



Republic of Kenya

## Coast Water Works Development Agency

Mikindani Street, Off Nkurumah Road, P.O. Box 90417-80100, Mombasa, Kenya. Tel: +254 041 231 5230

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# Bidding Document for Procurement of BARICHO WELL FIELD PROTECTION WORKS Volume 3 of 3

NCB No: KE-CWSB-233052-CW-RFB

**Project Name: WATER AND SANITATION DEVELOPMENT (WSD)**

**Employer: COAST WATER WORKS DEVELOPMENT AGENCY**

**Country: KENYA**

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**Part 2: Work Requirements – Attachment VII.2  
BOOK OF DRAWINGS**

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ISSUED ON : 27th July 2021

S/No	Drawing Code	Title
<b>GENERAL LOCATION AND LAYOUT</b>		
1	BWPW-DD-1-100	GENERAL PROJECT LOCATION PLAN
2	BWPW-DD-1-105	PROJECT ACCESS MAP
3	BWPW-DD-1-110	GENERAL PROJECT LAYOUT
4	BWPW-DD-1-120	BENCHMARK PLAN
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6	BWPW-DD-2-110	UPSTREAM WELLFIELD – SECTIONS
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18	BWPW-DD-2-143	UPSTREAM WELLFIELD TRANSFORMER BUILDING HORIZONTAL SECTION C-C
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24	BWPW-DD-3-101	DOWNSTREAM WELLFIELD – LAYOUT
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30	BWPW-DD-3-112	SECTIONS OF BH4A AND BH4B PROTECTION AREA
31	BWPW-DD-3-120	BH4 – PLAN AND SECTIONS
32	BWPW-DD-3-121	BH4 – PLAN AND SECTIONS
33	BWPW-DD-3-130	BH5 – PLAN AND SECTIONS

S/No	Drawing Code	Title
34	BWPW-DD-3-131	BH5 – PLAN AND SECTIONS
35	BWPW-DD-3-140	BH6 – PLAN AND SECTIONS
36	BWPW-DD-3-141	BH6 – PLAN AND SECTIONS
37	BWPW-DD-3-150	BH6A – PLAN AND SECTIONS
38	BWPW-DD-3-151	BH6A – PLAN AND SECTIONS
39	BWPW-DD-3-160	BH7 – PLAN AND SECTIONS
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64	BWPW-DD-6-102	BARICHO TOILET BLOCK - ELEVATION
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WATER & SANITATION AND IRRIGATION  
Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE



Coast Water Works  
Development Agency



**G. KARAVOKYRIS & PARTNERS**  
CONSULTING ENGINEERS

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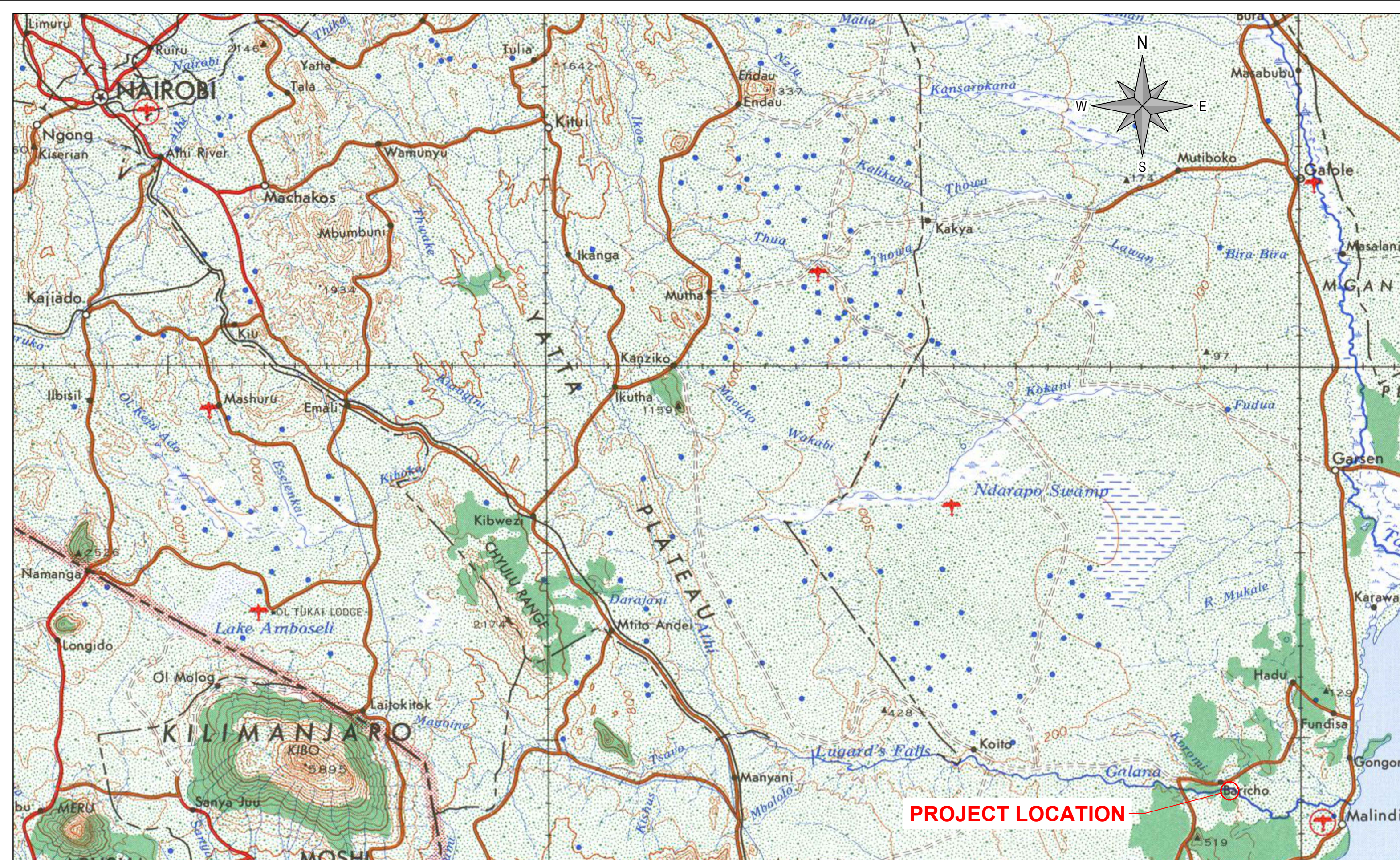
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### LIST OF DRAWINGS

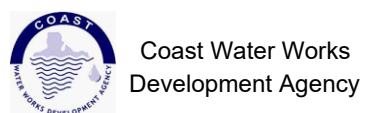
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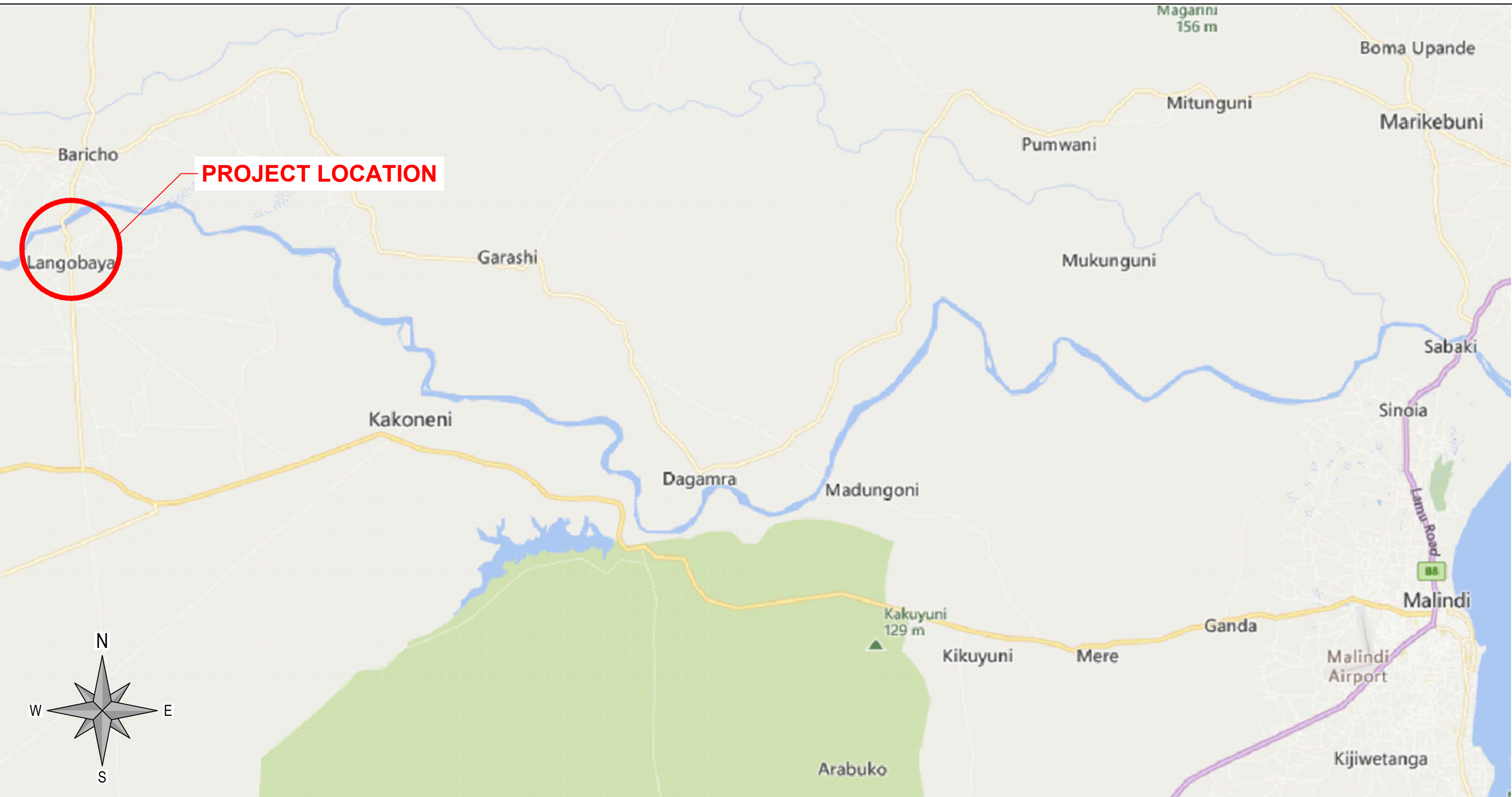


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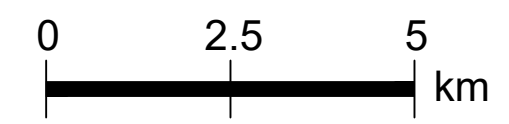
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**GENERAL PROJECT LOCATION PLAN**





SOURCE: BING MAPS 2021



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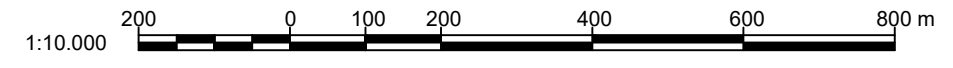
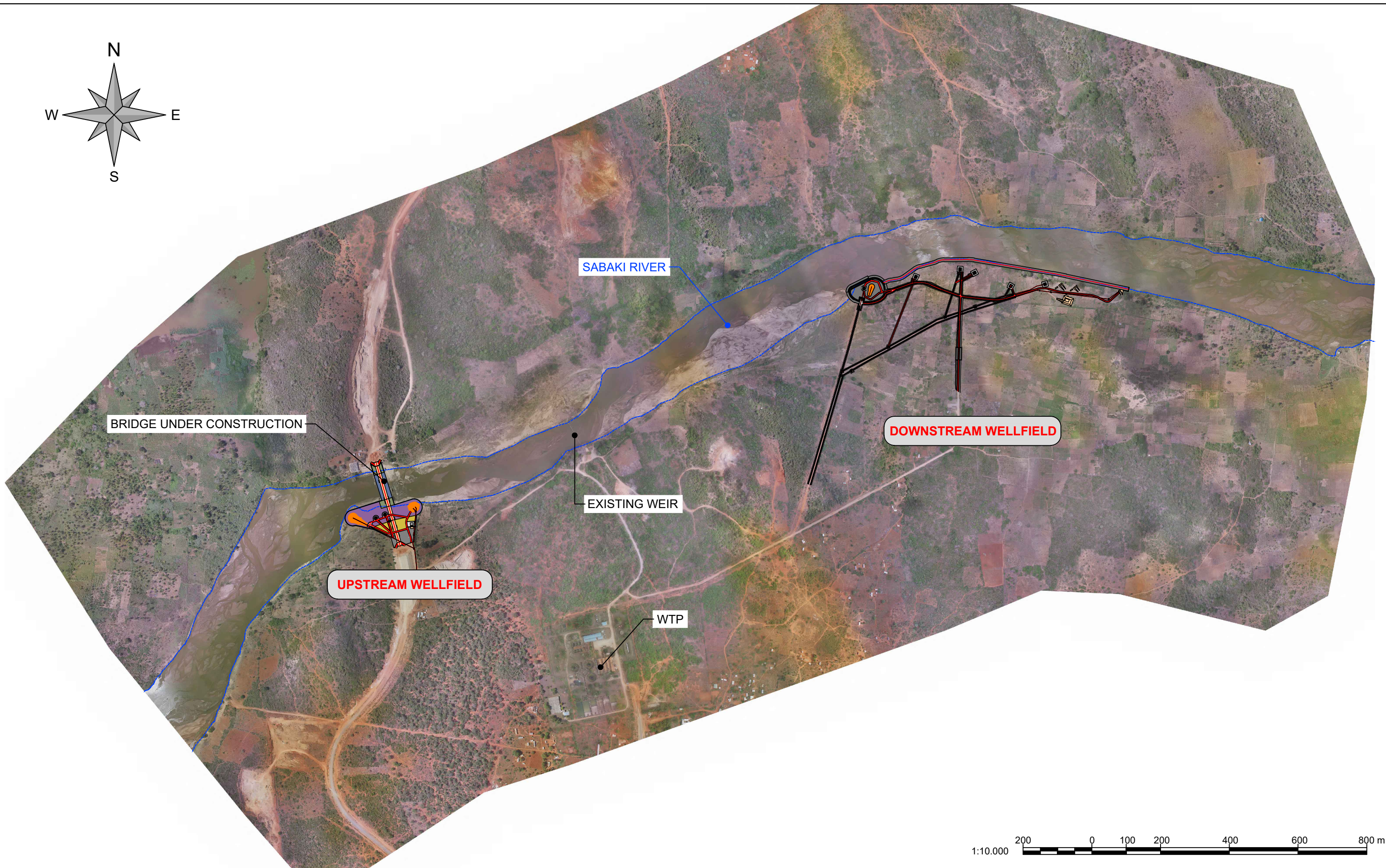
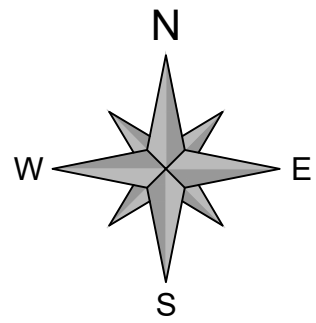
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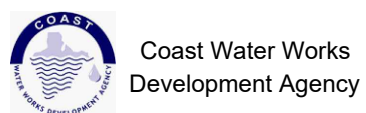
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**PROJECT ACCESS MAP**





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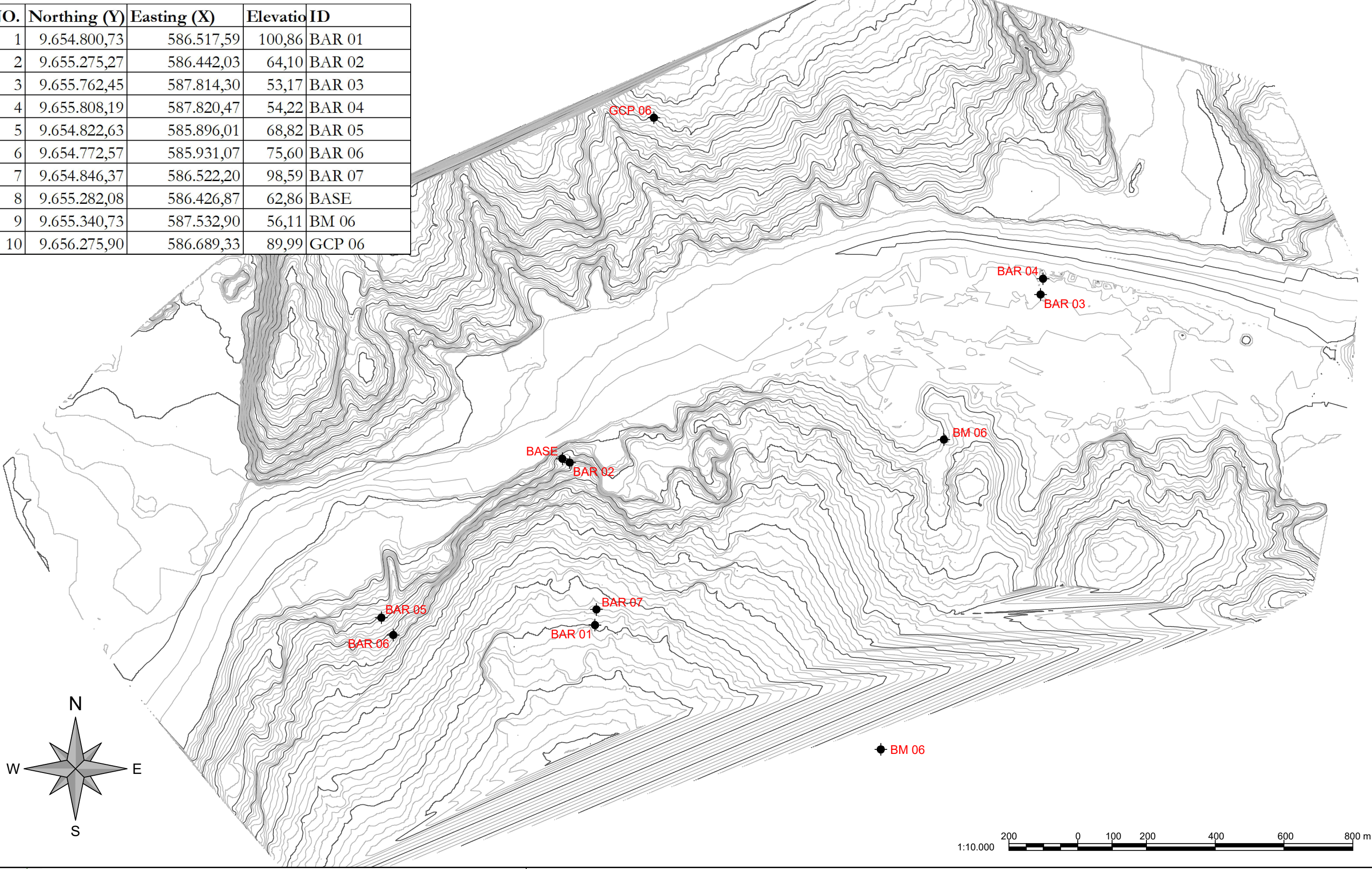
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**GENERAL PROJECT LAYOUT**



NO.	Northing (Y)	Easting (X)	Elevatio	ID
1	9.654.800,73	586.517,59	100,86	BAR 01
2	9.655.275,27	586.442,03	64,10	BAR 02
3	9.655.762,45	587.814,30	53,17	BAR 03
4	9.655.808,19	587.820,47	54,22	BAR 04
5	9.654.822,63	585.896,01	68,82	BAR 05
6	9.654.772,57	585.931,07	75,60	BAR 06
7	9.654.846,37	586.522,20	98,59	BAR 07
8	9.655.282,08	586.426,87	62,86	BASE
9	9.655.340,73	587.532,90	56,11	BM 06
10	9.656.275,90	586.689,33	89,99	GCP 06




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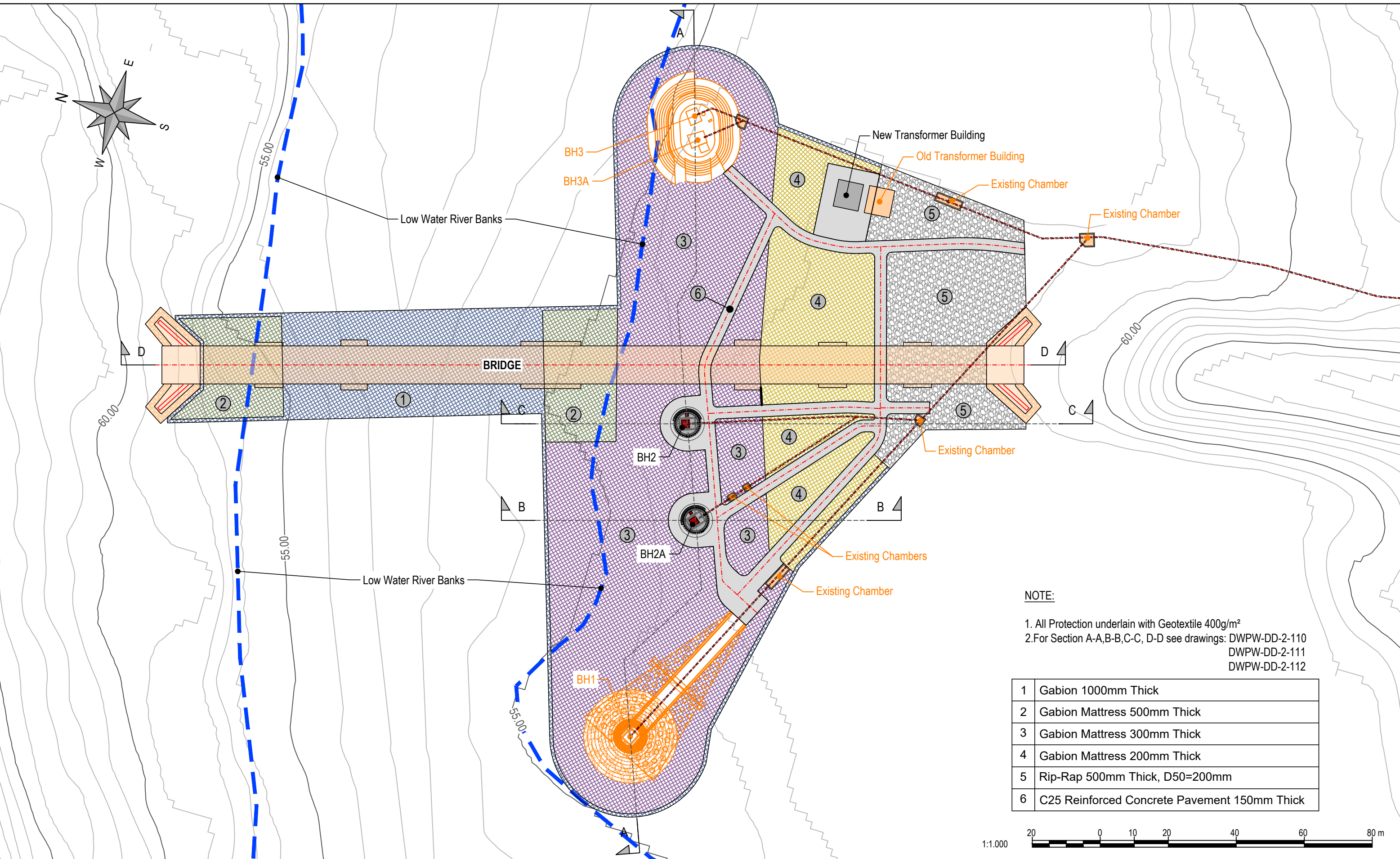


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**BENCHMARK PLAN**

Date : JUNE 2021    Scale: 1:10.000    Drg. No. BWPW-DD-1-120    Sheet No. 1/1






- NOTE:**
1. All Protection underlain with Geotextile 400g/m<sup>2</sup>
  2. For Section A-A, B-B, C-C, D-D see drawings: DWPW-DD-2-110  
DWPW-DD-2-111  
DWPW-DD-2-112

1	Gabion 1000mm Thick
2	Gabion Mattress 500mm Thick
3	Gabion Mattress 300mm Thick
4	Gabion Mattress 200mm Thick
5	Rip-Rap 500mm Thick, D50=200mm
6	C25 Reinforced Concrete Pavement 150mm Thick



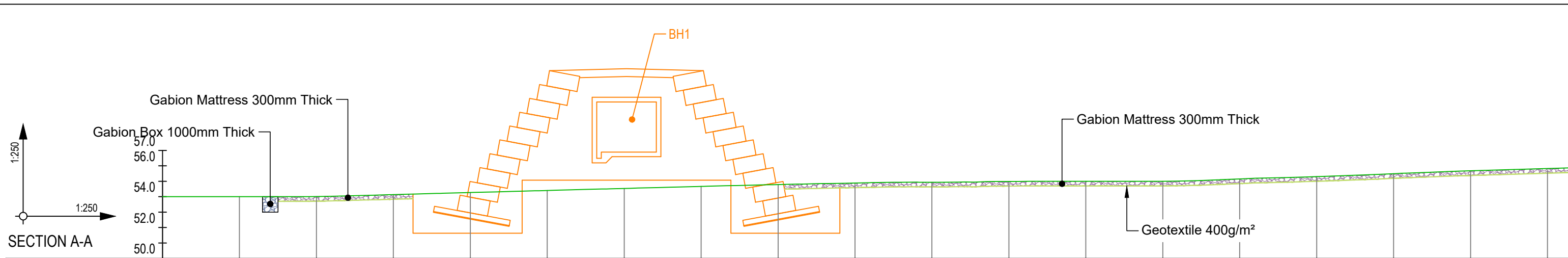

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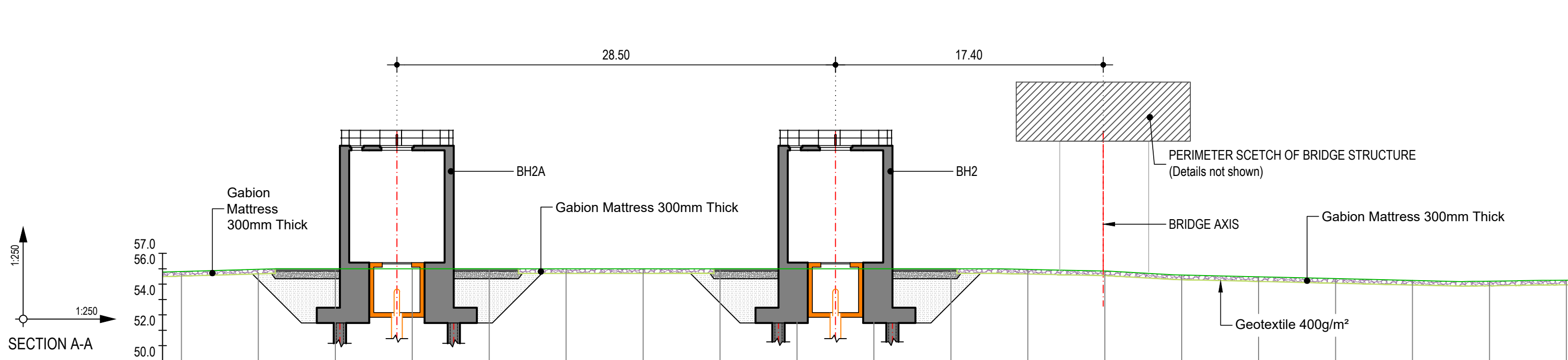

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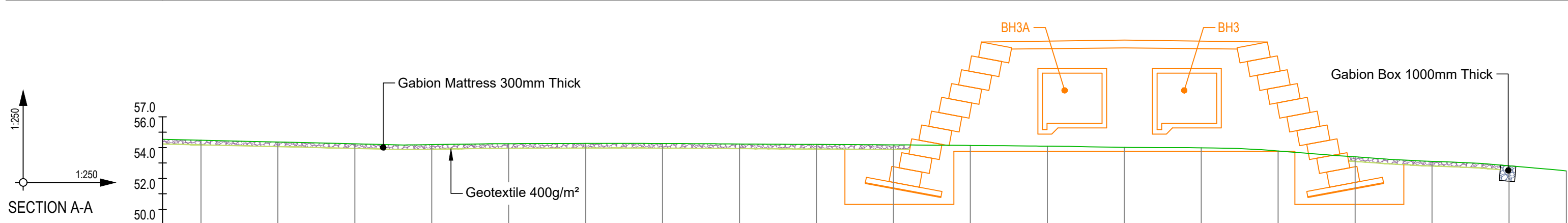




