SCALE 1:25

DESCRIPTION	No. OFF	REINFORCEMENT				BENDING DIMENSIONS TO SHAPE CODES SABS 082				
		BAR MK	TYPE & DIA.	No. OFF	TOTAL No.	LENGTH	SH. CODE	A	B	C
REDUCER SLAB	01	Y12	16	16	1900	38	130	1700	130	
	02	Y12	12	12	600	38	120	420	120	
	03	Y12	06	06	850	38	120	670	120	
	04	Y12	06	06	350	38	120	170	120	

- NOTES:
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 - 4) STEP IRONS WHERE REQUIRED ARE TO BE TO MUNICIPAL SPECIFICATIONS.
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REFERENCE DRAWING

REV	DESCRIPTION	DR.	APP.	DATE
A	ISSUED FOR INFORMATION	SKM	KH	03/05/23
DESIGNED				
DRAWN				
PROJECT ENG.				
APPROVED				

K&T
KANTLEY & TEMPLER
CONSULTING ENGINEERS
Engineering African Development
PO BOX 290 HILTON SOUTH AFRICA 3245 TEL +27 33 347 5453

CLIENT LOGO

CRDC ASSMANG
FOCUS: RURAL DEVELOPMENT CONSULTANTS
RURAL DEVELOPMENT CONSULTANTS

CLIENT
CATO RIDGE DEVELOPMENT COMPANY(Pty) Ltd
PROJECT
CATO RIDGE PHASED DEVELOPMENT

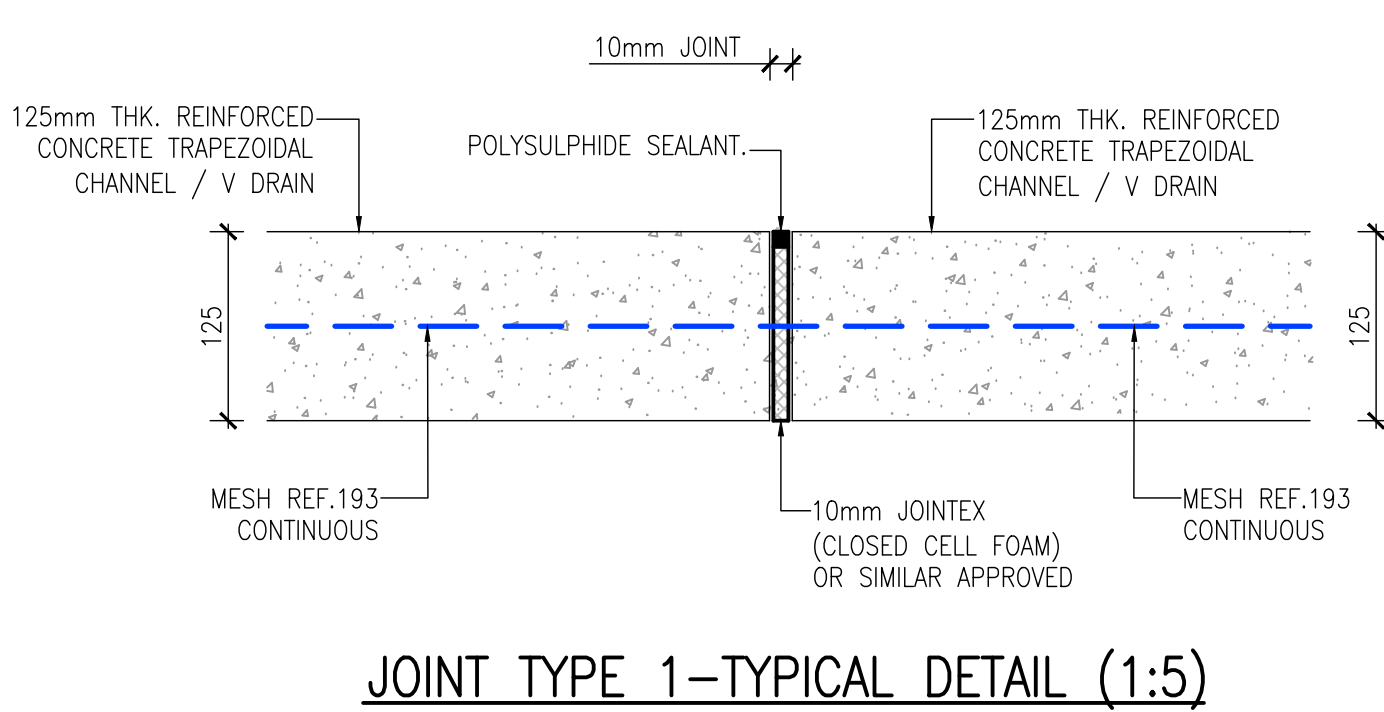
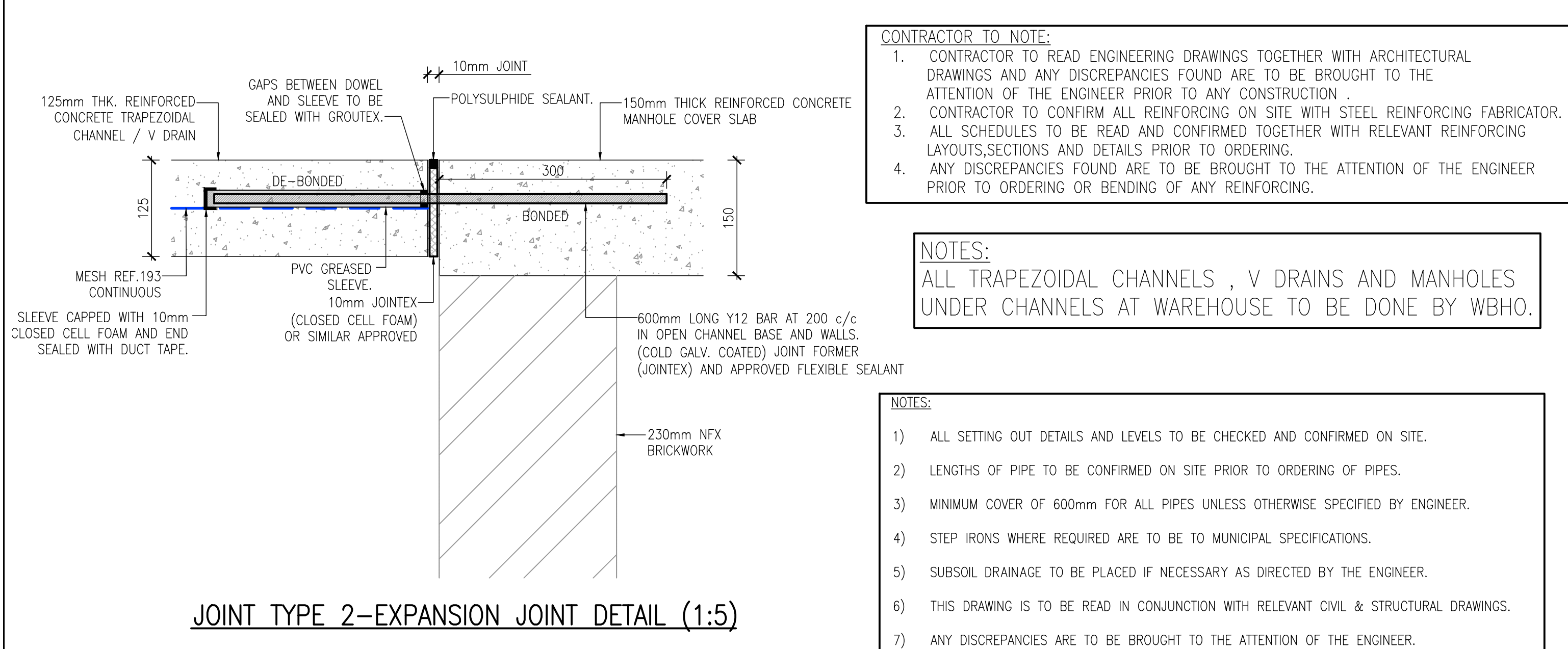
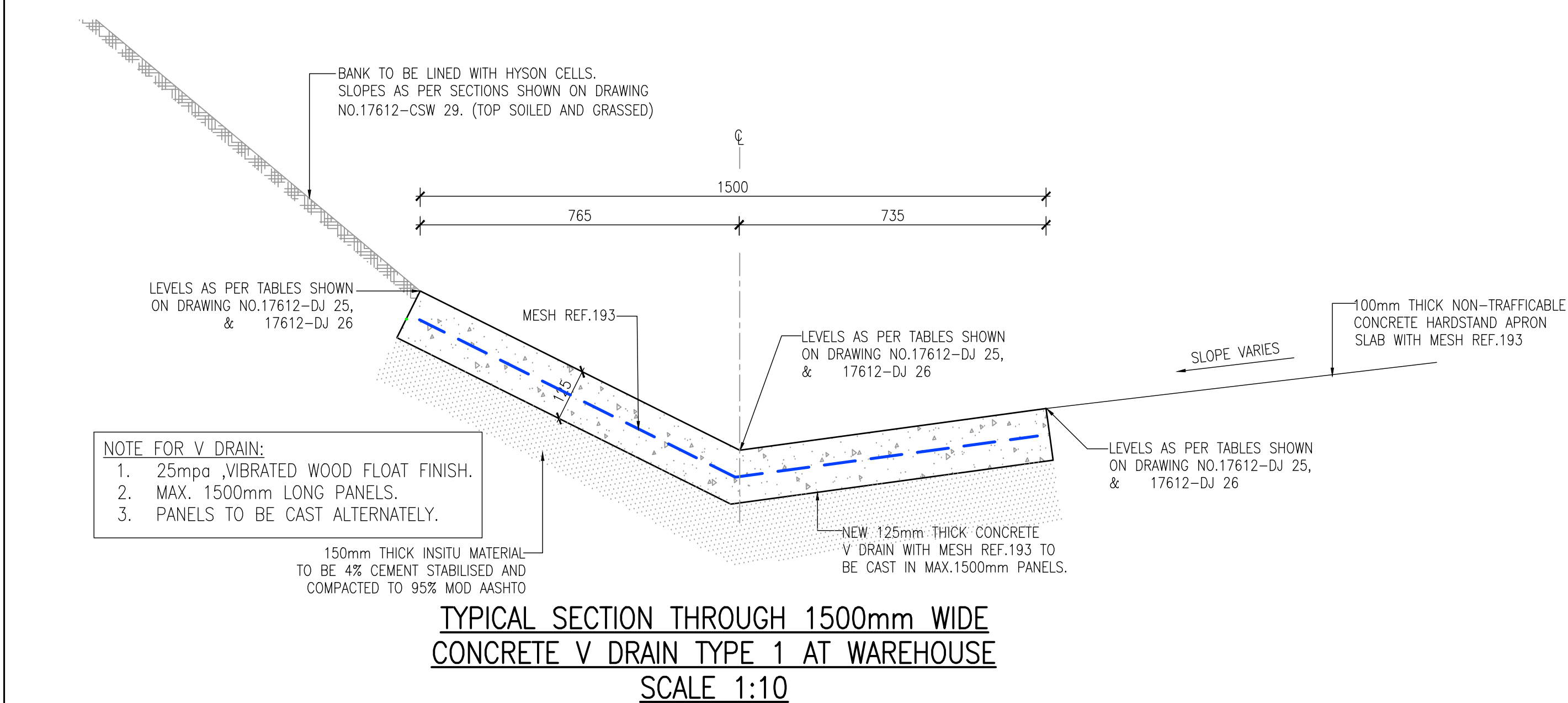
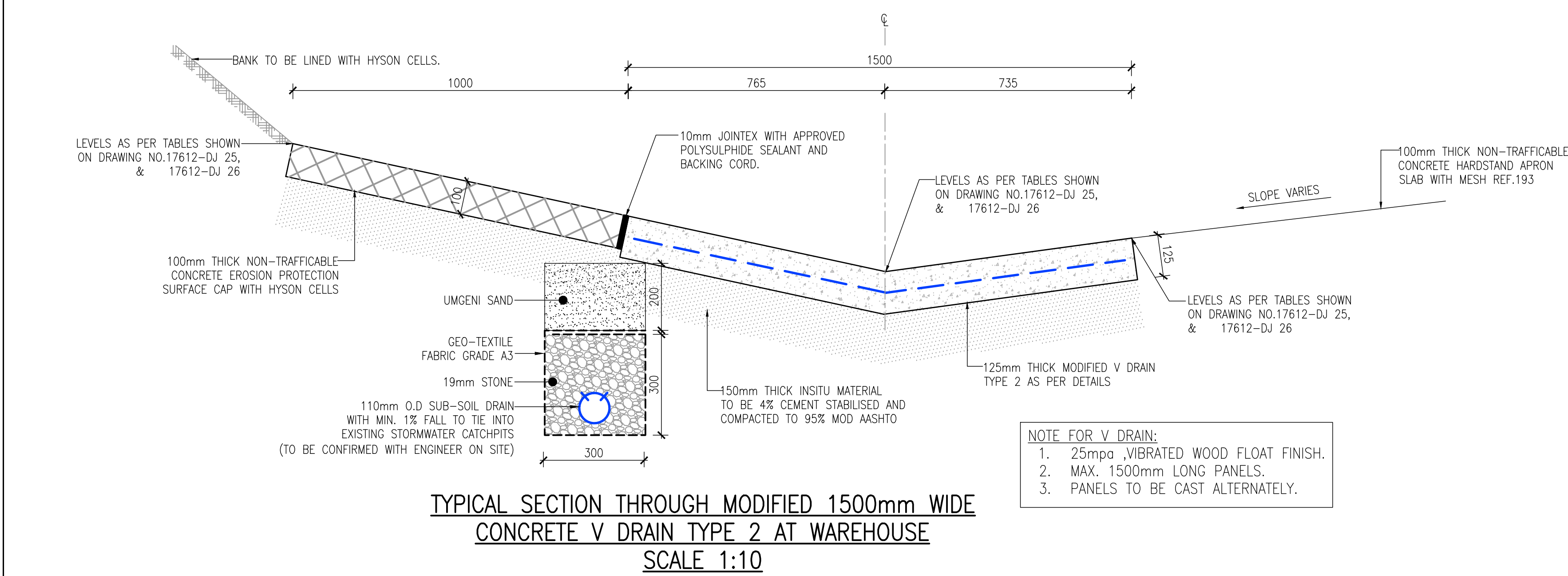
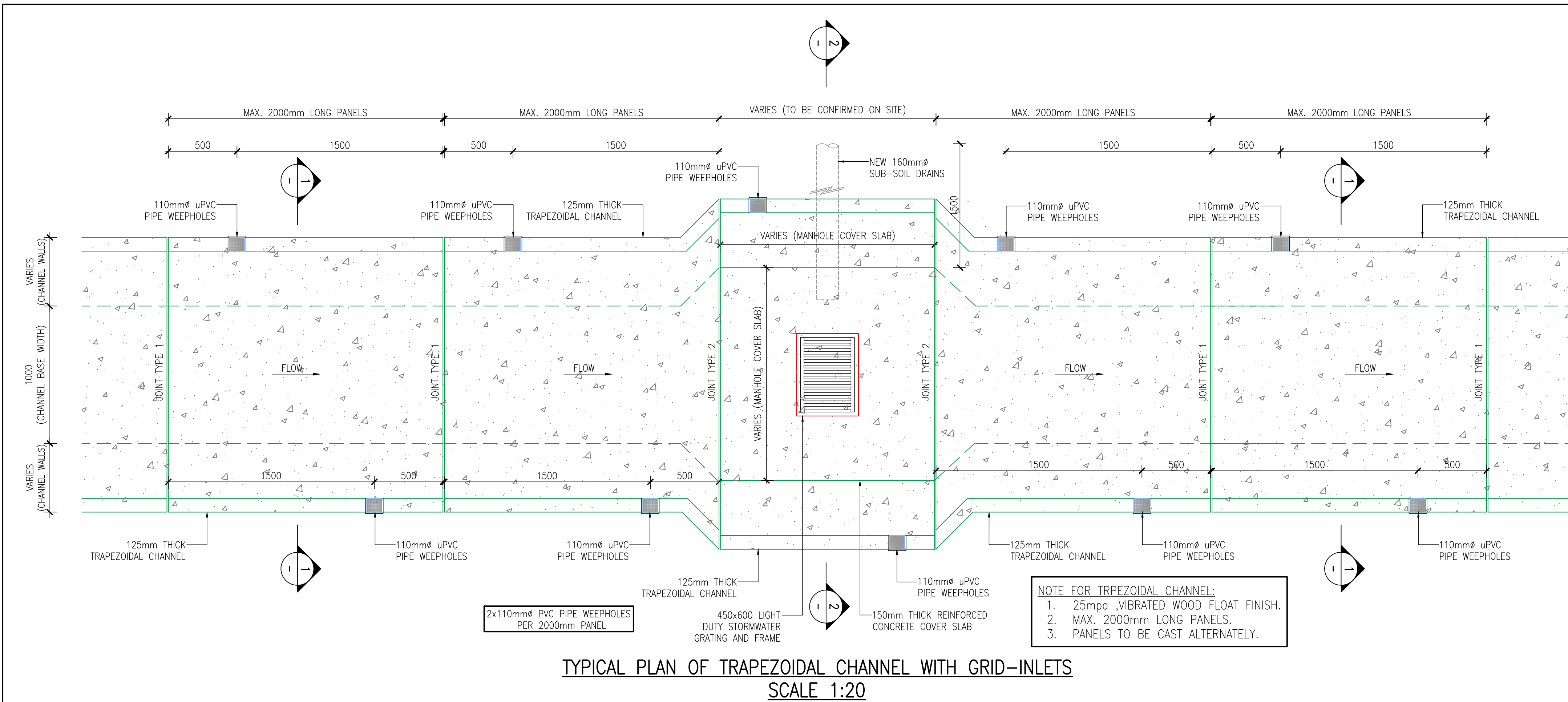
TITLE
STORMWATER MANHOLE DETAILS
SHEET 3 OF 3

SCALE : AS SHOWN

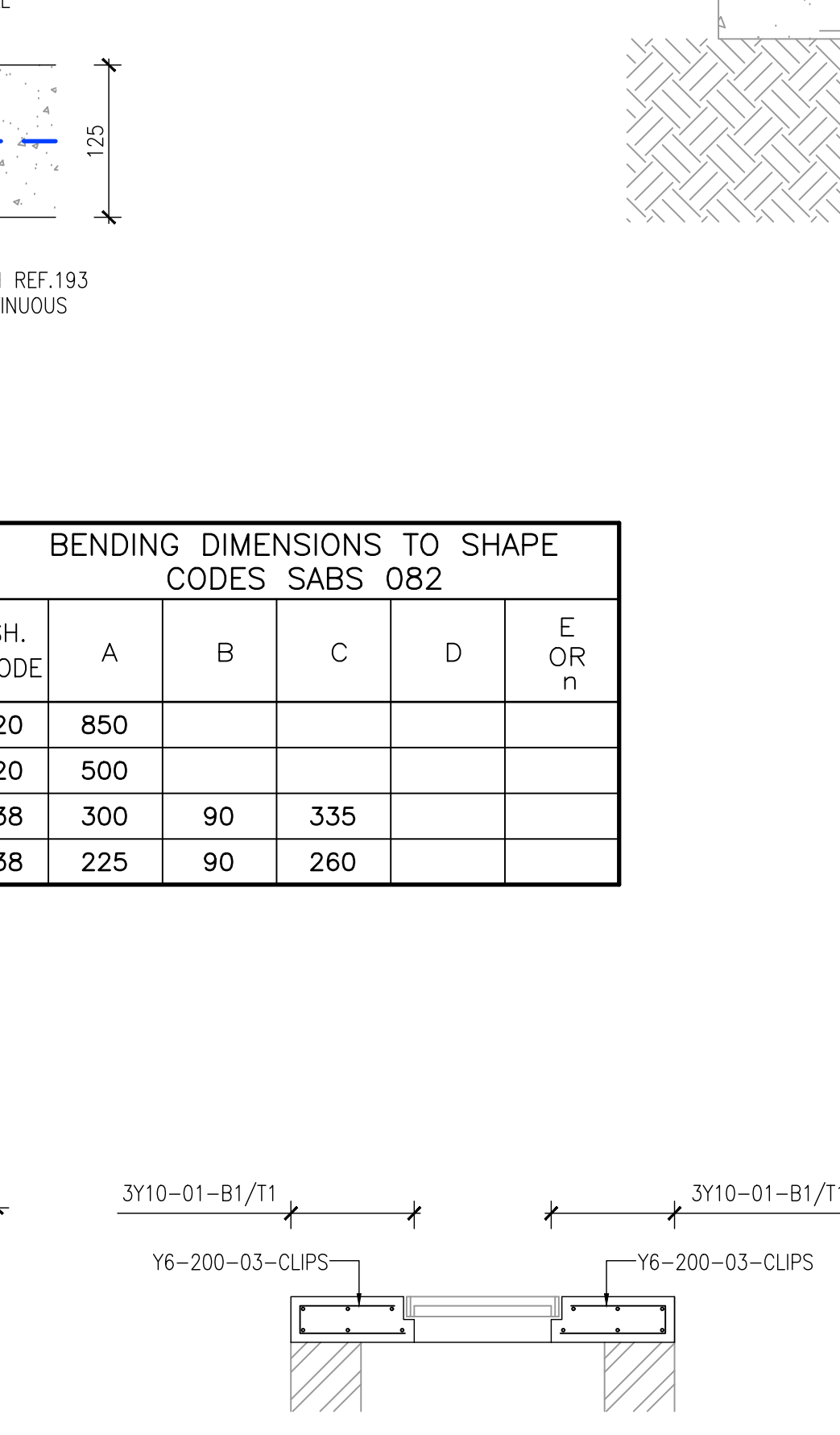
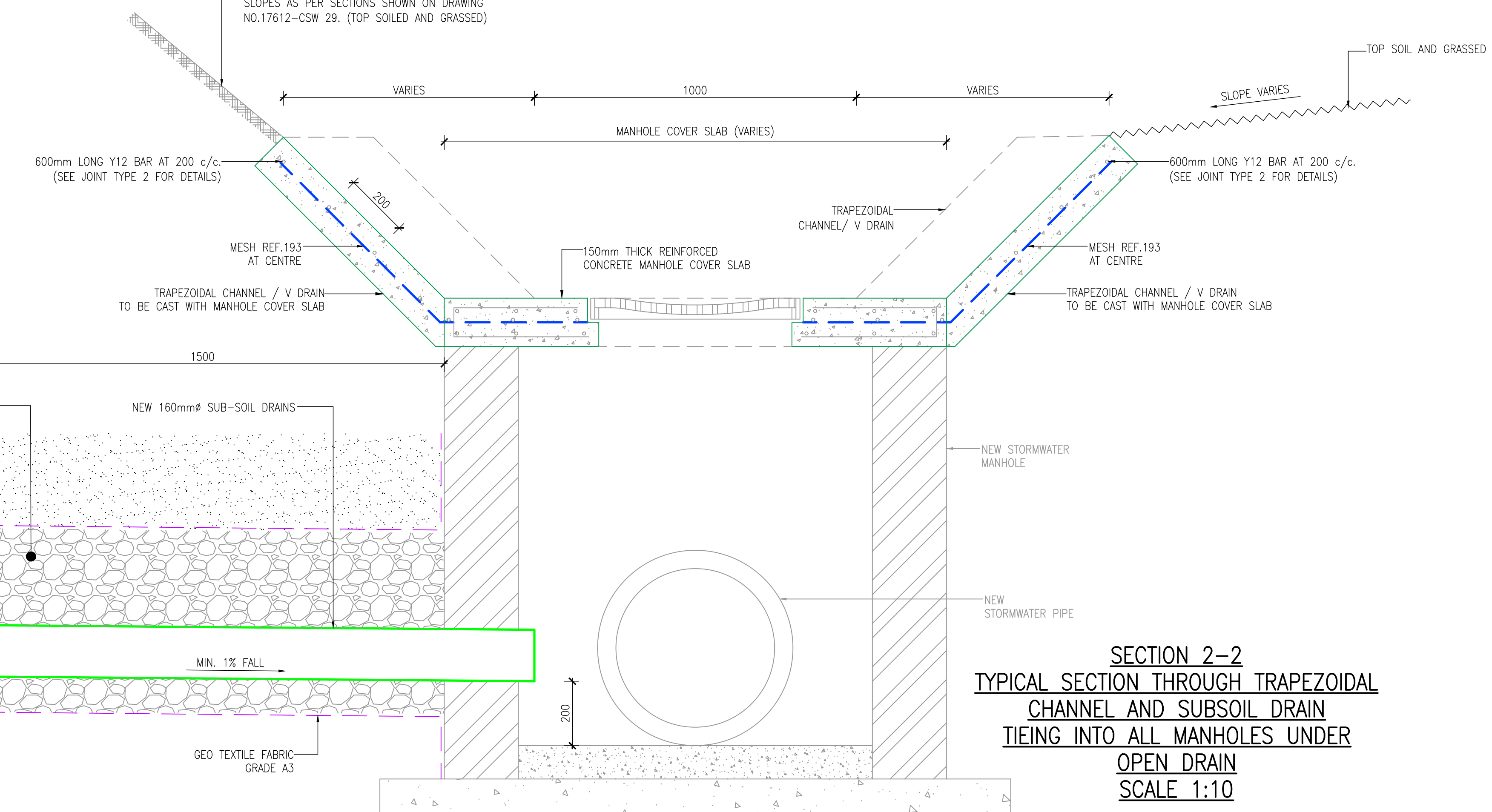
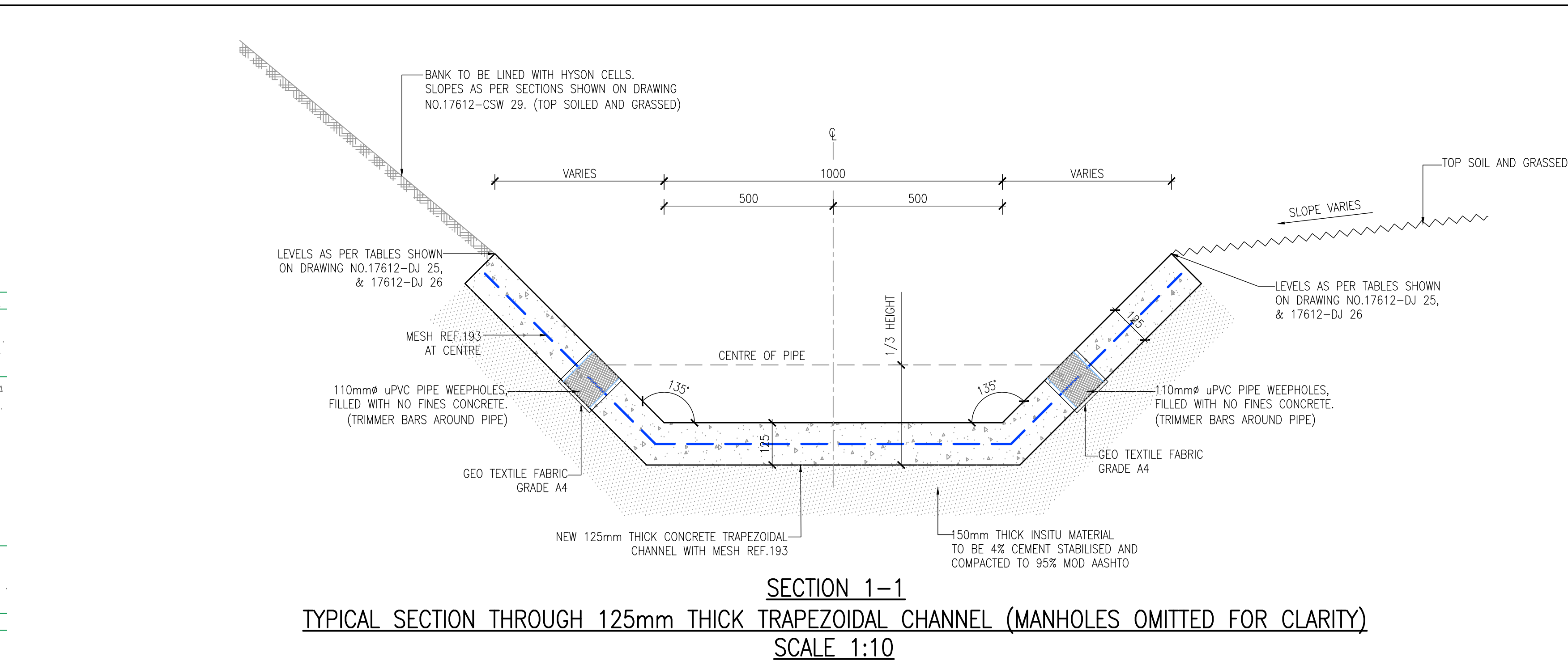
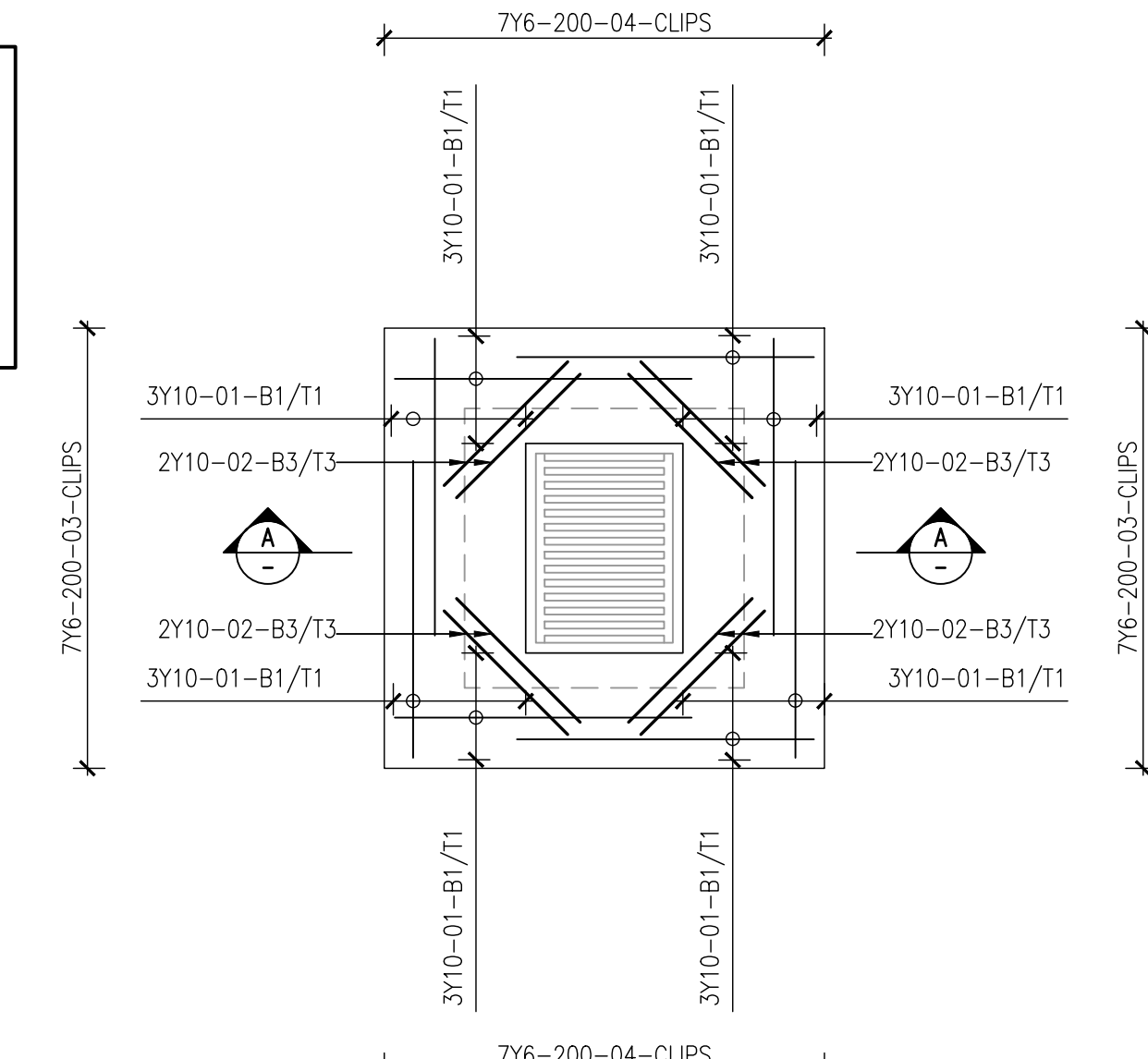
DRAWING No. 20207-CSW 03
REV A



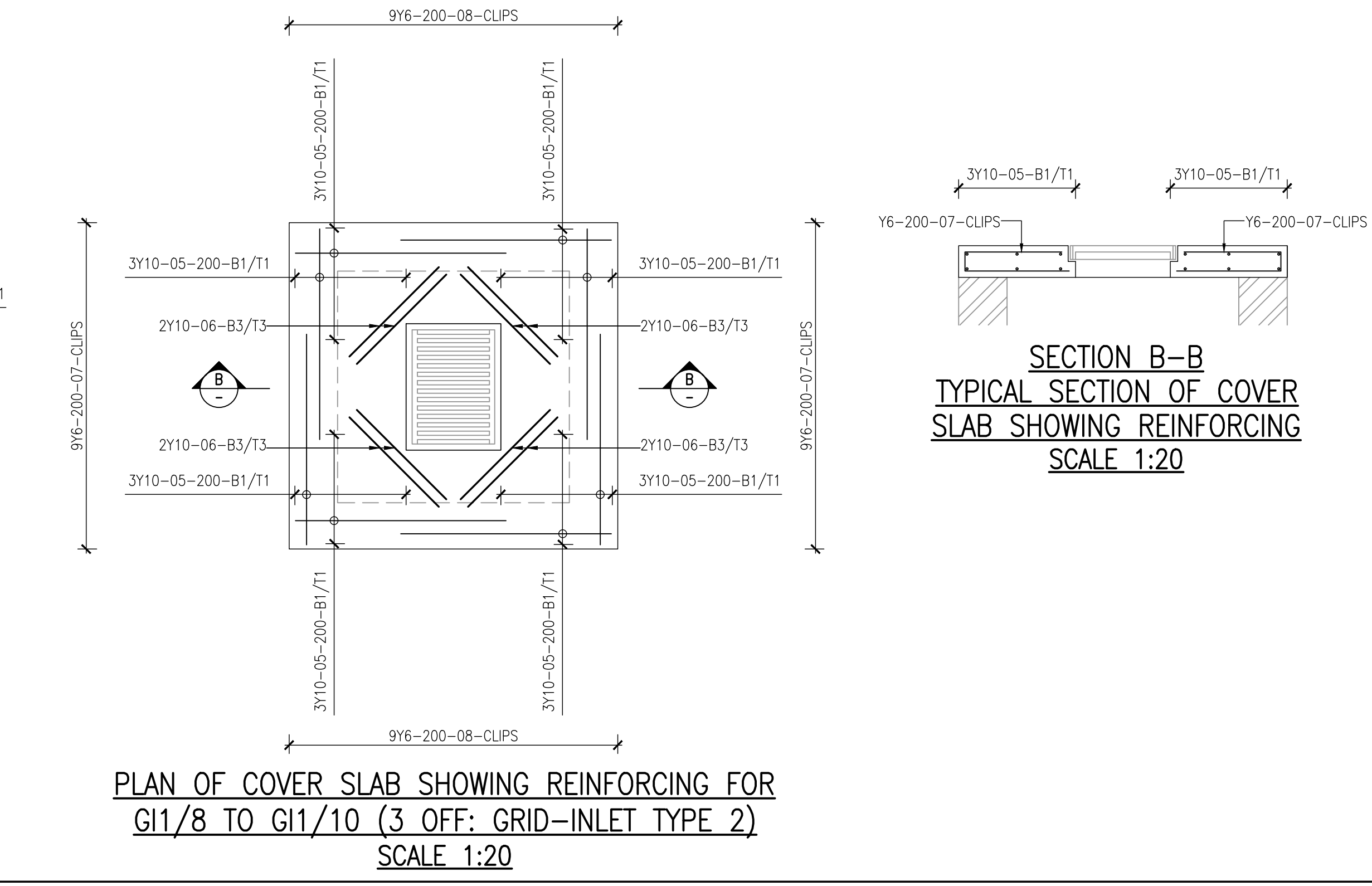
COMPILED	KH	03/05/23	CLIENT	PROJECT	TITLE	SCALE	PROJECT NO	SHEET NO.	REV
DRAWN	SKM	03/05/23	CATO RIDGE D/ COMP.(Pty) Ltd	CATO RIDGE	TYPICAL DETAIL SHOWING	AS SHOWN	20207	CSW 04	A
CHECKED	KH	03/05/23		PHASED DEVELOPMENT	ENCASEMENT FOR PIPES				



DESCRIPTION	NO. OFF.	REINFORCEMENT					BENDING DIMENSIONS TO SHAPE CODES SABS 082					
		BAR MK	TYPE & DIA.	No. OFF.	TOTAL No.	LENGTH	SH. CODE	A	B	C	D	E OR n
G1/1 TO G1/7 (GRID-INLET TYPE 1)	07	01	Y10	48	336	850	20	850				
		02	Y10	16	112	500	20	500				
		03	Y6	14	98	700	38	300	90	335		
		04	Y6	14	98	550	38	225	90	260		



DESCRIPTION	No. OFF	REINFORCEMENT					BENDING DIMENSIONS TO SHAPE CODES SABS 082					
		BAR MK	TYPE & DIA.	No. OFF	TOTAL No.	LENGTH	SH. CODE	A	B	C	D	E OR n
G1/8 TO G1/10 (GRID-INLET TYPE 2)	03	05	Y10	48	144	1000	20	1000				
		06	Y10	16	48	600	20	600				
		07	Y6	18	54	1000	38	485	90	450		
		08	Y6	18	54	850	38	375	90	410		



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REV	DESCRIPTION	DR	APP	DATE
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DRAWN
PROJECT ENG.
APPROVED

INITIALS SIGN DATE

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CLIENT LOGO

CRDC ASSMANG
ROADSIDE ENVIRONMENT CONSULTANTS

CLIENT
CATO RIDGE DEVELOPMENT COMPANY(Pty) Ltd

PROJECT
CATO RIDGE PHASED DEVELOPMENT

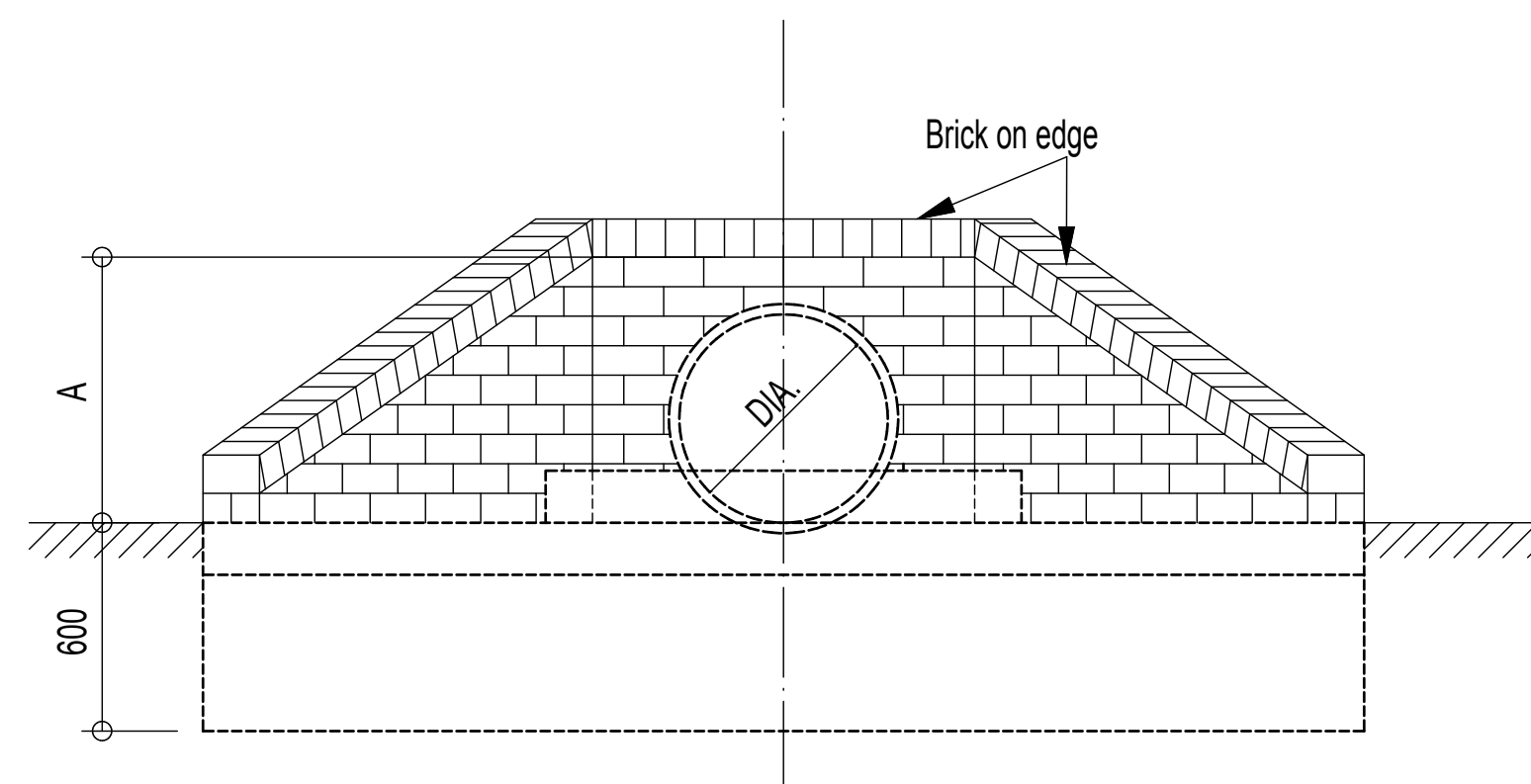
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TYPICAL DETAILS FOR TRAPEZOIDAL AND V CHANNELS

