



DESIGN DATA

GENERAL DESIGN NOTES:

1) THE CULVERT CONSISTS OF 2/2.40m 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 1988)"

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

3) DEAD LOADS: IN-SITU CONCRETE - 25.5kN/m³  
PREMIEX-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 (f<sub>cu</sub>=30MPa) =286Pa  
REINFORCING STEEL =2006Pa

MATERIALS

1) FOUNDINGS

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

2) CONCRETE CHARACTERISTIC STRENGTHS (95%)

| STRUCTURAL ELEMENT       | f <sub>cu</sub> (MPa) | CLASS                |
|--------------------------|-----------------------|----------------------|
| BLINDING LAYERS          | 15                    | C12/15-20            |
| FLOOR AND APRON SLABS    | 30                    | (25/30-XC3 (100) -20 |
| WALLS AND WING WALLS     | 30                    | (25/30-XC3 (100) -20 |
| DECK SLAB AND HEAD WALLS | 30                    | (25/30-XC3 (100) -20 |

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

3) REINFORCING CHARACTERISTIC STRENGTHS

| DESCRIPTION                        | f <sub>y</sub> (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

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

MANUFACTURE OF NUMBER PLATES

TYPE 1 NUMBER PLATE

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

CONSTRUCTION OF NUMBER PLATES

TYPE 1 NUMBER PLATE

(1) THE CULVERT NUMBER PLATES SHALL BE POSITIONED AS SHOWN.  
(11) 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):          | 1.654 |
| 2. RETURN PERIOD (yr):            | 20    |
| 3. DESIGN Q1 (m³/s):              | 9.99  |
| 4. HEADWATER:                     | 1.3   |
| 5. DESIGN FLOOD LEVEL:            | 5.800 |
| 6. FREEBOARD (m):                 | 0.79  |
| 7. FLOW VELOCITY (m/s):           | 2.07  |
| 8. AVE. SLOPE OF STREAMBED (m/m): | 0.005 |
| 9. METHOD OF ANALYSIS:            | SOF   |

FOR TENDER PURPOSES ONLY

|                     |  |  |  |                         |  |  |  |                                |  |  |  |                        |  |  |  |              |  |  |  |  |  |  |  |   |  |  |  |                    |  |  |  |             |  |  |  |                     |  |  |  |                                |  |  |  |            |  |  |  |                                |  |  |  |          |  |  |  |   |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |                 |  |  |  |              |  |  |  |   |  |  |  |                      |  |  |  |   |  |  |  |                     |  |  |  |  |  |  |  |                       |  |  |  |              |  |  |  |                    |  |  |  |     |  |  |  |    |  |  |  |
|---------------------|--|--|--|-------------------------|--|--|--|--------------------------------|--|--|--|------------------------|--|--|--|--------------|--|--|--|--|--|--|--|---|--|--|--|--------------------|--|--|--|-------------|--|--|--|---------------------|--|--|--|--------------------------------|--|--|--|------------|--|--|--|--------------------------------|--|--|--|----------|--|--|--|---|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|-----------------|--|--|--|--------------|--|--|--|---|--|--|--|----------------------|--|--|--|---|--|--|--|---------------------|--|--|--|--|--|--|--|-----------------------|--|--|--|--------------|--|--|--|--------------------|--|--|--|-----|--|--|--|----|--|--|--|
| CONSTRUCTION RECORD |  |  |  | WORKS CONTRACT ENGINEER |  |  |  | Name<br>Prof. Reg. No.<br>Date |  |  |  | SANRAL PROJECT MANAGER |  |  |  | Name<br>Date |  |  |  | Worley Parsons RSA retains the copyright in all intellectual property, including designs and/or documents prepared in terms of this appointment or the project covered by the appointment. The client may use the designs and/or documents for the sole purpose of their intended use on this project only subject to payment for the design having been received. Use for any other purpose, whether or not the design and/or documents have been paid for constitutes an infringement of copyright, and all rights are reserved. |  |  |  | All dimensions to be checked on site before any work is put in hand. Refer any discrepancies to the engineer. |  |  |  | Copyright reserved |  |  |  | DESIGNED BY |  |  |  | CONSULTANT APPROVAL |  |  |  | Name<br>Prof. Reg. No.<br>Date |  |  |  | CHECKED BY |  |  |  | Name<br>Prof. Reg. No.<br>Date |  |  |  | DRAWN BY |  |  |  | HEAD OFFICE<br>448 Tabor Avenue<br>Val de Grace<br>Pretoria<br>0184<br><br>PO Box 415<br>PRETORIA 0001<br>South Africa<br><br>Tel: (012) 844 8000 |  |  |  | NORTHERN REGION<br><br>38 Ida Street<br>Menlo Park<br>Pretoria<br>00811<br><br>Private Bag X17<br>Lynnwood Ridge<br>0040<br><br>Tel: (012) 426 6200 |  |  |  | ACCEPTANCE<br><br>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.<br><br>for CEO: SA NATIONAL ROADS AGENCY LTD<br>Date: |  |  |  | REHABILITATION OF NATIONAL ROUTE 11 SECTION 13<br>FROM R518 INTERSECTION(km 8.340) TO GROOTSANDSLOOT RIVER (km 24.280) |  |  |  | NEW 2/2.40 x 1.20m CULVERT AT km 20.551<br>GENERAL LAYOUT |  |  |  | SCALE: AS SHOWN |  |  |  | SHEET 2 OF 4 |  |  |  | PROJECT NUMBER<br>DRAWING LOCATION DATA |  |  |  | NRA N 011-130-2010/1 |  |  |  | ROUTE<br>SECTION<br>DRAWING km DISTANCE |  |  |  | N11<br>13<br>20.551 |  |  |  | DRAWING TYPE<br>BRIDGE/STRUCTURE No.<br>CONSULTANT DRAWING No. |  |  |  | STRUCTURES - CULVERTS |  |  |  | SANRAL DOC # |  |  |  | 251020-PPO-MC17-02 |  |  |  | VER |  |  |  | V1 |  |  |  |
|---------------------|--|--|--|-------------------------|--|--|--|--------------------------------|--|--|--|------------------------|--|--|--|--------------|--|--|--|--|--|--|--|---|--|--|--|--------------------|--|--|--|-------------|--|--|--|---------------------|--|--|--|--------------------------------|--|--|--|------------|--|--|--|--------------------------------|--|--|--|----------|--|--|--|---|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|-----------------|--|--|--|--------------|--|--|--|---|--|--|--|----------------------|--|--|--|---|--|--|--|---------------------|--|--|--|--|--|--|--|-----------------------|--|--|--|--------------|--|--|--|--------------------|--|--|--|-----|--|--|--|----|--|--|--|