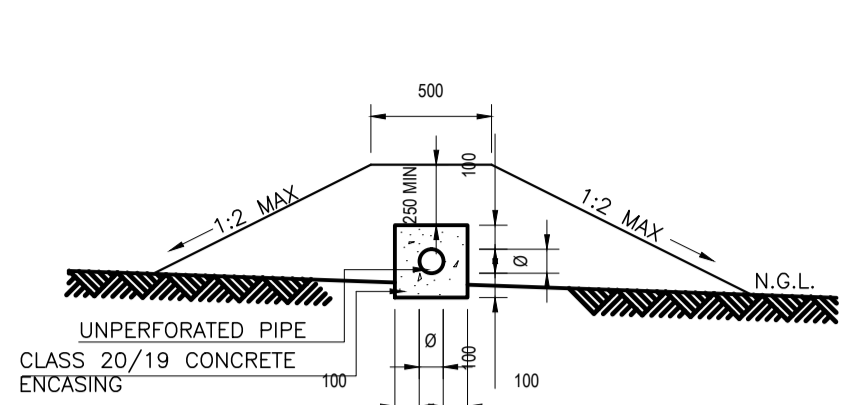
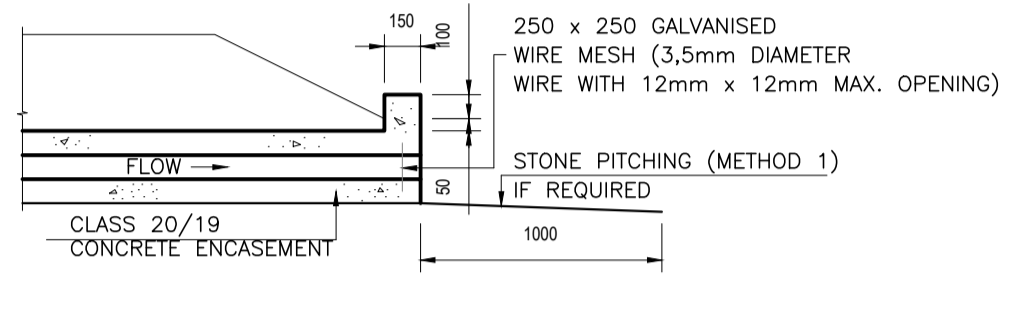


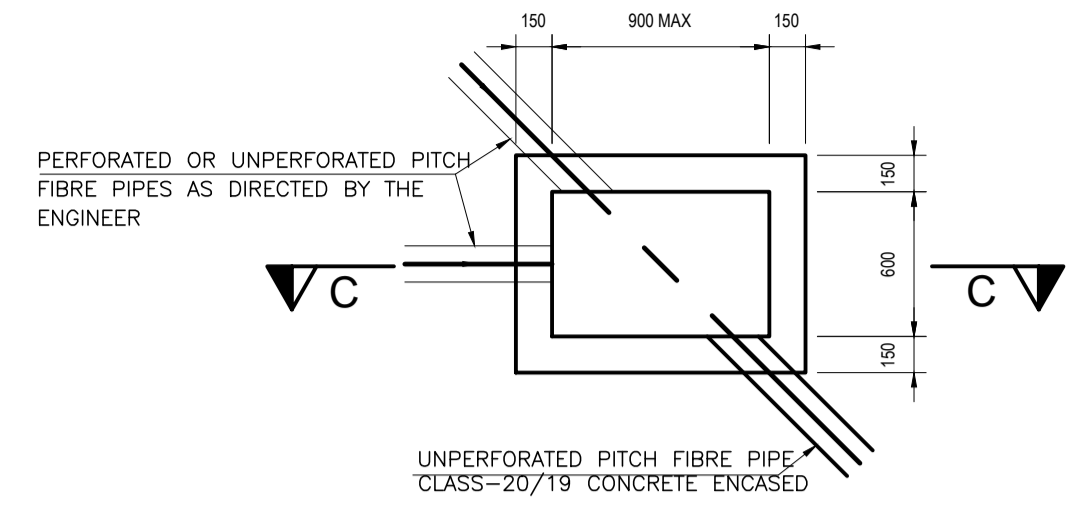
**TYPICAL LAYOUT OF SUBSURFACE DRAINAGE**  
SCALE 1:200