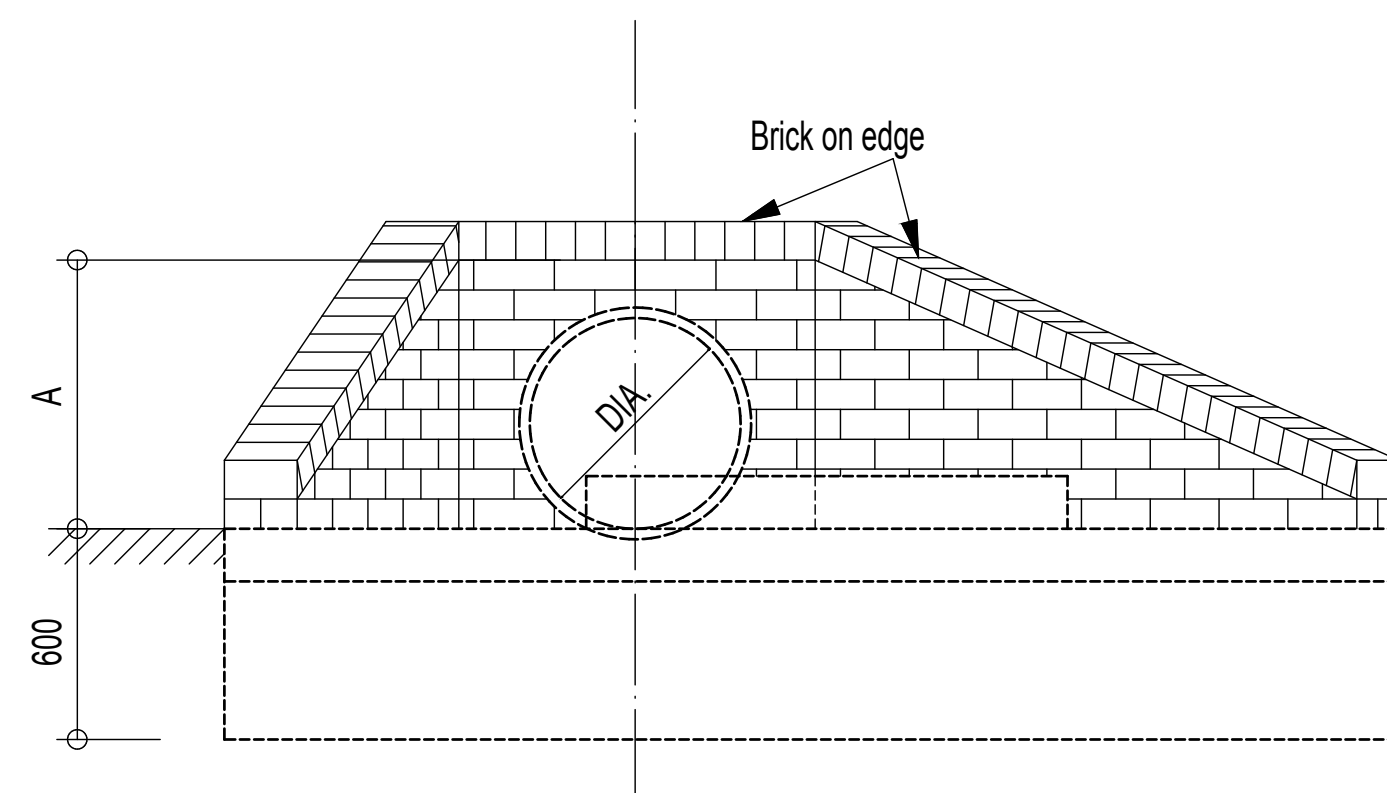
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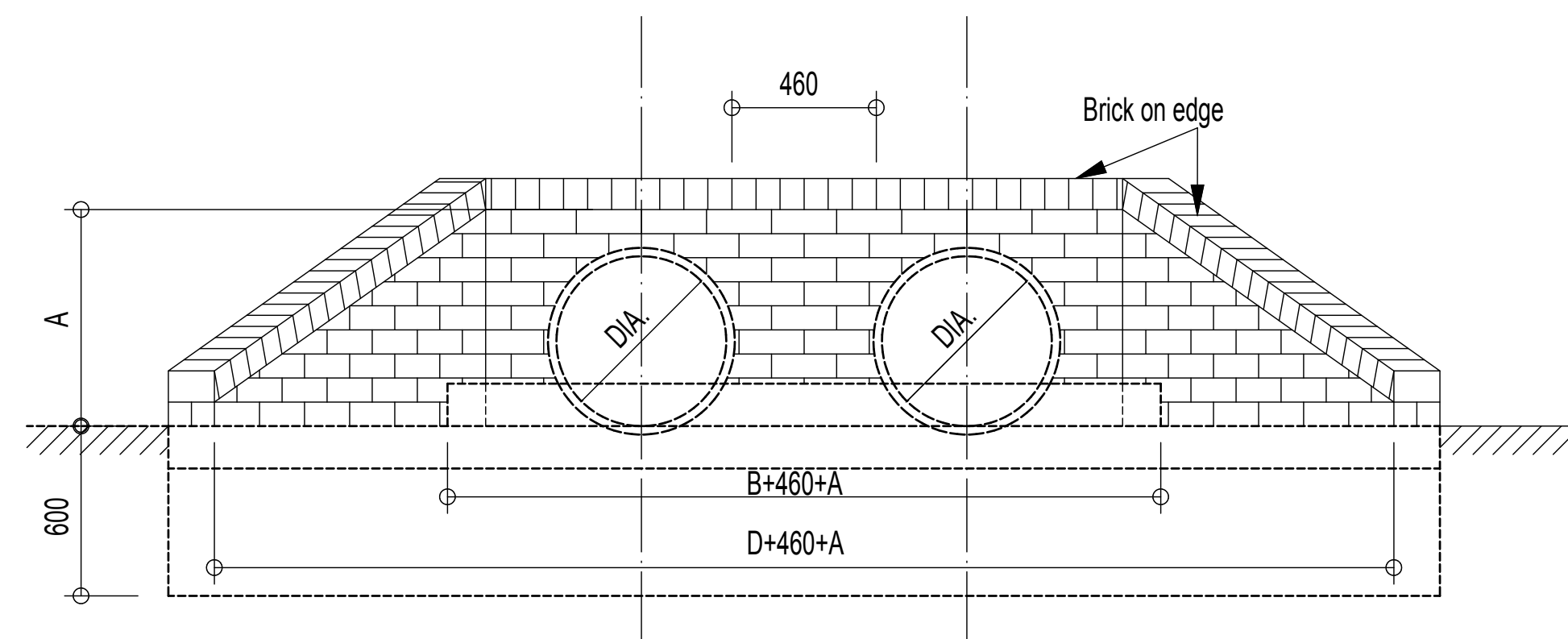
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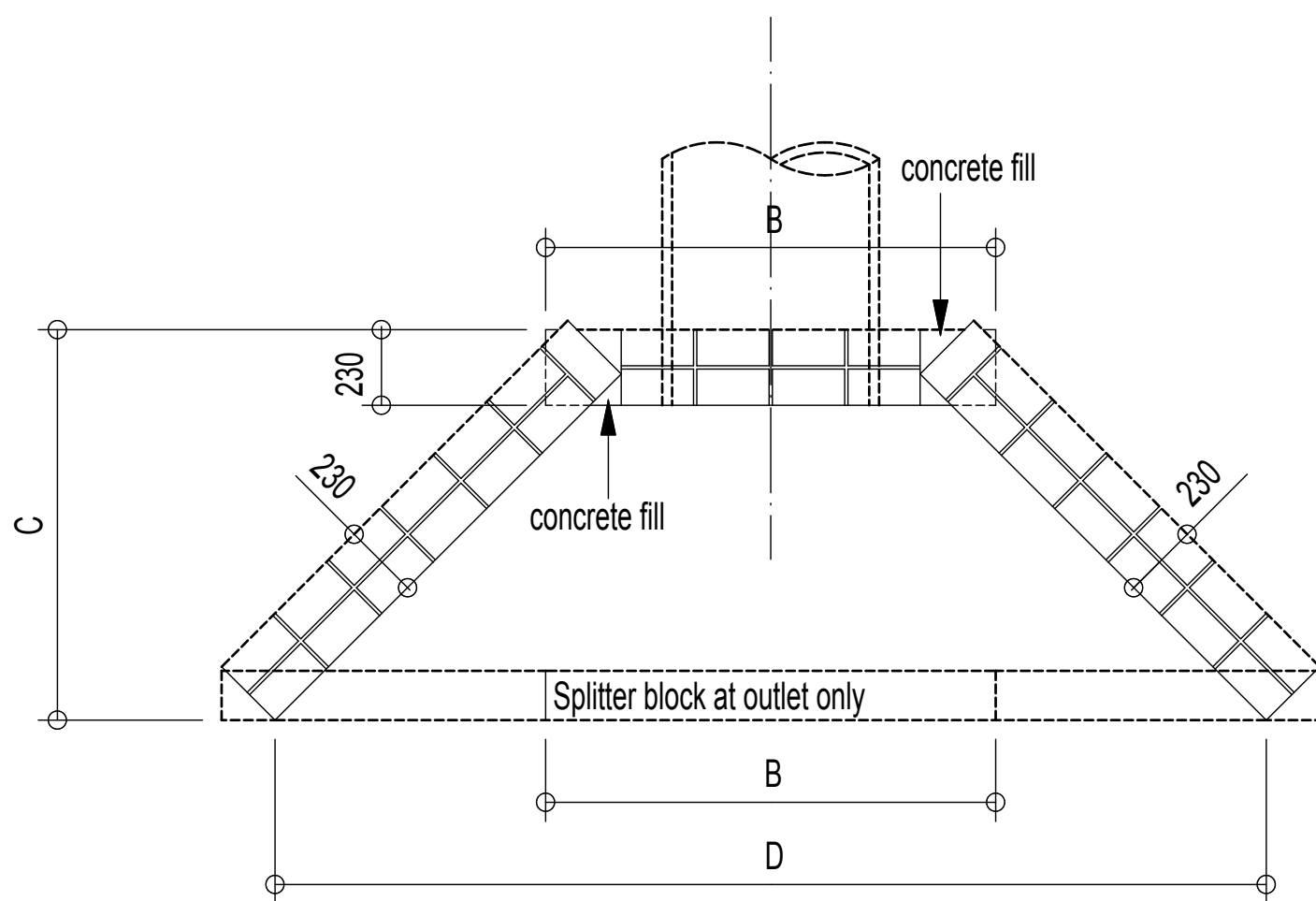
FRONT ELEVATION - SINGLE PIPE



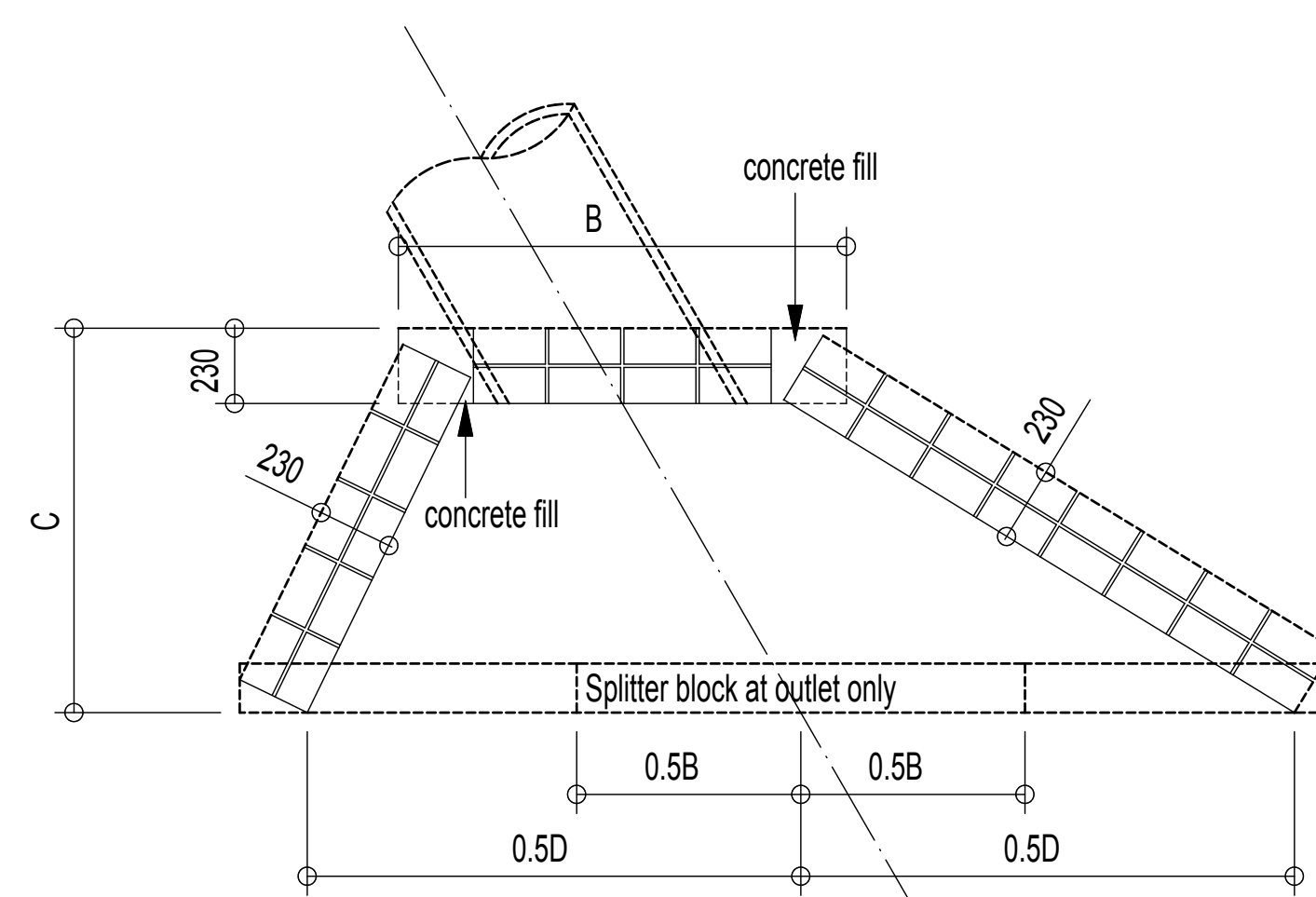
FRONT ELEVATION - SKEW PIPE



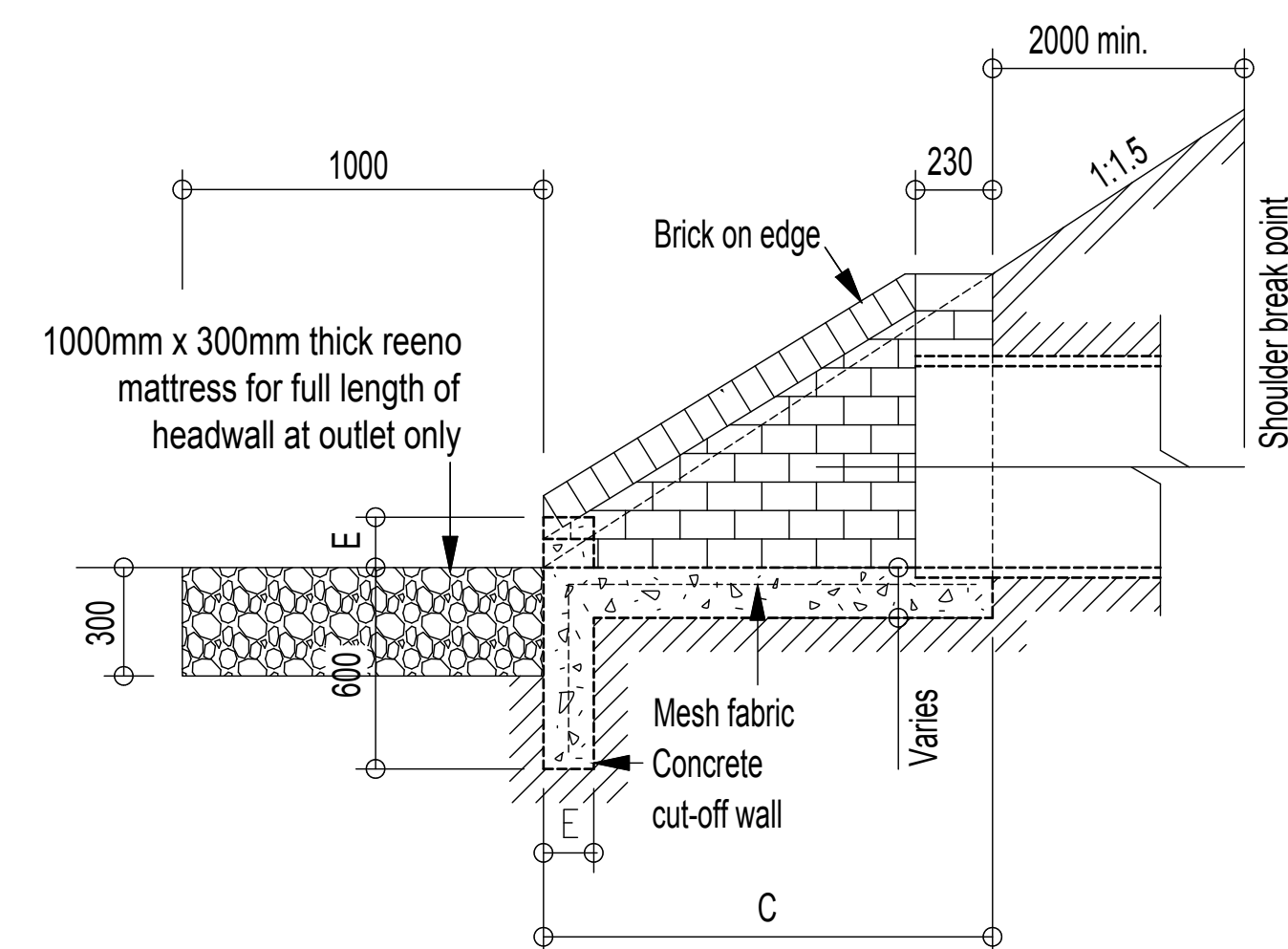
FRONT ELEVATION - DOUBLE PIPE



LAYOUT OF BRICKWORK



LAYOUT OF BRICKWORK

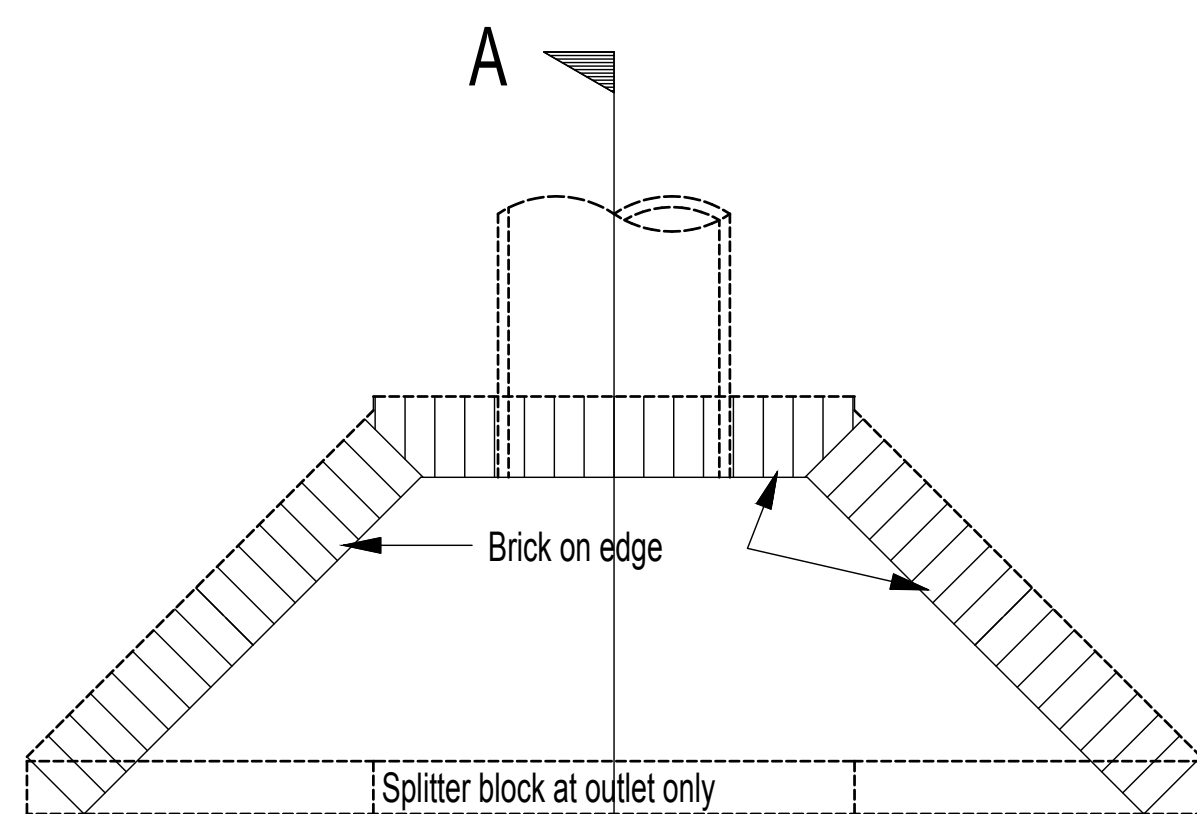


SECTION A-A

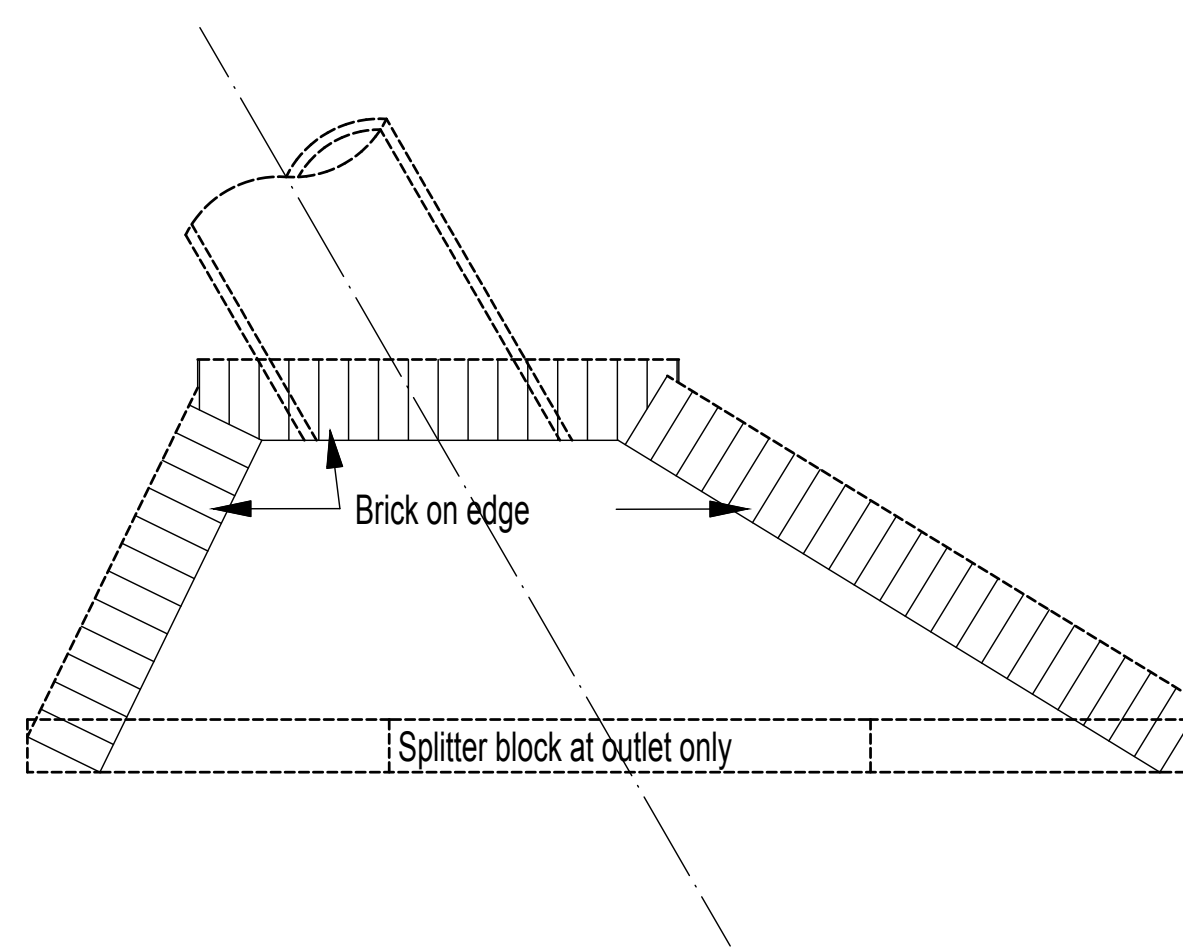
NOTES :

1. Splitter block and pitching to be provided at all outlets where erosion is likely to occur.
2. Splitter block may be omitted if discharge velocity is less than 0.9 m/s.
3. Cut-off walls may be omitted if structure is founded on rock.
4. For multiple pipe culverts increase dimensions 'E' and 'F' by $(n-1)(A+460)$ mm : Where n = number of pipes and A = nominal diameter of pipes
5. Pipes to be cut flush with headwall.
6. For skew pipe culverts the headwall shall be parallel to the centre line of the road.
7. If corrugated metal pipes are used 4x20mmx150mm long galvanised anchor bolts in the hollows of the corrugation are to be used.
8. All concrete is to be 20MPa.
9. Square mesh fabric (Reference S.M.F.193) is to be placed 50mm from top in all apron slabs and centrally in cut-off walls.
10. Brickwork is to consist of good quality burnt clay common bricks in accordance with SABS 227 Specification, or cement bricks in accordance with SABS 987 Specification, uniform in size and shape layed in stretcher bond style with the skins tied together with galvanised crimped wire wall ties.
11. Brickforce is to be placed every 4th course.
12. Jointing on all visible faces to be pointed
13. No in-fill shall be larger than a half standard brick size unless 15MPa concrete is used.

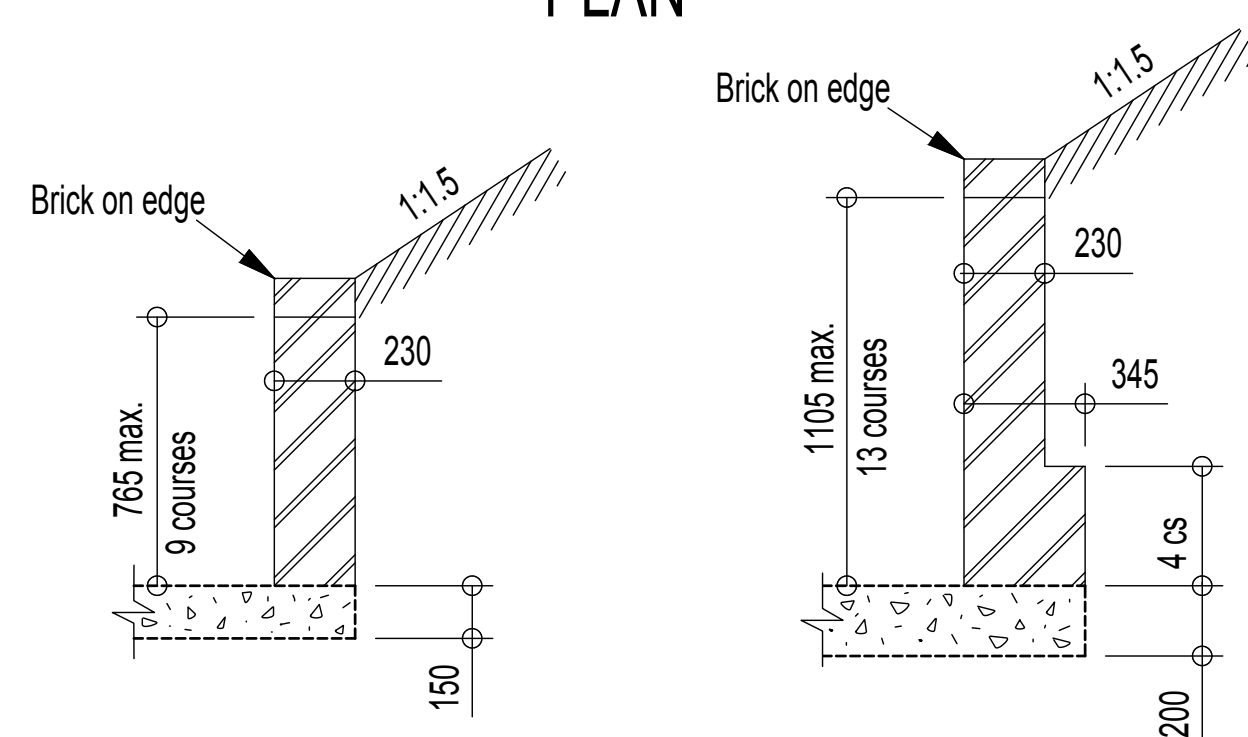
Dimensions (mm)					
Nominal Dia.	A	B	C	D	E
600	765	1 380	1 200	3 000	150
900	1 105	1 840	1 500	3 600	230



PLAN



PLAN OF SKEW CULVERT



TYPICAL RETAINING WALL DETAILS

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CATO RIDGE DEVELOPMENT COMPANY
Reg. No. 1950/003586/06

CLIENT
CATO RIDGE DEVELOPMENT COMPANY(Pty) Ltd

PROJECT
CATO RIDGE PHASED DEVELOPMENT

TITLE
HEADWALL DETAILS

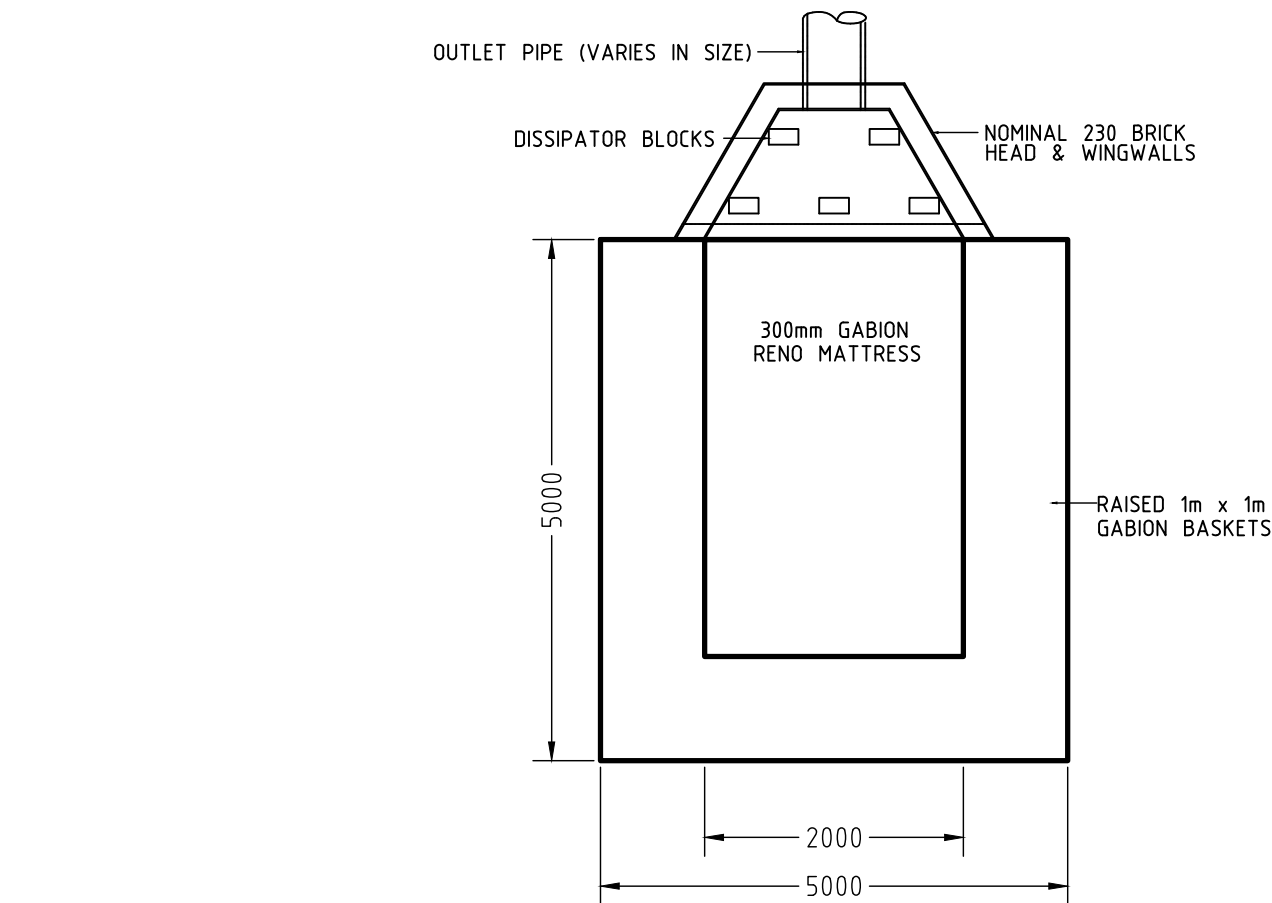
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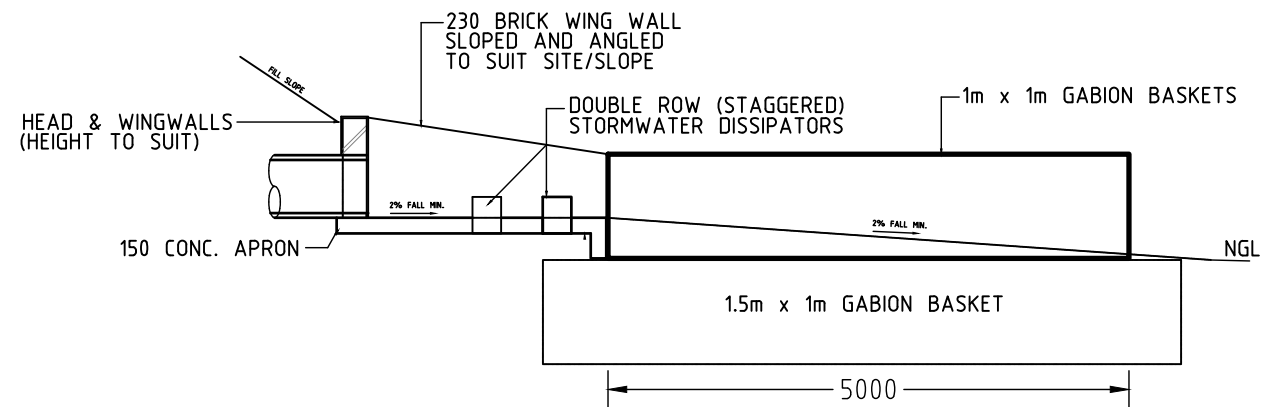
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REFERENCE DRAWING

BUILDING PLAN NO.:



PLAN



SECTION
HEADWALL WITH GABION BASKETS DETAIL

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CLIENT LOGO



CLIENT

**CATO RIDGE
DEVELOPMENT COMPANY(Pty) Ltd**

PROJECT

**CATO RIDGE
PHASED DEVELOPMENT**

TITLE

**HEADWALL AND
GABION BASKET
DETAILS AT OUTLET
STORMWATER**

SCALE : N.T.S.

DRAWING No. 20207-CSW 06

KT-pmb-A1.dwg

(SCALE) A1 SHEET

REV
B

ANNEXURE D – TRAFFIC IMPACT ASSESSMENT

TRAFFIC IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF PROPERTIES IN CATO RIDGE

Revision 5

MARCH 2023

PREPARED FOR:

***CATO RIDGE DEVELOPMENT COMPANY
PO BOX 21
CATO RIDGE
3680***

PREPARED BY:



Report No R2022/11/P0347Rev5

Date: 13 March 2023

Our Reference: P0347

Your Reference:

eThekweni Transport Authority
Roads System Management
PO Box 680
Durban
4000

Dear Sirs

VERIFICATION FOR TRAFFIC IMPACT ASSESSMENT (REPORT NUMBER R2022/11/P0347Rev5)

The undersigned has been appointed as the registered professional for this Traffic Impact Assessment and has applied due diligence to the content of the report and endeavoured to ensure that the TIA is free of technical errors and takes full responsibility for its contents.

I also undertake to attend any forum where the TIA is in dispute to report on matters that relate to the TIA. I understand and agree that the municipality shall not be liable to compensate me in this regard.



David Gordon McFarlane
Bsc (Eng); Msc (Eng)
Pr Eng
ECSA Registration Number 890452

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1. INTRODUCTION

David McFarlane and Associates cc were requested by the Cato Ridge Development Company [CRDC] to prepare a Traffic Impact Assessment (TIA) in support of the Environmental Impact Assessment [EIA] for the proposed development of various properties in Cato Ridge, the project known as "Cato Ridge land development and release project". This report documents the findings of this assessment

2. DETAILS AND EXPERTISE OF THE SPECIALIST

This report was prepared by David McFarlane. He has a BSc (Eng), and a MSc (Eng), from the University of Natal. David is a registered Professional Engineer with ECSA (registration number 890452). His full CV is contained in Appendix E.

3. THE PROPOSAL

The proposal is the development of various properties in Cato Ridge, the location as shown on Figure 1. There are three phases to the project, as shown on Figure 2 and discussed below.

Area 1 [1 on Figure 2], being Phase 1 of the development, positioned to the west and east of Eddie Hagen Drive and just to the north of the R103 and surrounds the Assmang Cato Ridge Works. The intention here is to formally accommodate the works [area 4 on Figure 2] and then to provide numerous smaller properties for general industrial/warehousing/logistics use. This land is already zoned "General Industry 2" [zonal controls for which are in Appendix B].

Area 2 [2 on Figure 2], being Phase 2 of the development, positioned to the west of Eddie Hagen Drive and north of the Assmang Cato Ridge Works is the consolidation and subdivision of four properties. These properties are already zoned "General Industry 2".

Area 3 [3 on Figure 2], being Phase 3 of the development, positioned between the R103 and the N3 is currently zoned "Residential Small Holding 3" with the intention being to rezone this to industrial/warehousing/logistics. This property contains some water courses and major servitudes, which will not be developed.

The properties to the west [5 on Figure 2] will remain as conservation.

The latest site layout plan for these properties, which allows for environmental considerations such as grassland and water courses as well as servitudes and proposed internal roads, is shown on Figure 3. A breakdown of areas for this site layout is as summarised in Table 1 below.

TABLE 1: BREAKDOWN OF CRDC LAND [Ha]

AREA	DESCRIPTION	NETT DEVELOPABLE	SERVITUDES	TOTAL
1	Phase 1	125.68 Ha	15.49 Ha	141.17 Ha
2	Phase 2	153.44 Ha	17.27 Ha	170.71 Ha
3	Phase 3	32.45 Ha	10.94 Ha	43.39 Ha
TOTAL	=	311.57 Ha	43.70 Ha	355.27 Ha

The nett developable area has been reduced considerably from the previous layout which was some 428.86Ha in extent. Following the current assessment, the project footprint was further reduced by a few hectares, but this remains sufficient for assessment purposes.

4. BACKGROUND INFORMATION

The greater Cato Ridge area has been considered for a number of years as a major metropolitan industrial growth node within eThekweni as well as fulfilling the role of “back of port” logistics along the N3 [SIP2] logistics corridor between Gauteng and Durban. The additional benefits of the area are the flat land, the main railway line between eThekweni and Gauteng in close proximity and the large population on the surrounds.

There has been a demand to construct warehousing/logistic facilities in this region in recent years, including Value Logistics [2014], Bakers Ltd [2020] and in Hammarsdale to the east [2015 - current].

The eThekweni Municipality has developed both Local Area Plans [LAPs] and Functional Area Plans [FAPs] for the greater Cato Ridge area, initially in 2012 [reference 2], with a review and update in 2018 [reference 3].

The Cato Ridge area is highly dependent on the Provincial road network, as indicated on Figure 2. The R103 [P1-3] runs east-west to the north of the N3, connecting to the N3 Cato Ridge Interchange to the west [A on Figure 2] and via the Thousand Hills Road [P245], it then connects to the N3 Hammarsdale interchange to the east [B on Figure 2]. In the north-south direction is Eddie Hagen Drive [P423] which connects to the R103 at its southern end.

The existing layout of the N3 Cato Ridge Interchange is shown on Figure 4. This is a modified diamond interchange with priority control at each ramp terminal.

The existing layout of the N3 Hammarsdale Interchange is shown on Figure 5. This was recently upgraded [completed in late 2020] and is predominantly free-flowing with two loop-ramps to and from the east.

Between these two interchanges a new interchange is being considered [N3 KwaXimba interchange], the location as indicated at C on Figure 2, with a schematic layout shown on Figure 6. This is planned to connect to an extension of Eddie Hagen Dr from the north. Due to its close proximity to the existing N3 Cato Ridge interchange, collector distributor [CD] roads are proposed to connect the two interchanges.

Access from the properties in question onto the road network will be at four intersections, three along Eddie Hagen Dr and one off the R103, as indicated by white circles on Figure 2. The spacing between intersections is as indicated in Table 2 below.

TABLE 2: INTERSECTION SPACING

FROM	TO	DISTANCE [Km]
R103/Cato Zulu	R103/Eddie Hagen	0.830
R103/Eddie Hagen	Eddie Hagen/Assmang	0.660
Eddie Hagen/Assmang	Eddie Hagen/Macro DC	1.133
Eddie Hagen/Macro DC	Eddie Hagen/Drakensburg	1.520

These intersection spacings do meet the standards for TRH26 for the classes of road.

Parcels of land in this region not in the ownership of CRDC are as indicated on Figure 2 and discussed below:

- Area 6 are a series of industrial sites, not all of which have been developed.
- Area 7 is the old Abattoir site which is zoned as "Special Industry". Similarly, this area is not fully developed.
- Area 8 is an industrial area with various zonings. To the south west of the site is a large Makro warehouse. Again, this area is not fully developed.
- Area 9 is a series of industrial sites, not all of which have been developed.
- Area 10 is where the new Bakers Transport site is situated. Again, this area is not fully developed.
- Area 11 is where the Value Logistics site is situated. Again, this area is not fully developed.
- Area 12 is situated to the south of the N3, but is seen as potential as an extension of the Industrial/Logistics precinct, particularly with the proposed new KwaXimba interchange on the N3. This area is currently not developed.

Areas of non CRDC land are summarised in Table 3 below

TABLE 3: GROSS AREAS OF NON CRDC LAND DEVELOPMENT [Ha]

Area	Developed	Potential	Total
Area 6	16.0	2.0	18.0
Area 7	28.0	32.0	60.0
Area 8	21.0	76.0	97.0
Area 9	32.0	6.0	38.0
Area 10	20.5	28.5	49.0
Area 11	20.0	146.0	166.0
Area 12	0.0	116.0	116.0
TOTAL	137.5	406.5	544.0

5. STUDY AREA

The study area considered was the intersection of Eddie Hagen Drive with Drakensberg Street to the north, N3 Cato Ridge Interchange to the west, R103/Thousand Hills St [P245] intersection to the east and the N3 to the south, as indicated on Figure 2. The recently

completed N3 Hammarsdale interchange was excluded from the analysis, being a high-capacity free-flow facility.

6. SITE INVESTIGATION

A site visit was undertaken on November 2021. Notes taken of the study area were as below:

- The high demand for trucking facilities surrounding the N3 Cato Ridge Interchange. This includes two truck stop areas in Cato Ridge village and trucks on the R103 in the vicinity of Dunbar's Spar.
- Adequate sight distances are available at the ramp terminals of the N3 Cato Ridge Interchange, as shown in the photographs in Figure 7.
- A number of intersections in the study area are currently provided with right turn refuge lanes to the Provincial standards. Along the R103 these include Selby Road, D12 Road, Safal Steel access, Cato Zulu Industrial access, Eddie Hagen Dr [P423], numerous property accesses just east of Eddie Hagen Dr, D157 and Thousand Hills St [P245]. Along Eddie Hagen Dr [P423] these are provided at the access to the Makro DC and to the industrial sites some 260m to the south of the Drakensberg St intersection.
- Traffic calming measures [in the form of speed humps] are in place along Eddie Hagen Dr [P423] on the approach to the R103.

7. EXISTING TRAFFIC

New traffic counts were undertaken at six key intersections throughout the study area in September 2021, together with previously undertaken traffic counts at the N3 Cato Ridge interchange in May 2019, details of which are contained in Appendix C. The AM and PM peak hours were extracted, as shown graphically in Figures 8 and 9 respectively.

Traffic patterns along Eddie Hagen Dr [P423] show residential traffic from KwaXimba to the north and west of the study area commuting towards the south in the AM, the reverse patterns occurring in the PM peak. At the same time, workers travel northbound in the AM peak towards employment in the warehouses and industrial sites along Eddie Hagen Dr, the reverse patterns occurring in the PM peak. The nett result is fairly balanced flows along Eddie Hagen Dr in both directions in the peaks.

Traffic patterns along the R103 also show balanced traffic flows per direction in the commuter peaks. This clearly indicates traffic from and to the N3 is being shared between the two available interchanges [N3 Cato Ridge to the west and N3 Hammarsdale to the east], which is understandable given the savings in terms of distance and time in doing so.

Traffic at the N3 Cato Ridge interchange also reflect the same patterns, with the west side on and off ramps carrying a higher percentage of traffic volumes [80%] than east side on and off ramps [20%].

Generally speaking, traffic volumes on the road network within the study area are relatively low with some spare capacity currently available.

8. TRAFFIC GENERATION AND DISTRIBUTION

The traffic generation of the proposal was based on the following assumptions:

- It was assumed that floor area ratio [FAR] would be 0.4 of the nett developable area.
- The land uses would be an equal mixture of warehousing [50%] and industry [50%], a nett rate of 0.65 per 100m² floor area [reference 1].
- Trip reduction factors were applied for low vehicle ownership [20%] and PT nodes or corridors [15%], the resulting factor being 68% [reference 1].
- Combining the above two factors, the effective trip rate was 0.442/100m² with a 66.6%/33.3% directional split.

Rail as a mode for transporting freight has the potential to reduce the dependency on road-based transport. The intention for this project is not to install new rail infrastructure, but to rely on the existing Durban to Johannesburg railway line which passes through Cato Ridge. A high-level note on the intentions for rail in this project is given below:

"Cato Ridge will serve as a privately-owned intermodal facility in order to promote the use of rail to transport freight, thereby decreasing the quantity of road-based freight transport. The implementation of a private rail solution is facilitated by Government's rail policy and the opening of private slots on the NATCOR.

The rail solution at Cato Ridge essentially has two legs:

- *Firstly, to enable more efficient long-distance rail transport between Johannesburg and Cato Ridge by reducing the bottleneck on rail networks due to slow turnaround times at Durban Container Terminal (DCT). Therefore, longer-distance trains will operate in a loop between Johannesburg and Cato Ridge, without needing to enter the congestion zone at DCT. This will allow rail networks to increasingly meet the demand for the transport of freight between Johannesburg and Durban; and*
- *Secondly, to serve as an inter-modal facility to allow for effective shorter-distance rail trips from Cato Ridge to DCT."*

In this assessment, it was assumed that rail would be a significant mode in the longer term and would reduce road-based trips by a further 25%.

