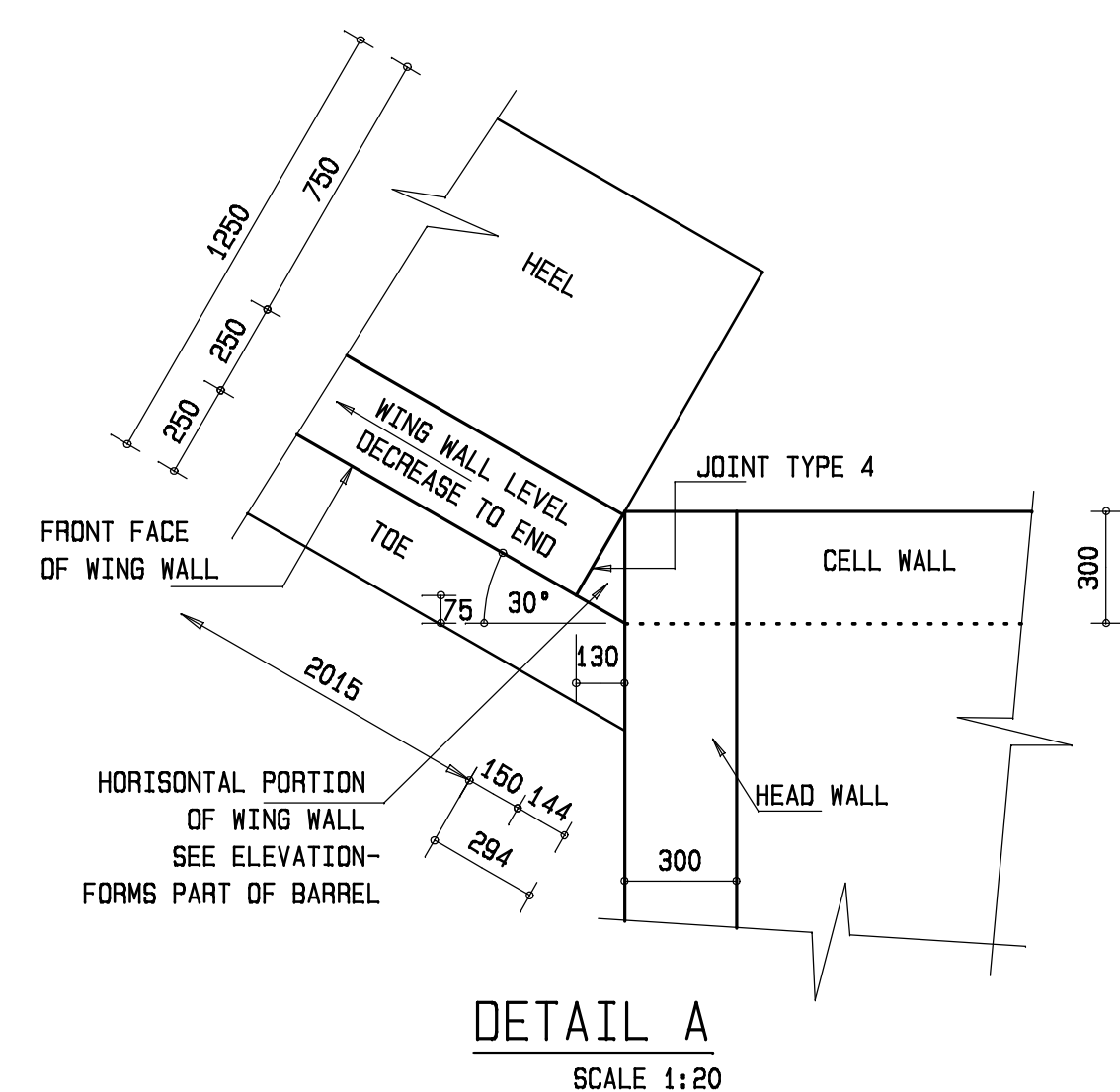


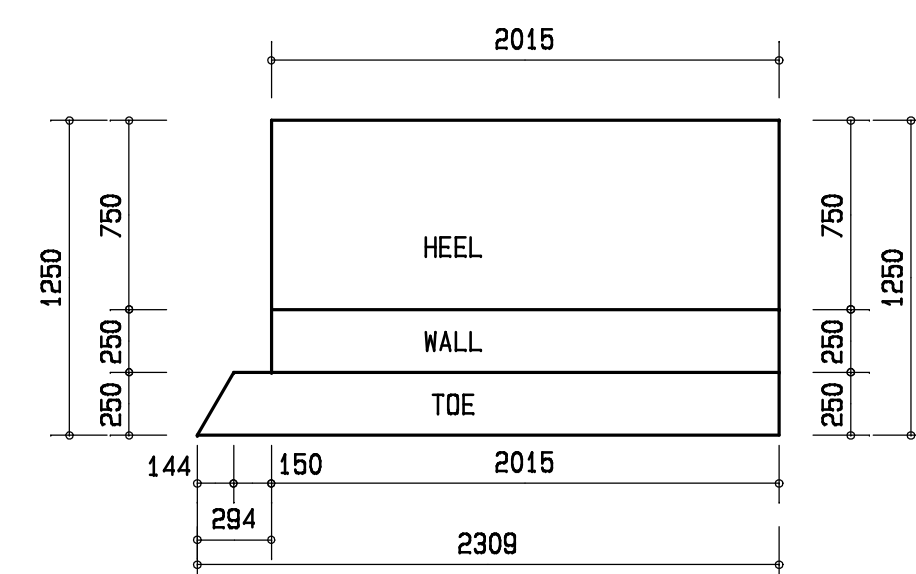
NOTE:
ALL EXISTING LEVELS AND DIMENSIONS
MUST BE CHECKED BEFORE CONSTRUCTION
CAN COMMENCE.
ANY DISCREPANCIES MUST BE BROUGHT TO
THE ATTENTION OF THE RESIDENT ENGINEER.

POINT	Y	X
A	3 484.675	2 668 061.031
B	3 482.693	2 668 061.292
C	3 471.786	2 668 062.724
D	3 463.359	2 668 063.831
E	3 461.376	2 668 064.061