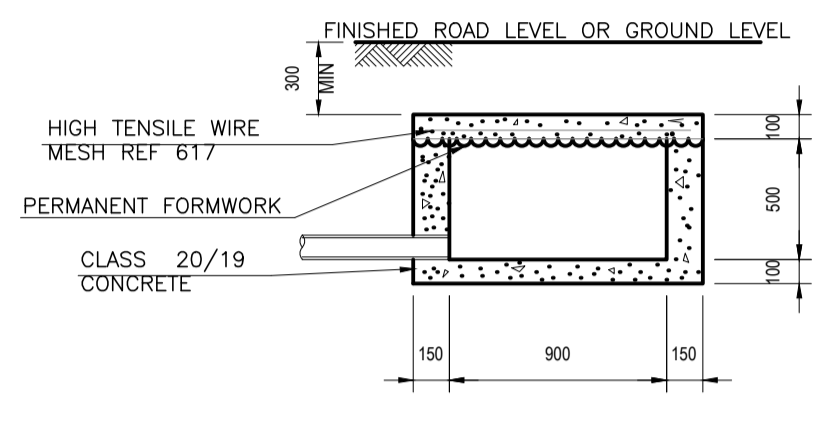
**SECTION A-A**  
LONGITUDINAL-SECTION OF PIPE  
TYPE A OUTLET STRUCTURE  
SCALE 1:20



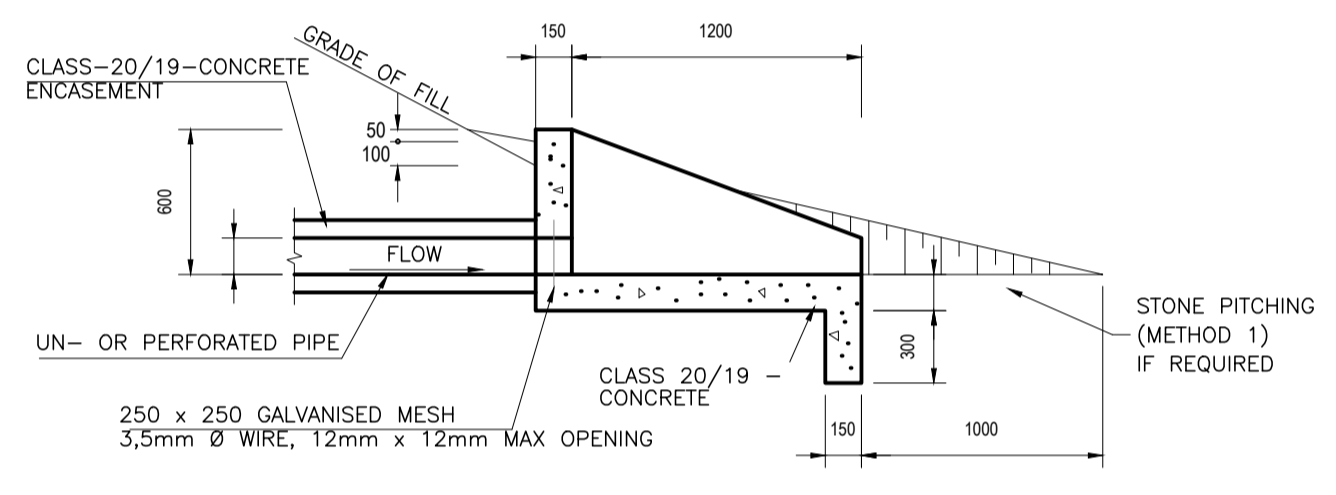
**SECTION B-B**  
LONGITUDINAL-SECTION OF PIPE  
TYPE A OUTLET STRUCTURE  
SCALE 1:20



