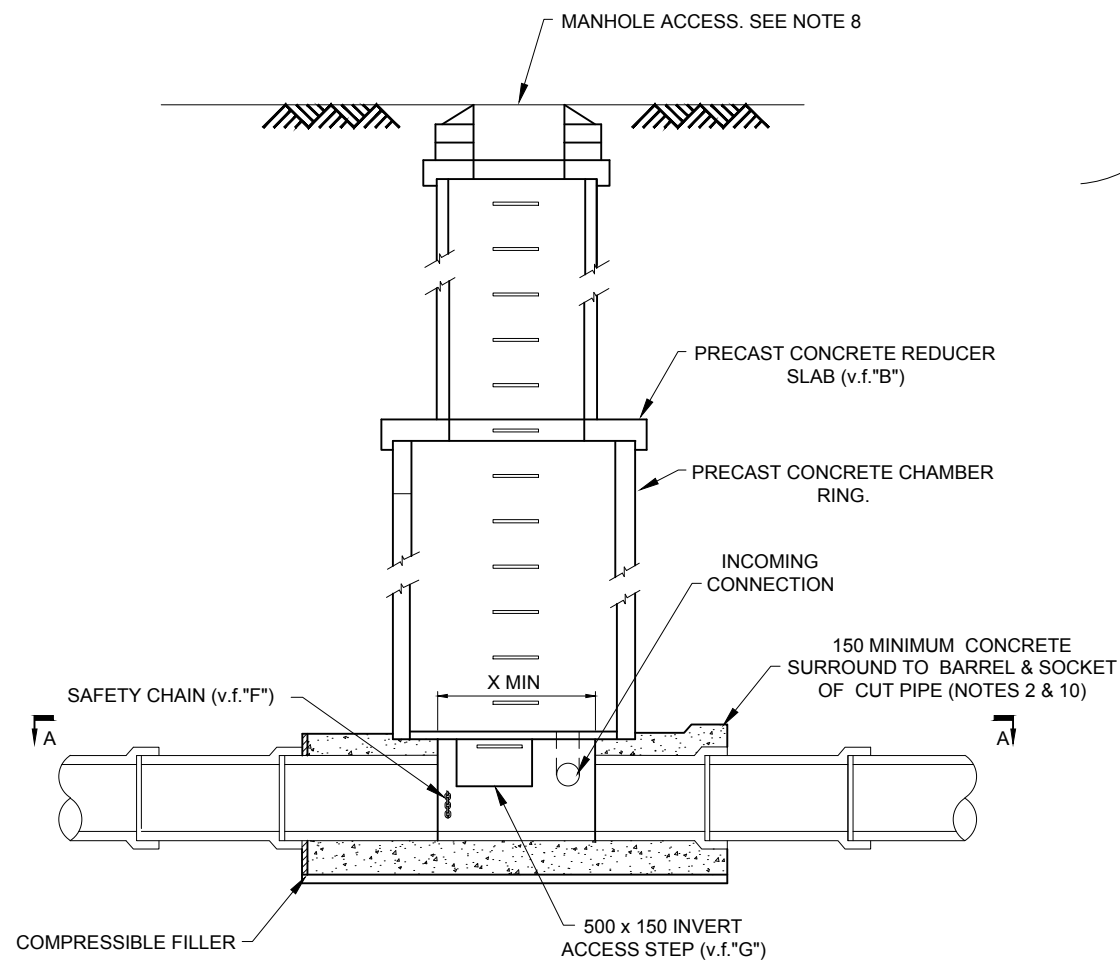


Developer Services Construction Details

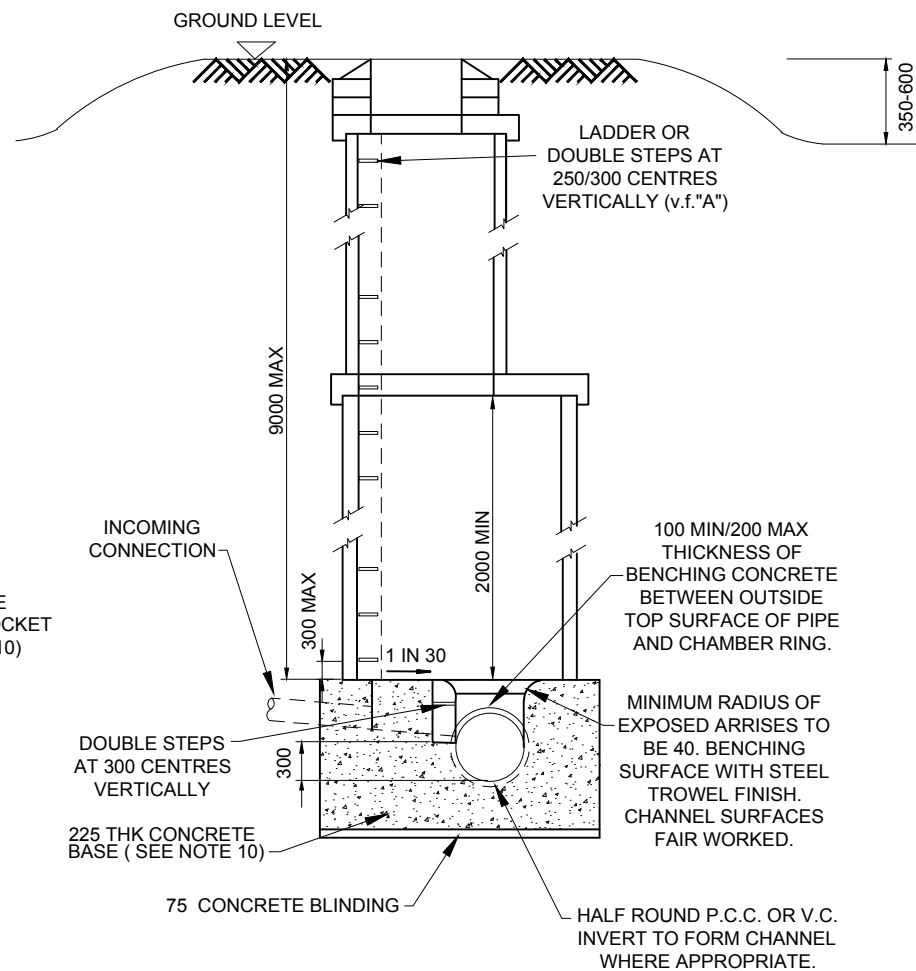


Approved details

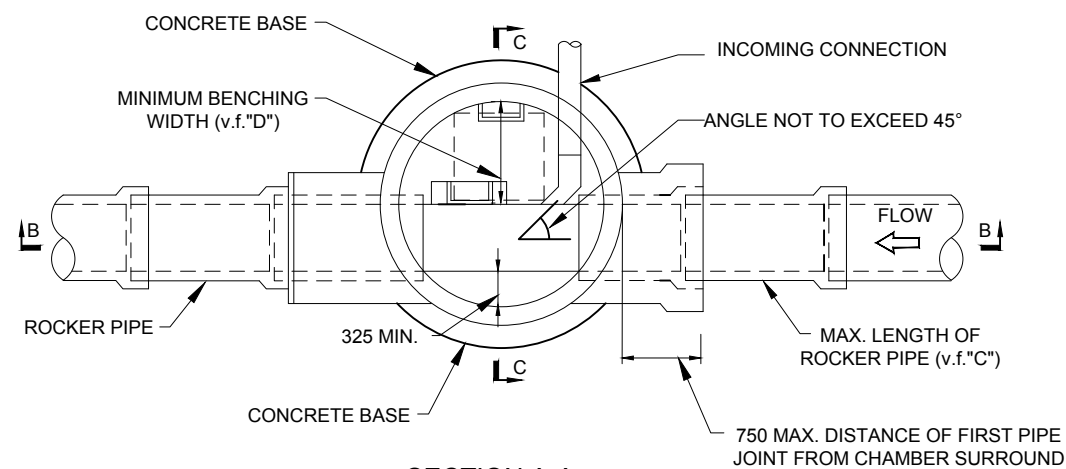
- Developer Services Detail 1 – Manhole Type 1
- Developer Services Detail 2 – Manhole Type 2
- Developer Services Detail 3 – Manhole Type 4
- Developer Services Detail 4 – SW Shallow Manhole
- Developer Services Detail 5 – Flow Control Manhole
- Developer Services Detail 7 – External Backdrop Detail
- Developer Services Detail 8 – Pipe Bedding Detail
- Developer Services Detail 10 – Variable Manhole Features
- Developer Services Detail 11 – Headwall Type 1 Detail
- Developer Services Detail 12 - Headwall Type 2 and 3 Details



SECTION B-B



SECTION C-C



SECTION A-A

MANHOLE TYPE 1 - PIPES NOT EXCEEDING 525 DIAMETER (DEPTH TO BENCHING NOT EXCEEDING 9000)

NOTES

- ALL DIMENSIONS ARE IN MILLIMETRES
- CONCRETE BENCHING AND PIPE SURROUND**
SHALL BE PLACED IN SINGLE CONTINUOUS OPERATION FROM TOP OF BASE SLAB TO TOP OF BENCHING AND PIPE SURROUND
- CONNECTION INTO MANHOLES**
SHALL BE CONSTRUCTED WITH THE SOFFITS LEVEL UNLESS DETAILED DIFFERENTLY ON CONTRACT DRAWINGS
- METALWORK**
LADDERS, HANDRAILING AND SAFETY CHAIN SHALL BE AS SHOWN ON DEVELOPER SERVICES DETAIL 9 (STND/19/009)
- CONCRETE SURROUND TO MANHOLES**
A CONCRETE SURROUND IS NOT NORMALLY REQUIRED TO MANHOLES UNLESS INSTALLED IN AREAS OF UNSTABLE GROUND, UNDER CONDITIONS OF FLOTATION OR WHERE SUBJECT TO EXCEPTIONAL OR ECCENTRIC LOADS. IN WHICH CASES A 150 SURROUND OF AT LEAST 20 N/mm CONCRETE SHALL BE PROVIDED. ANY JOINTS SHOULD BE STAGGERED WITH PRECAST CONCRETE JOINTS
- MINIMUM LENGTH OF CHANNEL (X Min)**

| CHAMBER DIA | "X" MIN |
|-------------|---------|
| 1050 | 800 |
| 1200 | 950 |
| 1350 | 1000 |
| 1500 | 1050 |
| 1800 | 1150 |
| 2100 | 1300 |
| 2400 | 1450 |
| 2700 | 1550 |
| 3000 | 1700 |

- CUT ENDS OF REINFORCED CONCRETE PIPES**
SHALL BE TREATED WITH EPOXY RESIN PAINT/MORTAR
- MANHOLE ACCESSES FOR MANHOLE ACCESS**
OPTIONS AND DETAILS SEE DEVELOPER SERVICES DETAIL 10 (STND/19/010)
DOUBLE STEPS SHALL BE PLASTIC ENCAPSULATED CARBON STEEL TO BS EN 1247-2. DOUBLE STEPS SHALL NOT BE USED WHERE COVER-TO-SOFFIT DIMENSION IS >3.0m
- COVER AND FRAME**
150 DEEP COVERS ARE TO BE USED IN CATEGORY 1, 2, 3 ROADS. 100 DEEP COVERS ARE TO BE USED IN CATEGORY 4 ROADS. DOUBLE TRIANGULAR COVERS ARE TO BE USED IN CARRIAGEWAY. ROAD CATEGORY TO BE DESIGNATED BY THE HIGHWAY AUTHORITY. FRAME TO BE SET AS PER SPECIFICATION
- CONCRETE**
ALL IN-SITU CONCRETE TO BE DC - 3 OR FND3
- VARIABLE FEATURES (V.F.)**
WHERE V.F. APPEARS IN ANNOTATION REFER TO VARIABLE FEATURES AS SHOWN ON DEVELOPER SERVICES DETAIL 10 (STND/19/010)

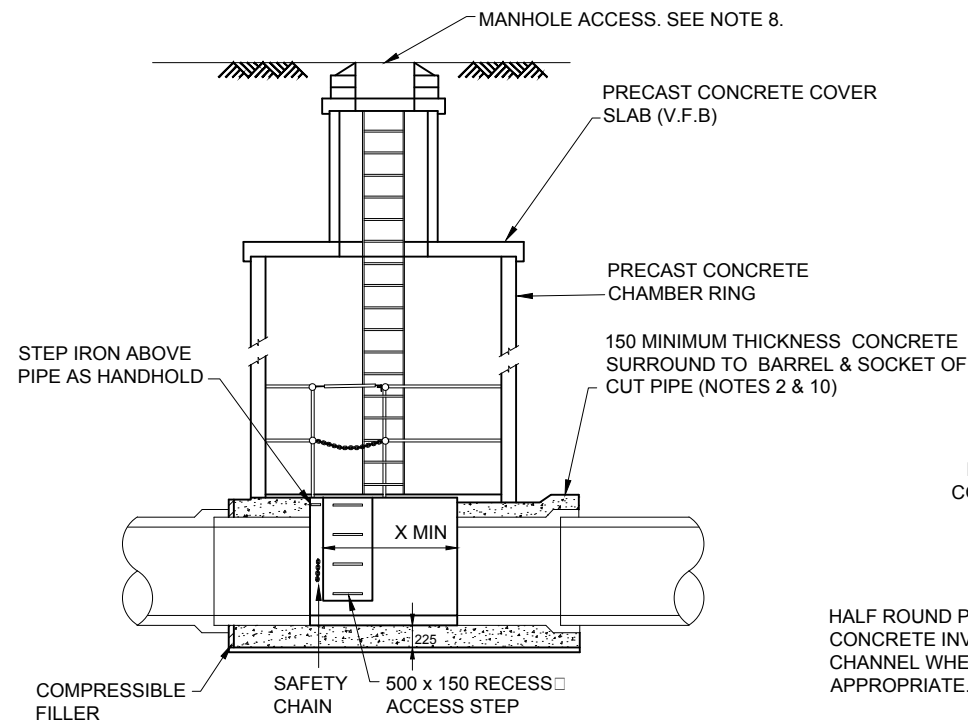
CURRENT ISSUE INFORMATION
B. DEPTH TO BENCHING INCREASED TO 9m MAX.

