

1 Mar 2023

See Distribution List

Dear Sir/Madam,

**REVISION TO PUB'S STANDARD DRAWING – MANHOLE ON SLOPE
(REVISED DRAWING NO.: PUB/WRN/STD/011)**

PUB has enhanced the standard drawing for the design of manholes constructed on slopes with consideration for safety. The revised standard drawing (**Drawing No.: PUB/WRN/STD/011A**) is attached below and can also be downloaded at the hyperlink: <https://www.pub.gov.sg/compliance/industry/drawings>. Key changes to the said standard drawing are stated in **Annex A**.



WRN_STD_011A.pdf

2 All new Development Control (DC) submissions shall adopt the revised drawing (Drawing No: PUB/WRN/STD/011A) and comply with the new design requirements from 1 Sep 2023 onwards. During this transition period, we encourage all industry professionals to adopt the revised drawing and the new design requirements early where this is possible.

3 If you have any further queries regarding the revised standard drawing, you may contact Assistant Director Mr Lee Jia Yi at lee_jia_yi@pub.gov.sg or email to pub_one@pub.gov.sg.

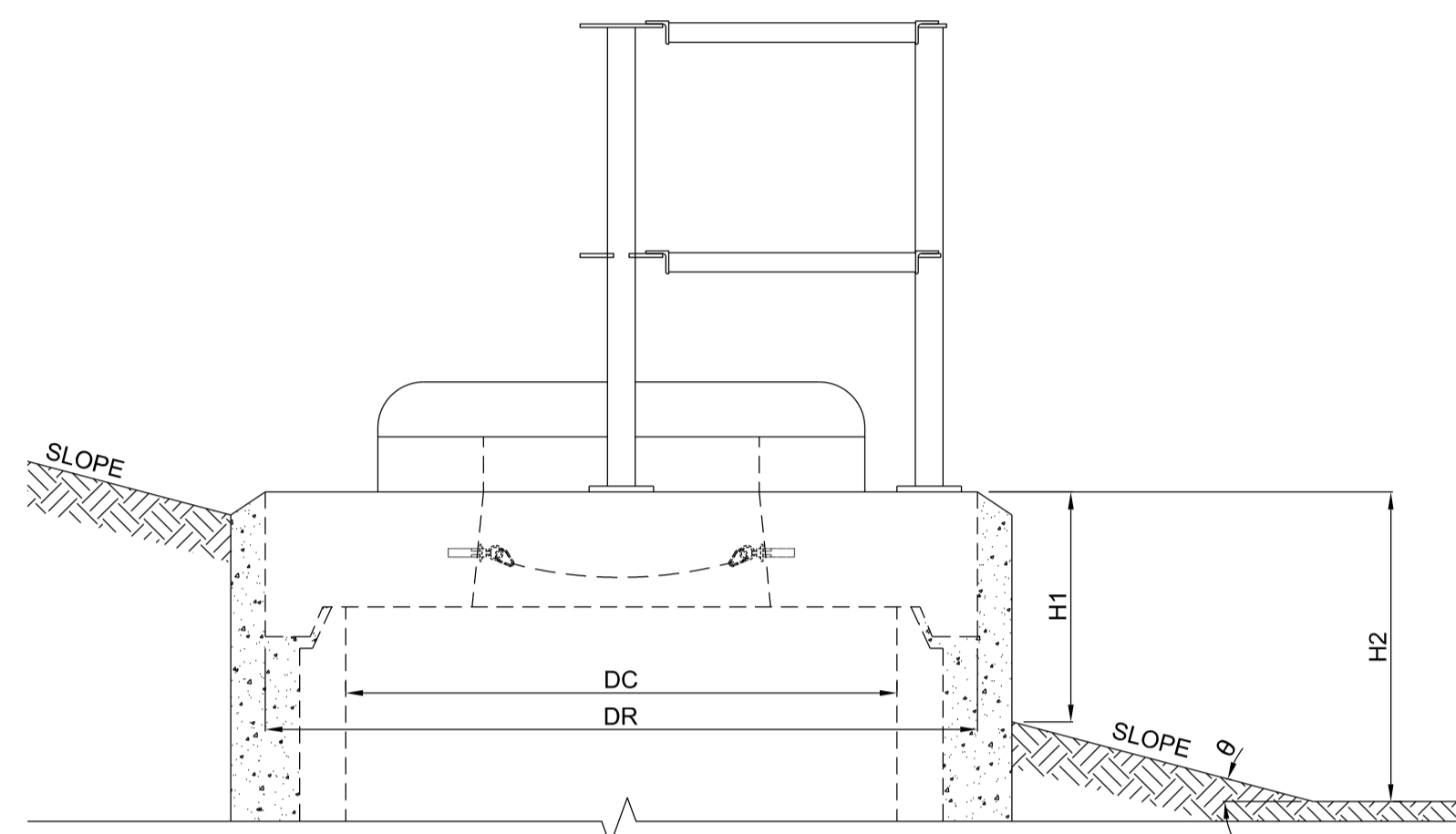
Yours faithfully,



Cheng Geok Ling (Ms)
Senior Deputy Director
Water Reclamation (Network) Department
PUB, Singapore's National Water Agency

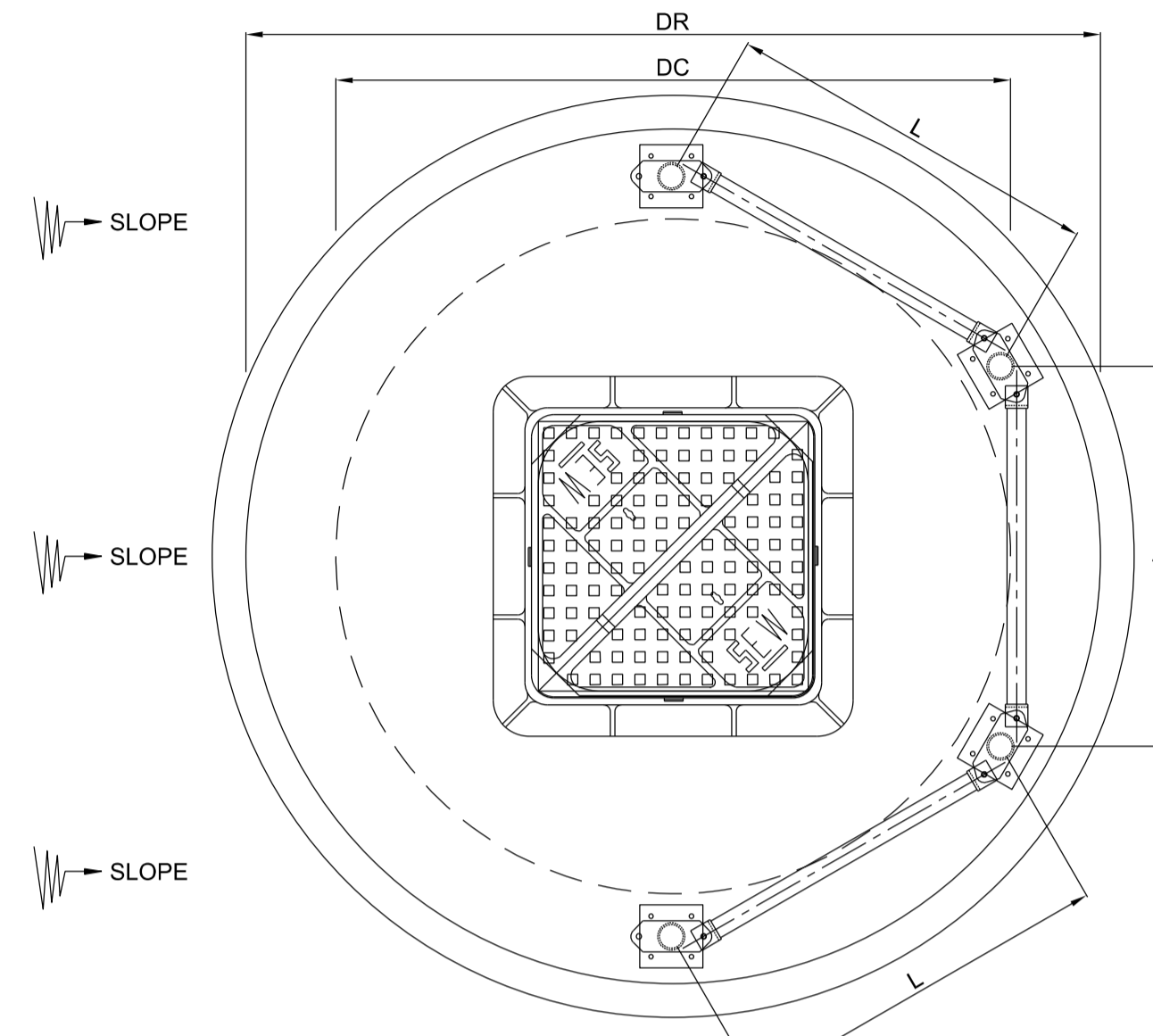
Annex A – Key Changes to PUB/WRN/STD/011A