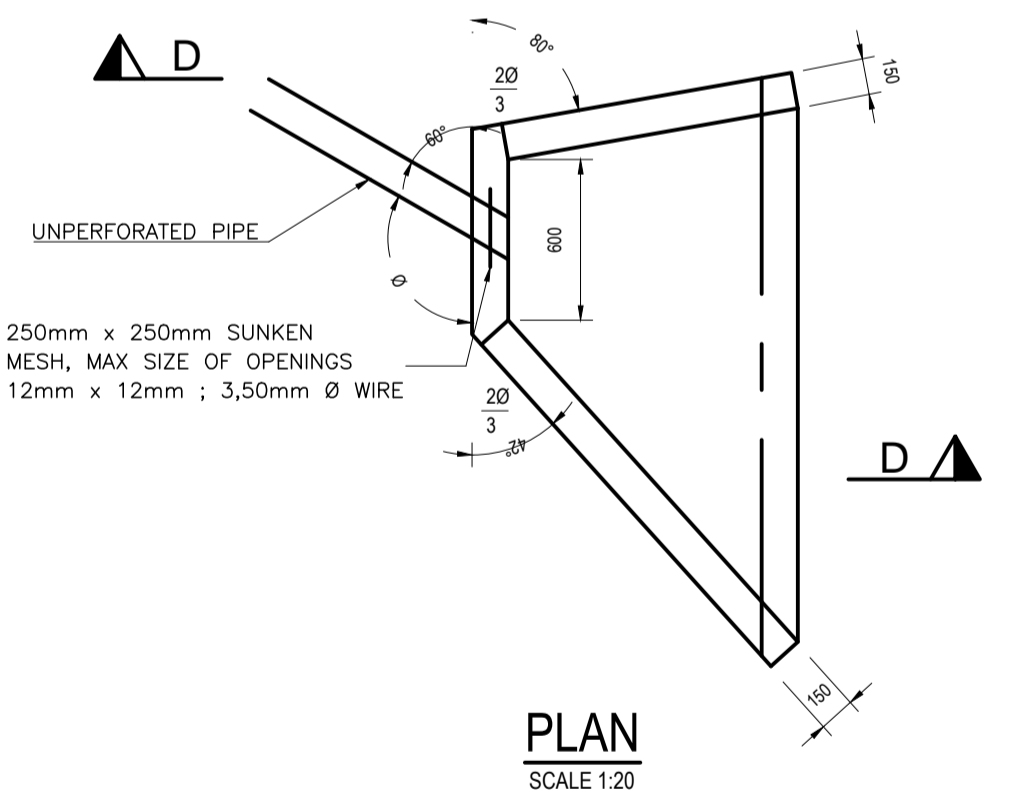
**DETAIL A**  
SCALE 1:20



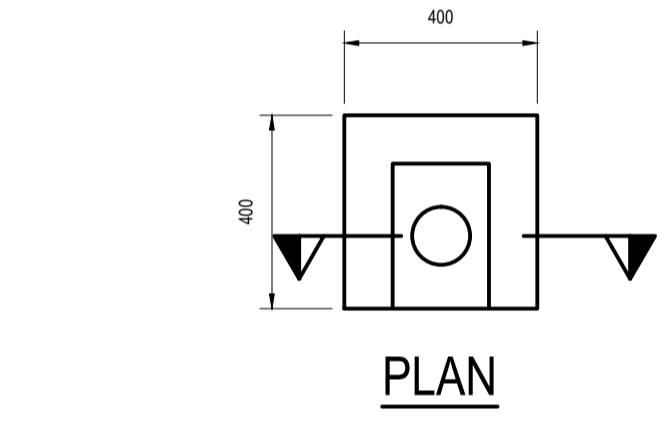
**SECTION C-C**  
SCALE 1:20  
CROSS-SECTION OF JUNCTION BOX