The traffic generation assumptions are then summarised in Table 4 below. The areas referred to are as shown on Figure 2.

TABLE 4: TRAFFIC GENERATION

AREA/PHASE	NETT AREA [Ha]	FAR [m2] [0.4]	TRIP GEN/100m2 [0.3315] *	DIRECTIONAL SPLIT	
				IN [AM]	OUT [AM]
1	125.68	502 720	1 667	1 111	556
2	153.44	613 760	2 035	1 357	678
3	32.45	129 800	430	287	143
TOTAL	311.57	1 246 280	4 132	2 755	1 377

* 0.65 [Average for industrial and warehousing] $\times 0.68$ [trip reduction factors] $\times 0.75$ [25% reduction due to rail]

The generated trips have been reduced considerably from the previous layout which was some 5 688 trips.

The assumed distribution of trips was as below:

- 10% internal trips.
- 10% from the residential areas to the north [KwaXimba north]
- 10% from the residential areas to the west [KwaXimba west].
- 35% from the R103 to the west towards the N2 Cato Ridge Interchange. At this interchange it was assumed 50% would come from the N3 west, 30% from the south and 20% would come from the N3 east.
- 35% from the R103 to the east. Of these trips, 70% was assumed to come from Thousand Hills Street [P245] and 30% from the R103.

Applying the above assumed distribution, the resulting trips are as shown on Figures 10 and 11 for the AM and PM peaks respectively.

9. FUTURE BACKGROUND TRAFFIC

Due to the number of new trips, a 10-year horizon was taken as the basis for the future background traffic for the analysis [reference 1].

Historical traffic counts were available from 2011 at the Eddie Hagen/R103 intersection and the Eddie Hagen/Drakensberg intersection. The change in traffic patterns from 2011 to 2021 are as follows:

- On Eddie Hagen Drive, north to south traffic volumes in the AM peak [and south to north traffic volumes in the PM peak] have increased considerably. This is traffic to and from KwaXimba to the north-west.
- At the Eddie Hagen/R103 intersection, traffic in both directions along the R103 have increased considerably.

Assuming this historical trend will continue over the next 10 years, taken as being 4% compound per annum [or some 50% above current volumes], the resulting background traffic would be as shown on Figures 12 and 13 for the AM and PM peaks respectively.

10 TRAFFIC IMPACT ASSESSMENT

Combining the future background traffic volumes [Figures 12 and 13] with the new trips generated [Figures 10 and 11], the total future traffic is as shown on Figures 14 and 15 for the AM and PM respectively.

The first consideration is the N3 Cato Ridge interchange and if it would be able to accommodate the additional predicted future demand. This interchange was analysed under two scenarios, firstly with the current layout and secondly the signalisation of the current layout, as summarised in Table 5 below.

TABLE 5: CAPACITY ANALYSIS – N3 CATO RIDGE INTERCHANGE

SCENARIO	PEAK	TERMINAL	OVERALL I/S		WORST MOVEMENT		
			DELAY	LOS	V/C	DELAY	LOS
EXISTING LAYOUT	AM	South	49.9s	E	1.319	172.9s	F
		North	193.0s	F	2.036	549.4s	F
		North onramp	1.2s	A	0.834	16.9s	C
	PM	South	45.9s	E	1.218	122.1s	F
		North	48.8s	E	1.892	492.1s	F
		North onramp	1.7s	A	0.687	34.2s	D
EXISTING LAYOUT SIGNALISED	AM	South	76.9s	E	1.308	184.6s	F
		North	71.8s	E	1.030	82.5s	F
		North onramp	21.6s	C	0.907	45.2s	D
	PM	South	59.1s	E	1.004	136.2s	F
		North	125.8s	F	1.415	222.4s	F
		North onramp	9.8s	A	0.886	26.5s	C

This analysis indicates that if a new interchange on the N3 is not provided, the existing interchange at Cato Ridge [in its current layout] could not accommodate the traffic that this development will generate at full development. The assumption going forward, therefore, was that the proposed new interchange on the N3 [KwaXimba Interchange] would be highly beneficial at full development. This does not preclude phasing the development, as discussed further in Chapter 11 below.

This would have a major impact on access to the development, with the assumed distribution being 55% of trips from the KwaXimba Interchange, 7.5% from the Cato Ridge Interchange and 7.5% from the Hammarsdale Interchange [as opposed to 35% from the Cato Ridge Interchange and 35% from the Hammarsdale Interchange]. Applying these assumptions, the revised future traffic loadings are as shown on Figures 16 and 17 for the AM and PM peaks respectively.

The impact on intersection performance at the N3 Cato Ridge Interchange [assuming signalisation would be in place] is summarised in Table 6 below.

TABLE 6: CAPACITY ANALYSIS – CATO RIDGE I/C [WITH KWAXIMBA I/C]

SCENARIO	PEAK	TERMINAL	OVERALL I/S		WORST MOVEMENT		
			DELAY	LOS	V/C	DELAY	LOS
EXISTING LAYOUT SIGNALISED	AM	South	23.5s	C	0.843	48.4s	D
		North	21.1s	C	0.703	28.7s	C
		North onramp	1.4s	A	0.423	12.8s	B
	PM	South	20.3s	C	0.745	42.9s	D
		North	22.5s	C	0.791	30.1s	C
		North onramp	1.2s	A	0.381	13.7s	B

This analysis shows that conditions at the N3 Cato Ridge I/C will be adequate.

The remaining road network within the study area [being Eddie Hagen Drive] was analysed to determine the configuration required to accommodate the predicted traffic demand. The one uncertainty is the type of layout for the Eddie Hagen/R103 intersection. Earlier investigations [reference 4] indicated this intersection as being grade-separated with a quarter-link in the north-west quadrant. We believe a simpler at-grade intersection may be more practical, particularly in the light of the uncertainties of the turning volume demands through this intersection and the limited capacity of a quarter-link configuration. In this assessment, an at-grade intersection was assumed.

This analysis indicated [the ultimate requirement] in the north/south direction the need for 2+2 through lanes (plus turning lanes at intersections) through the R103/Eddie Hagen Drive intersection to the Eddie Hagen/Macro DC intersection and 1+1 through lanes (plus turning lanes at intersections) up to the Eddie Hagen/Drakensberg intersection. This analysis also indicated in the east/west direction the need for 2+2 through lanes (plus turning lanes) through the R103/Eddie Hagen Drive. A schematic layout of these upgrades is as shown on Figure 18.

The analysis results for the intersections within the study area are as summarised in Table 7 below and shown in full detail in Appendix D.

TABLE 7: INTERSECTION CAPACITY ANALYSIS

INTERSECTION	PEAK	OVERALL I/S		WORST MOVEMENT		
		DELAY	LOS	V/C	DELAY	LOS
R103/Eddie Hagen	AM	31.9s	C	0.826	47.1s	D
	PM	23.2s	C	0.650	41.4s	D
Eddie Hagen/Assmang access	AM	12.6s	B	0.574	37.9s	D
	PM	18.4s	B	0.707	38.7s	D
Eddie Hagen/Macro DC	AM	13.6s	B	0.709	37.6s	D
	PM	16.3s	B	0.594	34.5s	C
Eddie Hagen /Drakensberg	AM	15.9s	B	0.700	38.6s	D
	PM	18.7s	B	0.809	41.8s	D
R103/Cato Zulu	AM	8.3s	A	0.530	43.2s	D
	PM	9.3s	A	0.460	42.7s	D
R103/Thousand Hills	AM	19.6s	B	0.693	31.9s	C
	PM	11.7s	B	0.533	39.1s	D

11. PUBLIC TRANSPORT AND PEDESTRIANS

The demand for trips by public transport are as estimated below:

- Employment densities for warehousing/industrial = 2.0/100m²
- Employment distribution by income groups= 10% high; 30% medium; 60% low.
- Use of public transport= 0% high; 20% medium; 80% low.
- Person trips by PT in peak period = 1.08/100m²
- Person trips by PT in peak hour = 0.65/100m²

If one then looks at each sub-area of the proposed development [as shown in Figure 2] the total demand is as summarised in Table 8 below.

TABLE 8: PUBLIC TRANSPORT DEMAND

PHASE	NETT AREA [Ha]	FAR [m ²] [0.4]	PERSON TRIPS [0.65/100m ²]
1	125.68	502 720	3 268
2	153.44	613 760	3 689
3	32.45	129 800	844
TOTAL	311.57	1 246 280	8 101

Any system to provide for public transport needs to be designed for a comfortable walking distance, ideally within 500m. Based on this premise, a schematic layout of a system is as shown in Figure 19.

Current public transport routes in the study area are from KwaXimba along Eddie Hagen Drive to both Cato Ridge to the west and Hammarsdale to the east along the R103 in the AM peak,

with the reverse in the PM Peak. Added to these movements are public transport trips coming into the area for employment in the AM, with the reverse in the PM.

Future public transport routes will become more employment dominated with the proposed developments within the study area. The future IPTN route C6 between Mpumalanga and Durban CBD via Pinetown will also affect future routing, with feeder services off the trunk IRPTN route C6 coming into this area.

Based on surveys at taxi ranks in the region, the expected major origins/destinations for trips by public transport are Durban [22%], Pietermaritzburg [15%], Pinetown [15%] and Hillcrest [3%], with the remainder [45%] localised shorter distance trips.

Walking between public transport facilities and final destinations will be a major component of the overall transport system. Surfaced pedestrian sidewalks should ideally be provided along both sides of all internal roads within the development.

12. PHASING OF INFRASTRUCTURE

Between the initial start of developing the first few sites and full development there is clearly opportunity to phase in the required infrastructure to match the take-up of the development. The potential sequence of events is as listed below:

- The current road network has spare capacity, so the development could make a start with no initial interventions.
- The first likely limitation that will be reached will be the capacity of the N3 Cato Ridge Interchange in its current [unsignalised] layout. This is estimated to occur at approximately 60% to 70% of Phase 1 of the development [or around 80Ha of development]. This could be overcome by signalising the current interchange layout, which would give a limited amount of additional system capacity.
- If the proposed N3 KwaXimba Interchange is not constructed or is delayed, the scenario of further upgrading the existing N3 Cato Ridge and N3 Hammarsdale interchanges is predicted to be required at around 160Ha of development [but this is highly sensitive to any other developments in the greater Cato Ridge area].
- The next possible intervention with major benefits will be the new N3 KwaXimba Interchange which will give substantial relief to both the existing N3 Cato Ridge and N3 Hammarsdale Interchanges. Should this interchange not materialise, options to provide alternative capacity based on the existing road network would need to be investigated, including upgrades to the two existing interchanges onto the N3.
- The identified upgrades to Eddie Hagen Drive could also be phased in to match the development take up. The upgrade of Eddie Hagen Drive to 2+2 lanes could be as far as the Eddie Hagen/Assmang intersection as the first phase of the development, which can then be extended further north for phase 2 of the project.

13. SUMMARY OF FINDINGS

The findings of this assessment are summarised below:

- The Cato Ridge Development Company [CRDC] intends to develop a large tract of land in Cato Ridge, the project known as "Cato Ridge land development and release project".
- The greater Cato Ridge area has been considered for a number of years as a major metropolitan industrial growth node within eThekweni as well as fulfilling the role of "back of port" logistics along the N3 [SIP2] logistics corridor between Gauteng and Durban.
- Current traffic volumes on the road network are low with spare capacity available.
- The predicted traffic generation of the proposed development will be high due to its size, but this has been reduced considerably since the layout that was initially considered.
- Rail as a mode for transporting freight has the potential to reduce the dependency on road-based transport. The intention for this project is to utilise the existing Durban to Johannesburg railway line which passes through Cato Ridge.
- The upgrading of the road networks will need to be aligned with the unlocking of the Proposed Cato Ridge Development and Land Release Project around the proposed development footprint. The development of Phase 1 of the Project will require certain upgrades to the first section of Eddie Hagen Road in the form of an additional lane (including the intersection at the R103), which the applicant will complete in phases.
- The development and release of Phase 2 of the Project will trigger the requirement for additional road system capacity. The ideal infrastructure would be the KwaXimba interchange, but should this interchange not materialise, options to provide alternative capacity would need to be investigated. A section of the R103 may also require upgrades which are yet to be determined based on traffic counts at the time to accommodate for the increased traffic volumes generated by developments which contribute to road users in the area. The R103 is a provincial road and upgrades will need to be completed by the Provincial Road authorities with assistance from the various developers' contributions and surrounding road users.

14. REQUIREMENTS SPECIFIC TO THE EIA PROCESS

In terms of the National Environmental Management Act (Act 107 of 1998) and the 2014 EIA Regulation, as amended, a Traffic Impact Assessment (TIA) does not carry specific protocols so Appendix 6 of the EIA Regulations applies. The steps taken in the methodology followed in this assessment are as listed and expanded on below:

1. Identification of key impacts and potential mitigation measures.
2. Impact by phase of the project.
3. Establish the significance of the key impacts using the methodology provided. Repeat the assessment for both the pre-and post- mitigation impact significance.
4. Discussion on the confidence rating of the impacts identified.
5. Discussion on the No Go alternative.
6. Assess and comment on cumulative impacts.

1. Identification of key impacts and potential mitigation measures

When land is developed into industrial/warehousing/logistics operational uses, by nature it triggers the demand for the transportation of people and goods. This transportation demand has to be catered for in some mode of transport, be that by road, rail or walking, each of which need the associated infrastructure [and sometimes associated services]. If the existing infrastructure [prior to the development starting] does not have sufficient spare capacity to accommodate this new transportation demand, the result will be congestion beyond an acceptable standard. If congestion occurs, the movement of people, goods and services becomes very difficult and inefficient, making the business of industrial/warehousing/logistics very difficult and inefficient [if not impossible], this being the key negative impact.

Unique to this particular development is the fact that a number of “back of port” activities that currently occur near the port of Durban are planned to be moved to this location. The nett result of this will be less congestion near the port of Durban [a positive impact] but a corresponding increase in congestion at this location [a negative impact].

The potential mitigation to the above impacts would involve measures to increase the system capacity as well as maintain safety. The “system” in this case would be increased road capacity (additional lanes and the provision of traffic signals), increased rail capacity (additional rail lines) or to increase both services and infrastructure (such as public transport routing, on-street stops and ranks). In this case it would be a combination of these measures. The complication here is that this infrastructure [particularly roads] are public property and any changes need to be approved by the government authorities. In this case the best mitigation measure would be to lobby the relevant road authorities and contribute financially to ensure timeous traffic system upgrades.

2. Impact by phase of the project

In an EIA process, the typical phases considered of any project are as listed below:

- * Pre-construction planning and design.
- * Construction.
- * Post construction, including rehabilitation and site closure impacts.
- * Operation.
- * Decommissioning.

In this case, the expected impacts will be during the operation phase [congestion due to the additional transport demand associated with the day-to-day operation of the industrial developments] and during the construction phase [increase in construction activity and related traffic]. In this particular case, decommissioning is not expected to occur for this project as operations are expected to continue indefinitely.

3. Significance, rating and tabulation of results

The significance and rating of the impacts identified are tabulated in Table 9 below.

TABLE 9: IMPACT ASSESSMENT SUMMARY

PHASE AND ACTIVITY	POTENTIAL IMPACT	SIGNIFICANCE PRE-MITIGATION							MITIGATION	SIGNIFICANCE POST-MITIGATION								
		Intensity	Duration	Extent	TOTAL	Probability	TOTAL	Status		SIGNIFICANCE	Intensity	Duration	Extent	TOTAL	Probability	TOTAL	Status	SIGNIFICANCE
Construction phase: Develop the land for industrial warehousing and logistics purposes	Congestion associated with the construction phase	3	2	3	8	7	56	Negative	Minor – negative	Minimise Impact during commuter Peaks	2	1	3	6	7	42	Negative	Minor-Negative
Construction phase: Develop the land for industrial warehousing and logistics purposes	Road Safety	3	2	3	8	7	56	Negative	Minor - negative	Appropriate Traffic management Measures ¹	2	1	3	6	7	42	Negative	Minor-Negative
Operations phase: Develop the land for industrial warehousing and logistics purposes	The demand for the transportation of people and goods will increase proportionately	4	5	3	12	7	84	Negative	Moderate - negative	Provide additional infrastructure to increase the system capacity	1	5	3	9	7	63	Positive	Minor-Positive
Operations phase: Develop the land for industrial warehousing and logistics purposes	Ongoing maintenance and road safety	3	5	3	11	6	66	Negative	Minor - negative	Appropriate system management measures by the road authorities ²	2	5	3	10	6	60	Positive	Minor-Positive

1. Measures including high quality signage, safety barriers, flagmen and traffic calming measures.
2. Measures including routine pavement, traffic signals, signage and road marking maintenance.

4. *Confidence rating*

The quantity of traffic generated by a change in land use has been well studied both locally and worldwide. Although there could be variations due to localised conditions, the confidence level that the demand for transport of people and goods will increase has a high confidence rating.

5. *No Go alternative*

In the event that the project does not proceed, there would be no impacts associated with the construction phase. It is expected, however, that traffic levels would continue to increase in the Cato Ridge area as it would continue to be developed and densified for rural/residential purposes or other potential land uses. While a lighter traffic type is likely, the inevitable increase in traffic will result in congestion and the eventual need for upgrades of the road network and intersections would still be required in future, be that at a slower rate. This was assessed as being Minor – negative.

6. *Cumulative Impacts*

The land surrounding this specific development has already begun to be developed for similar land uses as is proposed by this developer and there is also pressure from surrounding communities to develop for residential purposes. The potential cumulative impact is that all of these developments occur concurrently, compounding the impact proportionately. The impact on congestion together with the ongoing development of the surrounding areas. The cumulative impact on this project, within this context, is assessed as being Medium – negative.

15. RECOMMENDATIONS

Our recommendation [from a traffic impact view point only] is that the proposed development be allowed to proceed, provided the various mitigation measures identified in this report are timeously implemented.

REFERENCES

- 1) eThekweni Transport Authority, "*Manual for Traffic Impact Assessments and Site Traffic Assessments*", Version 0.1, October 2015.
- 2) Graham Muller Associates/RCR Collaborative/Arup, "*Cato Ridge Local Area Plan & Precinct Plans*", final report, May 2012.
- 3) The Markewicz Redman Partnership, "*Cato Ridge Local Area Plan Review, Functional Area Plans and Draft Scheme*", final local area plan [consolidated report], June 2018.
- 4) SMEC, "*Cato Ridge Local Area Plan Traffic Impact Study and modelling report*", May 2018.

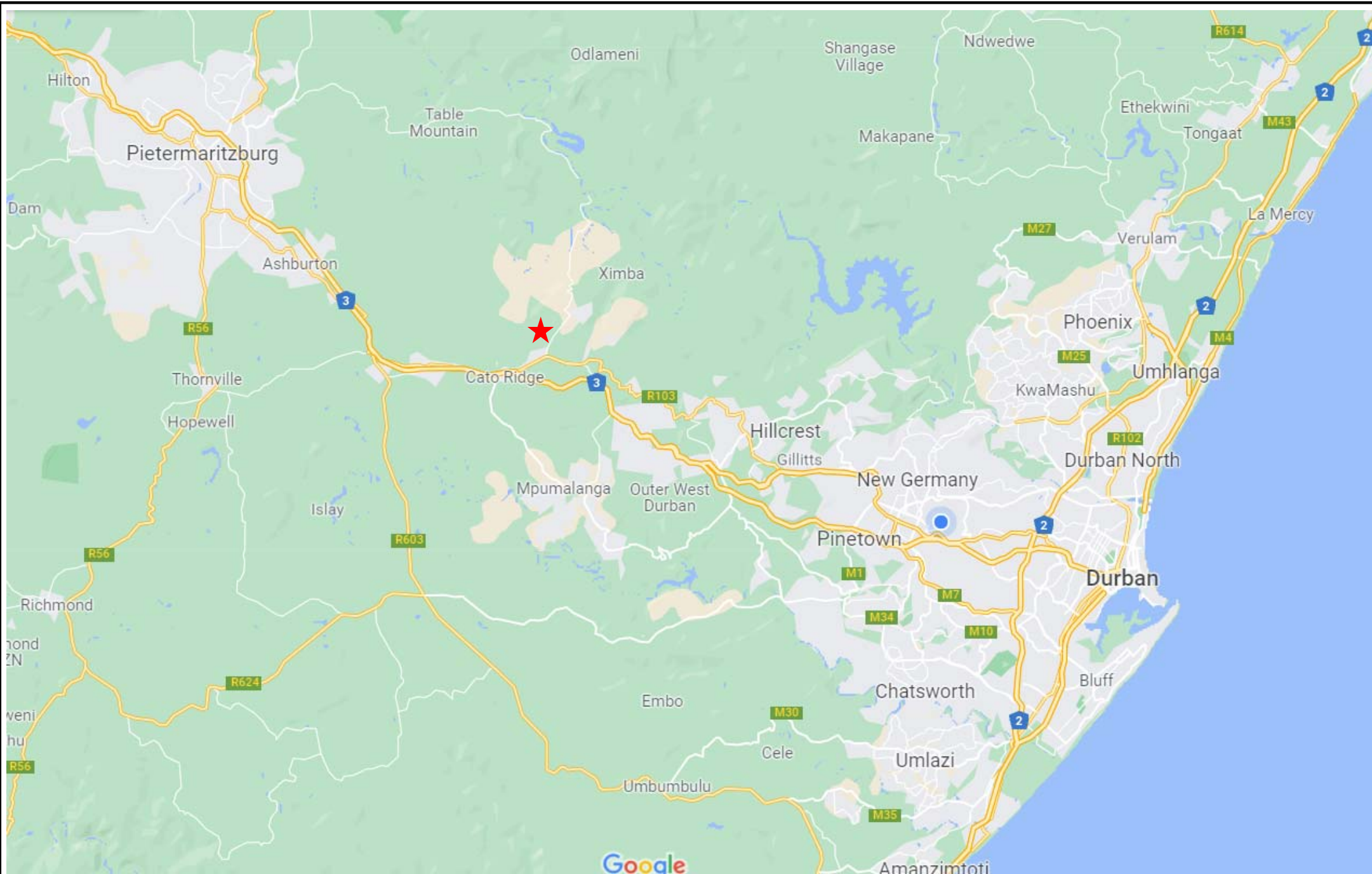


FIGURE 1: LOCALITY PLAN

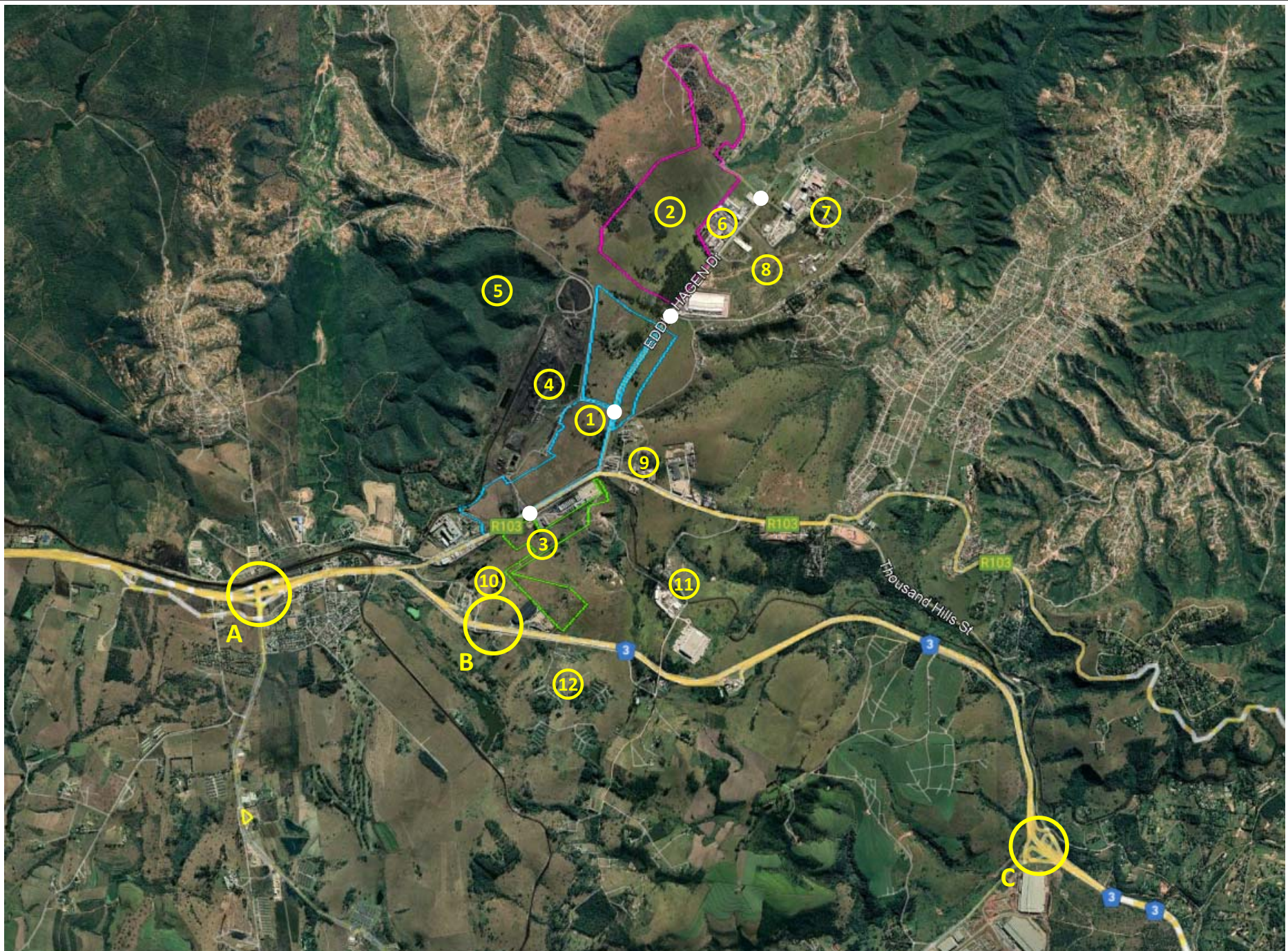


FIGURE 2: LOCALISED PLAN

STUDY AREA NOVEMBER UPDATE WITH SERVICES

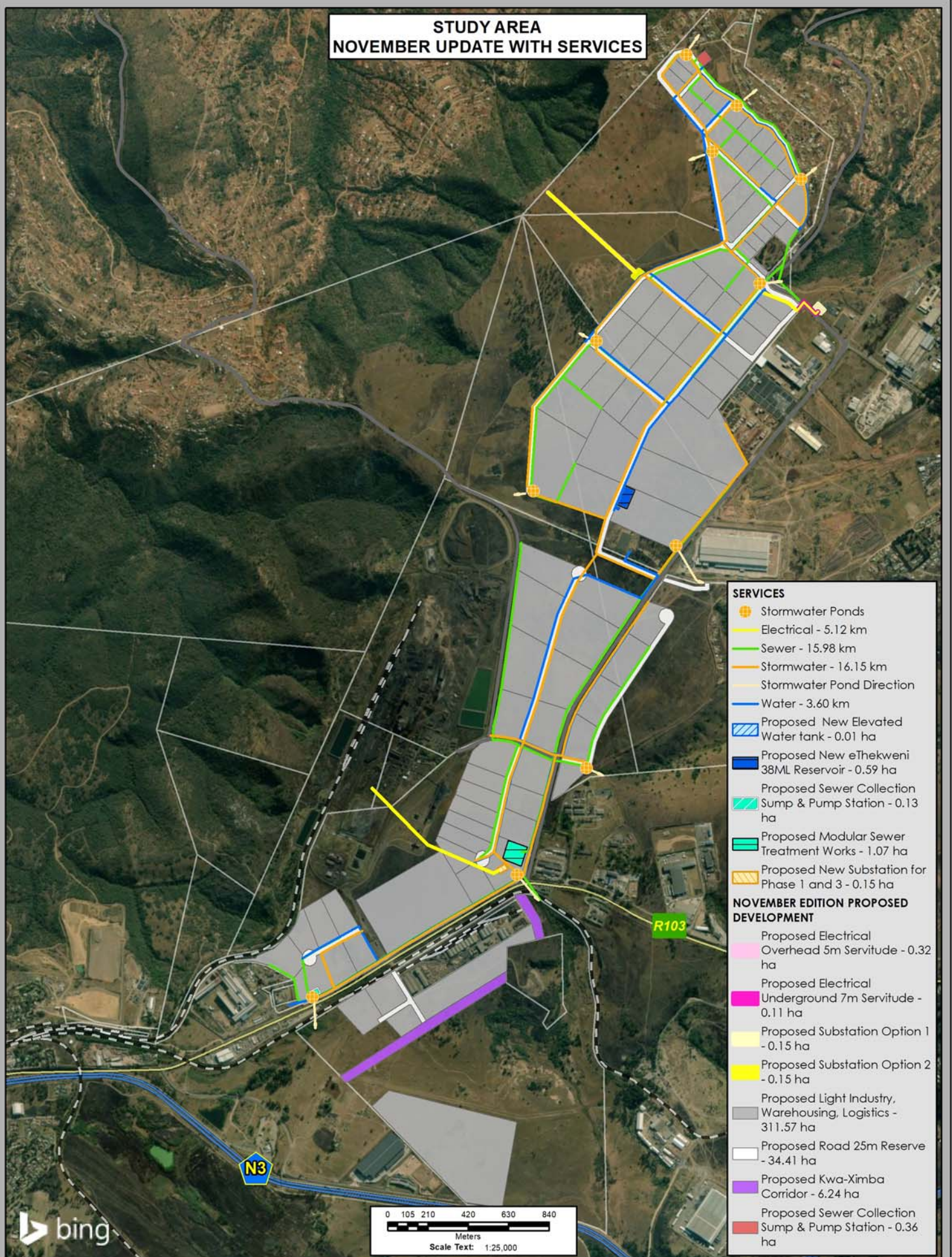




FIGURE 4: EXISTING CATO RIDGE INTERCHANGE



FIGURE 5: EXISTING HAMMARSDALE INTERCHANGE

Legend

Proposed KwaXimba Interchange and CD Roads

Interchange ramps and Collector Distributor (CD) roads

500m buffer

Western Aqueduct (02 Nov 2020)

Re-aligned Aquaduct

Proposed Re-alignment (underpass)

Proposed Re-alignment (overpass)

Existing Western Aqueduct Alignment

Roads

National roads

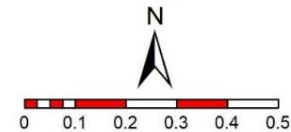
District/Provincial roads

Railway line

PROPOSED NEW KWAXIMBA INTERCHANGE

Zoom plan with CD (Collector Distributor) roads

Projection: Transverse Mercator (W31)
Datum: Hartbeesthoek 1994
False Easting: 0
False Northing: 31
Central Meridian: 31
Scale Factor: 1.0000
Latitude Of Origin: 0.0000
Units: Meter



1:10,000
when printed at A3

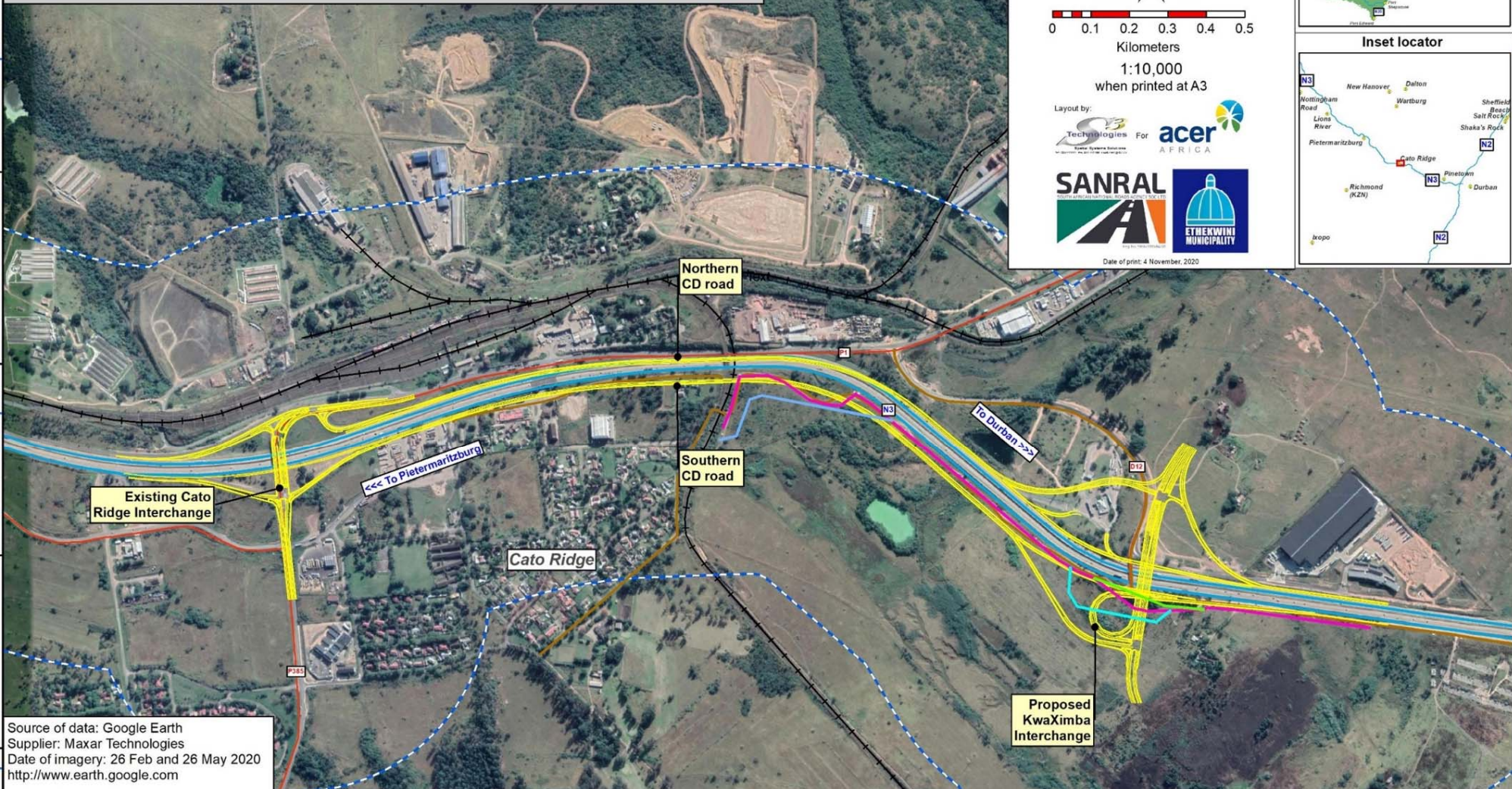


Date of print: 4 November, 2020

Provincial locator

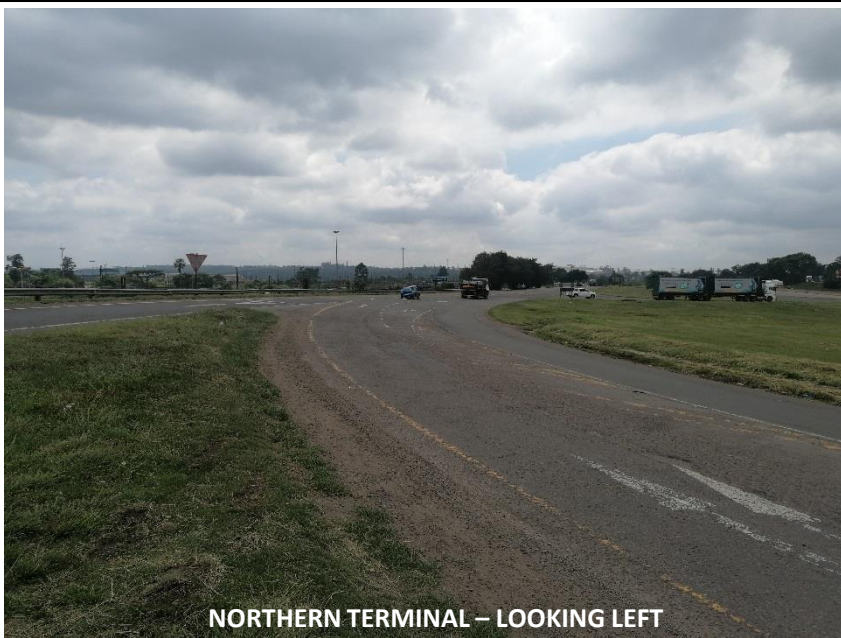


Inset locator

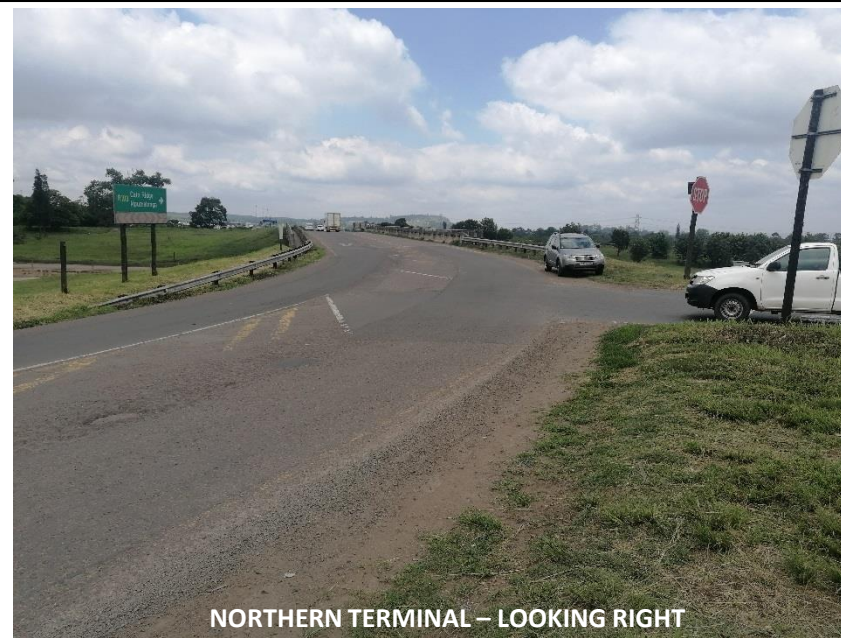


Source of data: Google Earth
Supplier: Maxar Technologies
Date of imagery: 26 Feb and 26 May 2020
<http://www.earth.google.com>

FIGURE 6 PROPOSED KWAXIMBA INTERCHANGE



NORTHERN TERMINAL – LOOKING LEFT



NORTHERN TERMINAL – LOOKING RIGHT



SOUTHERN TERMINAL – LOOKING LEFT



SOUTHERN TERMINAL – LOOKING RIGHT

FIGURE 7: PHOTOS OF N3 CATO RIDGE INTERCHANGE

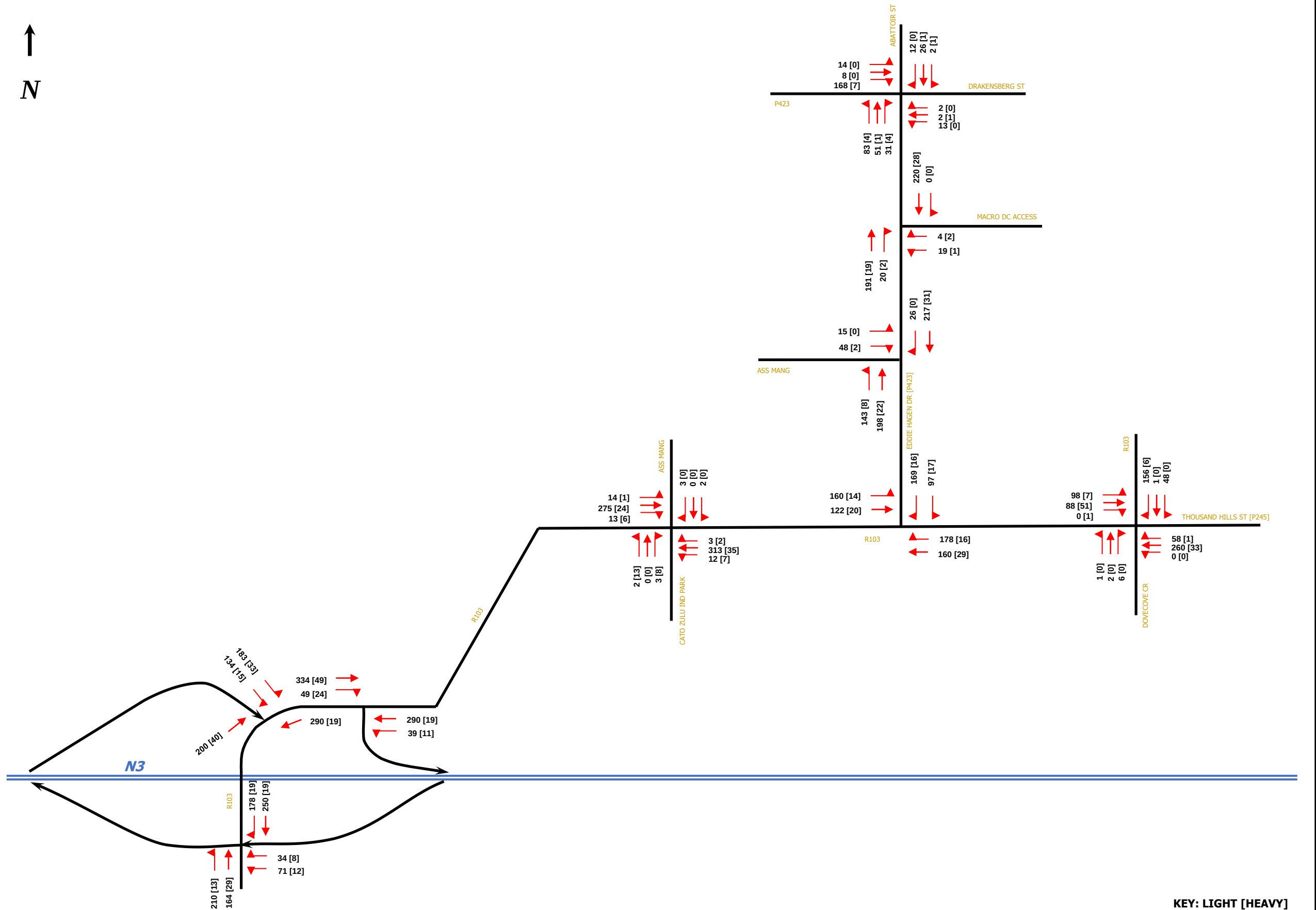
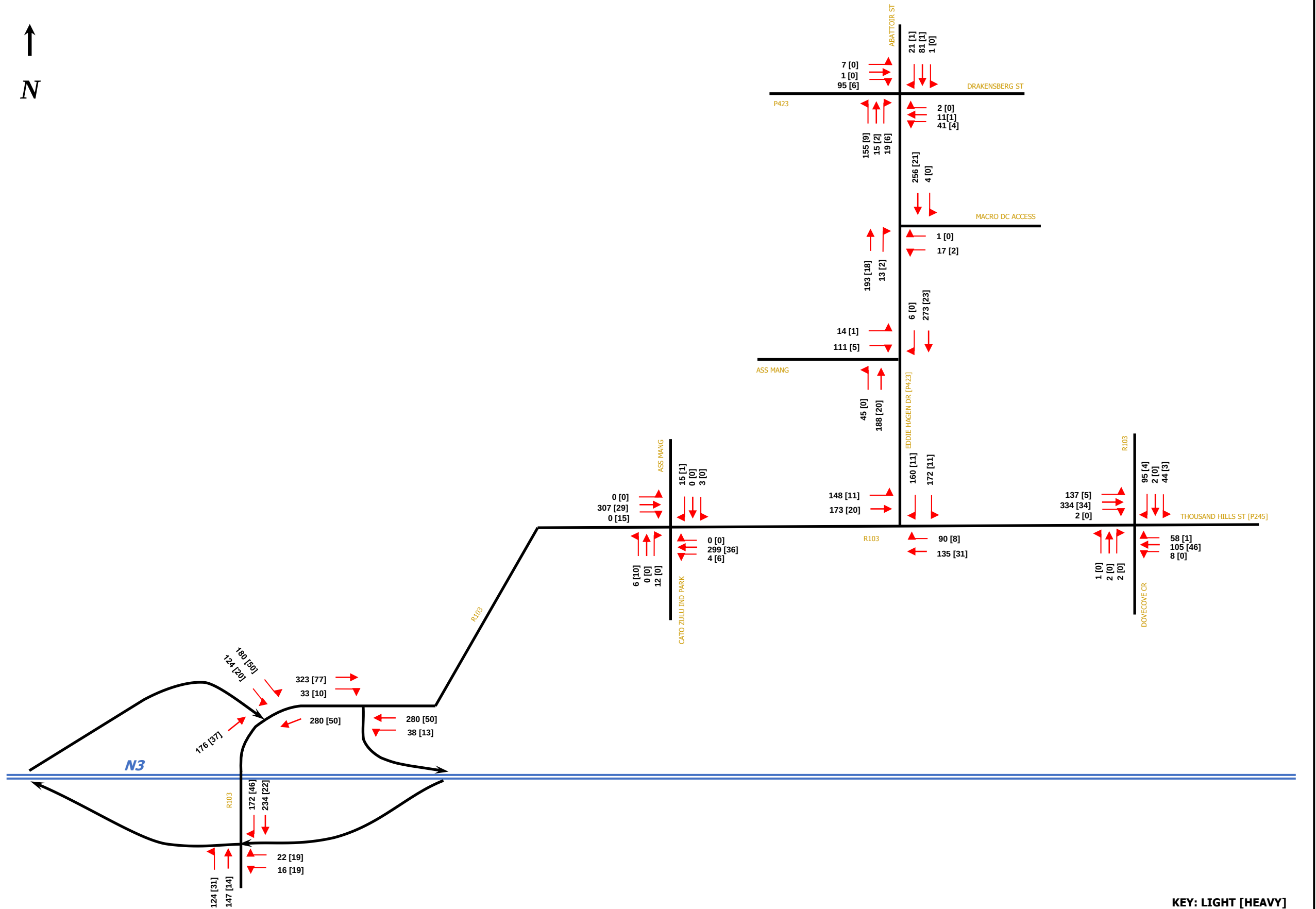