| | | | | | |
|---------|------|------|------|-----------------|----------|
| B | SC | DH | JH | FOR INFORMATION | 26.07.24 |
| VERSION | DRWN | CHKD | REVD | DATE | |

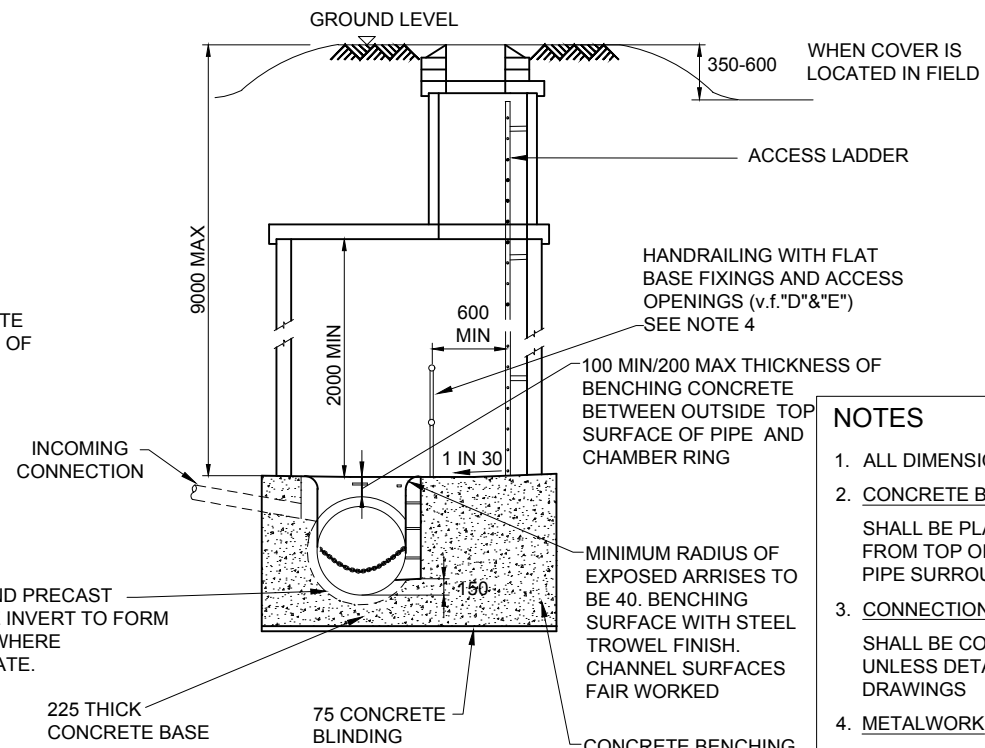


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DEVELOPER SERVICES
DETAIL 1
MANHOLE TYPE 1

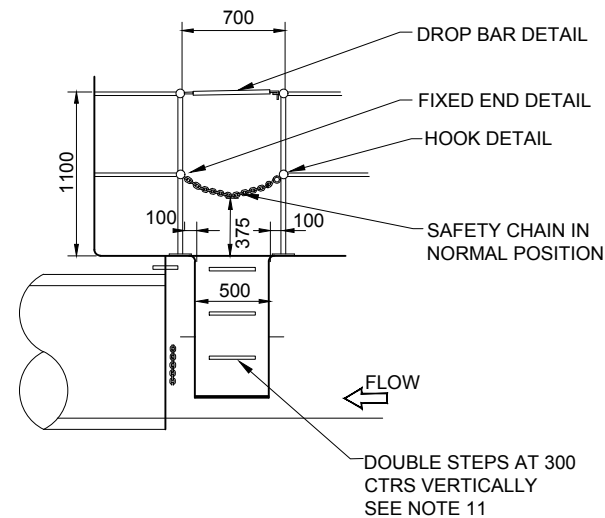
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| SCALE | NTS | SHEET SIZE | A3 |
| DRAWING NUMBER | STND/19/001 | REVISION | B |



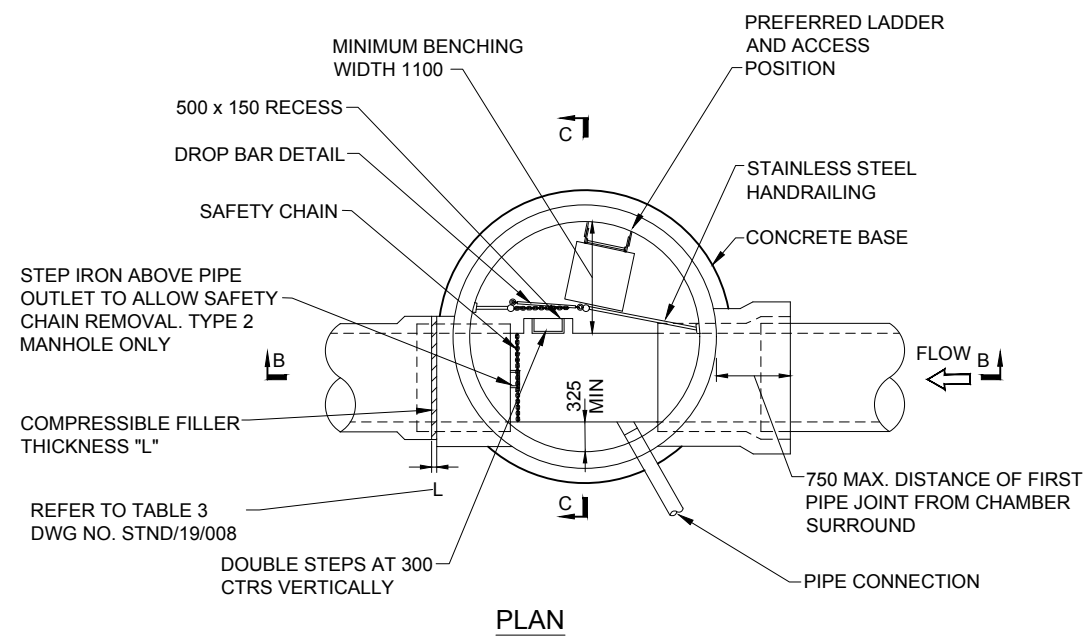
SECTION B-B



SECTION C-C

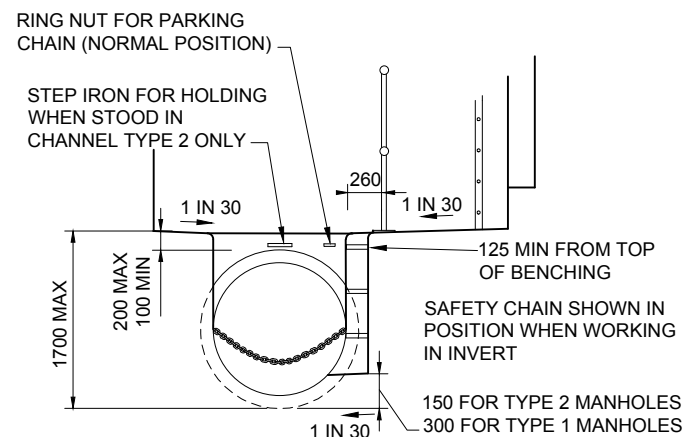


FRONT ELEVATION



PLAN

MANHOLE TYPE 2
PIPES 600 - 1500 DIAMETER
(DEPTH TO BENCHING NOT EXCEEDING 9000)



SIDE ELEVATION
(LOOKING DOWNSTREAM)

NOTES

- ALL DIMENSIONS ARE IN MILLIMETRES
- CONCRETE BENCHING AND PIPE SURROUND**
SHALL BE PLACED IN SINGLE CONTINUOUS OPERATION FROM TOP OF BASE SLAB TO TOP OF BENCHING AND PIPE SURROUND
- CONNECTION INTO MANHOLES**
SHALL BE CONSTRUCTED WITH THE SOFFITS LEVEL UNLESS DETAILED DIFFERENTLY ON CONTRACT DRAWINGS
- METALWORK**
LADDERS, HANDRAILING AND SAFETY CHAIN SHALL BE AS SHOWN ON DEVELOPER SERVICES DETAIL 9 (STND/19/009)
- CONCRETE SURROUND TO MANHOLES**
A CONCRETE SURROUND IS NOT NORMALLY REQUIRED TO MANHOLES UNLESS INSTALLED IN AREAS OF UNSTABLE GROUND, UNDER CONDITIONS OF FLOTATION OR WHERE SUBJECTED TO EXCEPTIONAL OR ECCENTRIC LOADS. IN WHICH CASES A 150 SURROUND OF AT LEAST 20 N/mm CONCRETE SHALL BE PROVIDED. ANY JOINTS SHOULD BE STAGGERED WITH PRECAST CONCRETE JOINTS
- MINIMUM LENGTH OF CHANNEL (X Min)**

| CHAMBER DIA | "X" MIN |
|-------------|---------|
| 1050 | 800 |
| 1200 | 950 |
| 1350 | 1000 |
| 1500 | 1050 |
| 1800 | 1150 |
| 2100 | 1300 |
| 2400 | 1450 |
| 2700 | 1550 |
| 3000 | 1700 |

- CUT ENDS OF REINFORCED CONCRETE PIPES**
SHALL BE TREATED WITH EPOXY RESIN PAINT/MORTAR
- MANHOLE ACCESSES FOR MANHOLE ACCESS**
OPTIONS AND DETAILS SEE DEVELOPER SERVICES DETAIL 10 (STND/19/010). DOUBLE STEPS SHALL BE PLASTIC ENCAPSULATED CARBON STEEL. DOUBLE STEPS SHALL NOT BE USED WHERE COVER-TO-SOFFIT DIMENSION IS >3.0m
- COVER AND FRAME**
150 DEEP COVERS ARE TO BE USED IN CATEGORY 1, 2, 3 ROADS. 100 DEEP COVERS ARE TO BE USED IN CATEGORY 4 ROADS. DOUBLE TRIANGULAR COVERS ARE TO BE USED IN CARRIAGEWAY. ROAD CATEGORY TO BE DESIGNATED BY THE HIGHWAY AUTHORITY. FRAME TO BE SET AS PER SPECIFICATION
- CONCRETE**
ALL IN-SITU CONCRETE TO BE DC - 3 OR FND3
- VARIABLE FEATURES (V.F.)**
WHERE V.F. APPEARS IN ANNOTATION REFER TO VARIABLE FEATURES AS SHOWN ON DEVELOPER SERVICES DETAIL 10 (STND/19/010)

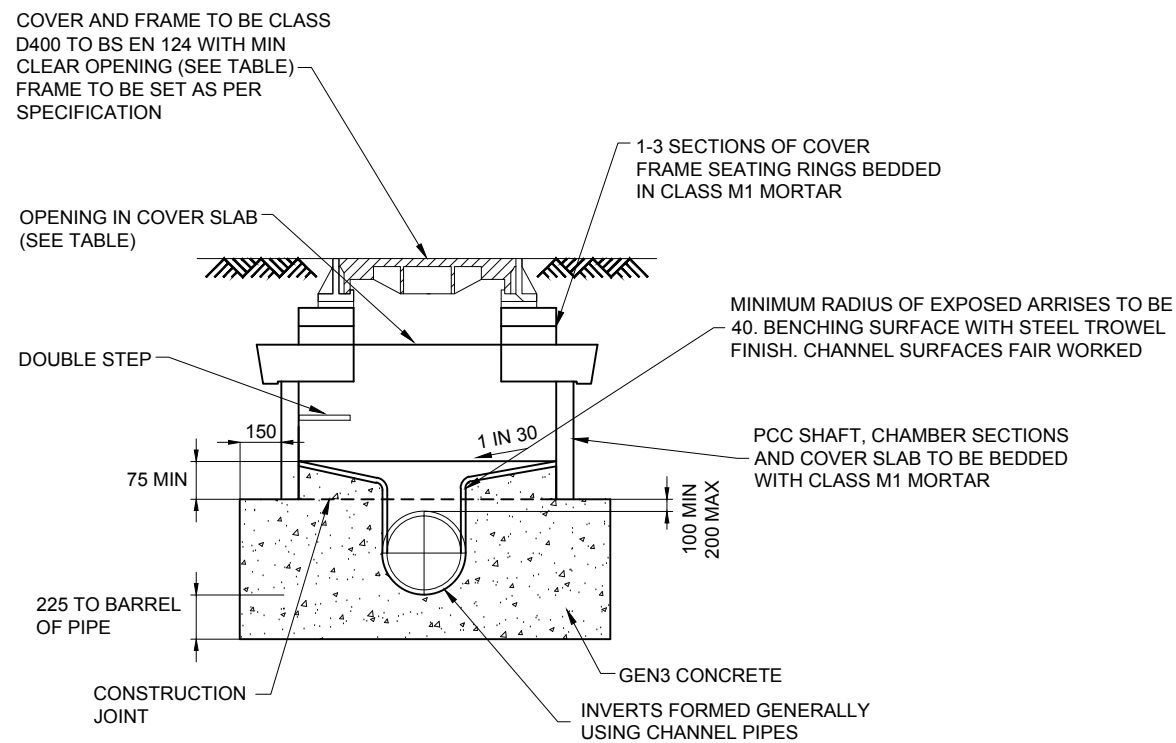
CURRENT ISSUE INFORMATION
B. DEPTH TO BENCHING INCREASED TO 9m MAX.