GROUND ELEVATIONS



GROUND ELEVATIONS



GROUND ELEVATIONS

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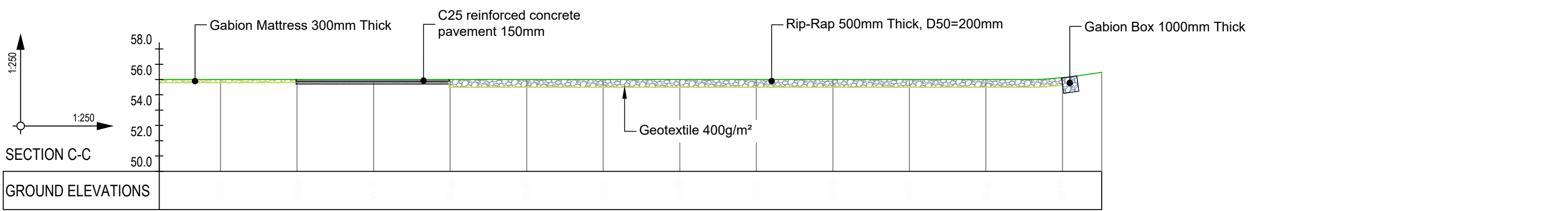
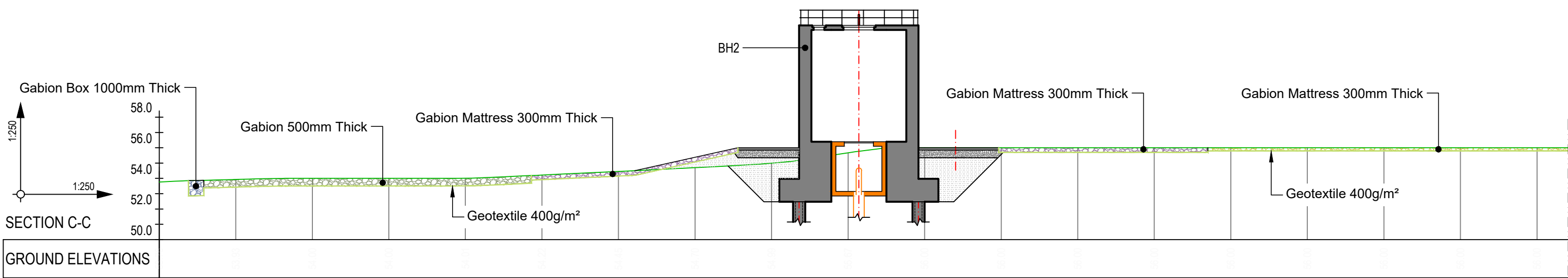
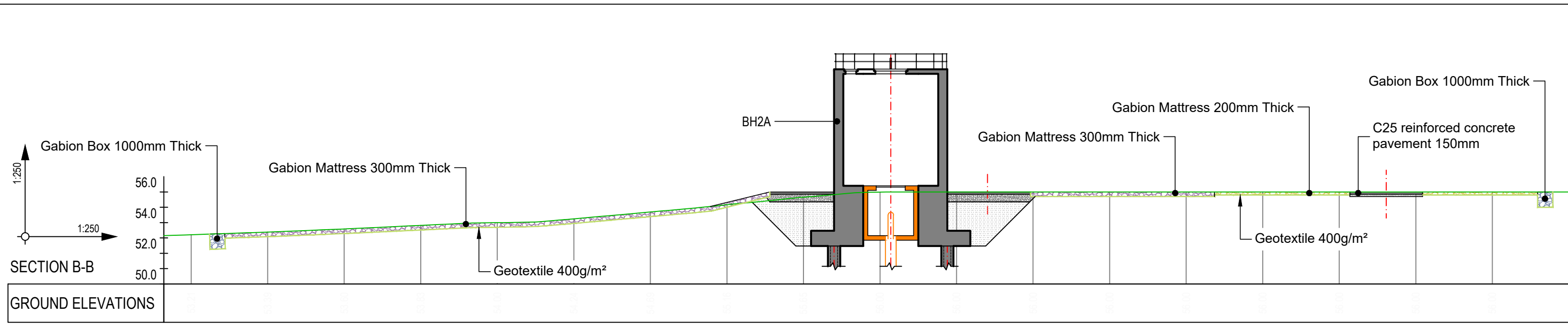


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**UPSTREAM WELLFIELD SECTIONS**





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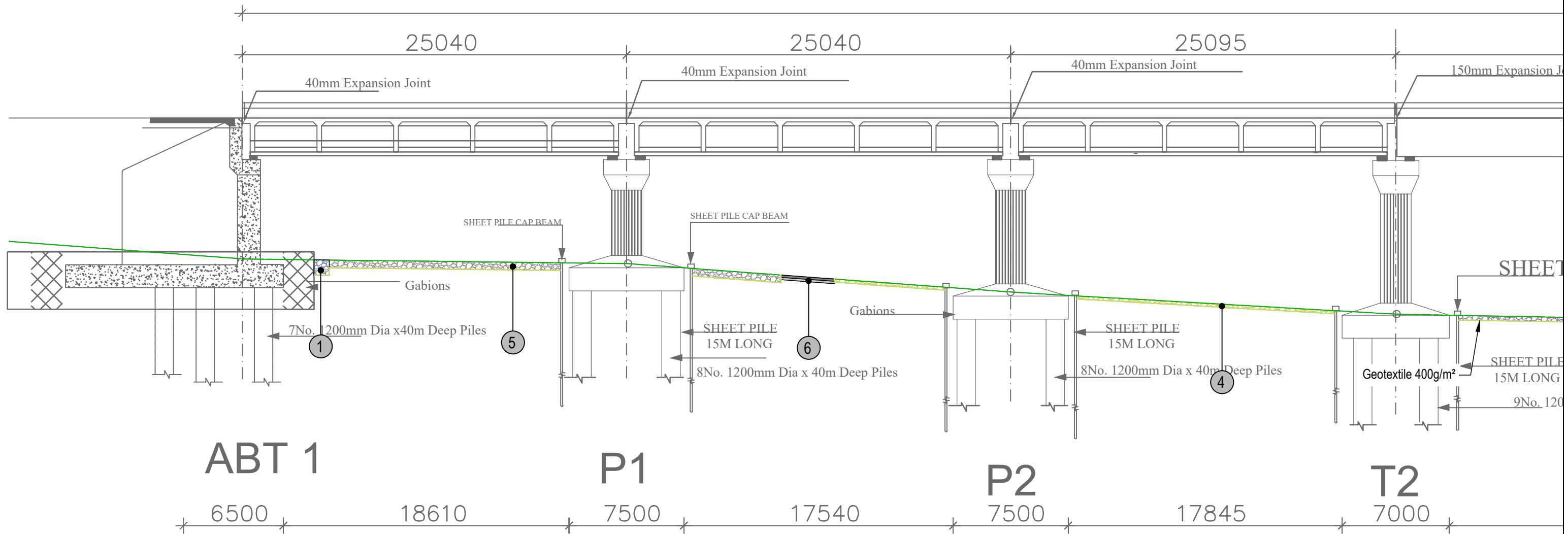
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**UPSTREAM WELLFIELD SECTIONS**

Date : JUNE 2021    Scale: 1:250    Drg. No. BWPW-DD-2-111    Sheet No. 2/2



1	Gabion 1000mm Thick
2	Gabion Mattress 500mm Thick
3	Gabion Mattress 300mm Thick
4	Gabion Mattress 200mm Thick
5	Rip-Rap 500mm Thick, D50=200mm
6	C25 Reinforced Concrete Pavement 150mm Thick



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**UPSTREAM WELLFIELD  
BRIDGE AXIS SECTION**



241460

58075

58075

150mm Expansion Joint

SHEET PILE CAP BEAM

SHEET PILE CAP BEAM

Geotextile 400g/m<sup>2</sup>

SHEET PILE  
15M LONG

9No. 1200mm Dia x40m Deep Piles

SHEET PILE  
15M LONG

SHEET PILE  
15M LONG

20No. 1200mm Dia x40m Deep Piles

Geotextile 400g/m<sup>2</sup>

T2

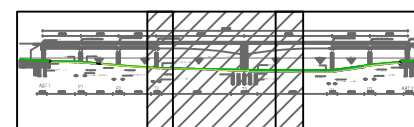
7000

45875

T3

17400

45875



1	Gabion 1000mm Thick
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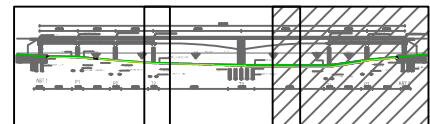
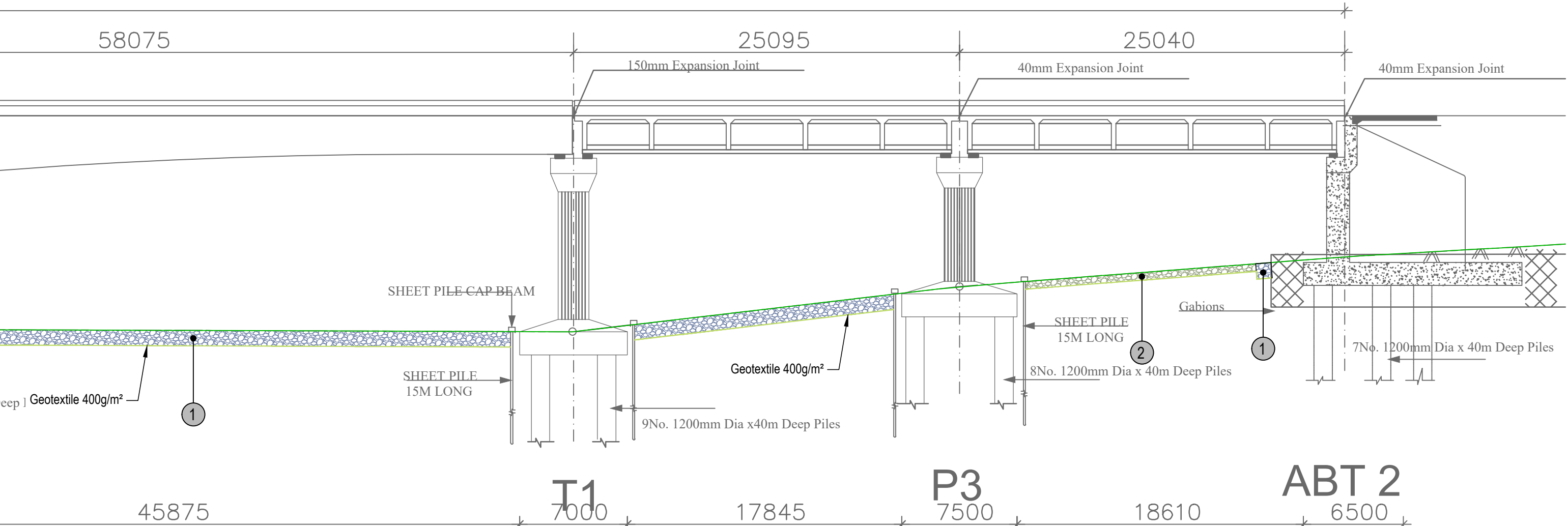
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**UPSTREAM WELLFIELD  
BRIDGE AXIS SECTION**

Date : JUNE 2021 Scale: 1:250 Drg. No. BWPW-DD-2-113 Sheet No. 2/3



1	Gabion 1000mm Thick
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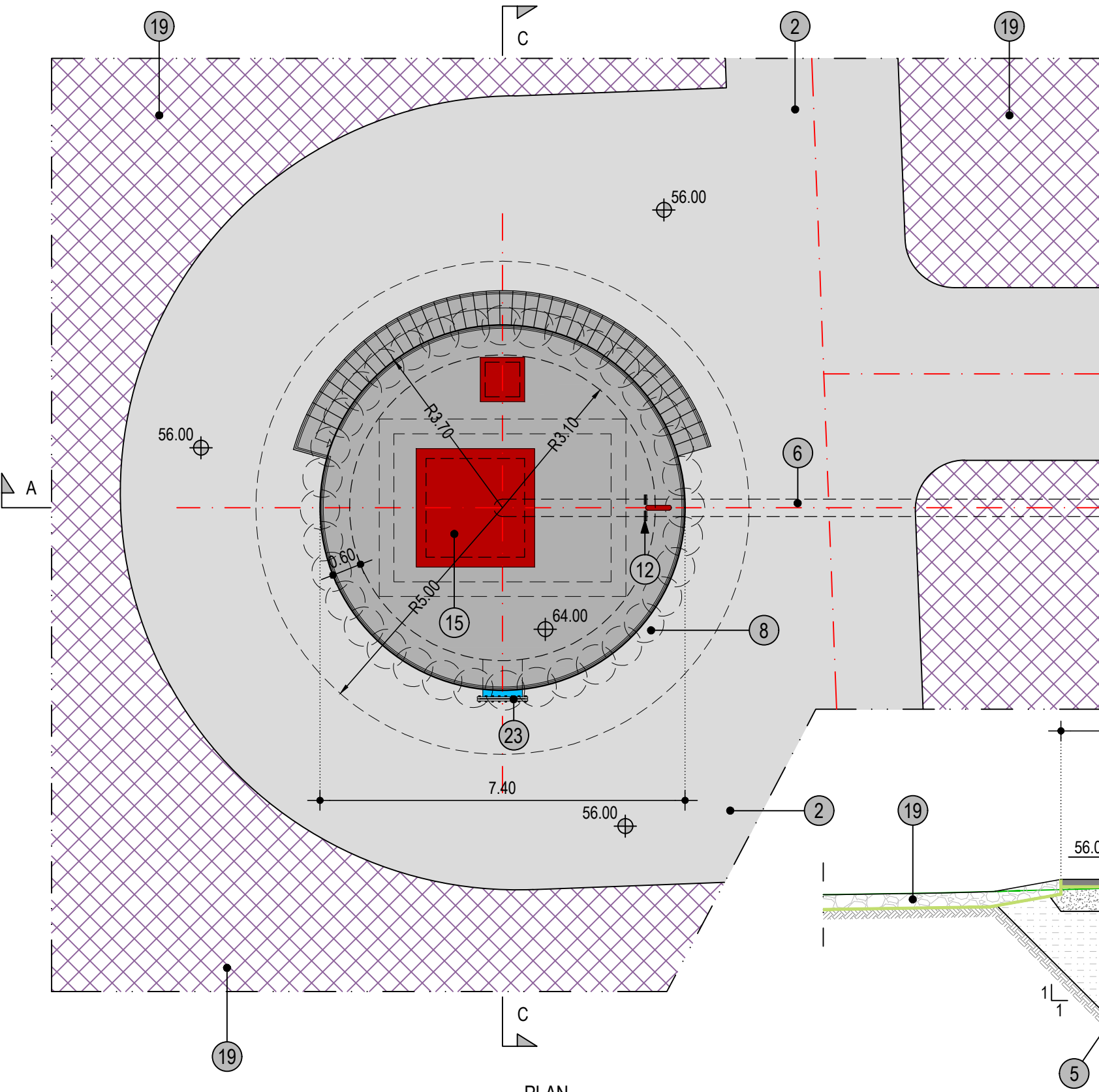

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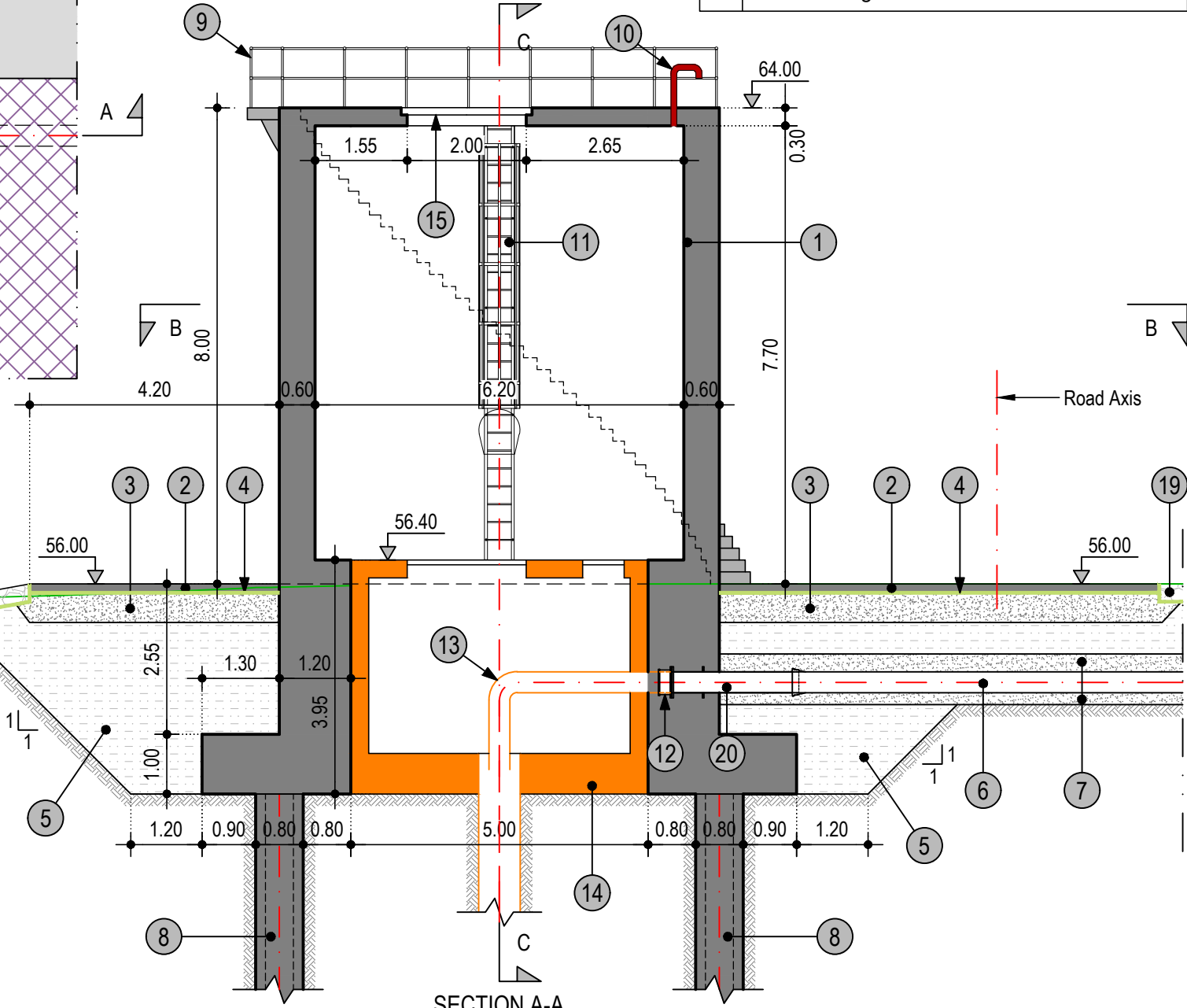


PLAN



1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
7	Embedding sand material
8	Concrete piles 800mm
9	Metal Rail
10	Ventilation Pipe with Insect Net
11	Safety Ladder
12	Puddle Flange DN350 PN16 two pieces

13	Existing pipe and equipment (not shown)
14	Existing Wellhead
15	Steel cover
16	Gabion Box 1m x 1m x 2m
17	Steel Flexible Stepped Coupling DN350 PN16
18	Existing Chamber
19	Gabion mattress 300mm
20	Flanged Spigot DI Pipe with Puddle Flange DN 350 PN16 L=2.0m
21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



SECTION A-A

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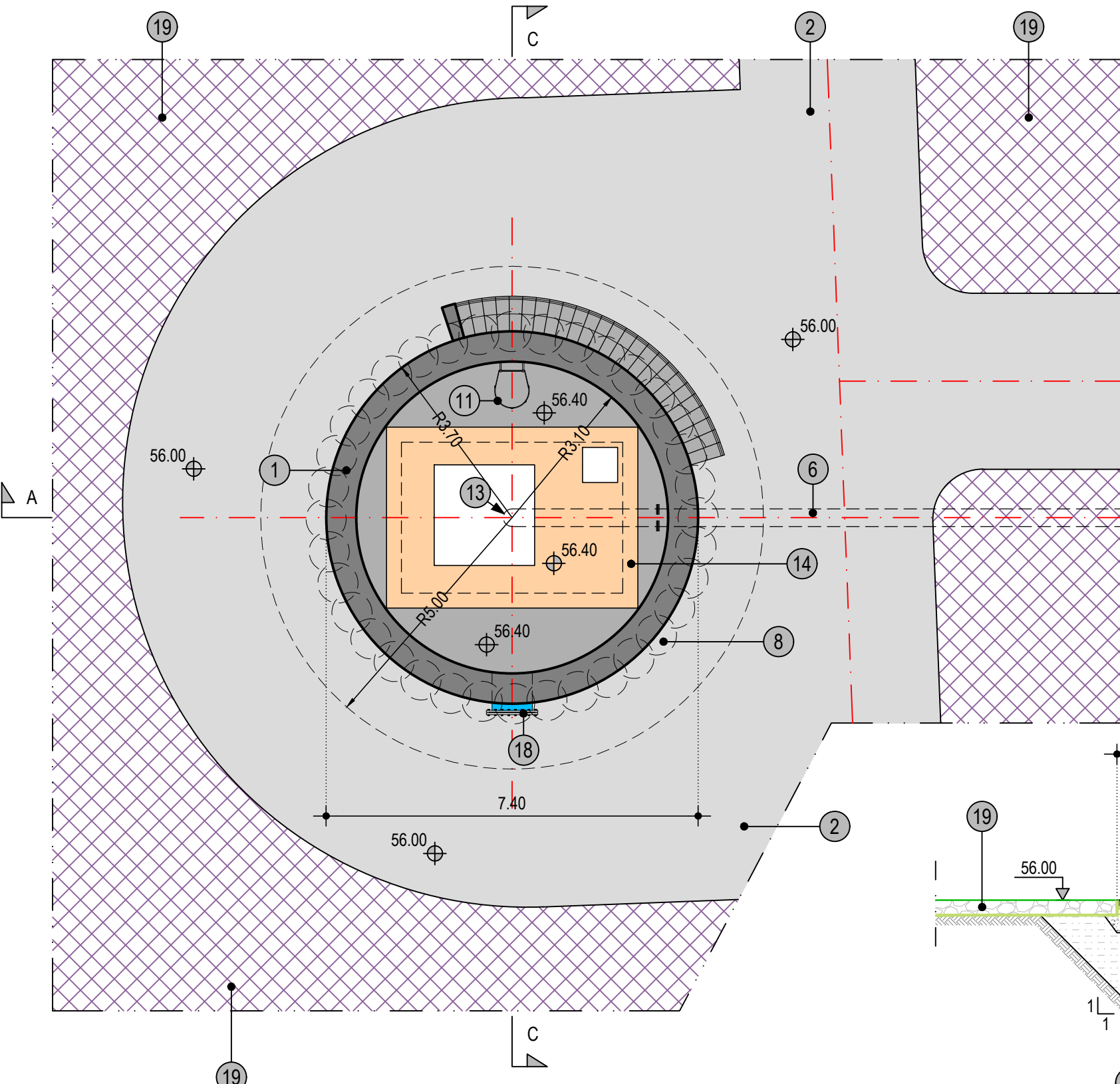
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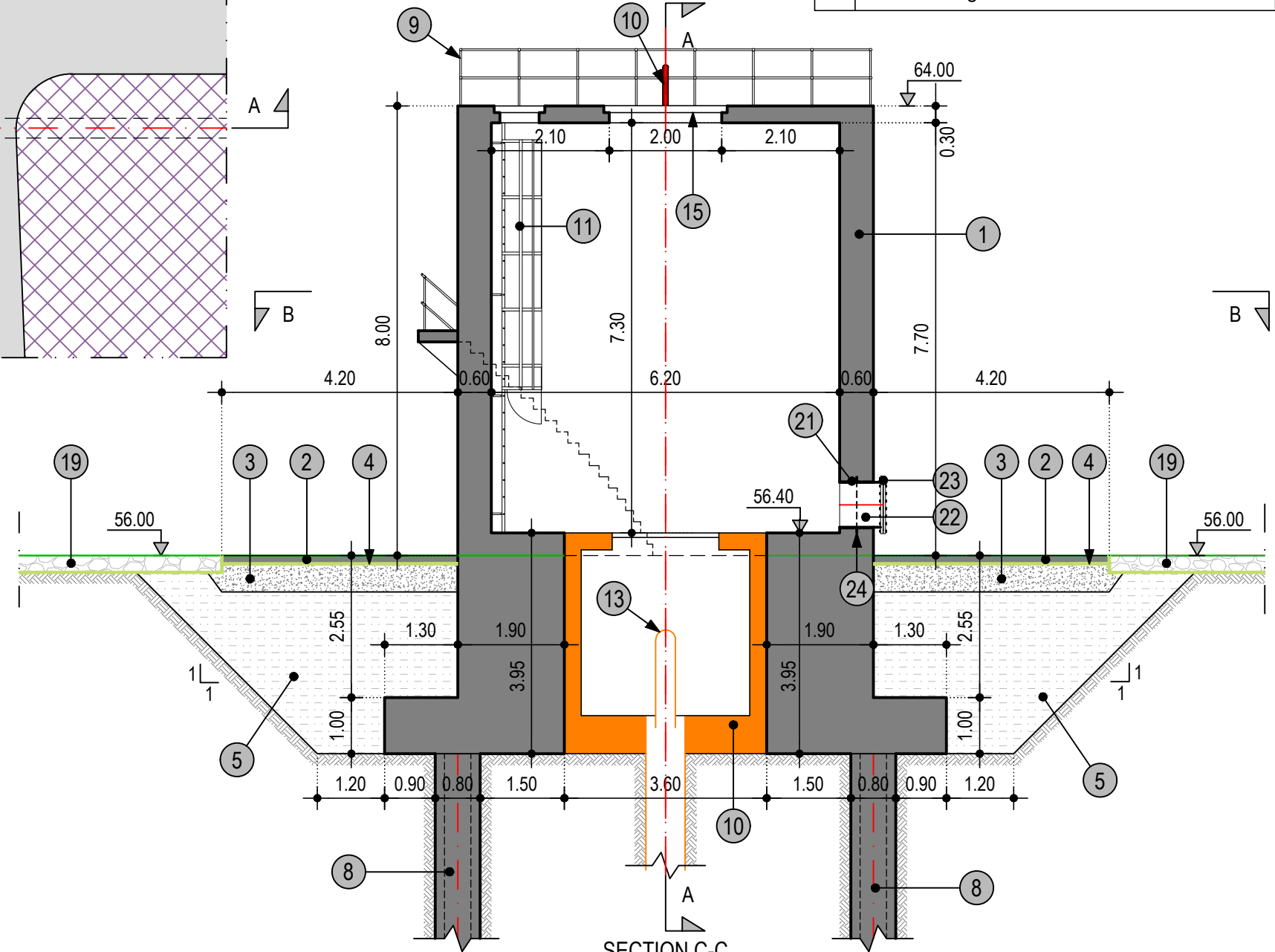
**BH2- PLAN AND SECTIONS**



SECTION B-B

1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
7	Embedding sand material
8	Concrete piles 800mm
9	Metal Rail
10	Ventilation Pipe with Insect Net
11	Safety Ladder
12	Puddle Flange DN350 PN16 two pieces

13	Existing pipe and equipment (not shown)
14	Existing Wellhead
15	Steel cover
16	Gabion Box 1m x 1m x 2m
17	Steel Flexible Stepped Coupling DN350 PN16
18	Existing Chamber
19	Gabion mattress 300mm
20	Flanged Spigot DI Pipe with Puddle Flange DN 350 PN16 L=2.0m
21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



SECTION C-C



THE REPUBLIC OF KENYA, MINISTRY OF WATER & SANITATION AND IRRIGATION  
Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE

CONSULTANCY SERVICES FOR PREPARATION OF DETAILED DESIGNS, TENDER DOCUMENTS, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (ESIA) AND CONSTRUCTION SUPERVISION OF THE BARICHO WELL-FIELD PROTECTION WORKS - KE-CWWDA-87234-CS-QCBS