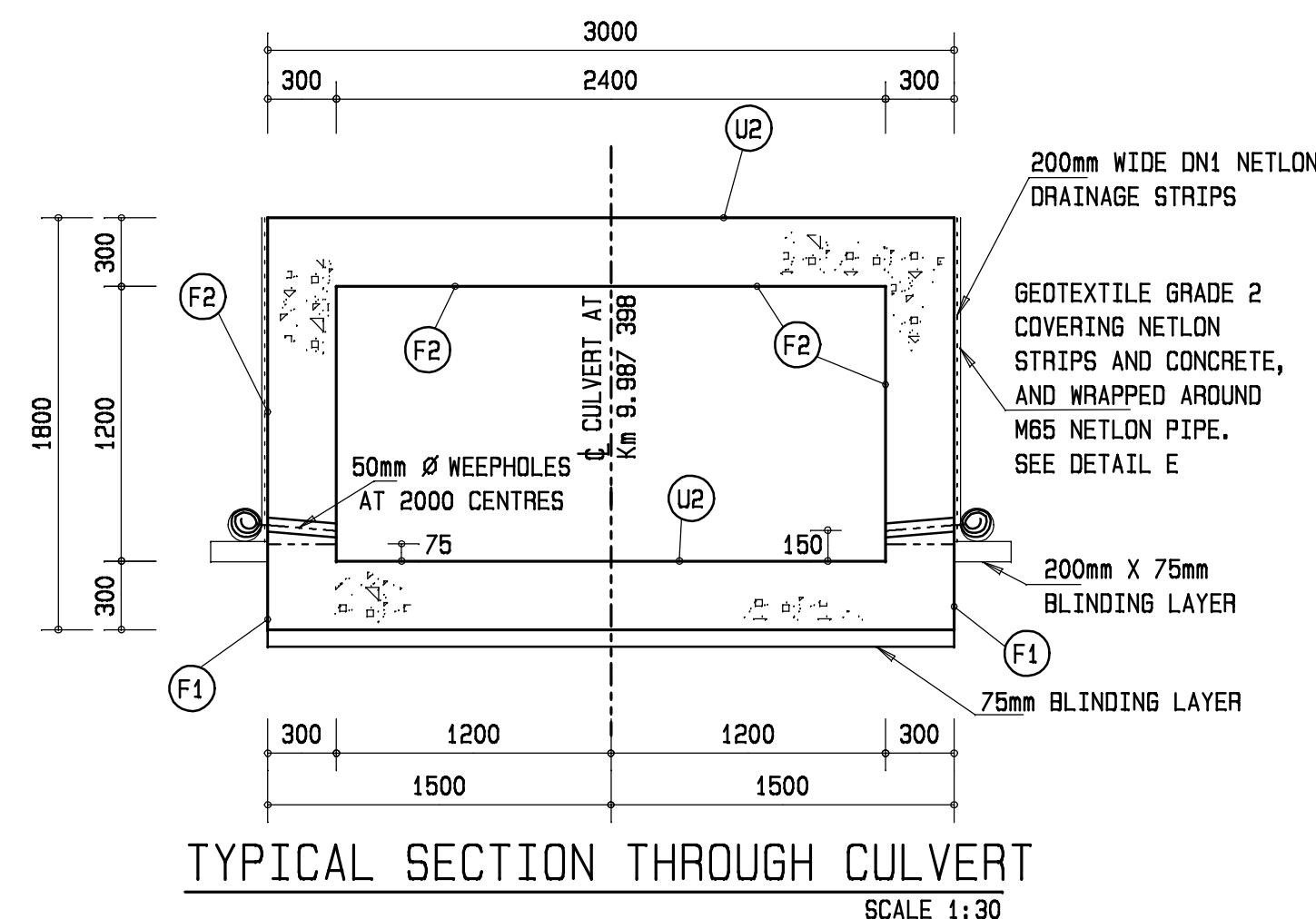
NOTE:
BEFORE DEMOLISHING OF PORTIONS OF THE EXISTING
STRUCTURE CAN COMMENCE, MUST THE POSITIONS OF
ALL EXISTING SERVICES (e.g. OPTICAL CABLES AND
WATER MAINS etc) BE RECORDED IN ORDER TO MAKE
PROVISION TO PROTECT IT AGAINST AGAINST ANY
POSSIBLE DAMAGE.