| | | | | | |
|---------|-------|------|------|-----------------|----------|
| B | SC | DH | JH | FOR INFORMATION | 26.07.24 |
| VERSION | DRAWN | CHKD | REVD | DATE | |



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DEVELOPER SERVICES
DETAIL 2
MANHOLE TYPE 2 AND
INVERT ACCESS DETAIL

| | | | |
|----------------|-------------|------------|----|
| SCALE | NTS | SHEET SIZE | A3 |
| DRAWING NUMBER | STND/19/002 | REVISION | B |

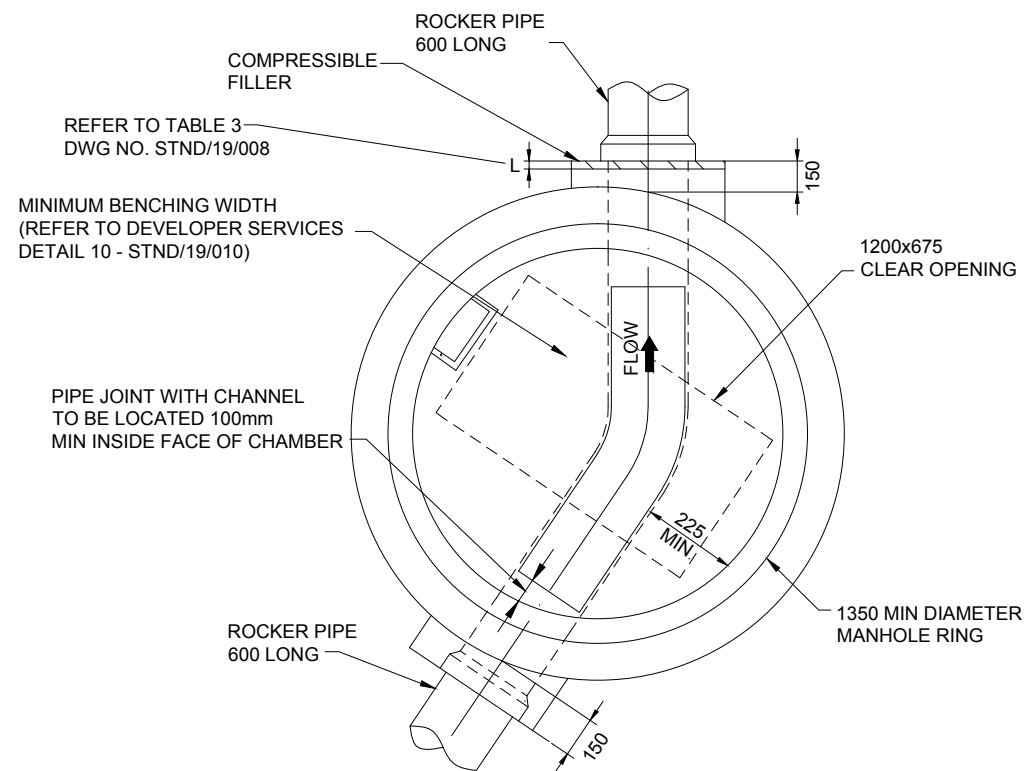


| NOMINAL INT PIPE DIA | MINIMUM INTERNAL CHAMBER DIA | MINIMUM CLEAR OPENING SIZE | COVER SLAB ACCESS HOLE | COVER FRAME SEATING RING |
|----------------------|------------------------------|----------------------------|------------------------|--------------------------|
| 100 | 1050 | 750 x 675 | 750 X 750 CENTRAL | 750 X 750 CENTRAL |
| 150 | 1050 | 750 x 675 | 750 X 750 CENTRAL | 750 X 750 CENTRAL |
| 225 | 1350 | 1200 x 675 | 1200 X 675 CENTRAL | 1200 X 675 CENTRAL |
| 300 | 1350 | 1200 x 675 | 1200 X 675 CENTRAL | 1200 X 675 CENTRAL |
| 375 | 1350 | 1200 x 675 | 1200 X 675 CENTRAL | 1200 X 675 CENTRAL |

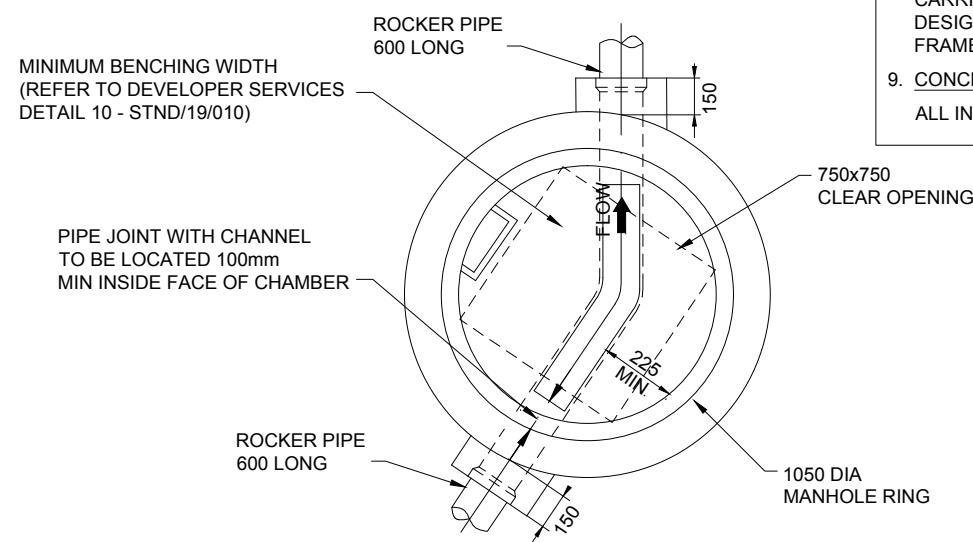
NOTES

- ALL DIMENSIONS ARE IN MILLIMETRES
- CONCRETE BENCHING AND PIPE SURROUND**
SHALL BE PLACED IN SINGLE CONTINUOUS OPERATION FROM TOP OF BASE SLAB TO TOP OF BENCHING AND PIPE SURROUND
- CONNECTION INTO MANHOLES**
SHALL BE CONSTRUCTED WITH THE SOFFITS LEVEL UNLESS DETAILED DIFFERENTLY ON CONTRACT DRAWINGS
- CONCRETE SURROUND TO MANHOLES**
A CONCRETE SURROUND IS NOT NORMALLY REQUIRED TO MANHOLES UNLESS INSTALLED IN AREAS OF UNSTABLE GROUND, UNDER CONDITIONS OF FLOTATION OR WHERE SUBJECTED TO EXCEPTIONAL OR ECCENTRIC LOADS. IN WHICH CASES A 150 SURROUND OF AT LEAST 20 N/mm CONCRETE SHALL BE PROVIDED. ANY JOINTS SHOULD BE STAGGERED WITH PRECAST CONCRETE JOINTS
- DOUBLE STEPS SHALL BE PLASTIC ENCAPSULATED CARBON TO BS EN 1247-2 MANHOLE STEPS
- MINIMUM LENGTH OF CHANNEL (X Min)**

| CHAMBER DIA | "X" MIN |
|-------------|---------|
| 1050 | 800 |
| 1200 | 950 |
| 1350 | 1000 |
| 1500 | 1050 |
| 1800 | 1150 |
| 2100 | 1300 |
| 2400 | 1450 |
| 2700 | 1550 |
| 3000 | 1700 |
- CUT ENDS OF REINFORCED CONCRETE PIPES**
SHALL BE TREATED WITH EPOXY RESIN PAINT/MORTAR
- COVER AND FRAME**
150 DEEP COVERS ARE TO BE USED IN CATEGORY 1, 2, 3 ROADS. 100 DEEP COVERS ARE TO BE USED IN CATEGORY 4 ROADS. DOUBLE TRIANGULAR COVERS ARE TO BE USED IN CARRIAGEWAY. ROAD CATEGORY TO BE DESIGNATED BY THE HIGHWAY AUTHORITY. FRAME TO BE SET AS PER SPECIFICATION
- CONCRETE**
ALL IN-SITU CONCRETE TO BE DC - 3 OR FND3



CIRCULAR PRE-CAST CONCRETE MANHOLE (MH4)
□ 1.5m TO SOFFIT (225mm TO 375mm DIAMETER PIPE)



CIRCULAR PRE-CAST CONCRETE MANHOLE (MH4)
□ 1.5m TO SOFFIT (100mm TO 150mm DIAMETER PIPE)

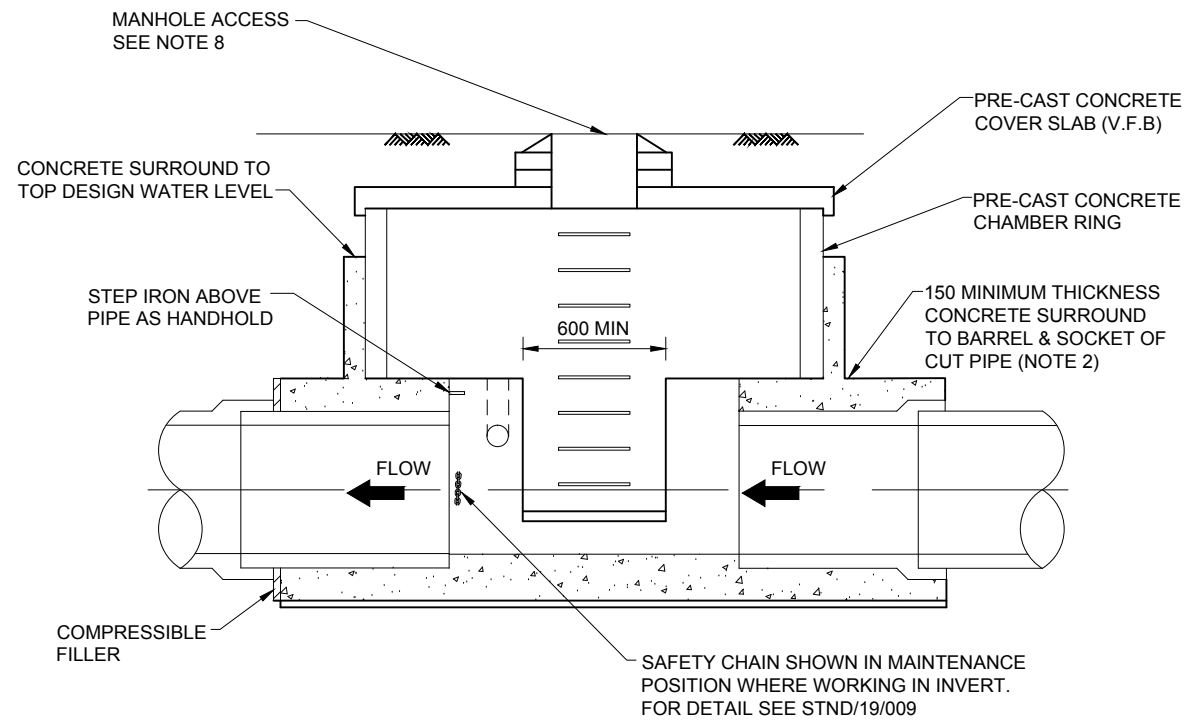
CURRENT ISSUE INFORMATION

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|---------|------|------|------|-----------------|----------|
| A | SC | DH | SD | FOR INFORMATION | 15.04.16 |
| VERSION | DRWN | CHKD | REVD | DATE | |