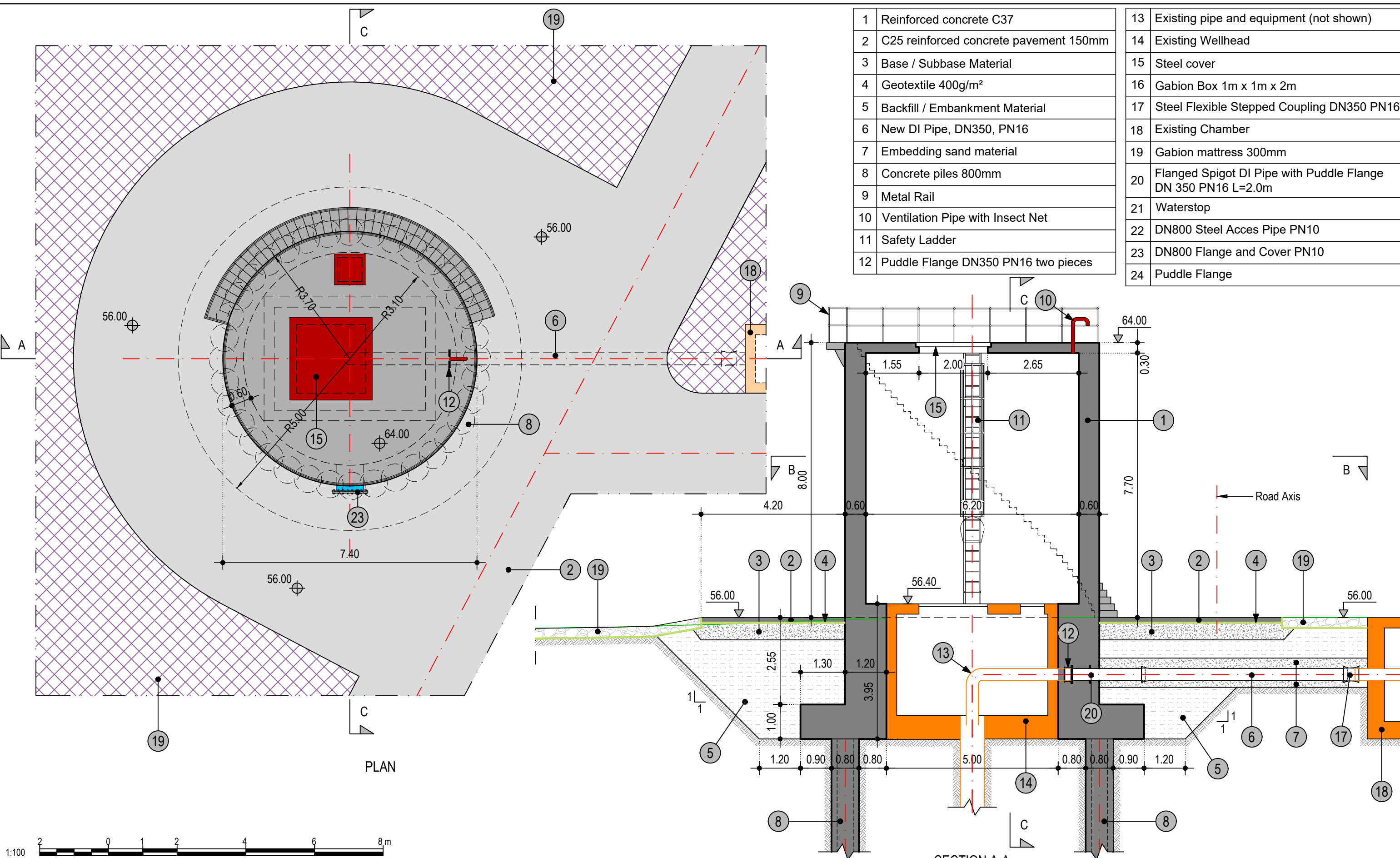


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**BH2- PLAN AND SECTIONS**





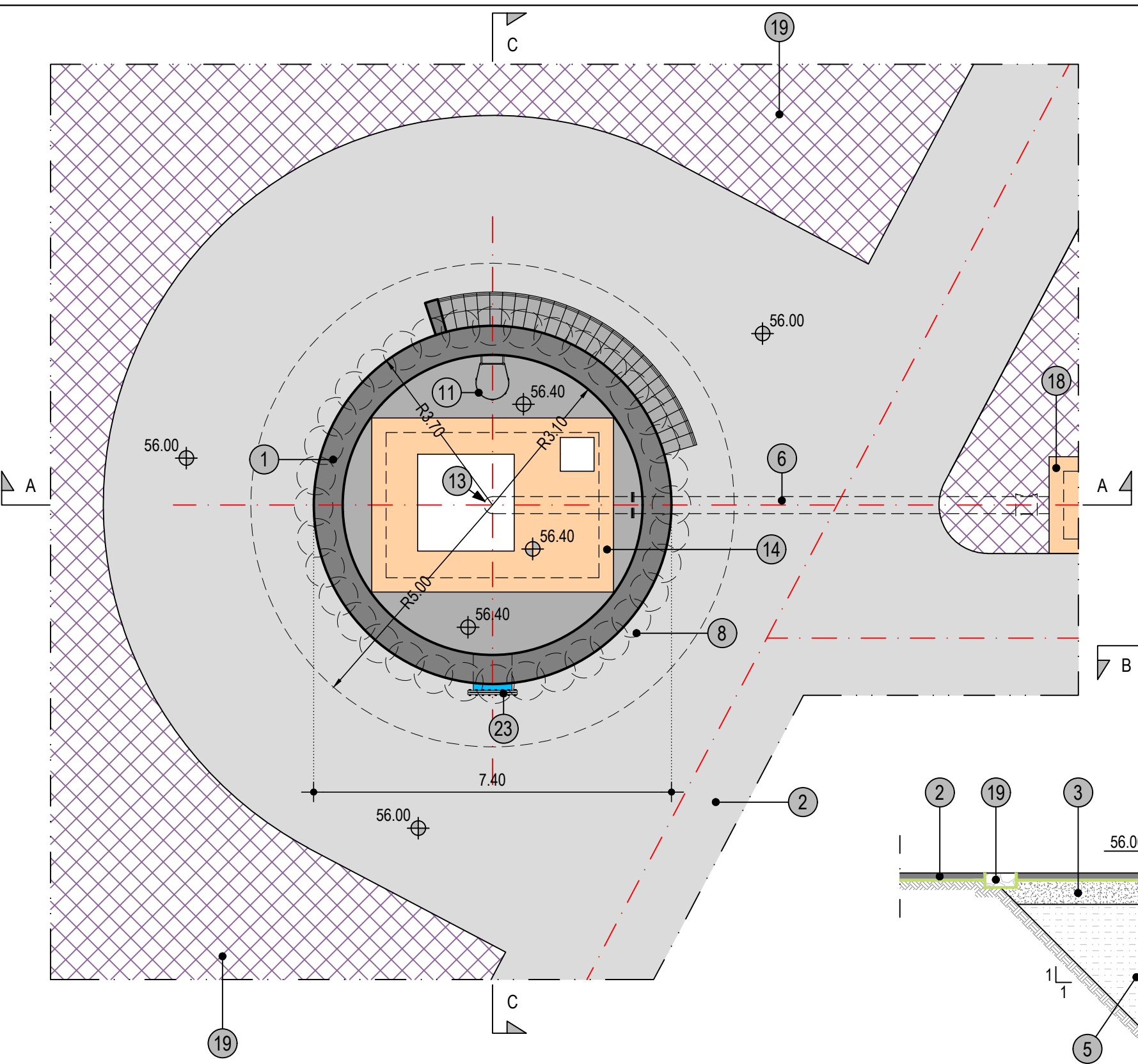
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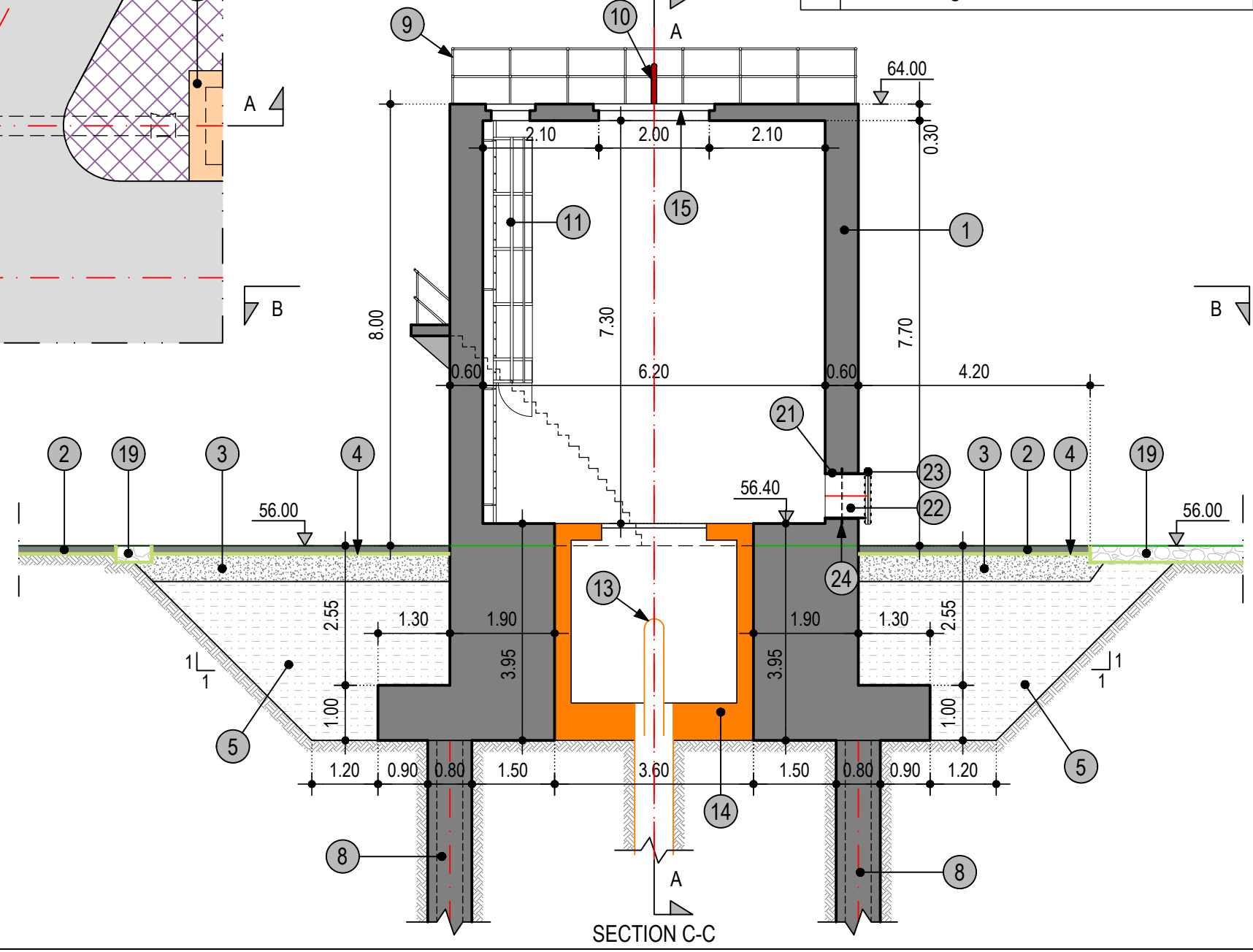
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				<b>BH2A- PLAN AND SECTIONS</b>																									
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SECTION B-B

SECTION C-C



THE REPUBLIC OF KENYA, MINISTRY OF WATER & SANITATION AND IRRIGATION  
Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE

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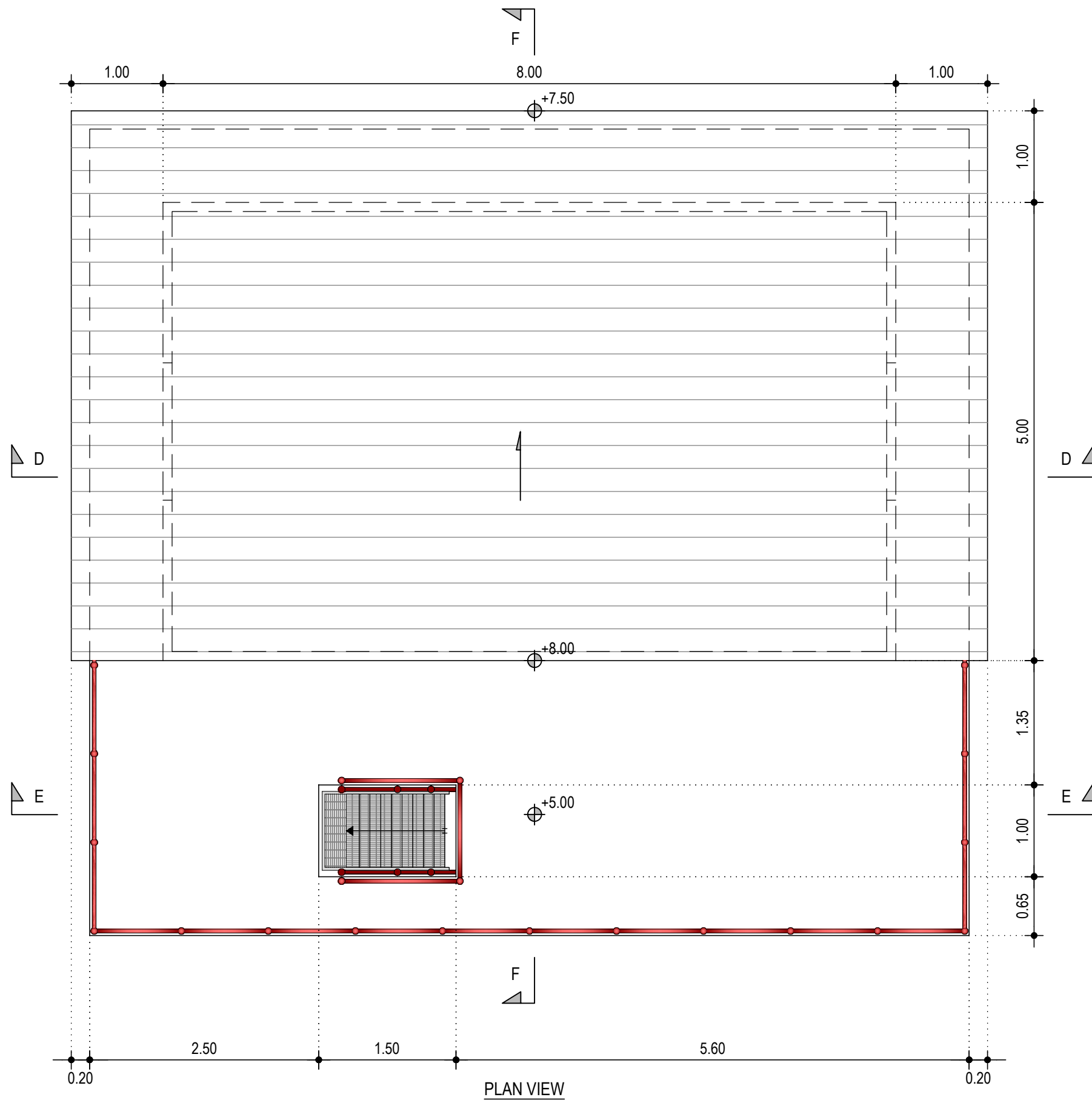


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**BH2A- PLAN AND SECTIONS**





PLAN VIEW



THE REPUBLIC OF KENYA, MINISTRY OF  
WATER & SANITATION AND IRRIGATION  
Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE



Coast Water Works  
Development Agency



**G. KARAVOKYRIS & PARTNERS**  
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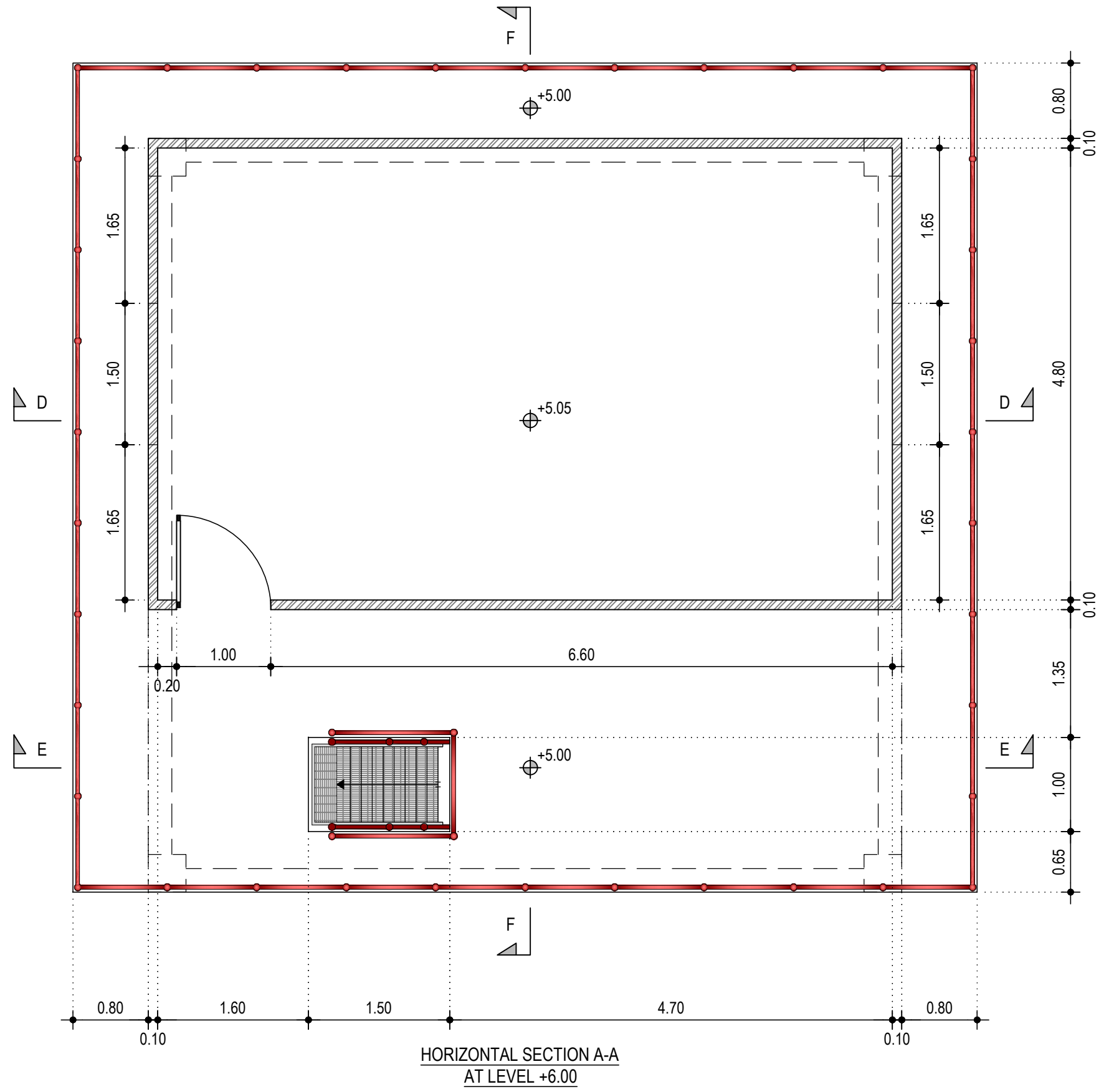
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**UPSTREAM WELLFIELD TRANSFORMER BUILDING  
PLAN VIEW**





HORIZONTAL SECTION A-A  
AT LEVEL +6.00



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Development Agency

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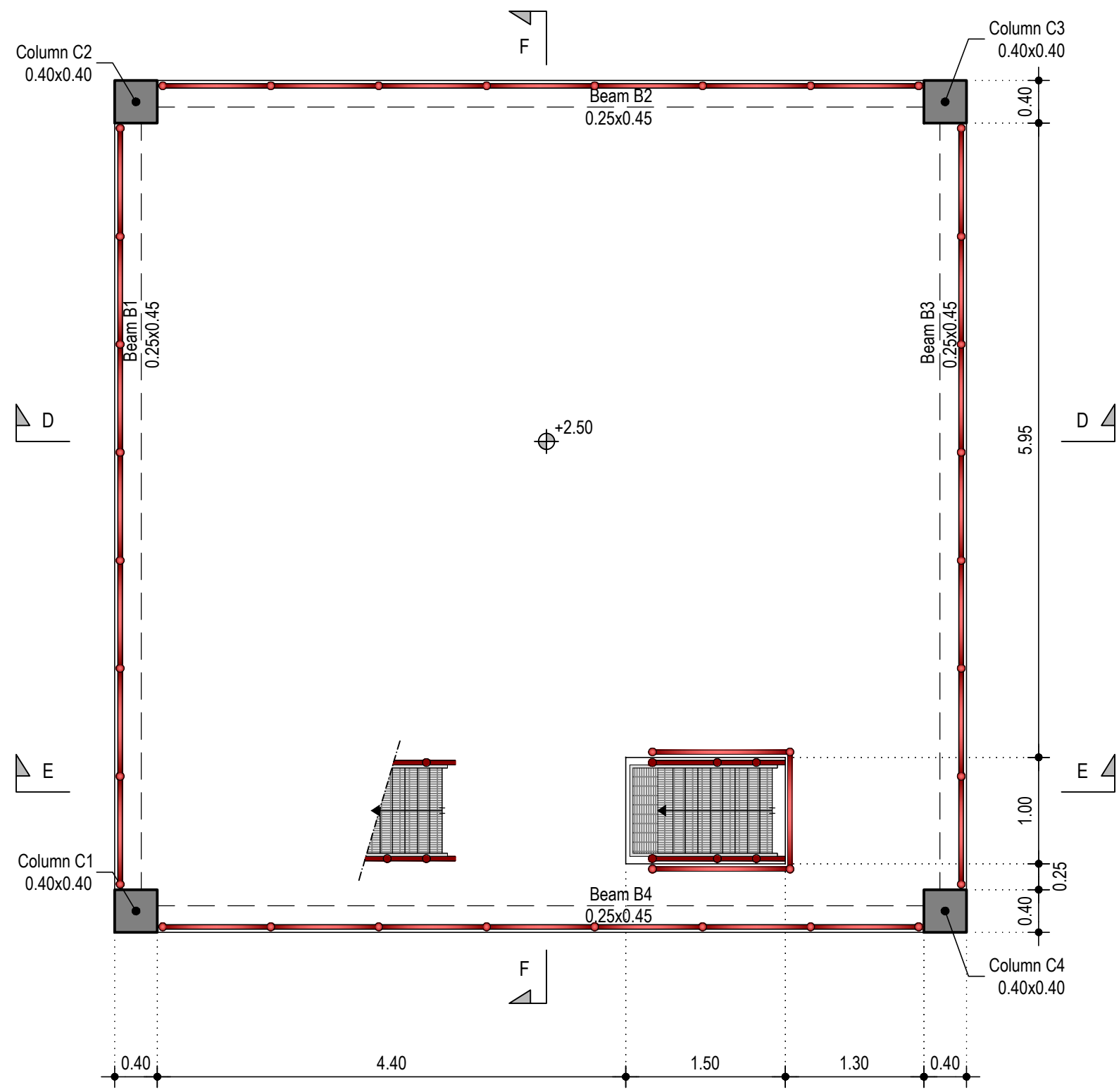
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**UPSTREAM WELLFIELD TRANSFORMER BUILDING  
HORIZONTAL SECTION A-A**





HORIZONTAL SECTION B-B  
AT LEVEL +3.00



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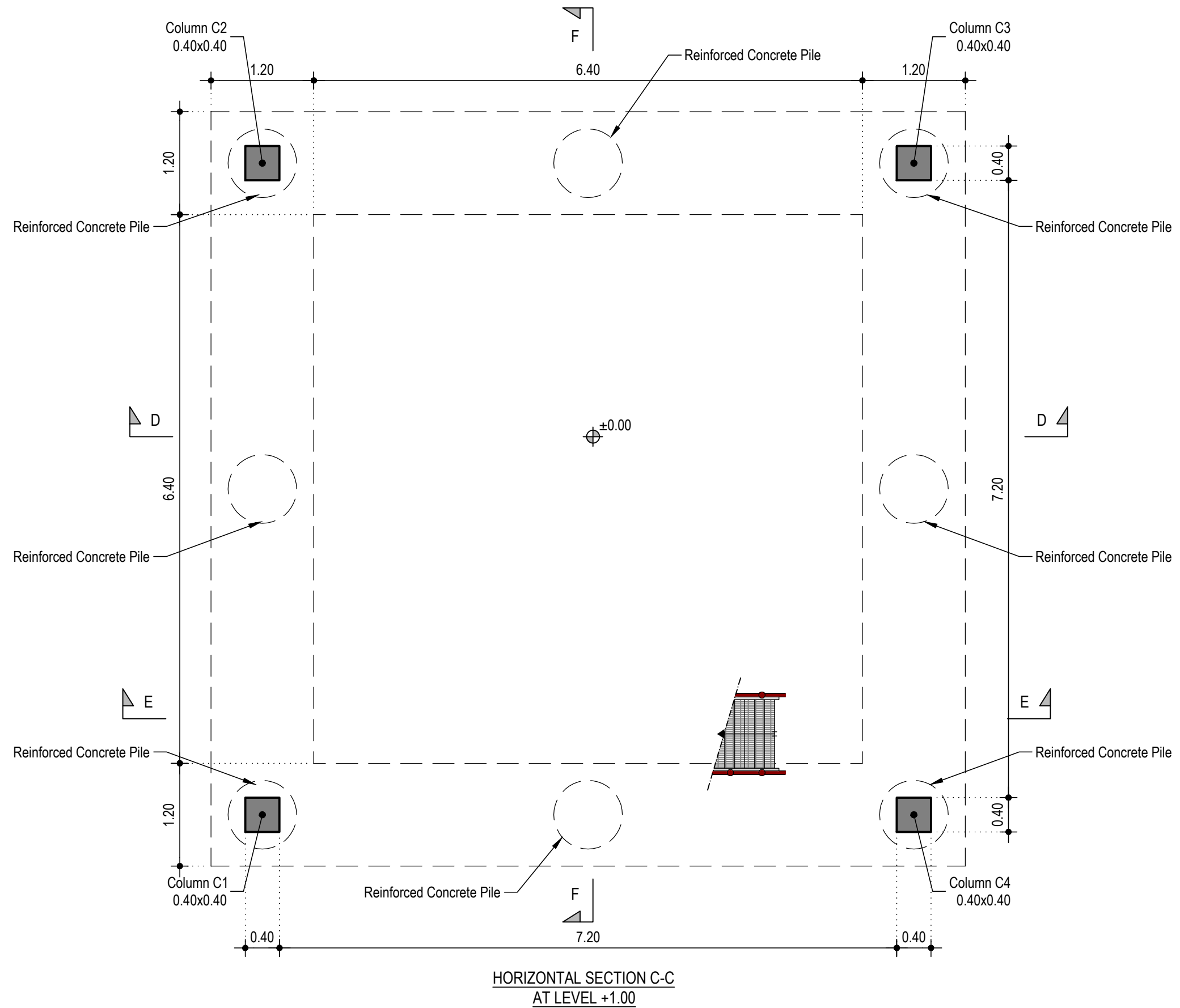
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**UPSTREAM WELLFIELD TRANSFORMER BUILDING  
HORIZONTAL SECTION B-B**





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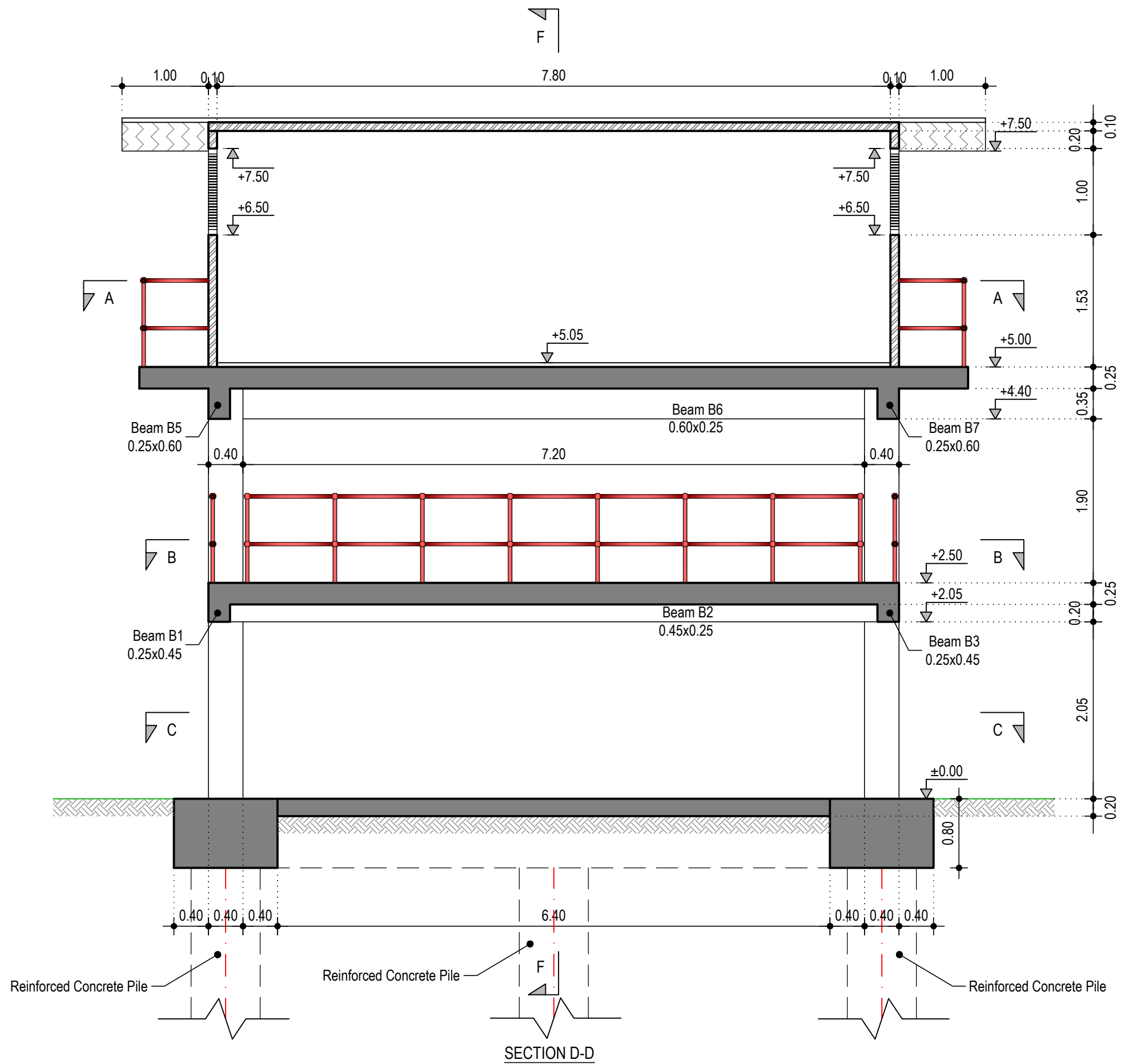