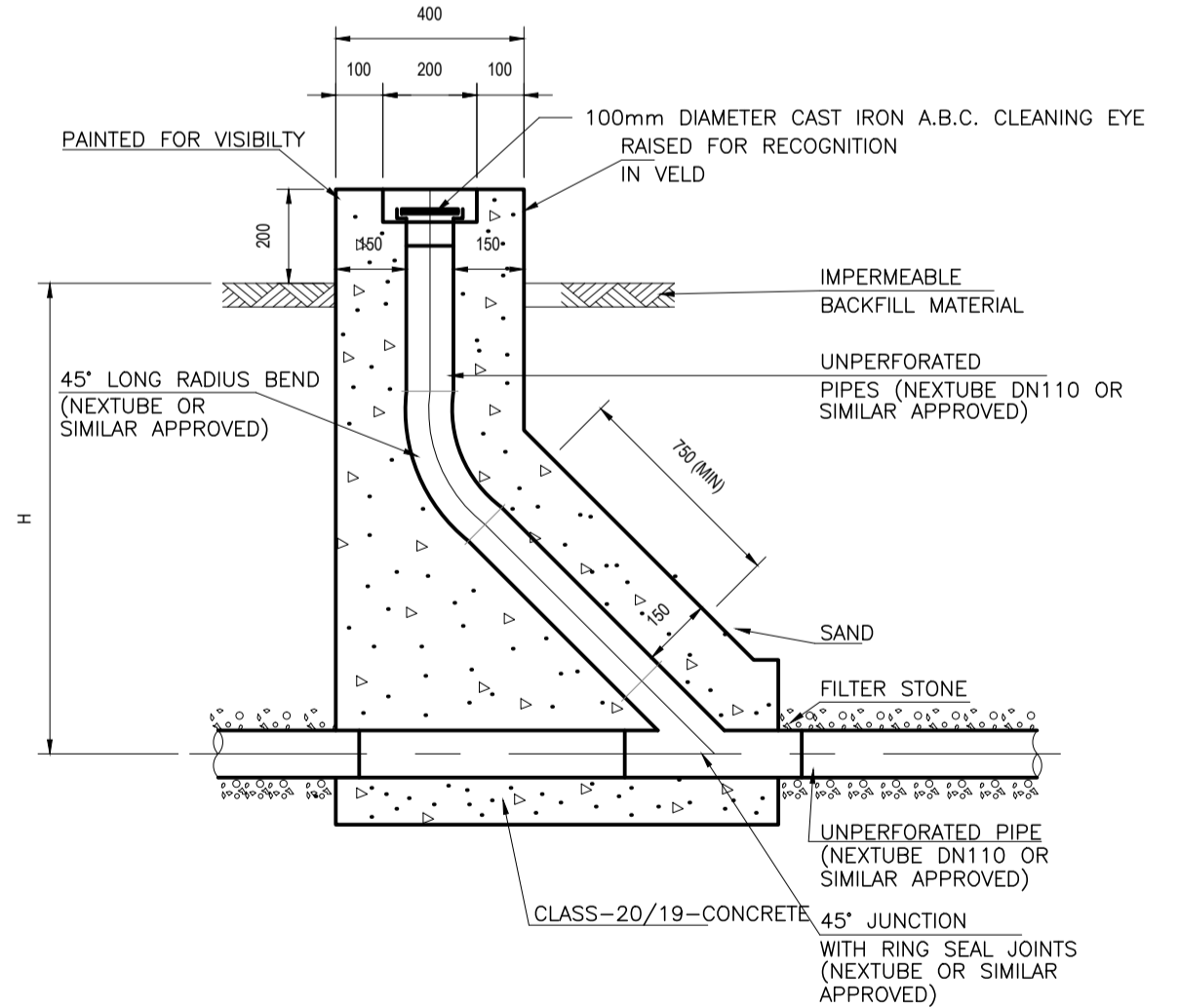
**SECTION D-D**  
SCALE 1:20  
DETAIL OF TYPE B OUTLET