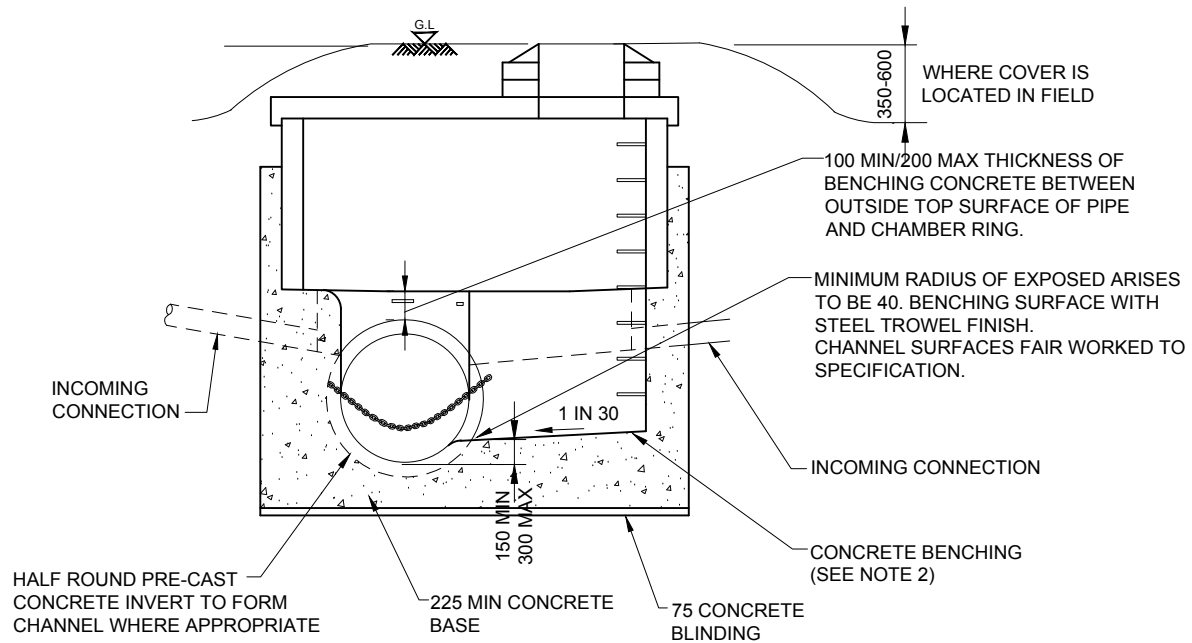


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DEVELOPER SERVICES
DETAIL 3
SHALLOW MH DETAIL FOR
SMALL DIAMETER PIPES (MH TYPE 4)

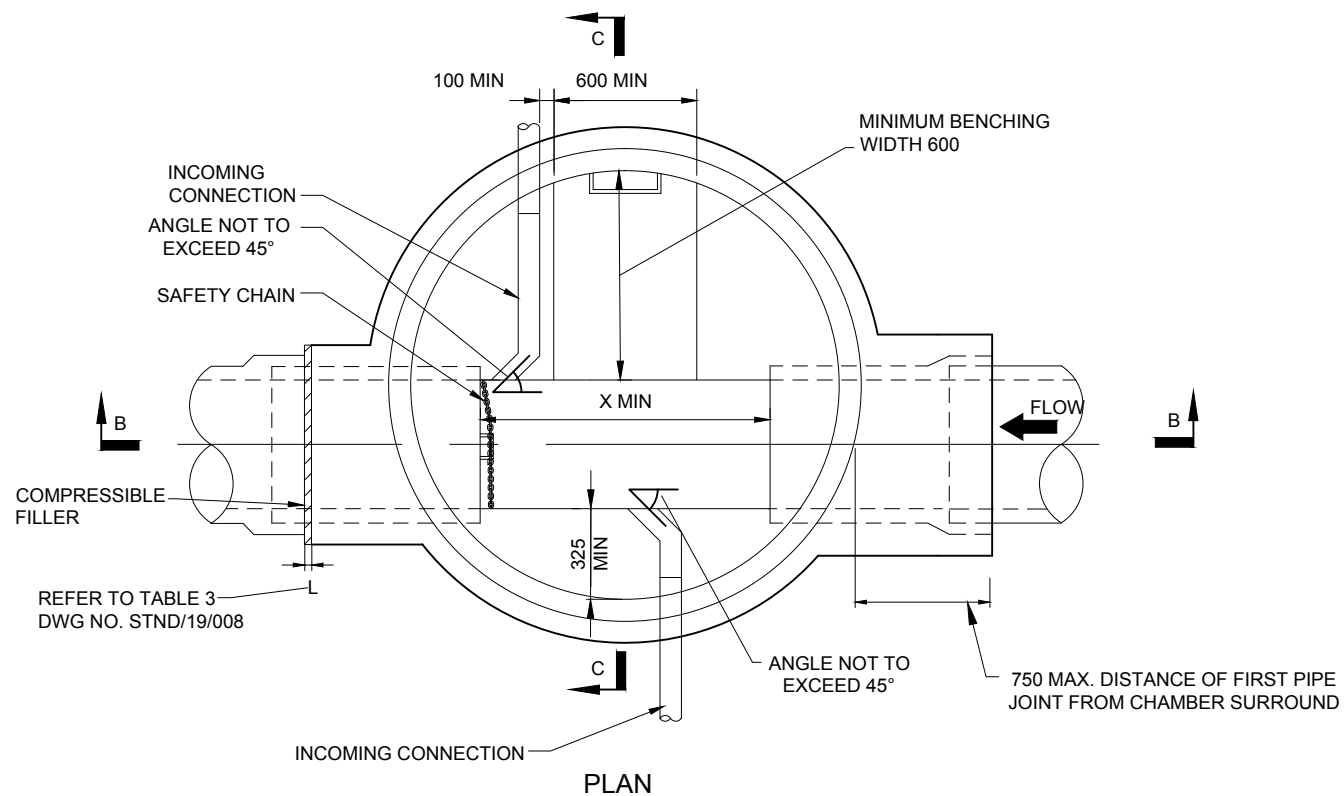
| | | | |
|----------------|-------------|------------|----|
| SCALE | NTS | SHEET SIZE | A3 |
| DRAWING NUMBER | STND/19/003 | REVISION | A |



SECTION B-B



SECTION C-C



SHALLOW SURFACE WATER MANHOLES ARE TO BE USED WHERE THE MINIMUM 2.0m HEADROOM CANNOT BE ACHIEVED BETWEEN TOP OF BENCHING AND UNDERSIDE OF COVER SLAB

NOTES

- ALL DIMENSIONS ARE IN MILLIMETRES
- CONCRETE BENCHING AND PIPE SURROUND**
SHALL BE PLACED IN SINGLE CONTINUOUS OPERATION FROM TOP OF BASE SLAB TO TOP OF BENCHING AND PIPE SURROUND
- CONNECTION INTO MANHOLES**
SHALL BE CONSTRUCTED WITH THE SOFFITS AT THE LEVEL UNLESS DETAILED DIFFERENTLY ON CONTRACT DRAWINGS
- METALWORK**
LADDERS, HANDRAILING AND SAFETY CHAIN SHALL BE AS SHOWN ON DEVELOPER SERVICES DETAIL 9 (STND/19/009)
- CONCRETE SURROUND TO MANHOLES**
A CONCRETE SURROUND IS NOT NORMALLY REQUIRED TO MANHOLES UNLESS INSTALLED IN AREAS OF UNSTABLE GROUND, UNDER CONDITIONS OF FLOTATION OR WHERE SUBJECTED TO EXCEPTIONAL OR ECCENTRIC LOADS. IN WHICH CASES A 150 SURROUND OF AT LEAST 20 N/mm CONCRETE SHALL BE PROVIDED. ANY JOINTS SHOULD BE STAGGERED WITH PRECAST CONCRETE JOINTS
- MINIMUM LENGTH OF CHANNEL (X MIN)**

| CHAMBER DIA | "X" MIN |
|-------------|---------|
| 1050 | 800 |
| 1200 | 950 |
| 1350 | 1000 |
| 1500 | 1050 |
| 1800 | 1150 |
| 2100 | 1300 |
| 2400 | 1450 |
| 2700 | 1550 |
| 3000 | 1700 |

- CUT ENDS OF REINFORCED CONCRETE PIPES**
SHALL BE TREATED WITH EPOXY RESIN PAINT/MORTAR
- MANHOLE ACCESSES AND VARIABLE FEATURES (v.f.)**
REFER TO DEVELOPER SERVICES DETAIL 10 (STND/19/010). DOUBLE STEPS SHALL BE PLASTIC ENCAPSULATED CARBON STEEL TO BS EN 1247-2
- COVER AND FRAME**
150mm DEEP COVERS ARE TO BE USED IN CATEGORY 1, 2, 3 ROADS. 100mm DEEP COVERS ARE TO BE USED IN CATEGORY 4 ROADS. DOUBLE TRIANGULAR COVERS ARE TO BE USED IN CARRIAGEWAY. ROAD CATEGORY TO BE DESIGNATED BY THE HIGHWAY AUTHORITY. FRAME TO BE SET AS PER SPECIFICATION
- CONCRETE**
ALL IN-SITU CONCRETE TO BE DC - 3 OR FND3

CURRENT ISSUE INFORMATION

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|---------|------|------|------|-----------------|----------|
| A | SC | DH | SD | FOR INFORMATION | 15.04.16 |
| VERSION | DRWN | CHKD | REVD | | DATE |



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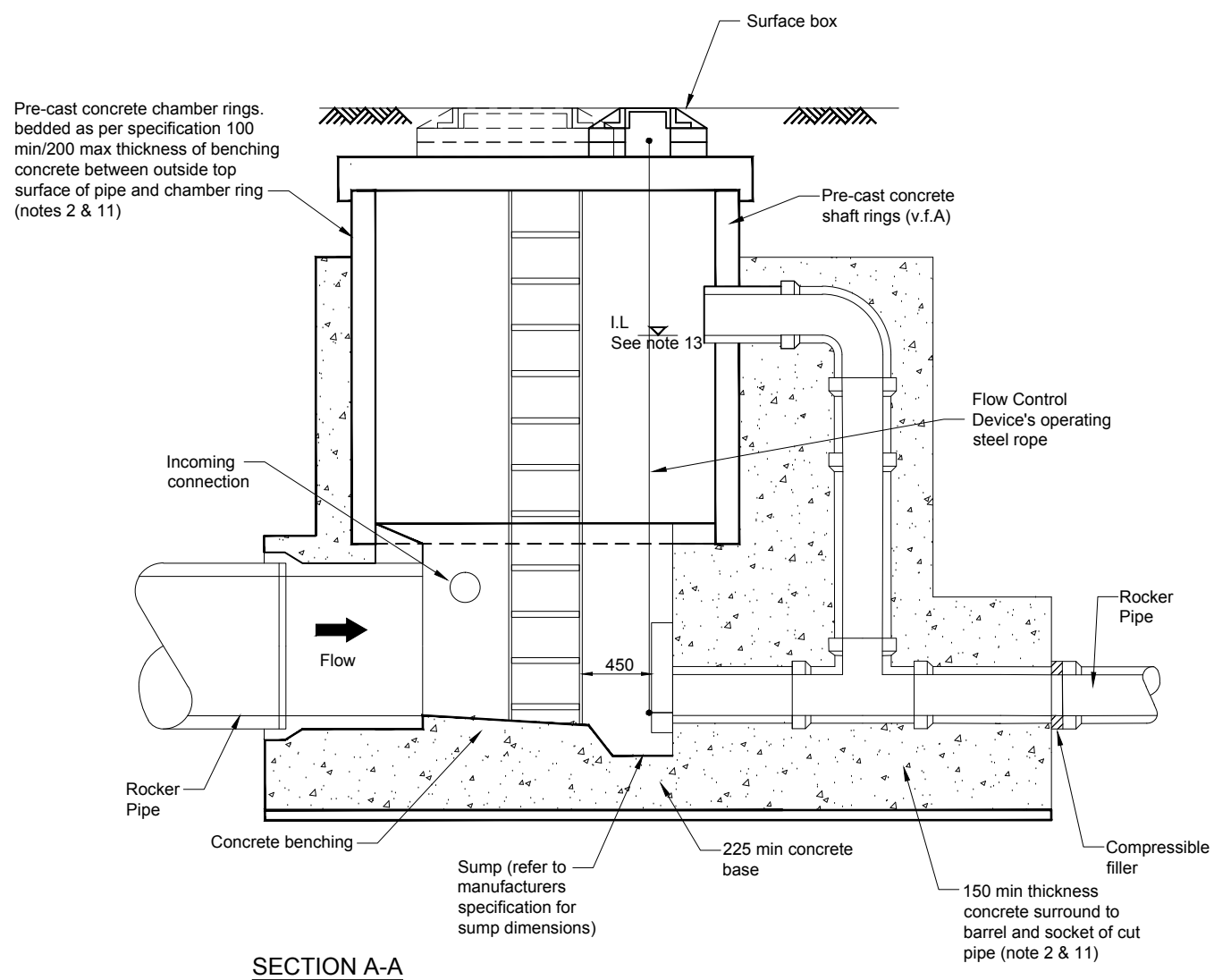
DEVELOPER SERVICES