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**UPSTREAM WELLFIELD TRANSFORMER BUILDING  
HORIZONTAL SECTION C-C**





SECTION D-D



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CONSULTANCY SERVICES FOR PREPARATION OF DETAILED DESIGNS, TENDER DOCUMENTS, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (ESIA) AND CONSTRUCTION SUPERVISION OF THE BARICHO WELL-FIELD PROTECTION WORKS - KE-CWWDA-87234-CS-QCBS

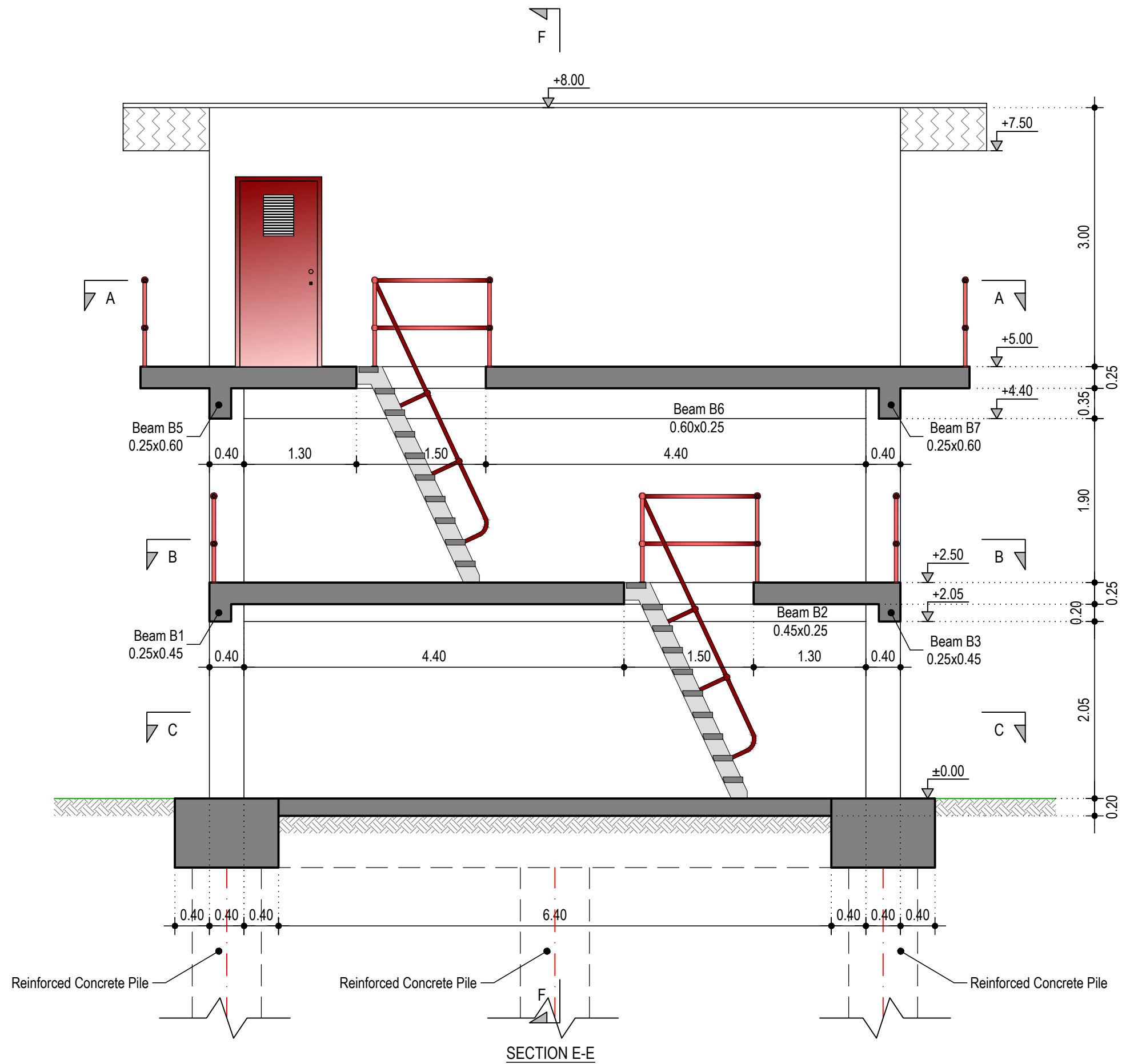


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**UPSTREAM WELLFIELD TRANSFORMER BUILDING  
SECTION D-D**





SECTION E-E



THE REPUBLIC OF KENYA, MINISTRY OF  
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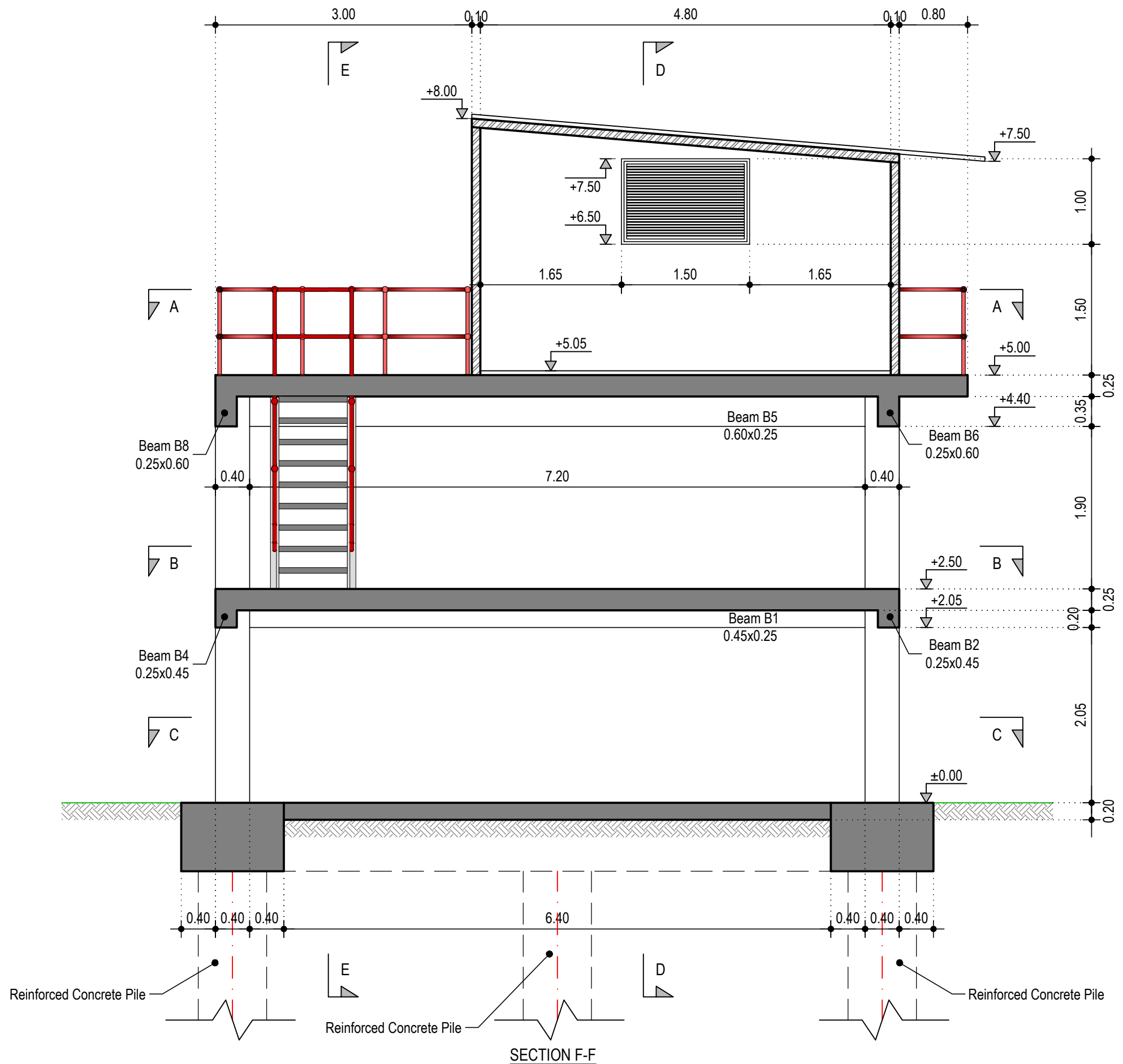


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**UPSTREAM WELLFIELD TRANSFORMER BUILDING  
SECTION E-E**





Coast Water Works Development Agency

**G. KARAVOKYRIS & PARTNERS**  
CONSULTING ENGINEERS

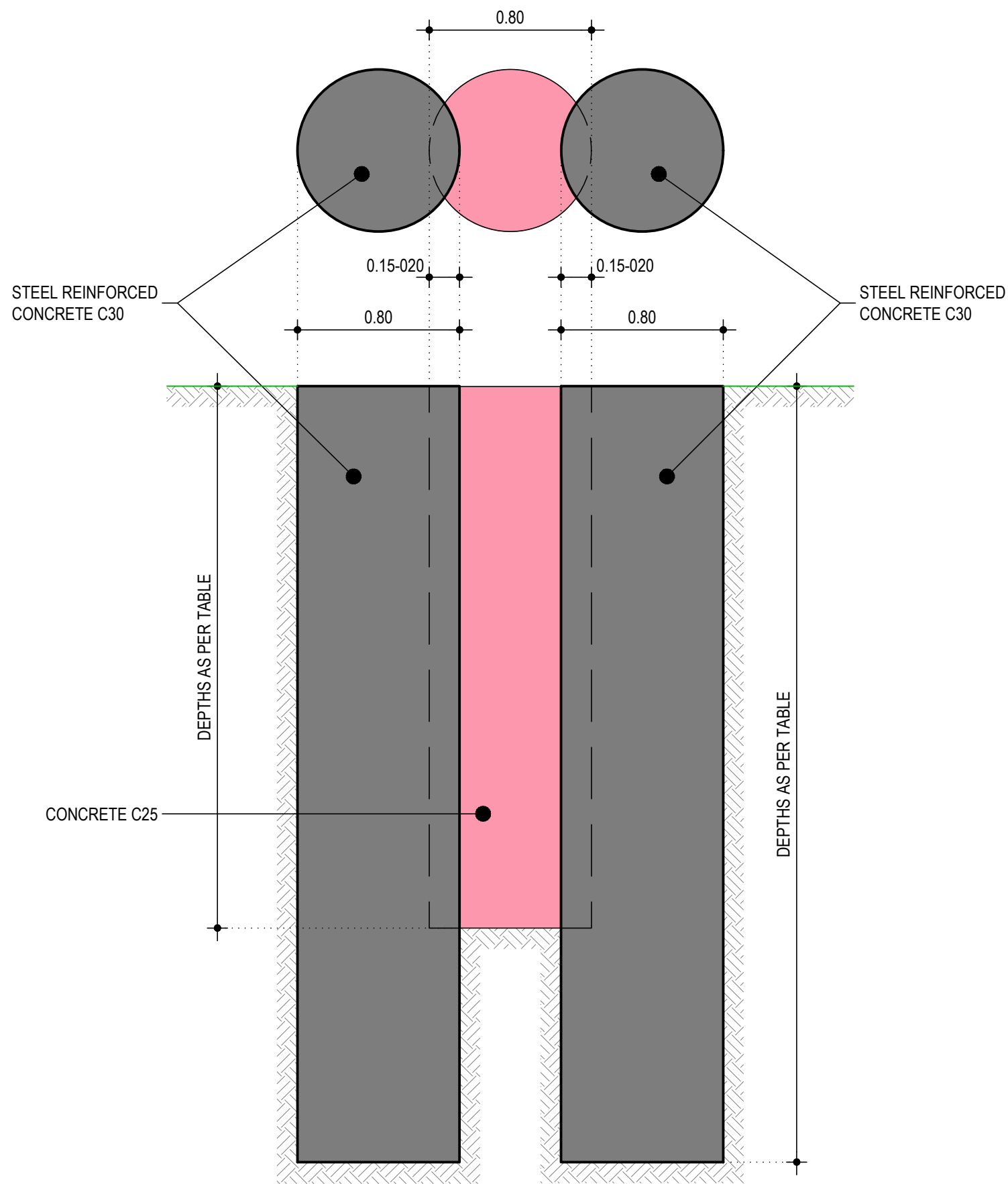
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**UPSTREAM WELLFIELD TRANSFORMER BUILDING**  
**SECTION F-F**



Wells	Reinforced pile depth	Unreinforced pile depth
	(m)	(m)
BH2	16	10
BH2A	16	10
Transformer House	14	-



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Coast Water Works  
Development Agency



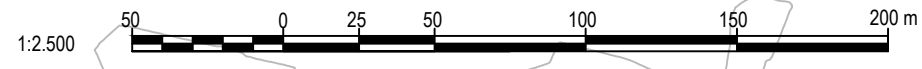
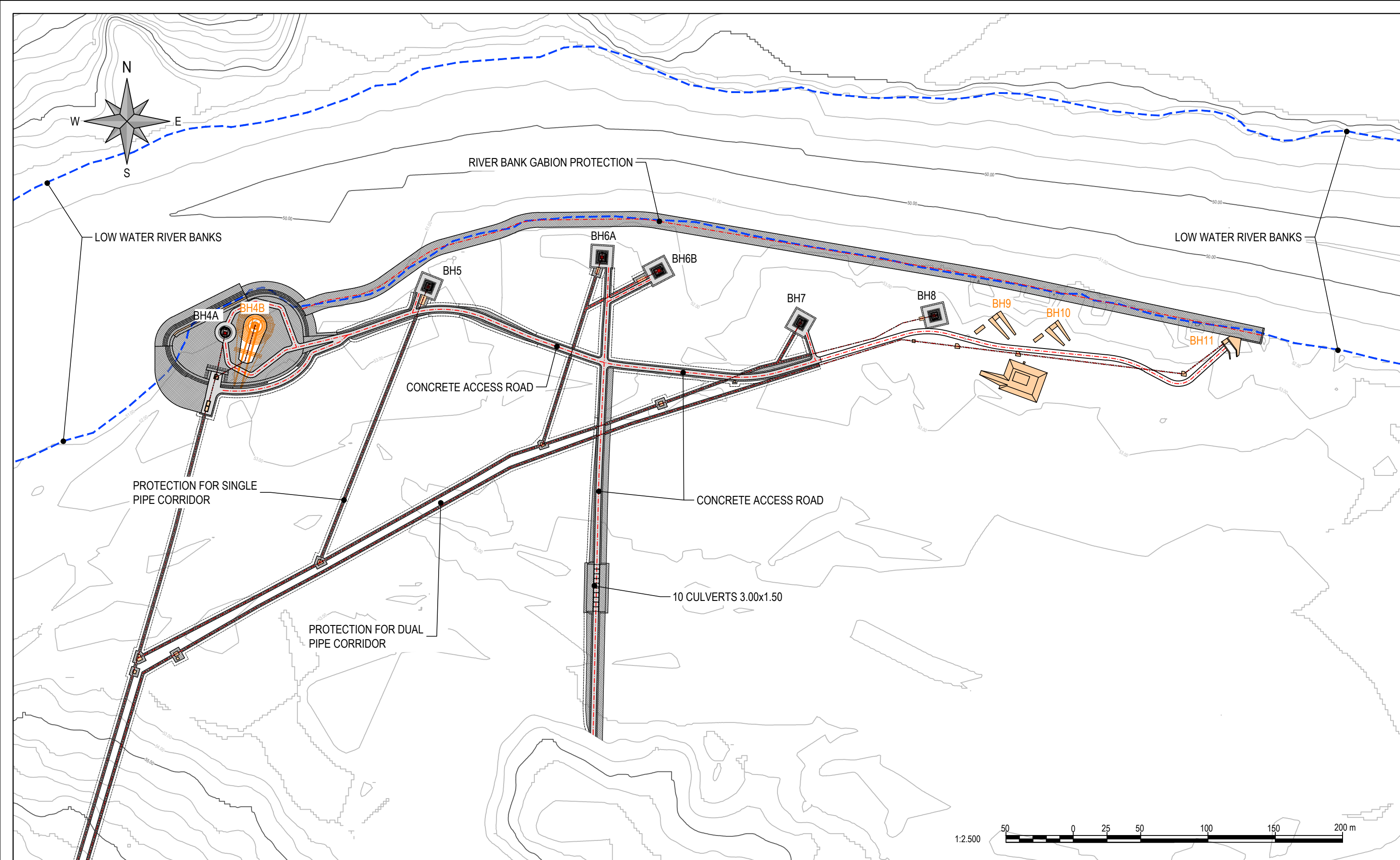
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**UPSTREAM WELLFIELD PILE SECTIONS**





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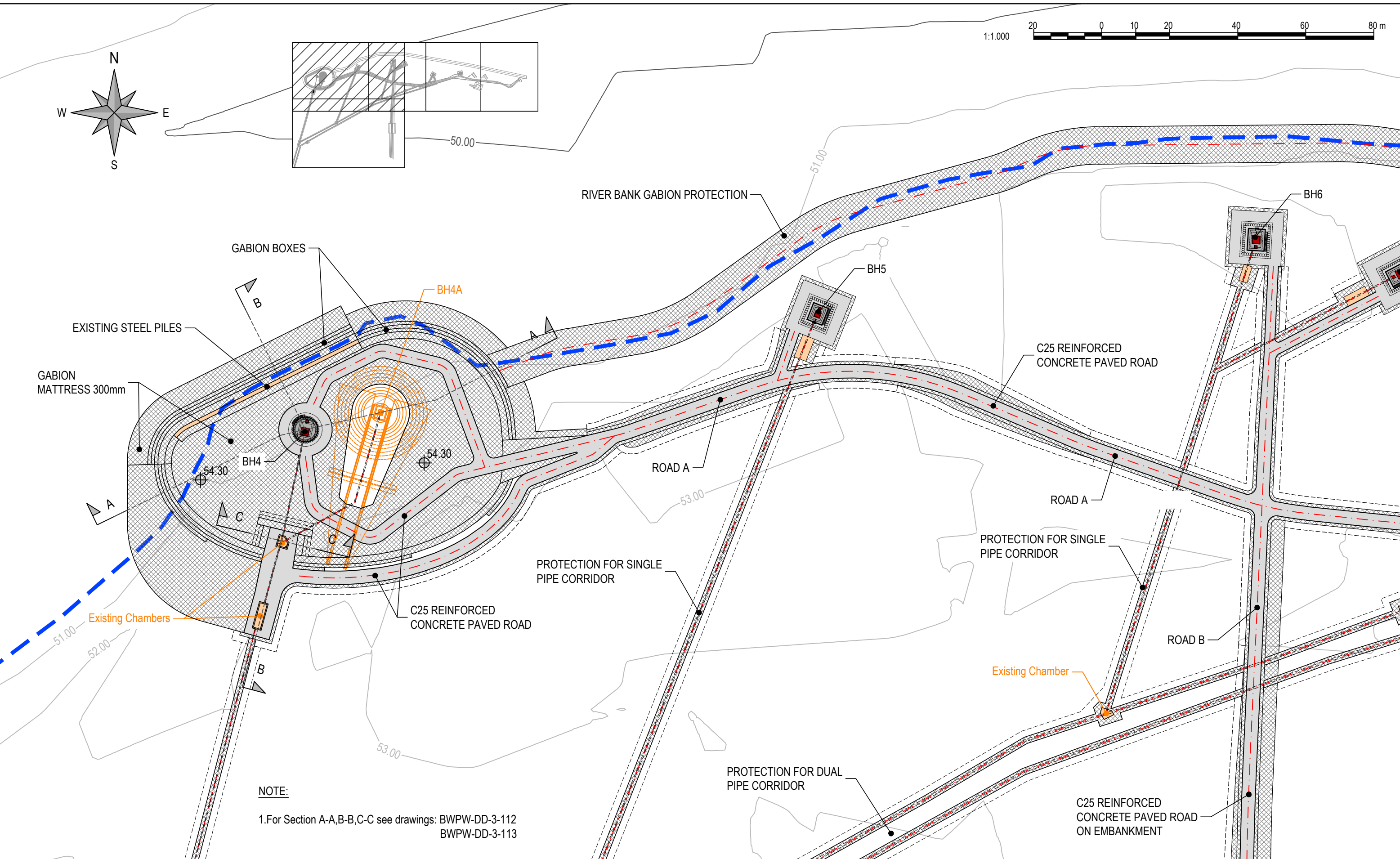
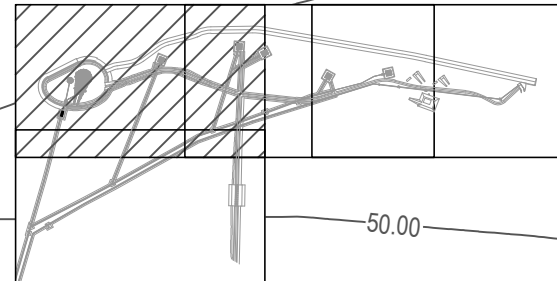
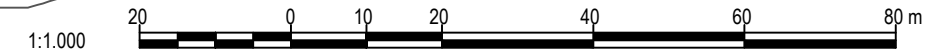
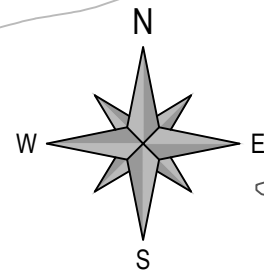


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**DOWNSTREAM WELLFIELD  
GENERAL LAYOUT**



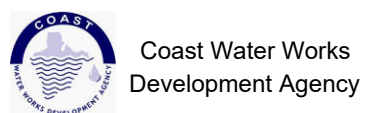


**NOTE:**  
 1. For Section A-A, B-B, C-C see drawings: BWPW-DD-3-112  
 BWPW-DD-3-113



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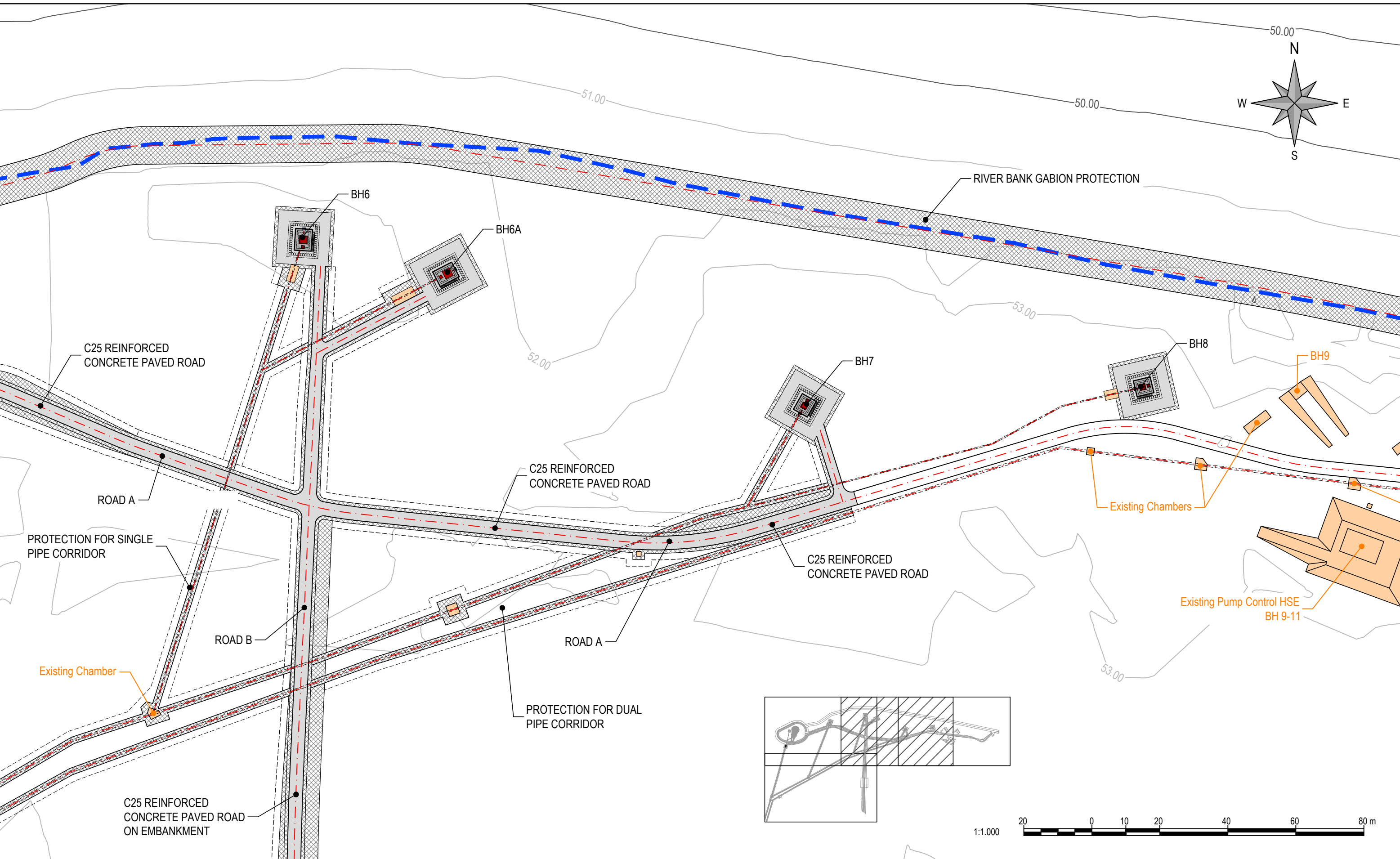
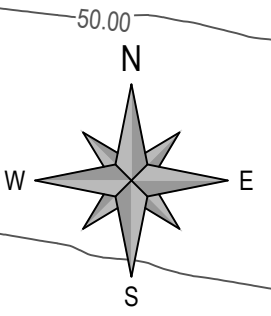



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**DOWNSTREAM WELLFIELD  
 LAYOUT**






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 Coast Water Works Development Agency

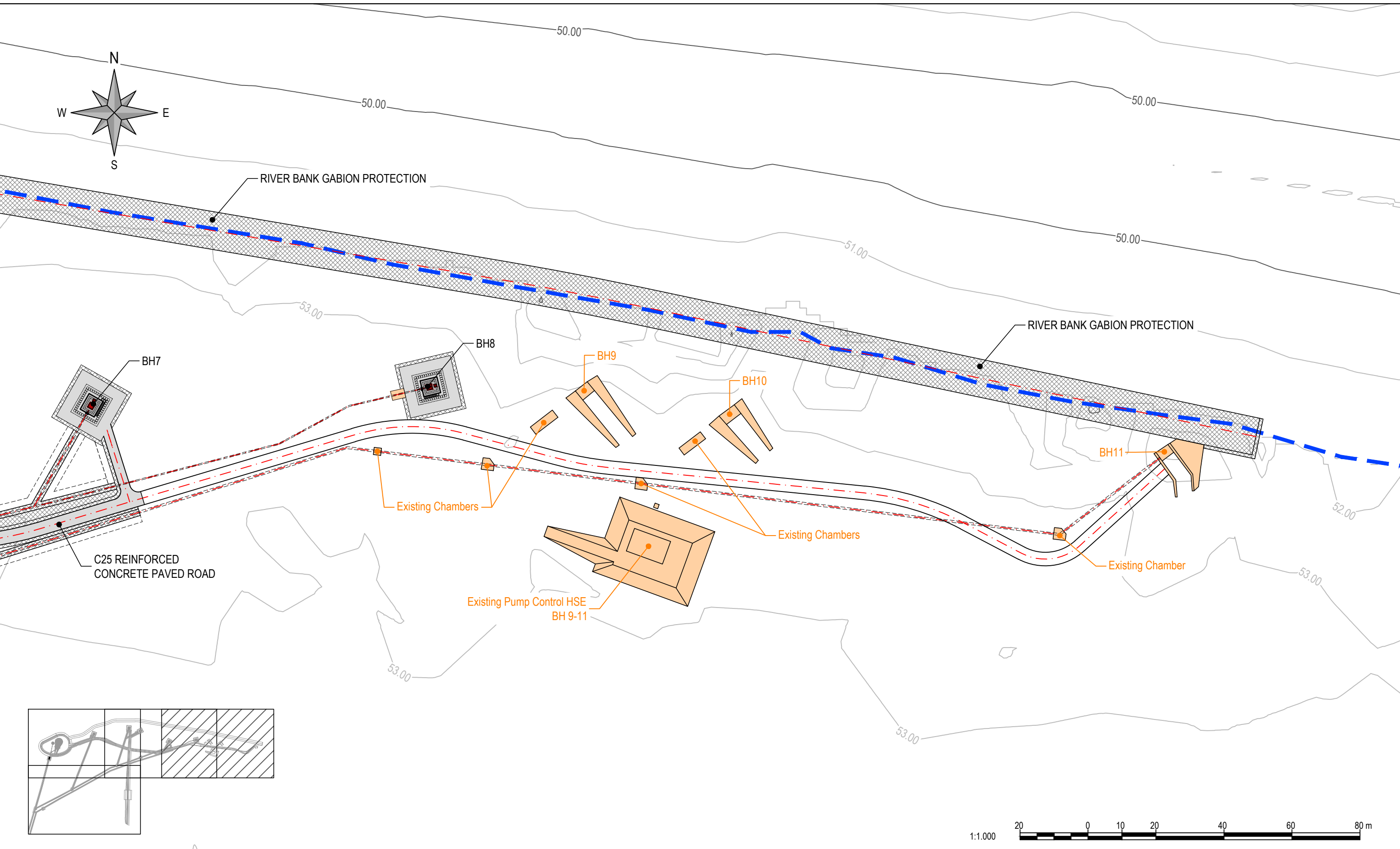
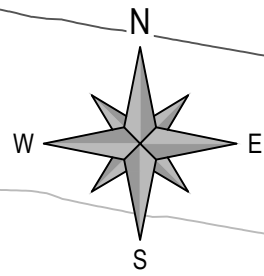