S/N	Descriptions
1	The material for handrails, including all members, bolts, anchor bolts, nuts, washers, etc., shall be of stainless steel 304.
2	Handrails are to be provided when: <ul style="list-style-type: none"> the exposed wall of the side of the manhole to the downhill slope exceeds 0.5m in height or; the height from the manhole cover slab to the flat ground exceeds 2m and the angle of slope is more than 30 degrees.
3	The height of handrails is standardised to 1m.
4	Handrails span and elements dimensions are revised.
5	The safety chain requirement for handrails is removed.
6	The minimum internal diameter of manhole on a slope shall be 1350mm.
7	All anchor bolts shall be M12, installed mechanically or chemically, with minimum embedment depth of 100mm. The minimum tensile capacity and shear capacity of anchor bolts shall be 15kN and 5kN respectively.
8	All anchor bolts shall have a minimum distance of 60mm to the concrete edge of manhole cover slab.
9	The base plate has been revised from a round to a square shape.
10	The handrail grab bars and post connection are changed to bolted joint.

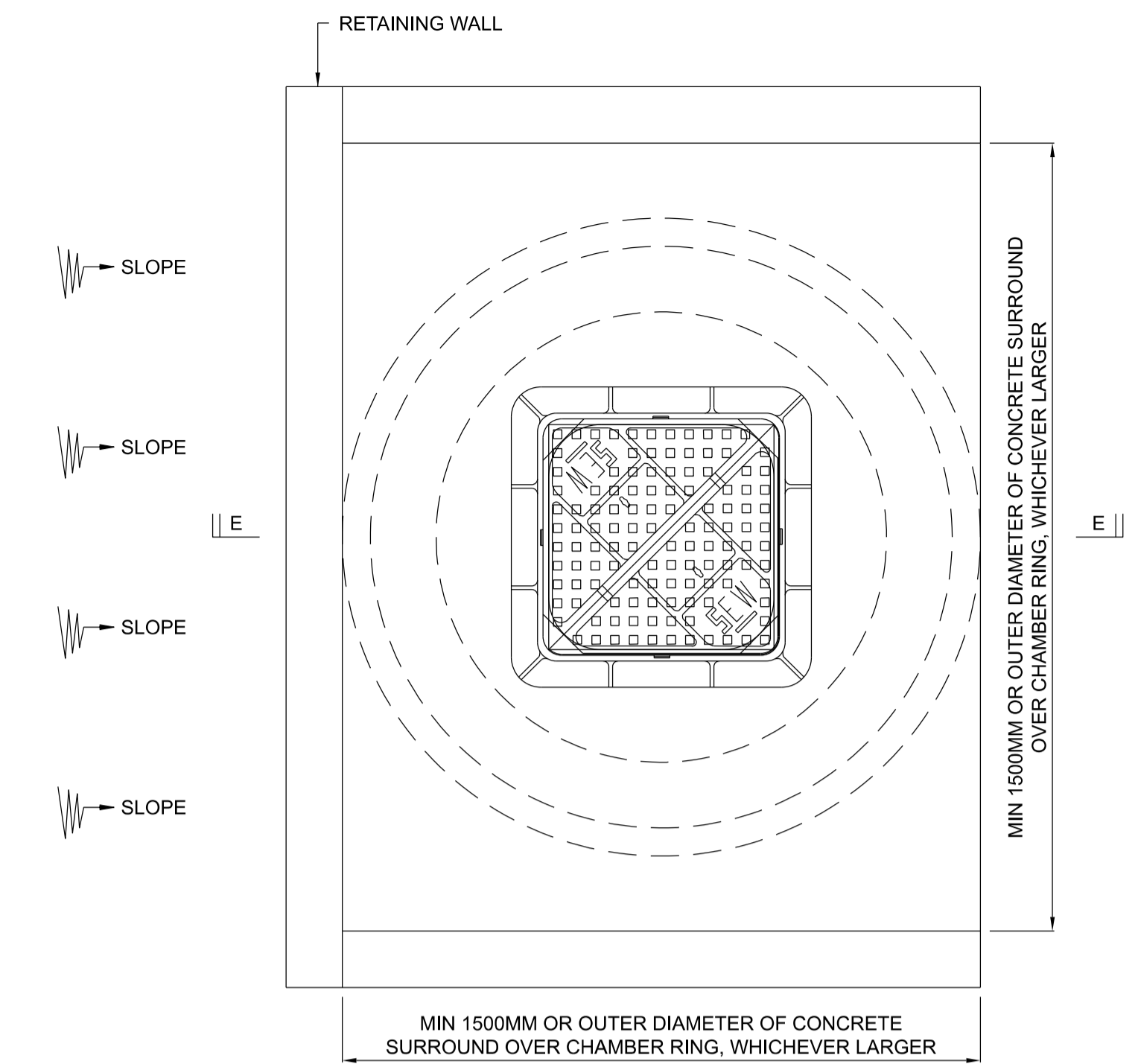


**ELEVATION
MANHOLE ON SLOPE (WITH HANDRAILS)**
SCALE 1:15

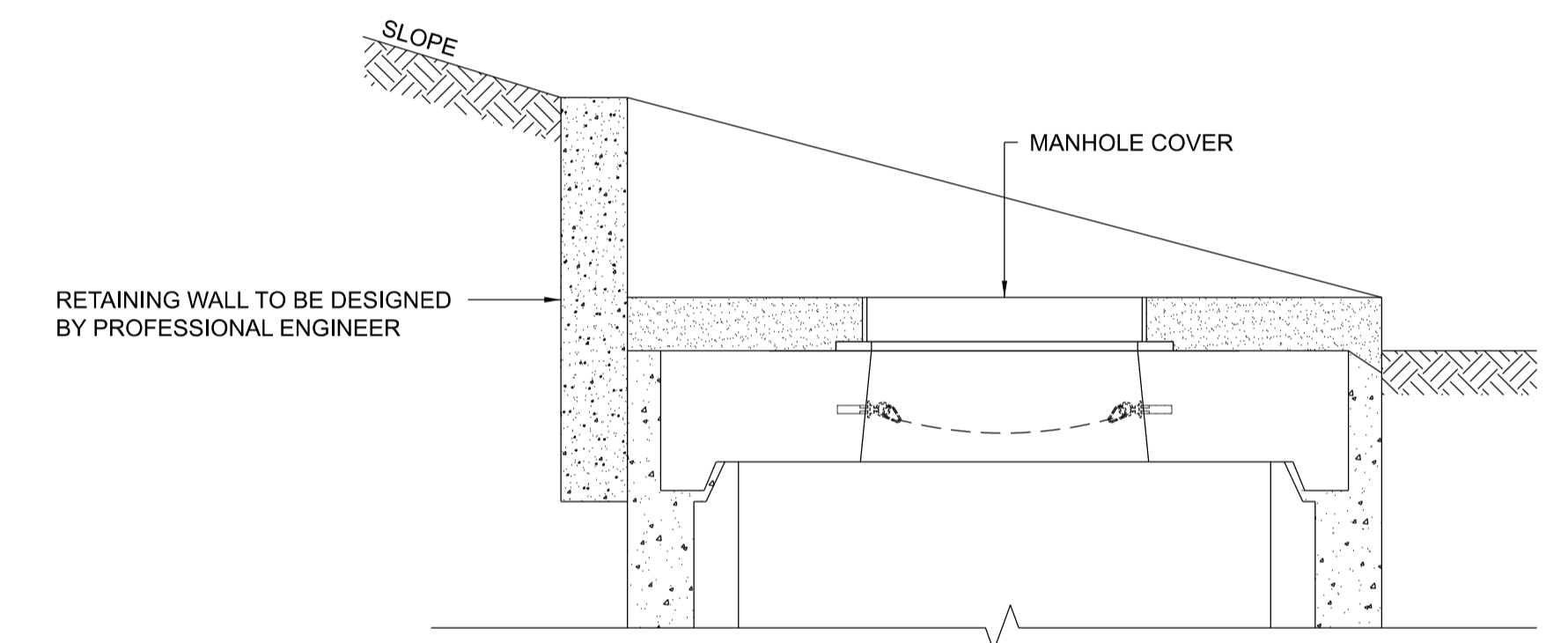
HANDRAILS TO BE PROVIDED WHEN:
I) H1 > 500 MM, OR
II) H2 > 2000 MM AND $\theta > 30^\circ$