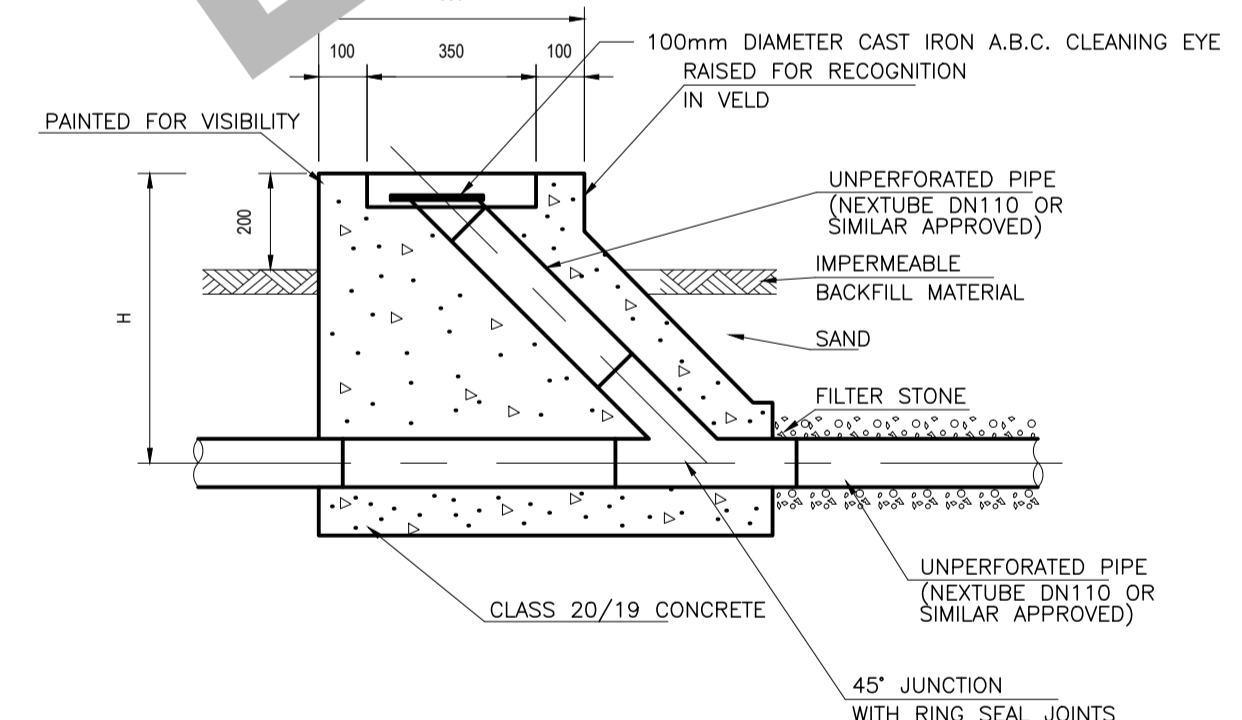
**PLAN**  
SCALE 1:20



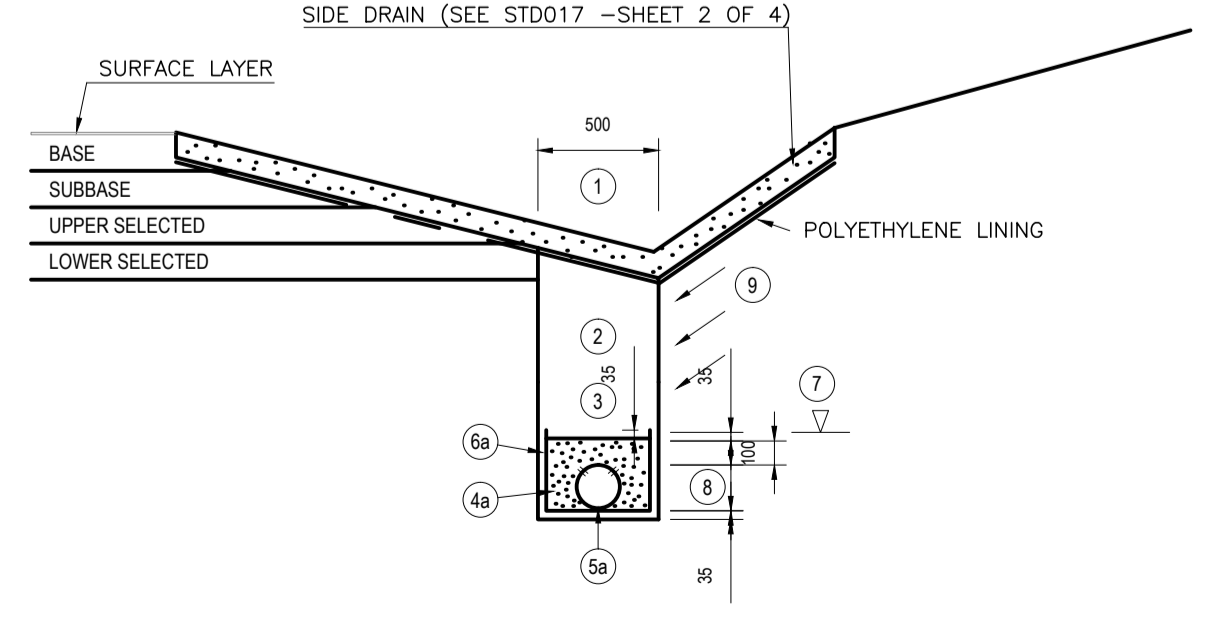