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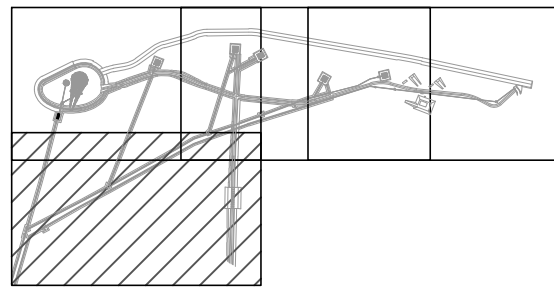
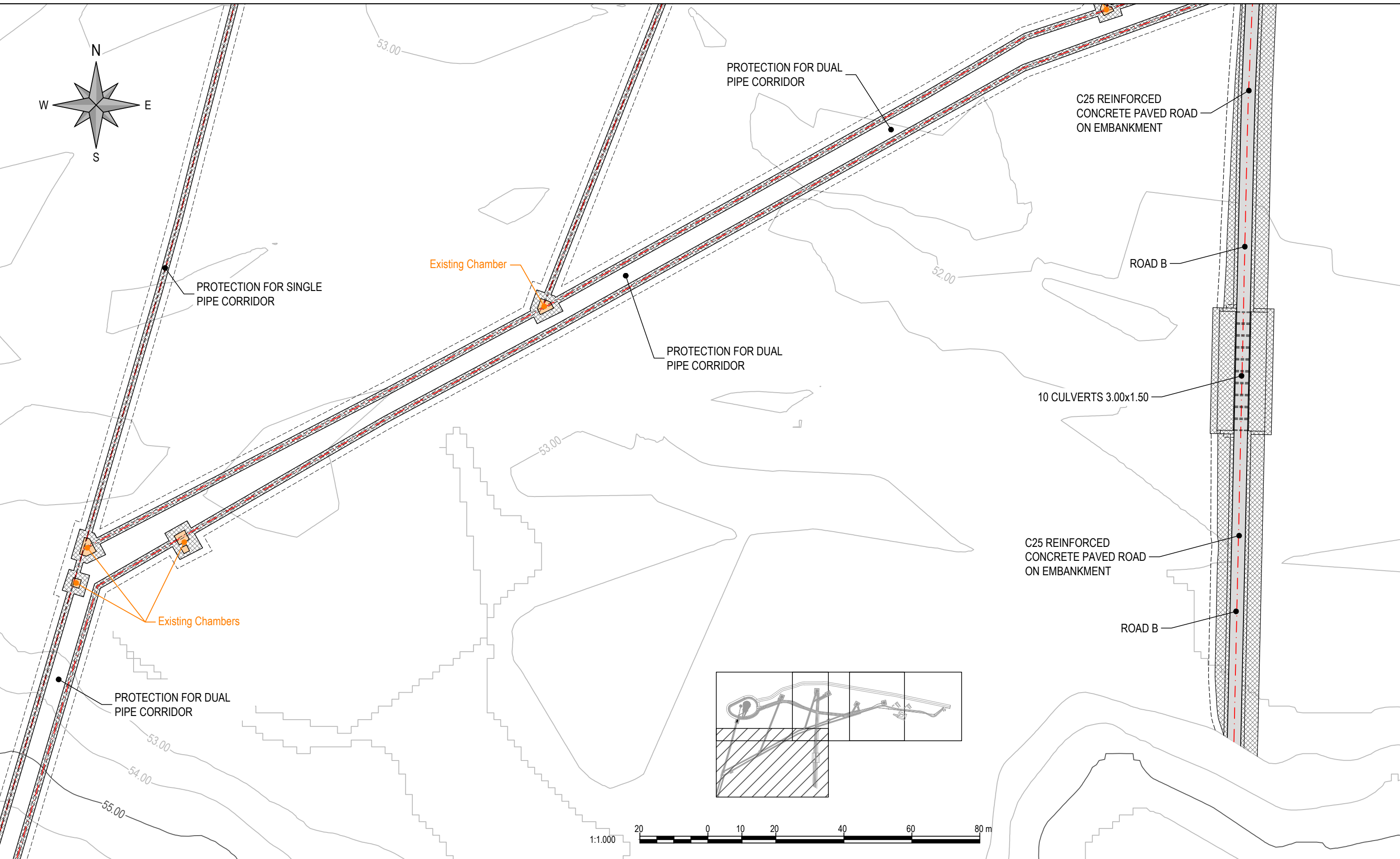
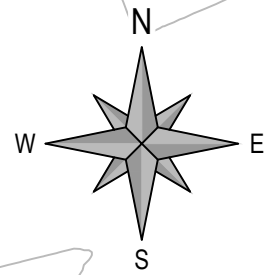
**DOWNSTREAM WELLFIELD LAYOUT**

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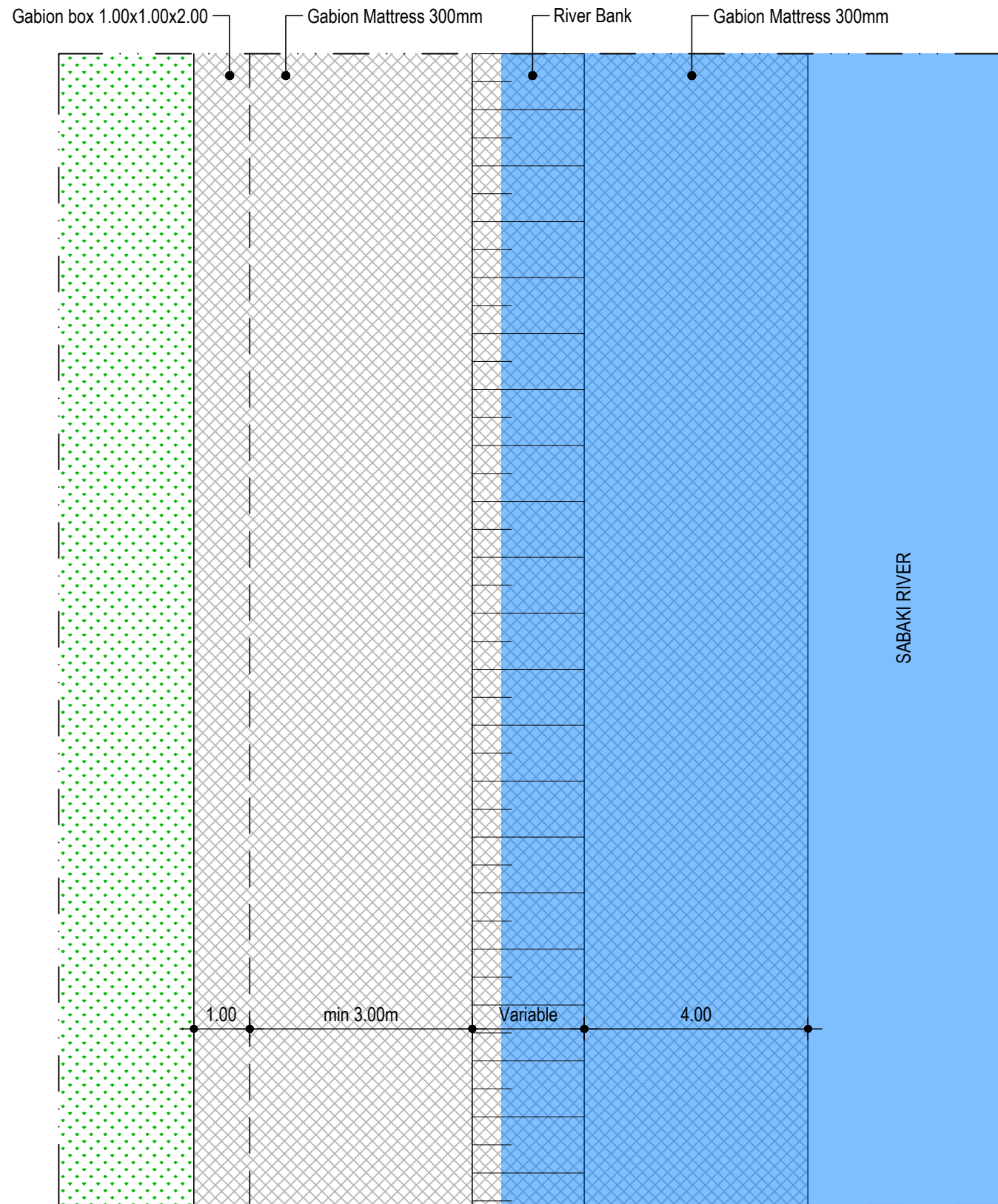
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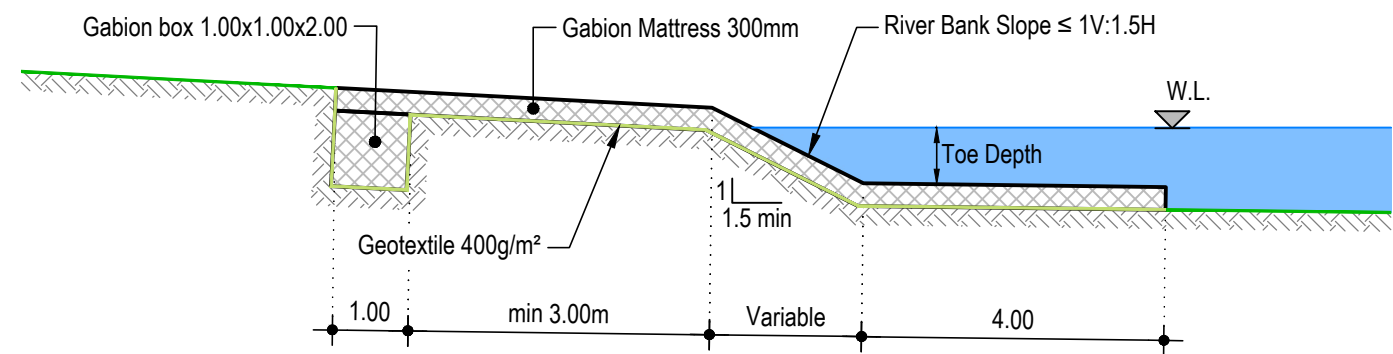
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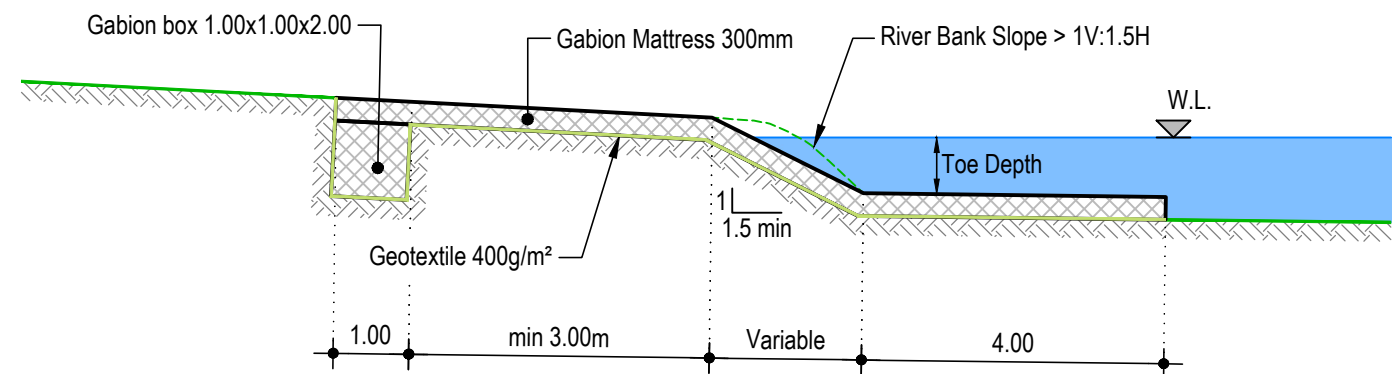
**DOWNSTREAM WELLFIELD LAYOUT**



PLAN



TYPICAL SECTION 1



TYPICAL SECTION 2

**NOTE:**

1. Mattresses to be placed on slopes with topsoil and vegetation removed and smoothed to avoid abrupt corners and as recommended by manufacturer and approved by the Engineer.
2. Underwater placement according to Method Statement of Contractor as approved by the Engineer.



THE REPUBLIC OF KENYA, MINISTRY OF  
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Coast Water Works  
Development Agency



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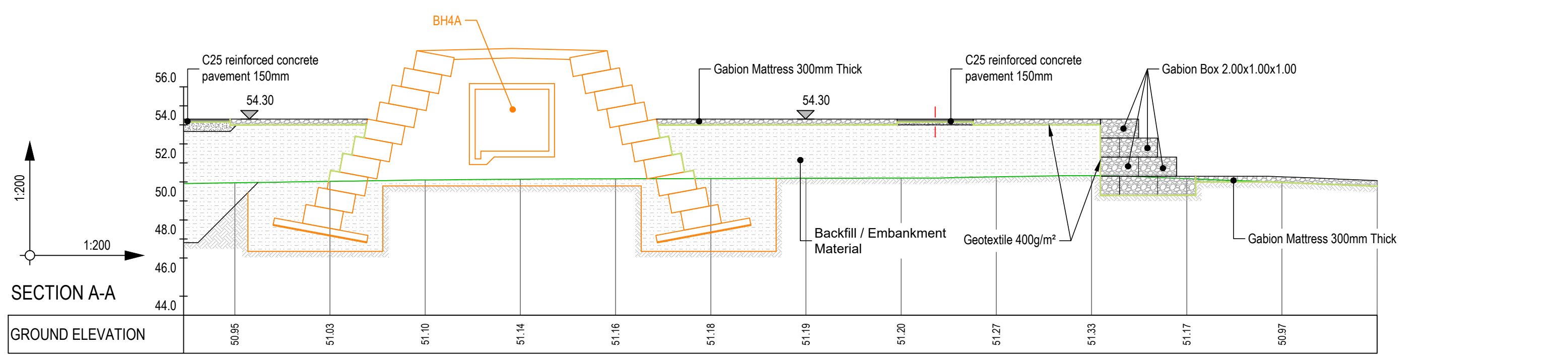
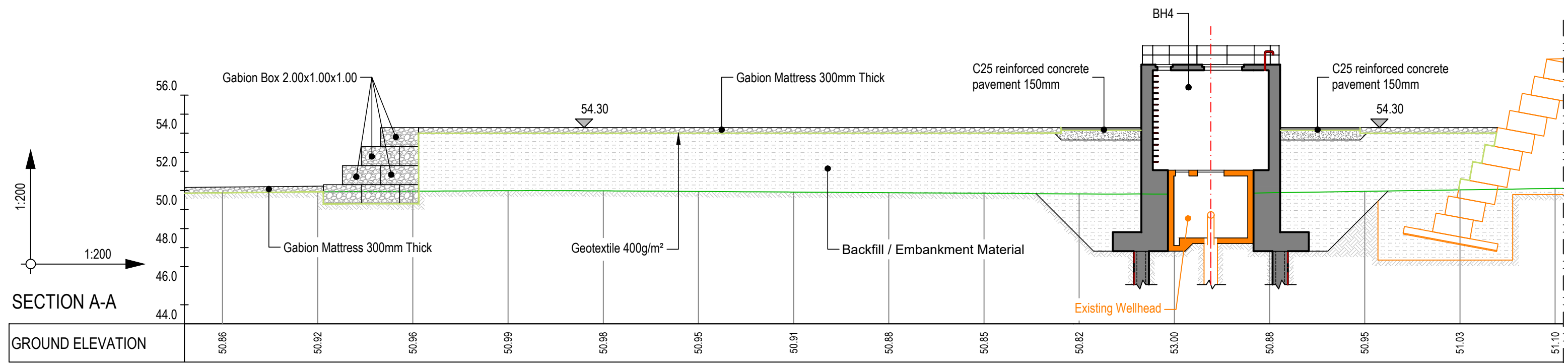
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CONSULTANCY SERVICES FOR PREPARATION OF DETAILED DESIGNS, TENDER DOCUMENTS, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (ESIA) AND CONSTRUCTION SUPERVISION OF THE BARICHO WELL-FIELD PROTECTION WORKS - KE-CWWDA-87234-CS-QCBS

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**DOWNSTREAM WELLFIELD  
RIVER BANK PROTECTION  
TYPICAL PLAN AND SECTIONS**






 THE REPUBLIC OF KENYA, MINISTRY OF WATER & SANITATION AND IRRIGATION  
 Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE

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 Coast Water Works Development Agency

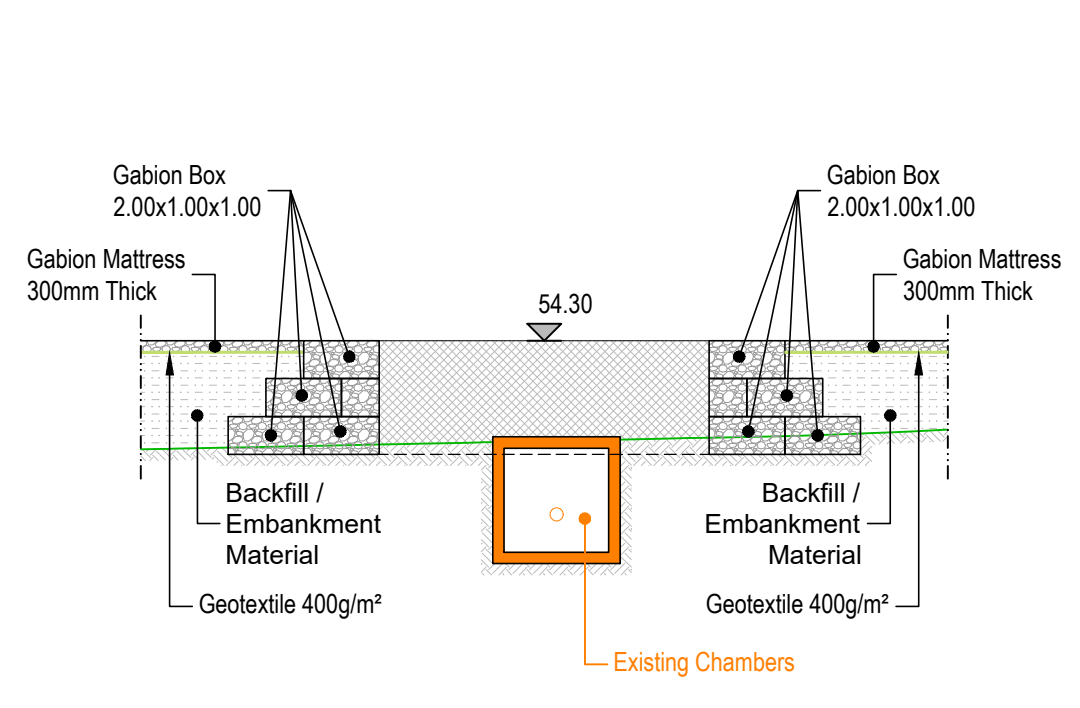
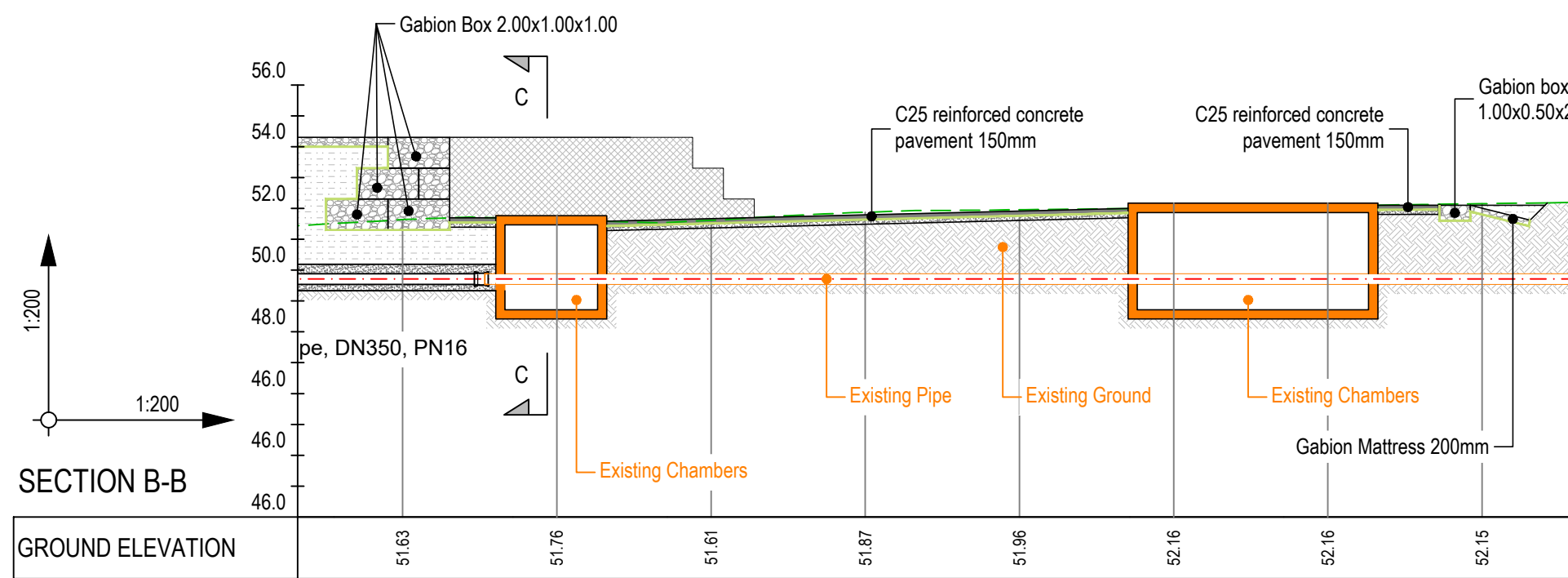
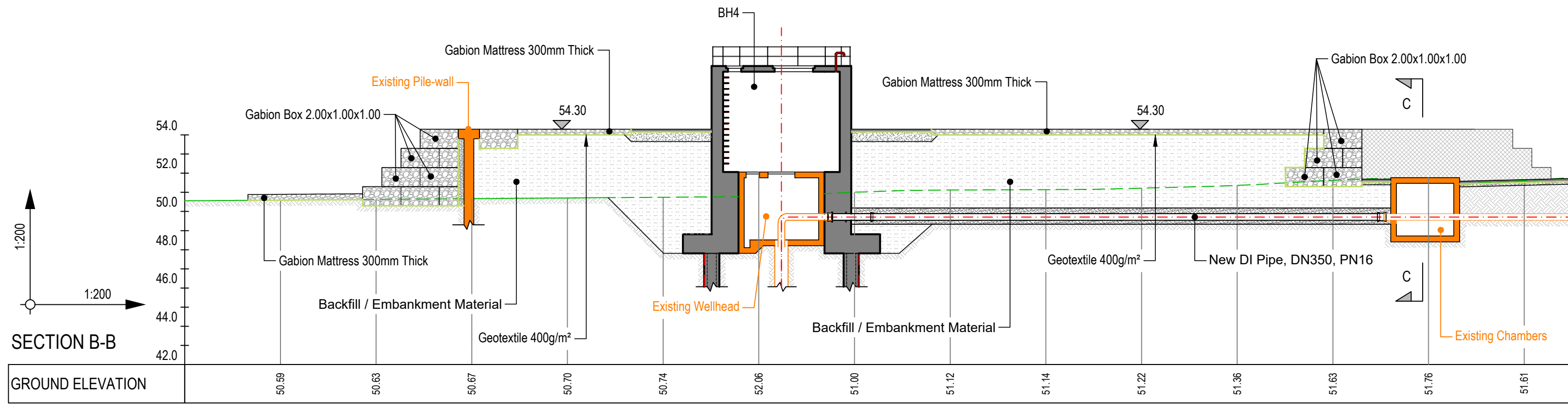

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**SECTIONS OF BH4 AND BH4A PROTECTION AREA**

Date : JUNE 2021    Scale: 1:250    Drg. No. BWPW-DD-3-111    Sheet No. 1/2



SECTION C-C

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 Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE

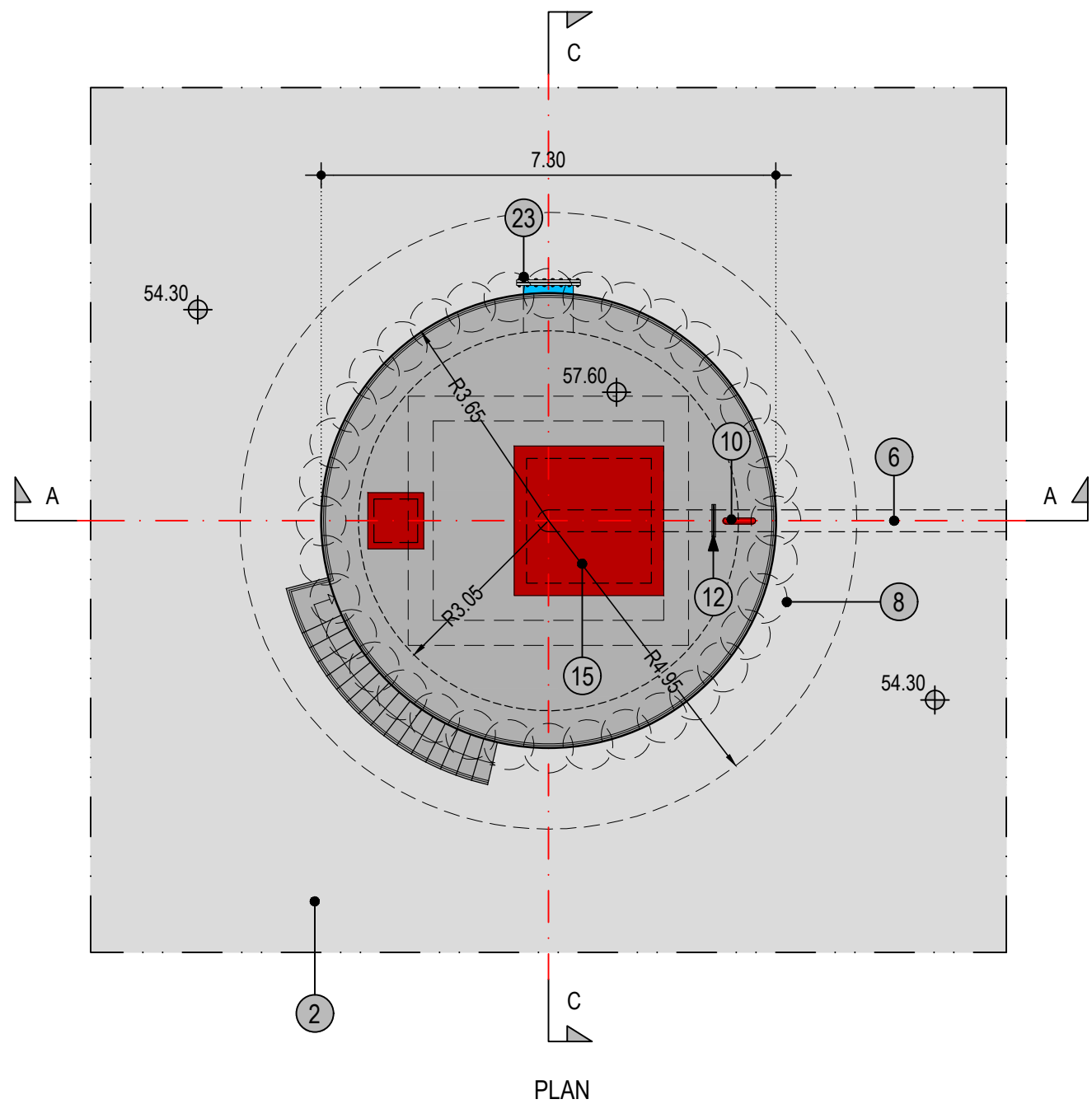
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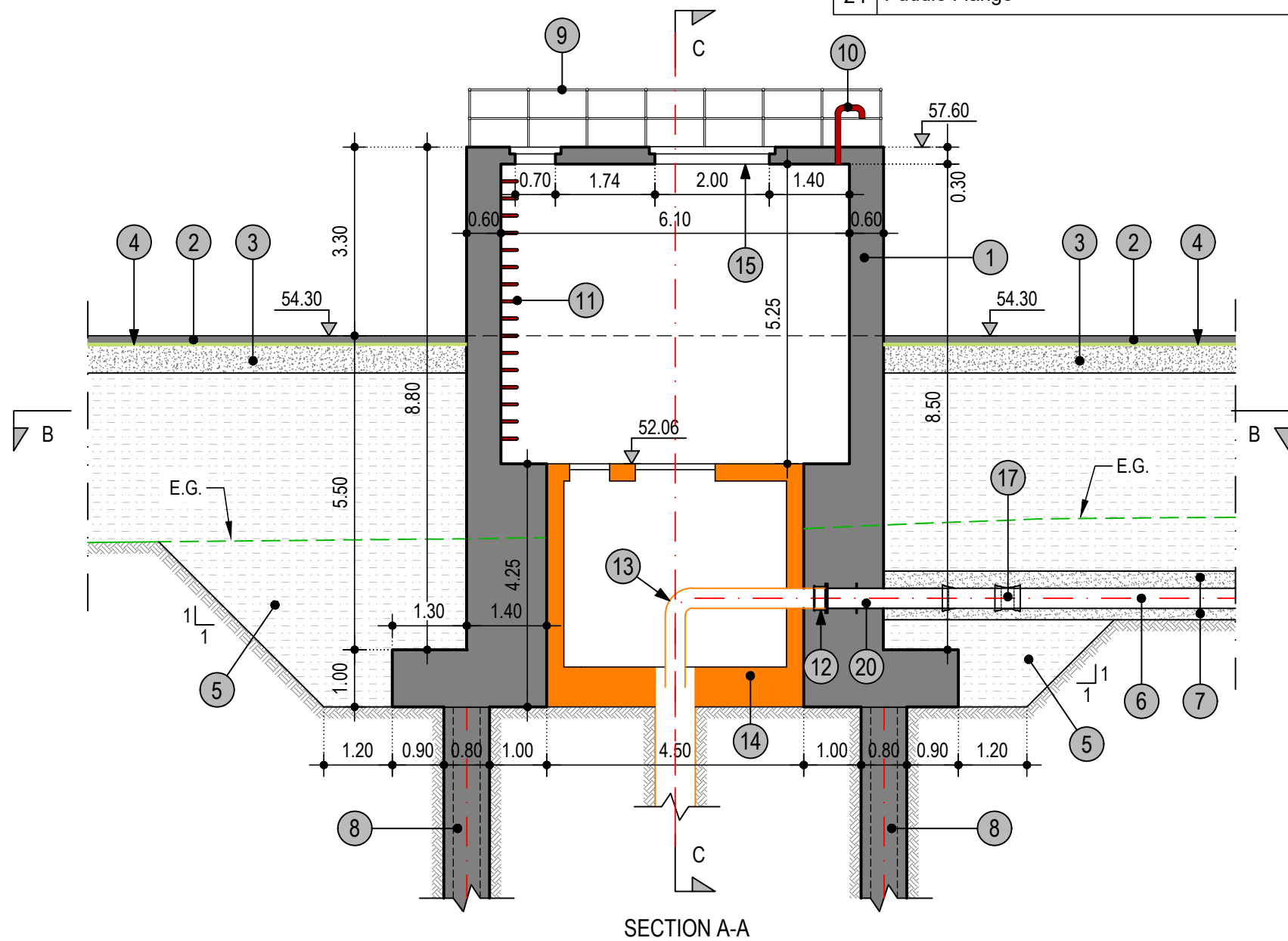
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**SECTIONS OF BH4A AND BH4B PROTECTION AREA**