FIGURE 8: EXISTING TRAFFIC [AM PEAK]



KEY: LIGHT [HEAVY]

FIGURE 9: EXISTING TRAFFIC [PM PEAK]



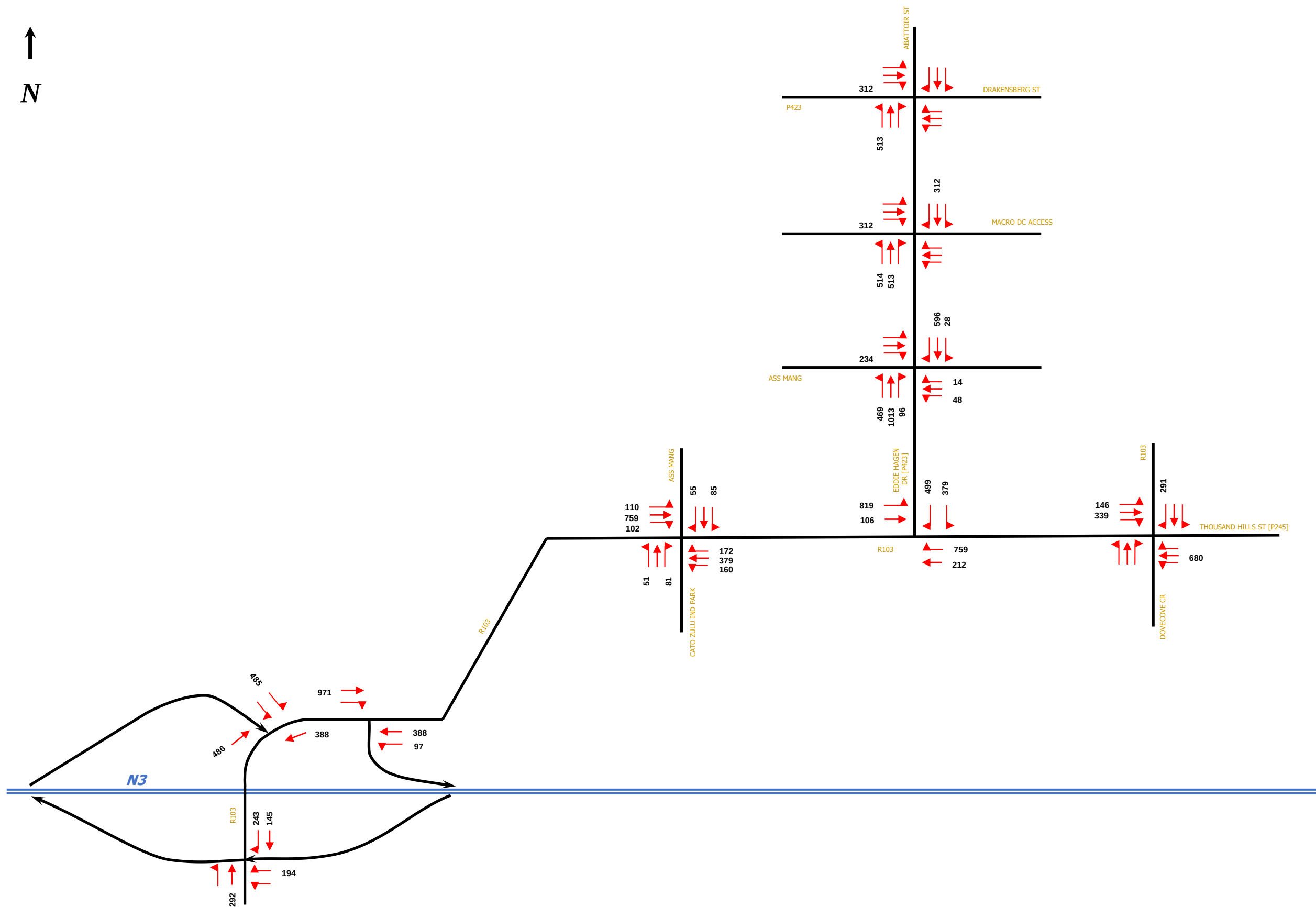


FIGURE 10: TRAFFIC GENERATION [AM PEAK]



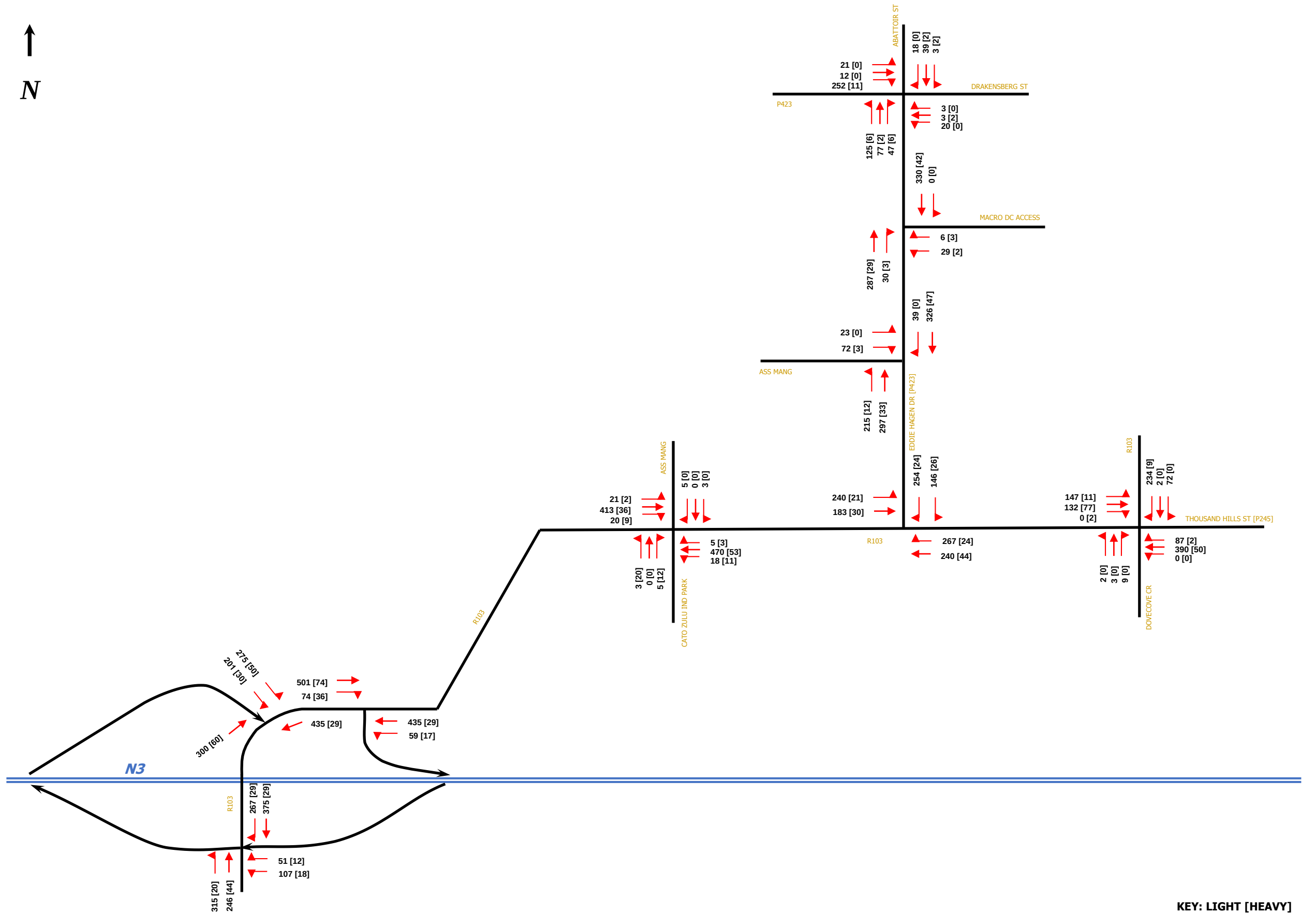


FIGURE 12: FUTURE [10 YEAR] BACKGROUND TRAFFIC [AM PEAK]

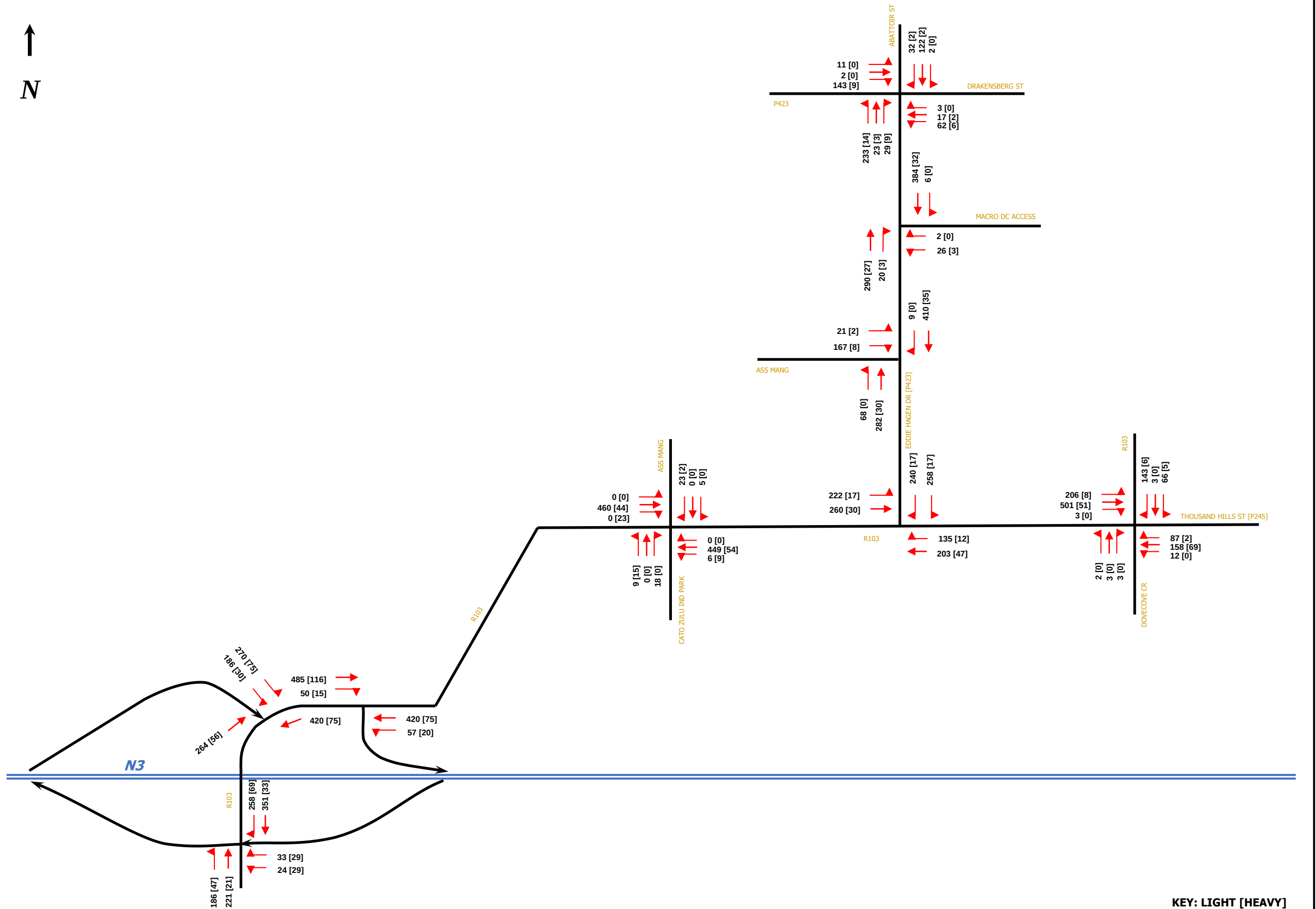


FIGURE 13: FUTURE [10 YEAR] BACKGROUND TRAFFIC [PM PEAK]

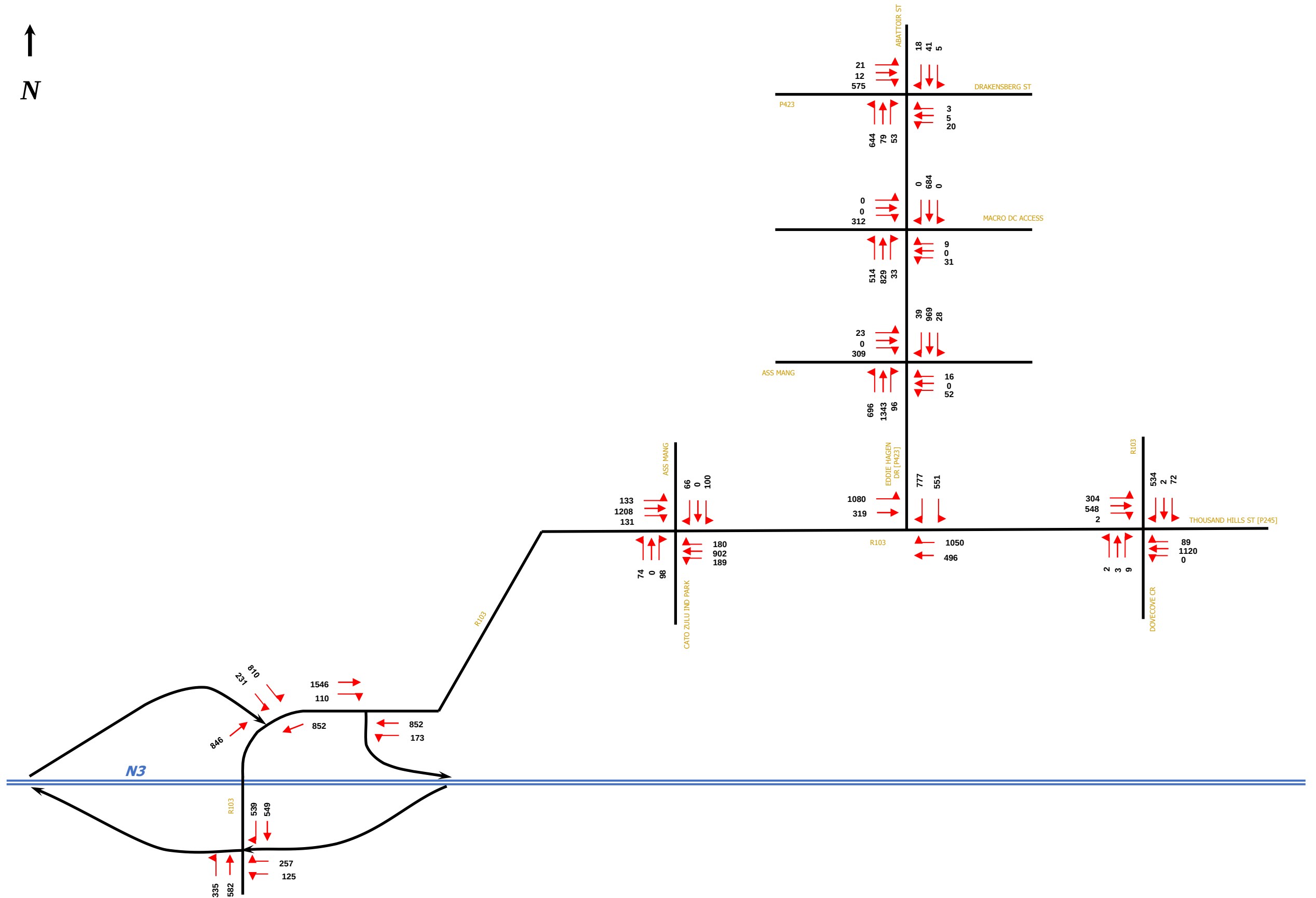


FIGURE 14: TOTAL FUTURE TRAFFIC [AM PEAK]

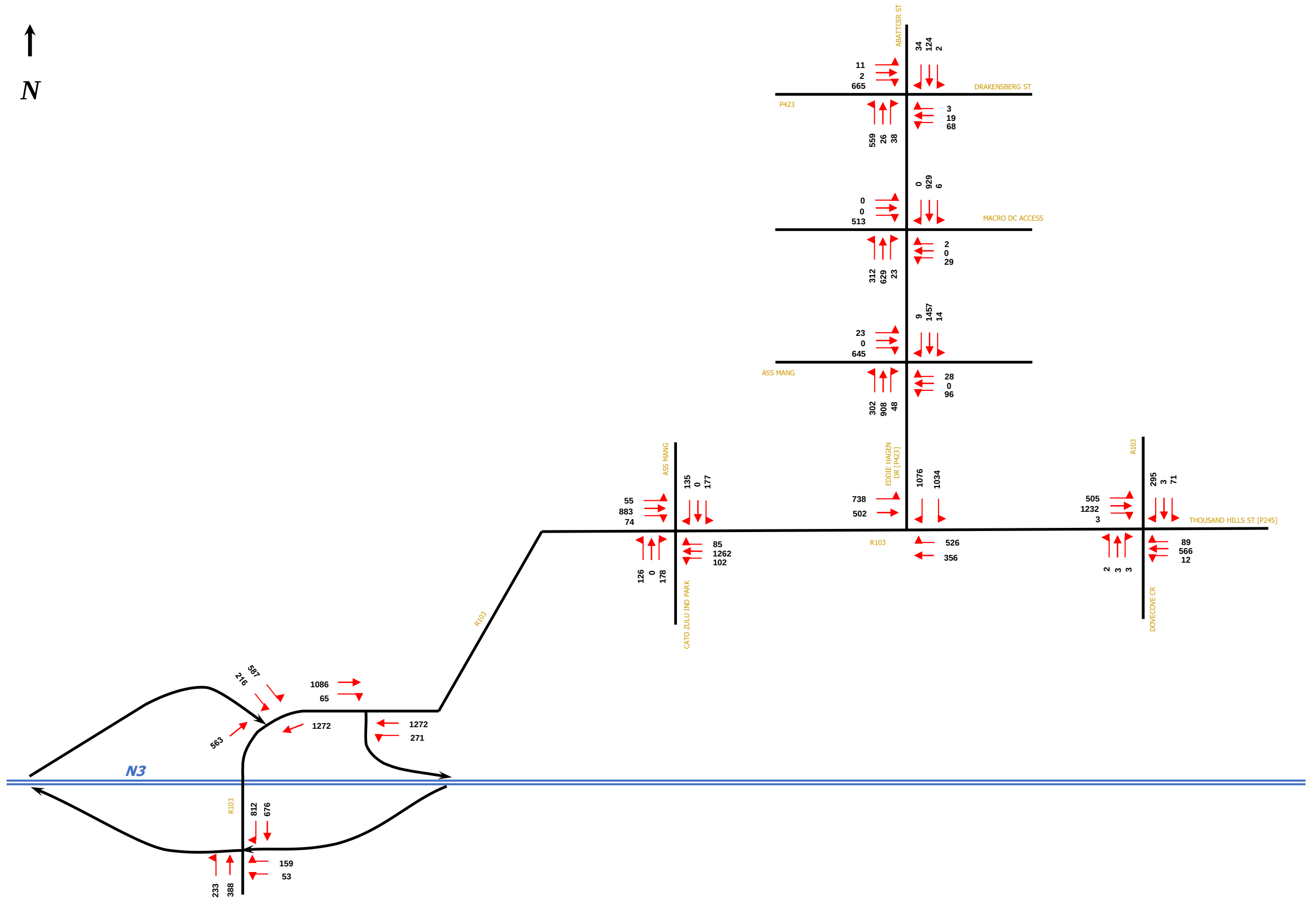


FIGURE 15: TOTAL FUTURE TRAFFIC [PM PEAK]

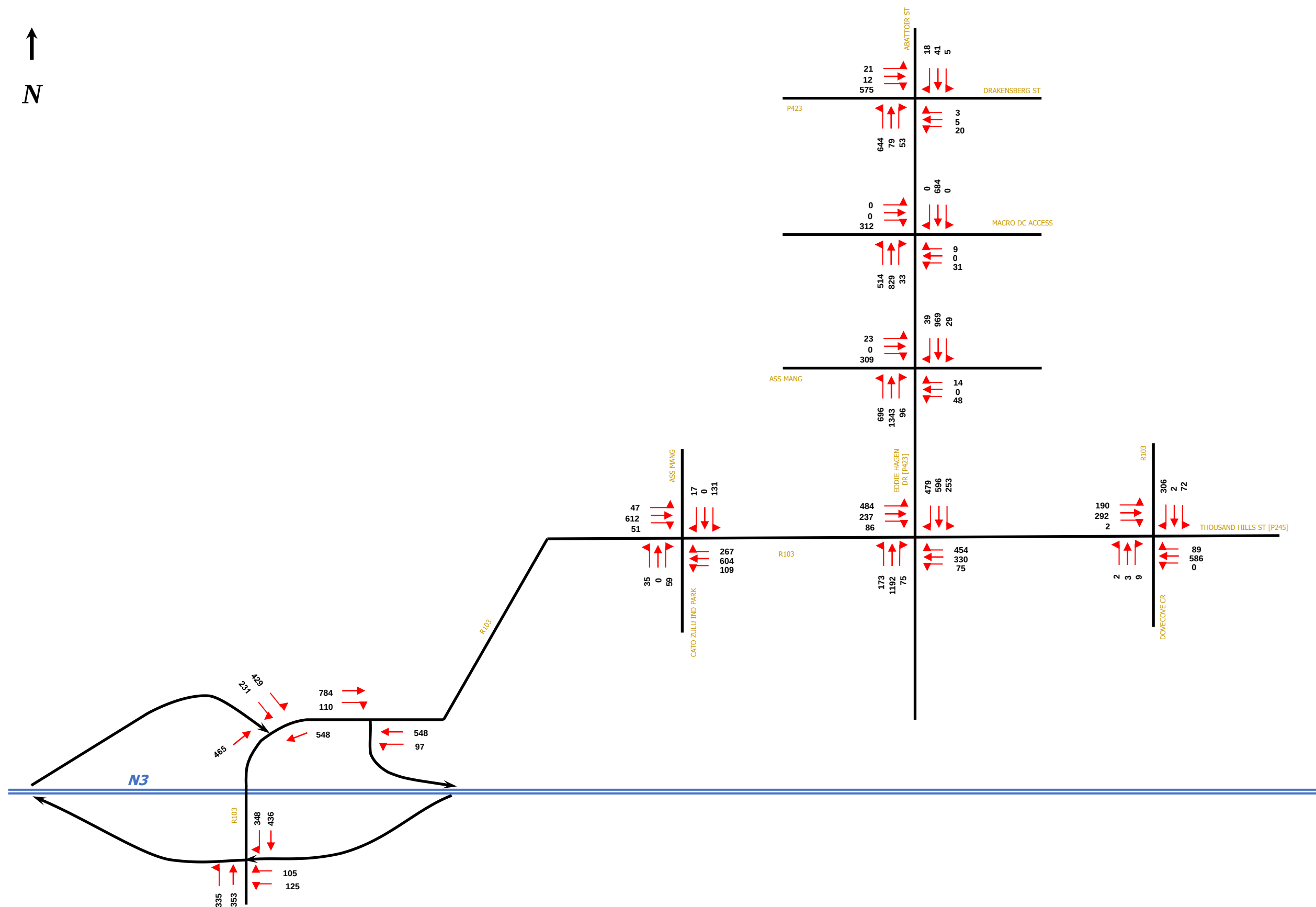


FIGURE 16: TOTAL FUTURE TRAFFIC – WITH N3 KWAXIMBA INTERCHANGE [AM PEAK]

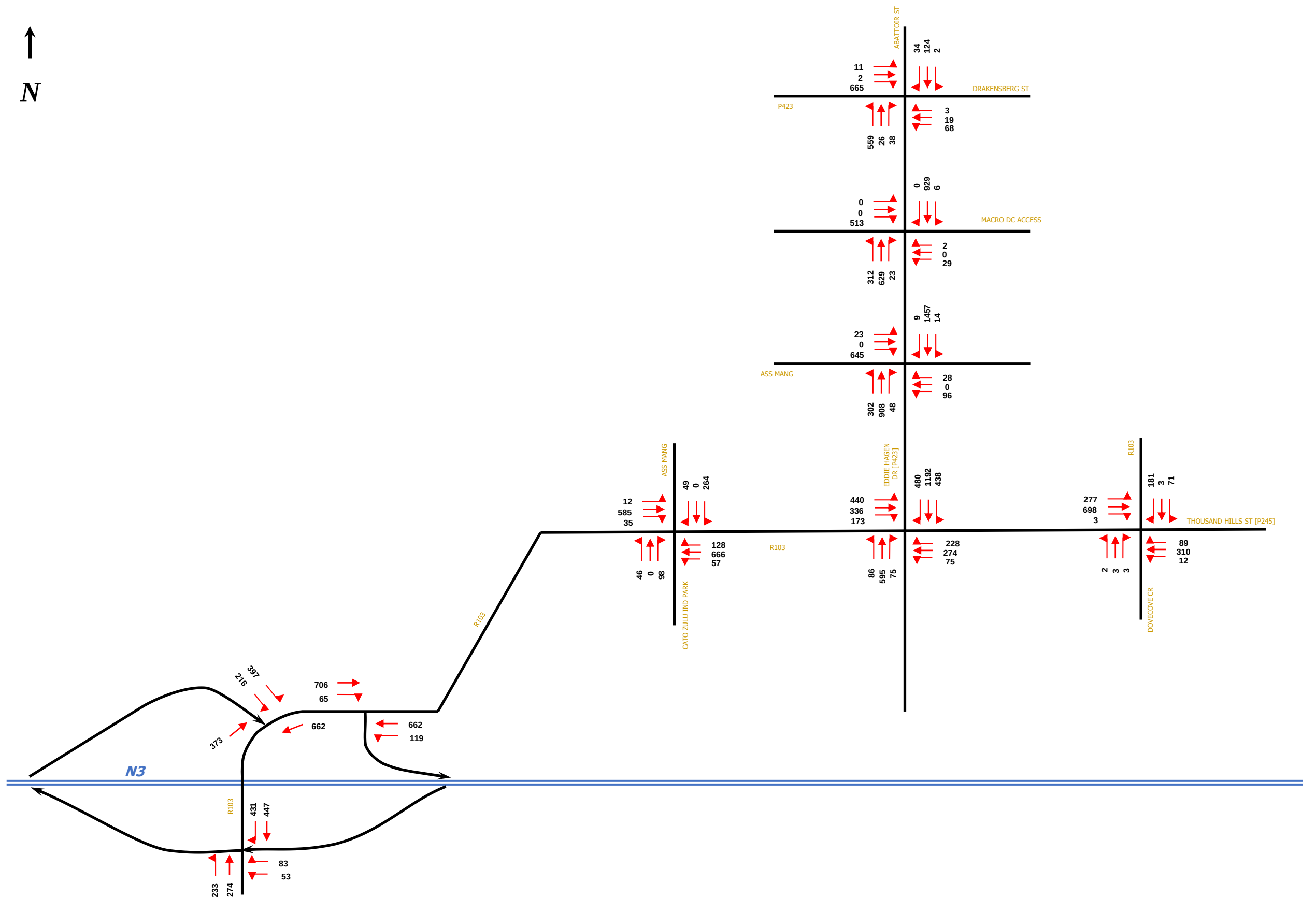


FIGURE 17: TOTAL FUTURE TRAFFIC – WITH N3 KWAXIMBA INTERCHANGE [PM PEAK]

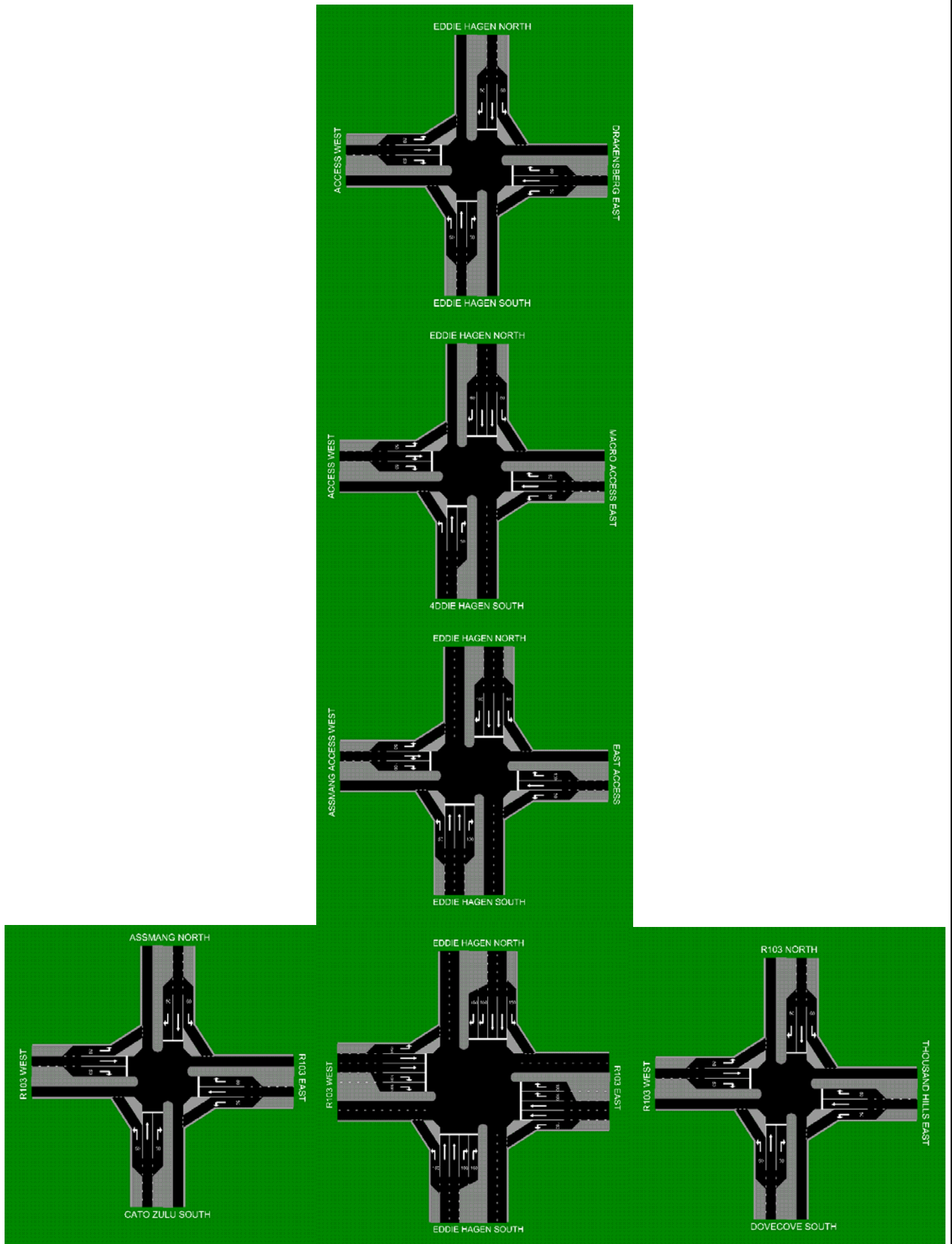


FIGURE 18: ROAD UPGRADE REQUIREMENTS

STUDY AREA NOVEMBER UPDATE WITH SERVICES

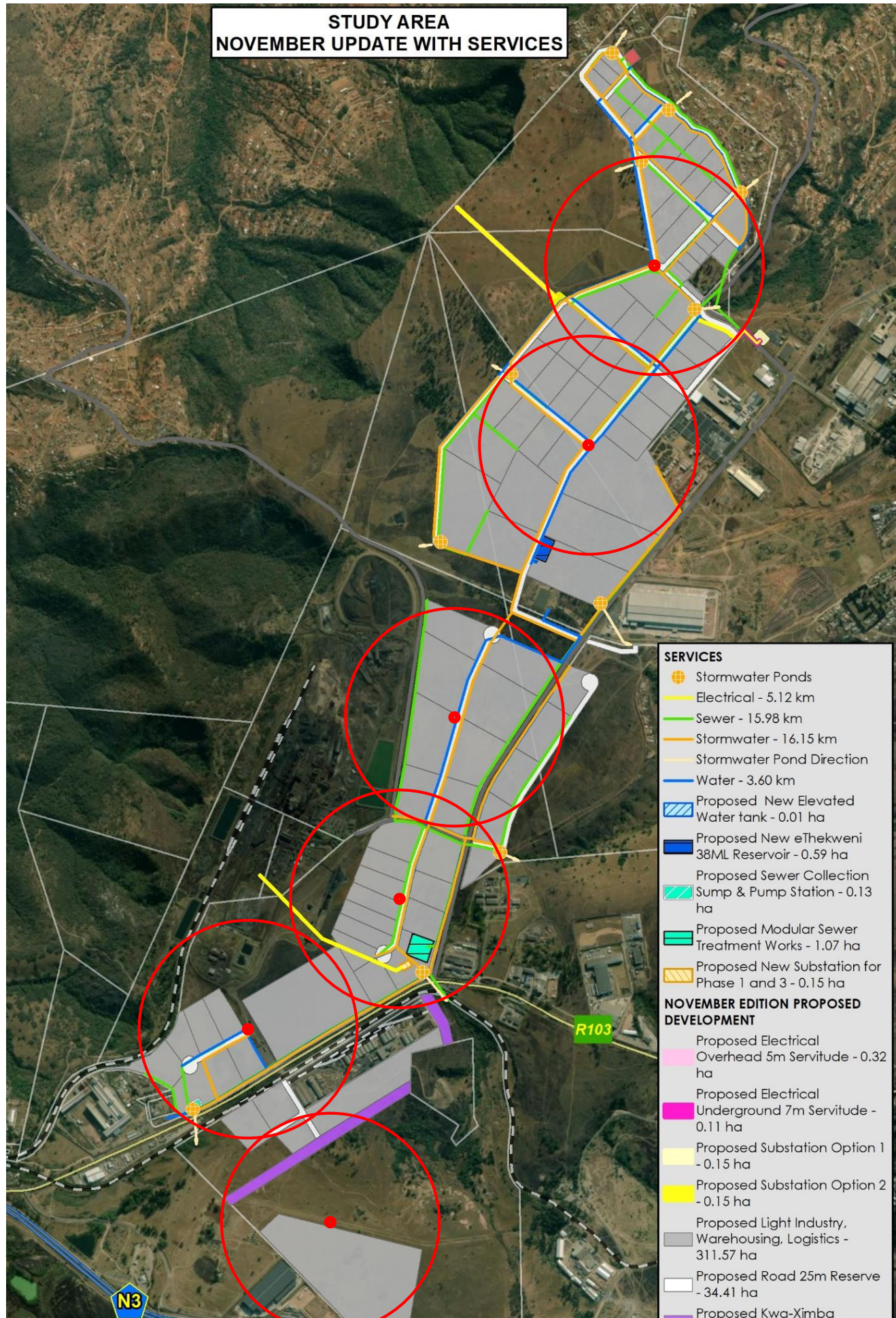


FIGURE 19: PUBLIC TRANSPORT FACILITIES

APPENDIX A

ETA TIA CHECKLIST



ETHEKWINI TRANSPORT AUTHORITY

30 Archie Gumede Place | Durban | 4001
P.O. Box 680 | Durban | 4000
Tel: 031 311 7344 | Fax 031 305 5871
www.durban.gov.za

TRAFFIC IMPACT ASSESSMENT CHECKLIST

Before a full review is conducted, the report will be checked for completeness. If the report is missing any of the items listed below, it will be returned for revision without reviewing the document. If any content is not applicable this must be indicated (with reasons) as such under the section/s of the report

ETA Ref. No:

Date of Application: 7/2022

Development Address: CATO RIDGE

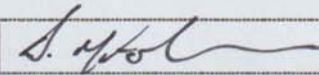
Development Description: EIA FOR THE DEVELOPMENT OF LAND

Traffic Professional: DAVID MCFARLANE AND ASSOCIATES CC

Content	Yes	No	N/A	Comment
1. Traffic impact assessment cover	✓			
2. Letter signed by ECSA registered professional	✓			
3. Development Particulars	✓			
3.1. Development description and reference name	✓			
3.2. Location plan	✓			
3.3. Land use rights existing and applied, including type and extent of rights, list of land uses under proposed zoning including town planning controls	✓			
4. Study area	✓			
4.1 Study area plan or map indicated	✓			
5. Background information	✓			
5.1. Listed information – transport facilities and planning	✓			
5.2. Relevant information provided by municipality e.g. Framework plans, road classification, traffic models, etc.	✓			
5.3. Schematic diagram/s	✓			
6. Site investigation	✓			
6.1. Documented and photographic record (e.g. road conditions, geometrics, operations, transport facilities, etc)	✓			
7. Traffic Demand Estimation	✓			
7.1. Carried out for worst case trip demand land use under the proposed change in land use or extent as stipulated in the town planning application	✓			
7.2. Assessment years	✓			
7.3. Assessment hours	✓			
7.4. Traffic counts not more than 2 years old – date and time	✓			
7.5. Traffic growth rates	✓			
7.6. Trip generation rates	✓			
7.7. Modal split	✓			
8. Trip Distribution and Traffic Assignment	✓			
8.1. Manual trip distribution and assignment	✓			
8.2. Simulation software used for trip distribution and assignment – software files must be provided			✓	
8.3. Supporting information documented for traffic distribution and assignment	✓			

8.4. Trip Distribution and Traffic Assignment diagrams	✓			
9. Total traffic demand – all aspects including diagrams	✓			
10. Demand side mitigation	✓			
11. Proposed improvements	✓			
11.1. New roads or widening or intersection improvements – TRL drawing and fatal flaw implementation screening checklist	✓			
11.2. Traffic signals must meet ETA's Urban Traffic Control warrant and requirements. In addition, a roundabout assessment comparison must be carried out	✓			
11.3. Traffic management plans	✓			
12. Traffic Impact Assessment Scenarios	✓			
12.1. Assessment based on worst case land use scenario	✓			
12.2. Design year horizon assessment	✓			
12.2.1. "Without" proposed mitigating measures (with and without development)	✓			
12.2.2. "With" proposed mitigating measures (with and without development)	✓			
12.3. Planning year horizon assessment	✓			
12.3.1. "With" proposed mitigating measures	✓			
13. Site Impact Assessment (if applicable)			✓	
14. Transport requirements and cost	✓			
14.1. Any changes to transport master planning	✓			
14.2. Transport / Road services cost contribution			✓	
14.3. Improvement costs estimates or municipal tariff as applicable			✓	
14.4. Recommendations	✓			
14.5. Traffic Road Layout Plans		✓		
14.6. Eng. Drawings, Cost estimate, Financial guarantees, and Undertakings for new or existing road improvements		✓		
15. Recommendations	✓			
15.1. The change in land use for which approval is required.	✓			
15.2. Proposed type and location of all erf accesses.	✓			
15.3. The improvements, changes and mitigation measures that are required, subject thereto that these improvements or measures may be amended in subsequent investigations.	✓			
15.4. Elements of the transport / road network master plan that should be implemented in support of the development.	✓			
15.5 Traffic management measures aimed at protecting residential or other sensitive areas.	✓			
16. Appendix	✓			
16.1. Relevant Traffic Impact Assessment Correspondence. e.g. Traffic Counts, analysis details, maps, plans, etc	✓			

Date: 7/2022



Signature

Name: D.G. McFarlane

Professional registration details

ECSA 890452

Disclaimer : Refer to ETA Manual For Traffic Impact Assessments and Site Traffic Assessments

APPENDIX B

PROPOSED ZONAL CONTROLS

		ZONE: GENERAL INDUSTRY 2				
SCHEME INTENTION: To provide, preserve, use land or buildings for full range of industrial uses where the emphasis is on bulk and heavy industry and where due cognisance must be taken of environmental impacts. Ensuring sustainable locations which accommodate the requirements for industrial activities and minimize their impact on surrounding uses MAP COLOUR REFERENCE: Purple						
PRIMARY		SPECIAL CONSENT		PRECLUDED		
• Action Sports bar • Builder's Yard • Car Wash • Conservation area • Dwelling House* • Display Area • Fuelling and Service Station • Government/Municipal • Industry – General • Industry – Light • Motor Display Area • Motor Vehicle Test Centre • Motor Workshop • Flat* • Scrap Yard • Warehouse		• Adult Premises • Agricultural Activity • Agricultural Land • Arts and Crafts Workshop • Boarding House • BTTS • Direct Access Service Centre • Escort Agency • Funeral Parlour • Garden Nursery • Health & Beauty Clinic • Health Studio • Laundry • Motor Garage • Night Club • Office • Parkade • Recycling Centre • Restaurant / Fast Food Outlet • Shop • Special Building • Truck Stop		• Airport • Animal facility • Betting Depot • Chalet Development • Container Depot • Convention Centre • Correctional Facility • Crèche • Cemetery/crematorium • Educational Establishment • Flea Market • Hotel • Industry – Extractive • Industry – Noxious • Institution • Landfill • Mobile Home Park and Camping Ground • Mortuary • Multiple Unit Development • Museum • Nature Reserve • Office – Medical • Pet Grooming Parlour • Place of Public Entertainment • Place of Public Worship • Private Open Space • Reform School • Refuse Disposal • Restricted Building • Retirement Centre • Riding Stables • Transport Depot • Utilities Facility • Veterinary Clinic • Zoological Garden		
ADDITIONAL CONTROLS						
1. *Notwithstanding the provisions of the above table one dwelling unit may be permitted on each site to accommodate a manager or caretaker's flat. 2. BTTS shall mean Base Telecommunications Transmission Station. 3. Accommodation for motor vehicles to be provided on the erf as per Section 8 4. Subject to the provision of a sewerage disposal system to the satisfaction of the Municipality						
DEVELOPMENT PARAMETERS						
SPACE ABOUT BUILDINGS		DWELLING UNITS PER HECTARE	MINIMUM ERF SIZE	HEIGHT IN STOREYS	COVERAGE	FLOOR AREA RATIO
BUILDING LINE: FRONT	BUILDING LINE: SIDE AND REAR					
7.5 m	3 m	N/A	1800 m²	4	70%	1.50