**PLAN**  
SCALE 1:200



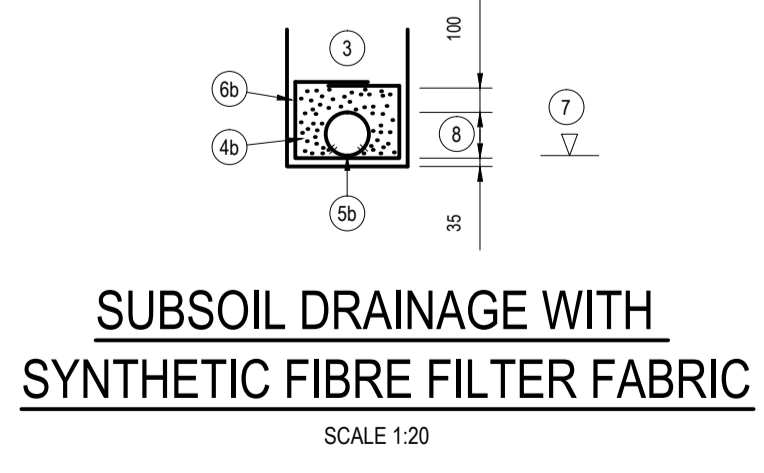
**CLEANING EYE (TYPE 2)**  
(H > 1000)  
SCALE 1:10