PLAN



SECTION A-A

1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
7	Embedding sand material
8	Concrete piles 800mm
9	Metal Rail
10	Ventilation Pipe with Insect Net
11	Steel Ladder
12	Puddle Flange DN350 PN16 two pieces

13	Existing pipe and equipment (not shown)
14	Existing Wellhead
15	Steel cover
16	Gabion Box 1m x 1m x 2m
17	Steel Flexible Stepped Coupling DN350 PN16
18	Existing Chamber
19	Gabion mattress 300mm
20	Flanged Spigot DI Pipe with Puddle Flange DN 350 PN16 L=2.0m
21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



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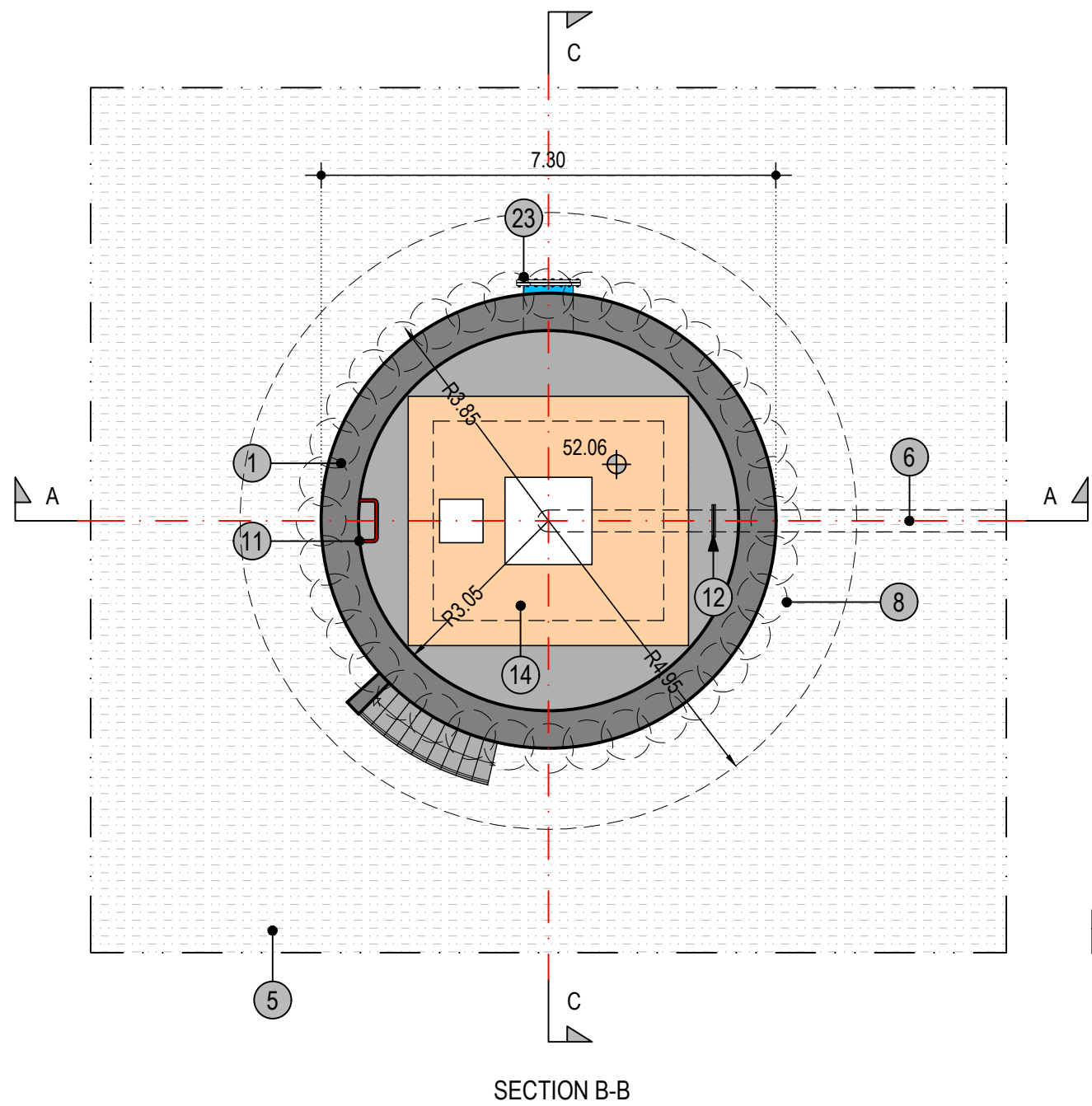


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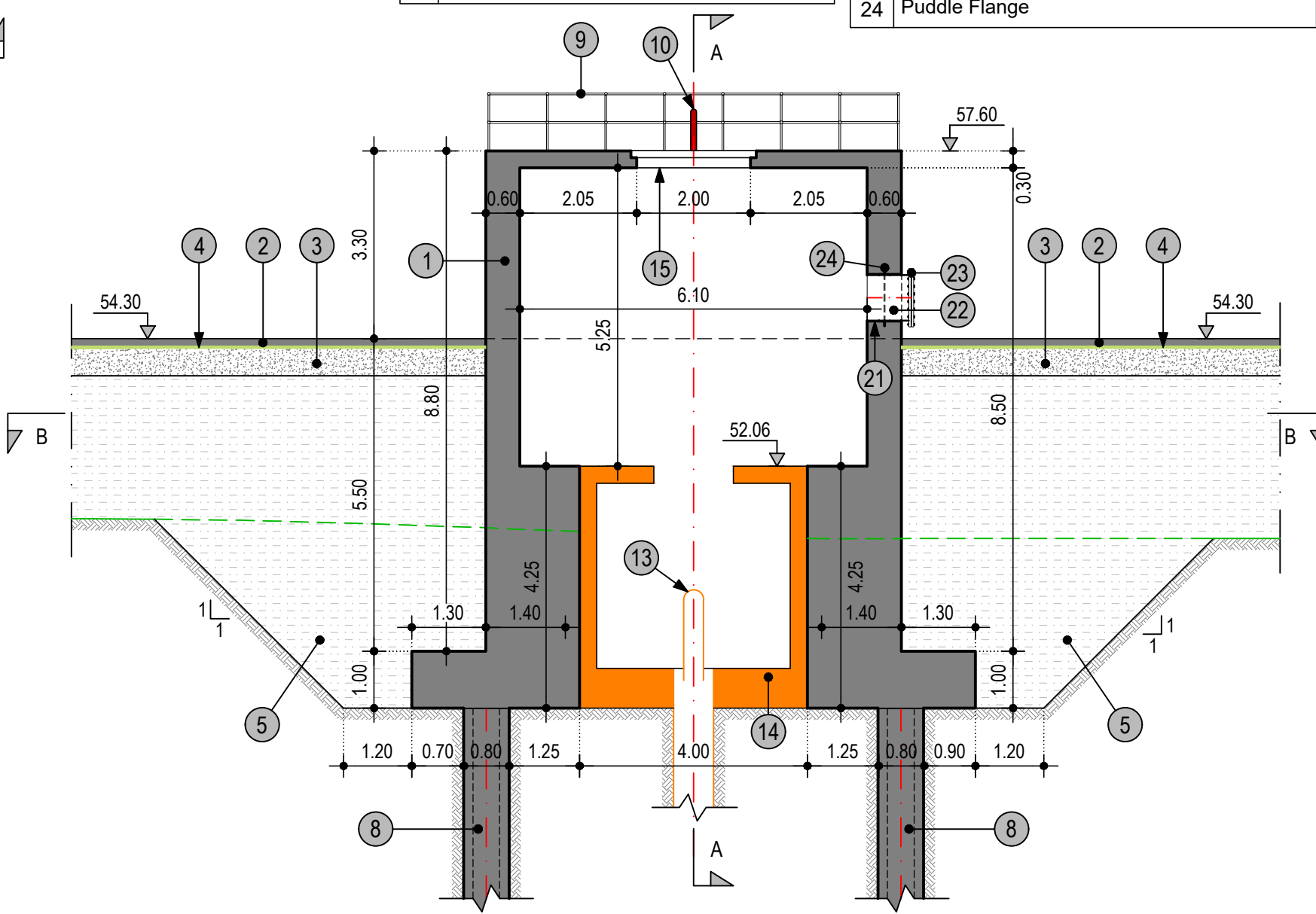
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**BH4 - PLAN AND SECTIONS**



SECTION B-B



SECTION C-C

1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
7	Embedding sand material
8	Concrete piles 800mm
9	Metal Rail
10	Ventilation Pipe with Insect Net
11	Steel Ladder
12	Puddle Flange DN350 PN16 two pieces

13	Existing pipe and equipment (not shown)
14	Existing Wellhead
15	Steel cover
16	Gabion Box 1m x 1m x 2m
17	Steel Flexible Stepped Coupling DN350 PN16
18	Existing Chamber
19	Gabion mattress 300mm
20	Flanged Spigot DI Pipe with Puddle Flange DN 350 PN16 L=2.0m
21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



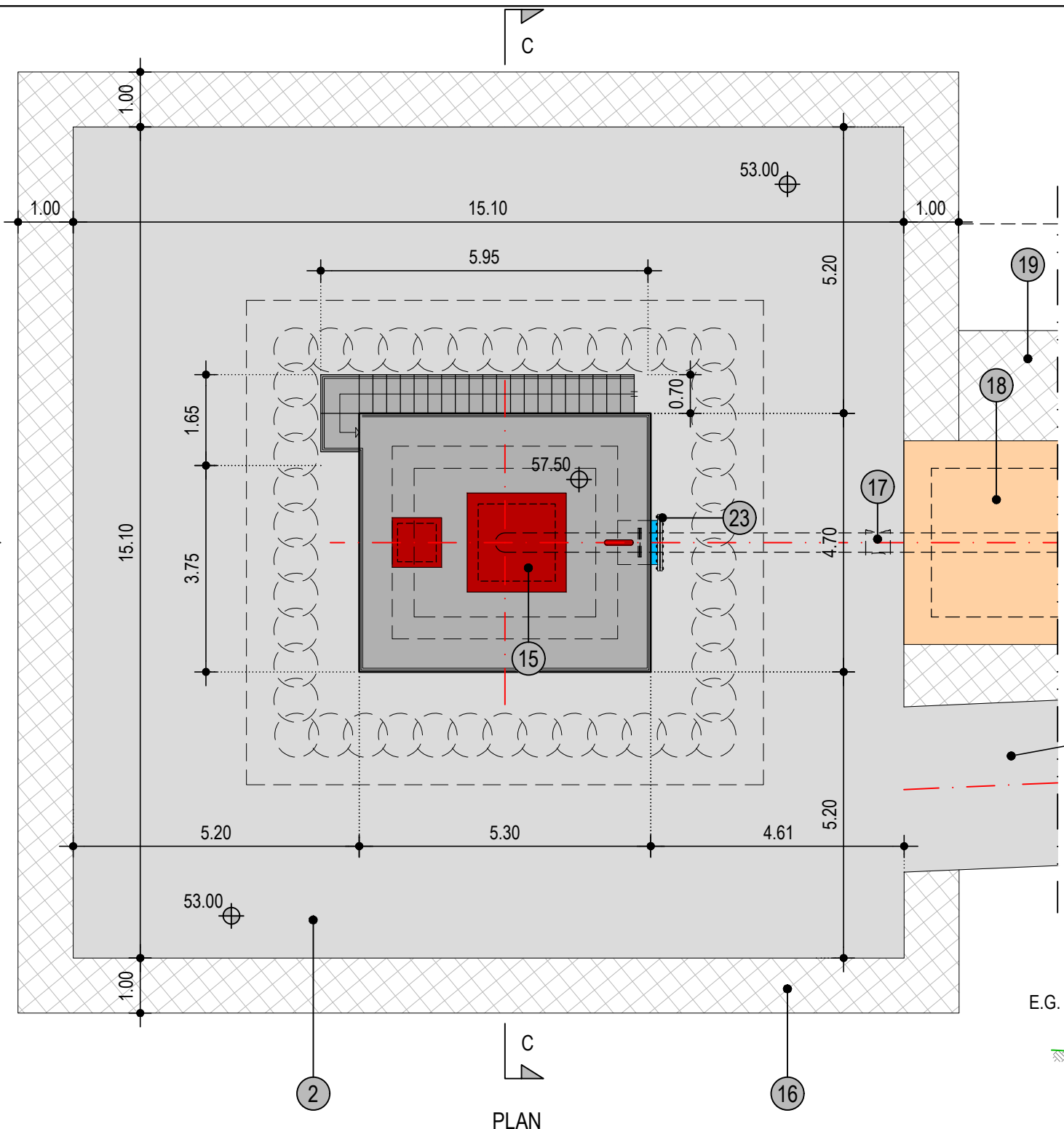
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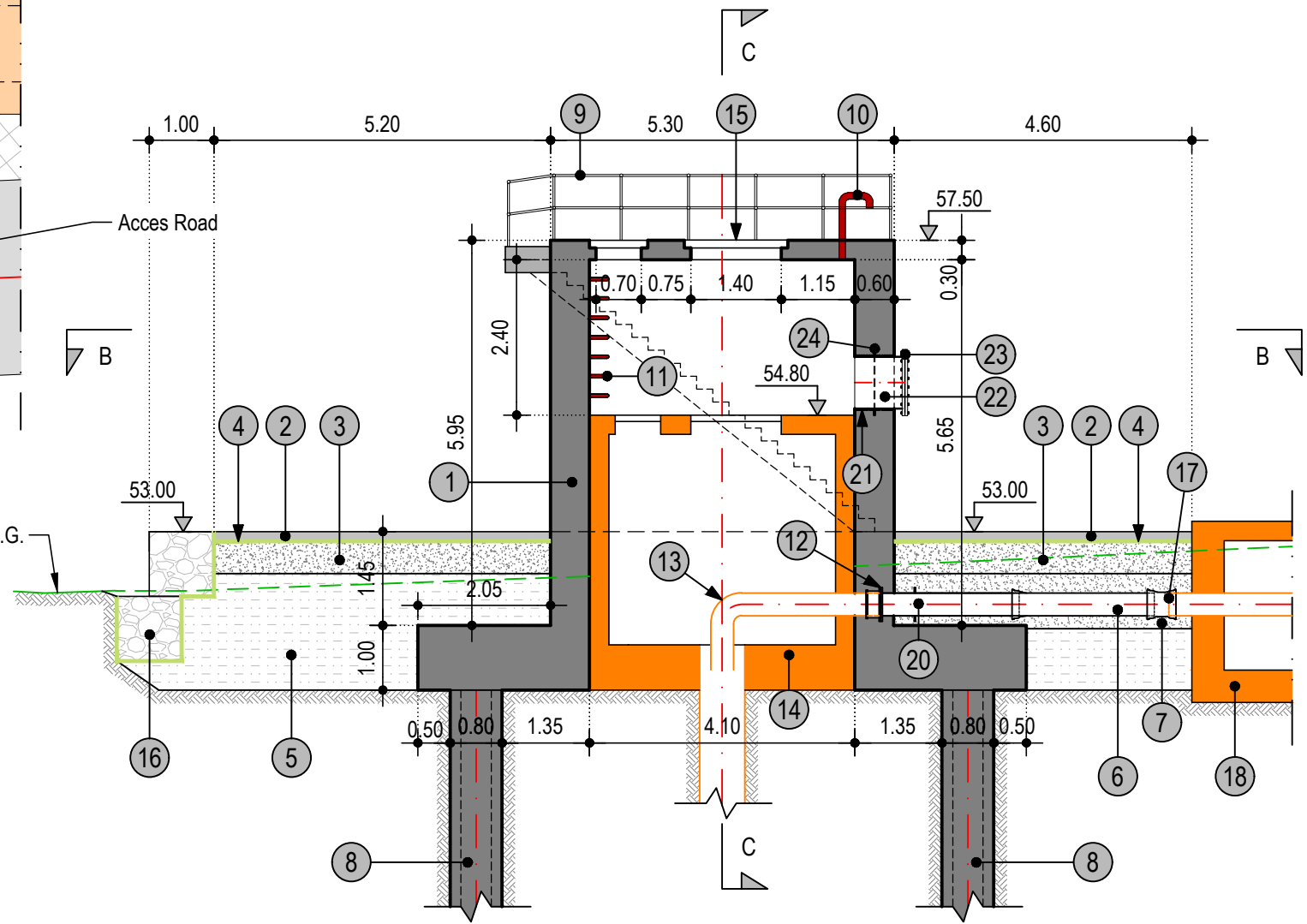




PLAN

1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
7	Embedding sand material
8	Concrete piles 800mm
9	Metal Rail
10	Ventilation Pipe with Insect Net
11	Steel Ladder
12	Puddle Flange DN350 PN16 two pieces

13	Existing pipe and equipment (not shown)
14	Existing Wellhead
15	Steel cover
16	Gabion Box 1m x 1m x 2m
17	Steel Flexible Stepped Coupling DN350 PN16
18	Existing Chamber
19	Gabion mattress 300mm
20	Flanged Spigot DI Pipe with Puddle Flange DN 350 PN16 L=2.0m
21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



SECTION A-A



THE REPUBLIC OF KENYA, MINISTRY OF WATER & SANITATION AND IRRIGATION  
 Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE

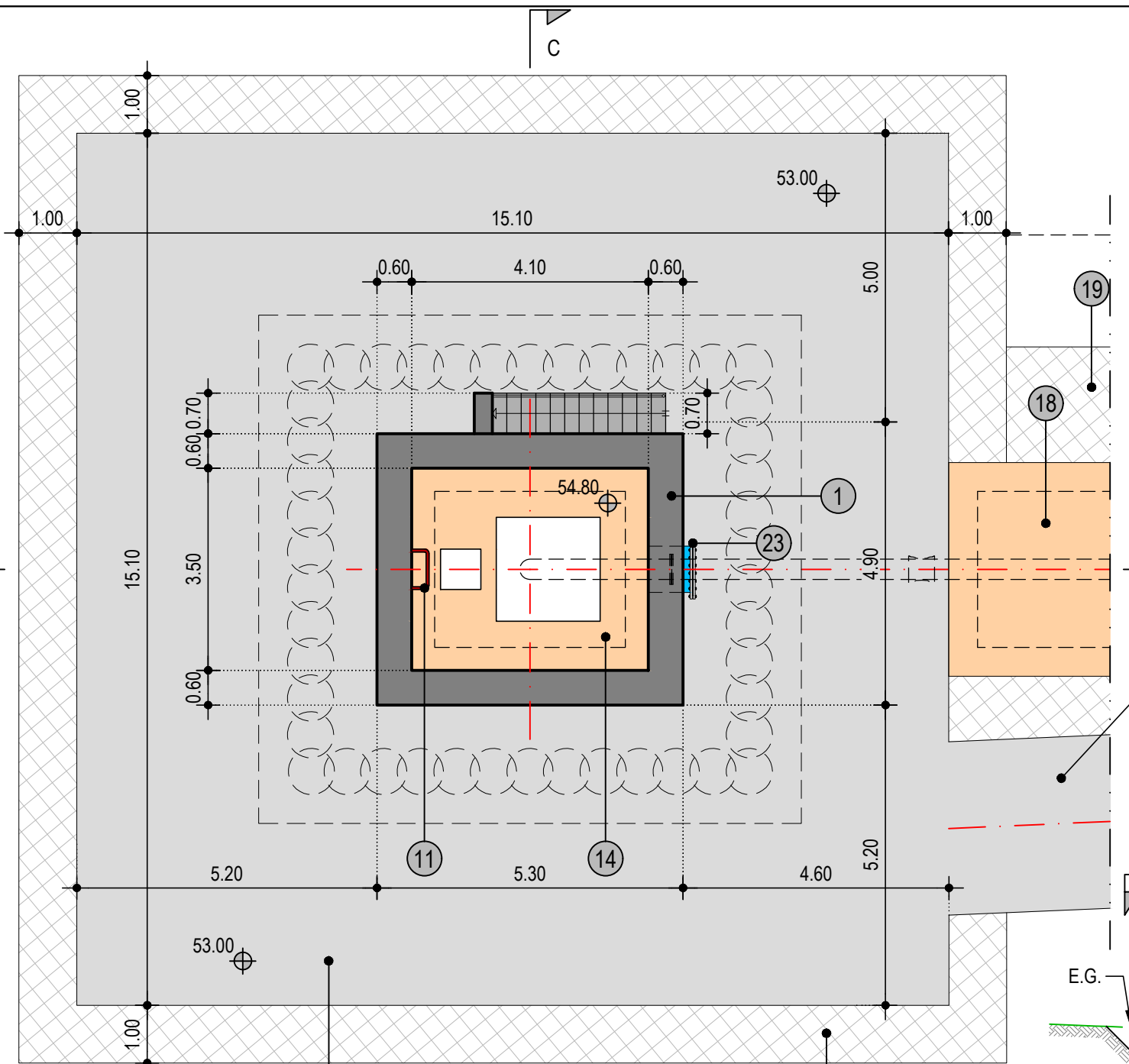
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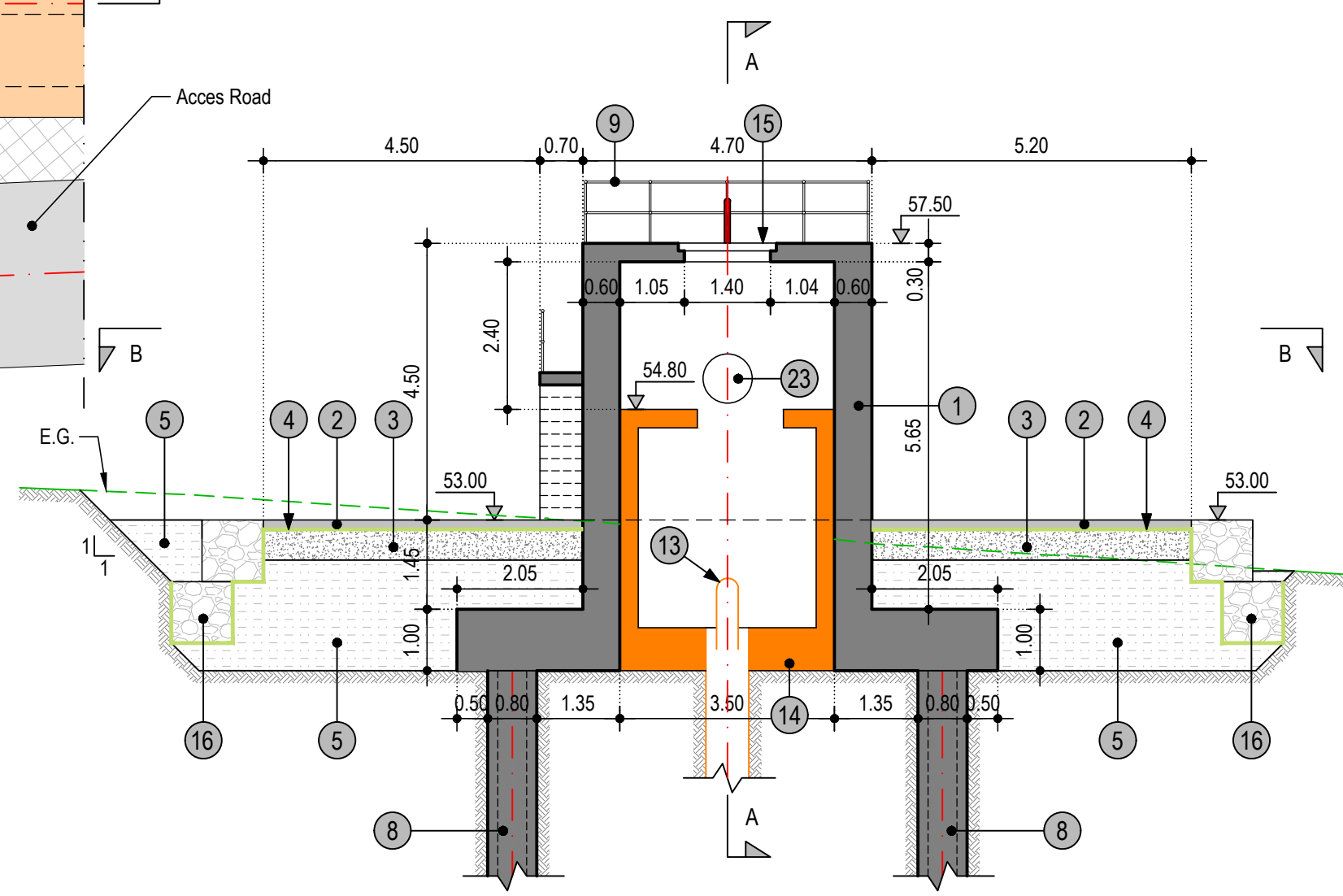
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**BH5 - PLAN AND SECTIONS**



1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
7	Embedding sand material
8	Concrete piles 800mm
9	Metal Rail
10	Ventilation Pipe with Insect Net
11	Steel Ladder
12	Puddle Flange DN350 PN16 two pieces

13	Existing pipe and equipment (not shown)
14	Existing Wellhead
15	Steel cover
16	Gabion Box 1m x 1m x 2m
17	Steel Flexible Stepped Coupling DN350 PN16
18	Existing Chamber
19	Gabion mattress 300mm
20	Flanged Spigot DI Pipe with Puddle Flange DN 350 PN16 L=2.0m
21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



SECTION B-B

SECTION C-C



THE REPUBLIC OF KENYA, MINISTRY OF WATER & SANITATION AND IRRIGATION  
Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE

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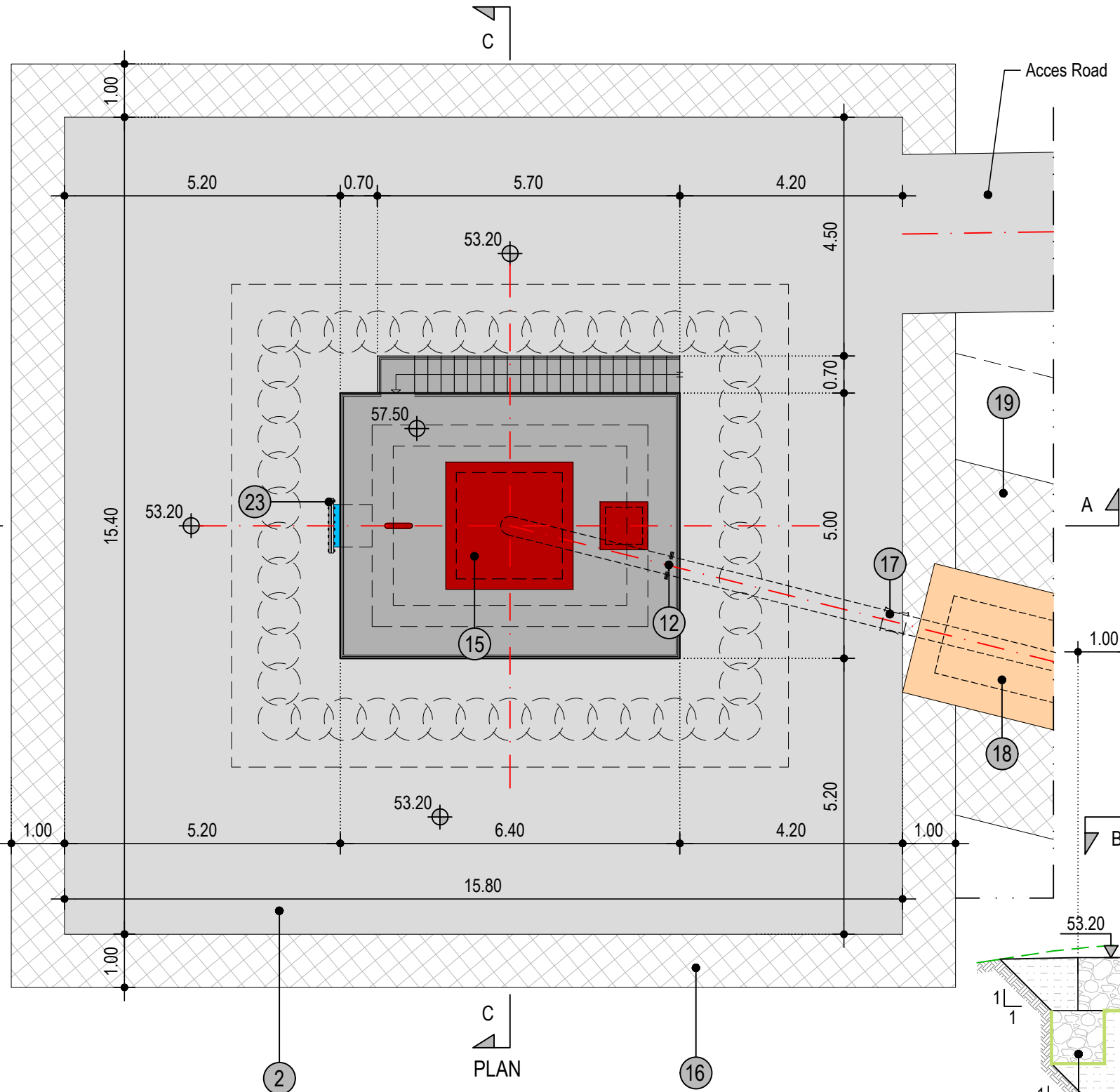
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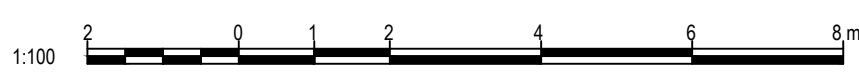
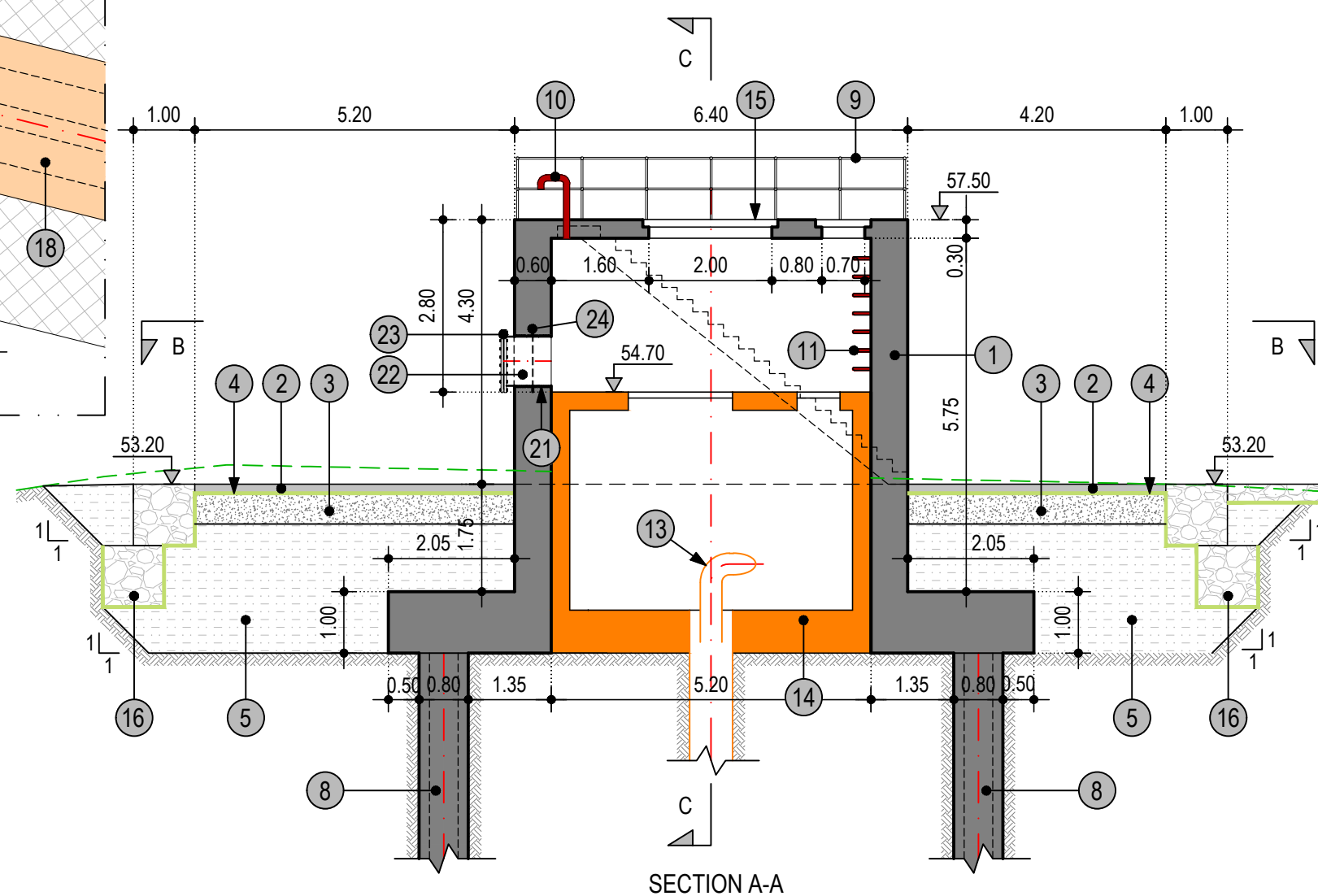
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1	Reinforced concrete C37	13	Existing pipe and equipment (not shown)
2	C25 reinforced concrete pavement 150mm	14	Existing Wellhead
3	Base / Subbase Material	15	Steel cover
4	Geotextile 400g/m <sup>2</sup>	16	Gabion Box 1m x 1m x 2m
5	Backfill / Embankment Material	17	Steel Flexible Stepped Coupling DN350 PN16
6	New DI Pipe, DN350, PN16	18	Existing Chamber
7	Embedding sand material	19	Gabion mattress 300mm
8	Concrete piles 800mm	20	Flanged Spigot DI Pipe with Puddle Flange DN 350 PN16 L=2.0m
9	Metal Rail	21	Waterstop
10	Ventilation Pipe with Insect Net	22	DN800 Steel Acces Pipe PN10
11	Steel Ladder	23	DN800 Flange and Cover PN10
12	Puddle Flange DN350 PN16 two pieces	24	Puddle Flange

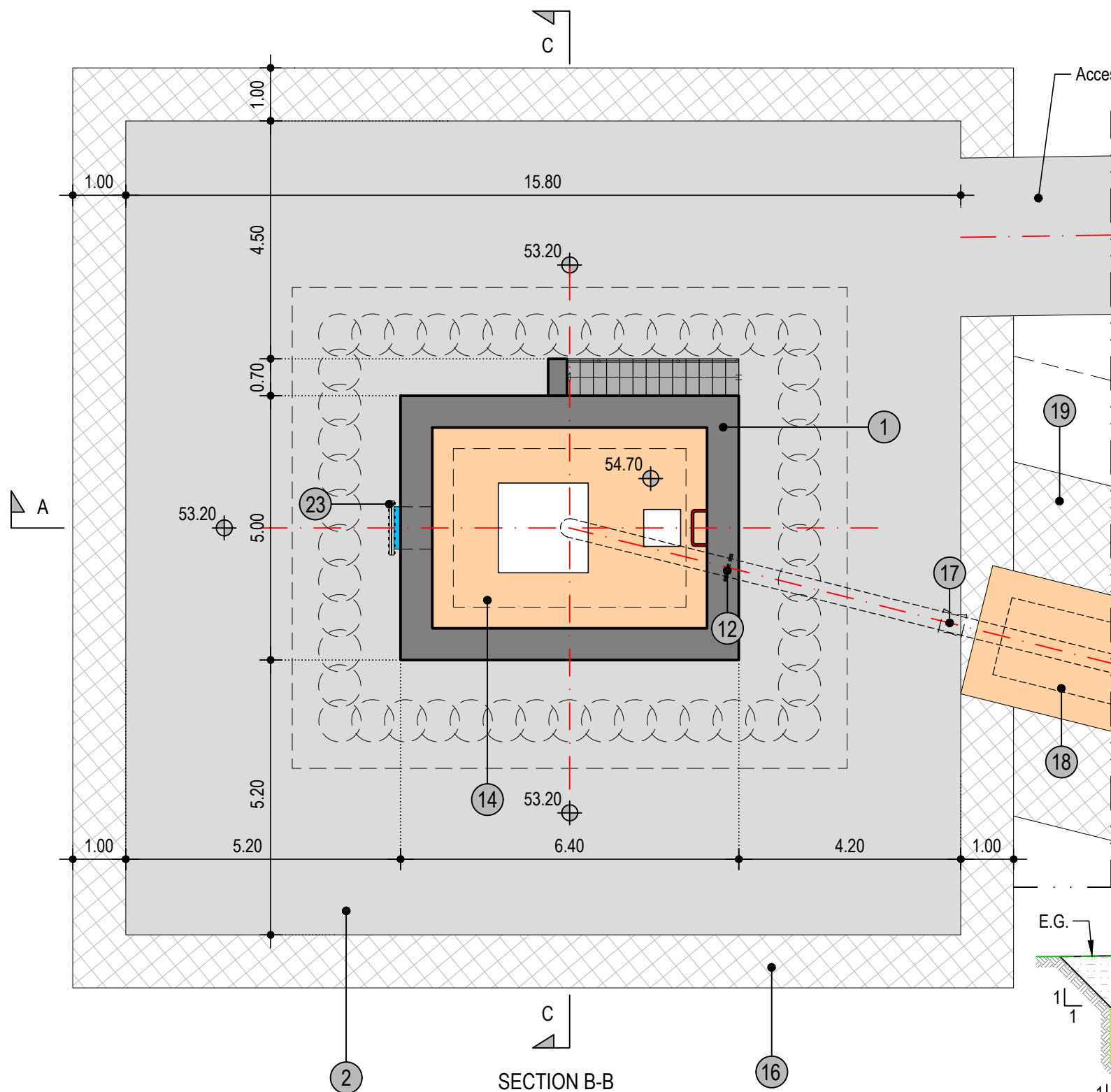


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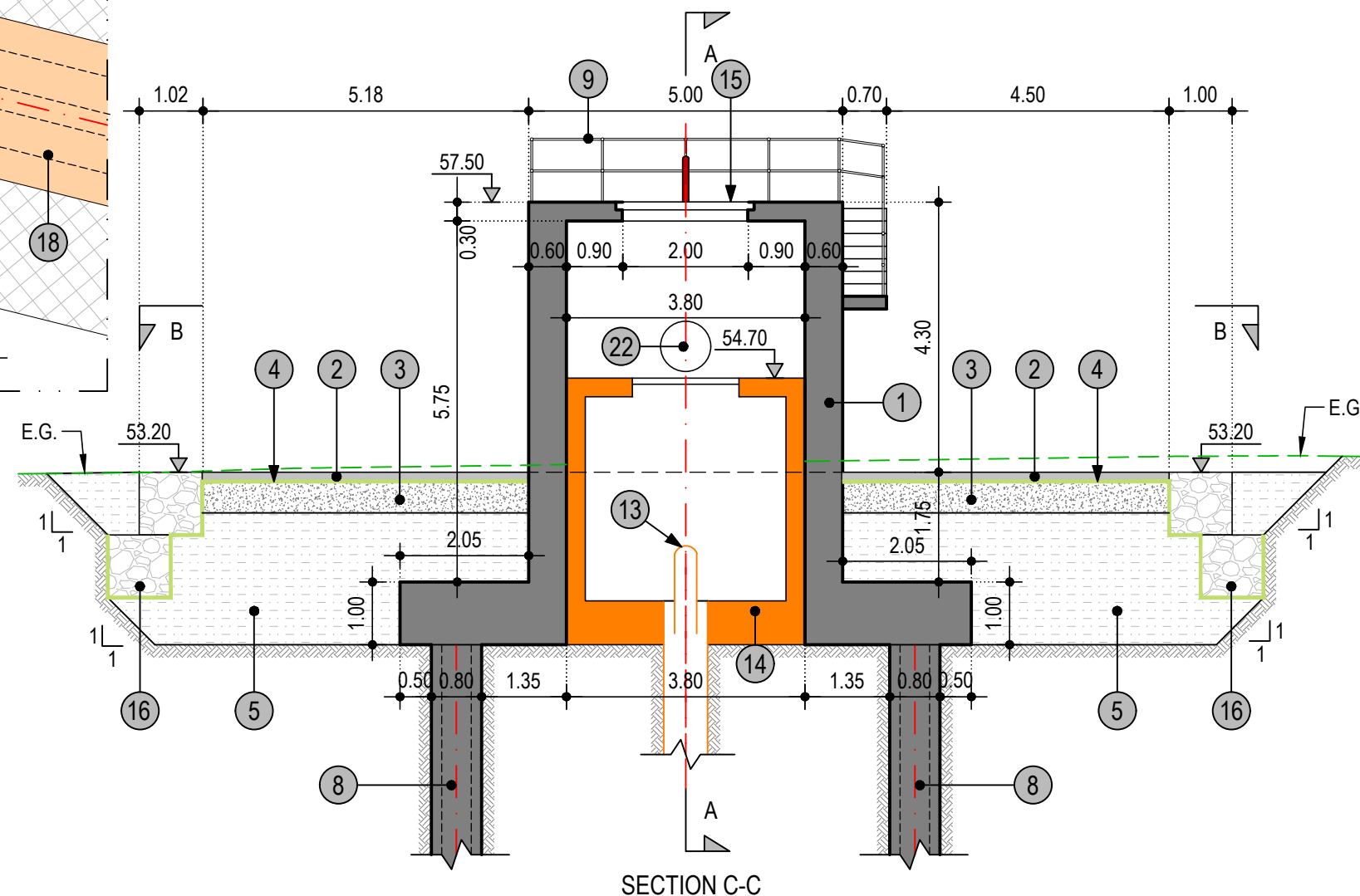
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2	C25 reinforced concrete pavement 150mm
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21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



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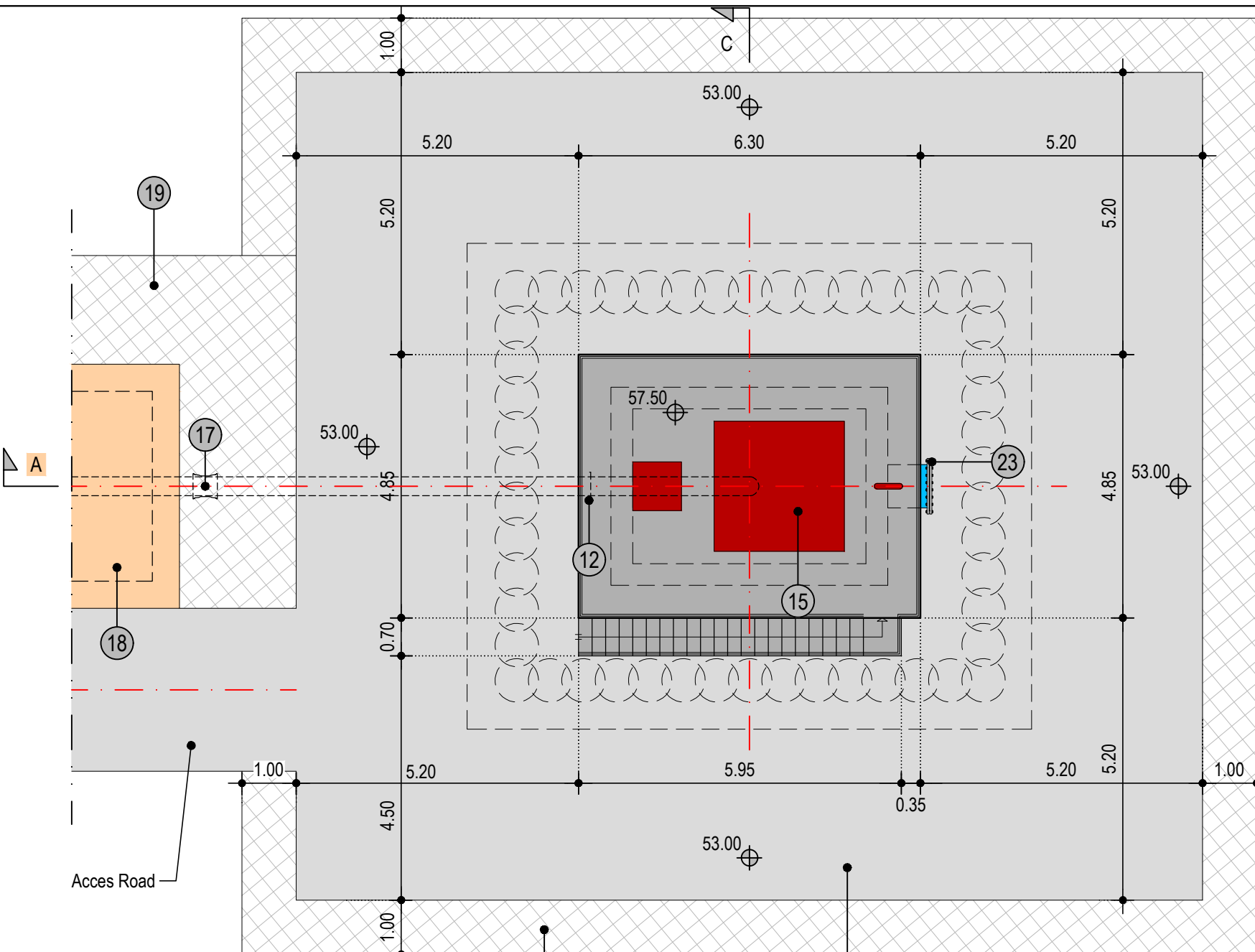
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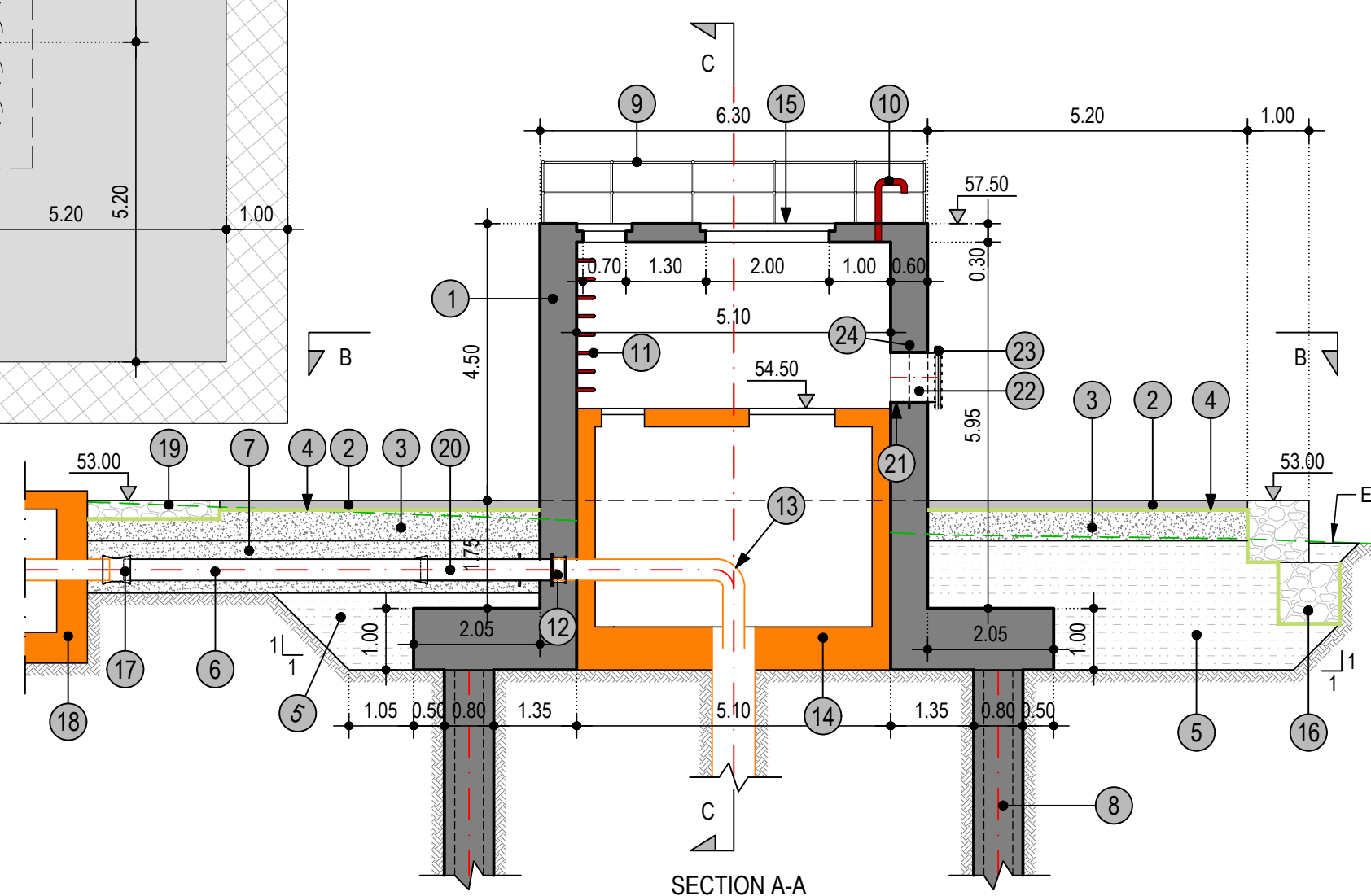
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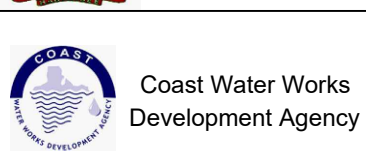
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21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange

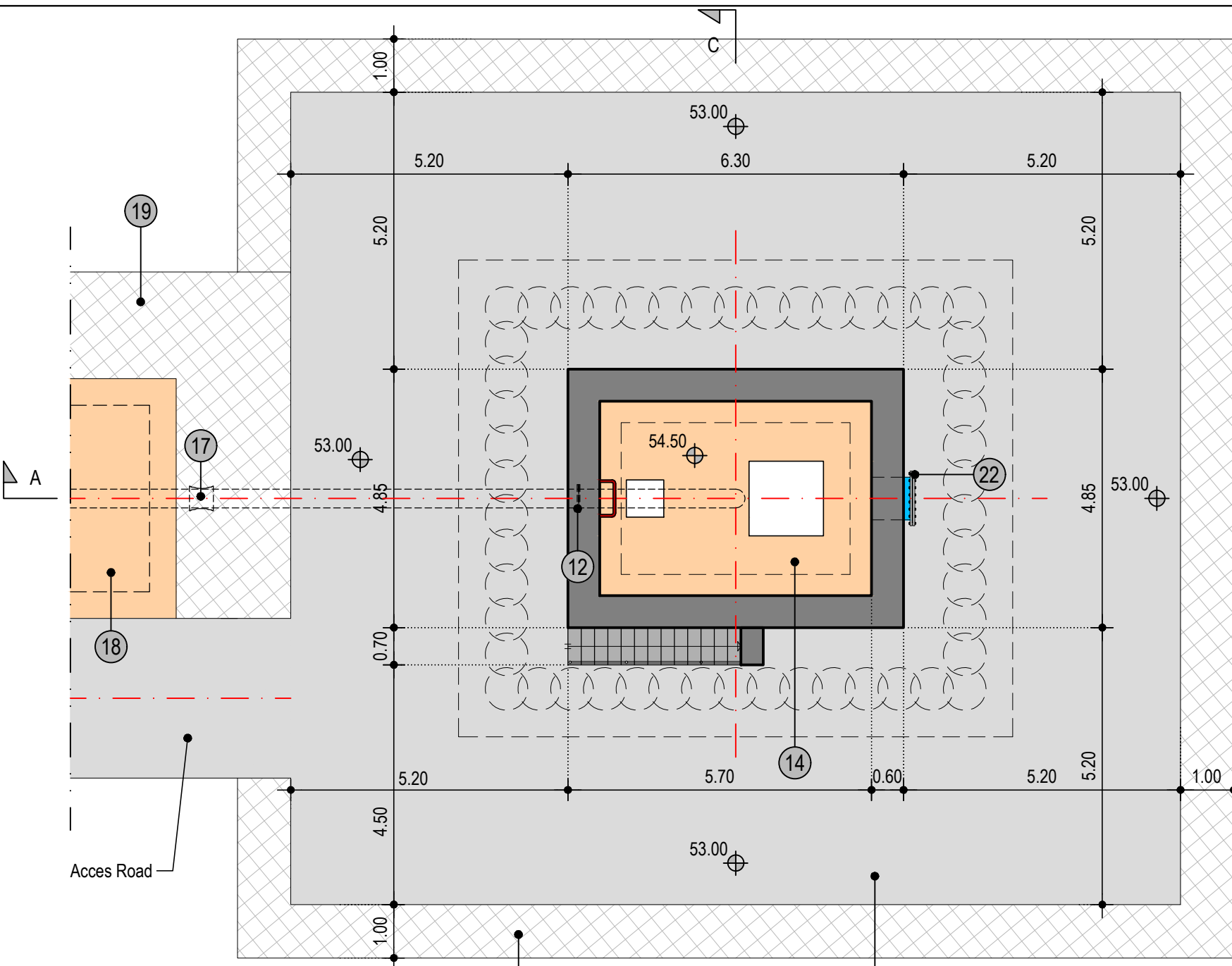


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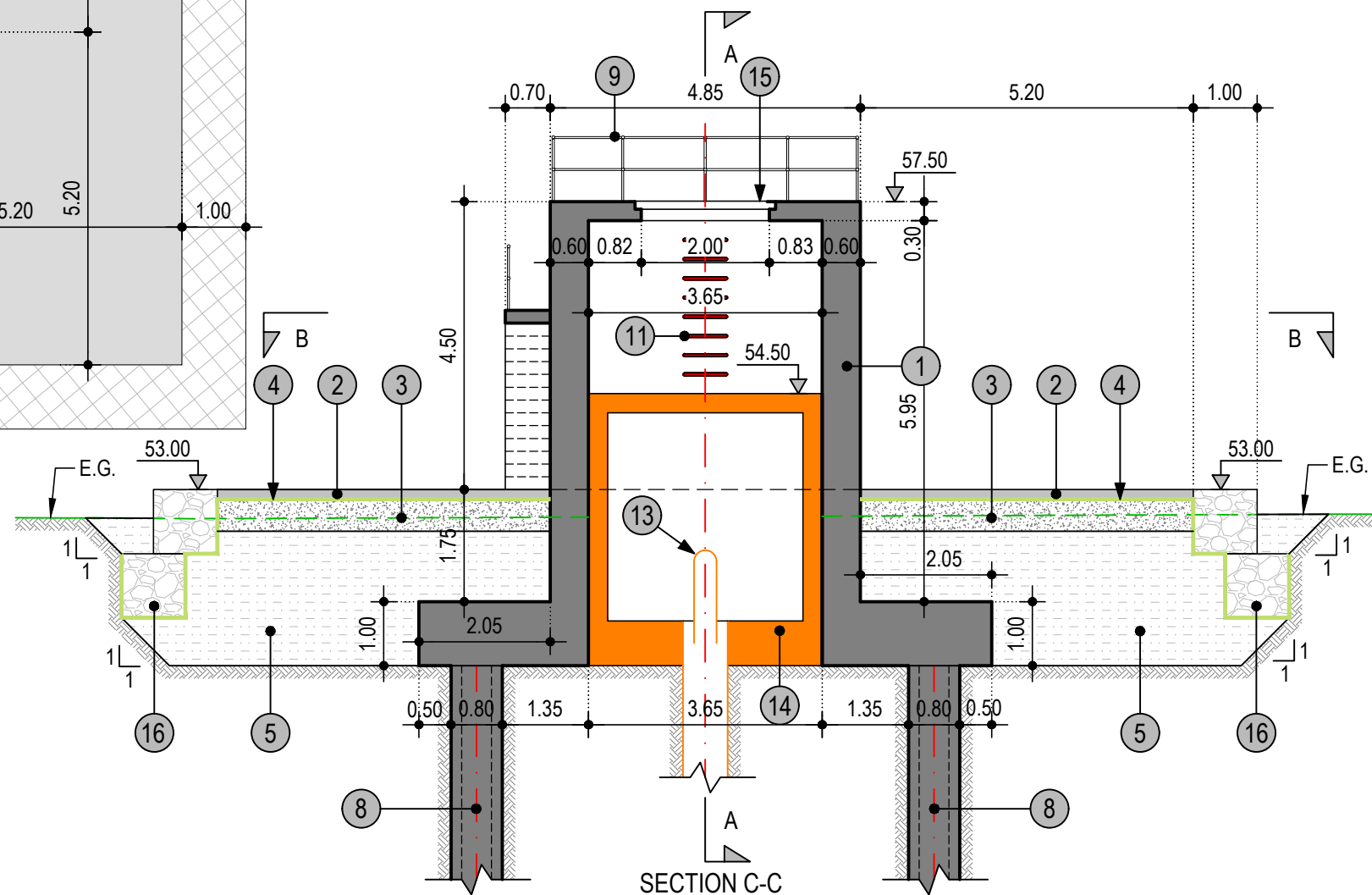


