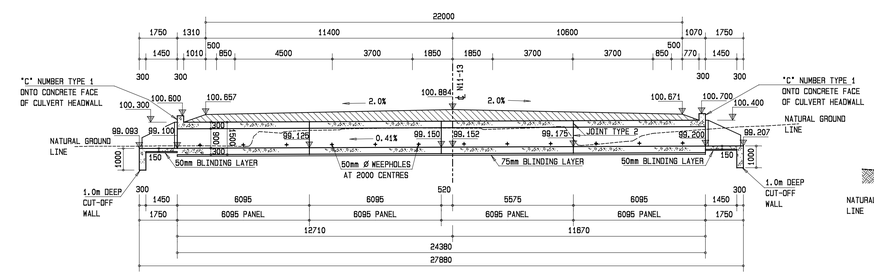
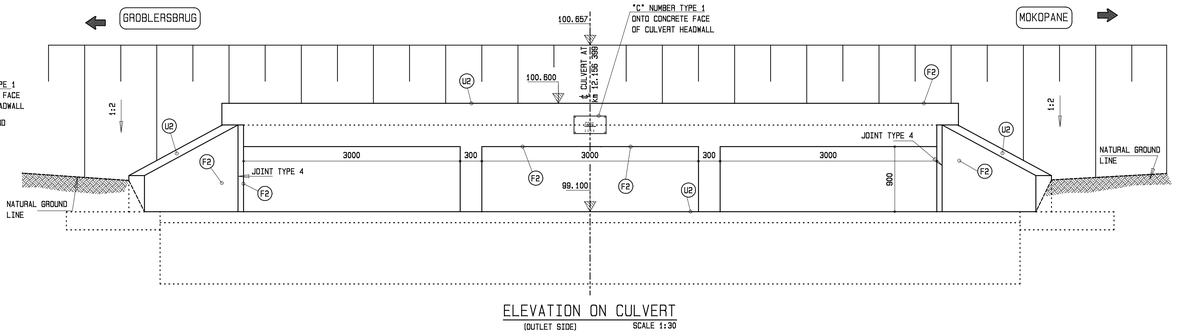