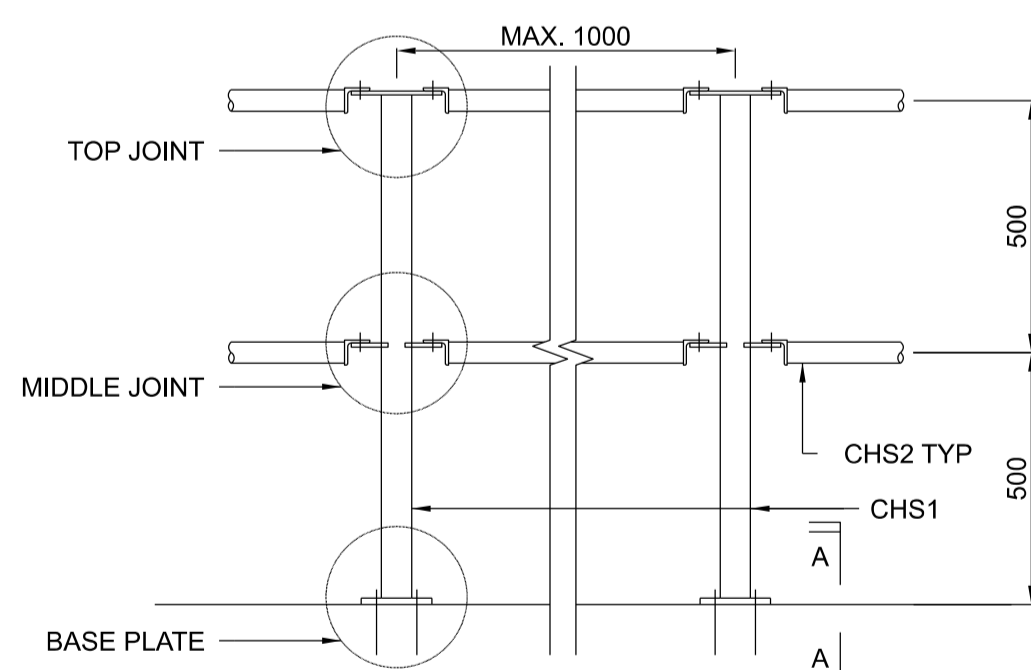
**PLAN
MANHOLE ON SLOPE (WITH HANDRAILS)**
SCALE 1:15



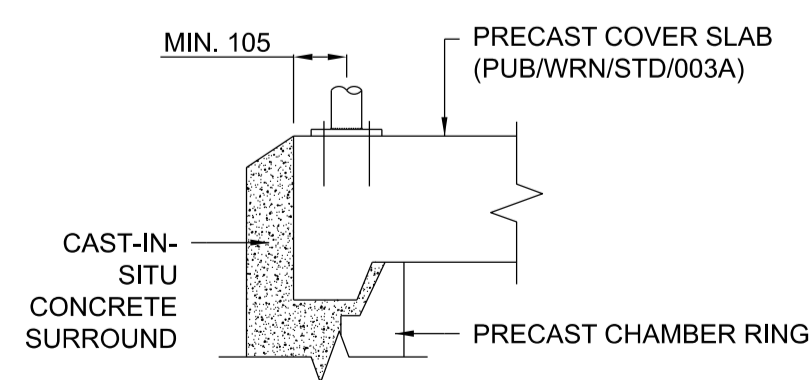
**PLAN
MANHOLE AT FOOT OF SLOPE
(WITH 3 SIDED RETAINING WALL)**
SCALE 1:15



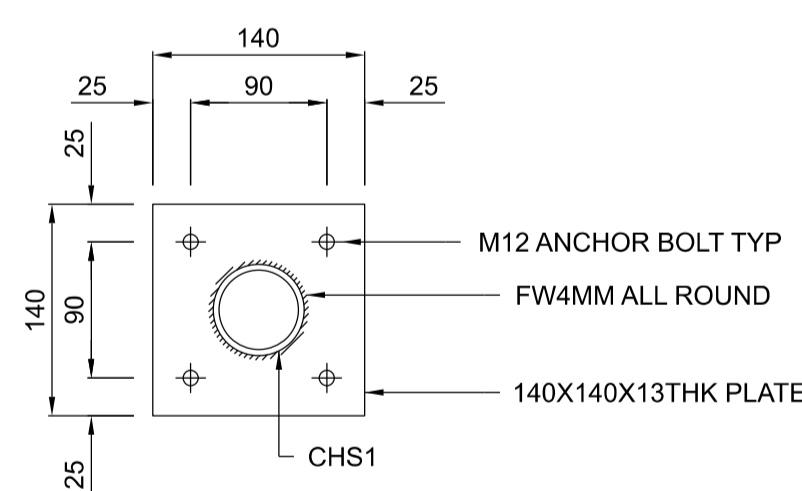
**SECTION E-E
MANHOLE AT FOOT OF SLOPE
(WITH 3 SIDED RETAINING WALL)**
SCALE 1:15