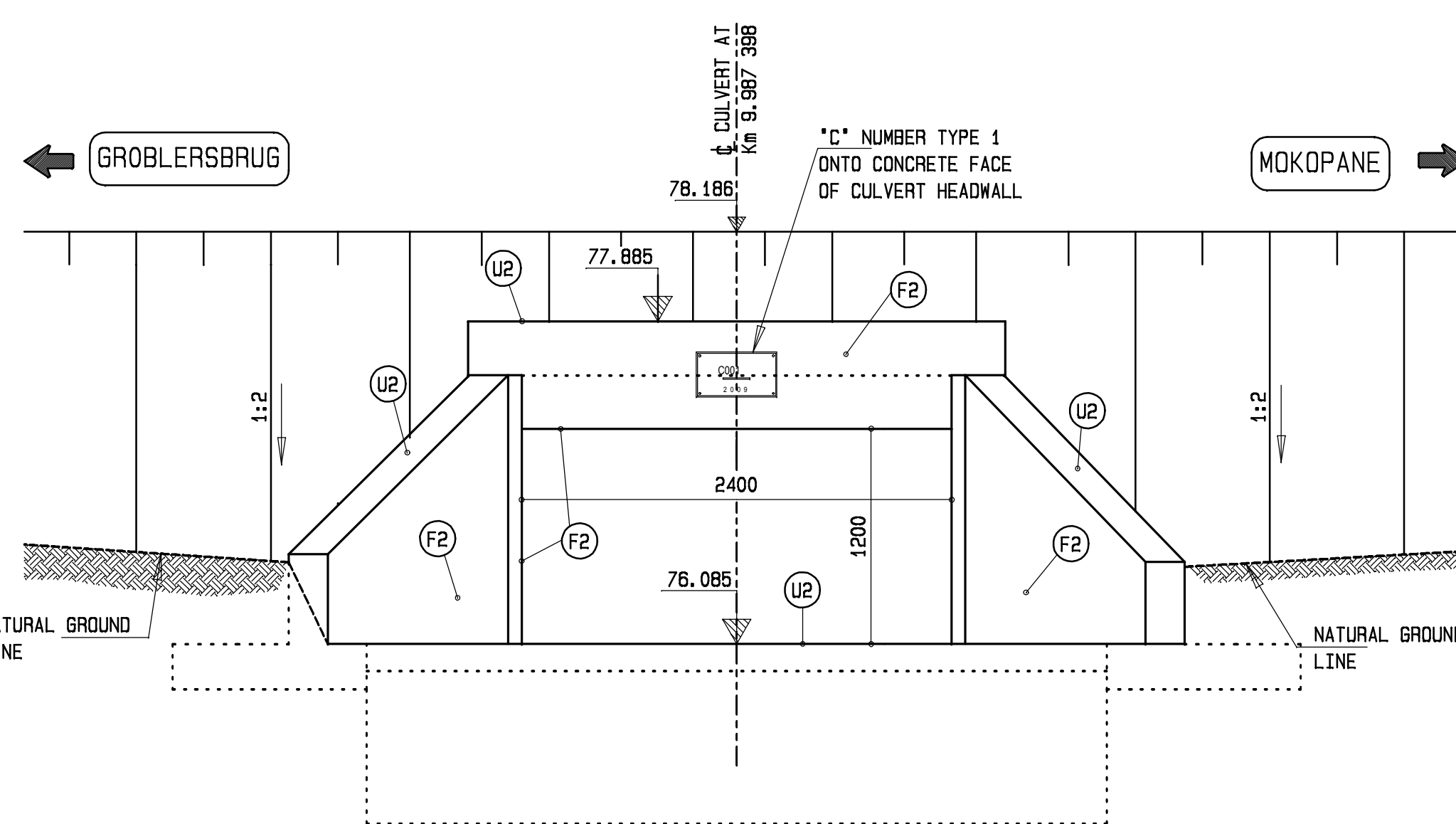
TYPICAL SECTION THROUGH WING WALLS
SCALE 1:30