DETAIL 4 - SHALLOW SW MANHOLE DETAIL

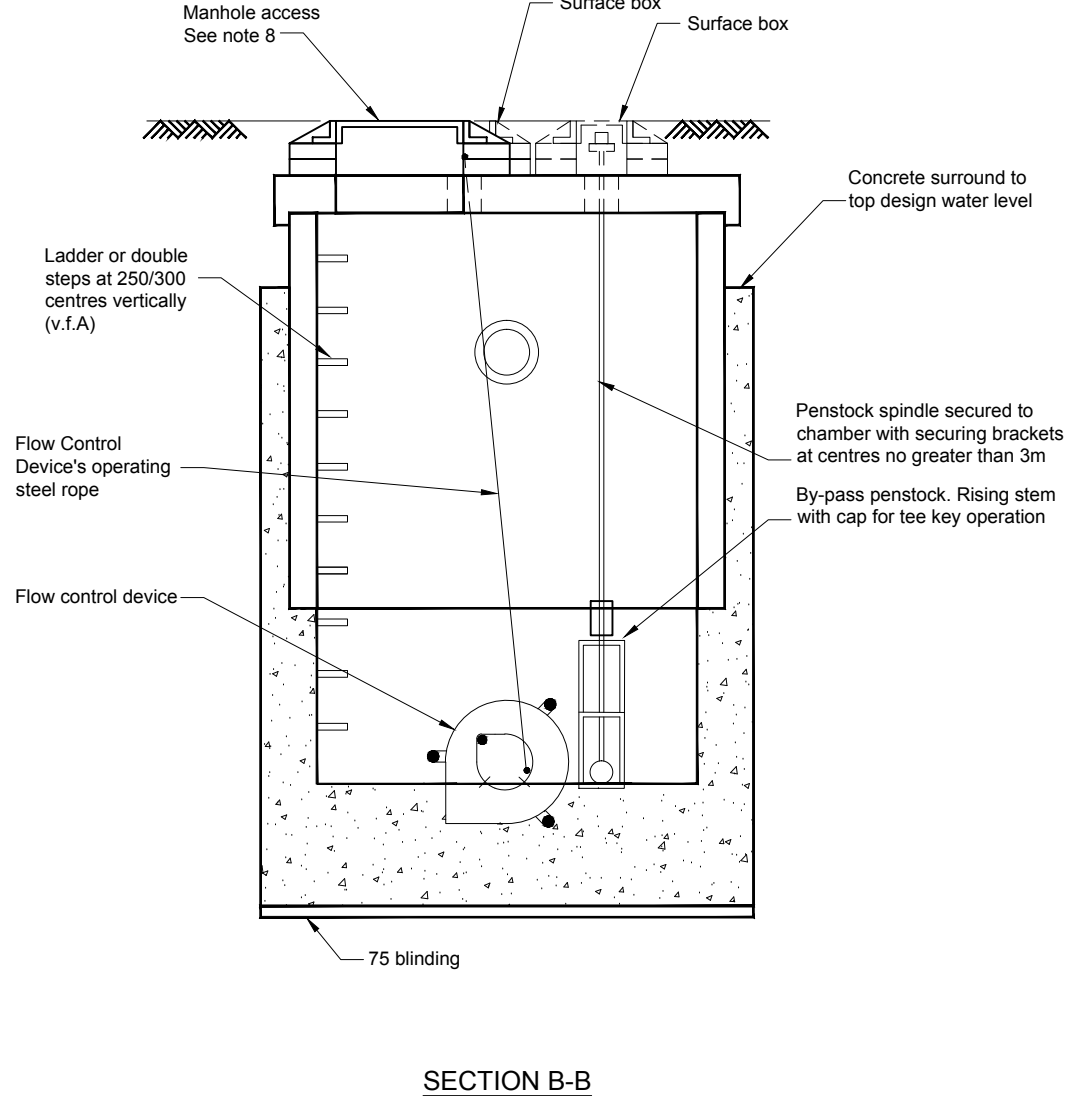
RESTRICTED HEADROOM (LESS THAN 2.0m)

FOR PIPE SIZES 450DIA AND ABOVE

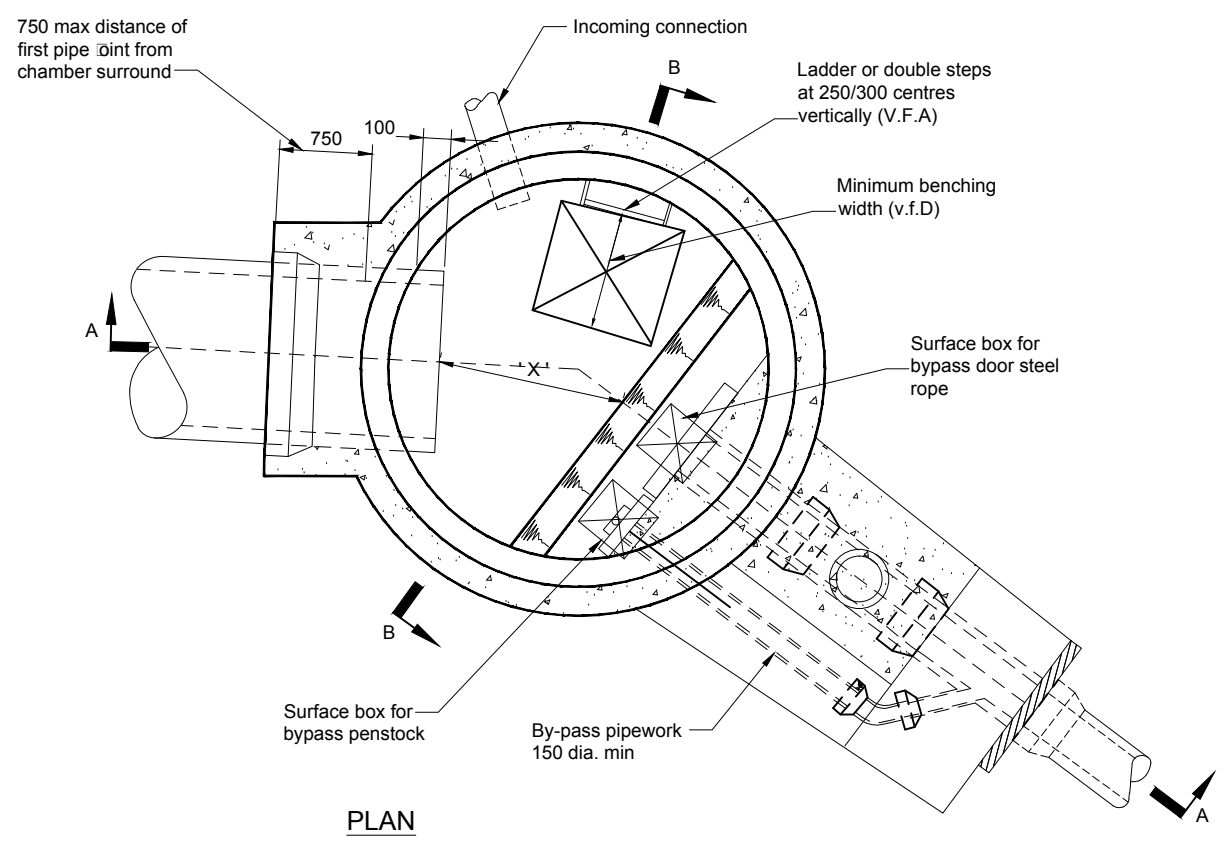
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|----------------|-------------|------------|----|
| SCALE | NTS | SHEET SIZE | A3 |
| DRAWING NUMBER | STND/19/004 | REVISION | A |



SECTION A-A



SECTION B-B



PLAN

- NOTES**
- All dimensions are in millimetres
 - CONCRETE BENCHING AND PIPE SURROUND**
Shall be placed in single continuous operation from top of base slab to top of benching and pipe surround
 - CONNECTION INTO MANHOLES**
Shall be constructed with the soffits at the level unless detailed differently on contract drawings
 - METALWORK**
Ladders, handrailing and safety chain shall be as shown on Developer Services Detail 9 (STND/19/009)
 - CONCRETE SURROUND TO MANHOLES**
A 150mm surround of at least 20N/mm² concrete shall be provided to the top design water level. Any joints should be staggered with precast concrete joints
 - MINIMUM LENGTH OF CHANNEL (X Min)**

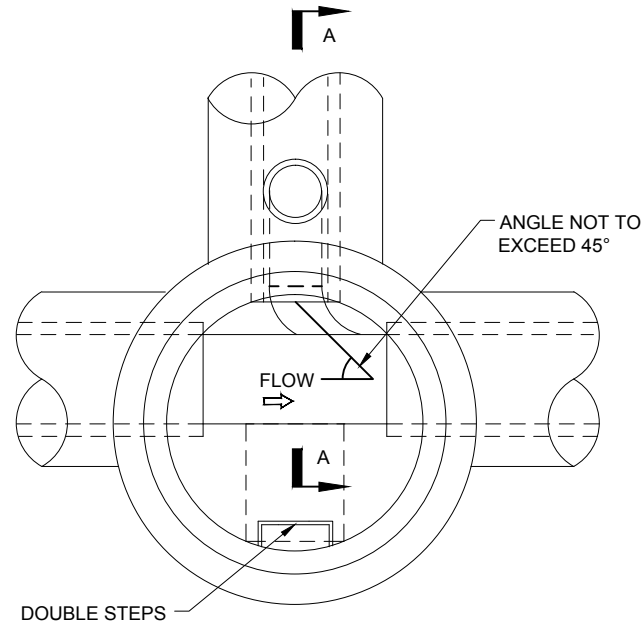
| CHAMBER DIA | "X" MIN |
|-------------|---------|
| 1050 | 800 |
| 1200 | 950 |
| 1350 | 1000 |
| 1500 | 1050 |
| 1800 | 1150 |
| 2100 | 1300 |
| 2400 | 1450 |
| 2700 | 1550 |
| 3000 | 1700 |
 - CUT ENDS OF REINFORCED CONCRETE PIPES**
Shall be treated with epoxy resin paint/mortar
 - MANHOLE ACCESSES AND VARIABLE FEATURES (v.f.)**
Refer to Developer Services Detail 10 (STND/19/010). Double steps shall be plastic encapsulated carbon steel. Double steps shall not be used where cover-to-soffit dimension is >3.0m
 - INVERT ACCESS DETAILS**
Refer to Developer Services Detail 2 (STND/19/002)
 - COVER AND FRAME**
150mm deep covers are to be used in category 1, 2, 3 roads.
100mm deep covers are to be used in Category 4 roads.
Double triangular covers are to be used in carriageway.
Road category to be designated by the highway authority.
Frame to be set as per specification
 - CONCRETE**
All in-situ concrete to be DC-3 or FND 3
 - Minimum headroom shall be 2000. Where 2000 cannot be achieved with benching set at half pipe level then the manhole cover size shall be increased to be in accordance with BS EN 752. Refer to Developer Services Detail 4 (STND/19/004)
 - Invert level for overflow to be site specific

| | | | | | |
|---------|------|------|------|-----------------|----------|
| A | SC | DH | SD | FOR INFORMATION | 15.04.16 |
| VERSION | DRWN | CHKD | REVD | | DATE |

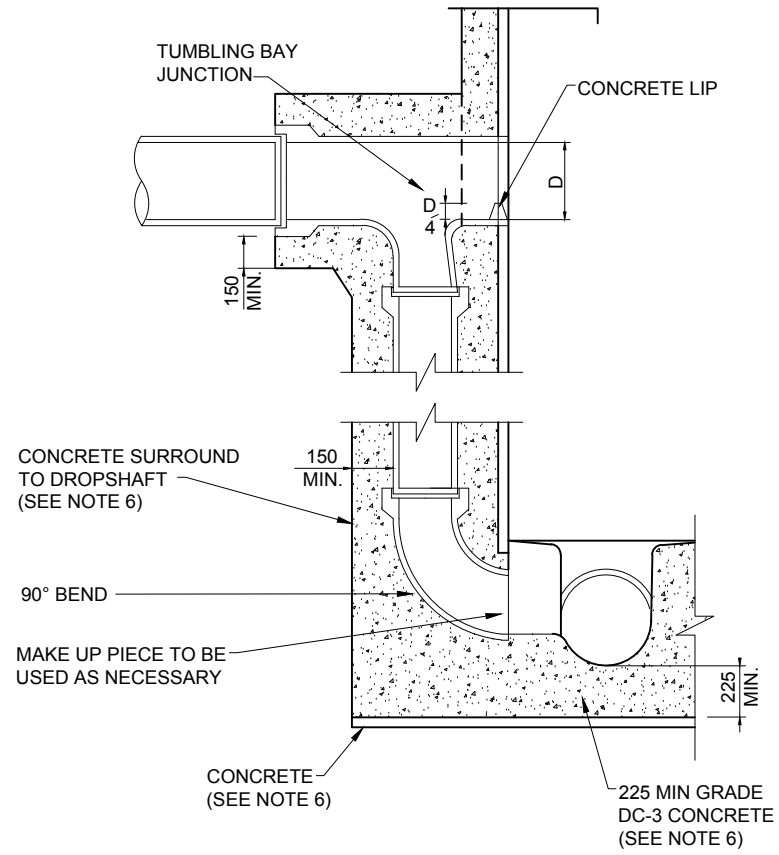


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DEVELOPER SERVICES
DETAIL 5
FLOW CONTROL MANHOLE DETAIL

| | | | |
|----------------|-------------|------------|----|
| SCALE | NTS | SHEET SIZE | A3 |
| DRAWING NUMBER | STND/19/005 | REVISION | A |