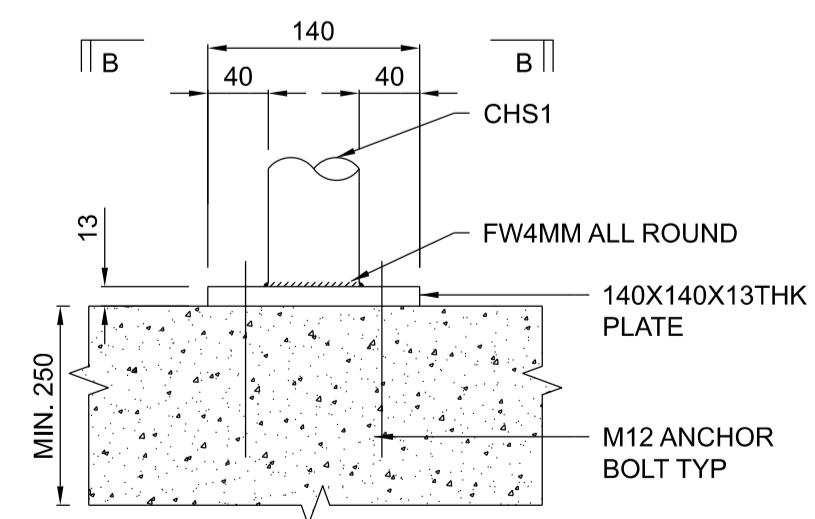
TYPICAL HANDRAIL ELEVATION
SCALE 1:15



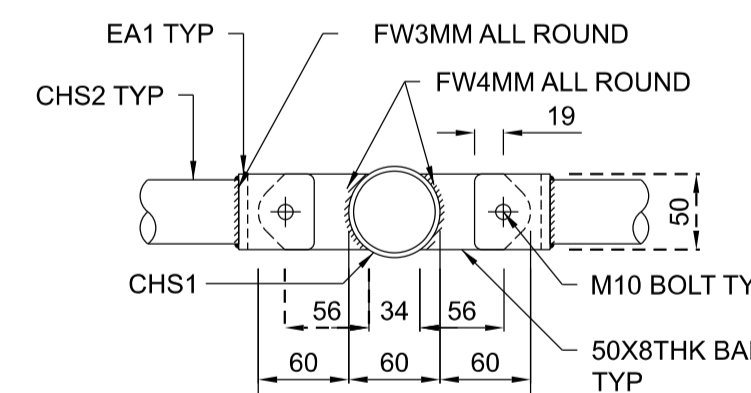
SECTION A-A
SCALE 1:15



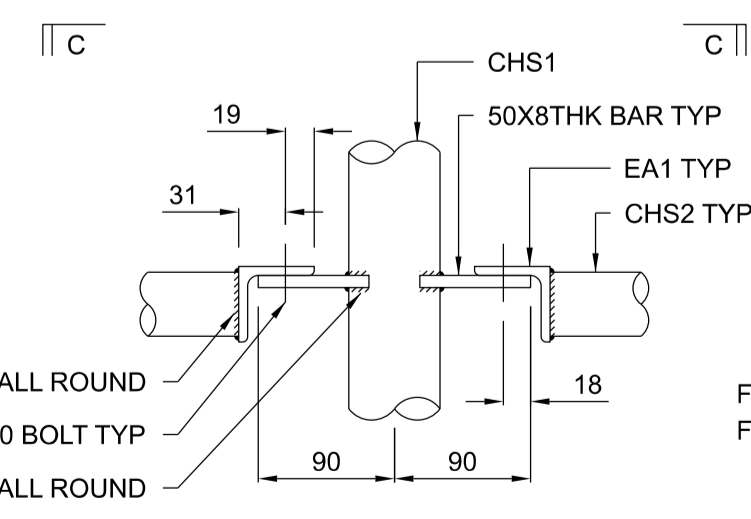
SECTIONAL PLAN B-B
SCALE 1:5



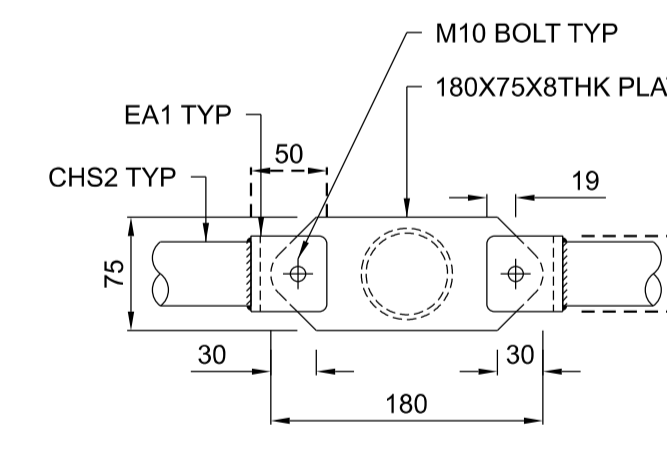
BASE PLATE DETAIL
SCALE 1:5



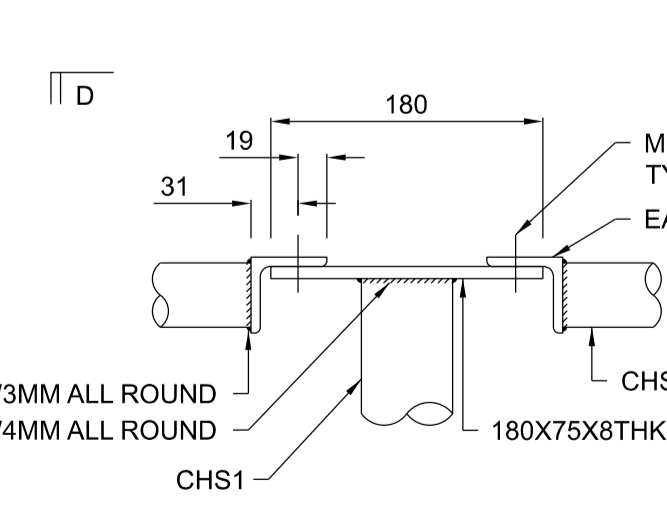
SECTIONAL PLAN C-C
SCALE 1:5



MIDDLE JOINT DETAIL
SCALE 1:5



SECTIONAL PLAN D-D
SCALE 1:5



TOP JOINT DETAIL
SCALE 1:5

	TYPE C	TYPE D	TYPE E
DC	1350	1500	1800
DR	1750	1900	2200
L	770	845	995

ELEMENT	SECTION/SIZE
CHS1	CHS 60.3X3.9THK
CHS2	CHS 42.4X3.2THK
EA1	EA 50X50X6THK

NOTES

1. THERE SHALL BE NO SHARP EDGE ON EXPOSED SURFACES.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
3. ALL BOLTS SHALL BE TIGHTENED WITH DOUBLE NUTS OF EQUAL THICKNESS.
4. ALL MEMBERS, BOLTS, ANCHOR BOLTS, NUTS, WASHERS, SHALL BE STAINLESS STEEL 304.
5. ALL WELDS SHALL BE STRUCTURAL TYPE MADE BY APPROVED WELDING TECHNIQUE TO GIVE SOUND, STRONG WELDS WITH A MAXIMUM THICKNESS NOT EXCEEDING THE THICKNESS OF JOINTING MEMBERS.
6. ALL ANCHOR BOLTS SHALL BE M12 CHEMICAL/ MECHANICAL ANCHOR BOLTS EMBED MINIMUM 100 MM, WITH MINIMUM TENSILE CAPACITY 15KN, SHEAR CAPACITY 5KN. ALL ANCHOR BOLTS SHALL HAVE MINIMUM 60MM DISTANCE TO CONCRETE EDGE. BOLTS SHALL COMPLY WITH THE REQUIREMENTS SET BY THE BOLT MANUFACTURER.

ISSUED : MAR 2023

LAST REVIEWED : JULY 2019

SCALES
AS
SHOWN

MANHOLE ON SLOPE

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