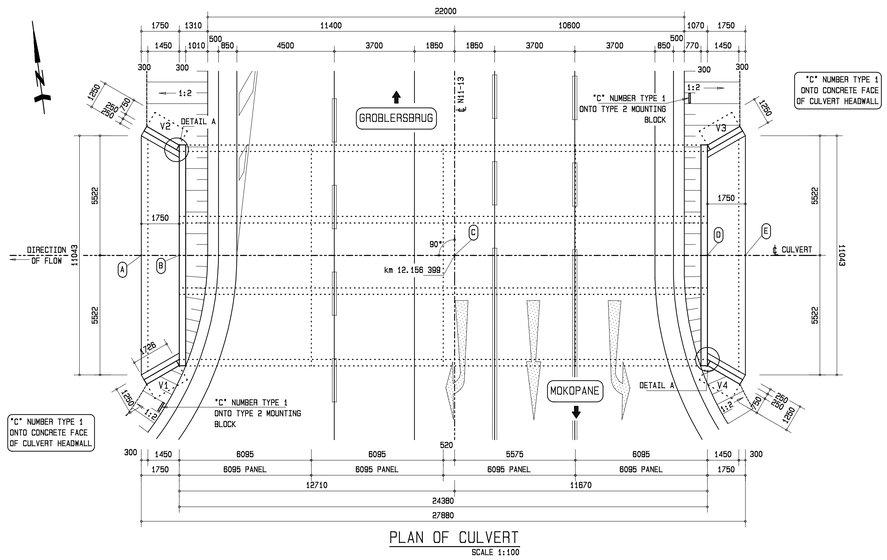
SECTION ALONG ℄ OF CULVERT

SCALE1:100



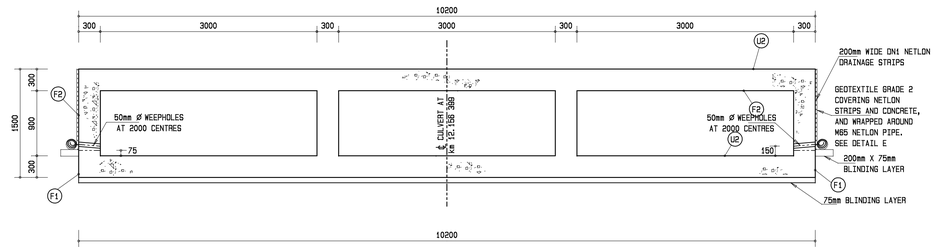
ELEVATION ON CULVERT

(OUTLET SIDE) SCALE 1:30



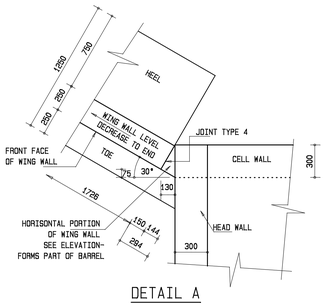
PLAN OF CULVERT

SCALE 1:100



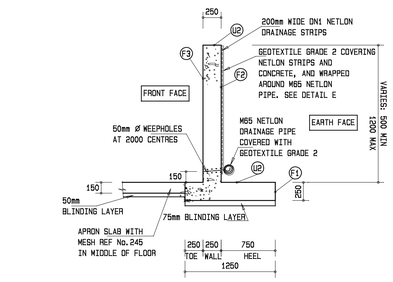
TYPICAL SECTION THROUGH CULVERT

SCALE 1:30



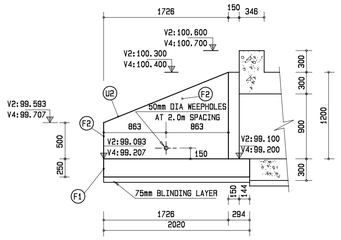
DETAIL A

SCALE 1:20



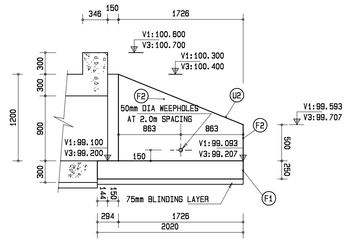
TYPICAL SECTION THROUGH WING WALLS

SCALE 1:30



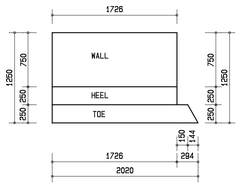
ELEVATION ON WING WALLS V2 & V4

SCALE 1:30



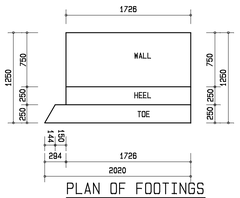
ELEVATION ON WING WALLS V1 & V3

SCALE 1:30



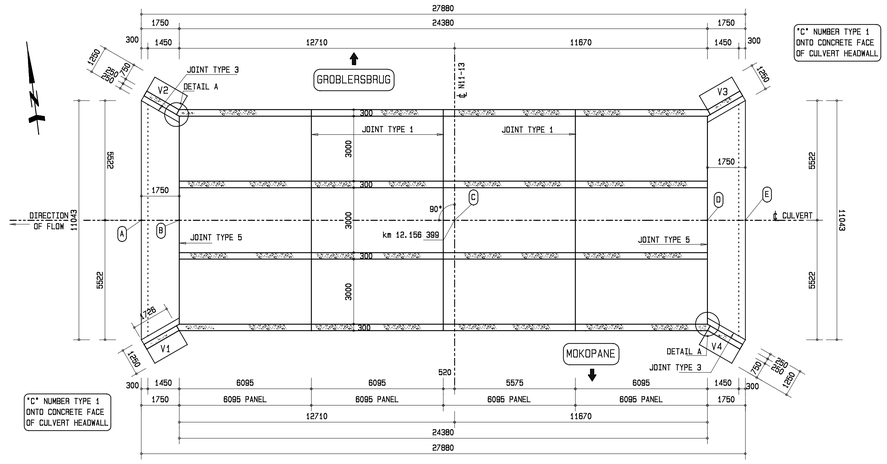
PLAN OF FOOTINGS WING WALL V2 & V4

SCALE 1:30



PLAN OF FOOTINGS WING WALL V1 & V3

SCALE 1:30



FOUNDATION LAYOUT

SCALE 1:100

NOTE:
ALL EXISTING LEVELS AND DIMENSIONS MUST BE CHECKED BEFORE CONSTRUCTION CAN COMMENCE.
ANY DISCREPANCIES MUST BE BROUGHT TO THE ATTENTION OF THE RESIDENT ENGINEER.