**CLEANING EYE (TYPE 1)**  
(H < 1000)  
SCALE 1:10



**SUBSOIL DRAINAGE WITH POLYETHYLENE LINING**  
SCALE 1:20



**SUBSOIL DRAINAGE WITH SYNTHETIC FIBRE FILTER FABRIC**  
SCALE 1:20

**NOTES AND SPECIFICATIONS**

| NO. | DESCRIPTION   |
|-----|---|
| 1   | THIS DIMENSION MAY BE REDUCED TO A MIN. OF THE PIPE DIAMETER + 20mm, PROVIDED THAT THE SECTIONAL AREA IS MAINTAINED WITHIN THE CLAUSE 20/19 OF THE STANDARD SPECIFICATIONS. |
| 2   | IMPERMEABLE BACKFILL MATERIAL, 100mm THICK TABS TO TOP OF WATER-BEARING LAYER OR CONCRETE LINGS.  |
| 3   | FILTER SAND OF APPROVED SOURCE NATURAL PERMEABLE MATERIAL AND GRADE.  |
| 4   | FILTER STONE - FINE OR COARSE OF APPROVED SOURCE AND GRADE AS REQUIRED (SUBCLAUSE 802.02) OF THE STANDARD SPECIFICATIONS.   |
| 5   | PERFORATED OR UNPERFORATED PITCH FIBRE PIPES SHALL BE 150mm DIA. OR SIMILAR APPROVED.   |
| 6   | SOME 80 FILTER MATERIAL, OR SIMILAR APPROVED TYPE.  |
| 7   | SYNTHETIC FIBRE FILTER FABRIC, GRADE 2, CLASS A (BROWAL OR APPROVED EQUIVALENT).  |
| 8   | LEVEL TO WHICH SURROUNDING AREA IS TO BE DRAINED.   |
| 9   | EXTERNAL PIPE DIAMETER.   |
| 10  | MINIMUM BEARING BETWEEN.  |

- SUBSURFACE DRAINS
  - REFER TO SET OF THE STANDARD SPECIFICATIONS FOR MUNICIPAL ENGINEERING WORKS, 3RD EDITION, 2005.
  - WHERE THE SUBSURFACE DRAINS ARE PLACED IN SOLID ROCK THE PROTECTIVE LINING IS NECESSARY.
  - THE FINAL POSITIONS OF SUBSURFACE DRAINS WILL BE VERIFIED BY THE ENGINEER ON SITE AND ALTERED IF NECESSARY.
- 2. FILTER CRITERIA**
- TO IS THE SIEVE SIZE WHERE  $\mu_v$  OF THE FILTER MATERIAL WILL GO THROUGH.
  - TO IS THE AVERAGE SIZE OR RANGE OF OPENING IN THE SYNTHETIC FIBRE FILTER FABRIC.
  - FILTER SAND (FS) IN RELATION TO WATER-BEARING STRATA (WBS).
  - WHEN  $\mu_{FS} > 100\mu_{WBS}$  (TO PREVENT BLOCCING OF FILTERSAND)
  - $\mu_{FS} < 140\mu_{WBS}$  (BY OR PERMEABILITY OF SAND)
  - $\mu_{FS} < 140\mu_{WBS}$
  - WHEN  $\mu_{FS} < 100\mu_{WBS}$  (TO PREVENT BLOCCING OF FILTERSAND)
  - $\mu_{FS} < 200\mu_{WBS}$
  - $\mu_{FS} < 100\mu_{WBS}$
  - PERMEABILITY REQUIREMENTS UNNECESSARY.
  - FILTER STONE (FS) IN RELATION TO THE SAND (FS) (TO PREVENT BLOCCING OF FILTER SAND)
  - $\mu_{FS} < 140\mu_{FS}$
  - $\mu_{FS} < 250\mu_{FS}$
  - PERMEABILITY FILTER STONE MUST BE COARSER THAN SAND IN ALL RESPECTS.
  - FILTER STONE (FS) IN RELATION TO THE SAND (FS) (TO PREVENT BLOCCING OF FILTER SAND)
  - $\mu_{FS} < 140\mu_{FS}$
  - $\mu_{FS} < 250\mu_{FS}$
  - SYNTHETIC FIBRE FILTER FABRIC (FF) IN RELATION TO THE SAND (FS) (TO PREVENT BLOCCING OF SYNTHETIC FIBRE FILTER FABRIC)
  - $\mu_{FF} < 10\mu_{FS}$
  - BY OR PERMEABILITY.
  - $\mu_{FF} < 10\mu_{FS}$
- CAST IN SITU CONCRETE
  - CONCRETE TO BE CLASS 20/19.
  - CONCRETE TO BE CURED FOR A MINIMUM OF 7 DAYS.
  - ALL FORMED SURFACES SHALL HAVE A CLASS F3 SURFACE FINISH.
  - ALL UNFORMED SURFACES SHALL HAVE A CLASS F3 SURFACE FINISH.