APPENDIX C

TRAFFIC COUNT DATA

TRAFFIC SURVEY

CLIENT: DMA

SITE: 4 – R103 & Entrance to Cato Zulu Industrial Park

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	NORTH R103																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	2	0	2	0	4	49	12	12	1	74	1	0	0	0	1	0	0	0	0	0	79
06:15 - 06:30	3	0	1	0	4	62	26	4	0	92	0	0	0	0	0	0	0	0	0	0	96
06:30 - 06:45	5	0	1	0	6	65	18	8	1	92	1	0	0	0	1	1	1	0	0	2	101
06:45 - 07:00	3	0	0	1	4	61	12	7	0	80	1	0	0	0	1	0	0	0	0	0	85
07:00 - 07:15	2	0	2	0	4	64	17	8	0	89	0	0	1	0	1	0	1	0	0	1	95
07:15 - 07:30	2	0	3	0	5	65	11	11	0	87	1	0	1	0	2	0	0	0	0	0	94
07:30 - 07:45	2	0	0	0	2	49	10	6	0	65	0	0	0	0	0	0	0	0	0	0	67
07:45 - 08:00	5	0	2	0	7	49	9	3	0	61	1	0	0	0	1	0	0	0	0	0	69
08:00 - 08:15	4	0	0	0	4	28	6	7	1	42	1	0	0	0	1	0	0	0	0	0	47
08:15 - 08:30	3	0	2	0	5	36	4	11	0	51	0	0	0	0	0	0	0	0	0	0	56
08:30 - 08:45	4	0	1	0	5	26	10	5	0	41	0	0	0	0	0	1	0	0	0	1	47
08:45 - 09:00	3	0	1	0	4	28	9	10	0	47	0	0	0	0	0	0	0	0	0	0	51
09:00 - 09:15	0	0	2	0	2	35	2	13	0	50	0	0	0	0	0	0	0	0	0	0	52
09:15 - 09:30	3	0	0	0	3	45	8	9	0	62	0	0	0	0	0	0	0	0	0	0	65
09:30 - 09:45	2	0	1	0	3	32	5	11	0	48	0	0	0	0	0	0	0	0	0	0	51
09:45 - 10:00	1	0	2	0	3	40	10	4	0	54	1	0	0	0	1	0	0	0	0	0	58
10:00 - 10:15	1	0	1	0	2	26	4	10	0	40	1	0	0	0	1	0	0	0	0	0	43
10:15 - 10:30	0	0	1	0	1	46	5	11	0	62	1	0	0	0	1	0	0	0	0	0	64
10:30 - 10:45	1	0	2	0	3	38	8	10	0	56	2	0	1	0	3	0	0	0	0	0	62
10:45 - 11:00	1	0	3	0	4	33	7	11	0	51	3	0	0	0	3	0	0	0	0	0	58
11:00 - 11:15	1	0	2	0	3	44	2	12	0	58	0	0	1	0	1	0	0	0	0	0	62
11:15 - 11:30	1	0	2	0	3	44	9	5	0	58	0	0	0	0	0	0	0	0	0	0	61
11:30 - 11:45	1	0	1	0	2	38	5	8	0	51	0	0	0	0	0	0	0	0	0	0	53
11:45 - 12:00	2	0	2	0	4	47	3	14	0	64	0	0	0	0	0	0	0	0	0	0	68
12:00 - 12:15	1	0	3	0	4	41	3	15	0	59	0	0	0	0	0	0	0	0	0	0	63
12:15 - 12:30	1	0	4	0	5	55	6	9	0	70	0	0	1	0	1	0	0	0	0	0	76
12:30 - 12:45	2	0	2	0	4	43	5	6	0	54	0	0	1	0	1	1	0	0	0	1	60
12:45 - 13:00	0	0	1	0	1	33	4	12	0	49	0	0	0	0	0	1	0	0	0	1	51
13:00 - 13:15	1	1	1	0	3	33	6	8	0	47	0	0	0	0	0	0	0	0	0	0	50
13:15 - 13:30	3	0	2	0	5	41	6	9	0	56	0	0	0	0	0	0	0	0	0	0	61
13:30 - 13:45	1	0	0	0	1	40	4	17	0	61	0	0	0	0	0	0	0	0	0	0	62
13:45 - 14:00	2	0	4	0	6	30	4	10	0	44	1	0	0	0	1	0	0	0	0	0	51
14:00 - 14:15	1	0	4	0	5	61	4	15	0	80	0	0	0	0	0	0	0	0	0	0	85
14:15 - 14:30	0	0	1	0	1	45	4	16	0	65	1	0	1	0	2	0	0	0	0	0	68
14:30 - 14:45	0	0	6	0	6	47	2	11	0	60	1	0	0	0	1	0	0	0	0	0	67
14:45 - 15:00	1	0	1	0	2	63	4	11	0	78	0	0	0	0	0	0	0	0	0	0	80
15:00 - 15:15	2	0	4	0	6	59	7	12	0	78	0	0	0	0	0	0	0	0	0	0	84
15:15 - 15:30	2	0	1	0	3	67	3	14	0	84	0	0	0	0	0	0	0	0	0	0	87
15:30 - 15:45	1	0	1	0	2	40	5	7	0	52	0	0	0	0	0	0	0	0	0	0	54
15:45 - 16:00	1	0	0	0	1	35	9	8	0	52	0	0	0	0	0	0	0	0	0	0	53
16:00 - 16:15	0	0	3	0	3	58	4	9	0	71	0	0	0	0	0	0	0	0	0	0	74
16:15 - 16:30	1	0	2	0	3	53	8	10	0	71	0	0	0	0	0	0	0	0	0	0	74
16:30 - 16:45	2	0	0	0	2	82	7	10	0	99	0	0	0	0	0	0	0	0	0	0	101
16:45 - 17:00	1	0	1	0	2	76	11	7	0	94	0	0	0	0	0	0	0	0	0	0	96
17:00 - 17:15	1	0	1	0	2	51	9	6	0	66	0	0	0	0	0	0	0	0	0	0	68
17:15 - 17:30	3	0	7	0	10	31	11	9	0	51	0	0	0	0	0	0	0	0	0	0	61
17:30 - 17:45	0	0	0	0	0	27	2	9	0	38	0	0	0	0	0	0	0	0	0	0	38
17:45 - 18:00	2	0	2	0	4	37	9	12	1	59	2	0	0	0	2	1	0	0	0	1	66
TOTAL	81	1	85	1	168	2198	349	462	4	3013	19	0	7	0	26	5	2	0	0	7	3214

TRAFFIC SURVEY

CLIENT: DMA

SITE: 4 – R103 & Entrance to Cato Zulu Industrial Park

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	EAST Entrance to Cato Zulu Industrial Park																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	1	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
06:15 - 06:30	0	0	4	0	4	0	0	0	0	0	0	0	5	0	5	0	0	0	0	0	9
06:30 - 06:45	0	0	4	0	4	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	7
06:45 - 07:00	1	0	4	1	6	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	8
07:00 - 07:15	0	0	3	0	3	0	0	0	0	0	2	0	1	0	3	0	0	0	0	0	6
07:15 - 07:30	1	0	1	0	2	0	0	0	0	0	1	0	2	0	3	0	0	0	0	0	5
07:30 - 07:45	0	0	7	0	7	0	0	0	0	0	1	0	2	0	3	0	0	0	0	0	10
07:45 - 08:00	1	0	0	0	1	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	5
08:00 - 08:15	1	0	2	0	3	0	0	0	0	0	1	0	3	0	4	0	0	0	0	0	7
08:15 - 08:30	0	0	4	0	4	0	0	0	0	0	1	0	2	0	3	0	0	0	0	0	7
08:30 - 08:45	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
08:45 - 09:00	3	0	7	0	10	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	12
09:00 - 09:15	2	0	3	0	5	0	0	1	0	1	3	0	0	0	3	0	0	0	0	0	9
09:15 - 09:30	1	0	6	0	7	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	8
09:30 - 09:45	0	0	3	0	3	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	5
09:45 - 10:00	3	0	5	0	8	0	0	0	0	0	2	0	2	0	4	0	0	0	0	0	12
10:00 - 10:15	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:15 - 10:30	1	0	3	0	4	0	0	0	0	0	3	0	1	0	4	0	0	0	0	0	8
10:30 - 10:45	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
10:45 - 11:00	1	0	5	0	6	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	8
11:00 - 11:15	0	0	4	0	4	0	0	0	0	0	2	0	5	0	7	0	0	0	0	0	11
11:15 - 11:30	3	0	1	0	4	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	6
11:30 - 11:45	1	0	0	0	1	0	0	0	0	0	2	0	1	0	3	0	0	0	0	0	4
11:45 - 12:00	0	0	2	0	2	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	4
12:00 - 12:15	4	0	2	0	6	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	9
12:15 - 12:30	1	0	2	0	3	0	0	0	0	0	1	0	2	0	3	0	0	0	0	0	6
12:30 - 12:45	1	0	3	0	4	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	6
12:45 - 13:00	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
13:00 - 13:15	2	0	0	0	2	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	4
13:15 - 13:30	0	0	5	0	5	0	0	0	0	0	2	0	3	0	5	0	0	0	0	0	10
13:30 - 13:45	4	0	3	0	7	0	0	0	0	0	2	1	2	0	5	0	0	0	0	0	12
13:45 - 14:00	2	0	1	0	3	1	0	1	0	2	0	0	4	0	4	0	0	0	0	0	9
14:00 - 14:15	1	0	4	0	5	0	0	1	0	1	3	0	2	0	5	0	0	0	0	0	11
14:15 - 14:30	0	0	6	0	6	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	8
14:30 - 14:45	0	0	1	0	1	0	0	0	0	0	3	0	1	0	4	0	0	0	0	0	5
14:45 - 15:00	0	0	2	0	2	0	0	0	0	0	5	0	2	0	7	0	0	0	0	0	9
15:00 - 15:15	1	0	3	0	4	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	5
15:15 - 15:30	1	0	7	0	8	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	10
15:30 - 15:45	10	0	2	0	12	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	13
15:45 - 16:00	0	0	8	0	8	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	9
16:00 - 16:15	1	0	3	0	4	0	0	0	0	0	4	0	2	0	6	0	0	0	0	0	10
16:15 - 16:30	2	0	4	0	6	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	7
16:30 - 16:45	3	0	2	0	5	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	11
16:45 - 17:00	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
17:00 - 17:15	0	0	1	0	1	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	4
17:15 - 17:30	0	0	4	0	4	0	0	0	0	0	1	0	7	0	8	0	0	0	0	0	12
17:30 - 17:45	1	0	1	0	2	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	4
17:45 - 18:00	2	0	4	0	6	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	7
TOTAL	57	0	147	1	205	1	0	3	0	4	65	1	72	0	138	0	0	0	0	0	347

TRAFFIC SURVEY

CLIENT: DMA

SITE: 4 – R103 & Entrance to Cato Zulu Industrial Park

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	SOUTH R103																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	4	0	0	0	4	30	7	5	1	43	1	0	0	0	1	0	0	0	0	0	48
06:15 - 06:30	4	0	0	0	4	44	11	10	0	65	2	0	0	0	2	0	0	0	0	0	71
06:30 - 06:45	2	0	0	0	2	48	12	4	1	65	2	0	0	0	2	1	0	0	0	1	70
06:45 - 07:00	7	0	1	0	8	61	19	6	2	88	1	0	3	0	4	0	0	0	0	0	100
07:00 - 07:15	2	0	0	0	2	40	13	5	0	58	3	0	2	0	5	0	0	0	0	0	65
07:15 - 07:30	3	0	0	0	3	71	11	6	0	88	7	0	1	0	8	0	0	0	0	0	99
07:30 - 07:45	0	0	1	0	1	47	8	11	0	66	3	0	0	0	3	0	0	0	0	0	70
07:45 - 08:00	0	0	0	0	0	52	9	11	0	72	2	0	1	0	3	1	0	0	0	1	76
08:00 - 08:15	1	0	0	0	1	35	6	14	0	55	1	0	2	0	3	0	0	0	0	0	59
08:15 - 08:30	0	0	0	0	0	24	3	7	0	34	0	0	0	0	0	0	0	0	0	0	34
08:30 - 08:45	0	0	0	0	0	35	3	6	1	45	1	0	3	0	4	0	0	0	0	0	49
08:45 - 09:00	1	0	0	0	1	32	8	7	0	47	1	0	3	0	4	1	0	0	0	1	53
09:00 - 09:15	0	0	0	0	0	20	4	10	0	34	1	0	1	0	2	1	0	0	0	1	37
09:15 - 09:30	2	0	0	0	2	30	2	8	0	40	0	0	2	0	2	0	0	0	0	0	44
09:30 - 09:45	2	0	0	0	2	38	5	13	0	56	1	0	1	0	2	0	0	0	0	0	60
09:45 - 10:00	0	0	0	0	0	35	3	12	0	50	1	0	4	0	5	0	0	0	0	0	55
10:00 - 10:15	0	0	2	0	2	28	2	10	0	40	1	0	2	0	3	0	0	0	0	0	45
10:15 - 10:30	0	0	0	0	0	27	6	7	0	40	0	0	2	0	2	0	0	0	0	0	42
10:30 - 10:45	0	0	0	0	0	38	2	6	0	46	0	0	2	0	2	0	0	0	0	0	48
10:45 - 11:00	1	0	0	0	1	35	1	11	1	48	0	0	1	0	1	0	0	0	0	0	50
11:00 - 11:15	1	0	0	0	1	31	5	7	0	43	0	0	0	0	0	0	0	0	0	0	44
11:15 - 11:30	0	0	0	0	0	42	1	11	0	54	1	0	2	0	3	0	0	0	0	0	57
11:30 - 11:45	0	0	0	0	0	50	6	10	0	66	1	0	3	0	4	0	0	0	0	0	70
11:45 - 12:00	1	0	0	0	1	45	3	10	0	58	1	0	2	0	3	0	0	0	0	0	62
12:00 - 12:15	0	0	0	0	0	36	5	8	0	49	1	0	3	0	4	0	0	0	0	0	53
12:15 - 12:30	1	0	0	0	1	37	1	7	0	45	1	0	1	0	2	0	0	0	0	0	48
12:30 - 12:45	0	0	0	0	0	29	8	7	0	44	1	0	10	0	11	0	0	0	0	0	55
12:45 - 13:00	0	0	0	0	0	40	2	9	0	51	2	0	0	0	2	0	0	0	0	0	53
13:00 - 13:15	1	0	0	0	1	40	2	9	0	51	0	0	4	0	4	0	0	0	0	0	56
13:15 - 13:30	0	0	0	0	0	36	6	9	0	51	0	0	4	0	4	0	0	0	0	0	55
13:30 - 13:45	0	0	0	0	0	36	8	10	0	54	2	0	2	0	4	0	0	0	0	0	58
13:45 - 14:00	1	0	0	0	1	41	5	17	0	63	2	0	0	0	2	0	0	0	0	0	66
14:00 - 14:15	0	0	0	0	0	43	5	2	0	50	2	0	6	0	8	0	0	0	0	0	58
14:15 - 14:30	4	0	1	0	5	49	3	6	0	58	0	0	2	0	2	0	0	0	0	0	65
14:30 - 14:45	0	0	1	0	1	67	10	8	0	85	1	0	0	0	1	2	0	0	0	2	89
14:45 - 15:00	2	0	0	0	2	45	9	9	0	63	0	0	3	0	3	0	0	0	0	0	68
15:00 - 15:15	0	0	1	0	1	46	7	4	0	57	1	0	5	0	6	0	0	0	0	0	64
15:15 - 15:30	0	0	0	0	0	39	7	10	0	56	0	0	1	0	1	0	0	0	0	0	57
15:30 - 15:45	0	0	0	0	0	65	6	8	0	79	0	0	2	0	2	0	0	0	0	0	81
15:45 - 16:00	0	0	1	0	1	59	7	6	0	72	1	0	3	0	4	0	0	1	0	1	78
16:00 - 16:15	0	0	0	0	0	71	13	7	0	91	0	0	10	0	10	0	0	0	0	0	101
16:15 - 16:30	0	0	0	0	0	59	6	6	0	71	0	0	0	0	0	0	0	0	0	0	71
16:30 - 16:45	0	0	0	0	0	66	8	7	0	81	0	0	4	0	4	0	0	0	0	0	85
16:45 - 17:00	0	0	0	0	0	73	11	9	0	93	0	0	1	0	1	0	0	0	0	0	94
17:00 - 17:15	0	0	0	0	0	65	10	3	0	78	1	0	9	0	10	0	0	0	0	0	88
17:15 - 17:30	0	0	0	0	0	74	13	8	0	95	0	0	2	0	2	0	0	0	0	0	97
17:30 - 17:45	2	0	0	0	2	68	12	8	0	88	4	0	2	0	6	0	0	0	0	0	96
17:45 - 18:00	0	0	0	0	0	51	11	5	1	68	0	0	4	0	4	0	0	0	0	0	72
TOTAL	42	0	8	0	50	2173	325	389	7	2894	50	0	115	0	165	6	0	1	0	7	3116

TRAFFIC SURVEY

CLIENT: DMA

SITE: 4 – R103 & Entrance to Cato Zulu Industrial Park

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	WEST Entrance to Reclam																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
06:15 - 06:30	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
06:30 - 06:45	1	0	0	0	1	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	3
06:45 - 07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00 - 07:15	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
07:15 - 07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 - 07:45	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
07:45 - 08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 - 08:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
08:15 - 08:30	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:30 - 08:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
08:45 - 09:00	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
09:00 - 09:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
09:15 - 09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 - 09:45	0	0	0	0	0	1	0	0	0	1	2	0	1	0	3	0	0	0	0	0	4
09:45 - 10:00	1	0	0	0	1	0	0	0	0	0	2	0	1	0	3	0	0	0	0	0	4
10:00 - 10:15	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
10:15 - 10:30	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:30 - 10:45	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10:45 - 11:00	1	0	1	0	2	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	5
11:00 - 11:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
11:15 - 11:30	1	0	0	0	1	0	0	0	0	0	2	0	1	0	3	0	0	0	0	0	4
11:30 - 11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 - 12:00	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
12:00 - 12:15	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:15 - 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 - 12:45	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
12:45 - 13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00 - 13:15	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
13:15 - 13:30	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
13:30 - 13:45	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
13:45 - 14:00	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
14:00 - 14:15	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
14:15 - 14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30 - 14:45	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	2
14:45 - 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00 - 15:15	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
15:15 - 15:30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
15:30 - 15:45	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
15:45 - 16:00	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
16:00 - 16:15	2	0	0	0	2	0	0	0	0	0	10	0	0	0	10	0	0	0	0	0	12
16:15 - 16:30	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
16:30 - 16:45	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	4
16:45 - 17:00	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	2
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	2
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45 - 18:00	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
TOTAL	13	0	10	0	23	1	0	0	0	1	40	2	12	0	54	0	0	0	0	0	78

TRAFFIC SURVEY

CLIENT: DMA

SITE: 5 - Eddie Hagen Drive & R103

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	NORTH Eddie Hagen Drive															TOTAL
	LEFT TURN					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	11	4	2	1	18	29	6	1	0	36	0	0	0	0	0	54
06:15 - 06:30	26	8	2	0	36	36	12	0	0	48	0	0	0	0	0	84
06:30 - 06:45	19	3	2	0	24	34	13	3	1	51	0	0	0	0	0	75
06:45 - 07:00	24	4	1	0	29	39	6	2	1	48	0	0	0	0	0	77
07:00 - 07:15	18	3	7	1	29	28	12	4	0	44	0	0	0	0	0	73
07:15 - 07:30	23	3	5	1	32	29	8	5	0	42	0	0	0	0	0	74
07:30 - 07:45	15	2	1	0	18	21	5	1	0	27	0	1	0	0	1	46
07:45 - 08:00	13	0	1	0	14	18	5	1	0	24	0	0	0	0	0	38
08:00 - 08:15	15	1	5	0	21	8	6	3	0	17	0	0	0	0	0	38
08:15 - 08:30	12	2	4	0	18	13	2	8	0	23	0	0	0	0	0	41
08:30 - 08:45	12	2	5	0	19	13	6	2	0	21	0	0	0	0	0	40
08:45 - 09:00	10	3	10	0	23	17	9	6	0	32	0	0	0	0	0	55
09:00 - 09:15	8	0	3	0	11	12	1	5	0	18	0	0	0	0	0	29
09:15 - 09:30	17	5	3	0	25	19	7	5	0	31	1	0	0	0	1	57
09:30 - 09:45	7	0	2	0	9	13	3	4	0	20	0	0	0	0	0	29
09:45 - 10:00	13	1	2	0	16	18	8	3	0	29	0	0	0	0	0	45
10:00 - 10:15	9	3	6	0	18	13	3	4	0	20	0	0	0	0	0	38
10:15 - 10:30	18	0	2	0	20	22	4	9	0	35	0	0	0	0	0	55
10:30 - 10:45	20	2	6	0	28	22	6	3	0	31	0	0	0	0	0	59
10:45 - 11:00	11	2	6	0	19	21	3	2	0	26	0	0	0	0	0	45
11:00 - 11:15	13	2	8	0	23	16	4	8	0	28	0	0	0	0	0	51
11:15 - 11:30	17	0	4	0	21	21	5	0	0	26	0	0	0	0	0	47
11:30 - 11:45	15	1	3	0	19	24	3	3	0	30	1	0	0	0	1	50
11:45 - 12:00	16	2	5	0	23	18	2	5	0	25	0	0	0	0	0	48
12:00 - 12:15	12	1	5	0	18	22	4	6	0	32	0	0	0	0	0	50
12:15 - 12:30	9	1	4	0	14	25	4	2	0	31	0	0	0	0	0	45
12:30 - 12:45	14	1	2	0	17	24	3	0	0	27	1	0	0	0	1	45
12:45 - 13:00	6	1	5	0	12	19	3	8	0	30	0	0	0	0	0	42
13:00 - 13:15	18	1	5	0	24	19	4	4	0	27	0	0	0	0	0	51
13:15 - 13:30	21	1	3	0	25	17	2	2	0	21	0	0	0	0	0	46
13:30 - 13:45	23	2	5	0	30	20	2	11	0	33	0	0	0	0	0	63
13:45 - 14:00	19	2	5	0	26	15	4	5	0	24	0	0	0	0	0	50
14:00 - 14:15	16	1	3	0	20	22	1	5	0	28	0	0	0	0	0	48
14:15 - 14:30	17	1	6	0	24	28	5	10	0	43	0	0	0	0	0	67
14:30 - 14:45	18	3	2	0	23	18	2	4	0	24	0	0	0	0	0	47
14:45 - 15:00	18	2	8	0	28	26	2	7	0	35	0	0	0	0	0	63
15:00 - 15:15	26	1	4	0	31	27	3	5	0	35	0	0	0	0	0	66
15:15 - 15:30	26	2	7	0	35	42	4	4	0	50	0	0	0	0	0	85
15:30 - 15:45	16	3	1	1	21	18	3	2	0	23	0	0	0	0	0	44
15:45 - 16:00	30	1	4	0	35	22	7	5	0	34	0	0	0	0	0	69
16:00 - 16:15	53	4	3	0	60	31	1	4	0	36	0	0	0	0	0	96
16:15 - 16:30	42	3	5	0	50	33	4	4	0	41	0	0	0	0	0	91
16:30 - 16:45	34	1	2	0	37	43	3	2	0	48	0	0	0	0	0	85
16:45 - 17:00	34	1	1	0	36	42	3	1	0	46	0	0	0	0	0	82
17:00 - 17:15	22	1	1	0	24	28	2	1	0	31	0	0	0	0	0	55
17:15 - 17:30	11	2	2	0	15	14	5	2	0	21	0	0	0	0	0	36
17:30 - 17:45	9	1	3	0	13	11	2	3	0	16	0	0	0	0	0	29
17:45 - 18:00	20	1	3	0	24	25	2	3	0	30	0	0	0	0	0	54
TOTAL	876	91	184	4	1155	1095	214	187	2	1498	3	1	0	0	4	2657

TRAFFIC SURVEY

CLIENT: DMA

SITE: 5 - Eddie Hagen Drive & R103

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	EAST R103 (E)															TOTAL
	STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	30	7	13	0	50	18	4	2	0	24	0	0	0	0	0	74
06:15 - 06:30	31	12	4	0	47	24	3	4	1	32	0	0	0	0	0	79
06:30 - 06:45	40	6	6	0	52	43	4	4	0	51	0	0	0	0	0	103
06:45 - 07:00	33	4	5	0	42	45	4	5	0	54	0	0	0	0	0	96
07:00 - 07:15	30	6	9	0	45	37	1	3	1	42	0	0	0	0	0	87
07:15 - 07:30	36	5	9	0	50	38	6	3	0	47	0	0	0	0	0	97
07:30 - 07:45	34	4	5	0	43	35	1	4	1	41	0	0	0	0	0	84
07:45 - 08:00	32	3	3	0	38	34	0	5	0	39	0	0	0	0	0	77
08:00 - 08:15	27	2	5	1	35	25	2	7	0	34	0	0	0	0	0	69
08:15 - 08:30	25	1	5	0	31	15	2	5	0	22	0	0	0	0	0	53
08:30 - 08:45	15	4	3	0	22	20	0	7	0	27	0	0	0	0	0	49
08:45 - 09:00	15	0	9	0	24	19	0	4	0	23	0	0	1	0	1	48
09:00 - 09:15	24	1	7	0	32	20	0	4	0	24	0	0	0	0	0	56
09:15 - 09:30	27	2	4	0	33	17	1	4	0	22	0	0	0	0	0	55
09:30 - 09:45	22	1	9	0	32	10	0	2	0	12	1	0	0	0	1	45
09:45 - 10:00	22	2	3	0	27	26	1	7	0	34	0	0	0	0	0	61
10:00 - 10:15	19	1	6	0	26	19	0	7	0	26	0	0	0	0	0	52
10:15 - 10:30	26	2	5	0	33	11	0	4	0	15	0	0	0	0	0	48
10:30 - 10:45	17	2	9	0	28	20	0	2	0	22	0	0	0	0	0	50
10:45 - 11:00	18	3	11	0	32	13	2	3	0	18	0	0	0	0	0	50
11:00 - 11:15	26	0	7	0	33	12	1	4	0	17	0	0	0	0	0	50
11:15 - 11:30	23	3	8	0	34	6	1	3	0	10	0	0	0	0	0	44
11:30 - 11:45	22	2	6	0	30	11	0	7	0	18	0	0	0	0	0	48
11:45 - 12:00	26	1	11	0	38	12	1	6	0	19	0	0	0	0	0	57
12:00 - 12:15	20	0	14	0	34	14	0	4	0	18	0	0	0	0	0	52
12:15 - 12:30	36	2	10	0	48	13	3	1	0	17	1	0	0	0	1	66
12:30 - 12:45	18	3	8	0	29	8	0	4	0	12	0	0	0	0	0	41
12:45 - 13:00	16	0	6	0	22	11	1	4	0	16	0	0	0	0	0	38
13:00 - 13:15	14	3	5	0	22	12	0	0	0	12	1	0	0	0	1	35
13:15 - 13:30	28	4	9	0	41	15	1	4	0	20	0	0	0	0	0	61
13:30 - 13:45	22	2	6	0	30	9	2	4	0	15	0	0	0	0	0	45
13:45 - 14:00	19	1	10	0	30	13	3	3	0	19	0	0	0	0	0	49
14:00 - 14:15	40	2	14	0	56	14	1	6	0	21	0	0	0	0	0	77
14:15 - 14:30	20	0	7	0	27	15	3	2	0	20	0	0	0	0	0	47
14:30 - 14:45	28	0	12	0	40	11	1	4	1	17	0	0	0	0	0	57
14:45 - 15:00	37	2	5	0	44	19	1	4	0	24	0	0	0	0	0	68
15:00 - 15:15	38	3	12	0	53	16	1	4	0	21	0	0	0	0	0	74
15:15 - 15:30	27	0	10	0	37	14	2	3	1	20	0	0	0	0	0	57
15:30 - 15:45	21	1	7	0	29	16	1	2	0	19	0	0	0	0	0	48
15:45 - 16:00	18	4	3	0	25	15	3	11	0	29	0	0	0	0	0	54
16:00 - 16:15	25	1	10	0	36	23	4	2	0	29	0	0	0	0	0	65
16:15 - 16:30	19	4	6	0	29	16	3	1	0	20	0	0	0	0	0	49
16:30 - 16:45	41	4	10	0	55	21	3	1	0	25	0	0	0	0	0	80
16:45 - 17:00	34	7	5	0	46	15	5	3	1	24	0	0	0	0	0	70
17:00 - 17:15	26	7	8	0	41	21	2	4	1	28	0	0	0	0	0	69
17:15 - 17:30	18	6	12	0	36	18	5	3	0	26	0	0	0	0	0	62
17:30 - 17:45	19	2	5	0	26	14	5	2	0	21	0	0	0	0	0	47
17:45 - 18:00	16	6	11	1	34	25	2	1	1	29	0	0	0	0	0	63
TOTAL	1220	138	367	2	1727	898	86	183	8	1175	3	0	1	0	4	2906

TRAFFIC SURVEY

CLIENT: DMA

SITE: 5 - Eddie Hagen Drive & R103

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	WEST R103 (W)															TOTAL
	LEFT TURN					STRAIGHT					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	16	6	5	0	27	15	1	0	1	17	0	0	0	0	0	44
06:15 - 06:30	24	9	3	0	36	19	2	10	0	31	0	0	0	0	0	67
06:30 - 06:45	31	8	0	1	40	20	4	7	0	31	0	0	0	0	0	71
06:45 - 07:00	31	14	8	1	54	30	4	2	0	36	0	0	0	0	0	90
07:00 - 07:15	25	10	2	0	37	19	5	4	1	29	0	0	0	0	0	66
07:15 - 07:30	33	8	2	0	43	37	3	6	0	46	0	0	0	0	0	89
07:30 - 07:45	25	4	7	0	36	19	4	6	0	29	0	0	0	0	0	65
07:45 - 08:00	36	5	0	0	41	17	4	10	0	31	0	0	0	0	0	72
08:00 - 08:15	19	4	10	0	33	17	2	11	0	30	0	0	0	0	0	63
08:15 - 08:30	14	2	4	0	20	14	1	8	0	23	0	0	0	0	0	43
08:30 - 08:45	16	2	4	0	22	17	1	2	1	21	0	0	0	0	0	43
08:45 - 09:00	16	7	4	0	27	16	1	4	0	21	0	0	0	0	0	48
09:00 - 09:15	5	2	6	0	13	15	2	4	0	21	0	0	0	0	0	34
09:15 - 09:30	15	2	3	0	20	16	0	4	0	20	0	0	0	0	0	40
09:30 - 09:45	23	1	5	0	29	20	4	11	0	35	0	0	0	0	0	64
09:45 - 10:00	15	1	6	0	22	19	2	8	0	29	0	0	0	0	0	51
10:00 - 10:15	19	1	6	0	26	9	0	3	0	12	0	0	0	0	0	38
10:15 - 10:30	15	5	4	0	24	15	2	3	0	20	0	0	0	0	0	44
10:30 - 10:45	17	1	3	0	21	21	1	5	0	27	0	0	0	0	0	48
10:45 - 11:00	18	0	5	0	23	21	1	8	1	31	0	0	0	0	0	54
11:00 - 11:15	14	3	5	0	22	19	3	7	0	29	0	0	0	0	0	51
11:15 - 11:30	17	1	3	0	21	24	0	10	0	34	0	0	0	0	0	55
11:30 - 11:45	21	4	8	0	33	29	2	3	0	34	0	0	0	0	0	67
11:45 - 12:00	23	2	2	0	27	16	1	8	0	25	0	0	0	0	0	52
12:00 - 12:15	20	4	3	0	27	18	0	8	0	26	0	0	0	0	0	53
12:15 - 12:30	19	1	2	0	22	18	1	9	0	28	0	0	0	0	0	50
12:30 - 12:45	22	3	2	0	27	14	3	3	0	20	0	0	0	0	0	47
12:45 - 13:00	23	2	3	0	28	25	2	6	0	33	0	0	0	0	0	61
13:00 - 13:15	19	1	2	0	22	21	1	8	0	30	0	0	0	0	0	52
13:15 - 13:30	17	3	7	0	27	24	1	5	0	30	0	0	0	0	0	57
13:30 - 13:45	13	7	6	0	26	22	4	6	0	32	0	0	0	0	0	58
13:45 - 14:00	23	2	9	0	34	23	3	8	0	34	0	0	0	0	0	68
14:00 - 14:15	19	3	2	0	24	26	2	8	0	36	0	0	0	0	0	60
14:15 - 14:30	28	2	3	0	33	23	1	5	0	29	0	0	0	0	0	62
14:30 - 14:45	28	8	3	0	39	34	2	5	0	41	0	0	0	0	0	80
14:45 - 15:00	26	5	5	0	36	27	4	8	0	39	0	0	0	0	0	75
15:00 - 15:15	19	6	2	0	27	25	2	3	0	30	0	0	0	0	0	57
15:15 - 15:30	23	4	2	0	29	20	3	8	0	31	0	1	0	0	1	61
15:30 - 15:45	27	3	5	0	35	29	3	5	0	37	0	0	0	0	0	72
15:45 - 16:00	35	4	1	0	40	29	3	3	0	35	0	0	0	0	0	75
16:00 - 16:15	34	8	4	0	46	46	5	5	0	56	0	0	0	0	0	102
16:15 - 16:30	31	5	2	0	38	31	1	3	0	35	0	0	0	0	0	73
16:30 - 16:45	27	6	2	0	35	43	2	5	0	50	0	0	0	0	0	85
16:45 - 17:00	30	7	3	0	40	42	3	7	0	52	0	0	0	0	0	92
17:00 - 17:15	26	4	0	0	30	36	4	4	0	44	0	0	0	0	0	74
17:15 - 17:30	43	14	4	0	61	41	2	10	0	53	0	0	0	0	0	114
17:30 - 17:45	34	6	0	0	40	36	5	9	0	50	0	0	0	0	0	90
17:45 - 18:00	27	7	1	1	36	20	4	4	0	28	0	0	0	0	0	64
TOTAL	1101	217	178	3	1499	1137	111	289	4	1541	0	1	0	0	1	3041

TRAFFIC SURVEY

CLIENT: DMA

SITE: Site 1 – Eddie Hagen Drive & Entrance to Assmang Manganese

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	NORTH Eddie Hagen Drive															TOTAL ALL MOVEMENTS
	STRAIGHT					RIGHT TURN					U TURN					
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	45	12	3	1	61	3	1	0	0	4	0	0	0	0	0	65
06:15 - 06:30	53	16	3	0	72	9	2	0	0	11	0	0	0	0	0	83
06:30 - 06:45	49	12	3	2	66	11	2	0	0	13	0	0	0	0	0	79
06:45 - 07:00	50	10	3	0	63	7	1	0	0	8	0	0	0	0	0	71
07:00 - 07:15	38	12	12	1	63	2	1	0	0	3	0	0	0	0	0	66
07:15 - 07:30	38	8	9	1	56	2	0	0	0	2	0	0	0	0	0	58
07:30 - 07:45	29	6	1	0	36	0	1	0	0	1	1	0	0	0	1	38
07:45 - 08:00	14	2	3	0	19	0	0	0	0	0	0	0	0	0	0	19
08:00 - 08:15	20	7	6	0	33	0	0	0	0	0	0	0	0	0	0	33
08:15 - 08:30	17	3	10	0	30	1	0	0	0	1	0	0	0	0	0	31
08:30 - 08:45	19	9	4	0	32	1	0	2	0	3	0	0	0	0	0	35
08:45 - 09:00	22	9	11	0	42	0	0	1	0	1	0	0	0	0	0	43
09:00 - 09:15	16	2	6	0	24	1	0	0	0	1	0	0	0	0	0	25
09:15 - 09:30	21	11	7	0	39	0	0	0	0	0	0	0	0	0	0	39
09:30 - 09:45	16	2	7	0	25	0	0	0	0	0	0	0	0	0	0	25
09:45 - 10:00	24	6	3	0	33	0	0	1	0	1	0	0	0	0	0	34
10:00 - 10:15	19	6	10	0	35	0	0	3	0	3	0	0	0	0	0	38
10:15 - 10:30	29	4	8	0	41	0	1	1	0	2	0	0	0	0	0	43
10:30 - 10:45	36	7	7	0	50	5	0	1	0	6	0	0	0	0	0	56
10:45 - 11:00	24	5	9	0	38	1	0	0	0	1	0	0	0	0	0	39
11:00 - 11:15	20	7	13	0	40	4	0	0	0	4	0	0	0	0	0	44
11:15 - 11:30	38	6	4	0	48	1	0	0	0	1	0	0	0	0	0	49
11:30 - 11:45	29	2	5	0	36	1	0	1	0	2	0	0	0	0	0	38
11:45 - 12:00	24	4	8	0	36	0	0	0	0	0	0	0	0	0	0	36
12:00 - 12:15	31	5	10	0	46	1	0	0	0	1	0	0	0	0	0	47
12:15 - 12:30	26	4	6	0	36	0	0	0	0	0	0	0	0	0	0	36
12:30 - 12:45	35	4	3	0	42	0	0	0	0	0	0	0	0	0	0	42
12:45 - 13:00	24	4	13	0	41	0	0	0	0	0	0	0	0	0	0	41
13:00 - 13:15	36	6	6	0	48	0	0	0	0	0	0	0	0	0	0	48
13:15 - 13:30	29	2	8	0	39	0	0	2	0	2	1	0	0	0	1	42
13:30 - 13:45	35	5	13	0	53	0	0	0	0	0	0	0	0	0	0	53
13:45 - 14:00	21	5	5	0	31	0	0	0	0	0	0	0	0	0	0	31
14:00 - 14:15	26	3	10	0	39	1	0	0	0	1	0	0	0	0	0	40
14:15 - 14:30	30	7	13	0	50	5	0	2	0	7	0	0	0	0	0	57
14:30 - 14:45	29	6	6	0	41	3	0	1	0	4	1	0	0	0	1	46
14:45 - 15:00	37	2	14	0	53	0	0	0	0	0	0	0	0	0	0	53
15:00 - 15:15	39	4	8	0	51	0	0	1	0	1	0	0	0	0	0	52
15:15 - 15:30	34	6	9	0	49	0	1	0	0	1	0	0	0	0	0	50
15:30 - 15:45	26	6	5	1	38	0	0	0	0	0	0	0	0	0	0	38
15:45 - 16:00	39	6	7	0	52	2	0	0	0	2	0	0	0	0	0	54
16:00 - 16:15	60	6	8	0	74	1	1	0	0	2	0	0	0	0	0	76
16:15 - 16:30	52	5	5	0	62	1	0	0	0	1	0	0	0	0	0	63
16:30 - 16:45	83	5	6	0	94	2	0	0	0	2	0	0	0	0	0	96
16:45 - 17:00	53	9	3	1	66	1	0	0	0	1	0	0	0	0	0	67
17:00 - 17:15	36	7	3	0	46	2	0	0	0	2	0	0	0	0	0	48
17:15 - 17:30	43	8	7	0	58	1	0	0	0	1	0	0	0	0	0	59
17:30 - 17:45	24	4	2	0	30	0	0	0	0	0	0	0	0	0	0	30
17:45 - 18:00	29	6	6	1	42	0	0	0	0	0	0	0	0	0	0	42
TOTAL	1567	293	331	8	2199	69	11	16	0	96	3	0	0	0	3	2298

TRAFFIC SURVEY

CLIENT: DMA

SITE: Site 1 – Eddie Hagen Drive & Entrance to Assmang Manganese

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	SOUTH Eddie Hagen Drive (S)															TOTAL ALL MOVEMENTS
	LEFT TURN					STRAIGHT					U TURN					
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	11	3	0	0	14	20	6	5	0	31	0	0	0	0	0	45
06:15 - 06:30	14	4	4	0	22	31	6	4	0	41	0	0	0	0	0	63
06:30 - 06:45	39	4	3	0	46	37	9	0	1	47	0	0	0	0	0	93
06:45 - 07:00	41	6	3	0	50	42	11	10	1	64	0	0	0	0	0	114
07:00 - 07:15	25	3	1	0	29	36	8	5	1	50	0	0	0	0	0	79
07:15 - 07:30	21	4	1	0	26	46	9	4	0	59	0	0	0	0	0	85
07:30 - 07:45	6	1	1	0	8	55	6	7	1	69	0	0	0	0	0	77
07:45 - 08:00	13	0	1	0	14	58	5	6	0	69	0	0	0	0	0	83
08:00 - 08:15	13	0	1	0	14	31	6	14	0	51	0	0	0	0	0	65
08:15 - 08:30	5	0	1	0	6	26	4	9	0	39	0	0	0	0	0	45
08:30 - 08:45	3	0	1	0	4	29	2	10	0	41	0	0	0	0	0	45
08:45 - 09:00	6	0	0	0	6	28	7	10	0	45	0	0	0	0	0	51
09:00 - 09:15	2	0	1	0	3	23	2	5	0	30	0	0	0	0	0	33
09:15 - 09:30	6	0	1	0	7	27	2	9	0	38	0	0	0	0	0	45
09:30 - 09:45	4	0	1	0	5	25	2	7	0	34	0	0	0	0	0	39
09:45 - 10:00	4	0	0	0	4	36	3	11	0	50	0	0	0	0	0	54
10:00 - 10:15	5	0	5	0	10	25	1	10	0	36	0	0	0	0	0	46
10:15 - 10:30	7	0	1	0	8	23	5	7	0	35	0	0	0	0	0	43
10:30 - 10:45	10	0	0	0	10	25	2	3	0	30	0	0	0	0	0	40
10:45 - 11:00	4	0	1	0	5	26	2	8	0	36	0	0	0	0	0	41
11:00 - 11:15	4	1	1	0	6	21	1	5	0	27	0	0	0	0	0	33
11:15 - 11:30	6	0	1	0	7	21	3	8	0	32	0	0	0	0	0	39
11:30 - 11:45	4	1	1	0	6	28	2	14	0	44	0	0	0	0	0	50
11:45 - 12:00	4	0	1	0	5	29	4	5	0	38	0	0	1	0	1	44
12:00 - 12:15	8	0	2	0	10	24	3	4	0	31	0	0	0	0	0	41
12:15 - 12:30	6	1	0	0	7	23	2	6	0	31	0	1	0	0	1	39
12:30 - 12:45	3	1	0	0	4	25	3	6	0	34	0	0	0	0	0	38
12:45 - 13:00	5	0	2	0	7	26	3	8	0	37	0	0	0	0	0	44
13:00 - 13:15	2	1	1	0	4	30	0	1	0	31	0	0	0	0	0	35
13:15 - 13:30	3	1	0	0	4	24	3	11	0	38	0	0	0	0	0	42
13:30 - 13:45	7	0	1	0	8	17	8	9	0	34	0	0	0	0	0	42
13:45 - 14:00	8	1	2	0	11	24	4	10	0	38	0	0	0	0	0	49
14:00 - 14:15	10	0	1	0	11	22	3	7	0	32	1	0	0	0	1	44
14:15 - 14:30	10	2	0	0	12	30	3	5	0	38	0	0	0	0	0	50
14:30 - 14:45	16	1	1	0	18	22	8	7	1	38	0	0	0	0	0	56
14:45 - 15:00	14	1	0	0	15	29	4	6	0	39	0	0	0	0	0	54
15:00 - 15:15	7	1	1	0	9	24	4	7	0	35	0	0	0	0	0	44
15:15 - 15:30	10	1	1	0	12	31	6	4	1	42	0	0	0	0	0	54
15:30 - 15:45	10	2	0	0	12	28	3	8	0	39	0	0	0	0	0	51
15:45 - 16:00	9	1	1	0	11	43	5	10	0	58	0	0	0	0	0	69
16:00 - 16:15	14	2	0	0	16	40	9	7	0	56	0	0	0	0	0	72
16:15 - 16:30	6	1	0	0	7	39	8	3	0	50	0	0	0	0	0	57
16:30 - 16:45	13	2	0	0	15	33	9	2	0	44	0	0	0	0	0	59
16:45 - 17:00	5	2	0	0	7	42	8	7	1	58	0	0	0	0	0	65
17:00 - 17:15	3	2	0	0	5	44	5	4	1	54	1	0	0	0	1	60
17:15 - 17:30	14	3	0	0	17	46	14	7	0	67	0	0	0	0	0	84
17:30 - 17:45	9	2	0	0	11	42	11	3	0	56	0	0	0	0	0	67
17:45 - 18:00	5	3	0	0	8	53	5	2	2	62	0	0	0	0	0	70
TOTAL	454	58	44	0	556	1509	239	320	10	2078	2	1	1	0	4	2638