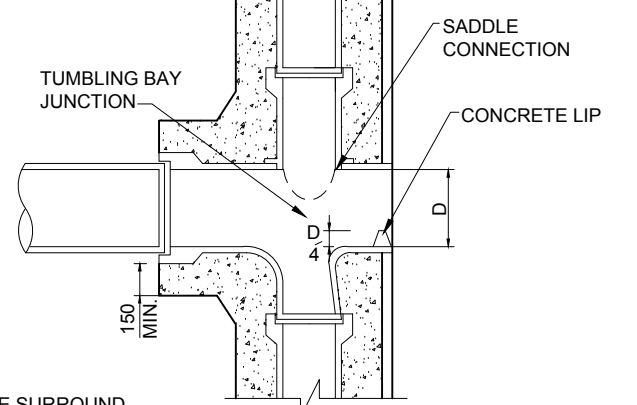
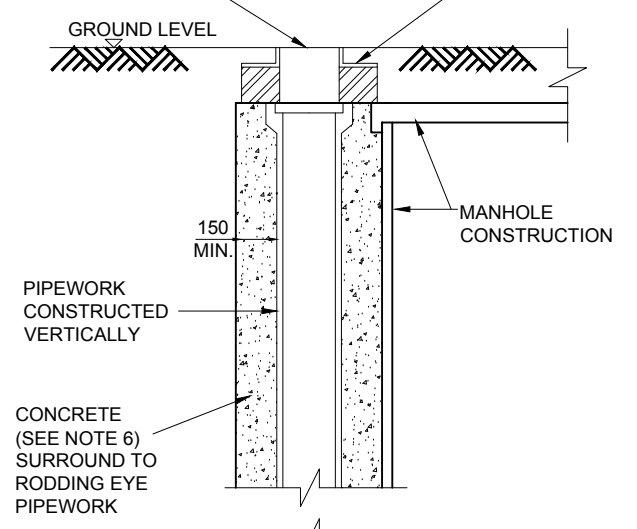
PLAN



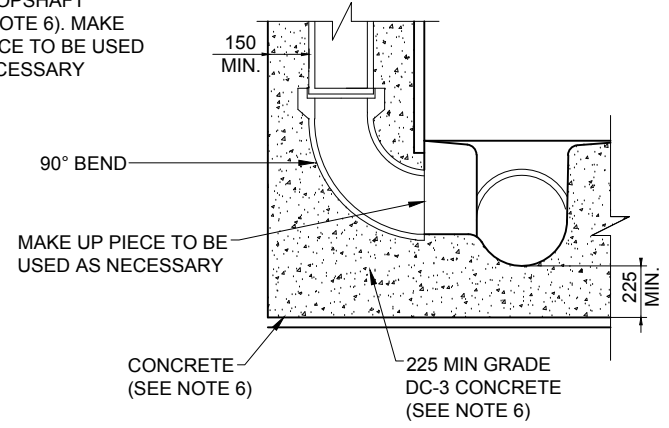
TYPE A
SECTION A-A (PART)
STANDARD DROPSHAFT

CLASS D400 COVER AND FRAME TO BS EN 124 WITH 300 x 300 CLEAR OPENING (SEE NOTE 7)

225 CLASS B ENGINEERING BRICKWORK, MIN 1 COURSE MAX 3 COURSES.



CONCRETE SURROUND TO DROPSHAFT (SEE NOTE 6). MAKE UP PIECE TO BE USED AS NECESSARY



TYPE B
SECTION A-A (PART) WHERE
ADDITIONAL RODDING EYE IS NECESSARY
(SEE NOTE 4)

- NOTES
- WHERE THE TUMBLING BAY IS MORE THAN 1.5m ABOVE BENCHING SPECIAL CONSIDERATION FOR MAINTENANCE SHALL BE GIVEN
 - | SEWER DIAMETER (mm) | DROPSHAFT DIAMETER (mm) |
|---------------------|-------------------------|
| 225-300 | 225 |
| 375 | 300 |
| 450 | 375 |
| 525-600 | 450 |
| 675 | 525 |
| 750-900 | 600 |
 - THE CONNECTION AT THE BOTTOM OF THE BACK DROP IS TO BE MADE AT SOFFIT LEVEL IN A MANHOLE TYPE 1 AND AT THE SPRINGING LEVEL IN A MANHOLE TYPE 2
 - THE VERTICAL RODDING EYE MAY BE REQUIRED IN SITUATIONS WHERE BLOCKAGES ARE A HIGH RISK, (TYPE B)
 - THE TUMBLING BAY SHALL BE BUILT INTO THE MANHOLE CHAMBER BELOW THE REDUCING SLAB
 - ALL INSITU CONCRETE TO BE DC-3 OR FND3
 - 150mm DEEP COVERS ARE TO BE USED IN CATEGORY 1, 2 AND 3 ROADS, 100mm DEEP COVERS ARE TO BE USED IN CATEGORY 4 ROADS

CURRENT ISSUE INFORMATION

| | | | | | |
|---------|------|------|------|-----------------|----------|
| A | SC | DH | SD | FOR INFORMATION | 15.04.16 |
| VERSION | DRWN | CHKD | REVD | DATE | |



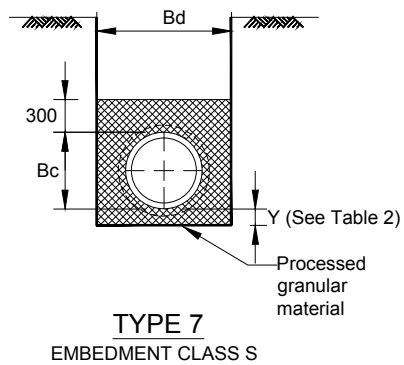
UNITED UTILITIES LTD

DEVELOPER SERVICES

DETAIL 7

EXTERNAL BACKDROP DETAIL

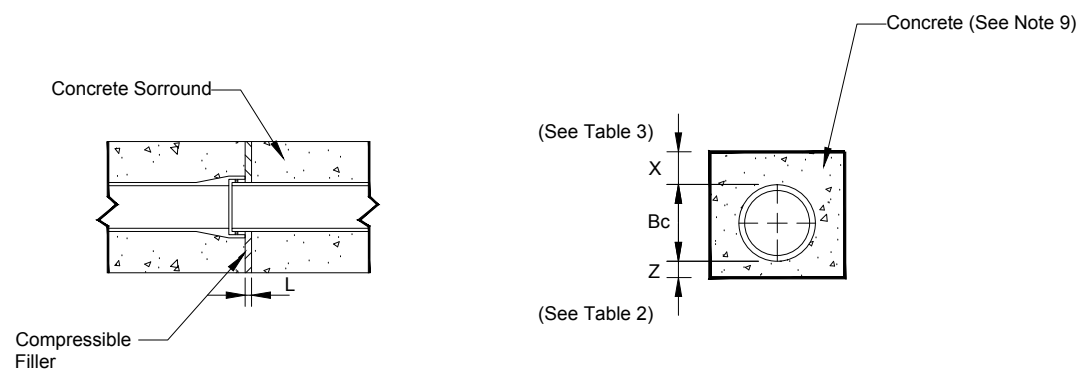
| | | | |
|----------------|-------------|------------|----|
| SCALE | NTS | SHEET SIZE | A3 |
| DRAWING NUMBER | STND/19/007 | REVISION | A |



| BEDDING FACTOR (See note 5) | |
|-----------------------------|---------------|
| 2.2 | Narrow Trench |
| 2.2 or 2.5 | Wide Trench |
| 2.2 | Enbankment |

| NOMINAL INT PIPE DIA | DIMENSION Y1 EVEN TRENCH BOTTOM (MIN) | DIMENSION Y2 ROCK OR UNEVEN TRENCH BOTTOM (MIN) | PROCESSED GRANULAR MATERIAL | DIMENSION Z (MIN) | MAX PERMITTED TRENCH WIDTH |
|----------------------|---------------------------------------|---|---|-------------------|----------------------------|
| 150 | 100 | 200 | 10mm single sized or 14mm to 5mm graded | 100 | 750 |
| 225 | 100 | 200 | | 100 | 825 |
| 300 | 100 | 200 | | 100 | 925 |
| 375 | 100 | 200 | 14mm single sized or 14mm to 5mm graded | 100 | 1050 |
| 450 | 150 | 200 | | 150 | 1150 |
| 525 | 150 | 250 | | 150 | 1200 |
| 600 | 150 | 250 | 20mm single sized or 20mm to 5mm graded | 150 | 1350 |
| 675 | 150 | 250 | | 225 | 1450 |
| 750 | 225 | 300 | | 225 | 1500 |
| 825 | 225 | 300 | | 225 | 1600 |
| 900 | 225 | 300 | | 225 | 1900 |
| 975 | 225 | 300 | | 300 | 2000 |
| 1050 | 225 | 300 | | 300 | 2100 |
| 1125 | 225 | 300 | | 300 | 2200 |
| 1200 | 250 | 350 | | 300 | 2300 |
| 1350 | 375 | 450 | | 375 | 2500 |
| 1500 | 375 | 450 | 375 | 2700 | |
| 1650 | 375 | 450 | 40mm single sized or 40mm to 5mm graded | 450 | 2800 |
| 1800 | 375 | 500 | | 450 | 3100 |
| 1950 | 400 | 500 | | 525 | 3200 |
| 2100 | 425 | 650 | | 525 | 3400 |
| 2400 | 450 | 675 | | 600 | 3700 |

Note:
Bc □ Outside Diameter of pipe
Bd □ Effective trench width measured 300mm above crown of pipe



FLEXIBLE JOINT DETAIL FOR CONCRETE BED AND CONCRETE SURROUND SPIGOT AND SOCKET PIPES

CONCRETE SURROUND (CLASS Z)

| Nominal Internal Pipe Dia | Dim. X mm | Compressible Filler L mm |
|---------------------------|-----------|--------------------------|
| □400 | 160 | 18 |
| 400-700 | 200 | 36 |
| 725-1200 | 300 | 36 |
| >1200 | 300 | 54 |

GENERAL NOTES

- All dimensions in millimetres
 - The pipe embedments indicate the minimum trench dimensions which should be assumed for initial design purposes. The minimum trench widths shown will usually be sufficient to allow adequate compaction of the embedment material. All pipework should be designed in accordance with BS EN 1295-1
 - For narrow trenching techniques the minimum trench width may be reduced, providing that the design indicates that the reduced embedment width is sufficient to support the pipework
 - Where selected excavated material may migrate into the native soil or vice versa, geotextile membrane shall be provided around the embedment material
 - Bedding factors are derived from "A guide to design loadings for buried rigid pipes" and IGN 4-11-02 "Revised bedding factor for Vitrified Clay drains and sewers"
 - Embedment dimensions shall be in accordance with Table 2
- PROCESSED GRANULAR MATERIAL:
- Processed granular material shall comply with WIS 4-08-02. The grading of processed granular material shall be as specified
 - Limestone material shall not be used where the native ground or ground water is acidic, ie pH of 6 or less
- CONCRETE EMBEDMENTS & SURROUND:
- Gen 3 concrete shall be used in non aggressive ground. Elsewhere the cement type and mix design should be selected to suit the sulphate content and pH of the ground and groundwater
 - Concrete surround details shall be adopted where cover to pipework is less than 1.2M and where it is necessary to protect the pipework from traffic loading
 - Pipes to be bedded/surrounded with concrete shall be supported on precast concrete setting blocks, the top face of of each block being covered with two layers of compressible packing
 - PVC and PE pipes shall be wrapped with a layer of plastic sheeting complying with UU CESWI 6 class 2.95
 - GRP pipes shall be wrapped with compressible filler material 100mm wide at the end of the end of the concrete surround
 - Compressible filler shall comply with UU CESWI 6 class 2.19

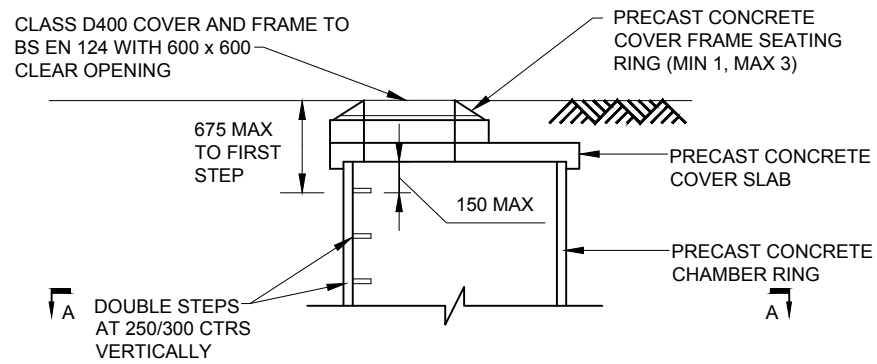
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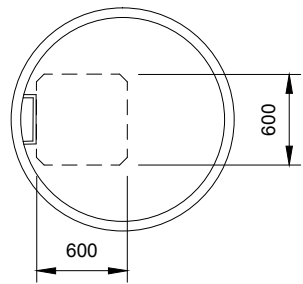