**AMENDMENTS**

| NR. | DATE | APPROVED | DESCRIPTION | PAR. |
|-----|------|----------|-------------|------|
|     |      |          |             |      |
|     |      |          |             |      |
|     |      |          |             |      |

|  |      |  |      |
|--|------|--|------|
| DESIGNED<br>J.J. WESSELS PR. ENG.          | DATE | DRAWN<br>S. AUDIE  | DATE |
| DESIGN CHECKED BY<br>J.J. WESSELS PR. ENG. | DATE | INFRASTRUCTURE TECHNICAL INFORMATION MANAGEMENT<br>D.J. CHALMERS | DATE |

**PROJECT STATUS**

|                                       |                                      |   |  |
|---------------------------------------|--------------------------------------|---|--|
| <input type="radio"/> CONCEPT DRAWING | <input type="radio"/> TENDER DRAWING | <input type="radio"/> APPROVED FOR CONSTRUCTION DRAWING | <input type="radio"/> AS BUILT DRAWING |
|---------------------------------------|--------------------------------------|---|--|

**PROJECT ENGINEER (CONSULTANT)**

|                      |                      |      |
|----------------------|----------------------|------|
| INITIALS AND SURNAME | SIGNATURE AND P. No. | DATE |
|                      |                      |      |

**INSPECTOR OF WORKS (CITY OF TSHWANE)**

|                      |                      |      |
|----------------------|----------------------|------|
| INITIALS AND SURNAME | SIGNATURE AND P. No. | DATE |
|                      |                      |      |

**CONSULTANT DETAIL**

|  |  |  |
|--|--|--|
|  |  |  |
|--|--|--|

**CITY OF TSHWANE**  
ROADS AND TRANSPORT DEPARTMENT

Mr. P. Lelonyane  
STRATEGIC EXECUTIVE DIRECTOR  
P.O. BOX 1409  
PRETORIA  
0001

Ms. L. V. Kegakwe-Piki  
EXECUTIVE DIRECTOR  
P.O. BOX 1409  
PRETORIA  
0001

DRAWING APPROVED BY EXECUTIVE DIRECTOR  
Ms. L. V. Kegakwe-Piki

**TYPICAL STANDARD DETAILS**

**DETAIL OF SUB-SURFACE DRAINS**

|   |                            |
|---|----------------------------|
| ROADS AND STORMWATER<br>For Internal Approval                   |                            |
| DIRECTOR: INFRASTRUCTURE PROVISION                              | SIGNATURE _____ DATE _____ |
| DIRECTOR: INFRASTRUCTURE CONSTRUCTION (PROJECT) MANAGEMENT      | SIGNATURE _____ DATE _____ |
| DIRECTOR: INFRASTRUCTURE ASSET MANAGEMENT                       | SIGNATURE _____ DATE _____ |
| DIRECTOR: TRANSPORT INFRASTRUCTURE PLANNING                     | SIGNATURE _____ DATE _____ |
| DIRECTOR: INTELLIGENT TRANSPORT SYSTEMS AND TRAFFIC ENGINEERING | SIGNATURE _____ DATE _____ |
| DIRECTOR: INFRASTRUCTURE MAINTENANCE MANAGEMENT (IMM)           | SIGNATURE _____ DATE _____ |

|               |              |
|---------------|--------------|
| CONTRACT No.: | PROJECT No.: |
|---------------|--------------|

|          |          |                      |
|----------|----------|----------------------|
| DATE:    | SCALE:   | ORIGINAL PAPER SIZE: |
| MAY 2013 | AS SHOWN | A1                   |

|                              |                     |          |
|------------------------------|---------------------|----------|
| DRAWING NO.<br><b>STD022</b> | SHEET NO.<br>1 OF 1 | REVISION |
|------------------------------|---------------------|----------|