TRAFFIC SURVEY

CLIENT: DMA

SITE: Site 1 – Eddie Hagen Drive & Entrance to Assmang Manganese

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	WEST Entrance to Assmang Manganese															TOTAL ALL MOVEMENTS
	LEFT TURN					RIGHT TURN					U TURN					
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	1	1	1	0	3	3	4	0	0	7	0	0	0	0	0	10
06:15 - 06:30	2	4	0	0	6	8	4	0	0	12	0	0	0	0	0	18
06:30 - 06:45	4	3	0	0	7	6	4	1	0	11	0	0	0	0	0	18
06:45 - 07:00	1	0	0	0	1	11	0	0	0	11	0	0	0	0	0	12
07:00 - 07:15	2	1	0	0	3	11	2	1	0	14	0	0	0	0	0	17
07:15 - 07:30	4	0	0	0	4	10	4	0	0	14	0	0	0	0	0	18
07:30 - 07:45	4	0	0	0	4	14	1	0	0	15	0	0	0	0	0	19
07:45 - 08:00	3	0	0	0	3	8	2	0	0	10	0	0	0	0	0	13
08:00 - 08:15	0	0	0	0	0	5	1	1	0	7	0	0	0	0	0	7
08:15 - 08:30	1	0	0	0	1	7	0	4	0	11	0	0	0	0	0	12
08:30 - 08:45	2	0	0	0	2	8	2	3	0	13	0	0	0	0	0	15
08:45 - 09:00	0	0	0	0	0	6	0	3	0	9	0	0	0	0	0	9
09:00 - 09:15	0	0	0	0	0	5	0	2	0	7	0	0	0	0	0	7
09:15 - 09:30	1	0	1	0	2	13	1	0	0	14	0	0	0	0	0	16
09:30 - 09:45	1	0	0	0	1	5	1	0	0	6	0	0	0	0	0	7
09:45 - 10:00	1	0	0	0	1	6	2	1	0	9	0	0	0	0	0	10
10:00 - 10:15	3	0	0	0	3	8	0	1	0	9	1	0	0	0	1	13
10:15 - 10:30	1	0	0	0	1	5	1	3	0	9	0	0	0	0	0	10
10:30 - 10:45	0	0	1	0	1	7	0	2	0	9	0	0	0	0	0	10
10:45 - 11:00	1	0	0	0	1	8	0	0	0	8	0	0	0	0	0	9
11:00 - 11:15	0	0	1	0	1	8	0	1	0	9	0	0	0	0	0	10
11:15 - 11:30	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	5
11:30 - 11:45	0	0	0	0	0	6	0	1	0	7	0	0	0	0	0	7
11:45 - 12:00	0	0	0	0	0	9	0	1	0	10	0	0	0	0	0	10
12:00 - 12:15	1	0	2	0	3	7	0	1	0	8	0	0	0	0	0	11
12:15 - 12:30	1	0	0	0	1	5	0	0	0	5	0	0	0	0	0	6
12:30 - 12:45	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	5
12:45 - 13:00	1	0	0	0	1	3	0	1	0	4	0	0	0	0	0	5
13:00 - 13:15	1	0	0	0	1	7	0	1	0	8	0	0	0	0	0	9
13:15 - 13:30	0	0	0	0	0	3	0	1	0	4	0	0	0	0	0	4
13:30 - 13:45	0	0	0	0	0	11	0	3	0	14	0	0	0	0	0	14
13:45 - 14:00	0	0	3	0	3	9	0	1	0	10	0	0	0	0	0	13
14:00 - 14:15	1	0	0	0	1	10	0	1	0	11	0	0	0	0	0	12
14:15 - 14:30	3	0	0	0	3	14	0	0	0	14	0	0	0	0	0	17
14:30 - 14:45	1	1	1	0	3	9	0	0	0	9	0	0	0	0	0	12
14:45 - 15:00	1	0	2	0	3	12	0	3	0	15	0	0	0	0	0	18
15:00 - 15:15	1	0	0	0	1	15	0	0	0	15	0	0	0	0	0	16
15:15 - 15:30	1	0	2	0	3	24	0	2	0	26	0	0	0	0	0	29
15:30 - 15:45	7	0	0	0	7	15	1	0	0	16	0	0	0	0	0	23
15:45 - 16:00	3	0	1	0	4	15	1	0	0	16	0	0	0	0	0	20
16:00 - 16:15	4	0	0	0	4	33	1	2	0	36	0	0	0	0	0	40
16:15 - 16:30	5	0	1	0	6	13	0	1	0	14	0	0	0	0	0	20
16:30 - 16:45	4	0	0	0	4	33	0	1	0	34	0	0	0	0	0	38
16:45 - 17:00	1	0	0	0	1	28	3	1	0	32	0	0	0	0	0	33
17:00 - 17:15	2	1	0	0	3	7	1	0	0	8	0	0	0	0	0	11
17:15 - 17:30	1	0	0	0	1	2	1	0	0	3	0	0	0	0	0	4
17:30 - 17:45	1	0	0	0	1	5	1	1	0	7	0	0	0	0	0	8
17:45 - 18:00	0	0	0	0	0	5	0	1	0	6	0	0	0	0	0	6
TOTAL	72	11	16	0	99	472	38	46	0	556	1	0	0	0	1	656

TRAFFIC SURVEY

CLIENT: DMA

SITE: 3 – Eddie Hagen Drive & Entrance to Makro DC

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	NORTH Eddie Hagen Drive																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	2	0	0	0	2	48	13	2	1	64	0	0	0	0	0	0	0	0	0	0	66
06:15 - 06:30	0	0	0	0	0	53	18	4	0	75	0	0	0	0	0	0	0	0	0	0	75
06:30 - 06:45	0	0	0	0	0	57	14	2	2	75	0	0	0	0	0	0	0	0	0	0	75
06:45 - 07:00	0	0	0	0	0	45	12	3	0	60	0	0	0	0	0	0	0	0	0	0	60
07:00 - 07:15	0	0	0	0	0	37	13	11	1	62	0	0	0	0	0	0	0	0	0	0	62
07:15 - 07:30	0	0	0	0	0	36	6	9	0	51	0	0	0	0	0	0	0	0	0	0	51
07:30 - 07:45	0	0	0	0	0	24	6	1	0	31	0	0	0	0	0	0	0	0	0	0	31
07:45 - 08:00	0	0	0	0	0	15	2	3	0	20	0	0	0	0	0	0	0	0	0	0	20
08:00 - 08:15	0	1	0	0	1	15	7	6	0	28	0	0	0	0	0	0	0	0	0	0	29
08:15 - 08:30	0	0	0	0	0	17	3	6	0	26	0	0	0	0	0	0	0	0	0	0	26
08:30 - 08:45	2	0	0	0	2	17	9	6	0	32	0	0	0	0	0	0	0	0	0	0	34
08:45 - 09:00	1	0	0	0	1	17	9	6	0	32	0	0	0	0	0	0	0	0	0	0	33
09:00 - 09:15	0	0	0	0	0	18	2	5	0	25	0	0	0	0	0	0	0	0	0	0	25
09:15 - 09:30	0	0	0	0	0	18	11	6	0	35	0	0	0	0	0	0	0	0	0	0	35
09:30 - 09:45	0	0	0	0	0	13	4	5	0	22	0	0	0	0	0	0	0	0	0	0	22
09:45 - 10:00	0	0	0	0	0	21	6	3	0	30	0	0	0	0	0	0	0	0	0	0	30
10:00 - 10:15	0	0	0	0	0	22	4	11	0	37	0	0	0	0	0	0	0	0	0	0	37
10:15 - 10:30	2	0	1	0	3	25	5	9	0	39	0	0	0	0	0	0	0	0	0	0	42
10:30 - 10:45	2	0	0	0	2	31	8	6	0	45	0	0	0	0	0	0	0	0	0	0	47
10:45 - 11:00	0	0	0	0	0	21	4	9	0	34	0	0	0	0	0	0	0	0	0	0	34
11:00 - 11:15	0	0	1	0	1	23	7	10	0	40	0	0	0	0	0	0	0	0	0	0	41
11:15 - 11:30	1	0	0	0	1	34	6	4	0	44	0	0	0	0	0	1	0	0	0	1	46
11:30 - 11:45	0	0	0	0	0	29	2	5	0	36	0	0	0	0	0	0	0	0	0	0	36
11:45 - 12:00	0	0	0	0	0	21	5	6	0	32	0	0	0	0	0	0	0	0	0	0	32
12:00 - 12:15	0	0	0	0	0	30	4	8	0	42	0	0	0	0	0	0	0	0	0	0	42
12:15 - 12:30	0	0	0	0	0	21	5	4	0	30	0	0	0	0	0	0	0	0	0	0	30
12:30 - 12:45	0	0	0	0	0	33	3	2	0	38	1	0	0	0	1	0	0	0	0	0	39
12:45 - 13:00	1	0	0	0	1	21	4	11	0	36	0	0	0	0	0	0	0	0	0	0	37
13:00 - 13:15	1	0	0	0	1	33	6	5	0	44	0	0	0	0	0	0	0	0	0	0	45
13:15 - 13:30	1	0	0	0	1	29	2	8	0	39	0	0	0	0	0	1	0	0	0	1	41
13:30 - 13:45	0	0	0	0	0	30	5	12	0	47	0	0	0	0	0	0	0	0	0	0	47
13:45 - 14:00	2	0	0	0	2	21	5	6	0	32	0	0	0	0	0	0	0	0	0	0	34
14:00 - 14:15	0	0	0	0	0	29	3	9	0	41	0	0	0	0	0	0	0	0	0	0	41
14:15 - 14:30	0	0	0	0	0	31	7	11	0	49	0	0	0	0	0	0	0	0	0	0	49
14:30 - 14:45	1	0	1	0	2	26	6	5	0	37	0	0	0	0	0	0	0	0	0	0	39
14:45 - 15:00	0	0	0	0	0	37	2	11	0	50	0	0	0	0	0	0	0	0	0	0	50
15:00 - 15:15	0	0	0	0	0	34	4	8	0	46	0	0	0	0	0	0	0	0	0	0	46
15:15 - 15:30	0	0	0	0	0	29	7	7	0	43	0	0	0	0	0	0	0	0	0	0	43
15:30 - 15:45	0	0	0	0	0	24	7	4	0	35	0	0	0	0	0	0	0	0	0	0	35
15:45 - 16:00	0	0	0	0	0	40	7	6	0	53	0	0	0	0	0	0	0	0	0	0	53
16:00 - 16:15	3	0	0	0	3	61	6	7	0	74	0	0	0	0	0	0	0	0	0	0	77
16:15 - 16:30	1	0	0	0	1	45	5	5	0	55	0	0	0	0	0	0	0	0	0	0	56
16:30 - 16:45	0	0	0	0	0	80	5	5	0	90	0	0	0	0	0	0	0	0	0	0	90
16:45 - 17:00	0	0	0	0	0	46	8	3	1	58	0	0	0	0	0	0	0	0	0	0	58
17:00 - 17:15	0	0	0	0	0	37	7	2	0	46	0	0	0	0	0	0	0	0	0	0	46
17:15 - 17:30	1	0	0	0	1	38	6	6	0	50	0	0	0	0	0	0	0	0	0	0	51
17:30 - 17:45	1	0	0	0	1	21	5	2	0	28	0	0	0	0	0	0	0	0	0	0	29
17:45 - 18:00	0	2	0	0	2	29	4	3	0	36	0	0	0	0	0	0	0	0	0	0	38
TOTAL	22	3	3	0	28	1482	299	288	5	2074	1	0	0	0	1	2	0	0	0	2	2105

TRAFFIC SURVEY

CLIENT: DMA

SITE: 3 – Eddie Hagen Drive & Entrance to Makro DC

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	EAST Entrance to Makro DC																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
06:15 - 06:30	7	0	0	0	7	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	9
06:30 - 06:45	4	0	0	0	4	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	6
06:45 - 07:00	6	0	0	0	6	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	8
07:00 - 07:15	3	1	0	1	5	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	6
07:15 - 07:30	5	0	0	0	5	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	6
07:30 - 07:45	4	1	0	0	5	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	6
07:45 - 08:00	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
08:00 - 08:15	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
08:15 - 08:30	5	0	4	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
08:30 - 08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 - 09:00	5	0	5	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
09:00 - 09:15	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
09:15 - 09:30	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
09:30 - 09:45	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
09:45 - 10:00	2	0	1	0	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	4
10:00 - 10:15	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
10:15 - 10:30	5	0	0	0	5	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	7
10:30 - 10:45	7	0	2	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
10:45 - 11:00	2	0	2	0	4	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	5
11:00 - 11:15	2	0	1	0	3	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	4
11:15 - 11:30	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
11:30 - 11:45	2	0	3	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
11:45 - 12:00	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
12:00 - 12:15	2	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
12:15 - 12:30	4	0	2	0	6	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	7
12:30 - 12:45	4	0	1	0	5	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	7
12:45 - 13:00	1	0	3	0	4	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	5
13:00 - 13:15	3	0	1	0	4	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	5
13:15 - 13:30	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
13:30 - 13:45	2	0	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	3
13:45 - 14:00	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
14:00 - 14:15	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
14:15 - 14:30	3	0	3	0	6	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	8
14:30 - 14:45	7	0	3	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
14:45 - 15:00	3	0	2	0	5	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	8
15:00 - 15:15	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
15:15 - 15:30	6	0	1	0	7	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	8
15:30 - 15:45	1	0	1	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	3
15:45 - 16:00	4	0	2	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
16:00 - 16:15	2	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
16:15 - 16:30	5	0	1	0	6	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	7
16:30 - 16:45	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
16:45 - 17:00	6	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
17:00 - 17:15	3	1	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
17:15 - 17:30	4	1	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
17:30 - 17:45	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
17:45 - 18:00	3	1	3	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
TOTAL	150	6	55	2	213	0	0	0	0	0	18	4	5	0	27	3	0	0	0	3	243

TRAFFIC SURVEY

CLIENT: DMA

SITE: 3 – Eddie Hagen Drive & Entrance to Makro DC

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	SOUTH Eddie Hagen Drive																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	0	0	0	0	0	19	7	3	0	29	2	0	1	0	3	0	0	1	0	1	33
06:15 - 06:30	0	0	0	0	0	28	11	5	0	44	3	0	0	0	3	1	0	0	0	1	48
06:30 - 06:45	0	0	0	0	0	32	12	0	1	45	4	0	0	0	4	1	0	0	0	1	50
06:45 - 07:00	0	0	0	0	0	36	12	9	1	58	5	2	0	0	7	0	0	1	0	1	66
07:00 - 07:15	0	0	0	0	0	35	9	5	0	49	5	1	0	1	7	0	0	0	0	0	56
07:15 - 07:30	0	0	0	0	0	48	7	3	0	58	2	1	1	0	4	0	0	0	0	0	62
07:30 - 07:45	0	0	0	0	0	54	5	4	1	64	6	2	3	0	11	0	0	0	0	0	75
07:45 - 08:00	0	0	0	0	0	55	5	2	0	62	2	0	1	0	3	0	0	0	0	0	65
08:00 - 08:15	0	0	0	0	0	32	5	12	0	49	2	0	2	0	4	0	0	0	0	0	53
08:15 - 08:30	0	0	0	0	0	22	2	7	0	31	1	0	3	0	4	0	0	0	0	0	35
08:30 - 08:45	0	0	0	0	0	31	4	10	0	45	4	0	2	0	6	0	0	0	0	0	51
08:45 - 09:00	0	0	0	0	0	25	6	5	0	36	3	0	4	0	7	0	0	0	0	0	43
09:00 - 09:15	0	0	0	0	0	18	3	3	0	24	4	0	0	0	4	0	0	0	0	0	28
09:15 - 09:30	0	0	0	0	0	27	2	9	0	38	1	0	3	0	4	0	0	0	0	0	42
09:30 - 09:45	0	0	0	0	0	25	2	5	0	32	3	0	2	0	5	0	0	0	0	0	37
09:45 - 10:00	0	0	0	0	0	32	1	9	0	42	3	0	1	0	4	0	0	0	0	0	46
10:00 - 10:15	0	0	0	0	0	24	2	8	0	34	7	0	3	0	10	0	0	0	0	0	44
10:15 - 10:30	0	0	0	0	0	21	4	6	0	31	4	0	1	0	5	0	0	0	0	0	36
10:30 - 10:45	0	0	0	0	0	18	2	2	0	22	2	0	1	0	3	0	0	0	0	0	25
10:45 - 11:00	0	0	0	0	0	28	2	9	0	39	3	0	0	0	3	0	0	0	0	0	42
11:00 - 11:15	0	0	0	0	0	22	1	5	0	28	0	0	1	0	1	0	0	0	0	0	29
11:15 - 11:30	0	0	0	0	0	18	2	7	0	27	1	0	0	0	1	0	0	0	0	0	28
11:30 - 11:45	0	0	0	0	0	22	3	10	0	35	5	0	3	0	8	0	0	0	0	0	43
11:45 - 12:00	0	0	0	0	0	26	4	6	0	36	3	0	1	0	4	0	0	0	0	0	40
12:00 - 12:15	0	0	0	0	0	24	2	4	0	30	2	0	1	0	3	1	0	0	0	1	34
12:15 - 12:30	1	0	0	0	1	18	3	5	0	26	4	1	1	0	6	0	0	0	0	0	33
12:30 - 12:45	0	0	0	0	0	24	2	5	0	31	1	1	0	0	2	0	0	0	0	0	33
12:45 - 13:00	0	0	0	0	0	25	3	8	0	36	1	0	0	0	1	0	0	0	0	0	37
13:00 - 13:15	0	0	0	0	0	28	0	2	0	30	1	0	0	0	1	0	0	0	0	0	31
13:15 - 13:30	0	0	0	0	0	22	2	10	0	34	2	0	0	0	2	0	0	0	0	0	36
13:30 - 13:45	0	0	0	0	0	18	8	8	0	34	1	0	1	0	2	0	0	0	0	0	36
13:45 - 14:00	0	0	0	0	0	19	5	8	0	32	3	0	3	0	6	0	0	0	0	0	38
14:00 - 14:15	0	0	0	0	0	20	3	7	0	30	5	0	2	0	7	0	0	0	0	0	37
14:15 - 14:30	0	0	0	0	0	34	4	4	0	42	1	0	1	0	2	0	0	0	0	0	44
14:30 - 14:45	0	0	0	0	0	20	9	7	0	36	1	0	0	0	1	1	0	0	0	1	38
14:45 - 15:00	0	0	0	0	0	28	4	8	0	40	2	1	1	0	4	0	0	0	0	0	44
15:00 - 15:15	0	0	0	0	0	21	4	7	1	33	1	0	1	0	2	0	0	0	0	0	35
15:15 - 15:30	0	0	0	0	0	27	6	4	1	38	6	0	2	0	8	1	0	0	0	1	47
15:30 - 15:45	0	0	0	0	0	34	2	6	0	42	2	0	2	0	4	0	0	0	0	0	46
15:45 - 16:00	1	0	0	0	1	35	6	8	0	49	3	0	2	0	5	0	0	0	0	0	55
16:00 - 16:15	0	0	0	0	0	45	8	6	0	59	4	0	1	0	5	0	0	0	0	0	64
16:15 - 16:30	0	0	0	0	0	34	9	3	0	46	4	0	1	0	5	2	0	0	0	2	53
16:30 - 16:45	1	0	0	0	1	38	7	2	0	47	1	1	0	0	2	0	0	0	0	0	50
16:45 - 17:00	0	0	0	0	0	46	6	7	0	59	2	1	0	0	3	0	0	0	0	0	62
17:00 - 17:15	0	0	0	0	0	40	7	3	2	52	5	2	2	0	9	0	0	0	0	0	61
17:15 - 17:30	0	0	0	0	0	37	14	4	0	55	6	1	2	0	9	1	0	0	0	1	65
17:30 - 17:45	0	0	0	0	0	36	9	3	0	48	7	0	0	0	7	1	0	0	0	1	56
17:45 - 18:00	0	0	0	0	0	49	6	1	1	57	3	0	0	1	4	0	1	0	0	1	62
TOTAL	3	0	0	0	3	1420	242	274	8	1944	143	14	56	2	215	9	1	2	0	12	2174

TRAFFIC SURVEY

CLIENT: DMA

SITE: 3 – Eddie Hagen Drive & Entrance to Makro DC

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	WEST Entrance to Yard																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 - 06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 - 06:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 - 07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00 - 07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 - 07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 - 07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 - 08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 - 08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 - 08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 - 08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 - 09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 - 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 - 09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 - 09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45 - 10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 - 10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 - 10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 - 10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 - 11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 - 11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 - 11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 - 11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 - 12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 - 12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 - 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 - 12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 - 13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00 - 13:15	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
13:15 - 13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30 - 13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45 - 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00 - 14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15 - 14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30 - 14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45 - 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00 - 15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15 - 15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30 - 15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45 - 16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00 - 16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15 - 16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30 - 16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45 - 17:00	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2

TRAFFIC SURVEY

CLIENT: DMA

SITE: 2 – Eddie Hagen Drive & Drakensberg Street

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	NORTH Abattoir Street																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	0	3	0	0	3	3	4	0	0	7	0	1	0	0	1	0	0	0	0	0	11
06:15 - 06:30	0	1	0	0	1	7	8	0	0	15	1	2	0	0	3	0	0	0	0	0	19
06:30 - 06:45	0	1	1	0	2	2	6	0	1	9	0	1	0	0	1	0	0	0	0	0	12
06:45 - 07:00	1	0	0	0	1	2	3	0	0	5	0	6	0	0	6	0	0	0	0	0	12
07:00 - 07:15	0	0	0	0	0	3	4	0	0	7	1	1	0	0	2	0	0	0	0	0	9
07:15 - 07:30	0	0	0	0	0	4	2	0	0	6	2	1	0	0	3	0	0	0	0	0	9
07:30 - 07:45	0	0	0	0	0	3	2	0	0	5	0	0	0	0	0	0	0	0	0	0	5
07:45 - 08:00	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:00 - 08:15	0	0	1	0	1	0	1	0	0	1	3	3	0	0	6	0	0	0	0	0	8
08:15 - 08:30	1	0	0	0	1	1	2	0	0	3	1	1	0	0	2	0	0	0	0	0	6
08:30 - 08:45	0	0	0	0	0	1	4	0	0	5	2	1	0	0	3	0	0	0	0	0	8
08:45 - 09:00	0	0	0	0	0	2	3	0	0	5	0	1	1	0	2	0	0	0	0	0	7
09:00 - 09:15	0	1	0	0	1	1	0	1	0	2	0	1	0	0	1	0	0	0	0	0	4
09:15 - 09:30	1	1	0	0	2	4	1	1	0	6	1	0	0	0	1	0	0	0	0	0	9
09:30 - 09:45	0	0	0	0	0	1	0	2	0	3	2	1	0	0	3	0	0	0	0	0	6
09:45 - 10:00	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
10:00 - 10:15	0	0	0	0	0	2	0	1	0	3	0	0	0	0	0	0	0	0	0	0	3
10:15 - 10:30	0	1	1	0	2	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	5
10:30 - 10:45	0	1	0	0	1	7	0	1	0	8	0	1	1	0	2	0	0	0	0	0	11
10:45 - 11:00	1	1	0	0	2	3	0	2	0	5	1	1	0	0	2	0	0	0	0	0	9
11:00 - 11:15	0	0	0	0	0	2	3	1	0	6	1	0	0	0	1	0	0	0	0	0	7
11:15 - 11:30	1	0	0	0	1	6	2	0	0	8	0	1	0	0	1	0	0	0	0	0	10
11:30 - 11:45	0	0	1	0	1	4	1	0	0	5	0	0	0	0	0	0	0	0	0	0	6
11:45 - 12:00	0	0	0	0	0	1	1	2	0	4	1	0	0	0	1	0	0	0	0	0	5
12:00 - 12:15	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	0	0	0	0	0	3
12:15 - 12:30	0	0	0	0	0	1	1	0	0	2	1	0	0	0	1	0	0	0	0	0	3
12:30 - 12:45	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3
12:45 - 13:00	0	0	0	0	0	3	0	1	0	4	0	1	0	0	1	0	0	0	0	0	5
13:00 - 13:15	0	0	0	0	0	4	0	0	0	4	1	0	0	0	1	0	0	0	0	0	5
13:15 - 13:30	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
13:30 - 13:45	0	0	1	0	1	2	1	1	0	4	3	2	0	0	5	0	0	0	0	0	10
13:45 - 14:00	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	1	0	0	0	1	3
14:00 - 14:15	0	1	0	0	1	1	0	2	0	3	1	0	0	0	1	0	0	0	0	0	5
14:15 - 14:30	0	0	0	0	0	2	0	1	0	3	0	0	0	0	0	0	0	0	0	0	3
14:30 - 14:45	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
14:45 - 15:00	1	0	0	0	1	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	3
15:00 - 15:15	0	0	0	0	0	6	1	0	0	7	3	2	0	0	5	0	0	0	0	0	12
15:15 - 15:30	1	0	0	0	1	2	2	0	0	4	2	0	0	0	2	0	0	0	0	0	7
15:30 - 15:45	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	0	0	0	0	0	3
15:45 - 16:00	0	0	0	0	0	6	5	1	0	12	0	0	0	0	0	0	0	0	0	0	12
16:00 - 16:15	1	0	0	0	1	8	3	1	0	12	0	1	1	0	2	0	0	0	0	0	15
16:15 - 16:30	0	0	0	0	0	13	2	0	0	15	2	1	0	0	3	0	0	0	0	0	18
16:30 - 16:45	0	0	0	0	0	39	2	0	0	41	11	0	0	0	11	0	0	0	0	0	52
16:45 - 17:00	0	0	0	0	0	14	0	0	0	14	4	2	0	0	6	0	0	0	0	0	20
17:00 - 17:15	0	0	0	0	0	8	2	0	0	10	2	1	0	1	4	0	0	0	0	0	14
17:15 - 17:30	0	0	0	0	0	5	3	0	0	8	1	0	0	0	1	0	0	0	0	0	9
17:30 - 17:45	0	0	0	0	0	3	3	0	0	6	0	1	1	0	2	0	1	0	0	1	9
17:45 - 18:00	0	1	0	0	1	3	2	0	0	5	1	0	0	0	1	0	0	0	0	0	7
TOTAL	9	12	5	0	26	190	81	18	1	290	50	35	4	1	90	1	1	0	0	2	408

TRAFFIC SURVEY

CLIENT: DMA

SITE: 2 – Eddie Hagen Drive & Drakensberg Street

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	EAST Drakensberg Street																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	2	2	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
06:15 - 06:30	5	2	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
06:30 - 06:45	3	2	0	0	5	0	0	1	0	1	1	1	0	0	2	0	0	0	0	0	8
06:45 - 07:00	1	2	0	0	3	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4
07:00 - 07:15	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:15 - 07:30	2	2	0	0	4	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	5
07:30 - 07:45	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:45 - 08:00	2	1	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
08:00 - 08:15	2	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
08:15 - 08:30	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
08:30 - 08:45	1	0	1	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3
08:45 - 09:00	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
09:00 - 09:15	0	1	4	0	5	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	6
09:15 - 09:30	3	1	0	0	4	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	6
09:30 - 09:45	1	0	1	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
09:45 - 10:00	1	0	2	0	3	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4
10:00 - 10:15	4	0	4	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
10:15 - 10:30	4	1	5	0	10	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	12
10:30 - 10:45	4	1	1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
10:45 - 11:00	1	2	2	0	5	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	6
11:00 - 11:15	3	0	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
11:15 - 11:30	2	1	1	0	4	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	5
11:30 - 11:45	6	0	2	0	8	0	2	0	0	2	1	0	0	0	1	0	0	0	0	0	11
11:45 - 12:00	2	1	2	0	5	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	6
12:00 - 12:15	4	0	2	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
12:15 - 12:30	3	1	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
12:30 - 12:45	2	0	2	0	4	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	6
12:45 - 13:00	5	0	2	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
13:00 - 13:15	1	0	3	0	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5
13:15 - 13:30	2	0	3	0	5	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	7
13:30 - 13:45	4	0	3	0	7	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	8
13:45 - 14:00	1	0	3	0	4	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	5
14:00 - 14:15	4	0	4	0	8	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	9
14:15 - 14:30	3	2	2	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
14:30 - 14:45	1	0	3	0	4	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5
14:45 - 15:00	5	0	4	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
15:00 - 15:15	3	0	1	0	4	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	7
15:15 - 15:30	3	2	2	0	7	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	8
15:30 - 15:45	2	1	5	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
15:45 - 16:00	7	0	1	0	8	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	10
16:00 - 16:15	23	0	2	0	25	2	3	0	0	5	2	0	0	0	2	0	0	0	0	0	32
16:15 - 16:30	10	1	0	0	11	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	12
16:30 - 16:45	4	0	1	0	5	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	6
16:45 - 17:00	3	0	1	0	4	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	8
17:00 - 17:15	4	0	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
17:15 - 17:30	3	0	0	0	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4
17:30 - 17:45	2	0	2	0	4	4	0	0	0	4	1	0	0	0	1	0	0	0	0	0	9
17:45 - 18:00	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
TOTAL	150	26	81	0	257	14	21	2	1	38	9	5	4	0	18	0	0	0	0	0	313

TRAFFIC SURVEY

CLIENT: DMA

SITE: 2 – Eddie Hagen Drive & Drakensberg Street

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	SOUTH Eddie Hagen Drive																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	5	2	0	0	7	3	3	0	0	6	2	0	0	0	2	0	0	0	0	0	15
06:15 - 06:30	12	6	0	0	18	7	5	0	0	12	10	0	1	0	11	1	0	0	0	1	42
06:30 - 06:45	8	3	0	0	11	7	8	0	0	15	14	1	0	0	15	0	1	0	0	1	42
06:45 - 07:00	14	3	2	0	19	5	6	0	0	11	7	1	1	0	9	1	0	1	0	2	41
07:00 - 07:15	15	7	1	1	24	11	3	1	0	15	4	0	2	0	6	0	0	0	0	0	45
07:15 - 07:30	29	4	0	0	33	10	1	0	0	11	3	1	1	0	5	0	0	0	0	0	49
07:30 - 07:45	28	7	1	0	36	11	1	0	0	12	3	0	1	0	4	0	0	0	0	0	52
07:45 - 08:00	30	5	0	0	35	19	0	0	0	19	4	0	0	0	4	0	0	0	0	0	58
08:00 - 08:15	18	2	3	0	23	6	3	3	0	12	2	0	1	0	3	0	0	0	0	0	38
08:15 - 08:30	10	3	1	0	14	4	0	3	0	7	3	0	1	0	4	0	0	0	0	0	25
08:30 - 08:45	13	2	4	0	19	9	1	1	0	11	2	1	3	0	6	0	0	0	0	0	36
08:45 - 09:00	18	4	0	0	22	1	2	1	0	4	4	0	2	0	6	1	0	0	0	1	33
09:00 - 09:15	13	3	0	0	16	4	0	0	0	4	1	0	0	0	1	0	0	0	0	0	21
09:15 - 09:30	20	0	3	0	23	0	1	0	0	1	4	2	4	0	10	0	0	0	0	0	34
09:30 - 09:45	9	1	0	0	10	4	1	0	0	5	3	0	2	0	5	0	0	0	0	0	20
09:45 - 10:00	20	3	2	0	25	1	0	1	0	2	4	0	3	0	7	0	0	0	0	0	34
10:00 - 10:15	22	1	1	0	24	2	0	1	0	3	2	0	1	0	3	0	0	0	0	0	30
10:15 - 10:30	12	4	4	0	20	3	0	0	0	3	5	0	2	0	7	0	0	0	0	0	30
10:30 - 10:45	8	1	1	0	10	2	1	0	0	3	1	0	2	0	3	0	0	0	0	0	16
10:45 - 11:00	21	1	3	0	25	5	0	0	0	5	3	1	3	0	7	1	0	0	0	1	38
11:00 - 11:15	11	2	2	0	15	2	0	1	0	3	3	0	0	0	3	0	0	0	0	0	21
11:15 - 11:30	14	1	2	0	17	4	1	1	0	6	3	0	1	0	4	0	0	0	0	0	27
11:30 - 11:45	12	1	3	0	16	2	0	2	0	4	0	2	2	0	4	1	0	0	0	1	25
11:45 - 12:00	11	4	0	0	15	4	0	0	0	4	2	0	2	0	4	0	0	0	0	0	23
12:00 - 12:15	16	2	1	0	19	7	0	0	0	7	3	0	3	0	6	1	0	0	0	1	33
12:15 - 12:30	10	1	1	0	12	0	0	1	0	1	0	1	1	0	2	0	0	0	0	0	15
12:30 - 12:45	13	4	3	0	20	2	0	0	0	2	3	0	2	0	5	0	0	0	0	0	27
12:45 - 13:00	17	2	1	0	20	4	0	2	0	6	4	0	2	0	6	0	0	0	0	0	32
13:00 - 13:15	19	1	0	0	20	0	0	0	0	0	4	0	3	0	7	0	0	0	0	0	27
13:15 - 13:30	17	1	1	0	19	3	0	1	0	4	3	1	4	0	8	0	0	0	0	0	31
13:30 - 13:45	10	6	4	0	20	2	2	0	0	4	3	0	4	0	7	0	0	0	0	0	31
13:45 - 14:00	13	2	3	0	18	1	0	0	0	1	1	1	2	0	4	0	0	0	0	0	23
14:00 - 14:15	15	5	0	0	20	1	0	1	0	2	4	0	1	0	5	0	0	0	0	0	27
14:15 - 14:30	24	4	0	0	28	4	0	0	0	4	2	0	1	0	3	0	0	0	0	0	35
14:30 - 14:45	17	8	1	0	26	0	1	0	0	1	1	0	2	0	3	0	0	0	0	0	30
14:45 - 15:00	21	4	0	0	25	6	0	0	0	6	2	1	3	0	6	0	0	0	0	0	37
15:00 - 15:15	14	2	2	0	18	1	1	0	0	2	3	2	2	0	7	0	0	0	0	0	27
15:15 - 15:30	27	4	0	1	32	1	0	0	0	1	1	2	0	0	3	0	0	0	0	0	36
15:30 - 15:45	22	4	2	0	28	4	0	0	0	4	3	0	0	0	3	1	0	0	0	1	36
15:45 - 16:00	30	6	3	0	39	1	0	1	0	2	0	0	1	0	1	0	0	0	0	0	42
16:00 - 16:15	24	1	4	0	29	4	1	1	0	6	6	4	3	0	13	0	0	0	0	0	48
16:15 - 16:30	36	10	1	0	47	3	1	0	0	4	1	1	2	0	4	0	0	0	0	0	55
16:30 - 16:45	32	3	0	0	35	1	2	1	0	4	2	2	0	0	4	0	0	0	0	0	43
16:45 - 17:00	47	2	4	0	53	2	1	0	0	3	0	3	1	0	4	0	0	0	0	0	60
17:00 - 17:15	36	5	0	0	41	2	1	0	0	3	1	2	0	0	3	0	0	0	0	0	47
17:15 - 17:30	32	11	1	0	44	0	1	0	0	1	3	0	1	0	4	0	0	0	0	0	49
17:30 - 17:45	33	7	2	0	42	2	2	0	0	4	1	0	1	0	2	0	0	0	0	0	48
17:45 - 18:00	34	5	0	0	39	2	1	0	0	3	1	0	1	0	2	0	0	0	0	0	44
TOTAL	932	170	67	2	1171	179	51	23	0	253	141	29	75	0	245	7	1	1	0	9	1678

TRAFFIC SURVEY

CLIENT: DMA

SITE: 2 – Eddie Hagen Drive & Drakensberg Street

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	WEST MR423																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	3	3	0	0	6	0	0	0	0	0	37	7	1	1	46	0	0	0	0	0	52
06:15 - 06:30	3	7	0	0	10	5	0	0	0	5	36	9	2	0	47	0	0	0	0	0	62
06:30 - 06:45	2	1	0	0	3	0	1	0	0	1	47	3	2	0	52	0	0	0	0	0	56
06:45 - 07:00	2	1	0	0	3	2	2	0	0	4	38	8	1	0	47	0	0	0	0	0	54
07:00 - 07:15	1	3	0	0	4	0	0	0	0	0	36	9	1	1	47	1	0	0	0	1	52
07:15 - 07:30	3	1	0	0	4	1	2	0	0	3	25	2	2	0	29	0	0	0	0	0	36
07:30 - 07:45	4	0	0	0	4	0	0	0	0	0	20	3	1	0	24	0	0	0	0	0	28
07:45 - 08:00	5	1	0	0	6	1	1	0	0	2	13	1	2	0	16	0	0	0	0	0	24
08:00 - 08:15	2	2	0	0	4	0	0	0	0	0	14	7	1	0	22	0	0	0	0	0	26
08:15 - 08:30	1	1	0	0	2	0	0	0	0	0	15	2	1	0	18	0	0	0	0	0	20
08:30 - 08:45	0	3	0	0	3	0	0	0	0	0	14	3	0	0	17	0	0	0	0	0	20
08:45 - 09:00	1	3	0	0	4	0	0	0	0	0	11	6	1	0	18	0	0	0	0	0	22
09:00 - 09:15	0	2	0	0	2	0	0	0	0	0	13	2	0	0	15	0	0	0	0	0	17
09:15 - 09:30	0	0	0	0	0	0	0	0	0	0	14	9	3	0	26	0	0	0	0	0	26
09:30 - 09:45	0	0	0	0	0	2	0	0	0	2	12	4	1	0	17	0	0	0	0	0	19
09:45 - 10:00	1	1	0	0	2	0	0	0	0	0	16	5	0	0	21	0	0	0	0	0	23
10:00 - 10:15	1	0	0	0	1	1	0	1	0	2	15	5	3	0	23	0	0	0	0	0	26
10:15 - 10:30	0	1	1	0	2	1	0	0	0	1	20	3	3	0	26	0	0	0	0	0	29
10:30 - 10:45	0	1	0	0	1	0	0	0	0	0	20	6	1	0	27	0	0	0	0	0	28
10:45 - 11:00	2	1	0	0	3	0	1	0	0	1	16	3	1	0	20	0	0	0	0	0	24
11:00 - 11:15	1	3	0	0	4	0	0	0	0	0	12	3	1	0	16	0	0	0	0	0	20
11:15 - 11:30	0	2	0	0	2	0	1	0	0	1	22	3	2	0	27	0	0	0	0	0	30
11:30 - 11:45	0	1	0	0	1	1	0	0	0	1	16	2	2	0	20	0	0	0	0	0	22
11:45 - 12:00	0	1	0	0	1	0	0	0	0	0	20	3	3	0	26	0	0	0	0	0	27
12:00 - 12:15	0	0	0	0	0	1	1	0	0	2	18	3	2	0	23	0	0	0	0	0	25
12:15 - 12:30	0	0	0	0	0	0	1	1	0	2	17	3	1	0	21	0	0	0	0	0	23
12:30 - 12:45	1	0	0	0	1	1	0	0	0	1	22	4	0	0	26	0	0	0	0	0	28
12:45 - 13:00	0	0	0	0	0	0	0	0	0	0	12	3	2	0	17	0	0	0	0	0	17
13:00 - 13:15	0	0	0	0	0	0	0	0	0	0	31	6	2	0	39	0	0	0	0	0	39
13:15 - 13:30	1	2	1	0	4	0	0	0	0	0	22	2	2	0	26	0	0	0	0	0	30
13:30 - 13:45	1	0	0	0	1	1	0	0	0	1	17	5	5	0	27	0	0	0	0	0	29
13:45 - 14:00	0	1	0	0	1	2	0	0	0	2	17	3	0	0	20	0	0	0	0	0	23
14:00 - 14:15	0	1	0	0	1	0	0	0	0	0	20	3	1	0	24	0	0	0	0	0	25
14:15 - 14:30	0	0	0	0	0	0	1	0	0	1	28	5	4	0	37	0	0	0	0	0	38
14:30 - 14:45	0	0	0	0	0	0	0	0	0	0	13	6	1	0	20	0	0	0	0	0	20
14:45 - 15:00	1	1	0	0	2	0	0	0	0	0	32	3	3	0	38	0	0	0	0	0	40
15:00 - 15:15	0	1	0	0	1	0	0	0	0	0	25	1	1	0	27	0	0	0	0	0	28
15:15 - 15:30	0	2	0	0	2	0	2	0	0	2	21	4	2	0	27	0	0	0	0	0	31
15:30 - 15:45	0	1	0	0	1	0	1	0	0	1	22	2	0	1	25	0	0	0	0	0	27
15:45 - 16:00	0	5	0	0	5	0	0	0	0	0	24	3	0	0	27	0	0	0	0	0	32
16:00 - 16:15	0	2	0	0	2	0	0	0	0	0	24	3	0	0	27	0	0	0	0	0	29
16:15 - 16:30	0	3	0	0	3	0	1	0	0	1	15	4	3	0	22	0	0	0	0	0	26
16:30 - 16:45	1	1	0	0	2	0	0	0	0	0	15	3	2	0	20	0	0	0	0	0	22
16:45 - 17:00	0	0	0	0	0	0	0	0	0	0	23	8	1	0	32	0	0	0	0	0	32
17:00 - 17:15	0	3	0	0	3	1	0	0	0	1	18	4	0	0	22	0	0	0	0	0	26
17:15 - 17:30	0	2	0	0	2	0	0	0	0	0	17	3	1	0	21	0	0	0	0	0	23
17:30 - 17:45	0	2	0	0	2	0	0	0	0	0	15	2	1	0	18	0	0	0	0	0	20
17:45 - 18:00	1	0	0	0	1	0	0	0	0	0	20	4	0	0	24	0	0	0	0	0	25
TOTAL	38	66	2	0	106	20	15	2	0	37	990	195	69	3	1257	1	0	0	0	1	1401

TRAFFIC SURVEY

CLIENT: DMA

SITE: 6 – R103 & Thousand Hills Street

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	NORTH R103																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	12	1	0	0	13	0	0	0	0	0	23	2	0	0	25	0	0	0	0	0	38
06:15 - 06:30	8	2	0	1	11	0	0	0	0	0	35	11	2	0	48	0	0	0	0	0	59
06:30 - 06:45	10	5	0	0	15	1	0	0	0	1	42	5	2	0	49	0	0	0	0	0	65
06:45 - 07:00	12	4	0	0	16	0	0	0	0	0	34	3	1	0	38	0	0	0	0	0	54
07:00 - 07:15	10	2	0	0	12	0	0	0	0	0	31	6	2	0	39	0	0	0	0	0	51
07:15 - 07:30	4	1	0	0	5	0	0	0	0	0	27	8	1	0	36	0	0	0	0	0	41
07:30 - 07:45	9	4	0	0	13	0	0	0	0	0	35	3	0	0	38	0	0	0	0	0	51
07:45 - 08:00	8	3	0	0	11	1	0	0	0	1	22	2	0	1	25	0	0	0	0	0	37
08:00 - 08:15	2	3	0	0	5	0	0	0	0	0	12	3	0	0	15	0	0	0	0	0	20
08:15 - 08:30	3	2	1	0	6	1	0	0	0	1	13	1	2	0	16	0	0	0	0	0	23
08:30 - 08:45	5	1	0	0	6	0	0	0	0	0	9	3	2	0	14	0	0	0	0	0	20
08:45 - 09:00	6	2	0	0	8	1	0	0	0	1	14	1	1	0	16	0	0	0	0	0	25
09:00 - 09:15	4	1	0	0	5	0	0	0	0	0	17	0	2	0	19	0	0	0	0	0	24
09:15 - 09:30	4	2	1	0	7	1	0	0	0	1	17	2	2	0	21	0	0	0	0	0	29
09:30 - 09:45	3	1	0	0	4	0	0	0	0	0	17	1	1	0	19	0	0	0	0	0	23
09:45 - 10:00	4	1	0	0	5	1	0	0	0	1	12	2	1	0	15	0	0	0	0	0	21
10:00 - 10:15	2	2	0	0	4	1	0	0	0	1	13	0	1	0	14	0	0	0	0	0	19
10:15 - 10:30	3	1	0	0	4	0	0	0	0	0	22	2	1	0	25	0	0	0	0	0	29
10:30 - 10:45	3	3	0	0	6	0	0	0	0	0	12	3	3	0	18	0	0	0	0	0	24
10:45 - 11:00	2	0	0	0	2	0	0	0	0	0	13	2	2	0	17	0	0	0	0	0	19
11:00 - 11:15	4	2	1	0	7	1	0	0	0	1	15	3	0	0	18	0	0	0	0	0	26
11:15 - 11:30	5	1	0	0	6	0	0	0	0	0	15	1	1	0	17	0	0	0	0	0	23
11:30 - 11:45	8	1	0	0	9	0	0	0	0	0	16	2	2	0	20	0	0	0	0	0	29
11:45 - 12:00	6	2	1	0	9	2	0	0	0	2	14	0	1	0	15	0	0	0	0	0	26
12:00 - 12:15	6	0	0	0	6	0	0	0	0	0	15	0	0	0	15	0	0	0	0	0	21
12:15 - 12:30	3	2	1	0	6	0	0	0	0	0	22	3	3	0	28	0	0	0	0	0	34
12:30 - 12:45	3	1	0	0	4	2	0	0	0	2	9	2	1	0	12	0	0	0	0	0	18
12:45 - 13:00	7	1	0	0	8	0	0	0	0	0	11	1	2	0	14	0	0	0	0	0	22
13:00 - 13:15	3	0	1	0	4	1	0	0	0	1	9	2	2	0	13	0	0	0	0	0	18
13:15 - 13:30	3	1	0	0	4	3	0	0	0	3	26	2	1	0	29	0	0	0	0	0	36
13:30 - 13:45	3	1	0	1	5	2	0	0	0	2	15	1	0	0	16	0	0	0	0	0	23
13:45 - 14:00	10	0	1	0	11	0	0	0	0	0	16	2	0	0	18	0	0	0	0	0	29
14:00 - 14:15	18	1	0	0	19	1	0	0	0	1	25	1	0	0	26	1	0	0	0	1	47
14:15 - 14:30	4	0	0	0	4	1	0	0	0	1	21	1	1	0	23	0	0	0	0	0	28
14:30 - 14:45	11	2	1	0	14	0	0	0	0	0	12	0	1	0	13	0	0	0	0	0	27
14:45 - 15:00	6	1	0	0	7	1	0	0	0	1	26	2	2	0	30	0	0	0	0	0	38
15:00 - 15:15	5	2	0	0	7	1	0	0	0	1	22	3	1	0	26	0	0	0	0	0	34
15:15 - 15:30	1	0	0	0	1	0	0	0	0	0	21	1	1	0	23	0	0	0	0	0	24
15:30 - 15:45	2	0	1	0	3	0	0	0	0	0	17	2	1	0	20	0	0	0	0	0	23
15:45 - 16:00	8	2	0	0	10	1	0	0	0	1	17	2	5	0	24	0	0	0	0	0	35
16:00 - 16:15	17	3	0	0	20	1	0	0	0	1	23	1	0	0	24	0	0	0	0	0	45
16:15 - 16:30	10	0	1	0	11	0	0	0	0	0	8	4	0	0	12	0	0	0	0	0	23
16:30 - 16:45	3	3	0	1	7	0	0	0	0	0	30	4	1	0	35	0	0	0	0	0	42
16:45 - 17:00	6	2	1	0	9	1	0	0	0	1	21	4	3	0	28	0	0	0	0	0	38
17:00 - 17:15	5	4	0	0	9	0	0	0	0	0	15	1	0	0	16	0	0	0	0	0	25
17:15 - 17:30	5	2	0	0	7	0	0	0	0	0	14	4	0	0	18	0	0	0	0	0	25
17:30 - 17:45	7	2	0	1	10	0	0	0	0	0	17	4	1	0	22	0	0	0	0	0	32
17:45 - 18:00	6	2	0	1	9	0	0	0	0	0	13	2	0	0	15	0	0	0	0	0	24
TOTAL	289	79	11	5	384	25	0	0	0	25	905	115	56	1	1077	1	0	0	0	1	1487