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DEVELOPER SERVICES
DETAIL 8
PIPE BEDDING DETAIL

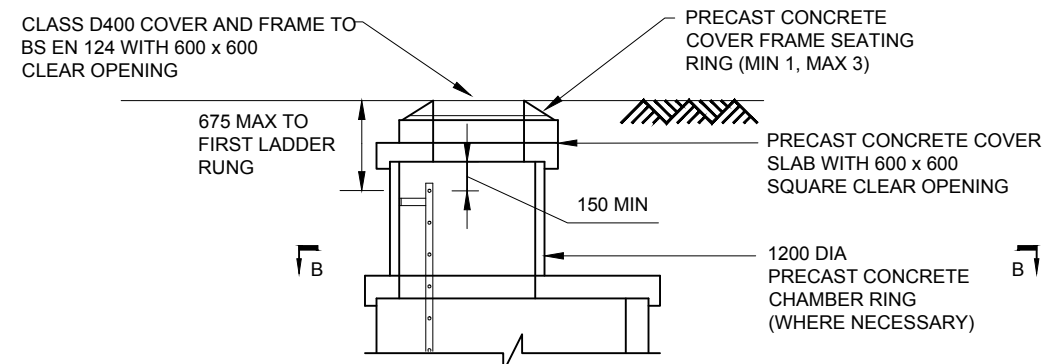
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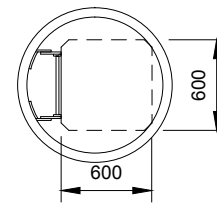
DOUBLE STEPS ACCESS



PLAN A-A



LADDER ACCESS



PLAN B-B

MANHOLE ACCESS DETAILS

NOTES

- ALL DIMENSIONS ARE IN MILLIMETRES
- METALWORK**
LADDERS, HANDRAILING AND SAFETY CHAIN SHALL BE AS SHOWN ON DEVELOPER SERVICES DETAIL 9 (STND/19/009)
- DOUBLE STEPS SHALL BE PLASTIC ENCAPSULATED CARBON STEEL TO BS EN 1247-2
- COVER AND FRAME**
150mm DEEP COVERS ARE TO BE USED IN CATEGORY 1, 2, 3 ROADS.
100mm DEEP COVERS ARE TO BE USED IN CATEGORY 4 ROADS.
DOUBLE TRIANGULAR COVERS ARE TO BE USED IN CARRIAGEWAY.
ROAD CATEGORY TO BE DESIGNATED BY THE HIGHWAY AUTHORITY.
FRAME TO BE SET AS PER SPECIFICATION.
- CONCRETE ALL IN-SITU CONCRETE TO BE DC-3 OR FND 3
- REFER TO v.f."C"
ROCKER PIPE EFFECTIVE LENGTH SHALL BE 1250, ROCKER PIPES TO BE USED UNTIL THE PIPE OUTSIDE DIAMETER EXCEEDS THE EFFECTIVE LENGTH OF THE ROCKER PIPE

VARIABLE FEATURES (V.F.)

| | | | | | | | | | | | |
|---|---|---|---|---|--|--|-------------------------|------------|-----|---------------|--|
| A | MANHOLE SHAFT AND LADDER / DOUBLE STEP ACCESS | FOR 1200, 1350 AND 1500 MANHOLE CHAMBERS (OR WHERE THE DEPTH TO SOFFIT IS $\geq 3M$) A FULL HEIGHT (NO ACCESS SHAFT) CONSTRUCTION IS TO BE USED. FOR DEPTHS TO BENCHING FROM COVER LEVEL $\geq 3.0m$ DOUBLE STEP ACCESS SHALL BE USED. FOR MANHOLES DEEPER THAN 3.0m TO BENCHING A LADDER IS REQUIRED. FOR DOUBLE STEP ACCESS MINIMUM INTERNAL MANHOLE ACCESS SHAFT DIAMETER SHALL BE 1050. FOR LADDER ACCESS MINIMUM INTERNAL SHAFT DIAMETER SHALL BE 1200. | | | | | | | | | |
| B | MANHOLE COVER | DEPTH TO SOFFIT FROM COVER LEVEL $\geq 1.5M$ | | | DEPTH TO SOFFIT FROM COVER LEVEL $\geq 1.5M$ | | | | | | |
| | | MINIMUM CLEAR OPENING SIZES 750 x 750 ON 1050 AND 1200 CHAMBER / SHAFT 1200 x 675 ON 1350 AND ABOVE CHAMBERS / SHAFTS BENEATH ALL MAN-ACCESS COVERS GREATER THAN 600x600 A RETRACTABLE SAFETY HANDHOLD SHALL BE PROVIDED. IT SHALL EXTEND 1200 ABOVE GROUND LEVEL | | | MINIMUM CLEAR OPENING SIZES 600 x 600 FOR DOUBLE STEP ACCESS 600 x 600 FOR LADDER ACCESS 750 x 600 FOR FEATURE LADDER ACCESS | | | | | | |
| | COVER SLAB | HOLE SIZE IN COVER SLAB | COVER FRAME SEATING RING ON COVER SLAB DOUBLE STEP ACCESS | | HOLE SIZE IN COVER SLAB | COVER FRAME SEATING RING ON COVER SLAB | | | | | |
| | | | | | | | | | | | |
| | CHAMBER DIA | | | | | DOUBLE STEP ACCESS | LADDER ACCESS | | | | |
| | 1050 | 750 x 750 C.O. | 750 x 750 C.O. | | 600 x 600 E.O. | TYPE 1 - 600 x 600 E.O. | NOT APPLICABLE | | | | |
| | 1200 | 750 x 750 E.O. | 750 x 750 E.O. | | 750 x 600 E.O. | TYPE 1 - 600 x 600 E.O. | TYPE 1 - 600 x 600 E.O. | | | | |
| | 1350 TO 1500 | 1200 x 675 C.O. | 1200 x 675 C.O. | | 750 x 600 E.O. | TYPE 1 - 600 x 600 E.O. | TYPE 1 - 600 x 600 E.O. | | | | |
| | 1800 AND ABOVE | 1200 x 675 E.O. | 1200 x 675 E.O. | | 750 x 600 E.O. | TYPE 1 - 600 x 600 E.O. | TYPE 1 - 600 x 600 E.O. | | | | |
| | | NOTE : FOR LADDER ACCESS THE ECCENTRIC SEATING RING IS TURNED THROUGH 180 DEGREES C.O. \square CENTRAL OPENING E.O. \square ECCENTRIC OPENING | | | | | | | | | |
| | REDUCING SLAB | HOLE DIAMETER IN REDUCING SLAB | | | | | | | | | |
| | CHAMBER DIA | REDUCING SLAB NOT USED | | | | | | | | | |
| | 1200 TO 1500 | 1050 FOR DOUBLE STEP ACCESS OR 1200 FOR LADDER ACCESS | | | | | | | | | |
| | 1800 AND ABOVE | | | | | | | | | | |
| | FEATURE RELATED TO PIPE DIAMETER | DIAMETER OF LARGER PIPES | | | | | | | | | |
| | | 225 | 300 | 375 | 450 | 525 | 600 | 675 | 750 | 825 AND ABOVE | |
| C | ROCKER PIPES | ROCKER PIPE EFFECTIVE LENGTH : 600 | | | | ROCKER PIPE EFFECTIVE LENGTH : 1000 | | SEE NOTE 6 | | | |
| D | BENCHING WIDTH | MINIMUM 600 | | MINIMUM 750 | | MINIMUM 1100 | | | | | |
| E | BENCHING RAILINGS | NOT REQUIRED | | | | REQUIRED | | | | | |
| F | SEWER SAFETY CHAINS | NOT REQUIRED | | | | REQUIRED | | | | | |
| G | INVERT ACCESS STEP | NOT REQUIRED | | | | REQUIRED WITH DOUBLE STEPS | | | | | |
| H | CHANNEL FITTINGS | VITRIFIED CLAY | | NOT REQUIRED (CHANNELS FORMED USING GRANOLITHIC CONCRETE) | | | | | | | |

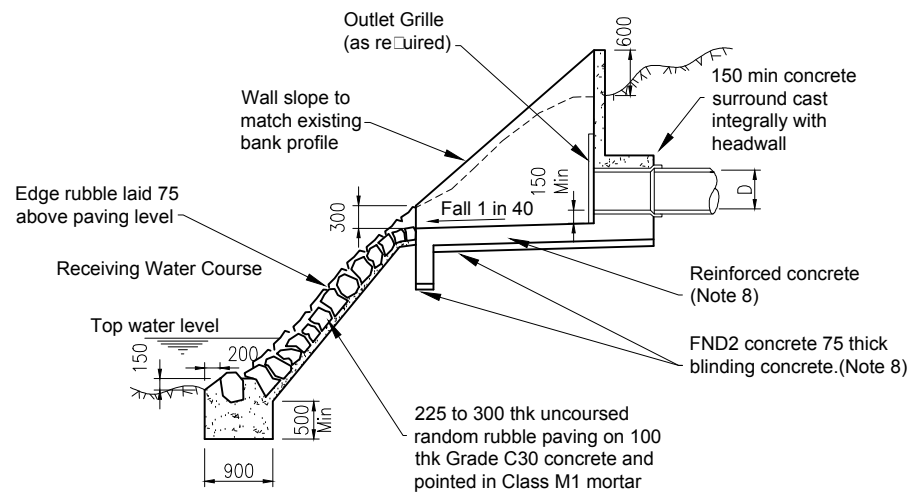
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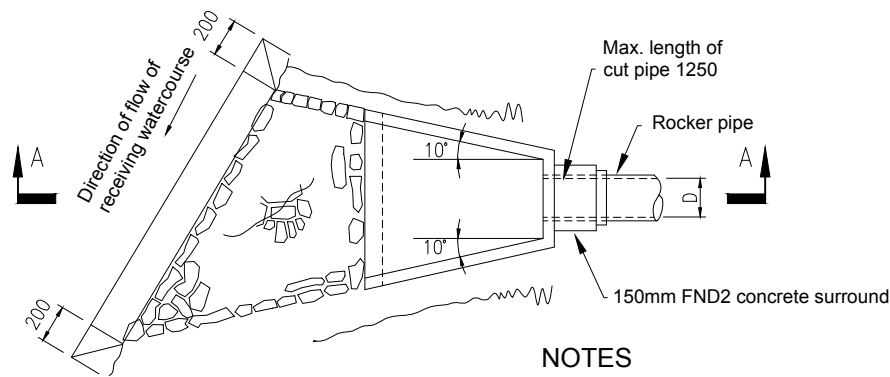


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DEVELOPER SERVICES
DETAIL 10
VARIABLE MANHOLE
GUIDANCE NOTES

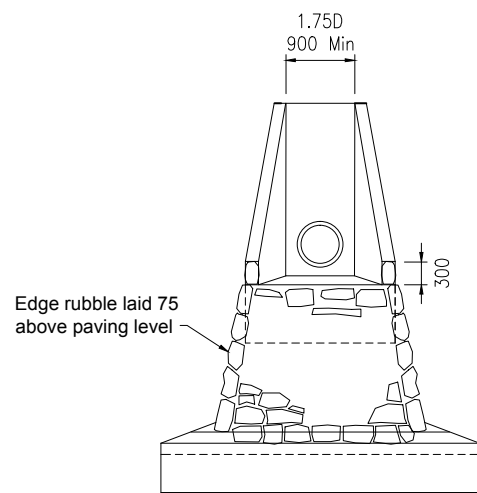
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| SCALE | NTS | SHEET SIZE | A3 |
| DRAWING NUMBER | STND/19/010 | REVISION | A |