CO-ORDINATES		
POINT	Y	X
A	3 203.691	2 665 910.307
B	3 201.956	2 665 910.535
C	3 189.354	2 665 912.190
D	3 177.784	2 665 913.709
E	3 175.414	2 665 914.021

NOTE:
BEFORE DEMOLISHING OF PORTIONS OF THE EXISTING STRUCTURE CAN COMMENCE, MUST THE POSITIONS OF ALL EXISTING SERVICES eg. OPTICAL CABLES AND WATER MAINS etc BE RECORDED IN ORDER TO MAKE PROVISION TO PROTECT IT AGAINST ANY POSSIBLE DAMAGE.

DESIGN DATA

GENERAL DESIGN NOTES:

1) THE CULVERT CONSISTS OF 3/3.0m x 0.90m CELL OF IN-SITU CAST CONCRETE

2) DESIGN METHOD: LIMIT STATE

3) DESIGN CODE: TMH7:PART 3 - 1989

DESIGN LOADINGS:

1) DESIGN CODES: TMH7 - PARTS 1 AND 2,
"CODE OF PRACTICE FOR THE DESIGN OF HIGHWAY BRIDGES AND CULVERTS IN SOUTH AFRICA (AS AMMENDED IN 1988)"

2) LIVE LOADS: TYPE NA LOADING
TYPE NB-36 LOADING AND NC35 x S x40

3) DEAD LOADS: IN-SITU CONCRETE - 25.5kN/m³
PREMIX-24kN/m³
COMPACTED EARTH FILL - 20kN/m³

4) DESIGN FILL HEIGHT: 0.6m

5) INTERNAL ANGLE OF FRICTION OF BACKFILL MATERIAL - 30°
EARTH PRESSURE DUE TO BACKFILL MATERIAL 10 kPa/m
(UNYIELDING STRUCTURE)

6) COMPUTER PROGRAM: PROKON

7) REFER TO THE COTO STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR SOUTH AFRICAN ROAD AUTHORITIES (DRAFT STANDARD OCTOBER 2020)

DESIGN PARAMETERS

1) YOUNG'S MODULUS (E): PLAIN CONCRETE (fcu=30MPa) =28GPa
REINFORCING STEEL =200GPa

MATERIALS

1) FOUNDING

FOUNDING MATERIAL - CLAYEY SAND
PERMISSIBLE BEARING PRESSURE - 250kPa
DESIGN BEARING PRESSURE - 180kPa

2) CONCRETE CHARACTERISTIC STRENGTHS (95%)

STRUCTURAL ELEMENT	fcu(MPa)	CLASS
BLINDING LAYERS	15	C12/15-20
FLOOR AND APRON SLABS	30	D25/30-XC3(100)-20
WALLS AND WING WALLS	30	D25/30-XC3(100)-20
DECK SLAB AND HEAD WALLS	30	D25/30-XC3(100)-20

2.1) COEFICIENT OF EXPANSION OF CONCRETE - 0.012mm/m/°C

3) REINFORCING CHARACTERISTIC STRENGTHS

DESCRIPTION	fy (MPa)
MILD STEEL	250
HIGH TENSILE STEEL (SABS 920 1985)	450

GENERAL

1) CONCRETE FINISH:

1.1 SHUTTERED SURFACES: FOUNDATIONS - F1
UNEXPOSED SURFACES - F2
EXPOSED SURFACES - F2

1.2 UNSHUTTERED SURFACES: TOP OF FLOOR SLABS - U2
TOP OF WALLS - U2
TOP OF ACCESS COVER SLAB - U2

2) CONCRETE COVER : 50mm

3) ALL VISIBLE CORNERS MUST BE CHAMFERED - 25mmx25mm

STRUCTURE NUMBER PLATES

(i) LETTERS AND NUMERALS SHALL BE TYPE 'B' LETTERS TO DIN 1451 PART 2.
(ii) THE DATE ON THE CULVERT NUMBER PLATE SHALL BE THE YEAR IN WHICH THE CULVERT WAS COMPLETED.
(iii) THE CULVERT NUMBER SHALL HAVE A WHITE BACKGROUND WITH BLACK LETTERS, NUMERALS AND BORDER.