TRAFFIC SURVEY

CLIENT: DMA

SITE: 6 – R103 & Thousand Hills Street

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	EAST Thousand Hills Street																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	0	0	0	0	0	28	1	7	1	37	4	2	0	0	6	0	0	0	0	0	43
06:15 - 06:30	0	0	0	0	0	25	3	6	0	34	7	3	0	0	10	0	0	0	0	0	44
06:30 - 06:45	0	0	0	0	0	68	3	7	0	78	6	4	0	0	10	0	0	0	0	0	88
06:45 - 07:00	0	0	0	0	0	67	3	8	0	78	12	2	0	0	14	0	0	0	0	0	92
07:00 - 07:15	0	0	0	0	0	55	4	6	1	66	10	7	0	0	17	0	0	0	0	0	83
07:15 - 07:30	0	0	0	0	0	57	3	11	0	71	14	3	0	1	18	0	0	0	0	0	89
07:30 - 07:45	0	0	0	0	0	69	1	12	1	83	5	1	0	0	6	0	0	0	0	0	89
07:45 - 08:00	1	0	0	0	1	51	0	4	0	55	10	1	0	0	11	0	0	0	0	0	67
08:00 - 08:15	0	0	0	0	0	48	1	13	0	62	7	3	1	0	11	0	0	0	0	0	73
08:15 - 08:30	0	0	0	0	0	41	2	6	0	49	3	3	0	0	6	0	0	0	0	0	55
08:30 - 08:45	0	0	0	0	0	31	0	6	0	37	5	0	0	0	5	0	0	0	0	0	42
08:45 - 09:00	2	0	0	0	2	32	0	9	0	41	5	1	1	0	7	0	0	0	0	0	50
09:00 - 09:15	6	0	0	0	6	24	0	9	0	33	3	2	1	0	6	0	0	0	0	0	45
09:15 - 09:30	2	0	0	0	2	21	1	6	0	28	3	0	0	0	3	0	0	0	0	0	33
09:30 - 09:45	1	0	0	0	1	28	1	8	0	37	4	0	0	0	4	0	0	1	0	1	43
09:45 - 10:00	0	0	0	0	0	33	2	13	0	48	5	0	0	0	5	0	0	0	0	0	53
10:00 - 10:15	1	0	0	0	1	23	0	9	0	32	3	0	1	0	4	0	0	1	0	1	38
10:15 - 10:30	2	0	0	0	2	12	0	13	0	25	3	0	0	0	3	0	0	0	0	0	30
10:30 - 10:45	0	0	0	0	0	27	0	12	0	39	4	0	0	0	4	0	0	0	0	0	43
10:45 - 11:00	0	0	0	0	0	26	2	11	0	39	1	0	0	0	1	0	0	0	0	0	40
11:00 - 11:15	2	0	0	0	2	17	0	12	0	29	5	1	0	0	6	0	0	0	0	0	37
11:15 - 11:30	0	0	0	0	0	17	1	11	0	29	4	2	0	0	6	0	0	0	0	0	35
11:30 - 11:45	2	0	0	0	2	15	0	15	0	30	8	1	1	0	10	0	0	0	0	0	42
11:45 - 12:00	0	0	0	0	0	19	1	17	0	37	6	0	0	0	6	0	0	0	0	0	43
12:00 - 12:15	0	0	0	0	0	23	0	15	0	38	3	1	0	0	4	0	0	0	0	0	42
12:15 - 12:30	3	0	0	0	3	20	2	10	0	32	4	0	1	0	5	0	0	0	0	0	40
12:30 - 12:45	4	0	0	0	4	13	1	8	0	22	3	1	0	0	4	0	0	1	0	1	31
12:45 - 13:00	1	0	0	0	1	20	1	12	0	33	5	2	1	0	8	0	0	0	0	0	42
13:00 - 13:15	0	0	0	0	0	19	1	14	0	34	7	1	2	0	10	0	0	0	0	0	44
13:15 - 13:30	1	0	0	0	1	22	1	10	0	33	7	1	0	0	8	0	0	0	0	0	42
13:30 - 13:45	0	0	0	0	0	20	1	9	0	30	6	2	0	0	8	0	0	0	0	0	38
13:45 - 14:00	1	0	0	0	1	20	3	6	0	29	6	1	0	0	7	0	0	0	0	0	37
14:00 - 14:15	0	0	0	0	0	21	2	18	0	41	3	2	0	0	5	0	0	0	0	0	46
14:15 - 14:30	2	0	0	0	2	23	1	14	0	38	5	0	0	0	5	0	0	0	0	0	45
14:30 - 14:45	1	0	0	0	1	23	1	14	1	39	8	0	1	0	9	0	0	0	0	0	49
14:45 - 15:00	0	0	0	0	0	30	1	6	0	37	6	1	0	0	7	0	0	0	0	0	44
15:00 - 15:15	0	0	0	0	0	31	2	14	0	47	10	2	0	0	12	0	0	0	0	0	59
15:15 - 15:30	0	0	0	0	0	18	2	14	1	35	12	2	0	0	14	0	0	0	0	0	49
15:30 - 15:45	2	0	0	0	2	18	1	10	0	29	12	0	1	0	13	0	0	0	0	0	44
15:45 - 16:00	2	0	0	0	2	19	3	7	0	29	11	2	0	0	13	0	0	0	0	0	44
16:00 - 16:15	1	0	0	0	1	22	5	12	0	39	11	2	1	0	14	0	0	0	0	0	54
16:15 - 16:30	3	0	0	0	3	17	1	11	0	29	12	4	0	0	16	0	0	0	0	0	48
16:30 - 16:45	2	0	0	0	2	28	2	12	0	42	7	3	0	0	10	0	0	0	0	0	54
16:45 - 17:00	2	0	0	0	2	25	5	10	1	41	13	6	0	0	19	0	0	1	0	1	63
17:00 - 17:15	1	0	0	0	1	22	1	17	1	41	12	3	0	0	15	0	0	0	0	0	57
17:15 - 17:30	3	0	0	0	3	24	2	14	0	40	12	8	1	0	21	0	0	1	0	1	65
17:30 - 17:45	4	0	0	0	4	23	5	12	1	41	11	7	0	0	18	0	0	0	0	0	63
17:45 - 18:00	0	0	0	0	0	24	3	7	1	35	11	4	0	0	15	0	0	0	0	0	50
TOTAL	52	0	0	0	52	1359	76	507	9	1951	334	91	13	1	439	0	0	5	0	5	2447

TRAFFIC SURVEY

CLIENT: DMA

SITE: 6 – R103 & Thousand Hills Street

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	SOUTH Dovecote Crescent																				TOTAL
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					ALL MOVEMENTS
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	1	0	0	0	1	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	3
06:15 - 06:30	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
06:30 - 06:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
06:45 - 07:00	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	3
07:00 - 07:15	0	0	0	0	0	0	0	0	0	0	2	0	0	1	3	0	0	0	0	0	3
07:15 - 07:30	1	0	0	0	1	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3
07:30 - 07:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
07:45 - 08:00	1	0	0	0	1	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	4
08:00 - 08:15	2	0	0	0	2	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	4
08:15 - 08:30	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	3
08:30 - 08:45	1	0	0	0	1	1	0	0	0	1	2	0	0	0	2	0	0	0	0	0	4
08:45 - 09:00	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
09:00 - 09:15	0	0	0	0	0	1	0	0	0	1	2	0	0	0	2	0	0	0	0	0	3
09:15 - 09:30	1	0	0	0	1	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	3
09:30 - 09:45	2	0	0	0	2	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	4
09:45 - 10:00	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
10:00 - 10:15	2	0	0	0	2	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	4
10:15 - 10:30	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	2
10:30 - 10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 - 11:00	1	0	0	0	1	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	4
11:00 - 11:15	1	0	0	0	1	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	3
11:15 - 11:30	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	3
11:30 - 11:45	2	0	0	0	2	2	0	0	0	2	1	0	0	0	1	0	0	0	0	0	5
11:45 - 12:00	3	0	0	0	3	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	5
12:00 - 12:15	2	0	0	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3
12:15 - 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 - 12:45	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
12:45 - 13:00	2	0	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	3
13:00 - 13:15	1	0	0	0	1	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	3
13:15 - 13:30	1	0	0	0	1	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	3
13:30 - 13:45	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
13:45 - 14:00	2	0	0	0	2	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	4
14:00 - 14:15	3	0	0	0	3	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	4
14:15 - 14:30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
14:30 - 14:45	0	0	0	0	0	2	0	0	0	2	3	0	0	0	3	0	0	0	0	0	5
14:45 - 15:00	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
15:00 - 15:15	2	0	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	3
15:15 - 15:30	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0	0	2
15:30 - 15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45 - 16:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
16:00 - 16:15	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
16:15 - 16:30	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
16:30 - 16:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
16:45 - 17:00	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
17:45 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	34	0	0	0	34	20	0	0	0	20	56	0	0	1	57	0	0	0	0	0	111

TRAFFIC SURVEY

CLIENT: DMA

SITE: 6 – R103 & Thousand Hills Street

DATE: 12 HOUR COUNT ON WEDNESDAY 15 SEPTEMBER 2021

UNITS: CLASSIFIED

APPROACH FROM NAME MOVEMENT TIME	WEST R103																				TOTAL ALL MOVEMENTS
	LEFT TURN					STRAIGHT					RIGHT TURN					U TURN					
	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	C	T	H	B	TOTAL	
06:00 - 06:15	12	4	0	0	16	23	8	6	1	38	0	0	0	0	0	0	0	0	0	0	54
06:15 - 06:30	10	2	2	0	14	26	6	12	0	44	0	0	0	0	0	0	0	0	0	0	58
06:30 - 06:45	13	4	1	0	18	21	2	14	0	37	0	0	0	0	0	0	0	0	0	0	55
06:45 - 07:00	22	4	2	0	28	24	2	12	0	38	0	0	0	0	0	0	0	0	0	0	66
07:00 - 07:15	16	8	4	0	28	14	1	13	1	29	0	0	0	1	1	0	0	0	0	0	58
07:15 - 07:30	27	4	0	0	31	22	2	10	1	35	0	0	0	0	0	0	0	0	0	0	66
07:30 - 07:45	23	6	1	0	30	24	0	9	0	33	0	0	0	0	0	0	0	0	0	0	63
07:45 - 08:00	24	2	0	0	26	12	0	13	0	25	0	0	0	0	0	0	0	0	0	0	51
08:00 - 08:15	8	3	1	0	12	16	1	18	0	35	0	0	0	0	0	0	0	0	0	0	47
08:15 - 08:30	12	2	1	0	15	17	1	6	0	24	0	0	0	0	0	0	0	0	0	0	39
08:30 - 08:45	12	0	1	1	14	16	2	11	0	29	0	0	0	0	0	0	0	0	0	0	43
08:45 - 09:00	9	2	2	0	13	15	1	13	0	29	0	0	0	0	0	0	0	0	0	0	42
09:00 - 09:15	9	0	2	0	11	11	3	7	0	21	0	0	0	0	0	0	0	0	0	0	32
09:15 - 09:30	11	1	1	0	13	21	5	10	0	36	2	0	0	0	2	0	0	0	0	0	51
09:30 - 09:45	16	3	3	0	22	20	1	10	0	31	1	0	0	0	1	0	0	0	0	0	54
09:45 - 10:00	12	3	1	0	16	27	0	7	0	34	1	0	0	0	1	0	0	0	0	0	51
10:00 - 10:15	9	0	1	0	10	17	2	5	0	24	1	0	0	0	1	0	0	0	0	0	35
10:15 - 10:30	11	1	1	0	13	26	0	11	0	37	1	0	0	0	1	0	0	0	0	0	51
10:30 - 10:45	16	2	1	0	19	24	2	7	0	33	0	0	0	0	0	0	0	0	0	0	52
10:45 - 11:00	16	2	2	1	21	12	1	14	0	27	2	0	0	0	2	0	0	0	0	0	50
11:00 - 11:15	11	1	1	0	13	20	2	14	0	36	1	0	0	0	1	0	0	0	0	0	50
11:15 - 11:30	16	2	4	0	22	18	0	12	0	30	1	0	0	0	1	0	0	0	0	0	53
11:30 - 11:45	23	2	1	0	26	28	1	7	0	36	2	0	0	0	2	0	0	0	0	0	64
11:45 - 12:00	11	1	3	0	15	19	1	5	0	25	1	0	0	0	1	0	0	0	0	0	41
12:00 - 12:15	11	0	0	0	11	24	0	8	0	32	1	0	0	0	1	0	0	0	0	0	44
12:15 - 12:30	17	2	3	0	22	24	1	17	0	42	1	0	0	0	1	0	0	0	0	0	65
12:30 - 12:45	10	3	0	0	13	24	2	7	0	33	0	0	0	0	0	0	0	0	0	0	46
12:45 - 13:00	18	4	2	0	24	20	0	7	0	27	3	0	0	0	3	0	0	0	0	0	54
13:00 - 13:15	13	1	0	0	14	29	0	12	0	41	0	0	0	0	0	0	0	0	0	0	55
13:15 - 13:30	26	1	1	0	28	23	1	12	0	36	0	0	0	0	0	0	0	0	0	0	64
13:30 - 13:45	14	5	2	0	21	28	1	12	0	41	1	0	0	0	1	0	0	0	0	0	63
13:45 - 14:00	18	2	0	0	20	26	3	7	0	36	0	0	0	0	0	0	0	0	0	0	56
14:00 - 14:15	16	0	0	0	16	22	2	21	0	45	0	0	0	0	0	1	0	0	0	1	62
14:15 - 14:30	18	3	4	0	25	31	2	7	0	40	2	0	0	0	2	0	0	0	0	0	67
14:30 - 14:45	22	1	2	0	25	31	3	5	0	39	1	0	0	0	1	0	0	0	0	0	65
14:45 - 15:00	17	4	2	0	23	30	2	15	0	47	1	0	0	0	1	0	0	1	0	1	72
15:00 - 15:15	17	2	1	0	20	44	1	7	0	52	0	0	0	0	0	0	0	0	0	0	72
15:15 - 15:30	22	4	3	0	29	30	1	10	0	41	2	0	0	0	2	1	0	0	0	1	73
15:30 - 15:45	22	6	0	0	28	27	2	4	1	34	1	0	0	0	1	0	0	0	0	0	63
15:45 - 16:00	38	3	2	0	43	36	0	11	0	47	0	0	0	0	0	0	0	0	0	0	90
16:00 - 16:15	29	1	1	0	31	80	5	8	0	93	0	0	0	0	0	0	0	0	0	0	124
16:15 - 16:30	28	2	2	0	32	65	4	6	0	75	2	0	0	0	2	0	0	0	0	0	109
16:30 - 16:45	24	0	0	0	24	86	1	6	0	93	0	0	0	0	0	0	0	0	0	0	117
16:45 - 17:00	47	6	2	0	55	91	2	13	1	107	0	0	0	0	0	0	0	0	0	0	162
17:00 - 17:15	38	3	2	0	43	52	1	6	0	59	1	0	0	0	1	0	0	0	0	0	103
17:15 - 17:30	25	3	0	0	28	51	3	8	0	62	0	0	0	0	0	0	0	0	0	0	90
17:30 - 17:45	31	5	1	0	37	24	2	5	0	31	1	0	0	0	1	1	0	1	0	2	71
17:45 - 18:00	17	3	1	0	21	23	1	3	1	28	0	0	0	0	0	0	0	0	0	0	49
TOTAL	887	123	67	2	1079	1394	84	463	6	1947	30	0	0	1	31	3	0	2	0	5	3062

APPENDIX D

SIDRA OUTPUTS

Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 100 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
EDDIE HAGEN SOUTH										
1	L	173	1336	0.130	10.5	LOS B	20	0.68	44.9	64
2	T	1192	1443	0.826	39.0	LOS D	213	0.94	28.9	643
3	R	75	1154	0.065	19.5	LOS B	9	0.71	38.1	32
Approach		1440	3933	0.826	34.6	LOS C	213	0.90	30.6	738
R103 EAST										
4	L	75	1130	0.066	10.0	LOS B	8	0.67	46.8	27
5	T	330	585	0.564	47.1	LOS D	68	0.79	26.1	194
6	R	454	826	0.550	39.9	LOS D	75	0.81	28.4	248
Approach		859	2541	0.564	40.1	LOS D	75	0.79	28.4	468
EDDIE HAGEN NORTH										
7	L	253	1415	0.179	9.3	LOS A	19	0.67	47.2	89
8	T	596	1443	0.413	25.2	LOS C	89	0.68	35.5	265
9	R	479	775	0.618	32.9	LOS C	60	0.83	28.8	258
Approach		1328	3633	0.618	24.9	LOS C	89	0.73	34.2	612
R103 WEST										
10	L	484	874	0.554	23.1	LOS C	114	0.81	36.6	212
11	T	237	585	0.405	42.6	LOS D	49	0.75	27.6	132
12	R	86	748	0.115	32.9	LOS C	15	0.73	31.2	43
Approach		807	2207	0.554	29.9	LOS C	114	0.78	32.9	387
All Vehicles		4434	12314	0.826	31.9	LOS C	213	0.81	31.5	2205

C:\SIDRA_P0347\R103_EDDIE_AM_2 rev
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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 100 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
EDDIE HAGEN SOUTH										
1	L	86	1248	0.069	9.8	LOS A	8	0.66	46.2	31
2	T	595	1833	0.325	17.5	LOS B	77	0.57	40.5	234
3	R	75	615	0.122	22.1	LOS C	9	0.72	34.9	34
Approach		756	3696	0.325	17.1	LOS B	77	0.60	40.4	299
R103 EAST										
4	L	75	898	0.084	13.7	LOS B	14	0.70	43.4	28
5	T	274	702	0.390	39.4	LOS D	54	0.75	28.8	147
6	R	228	642	0.355	37.7	LOS D	40	0.77	29.1	122
Approach		577	2242	0.390	35.4	LOS D	54	0.75	30.3	297
EDDIE HAGEN NORTH										
7	L	438	1451	0.302	9.9	LOS A	41	0.69	46.2	157
8	T	1192	1833	0.650	23.8	LOS C	170	0.73	36.3	521
9	R	480	1087	0.442	22.0	LOS C	55	0.77	36.6	210
Approach		2110	4371	0.650	20.5	LOS C	170	0.73	38.0	888
R103 WEST										
10	L	440	1021	0.431	12.2	LOS B	59	0.72	44.9	162
11	T	336	702	0.479	41.4	LOS D	66	0.77	28.1	185
12	R	173	696	0.248	35.8	LOS D	31	0.76	29.9	90
Approach		949	2419	0.479	26.8	LOS C	66	0.74	34.4	437
All Vehicles		4392	12728	0.650	23.2	LOS C	170	0.71	36.4	1921

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 70 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
EDDIE HAGEN SOUTH										
1	L	696	1333	0.522	10.3	LOS B	43	0.69	46.5	248
2	T	1343	2340	0.574	10.6	LOS B	115	0.59	46.5	470
3	R	96	380	0.253	21.5	LOS C	21	0.77	37.7	41
Approach		2135	4054	0.574	11.0	LOS B	115	0.63	46.0	759
EAST ACCESS										
4	L	48	591	0.081	10.9	LOS B	5	0.67	45.9	17
5	T	1	195	0.005	28.4	LOS C	0	0.54	33.7	0
6	R	14	217	0.065	37.9	LOS D	5	0.68	29.4	7
Approach		63	1003	0.081	17.2	LOS B	5	0.67	40.6	25
EDDIE HAGEN NORTH										
7	L	29	1245	0.023	8.8	LOS A	1	0.64	48.0	10
8	T	969	2340	0.414	8.5	LOS A	77	0.50	48.6	324
9	R	39	249	0.157	23.6	LOS C	10	0.75	36.3	17
Approach		1037	3833	0.414	9.1	LOS A	77	0.52	48.0	351
ASSMANG ACCESS WEST										
10	L	23	547	0.042	11.3	LOS B	3	0.67	45.5	8
11	T	1	2	0.432	25.6	LOS C	43	0.75	35.0	0
12	R	309	697	0.444	34.3	LOS C	43	0.79	30.7	157
Approach		333	1246	0.444	32.6	LOS C	43	0.78	31.5	166
All Vehicles		3568	10135	0.574	12.6	LOS B	115	0.61	44.5	1301

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 70 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
EDDIE HAGEN SOUTH										
1	L	302	1350	0.224	9.1	LOS A	14	0.66	47.8	105
2	T	906	2061	0.440	11.5	LOS B	82	0.58	45.6	322
3	R	48	182	0.264	33.0	LOS C	15	0.77	31.4	24
Approach		1256	3593	0.440	11.7	LOS B	82	0.60	45.3	451
EAST ACCESS										
4	L	96	555	0.173	17.2	LOS B	18	0.74	40.5	39
5	T	1	195	0.005	28.4	LOS C	0	0.54	33.7	0
6	R	28	217	0.129	38.7	LOS D	10	0.71	29.0	15
Approach		125	967	0.173	22.1	LOS C	18	0.73	37.2	54
EDDIE HAGEN NORTH										
7	L	14	1350	0.010	8.6	LOS A	1	0.64	48.1	5
8	T	1457	2061	0.707	16.5	LOS B	151	0.73	41.3	570
9	R	9	346	0.026	21.7	LOS C	2	0.70	37.5	4
Approach		1480	3757	0.707	16.5	LOS B	151	0.73	41.3	579
ASSMANG ACCESS WEST										
10	L	23	620	0.037	10.0	LOS A	2	0.66	46.8	8
11	T	1	2	0.609	26.9	LOS C	83	0.83	34.4	0
12	R	645	963	0.670	35.5	LOS D	83	0.85	30.2	333
Approach		669	1585	0.670	34.6	LOS C	83	0.84	30.6	341
All Vehicles		3530	9901	0.707	18.4	LOS B	151	0.71	39.8	1425

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 70 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
4DDIE HAGEN SOUTH										
1	L	514	1668	0.308	9.2	LOS A	26	0.68	47.6	180
2	T	829	1170	0.709	13.4	LOS B	159	0.68	43.9	307
3	R	33	417	0.079	17.2	LOS B	6	0.72	40.7	13
Approach		1376	3255	0.709	11.9	LOS B	159	0.68	45.1	500
MACRO ACCESS EAST										
4	L	31	721	0.043	9.8	LOS A	3	0.66	47.0	11
5	T	1	195	0.005	28.4	LOS C	0	0.54	33.7	0
6	R	9	217	0.042	37.6	LOS D	3	0.67	29.5	5
Approach		41	1133	0.043	16.4	LOS B	3	0.66	41.2	16
EDDIE HAGEN NORTH										
7	L	1	1340	0.001	8.6	LOS A	0	0.62	48.1	0
8	T	684	2340	0.292	7.4	LOS A	53	0.45	49.8	223
9	R	1	281	0.004	25.4	LOS C	0	0.64	35.3	0
Approach		686	3961	0.292	7.5	LOS A	53	0.45	49.8	224
ACCESS WEST										
10	L	1	547	0.002	12.9	LOS B	0	0.62	44.0	0
11	T	1	2	0.432	25.7	LOS C	44	0.76	35.0	0
12	R	312	697	0.448	34.5	LOS C	44	0.79	30.6	159
Approach		314	1246	0.448	34.4	LOS C	44	0.79	30.7	160
All Vehicles		2417	9595	0.709	13.6	LOS B	159	0.63	43.6	899

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 70 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
4DDIE HAGEN SOUTH										
1	L	312	1665	0.187	8.9	LOS A	14	0.67	47.9	109
2	T	629	1059	0.594	13.3	LOS B	118	0.65	44.0	232
3	R	48	349	0.138	23.0	LOS C	12	0.75	36.7	21
Approach		989	3072	0.594	12.4	LOS B	118	0.66	44.7	361
MACRO ACCESS EAST										
4	L	29	584	0.050	11.3	LOS B	3	0.67	45.5	11
5	T	1	279	0.004	25.8	LOS C	0	0.52	35.1	0
6	R	2	294	0.007	34.5	LOS C	1	0.62	30.7	1
Approach		32	1156	0.050	13.2	LOS B	3	0.66	43.8	12
EDDIE HAGEN NORTH										
7	L	6	1335	0.004	8.6	LOS A	0	0.63	48.1	2
8	T	929	2117	0.439	10.9	LOS B	82	0.56	46.1	327
9	R	1	359	0.003	24.7	LOS C	0	0.64	35.7	0
Approach		936	3811	0.439	10.9	LOS B	82	0.56	46.1	329
ACCESS WEST										
10	L	1	605	0.002	11.3	LOS B	0	0.62	45.5	0
11	T	1	2	0.530	25.3	LOS C	65	0.81	35.0	0
12	R	513	904	0.567	33.9	LOS C	65	0.84	30.7	261
Approach		515	1511	0.567	33.9	LOS C	65	0.84	30.7	262
All Vehicles		2472	9550	0.594	16.3	LOS B	118	0.66	41.3	964

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 60 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
EDDIE HAGEN SOUTH										
1	L	644	1322	0.487	10.2	LOS B	36	0.69	46.6	229
2	T	79	195	0.405	31.5	LOS C	23	0.74	32.2	39
3	R	53	185	0.286	38.6	LOS D	16	0.73	29.1	28
Approach		776	1702	0.487	14.3	LOS B	36	0.70	42.9	296
DRAKENSBERG EAST										
4	L	20	804	0.025	10.1	LOS B	2	0.66	46.5	7
5	T	5	293	0.017	21.8	LOS C	1	0.57	37.5	2
6	R	3	310	0.010	30.6	LOS C	1	0.64	32.5	1
Approach		28	1407	0.025	14.4	LOS B	2	0.64	42.7	11
EDDIE HAGEN NORTH										
7	L	5	1286	0.004	8.7	LOS A	0	0.63	48.0	2
8	T	41	195	0.210	27.3	LOS C	12	0.70	34.3	19
9	R	18	152	0.118	36.8	LOS D	6	0.69	29.8	9
Approach		64	1633	0.210	28.5	LOS C	12	0.69	33.6	30
ACCESS WEST										
10	L	21	1207	0.017	8.9	LOS A	1	0.64	47.8	7
11	T	12	1430	0.008	2.2	LOS A	1	0.20	56.3	3
12	R	575	822	0.700	17.3	LOS B	73	0.80	40.3	231
Approach		608	3459	0.700	16.7	LOS B	73	0.78	40.7	242
All Vehicles		1476	8201	0.700	15.9	LOS B	73	0.73	41.5	579

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 60 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
EDDIE HAGEN SOUTH										
1	L	559	1279	0.437	9.9	LOS A	30	0.69	46.9	198
2	T	26	195	0.133	26.0	LOS C	8	0.67	35.0	12
3	R	38	132	0.288	41.8	LOS D	12	0.71	27.9	21
Approach		623	1606	0.437	12.6	LOS B	30	0.69	44.4	231
DRAKENSBERG EAST										
4	L	68	673	0.101	11.1	LOS B	7	0.69	45.5	25
5	T	19	260	0.073	23.3	LOS C	5	0.63	36.6	8
6	R	3	282	0.011	31.5	LOS C	1	0.63	32.1	1
Approach		90	1215	0.101	14.4	LOS B	7	0.67	42.7	34
EDDIE HAGEN NORTH										
7	L	2	1347	0.001	8.7	LOS A	0	0.62	48.0	1
8	T	124	195	0.636	40.7	LOS D	38	0.83	28.3	68
9	R	34	198	0.171	35.5	LOS D	10	0.72	30.3	17
Approach		160	1740	0.636	39.2	LOS D	38	0.80	28.9	86
ACCESS WEST										
10	L	11	1306	0.008	8.7	LOS A	0	0.64	48.0	4
11	T	2	1430	0.001	2.1	LOS A	0	0.17	56.4	1
12	R	665	822	0.809	20.3	LOS C	92	0.88	38.1	281
Approach		678	3557	0.809	20.1	LOS C	92	0.87	38.3	286
All Vehicles		1551	8119	0.809	18.7	LOS B	92	0.78	39.4	637

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 70 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
CATO ZULU SOUTH										
1	L	35	716	0.049	9.6	LOS A	3	0.66	46.4	13
2	T	1	167	0.006	29.3	LOS C	0	0.54	33.2	0
3	R	59	189	0.312	43.2	LOS D	20	0.74	27.4	33
Approach		95	1072	0.312	30.7	LOS C	20	0.71	32.3	46
R103 EAST										
4	L	109	1246	0.087	8.9	LOS A	5	0.65	47.8	38
5	T	604	1504	0.402	3.4	LOS A	66	0.32	54.8	179
6	R	267	504	0.530	18.0	LOS B	45	0.77	40.1	108
Approach		980	3254	0.530	8.0	LOS A	66	0.48	49.1	325
ASSMANG NORTH										
7	L	131	708	0.185	10.3	LOS B	12	0.68	45.7	47
8	T	1	167	0.006	29.3	LOS C	0	0.54	33.2	0
9	R	17	189	0.090	39.3	LOS D	6	0.69	28.8	9
Approach		149	1065	0.185	13.7	LOS B	12	0.68	42.7	57
R103 WEST										
10	L	47	1030	0.046	9.0	LOS A	3	0.65	47.5	16
11	T	612	1504	0.407	3.5	LOS A	67	0.32	54.8	182
12	R	51	510	0.100	13.2	LOS B	7	0.72	43.9	19
Approach		710	3044	0.407	4.6	LOS A	67	0.37	53.3	217
All Vehicles		1934	8436	0.530	8.3	LOS A	67	0.47	48.7	645

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 70 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
CATO ZULU SOUTH										
1	L	46	652	0.071	10.1	LOS B	4	0.67	45.5	17
2	T	1	223	0.004	27.5	LOS C	0	0.53	34.2	0
3	R	98	241	0.407	42.7	LOS D	32	0.77	27.5	55
Approach		145	1115	0.407	32.3	LOS C	32	0.74	31.6	72
R103 EAST										
4	L	57	1261	0.045	8.8	LOS A	3	0.65	47.9	20
5	T	666	1449	0.460	4.6	LOS A	81	0.38	53.3	203
6	R	128	491	0.261	15.3	LOS B	20	0.75	42.2	49
Approach		851	3200	0.460	6.5	LOS A	81	0.45	50.9	273
ASSMANG NORTH										
7	L	264	718	0.368	11.4	LOS B	26	0.70	44.5	98
8	T	1	223	0.004	27.5	LOS C	0	0.53	34.2	0
9	R	49	241	0.203	38.9	LOS D	16	0.74	28.9	26
Approach		314	1181	0.368	15.7	LOS B	26	0.71	41.0	124
R103 WEST										
10	L	12	1155	0.010	8.8	LOS A	1	0.64	47.8	4
11	T	585	1449	0.404	4.1	LOS A	69	0.35	53.9	177
12	R	35	455	0.077	14.6	LOS B	6	0.72	42.7	13
Approach		632	3059	0.404	4.8	LOS A	69	0.38	53.0	194
All Vehicles		1942	8555	0.460	9.3	LOS A	81	0.49	47.5	663

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 70 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
DOVECOVE SOUTH										
1	L	2	714	0.003	12.0	LOS B	0	0.63	42.4	1
2	T	3	808	0.004	12.0	LOS B	1	0.39	45.1	1
3	R	9	450	0.020	21.0	LOS C	2	0.68	38.0	4
Approach		14	1972	0.020	17.8	LOS B	2	0.61	39.9	6
THOUSAND HILLS EAST										
4	L	1	1317	0.001	8.7	LOS A	0	0.62	48.0	0
5	T	586	864	0.679	19.8	LOS B	130	0.76	38.9	242
6	R	89	383	0.232	25.7	LOS C	22	0.76	35.1	40
Approach		676	2564	0.679	20.6	LOS C	130	0.76	38.3	283
R103 NORTH										
7	L	72	893	0.081	9.5	LOS A	5	0.66	46.6	26
8	T	2	808	0.002	12.0	LOS B	0	0.38	45.1	1
9	R	306	442	0.693	31.9	LOS C	72	0.84	31.9	150
Approach		380	2143	0.693	27.5	LOS C	72	0.81	34.0	177
R103 WEST										
10	L	190	1186	0.160	9.2	LOS A	11	0.66	47.5	66
11	T	292	864	0.338	13.8	LOS B	59	0.59	43.5	108
12	R	2	261	0.008	30.6	LOS C	1	0.64	32.5	1
Approach		484	2311	0.338	12.1	LOS B	59	0.62	44.9	176
All Vehicles		1554	8989	0.693	19.6	LOS B	130	0.73	38.9	641

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Movement Summary

CATO RIDGE DEVELOPMENT

Signalised - Fixed time
Cycle Time = 70 seconds

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Eff. Stop Rate	Aver Speed (km/h)	Oper Cost (\$/h)
DOVECOVE SOUTH										
1	L	2	953	0.002	9.3	LOS A	0	0.63	47.1	1
2	T	3	362	0.008	23.3	LOS C	1	0.53	36.6	1
3	R	3	367	0.008	32.2	LOS C	1	0.64	31.8	1
Approach		8	1682	0.008	23.1	LOS C	1	0.60	36.6	3
THOUSAND HILLS EAST										
4	L	12	1285	0.009	8.7	LOS A	1	0.64	48.0	4
5	T	310	1309	0.237	4.9	LOS A	41	0.36	52.9	95
6	R	89	388	0.230	19.9	LOS B	19	0.76	38.7	37
Approach		411	2982	0.237	8.3	LOS A	41	0.45	48.9	136
R103 NORTH										
7	L	71	594	0.119	11.1	LOS B	8	0.68	44.0	27
8	T	3	362	0.008	23.3	LOS C	1	0.53	36.6	1
9	R	181	367	0.493	39.1	LOS D	53	0.80	28.9	97
Approach		255	1324	0.493	31.1	LOS C	53	0.77	32.0	125
R103 WEST										
10	L	277	1225	0.226	9.2	LOS A	15	0.67	47.6	97
11	T	698	1309	0.533	7.4	LOS A	103	0.50	49.8	228
12	R	3	547	0.005	14.1	LOS B	0	0.67	43.2	1
Approach		978	3081	0.533	8.0	LOS A	103	0.55	49.1	326
All Vehicles		1652	9069	0.533	11.7	LOS B	103	0.56	45.3	591

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APPENDIX E

CURRICULUM VITAE

CURRICULUM VITAE

Name : **David Gordon McFarlane**
Date of Birth : 30 January 1960
Specialisation : Transportation Planning
Nationality : South Africa
Years experience : 40 Years

KEY EXPERIENCE

Dave McFarlane has extensive experience in Transport planning, Traffic engineering and Road Safety Auditing ranging from National and Provincial Roads, Metropolitan wide transportation planning through to Traffic Impact Assessments for individual developments. Dave has been involved in the development of a number of computerised traffic models using both the EMME and SATURN computer software. Dave has worked for a number of Clients including National and Provincial Departments, Municipalities, and private Developers.

QUALIFICATIONS

<i>Date</i>	<i>Institution</i>	<i>Degree Obtained</i>
1980	University of Natal	BSc (Eng) Civil
1995	University of Natal	MSc (Eng) Civil

PROFESSIONAL STANDING

Registered as a Professional Engineer with the Engineering Council of South Africa (PrEng (SA) 890452 (1989)).

EMPLOYMENT RECORD

2005 - date	David McFarlane & Associates	(Own Practise)
1984 - 2005	VelaVKE Engineers [SMEC]	(Associate, Transportation Division)
1981 - 1983	LTA Earthworks (South) Pty Ltd	(Construction Engineer)

RELEVANT PROJECT EXPERIENCE

RewardSCO office Green Star rating (2022)

Green Star office rating, Umhlanga Ridge

KwaDukuza CBD roads rehabilitation project (2022)

Roads rehabilitation project for the town of KwaDukuza

Verulam Housing Project (2022)

Traffic Impact Assessment for an affordable housing project

Cato Ridge Development Company EIA (2022)

Traffic Impact Assessment for a large industrial development

N1 Section 29 (2022)

Traffic aspects of a freeway upgrade project

N2 Section 27 + 28 (2022)

Traffic aspects of a freeway upgrade project

Synergy site assessment, Dube Trade Port (2022)

Heavy vehicle tracking on an industrial site

Halfway Toyota Assagay (2022)

Traffic Impact Assessment of a motor dealership

R103 Ashburton Traffic Loading Assessment (2022)

Traffic loading assessment for pavement design

Renishaw Coastal Precinct (2022)

Traffic Impact Assessment for potential development options

Balwin Izinga housing development, Umhlanga Ridge (2021)

Strategic assessment of a large housing development

N11 Section 9 Road Safety Appraisal (2021)

Road Safety Appraisal of an existing National Road.

R23 Section 2 Road Safety Appraisal (2021)

Road Safety Appraisal of an existing National Road.

N3 Section 1 Road Safety Audit (2021)

Road Safety Audit of an existing National Road.

N2 Sections 17 & 18 Road Safety Audit (2021)

Road Safety Audit of an existing National Road.

Kwambonambi Housing Project (2021)

Low cost housing project, Kwambonambi. Umfolozi Municipality.

DPHS rezoning (2021)

Rezoning of properties linked to a school, Durban

Ridgeside Drive, Umhlanga Ridge (2020)

TIA for the extension of Ridgeside Drive in Umhlanga Ridge.

N14/8 Road Safety Audit (2020)

Road Safety Audit of an existing National Road.

N10/7 Road Safety Audit (2020)

Road Safety Audit of an existing National Road.

Bhamshela Vehicle Test Centre, Ndwedwe Municipality (2020)

Traffic aspects of a proposed new vehicle test centre, Ndwedwe Municipality.

Shopping Centre, Merrivale (2020)

Regional Shopping Centre near Howick in Merrivale.

St Augustine's Hospital (2020)

Revised circulation and parking signage.

Engen refinery gate 1 (2020)

Revised access to the Engen refinery, Tara Road.

Caltex Gillitts (2019)

Revised petrol filling site layout.

Arbour Crest (2019)

Residential development, Umbogintwini.

APN retirement development (2019)

Retirement village, Assagay

Masterparts, Phoenix (2019)

Heavy vehicle circulation at a parts depot.

R578 Limpopo (2019)

Planning for SANRAL upgrade of the R578. Limpopo.

N2 Wild Coast Freeway (2018)

Planning phase for a section of the N2 Wild Coast Freeway near Lusikisiki.

Seaton Delaval Development (2018)

Multi-use development, KwaDukuza Municipality.

Renishaw Development (2018)

Multi-use development, Scottburgh.

City Housing Projects (2018)

Various low-cost housing projects for the eThekweni Municipality.

Inner City Public Transport Study (2018)

Inner City public transport study, Durban.

N7/3 Road Safety Audit (2018)

Road Safety Audit of a proposed upgrade design of an existing National Road (in progress)

Pinecrest Shopping Centre Upgrade (2018)

Traffic aspects of a major shopping centre, Pinetown

N1/18 Road Safety Audit (2018)

Road Safety Audit of a proposed upgrade design of an existing National Road

Lifestyle Centre, Empangeni (2017)

Traffic aspects of a major shopping centre, Empangeni

Premier Hotel, Umhlanga (2017)

Traffic aspects of an hotel, Umhlanga Ridge

Umhlanga Arch, Ridgeside (2017)

Traffic aspects of a mixed-use development, Umhlanga Ridge

Zimbali Lakes Development update (2017)

Update of the Zimbali Lakes Development scheme

R102 Upgrade through Mt Edgecombe (2017)

Traffic aspects of a road upgrade

Sibaya Shoreline Development, Sibaya (2017)

Traffic aspects of a retirement complex

SHF outlet, Millennium Business Park (2017)

Traffic aspects for the proposed furniture showroom

Berea Centre upgrade (2017)

Traffic aspects of the proposed shopping centre upgrade

Engen Fuel Distribution upgrade (2017)

Traffic assessment of a fuel outlet facility

Renishaw Hills, Scottburgh (2017)

Traffic aspects of a retirement residential development

CCI Development, URTC (2016)

Traffic Aspects of a call centre, Umhlanga Ridge

Watson North and Greylands FAP (2016)

Traffic aspects of a Functional Area Plan north of eThekweni

Gateway expansion (2016)

Traffic aspects for the proposed expansion of Gateway

Dunlop Factory Upgrade, Sydney Road (2016)

Traffic aspects of the conversion of the facility to logistics

N3 Ashburton Interchange proposed upgrade (2016)

Traffic assessment of a proposed N3 interchange upgrade

Dube City second Parkade (2016)

Second central parking facility, Dube City, Dube TradePort

Arbourtown SATURN traffic model update

Update of an earlier SATURN traffic model

Nedbank Park, URTC (2016)

Traffic aspects of an Office complex, URTC

Gautrain EMMÉ model (2015-2016)

Assistance with developing the Gautrain EMMÉ model, Gauteng

Tshwane SATURN Model (2016)

Assistance with developing a SATURN model, Tshwane

N18 Road Safety Audit (2015)

Road Safety Audit of a section of an existing National Road

N6/6 Road Safety Audit (2015)

Road Safety Audit of a proposed upgrade design of an existing National Road

Athlone Development (2014-2015)

Traffic aspects of a mixed-use development, Pietermaritzburg.

Bluff Towers Upgrade (2014)

Traffic aspects of a major shopping mall, Bluff

Lion Match Office Park (2014)

Traffic aspects of the conversion of the Lion Match factory to offices, Umgeni Road, Durban.

N2 Isipingo Interchange (2014)

Traffic aspects of an upgrade to an existing SANRAL interchange, Durban.

Nedbank Call Centre Mt Edgecombe (2014)

Expansion of the existing Nedbank call centre, Mt Edgecombe

Westend Office Estate expansion, (2014)

Expansion of an existing office estate, Westville, Durban

Umbogintwini Industrial Estate (2014)

Traffic aspects of the AECI complex, Umbogintwini.

Gillitts Shopping Centre (2014-2015)

Proposed new regional shopping centre, Gillitts, Durban.

Dube City Parkade (2014)

New central parking facility, Dube City, Dube TradePort

Corobrik Development (2012-2015)

Transport planning for the proposed Corobrik site development.

eThekweni EMMÉ3 freight modelling (2013)

Modelling of freight specifically for the DFR and proposed dig out port.

Gateway expansion (2010-2015)

Traffic planning for the proposed Gateway expansion.

FNB/Offices/Residential Ridgeside (2012-2014)

Traffic aspects of the project

Tshwane traffic model (2012-2013)

Development of a SATURN traffic model of the Tshwane CBD to assess the new BRT system.

N2/27 Road Safety Audit (2013)

Assessment of a section of N2/27 for potential geometric improvements to improve road safety.

GUM traffic model (2012-2013)

Update of the Greater Umhlanga Traffic Model

Nedbank Kingsmead (2013)

Expansion of the Nedbank regional head office, Durban CBD.