SECTION A-A



PLAN

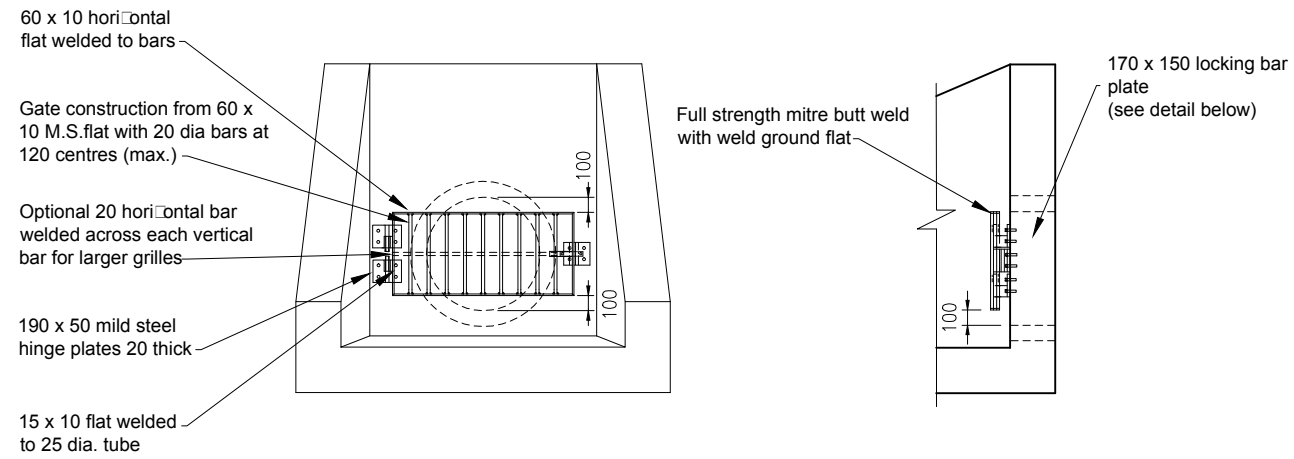


ELEVATION

TYPICAL DETAIL D
TYPICAL OUTFALL DETAIL TYPE 1

NOTES

1. All dimensions in millimetres
2. Generally the angle between the direction of flow of the receiving watercourse and the outfall pipe should be 45°
3. All reinforced concrete edges to be finished with a 25 x 25 fillet
4. Min cover to reinforcement in the top face of the base slab to be 40
5. The bed and opposite bank of the watercourse may, in certain circumstances need to be protected by 225 to 300 thick uncoursed rubble pitching laid on a 100 thick bed of FND2 concrete (Note 8) and pointed in Class M1 Mortar. The stone for pitching shall consist of large smooth faced stones roughly dressed square and shall be of a hard durable and inert material. Bunter sandstone, Keuper waterstones and Carboniferous shales and mudstones are not to be used
6. An Outlet Grille as shown on Typical Detail G must be provided on all outfalls where the pipe size exceeds 450mm. Where pipe diameters are 375 to 450, 20 dia. stainless steel bars are to be provided across outlet at max. 120mm c/c leaving 100mm max. clear opening
7. Where outlets have a flap valve, a special detailed grille must be provided on all outlets 375mm diameter and above
8. Secure handrailing shall be supplied where a person may fall 2 metres or more or where a fall of less than 2 metres carries an increased risk of injury due to the landing surface
9. FND2 to be used for soil conditions Sulphate class 1 only. Designated mix references FND3, FND4A & FND4B to be used in soil conditions with sulphate classes 3,4A and 4B respectively (refer to specification clause 4.3.1)

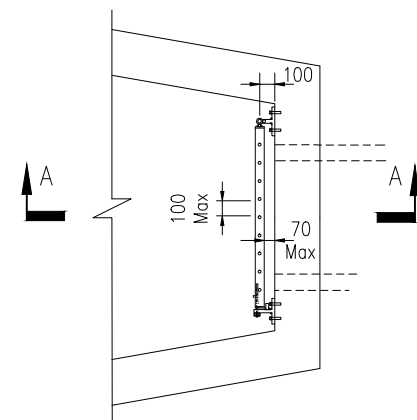


FRONT ELEVATION

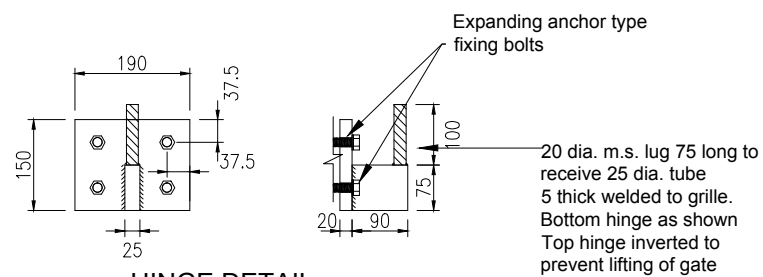
SECTION A-A

NOTES

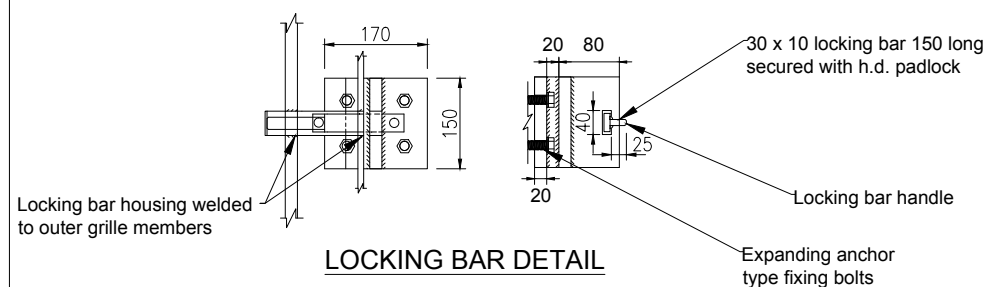
1. All dimensions in millimetres
2. All grilles and fittings are to be manufactured with mild steel 'hot dip' galvanised to BS 729 and treated with 2 coats of bituminous paint
3. The sizes detailed on the grille indicate the preferred member size in normal locations. Consideration should be given to up-sizing members where the grille is in exposed locations or is of particularly large size



PLAN



HINGE DETAIL



LOCKING BAR DETAIL

DETAIL G
TYPICAL OUTFALL GRILLE

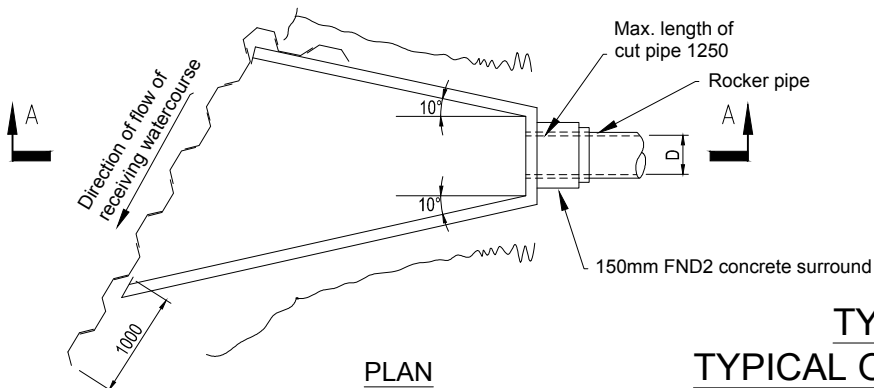
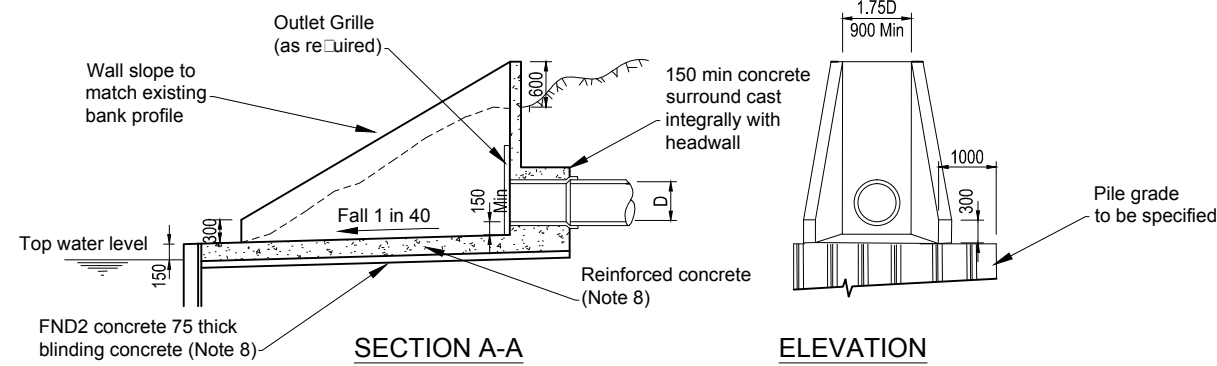
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DETAIL 11
HEADWALL TYPE 1

| | | | |
|----------------|-------------|------------|----|
| SCALE | NTS | SHEET SIZE | A3 |
| DRAWING NUMBER | STND/19/011 | REVISION | A |



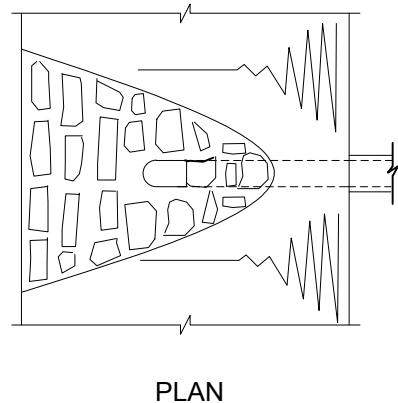
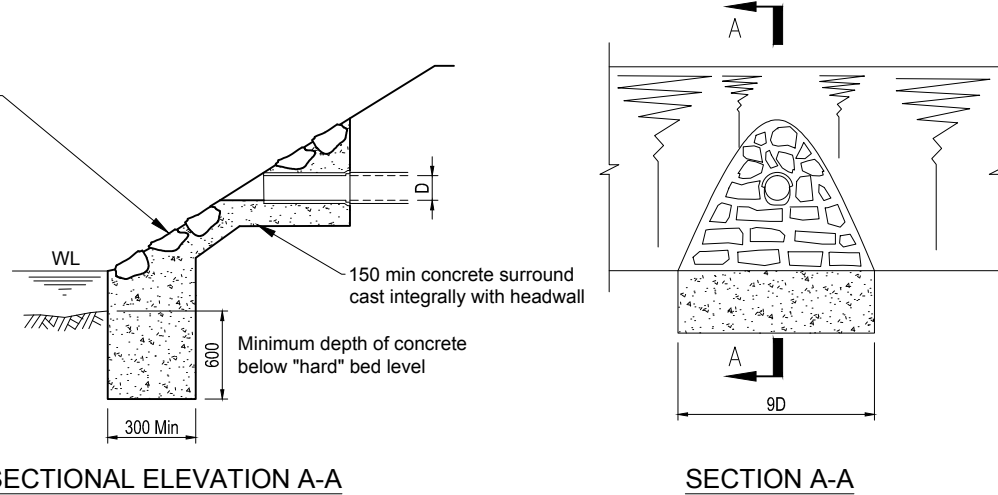
TYPICAL DETAIL E
TYPICAL OUTFALL DETAIL TYPE 2

Local conditions may dictate the use of sheet piles driven to a suitable designed depth below bed level of the watercourse. Alternatively a concrete toe beam together with stone pitching to the bank of the watercourse as shown on Typical detail D must be used.

NOTES

1. All dimensions in millimetres
2. Generally the angle between the direction of flow of the receiving watercourse and the outfall pipe should be 45°
3. All reinforced concrete edges to be finished with a 25 x 25 fillet
4. Min cover to reinforcement in the top face of the base slab to be 40
5. The bed and opposite bank of the watercourse may, in certain circumstances need to be protected by 225 to 300 thick uncoursed rubble pitching laid on a 100 thick bed of FND2 concrete (Note 8) and pointed in Class M1 Mortar. The stone for pitching shall consist of large smooth faced stones roughly dressed square and shall be of a hard durable and inert material. Bunter sandstone, Keuper waterstones and Carboniferous shales and mudstones are not to be used
6. An Outlet Grille as shown on Typical Detail G must be provided on all outfalls where the pipe size exceeds 450mm. Where pipe diameters are 375 to 450, 20 dia. stainless steel bars are to be provided across outlet at max. 120mm c/c leaving 100mm max. clear opening
7. Where outlets have a flap valve, a special detailed grille must be provided on all outlets 375mm diameter and above
8. Secure handrailing shall be supplied where a person may fall 2 metres or more or where a fall of less than 2 metres carries an increased risk of injury due to the landing surface
9. FND2 to be used for soil conditions Sulphate class 1 only. Designated mix references FND3, FND4A & FND4B to be used in soil conditions with sulphate classes 3,4A and 4B respectively (refer to specification clause 4.3.1)

225 to 300 thick uncoursed random rubble pitching on 100 thick Grade FND2 (Note 4) concrete and pointed in Class M1 mortar



TYPICAL DETAIL F
TYPICAL OUTFALL DETAIL TYPE 3
(MAXIMUM PIPE SIZE 225mm)

NOTES

- All dimensions in millimetres
1. The bed and opposite bank of the watercourse may, in certain circumstances, need to be protected by 225 to 300 thick uncoursed rubble pitching laid on 100 thick bed of FND2 concrete (Note 4) and bed of FND2 concrete (Note 4) and pointed in Class M1 mortar. The stone for pitching shall consist of large smooth faced stones roughly dressed square and shall be of a hard durable and inert material. Bunter sandstones, Keuper waterstones and carboniferous shales and mudstones are not to be used
 2. Maximum diameter 225mm
 3. FND2 to be used for soil conditions sulphate class 1 only. Designated mix references FND3, FND4A & FND4B to be used in soil conditions with sulphate classes 3,4A and 4B respectively (refer to specification clause 4.3.1)

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DEVELOPER SERVICES
DETAIL 12
TYPICAL OUTFALL DETAIL
TYPE 2 & TYPE 3

| | | | |
|----------------|-------------|------------|----|
| SCALE | NTS | SHEET SIZE | A3 |
| DRAWING NUMBER | STND/19/012 | REVISION | A |