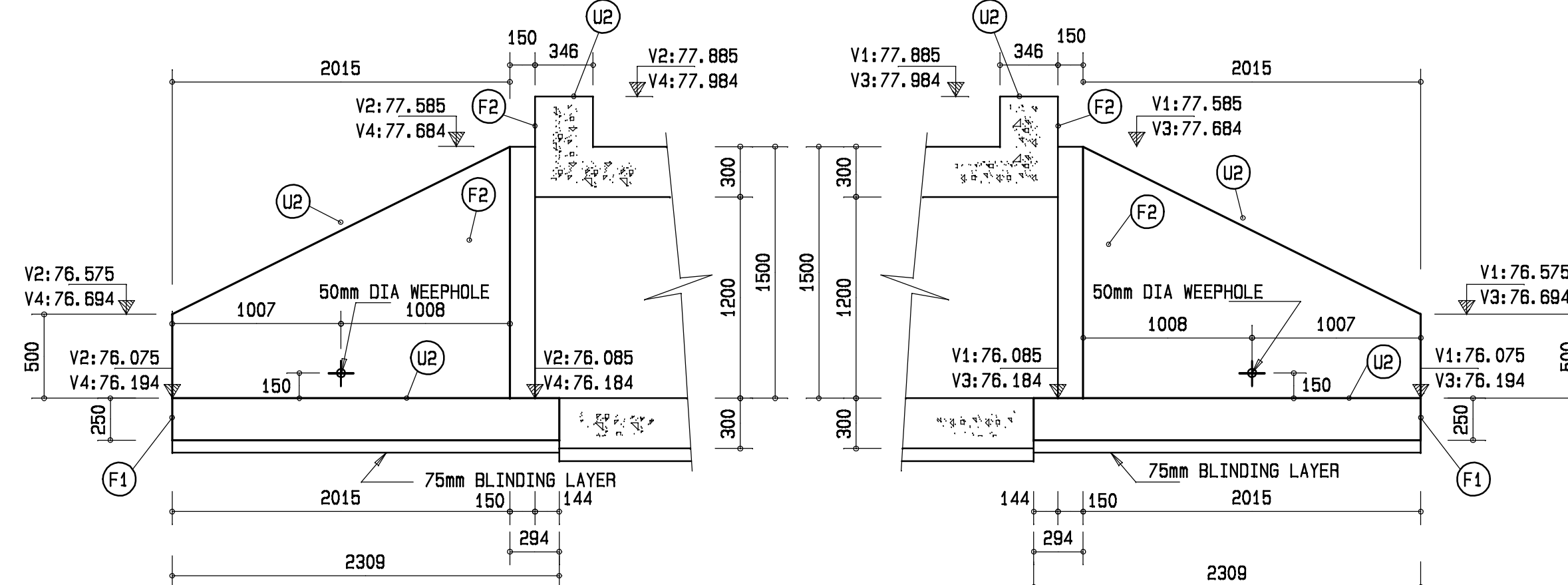
PLAN OF WING WALL FOOTINGS
SCALE 1:30



TYPICAL SECTION THROUGH CULVERT
SCALE 1:30

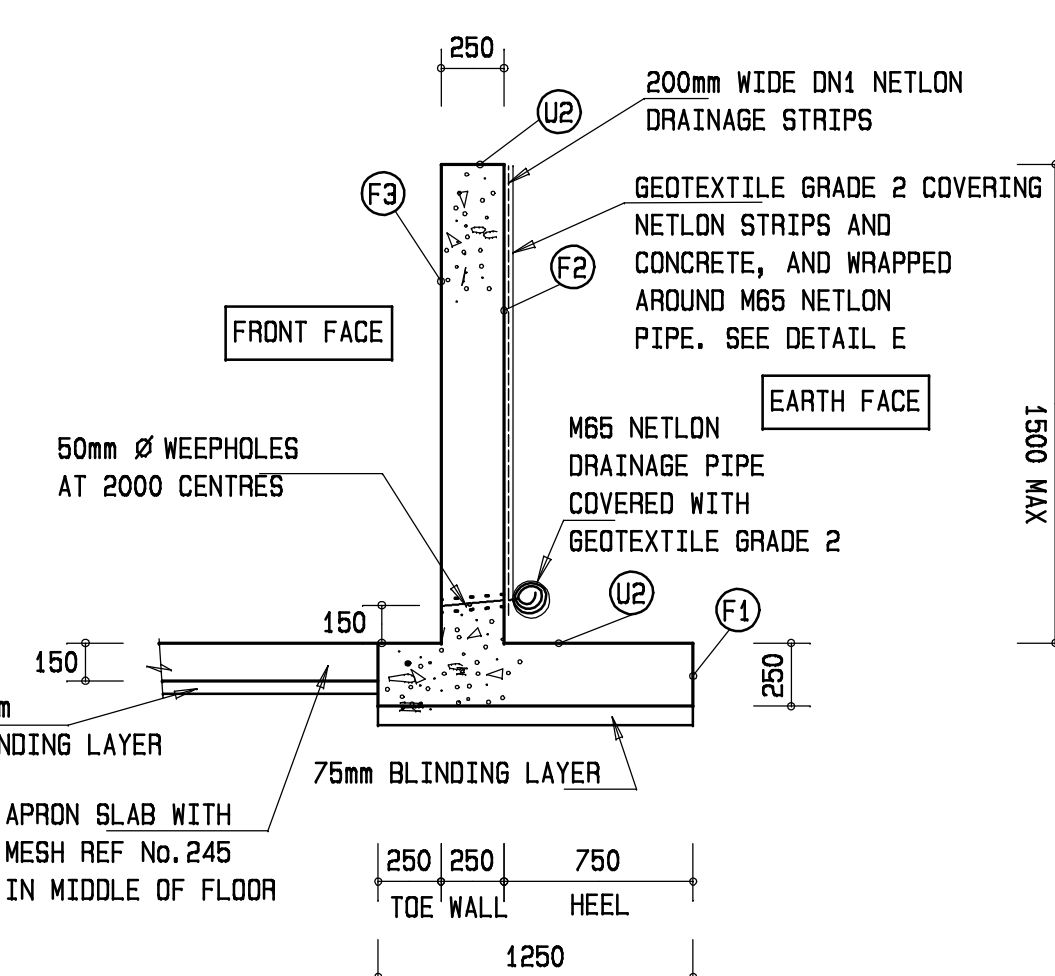


ELEVATION ON CULVERT
(OUTLET SIDE)
SCALE 1:30



ELEVATION ON WING WALLS V2 & V4
SCALE 1:30

ELEVATION ON WING WALLS V1 & V3
SCALE 1:30



TYPICAL SECTION THROUGH WING WALLS
SCALE 1:30

DESIGN DATA

GENERAL DESIGN NOTES:

1) THE CULVERT CONSISTS OF 1/2.40m x 1.20m CELL OF
IN-SITU CAST CONCRETE

2) DESIGN METHOD: LIMIT STATE

3) DESIGN CODE: TM47:PART 3 - 1989

DESIGN LOADINGS:

1) DESIGN CODES: TM47 - PARTS 1 AND 2,
CODE OF PRACTICE FOR THE DESIGN
OF HIGHWAY BRIDGES AND CULVERTS
IN SOUTH AFRICA (AS AMENDED IN
1989) *

2) LIVE LOADS: TYPE NA LOADING
TYPE NB-36 LOADING AND NC35 x 5 x40

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

4) DESIGN FILL HEIGHT: 0.7m

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 (f_{cu}=30MPa) =286GPa
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	f _{cu} (MPa)	CLASS
BLINDING LAYERS	15	C12/15-20
FLOOR AND APRON SLABS	30	C25/30-XC3 (100) -20
WALLS AND WING WALLS	30	C25/30-XC3 (100) -20
DECK SLAB AND HEAD WALLS	30	C25/30-XC3 (100) -20

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

3) REINFORCING CHARACTERISTIC STRENGTHS

DESCRIPTION	f _y (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

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

MANUFACTURE OF NUMBER PLATES

TYPE 1 NUMBER PLATE

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

CONSTRUCTION OF NUMBER PLATES

TYPE 1 NUMBER PLATE

- THE CULVERT NUMBER PLATES SHALL BE POSITIONED AS SHOWN.
- 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

- CATCHMENT AREA (km²): 6.574
- RETURN PERIOD (yr): 20
- DESIGN Q: (m³/s): 16.37
- HEADWATER: 1.52
- DESIGN FLOOD LEVEL: 78.170
- FREEBOARD (m): 0.43
- FLOW VELOCITY (m/s): 2.48
- AVE. SLOPE OF STREAMBED (m/m): 0.005
- METHOD OF ANALYSIS: SDP

FOR TENDER PURPOSES ONLY

No.	DATE	REVISION	CONSULT. ENG.	CONSTRUCTION RECORD	DESIGNED BY	CONSULTANT APPROVAL	HEAD OFFICE	NORTHERN REGION	ACCEPTANCE	PROJECT NUMBER	NRA N 011-130-2010/1
				WORKS CONTRACT ENGINEER	NAME	NAME	448 Tumbos Avenue	38 Ida Street	THE ACCEPTANCE IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OR LIABILITY OF ANY KIND FROM WHATEVER CAUSE OR HOWEVER ARISING.	REHABILITATION OF NATIONAL ROUTE 11 SECTION 13 FROM R518 INTERSECTION(km 8.340) TO GROOTSANDSLOOT RIVER (km 24.280)	START
				Name : Prof. Reg. No. : Date :	Prof. Reg. No. : Date :	Prof. Reg. No. : Date :	Pretoria 0184	Menlo Park Pretoria 0081		ROUTE	N11
				SANRAL PROJECT MANAGER	CHECKED BY		PO Box 415	Private Bag X17		SECTION	N11
				Name : Date :	NAME		Pretoria 0001	Lynnwood Ridge 0040		DRAWING km DISTANCE	9.987
					Prof. Reg. No. : Date :		South Africa			DRAWING TYPE	STRUCTURES - CULVERTS
					DRAWN BY		Tel:(012) 844 8000	Tel: (012) 426 6200		BRIDGE/STRUCTURE No.	
					NAME					CONSULTANT DRAWING No.	251020-PP0-MC11-02
										SANRAL DCC #	VER V1
										SCALE: AS SHOWN	SHEET 2 OF 4