MANUFACTURE OF NUMBER PLATES

TYPE 1 NUMBER PLATE

(i) THE NUMBER PLATES SHALL BE MANUFACTURED FROM NON-METALLIC, UV RESISTANT MATERIAL WITH EPOXY BLACK LETTERING

CONSTRUCTION OF NUMBER PLATES

TYPE 1 NUMBER PLATE

(i) THE CULVERT NUMBER PLATES SHALL BE POSITIONED AS SHOWN.

(ii) THE NUMBER PLATE SHALL BE SECURELY FASTENED TO THE INSIDE FACE OF THE SHUTTER BY MEANS OF M10 ANCHOR BOLTS. THE PROTRUDING THREADS OF THE BOLTS SHALL BE COATED WITH AN APPROVED DEBONDING AGENT. ONCE THE CONCRETE HAS SET AND PRIOR TO STRIPPING THE SHUTTER THE M10 BOLTS SHALL BE REMOVED. THE BOLT HOLES SHALL BE MADE GOOD WITH EPOXY FILLER AND THE PAINT WORK TOUCHED UP.

CULVERT HYDRAULICS

1. CATCHMENT AREA (km²):	5.594
2. RETURN PERIOD (yr):	20
3. DESIGN Qt (m³/s):	22.81
4. HEADWATER:	0.87
5. DESIGN FLOOD LEVEL:	100.130
6. FREEBOARD (m):	0.4
7. FLOW VELOCITY (m/s):	2.14
8. AVE SLOPE OF STREAMBED (m/m):	0.004
9. METHOD OF ANALYSIS:	SDF

FOR TENDER PURPOSES ONLY

SCALE FOR REDUCED PLAN
100mm ON ORIGINAL PLAN

No.	DATE	REVISION	CONSULT. ENG

CONSTRUCTION RECORD
WORKS CONTRACT ENGINEER
Name :
Prof. Reg. No. :
Date :
SANRAL PROJECT MANAGER
Name :
Date :

DESIGNED BY	
NAME	
Prof. Reg. No.	
CHECKED BY	
NAME	
Prof. Reg. No.	
DRAWN BY	
NAME	

CONSULTANT APPROVAL
Name :
Prof. Reg. No. :
Date :

HEAD OFFICE
48 Tambotie Avenue
Val de Grace
Pretoria
0184

PO Box 415
PRETORIA 0001
South Africa

Tel:(012) 844 8000

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

NORTHERN REGION
38 Ida Street
Menlo Park
Pretoria
0081

Private Bag X17
Lynnwood Ridge
0040

Tel: (012) 426 6200

ACCEPTANCE
THE ACCEPTANCE IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OR LIABILITY OF ANY KIND FROM WHATSOEVER CAUSE OR HOWEVER ARISING.

for CEO : SA NATIONAL ROADS AGENCY LTD
Date:

REHABILITATION OF NATIONAL ROUTE 11 SECTION 13
FROM R518 INTERSECTION(km 8.340) TO GROOTSANDSLOOT RIVER (km 24.280)

NEW 3/3.00 x 0.90m CULVERT AT km 12.156 399
GENERAL LAYOUT

SCALE: AS SHOWN SHEET 2 OF 4

PROJECT NUMBER	NRA N.011-130-2010/1	
DRAWING LOCATION DATA	START	END
ROUTE	N11	N11
SECTION	13	13
DRAWING km DISTANCE	12.156	12.156
DRAWING TYPE	STRUCTURES - CULVERTS	
BRIDGE/STRUCTURE No.		
CONSULTANT DRAWING No.	251020-PPO-MC13-02	VER V1
SANRAL DOC #		