Builders Express, Bluff Towers (2013)

Traffic aspects of a commercial development.

Victoria Hospital upgrade, Tongaat (2013)

Traffic aspects of the proposed upgrade.

N2 Interchanges, eThekweni (2012-2014)

Assessment of cost share between Authorities.

Transnet CX Container depot transport study (2013)

Assessment of revised access and internal circulation

eThekweni EMME3 Update (2012-2013)

Update of the eThekweni macro model

Renishaw development traffic aspects (2011)

Major regional development plan in the Scottburgh/Umkomaas area

Warehousing development, Riverhorse (2011)

Traffic aspects of a large warehousing development, Riverhorse

eThekweni IRPTN (2011)

Traffic model component of phase 1 of the IRPTN

EWS Southern Depot (2011)

Traffic aspects of the eThekweni Water Services proposed new southern depot

Ugu District Municipality – Infrastructure Audit (2010)

Part of a Consortium to prepare an infrastructure audit for the Ugu DM.

Nedbank Ridgeside (2010)

Transport aspects and Green Star rating, Umhlanga Ridge.

Mandeni/Sundumbili CBD upgrade (2010)

Transport aspects of the project.

FIFA Soccer World Cup – Durban Host City TOP (2009-2010)

Part of a Consortium to prepare the Transport Operational plan for the 2010 Soccer world Cup in Durban

Cornubia Development (2010-2012)

Transport aspects of the proposed Cornubia development.

Arbourtown Development (2009-2013)

Traffic Aspects of the new regional mixed use development, Amanzimtoti.

Ohlanga – Tongati Local Area Plan (2008)

Traffic aspects of the Ohlanga – Tongati Local Area Plan.

Ilembe Transport Infrastructure Plan (2008)

Part of a Consortium to prepare the Ilembe Transport Infrastructure Plan

Ridgeside Development, Umhlanga Ridge (2008)

Traffic aspects of the proposed Ridgeside Development, Umhlanga Ridge.

Old Mutual Centre upgrade, Durban CBD (2008)

Traffic aspects of the Old Mutual Centre upgrade, Durban CBD.

Traffic Aspects of DFA Applications (2005 – 2010)

Numerous traffic impact assessments for developments through the DFA application procedures.

Umhlanga Ridge extended traffic model (2005- 2010).

Development of a SATURN traffic model covering the Umhlanga ridge and beyond.

Sibaya Precinct TIA (2005-2007).

Traffic impact assessment of the Precinct surrounding the Sibaya casino

Various, Umhlanga New Town Centre and La Lucia Ridge Office Estate (2004-2010)

TIA for various types of developments, URNTC and LLROE.

Dube Trade Port (2006)

Metropolitan wide impacts of the proposed Dube Trade Port, eThekweni Municipality.

La Mercy traffic model (2006).

Development of a SATURN traffic model for the greater La Mercy area, eThekweni Municipality.

Port/City planning (TEMPI) study (2006)

Traffic aspects of the long-term expansion of the Port of Durban

Gateway extension (2006-2007)

Traffic aspects of the proposed expansion to the Gateway Shopping Centre, starting 2007.

TIA for petrol filling stations (2004-2010).

Various investigations for proposed PFS's in the eThekweni Municipal area

Ballito regional traffic assessment (2005).

Regional impacts of the major developments planned for Ballito and surrounds

Umhlanga Ridge Public Transport Study (2004).

Estimation of future demand for public transport and infrastructure to cater for this.

KZN-DOT Provincial wide traffic counting strategy (2004).

Strategic assessment of managing traffic counting information covering the Province.

Investigation into the closure of Walnut road (2005).

Investigation into the closing Walnut road in Durban's CBD linked to the extension of the ICC.

Fields Hill Investigation (2005).

Impacts of providing a third lane down Fields Hill.

eThekweni Metropolitan Transport Plan (2004).

Long term traffic and transport needs for the eThekweni Municipality

Sibaya Casino Link Road and Interchange (2004)

Planning aspects of road access to the Sibaya Casino.

Pinetown CD Study (2004)

Investigation into parking, loading and PT vehicles in Pinetown's CBD.

Realignment of MR398 (2004)

Traffic aspects of the realignment of MR398, Zimbali.

Durban CBD Public Transport Circulation system (2004)

Investigation into Public transport in Durban's CBD.

Zimbali Resort Expansion (2003)

TIA for the proposed expansion of the Zimbali Resort, North Coast.

City Lodge, Umhlanga Ridge New Town Centre (2003)

TIA for the proposed City Lodge Hotel, Umhlanga Ridge New Town Centre

eThekweni Route Marker Map (2003)

Upgrade of the Municipal route marker (M route) map to incorporate the recently expanded municipal boundaries.

Road Safety Audits (2002)

Road Safety Audits for the worst pedestrian accident locations in Durban.

URNTEC Transport Model (2002)

Formulation of a computerised transport model in the Umhlanga New Town Centre.

Quality Street Interchange Upgrade (2002)

TIA for the upgrade of a freeway Interchange in Southern Durban.

The Crescent, Umhlanga Ridge New Town Centre (2002)

TIA for the Crescent Shopping Centre, Umhlanga Ridge New Town Centre.

Toyota Plant expansion, Prospecton, Durban (2002).

Traffic impact aspects of the expansion to the Toyota motor manufacturing plant, Prospecton.

Cato Manor Industrial Developments (2001).

Traffic impact aspects of Industrial Developments, Cato Manor, Durban.

EMME2 Model Update (2001).

Update of the Durban Metropolitan traffic model as part of the Metropolitan Transport Plan.

Gateway Shopping Centre Metro Wide TIA (1999)

Metropolitan wide traffic impact of the proposed Gateway Shopping Centre.

EMME/2 Public Transport Model (1999)

Formulation of a computerised public transport model in the Durban Metropolitan Region.

Cato Creek Car Terminal (1998)

Traffic aspects of a proposed car terminal at Cato Creek in Durban Harbour.

Inner City Transport Plan (1998)

Medium to long term Transport plan for the central Durban area.

EMME/2 Calibration (1994)

Calibration of a computerised traffic assignment model in the Durban Metropolitan Region.

Freeway Operations Study (1992)

Operations assessment of the freeways in Durban.

ICC Durban (1992)

Traffic and parking aspects of the ICC Convention Centre, Durban.

N2/25 Interchange Capacity Study (1992)

The capacity assessment of interchanges on a major urban Freeway in Durban.

Saturn Model of Durban (1991)

Involved in the computerised traffic model of Durban's CBD.

Shallcross Link Road (1990)

The design of and tender for a road project in the Durban Area.

N3 Key Ridge to Cato Ridge Rehabilitation (1988)

The design of rehabilitation works for a three-lane freeway.

R613 Detailed Assessment (1988)

Involved in a report on an urban two- lane freeway including traffic, drainage and geometrics assessment.

Oliviershoek Pass (1988)

The design of a major rehabilitation strategy for a section of a Provincial main road in the Drakensburg, Natal.

Provincial Main Road 52 (1986)

The design of 18 kilometres of a Provincial Main Road.

Provincial Main Road 234 (1985)

The design of 14 kilometres of a Provincial Main Road.

R613/M13 Freeway Upgrading (1985)

The design of various freeway interchange upgrading on this urban freeway.

Transkei Government (1982)

The construction of 50 kilometres of surfaced two-lane two-way surfaced road in the Transkei, Butterworth to Tsomo.

Provincial Main Road 304 (1981)

The construction of a Provincial Main Road, Bergville to Oliviershoek Pass.



D.G. McFarlane

ANNEXURE E – STORMWATER PIPE SIZES AND STORMWATER PIPE LENGTHS

ANNEXURE E : ASSMANG REZONING: STORMWATER PIPE SIZES AND LENGTHS FOR EIA / WULA SUBMISSION (CLASS 100D CONCRETE PIPES)

STORMWATER LINE	PIPE SIZE (mm dia.)	LENGTH (m)		STORMWATER LINE	PIPE SIZE (mm dia.)	LENGTH (m)		STORMWATER LINE	PIPE SIZE (mm dia.)	LENGTH (m)
1	450	567.619		16	450	174.748		34	600	259.083
	600	382.737		17	450	124.125		35	450	484.236
2	450	167.040		18	450	72.430			600	191.654
3	600	217.522		19	600	330.318		35a	750	40.067
4	450	596.781		20	900	81.966		36	450	312.789
	600	364.289		21	450	421.944			600	205.870
5	450	563.021		22	450	211.531		37	450	648.853
	600	209.391		23	600	37.218		38	900	443.112
6	900	78.142		24	600	229.235		39	450	515.375
7	900	84.000		25	450	380.635			600	178.237
8	450	559.864		26	450	596.343		39a	450	211.623
	600	307.655			600	483.504		39b	450	98.861
9	450	604.002		26a	750	66.777		40	450	580.825
10	450	205.469		26b	450	135.596			600	161.652
11	600	127.218		27	450	295.602		41	450	589.106
12	450	516.044		28	450	151.648			600	158.654
13	450	640.547		29	450	407.525		41a	750	414.603
	600	264.950		30	600	235.330				
14	750	264.082		31	450	165.117		42	450	399.639
15	450	444.429		32	450	375.217		43	450	230.159
	600	145.262		33	450	468.960		44a	600	78.567

PIPE SIZES & LENGTHS (m)	
450mm dia.	12917.703
600mm dia.	4568.346
750mm dia.	785.529
900mm dia.	687.220
TOTAL PIPE SIZE LENGTHS (m)	18958.798

**ANNEXURE F – METHOD STATEMENT FOR CONSTRUCTION
ACTIVITIES FOR THE PROPOSED DEVELOPMENT OF PROPERTIES IN
CATO RIDGE**



**METHOD STATEMENT FOR CONSTRUCTION ACTIVITIES
FOR THE PROPOSED DEVELOPMENT OF PROPERTIES IN
CATO RIDGE
FOR THE CATO RIDGE DEVELOPMENT COMPANY**

MAY 2023

K&T PROJECT REFERENCE: 20207/ M1

REVISION 0



Details of this report

Client Name	CATO RIDGE DEVELOPMENT COMPANY
Document Title	METHOD STATEMENT FOR CONSTRUCTION ACTIVITIES FOR THE PROPOSED DEVELOPMENT OF PROPERTIES IN CATO RIDGE FOR THE CATO RIDGE DEVELOPMENT COMPANY
K&T Project Reference	20207/M1
File Name	20207-PMB/M/1
Prepared by	R. Keppler

Report Revision Record

Revision	Date	Description
0	24/05/2023	Issued for Review

This report has been prepared by Kantey & Templer (Pty) Ltd, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

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For and on behalf of	
Kantey & Templer (Pty) Ltd	
Approved by:	Kevin Hohls
Signed:	
Position:	Professional Engineer
Date:	24 May 2023

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METHOD STATEMENT FOR CONSTRUCTION ACTIVITIES FOR THE PROPOSED DEVELOPMENT OF PROPERTIES IN CATO RIDGE FOR THE CATO RIDGE DEVELOPMENT COMPANY

1. Introduction

Kantey & Templer (PTY) LTD was appointed by the Cato Ridge Development Company (CRDC) to compile a Pre-Feasibility Engineering Services Report in order to obtain preliminary approval from the service authorities for the proposed bulk services provision for the new Cato Ridge Development in KwaZulu-Natal in support of the Environmental Impact Assessment Application.

The proposed Industrial & Warehouse Development in Cato Ridge is situated on a 351 Ha greenfields site which will be completed in 3 phases as follows:-

PHASE 1

Phase 1 is programmed to be unlocked within the next 18 months and will be phased in over the next 10 year period as and when the demand arises.

PHASE 2

Phase 2 will be implemented over the next 10 to 20 years

PHASE 3

Phase 3 will be implemented over the next 20 to 25 years

This report will provide Technical information on the proposed project, with a Method Statement that is triggered due to the construction activities for the 6 No specific areas, where the stormwater runoff and sewer crossings discharge outlets falls within a watercourse.

2. Location & Access

The site locality plan is attached in Annexure A of this document.
The co-ordinates (centre) of each of the 3 Phases are as follows:

Phases	Y- CORDINATES	X- CORDINATES
Phase 1	+37 068	+3 289 114
Phase 2	+36 175	+3 286 829
Phase 3	+37 224	+3 290 057

Access to the development is via the R103 and Eddie Hagen Road

3. Scope of Works

Please refer to the attached drawing in Annexure C for the stormwater layout drawing 20207-DSW 01 Revision I

The table below indicates the three Phases for the proposed development.

Phases	Warehouse Bulk (HA)	Industrial Bulk (HA)
Phase 1	60.305	60.305
Phase 2	74.015	74.015
Phase 3	19.31	19.31
TOTAL	153.63	153.63

The scope of works for the services will include the construction of:-

- 1) Roads
- 2) Water reticulation, which includes an elevated tank
- 3) Sewer reticulation which includes a rising main
- 4) 4 x Sewer collection sumps with pump stations
- 5) Mini Wasterwater Treatment Works
- 6) Roads
- 7) Stormwater reticulation
- 8) Stormwater attenuation ponds
- 9) Electrical which includes a substation, overhead lines and underground lines
- 10) Warehousing & Industrial.

This technical note covers the design and construction considerations and parameters for the construction activities for The Proposed Development of Properties in Cato Ridge for the Cato Ridge Development Company.

In the Project Development certain construction activities will have an impact on the wetlands and these items are covered as Construction Methodology activities within the Project Area.

There are 6 specific areas in the table below which describe the storm water runoff and sewer crossing that discharge within the watercourse that require a Method Statement:-

Point Number	Description	Watercourse
1	Stormwater discharge point , plus stormwater pipeline	S6
2	Stormwater discharge point , plus stormwater pipeline	S11
3	Effluent Discharge Point	Within R3 drainage line
4	Stormwater discharge point , plus stormwater pipeline	R3 and R4 drainage line and within the 33m drainage buffer
5	Stormwater discharge point , plus stormwater pipeline	R2 and drainage buffer
6	Stormwater discharge point , plus stormwater pipeline	R2 Drainage line

The 6 specific areas are indicated in blocks on the attached Master Layout of the Water Uses associated with the project which is attached in Annexure C.

Stormwater Outlets

Where the stormwater outlets flow into the drainage line or wetland buffer they will be managed with the construction of a headwall with dissipater blocks, a gabion structure to dissipate the flow and erosion protection measures which are highlighted in more detail in this report.

Ponds 5, 9, 10, 11 & 12 flow into the drainage line or wetland buffer area. Please refer to Annexure D for the proposed throttling and outlet pipe sizes.

Sewer Outlet

There is one sewer outlet which is from the Mini Wastewater Treatment Works that requires a method statement as it falls within the R3 drainage line. The flow rate is only around 52 litres/second and will be managed in the same manner as the stormwater outlets with the construction of a headwall with dissipater blocks and a gabion structure with suitable stone pitching and erosion protection measures where required.

As indicated above the storm water runoff and sewer will be discharged via 6 outlets into the watercourses or wetland buffer and, where possible, will be further managed with the construction of swales that will retain, sink and spread the storm water runoff. This construction work would be undertaken within the wetland buffer and drainage lines.

4. Planning Construction

In the planning for the design phase, cognizance is taken of the following reference documents:

1. Red Book – Guidelines for Human Settlement Planning and Design;
2. SABS 1200 – Standardized Specification for Civil Engineering Construction; and
3. Local municipal standards.

Due to the environmental sensitivity the impact on water quality, potential flooding and erosion needs to be considered in the planning phase. The planning would consider:

The proposed stormwater design concept for the proposed development in Cato Ridge must comply to all Environmental and eThekweni Municipality requirements and specifications.

The traditional design of storm water drainage systems collects and confines storm water runoff as rapidly as possible to a suitable location where it can be discharged. This traditional design can however result in drainage and flooding problems downstream unless erosion protection measures are implemented.

The road network stormwater management system is designed to accommodate both the 351 hectare development footprints and the actual roads.

4.1 Objective

The objective of a storm water management plan should be to manage the storm water resources of the collective watersheds to:

- Prevent erosion and flood damage
- Preserve the natural and beneficial functions of the natural drainage system
- Preserve and enhance storm water quality.
- The storm water management strategy will be to collect all surface runoff, pass it through an attenuation/ detention system before discharging the water into the natural drainage systems.
- The storm water drainage network system will be kept separate from the waste water.

4.2 Stormwater Design

The stormwater management principles applied to the proposed Cato Ridge development to accommodate the stormwater run-off is separated into two sections which are as follows:-

4.2.1 All developable Erf/ Sites to be responsible for their own stormwater design and attenuation infrastructure.

A standard condition will be incorporated in all Purchase or Rental Agreements for each erf/stand that the Developer/ Landowner/ Tenant will be responsible to submit a stormwater management plan to the eThekweni Municipality for approval.

This shall include:-

- a stormwater design to attenuate the infrastructure into attenuation ponds or attenuation within the hardstands/ parking area. Other local on-site attenuation may be considered which includes grass-lined drains and swales, storm water infiltration systems undulations, landscaping etc. The attenuation area will be designed for a 1 in 50 year event.
- A throttling manhole will be designed and sized accordingly at the attenuation outlet to cater for the pre and post stormwater flows.
- stormwater reticulation pipelines, channels, energy dissipation measures etc.
- Erosion protection where required.
- Details of the stormwater discharge tie into point into the bulk Municipal road stormwater system
- All internal stormwater pipes will be gravity reticulated via the sub-catchments across the site.

4.2.2 Roads Stormwater

The bulk stormwater has been designed for a minimum 1 in 50 year event.

Storm water from the roads and surface channels will be collected through inlets and piped across or parallel to the roads, within the road reserve, to points where the water will be discharged into attenuation ponds, in an efficient, safe and environmental acceptable manner. Please refer to drawing no 20207-DSW 01 Revision I in Annexure B for details of the stormwater reticulation system and proposed attenuation ponds.

Each attenuation pond will be designed accordingly and constructed with throttling manholes at the outlets to restrict the outlet flow in the event of a heavy storm. The design will cater for the pre and post development stormwater flows from the roads prior to discharging into the valleys and low lying areas.

The attenuation ponds will be dry and will only be a temporary storage in the event of heavy rainfall. The discharge from the attenuation pond will be restricted by the throttling manhole.

The velocity and energy of the stormwater discharge will be reduced when entering the stormwater attenuation ponds due to:-

- 1) the volume of the pond which must be vegetated.
- 2) dissipator blocks at the inlet headwall.
- 3) Gabion baskets/ rip rap at the inlet to prevent erosion.

At discharge points :-

- 1) Grass lined open drains will be installed which will assist in retaining sediment and reduce the velocity of the flows.
- 2) Where applicable concrete channels or concrete pipes will be installed from the attenuation pond outlets which will be directed within the existing road network to avoid further impact on the environment. This will reduce the registration of servitudes through tribal authority areas. Road Servitudes will be registered where required in remaining disturbed areas.
- 3) The drains and stormwater pipe network will prevent flooding of houses and reduce the safety risk within the area.
- 4) Where there are no structures or erf/stands the outlet will discharge directly onto the site with erosion protection where deemed necessary.

- 5) The design measures incorporated will take measures into account to reduce the impact on disturbing the biodiversity in the area. Where possible, stormwater discharge points will be directed to follow areas that have already been disturbed by the existing road footprint.
- 6) Where possible, the stormwater will discharge into an open area to allow water to dissipate before entering into the river systems.

The standards for the storm water infrastructure to be installed with the proposed road development can be summarised as follows:

- Flood occurrence interval : 50 years
- Pipe Material : Concrete
- Pipe class : Minimum 75D in road reserve and 100D at road crossings.
The developer will be responsible for their own stormwater within the sites to be developed
- Pipe diameters : minimum 450φmm diameter within the road reserve and discharging from the road reserve. The developer will be responsible for their own stormwater within the sites to be developed
- Bedding : Class C
- Inlets : Manhole
- Junctions : Points of deflections on pipelines
- V-drains : Concrete lined open channels
- Cut-off drains : Grass lined channels and berms

4.2.3 Erosion Protection

The following recommendations are suggested:

1. It is essential that appropriate erosion control measures need to be taken into consideration at the various storm water discharge points located throughout the site to limit erosion on the receiving environment e.g. at headwalls and culverts.
2. Steep water courses may require additional protection from erosion through the use of lined channels, controlled drops etc. in order to dissipate flow energy.
3. Road intersections should be designed to prevent localised flooding.
4. The storm water system must be kept separate from the wastewater (sewer) drainage system.
5. Suitable erosion protection measures will be installed at all discharge points. At each attenuation pond dissipator blocks with a gabion retaining structure (see attached detail in Annexure E) will be constructed after each throttling manhole/headwall outlet to reduce the stormwater velocity at the outlet which will reduce erosion.
6. For the design of the swale the philosophy of "Slow it, Spread it and Sink it" will be followed so that the velocity of the stormwater runoff is slowed down and spread laterally to mitigate erosion while sink it will assist in recharge of ground water.
7. Appropriate and adequate protection of the banks will be incorporated into the design.
8. Swales will be designed to accommodate both dry conditions and storm flow conditions.
9. For high intensity, the water will overtop the berm and suitable bank protection in the form of vegetation will be implemented to prevent erosion during these events.
10. Headwall details will be as per the eThekweni Municipality or Department of Transport standard specifications depending on which is applicable.
11. Suitable stone pitching and/or reno-mattress and gabion protection structure will be constructed to obviate any erosion that may be prone to occur at these points.
12. A sediment fence will be erected on the wetland buffer boundary to demarcate the edge of the wetland buffer. In addition, this fence will intercept and detain small amounts of sediment from disturbed areas during construction operations and reduce runoff velocity down a slope.

5. Construction Methodology

5.1 The typical construction sequence is summarized hereunder:

- The engineer in consultation with the Environmental Assessment Practitioner / Environmental Control Officer will confirm the nature of the drainage line being considered and ensure adequate control measures are allowed for in the drawings, tender and site instructions.
- Appointed contractor to submit a Method Statement for the construction activities for review and approval by appointed Safety Agent, Environmental Assessment Practitioner / Environmental Control Officer and Engineer
- Site Handover and briefing meeting with the contractor to highlight environmental sensitivity and confirm construction methods.
- Regular meetings and inspections from Environmental Assessment Practitioner / Environmental Control Officer and Engineer to confirm agreed method statement is being followed.
- Before final handover, inspections and snag list are compiled to ensure all necessary protection has been undertaken as per engineers design.

5.2 Typical general measures that should be implemented are

- The area of disturbance should be kept to a minimum to allow clearing of the construction right of way, excavation, layer works, construct works, backfill, to restore the construction right of way. This should not exceed the construction footprint width and must be kept to a minimum, for the wetland;
- Construction should be immediately followed by rehabilitation;
- Soil surfaces should not be left open for lengthy periods to prevent erosion;
- Sods must be stored and placed back immediately after trenches have been backfilled;
- Where possible, construction should take place during the dry season;
- Weather forecasts from the South African Weather Bureau of up to three days in advance must be monitored on a daily basis to avoid exposing soil or building works during a storm event. Appropriate action must be taken in advance to protect construction works should a storm event be forecasted;
- Appropriate erosion and sediment control measures should be implemented;
- Sediment barriers should be constructed across the entire construction site where necessary to prevent sediment flow into the wetland;
- Vegetation and soil should be retained in position for as long as possible, and should only be removed immediately ahead of construction / earthworks in any specific area;
- Remove only the vegetation where essential for the continuation of construction of services. On completion of the construction work, the site will be contoured to ensure free flow of runoff and to prevent ponding of water. Drainage will be controlled to ensure that runoff from the site will not culminate in off - site pollution or result in damage to properties downstream of any storm water discharge.
- During final design stages erosion protection will be designed to comply to Municipal & Department of Transport standards. Special precautions will be carried out to ensure that a designed storm water discharge route is approved to prevent erosion or flooding in the valleys and low lying areas which also have residential houses in areas.
- The attenuation ponds are a temporary storage facility and will only fill up in the event of heavy rainfall event.

5.3 Typical Plant and Resources required:

- Excavators;
- TLB;
- Dozer;

- Bob Cat;
- Tipper trucks for the delivery of bedding material and road fill material to be placed over the pipes;
- Small Compaction equipment for pipe bedding and restricted fill around the pipe culvert;
- Heavy compaction equipment for compaction of the bulk fill for roads and hardstands;
- Equipment for the construction of the brick headwalls as detailed;
- Equipment and labour for the positioning and packing of gabion and reno-mattress baskets or stone pitching, as appropriate and as agreed with the Environmental Assessment Practitioner / Environmental Control Officer, to control and obviate any erosion;
- Light equipment and labour to dress backfill, topsoil and re-vegetate all exposed areas.

5.4 Construction Methods:

- Remove topsoil and stockpile for later use.
- Excavate trench for pipe or culvert to the design level
- Construct storm water diversion berms where required.
- Place temporary diversion pipe if required to divert water
- Place bedding, lay pipes, place and compact selected fill over the pipeline.
- Backfill to specification.
- Construction of gabions
- Construction of headwalls
- Construction of swales
- Dress backfill, topsoil and re-vegetate all exposed areas.
- Stockpiles of construction materials must be clearly separated from soil stockpiles in order to limit any contamination of soils.
- The stockpiles may only be placed within demarcated stockpile areas, which must fall within the demarcated construction area. The contractor should avoid stockpiling materials in vegetated areas that will not be cleared. The slope and height of stockpiles must be limited to 2 m to avoid collapse.
- Stockpiled soils are to be kept free of weeds and are not to be compacted. The stockpiled soil must be kept moist using some form of spray irrigation on a regular basis as appropriate and according to weather conditions.

5.5 Storage

- No construction materials may be stored or disposed of within the delineated wetland or within the buffer zone of 30 m from the wetland.
- No concrete batching may take place within the delineated wetland or within the buffer zone of 30 m from the wetland.
- No refuelling may take place within the delineated wetland or within the buffer zone of 30 m from the wetland.
- Contamination of the soil and groundwater by construction liquid waste should be prevented by using drip trays or appropriate containment receptacles and bunding. Appropriate containment receptacles and bunding. Construction liquid waste, including toxic liquid waste, should be stored in leak-proof containers and taken to the closest authorised waste and recycling centre.

5.6 Rehabilitation

In areas where construction activities have been completed and no further disturbance is anticipated, rehabilitation and re-vegetation should commence as soon as possible.

- Profile the banks over the disturbed areas to an acceptable slope and replace topsoil;
- Plant indigenous sedge and grass material from the adjacent areas;

- Water plants thoroughly immediately after planting and continue to water every three days in the absence of more than 10 mm of rainfall until plants are established;
- Re-vegetation of disturbed areas must be undertaken with indigenous species and in accordance with the instructions issued by the Environmental Control Officer;
- Replanting activities should be undertaken at the end of the dry season (middle to end September) to ensure optimal conditions for germination and rapid vegetation establishment;
- Should plants not successfully establish within two growing seasons after the first planting, new plant material should be provided;
- Any weed or alien species that germinates during the contract period should be cleared by hand before flowering;
- Any erosion channels developed during the construction period should be appropriately backfilled (and compacted where relevant) and the areas restored to a condition similar to the condition before the construction erosion occurred.

6. Maintenance

- After construction the temporary sediment fence to be removed and replaced with a permanent fence;
- Fence to be regularly checked and maintain to ensure functionality;
- All storm water pipes and outlets to be checked for blockages;
- Swale to be checked to ensure no sediment and silts collect in the trench;
- All litter to be removed from storm water systems including swale and that no general waste is dumped in the wetlands;
- Lined and sealed VIPs to be fitted with an effluent overflow, the wet sludge can be removed by ordinary vacuum tankers. These tankers are the same as those used for emptying septic tanks.

7. Conclusion

All design and construction work will be carried out in accordance with the relevant construction specifications and in compliance with the Construction Health and Safety Specifications as well as the Construction Environmental Management Programme.

KANTEY AND TEMPLER CONSULTING ENGINEERS



KEVIN HOHLS
Pr. Eng. 20060264
ASSOCIATE DIRECTOR

ANNEXURE A
Site Locality Plan

ANNEXURE B
Stormwater Layout Drawing

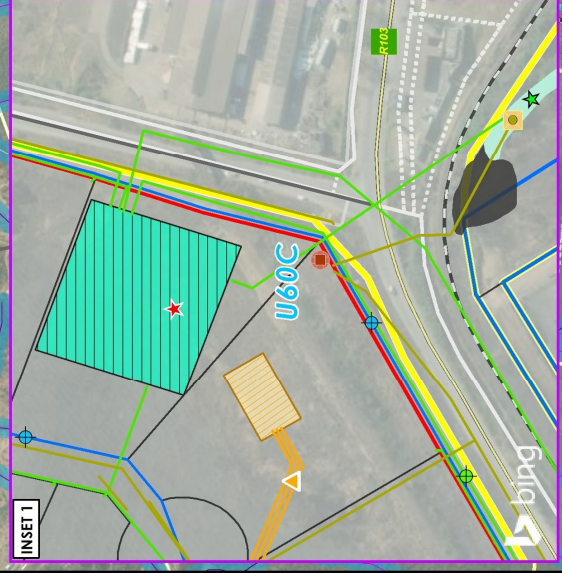
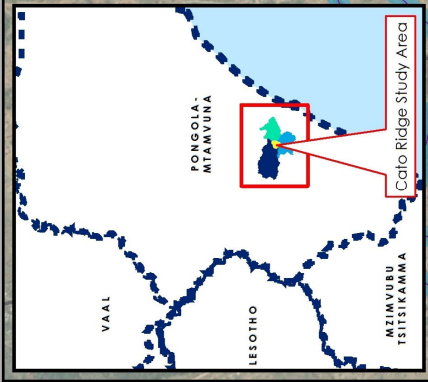
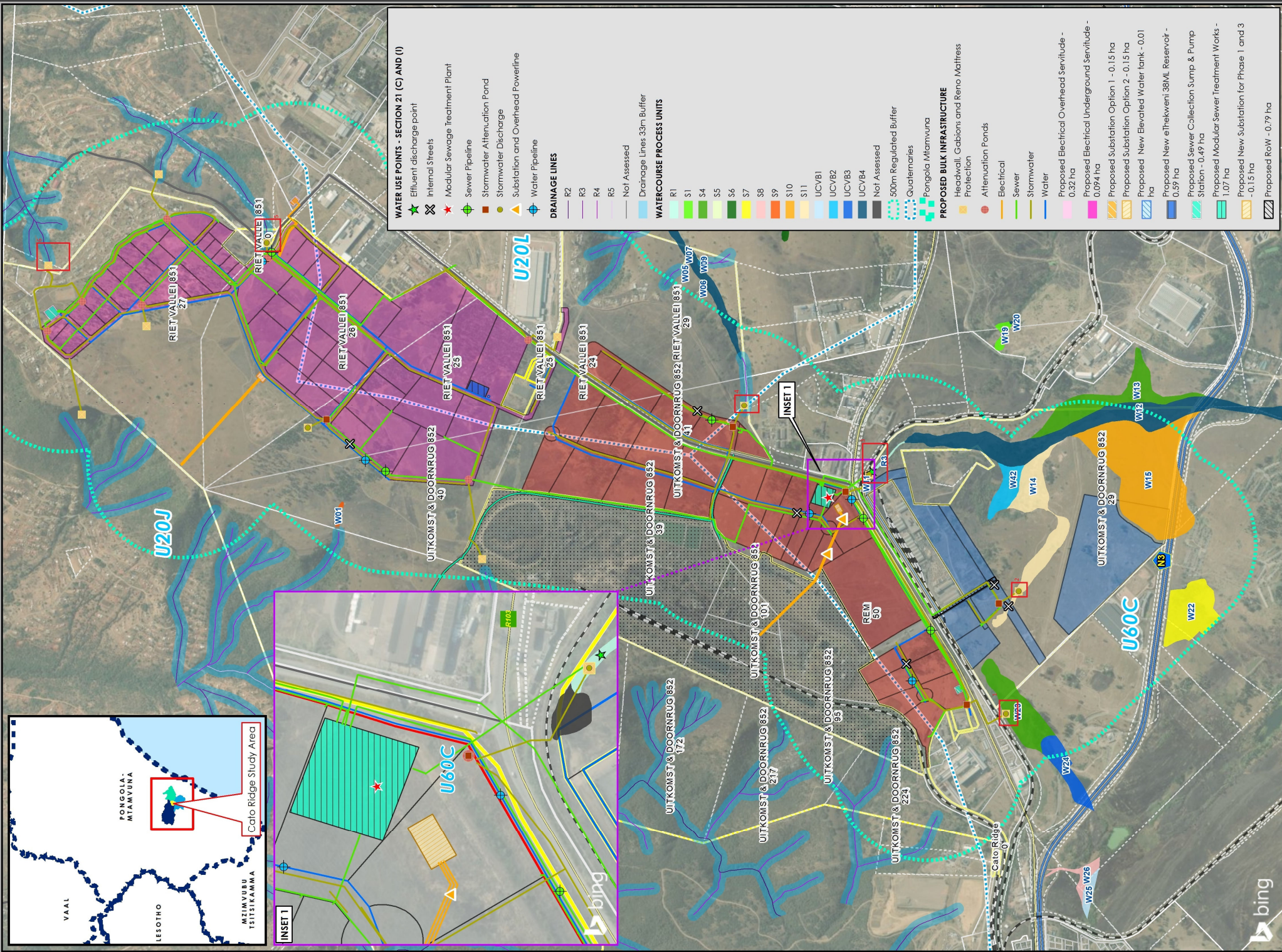
ANNEXURE C

Master Layout of the Water Uses associated with the project

ANNEXURE D
Throttling Pipe sizes and outlet pipe sizes

ANNEXURE E
Stormwater Gabion Structure & Standard Details

**ANNEXURE G – MASTER LAYOUT OF THE WATER USES ASSOCIATED
WITH THE PROJECT**



- WATER USE POINTS - SECTION 21 (C) AND (I)**
- ★ Effluent discharge point
 - ✕ Internal Streets
 - ★ Modular Sewage Treatment Plant
 - Sewer Pipeline
 - Stormwater Attenuation Pond
 - Stormwater Discharge
 - Substation and Overhead Powerline
 - Water Pipeline
- DRAINAGE LINES**
- R2
 - R3
 - R4
 - R5
 - Not Assessed
- WATERCOURSE PROCESS UNITS**
- Drainage Lines 33m Buffer
 - R1
 - S1
 - S4
 - S5
 - S6
 - S7
 - S8
 - S9
 - S10
 - S11
 - UCV/B1
 - UCV/B2
 - UCV/B3
 - UCV/B4
 - Not Assessed
 - 500m Regulated Buffer
 - Quaternaries
 - Pongola Mthamvuna
- PROPOSED BULK INFRASTRUCTURE**
- Headwall, Gabions and Reno Mattress Protection
 - Attenuation Ponds
 - Electrical
 - Sewer
 - Stormwater
 - Water
- PROPOSED ELECTRICAL OVERHEAD SERVITUDE -**
- 0.32 ha
 - Proposed Electrical Underground Servitude - 0.094 ha
 - Proposed Substation Option 1 - 0.15 ha
 - Proposed Substation Option 2 - 0.15 ha
 - Proposed New Elevated Water tank - 0.01 ha
 - Proposed New eThekweni 38ML Reservoir - 0.59 ha
 - Proposed Sewer Collection Sump & Pump Station - 0.49 ha
 - Proposed Modular Sewer Treatment Works - 1.07 ha
 - Proposed New Substation for Phase 1 and 3 - 0.15 ha
 - Proposed RoW - 0.79 ha

CRDC

Water Use

Section 21 (c) and (i)

Disclaimer:

Zutari gives no warranty of any kind, expressed or implied, with regard to the data and shall not be liable for any loss or damage, in whole or in part, connection with or arising out of the use of this data. The data remains the sole property of the CLIENT and may be used by Zutari for purposes of this project with prior written approval of the CLIENT.

Compiled by: Angela White

Compiled on: 5/9/2023

ZUTARI

IMPACT ENGINEERED

BASE DATA

- Major Road
- Towns
- Existing Private Road
- 500m Buffer

PROPOSED DEVELOPMENT AREAS

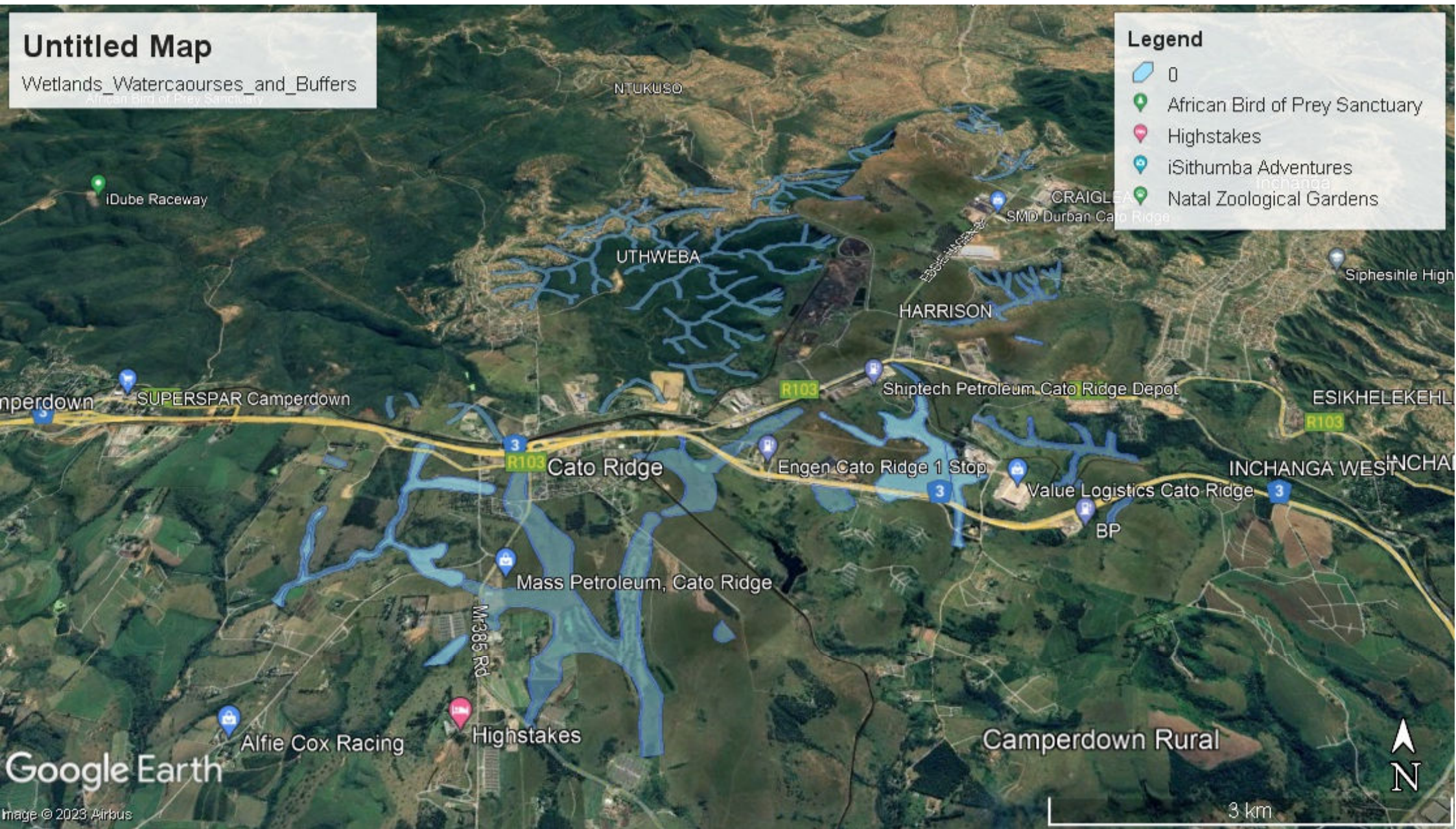
- Proposed Development
- Cato Ridge Works
- CRDC Study Area

PROPOSED DEVELOPMENT

- Phase 1 - 131 ha
- Phase 2 - 174 ha
- Phase 3 - 46 ha

Untitled Map

Wetlands_Watercourses_and_Buffers



Legend

- 0
- African Bird of Prey Sanctuary
- Highstakes
- iSithumba Adventures
- Natal Zoological Gardens

Google Earth

Image © 2023 Airbus

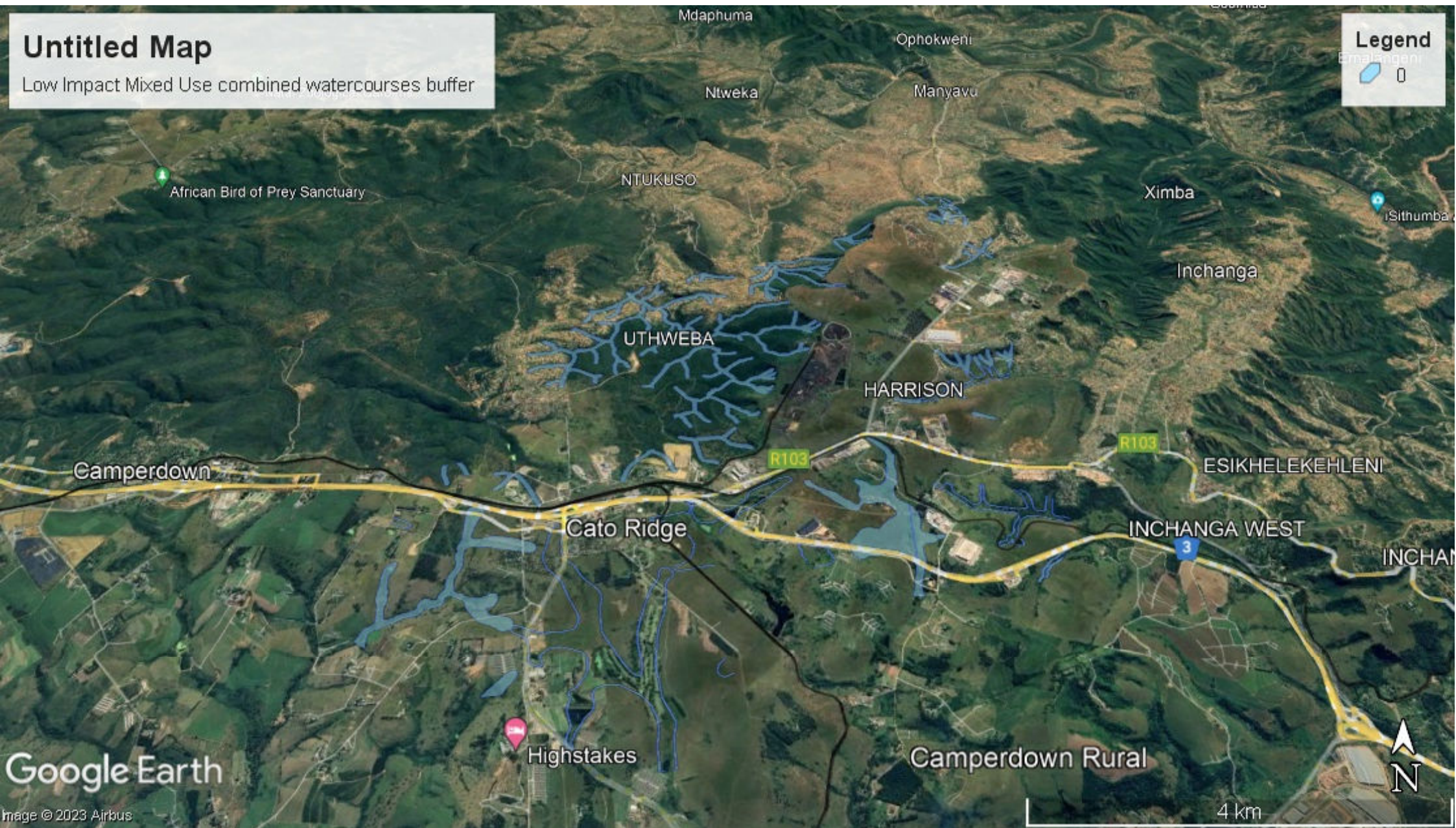
**ANNEXURE H – DELINEATED WETLANDS AND LOW IMPACT MIXED
USE COMBINED WATERCOURSES**

Untitled Map

Low Impact Mixed Use combined watercourses buffer

Legend

Emalingeni 0



ANNEXURE I – THROTTLING PIPE SIZES & OUTLET PIPES SIZES

ANNEXURE I : THROTTLING PIPE SIZES AND OUTLET PIPE SIZES

POND	INLET PIPE SIZE (mm Ø)	THROTTLING PIPE SIZE (mm Ø)	OUTLET PIPE SIZE (mm Ø)
5	600	450	600
9	900	575	900
10	600	375	750
11	600	375	750
12	450	300	600