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22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



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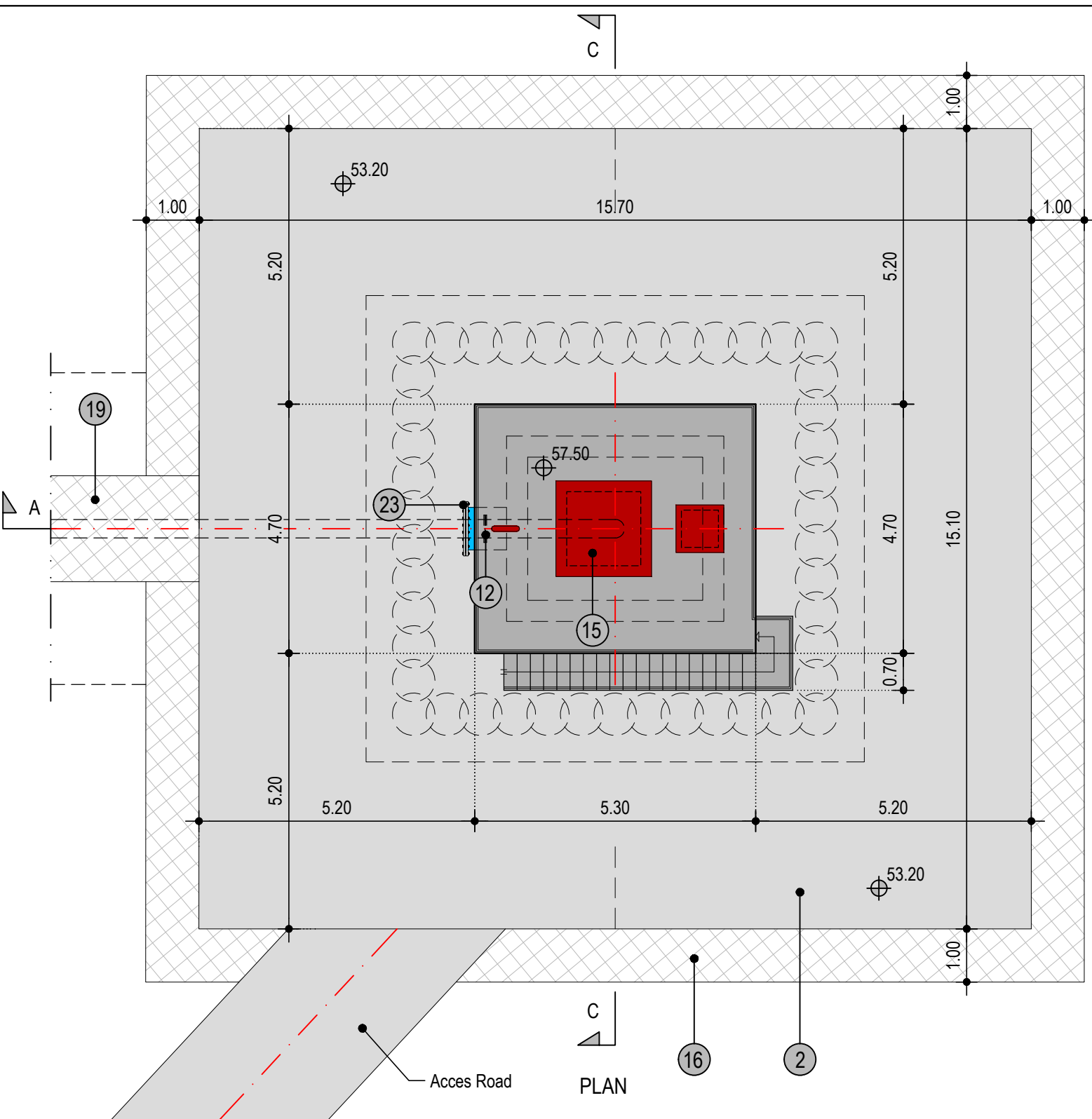
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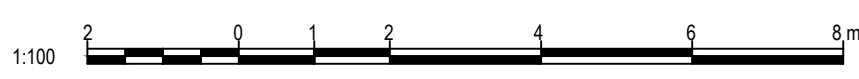
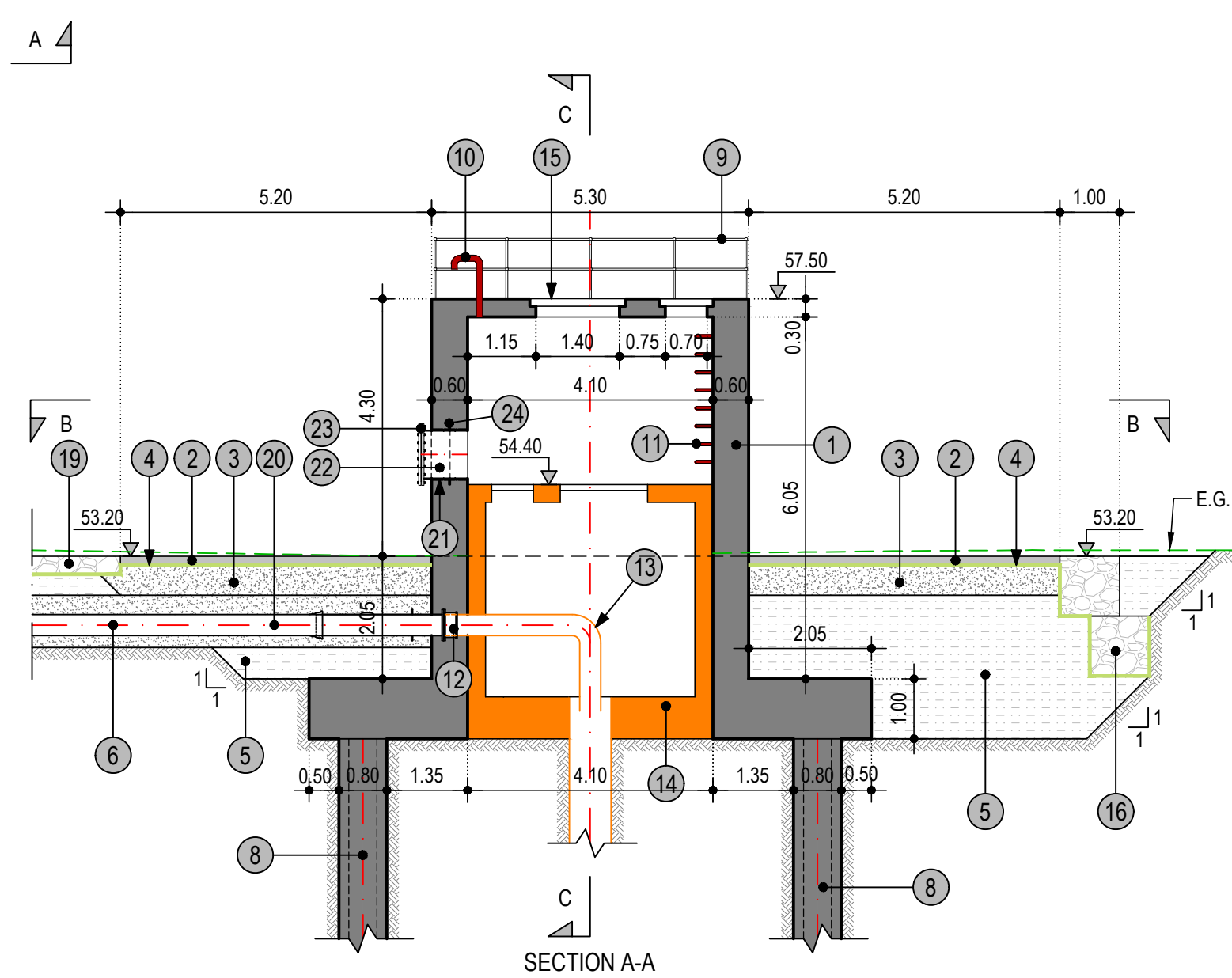
**BH6A - PLAN AND SECTIONS**





1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
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24	Puddle Flange



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Coast Water Works Development Agency

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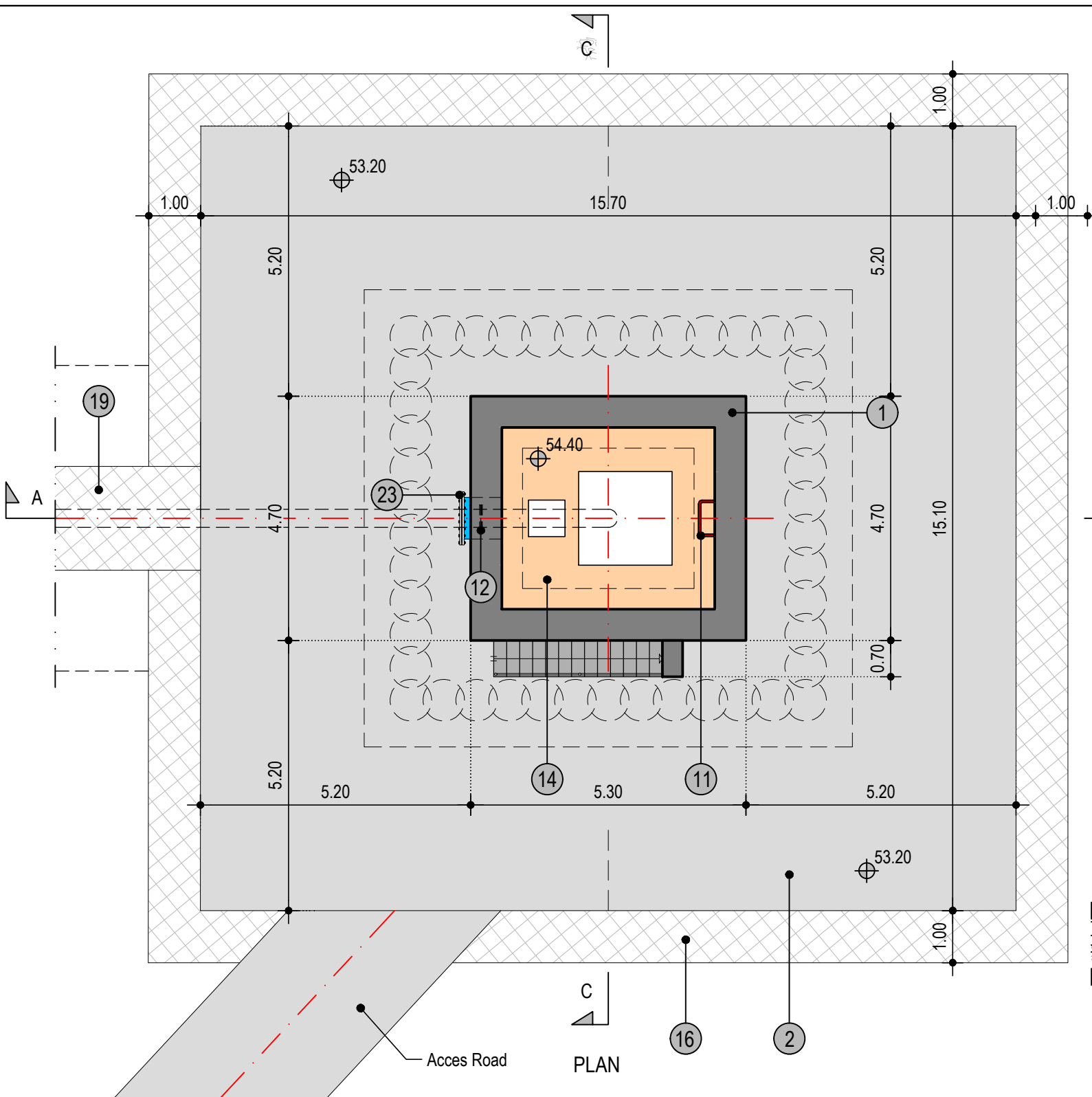
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CONSULTANCY SERVICES FOR PREPARATION OF DETAILED DESIGNS, TENDER DOCUMENTS, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (ESIA) AND CONSTRUCTION SUPERVISION OF THE BARICHO WELL-FIELD PROTECTION WORKS - KE-CWWDA-87234-CS-QCBS

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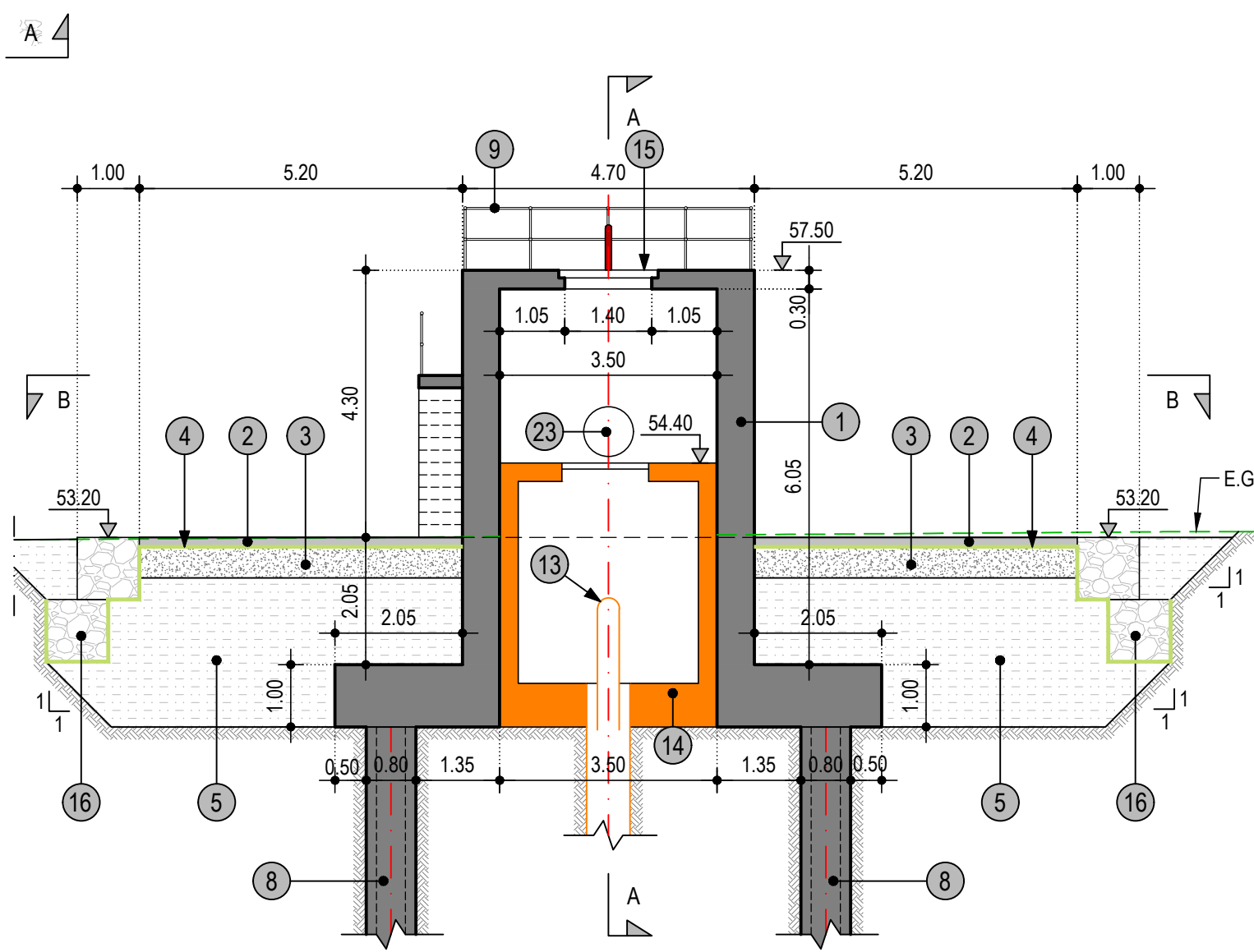
**BH7 - PLAN AND SECTIONS**

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1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
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SECTION C-C

THE REPUBLIC OF KENYA, MINISTRY OF WATER & SANITATION AND IRRIGATION  
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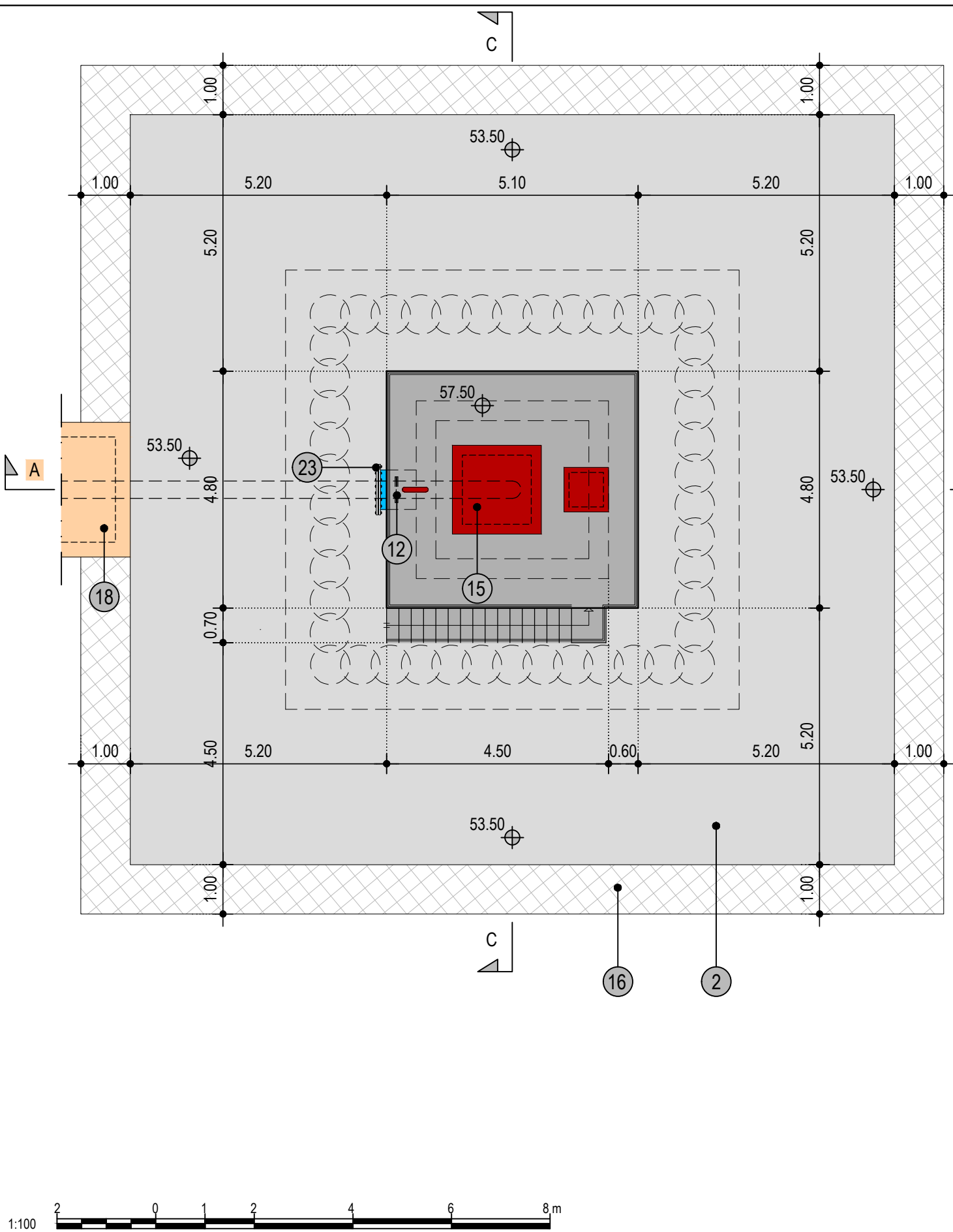


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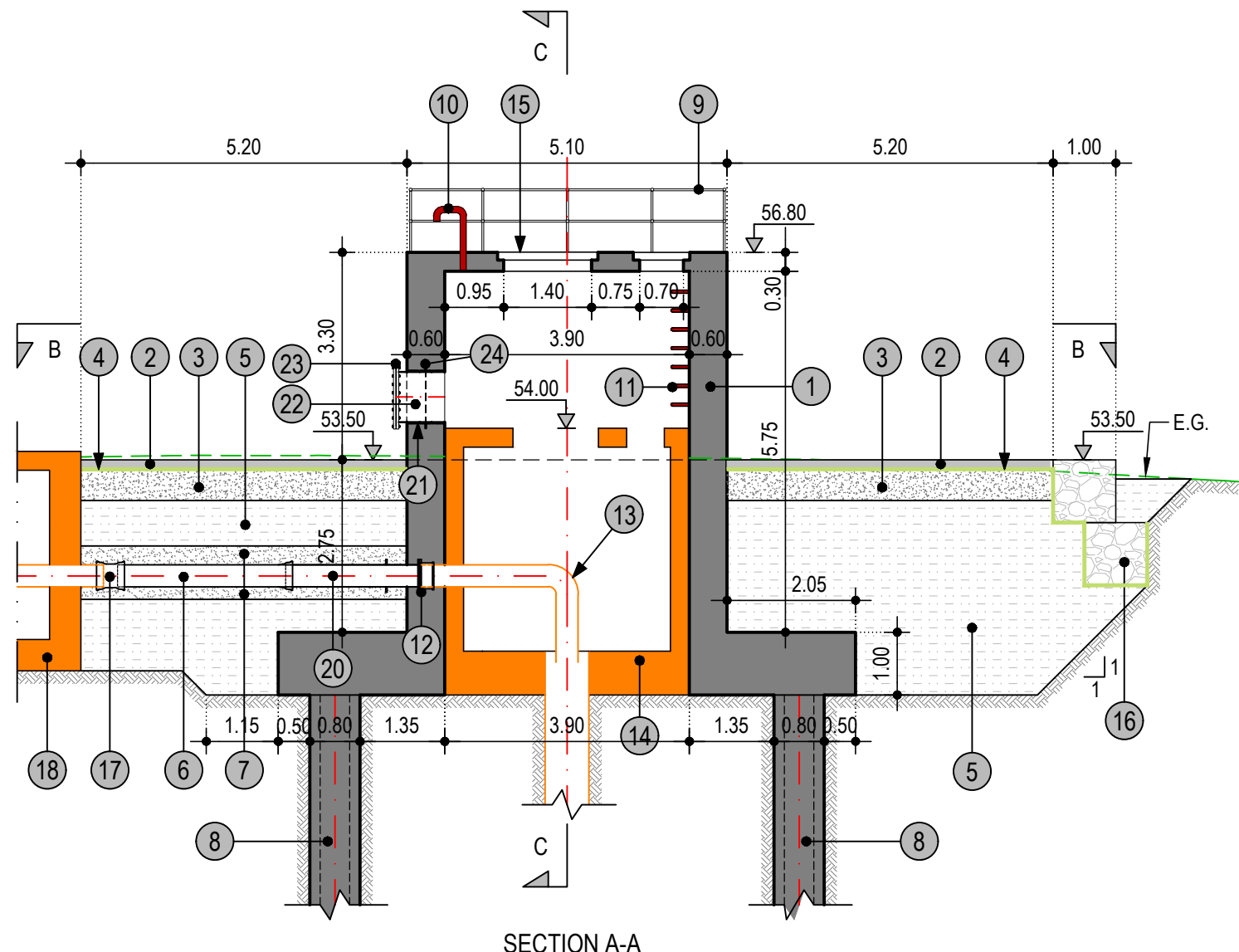
**BH7 - PLAN AND SECTIONS**





1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
7	Embedding sand material
8	Concrete piles 800mm
9	Metal Rail
10	Ventilation Pipe with Insect Net
11	Steel Ladder
12	Puddle Flange DN350 PN16 two pieces

13	Existing pipe and equipment (not shown)
14	Existing Wellhead
15	Steel cover
16	Gabion Box 1m x 1m x 2m
17	Steel Flexible Stepped Coupling DN350 PN16
18	Existing Chamber
19	Gabion mattress 300mm
20	Flanged Spigot DI Pipe with Puddle Flange DN 350 PN16 L=2.0m
21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



SECTION A-A





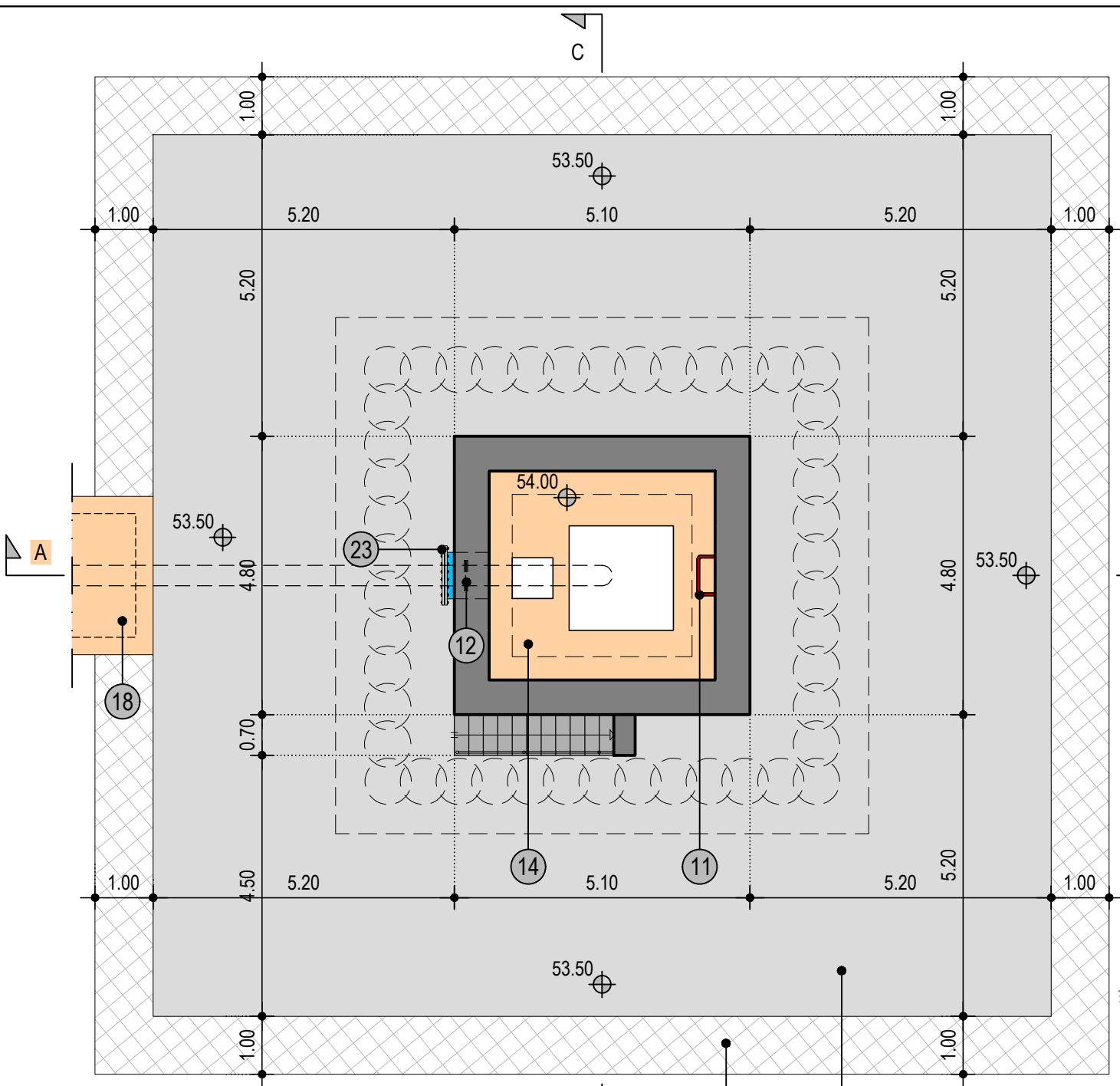
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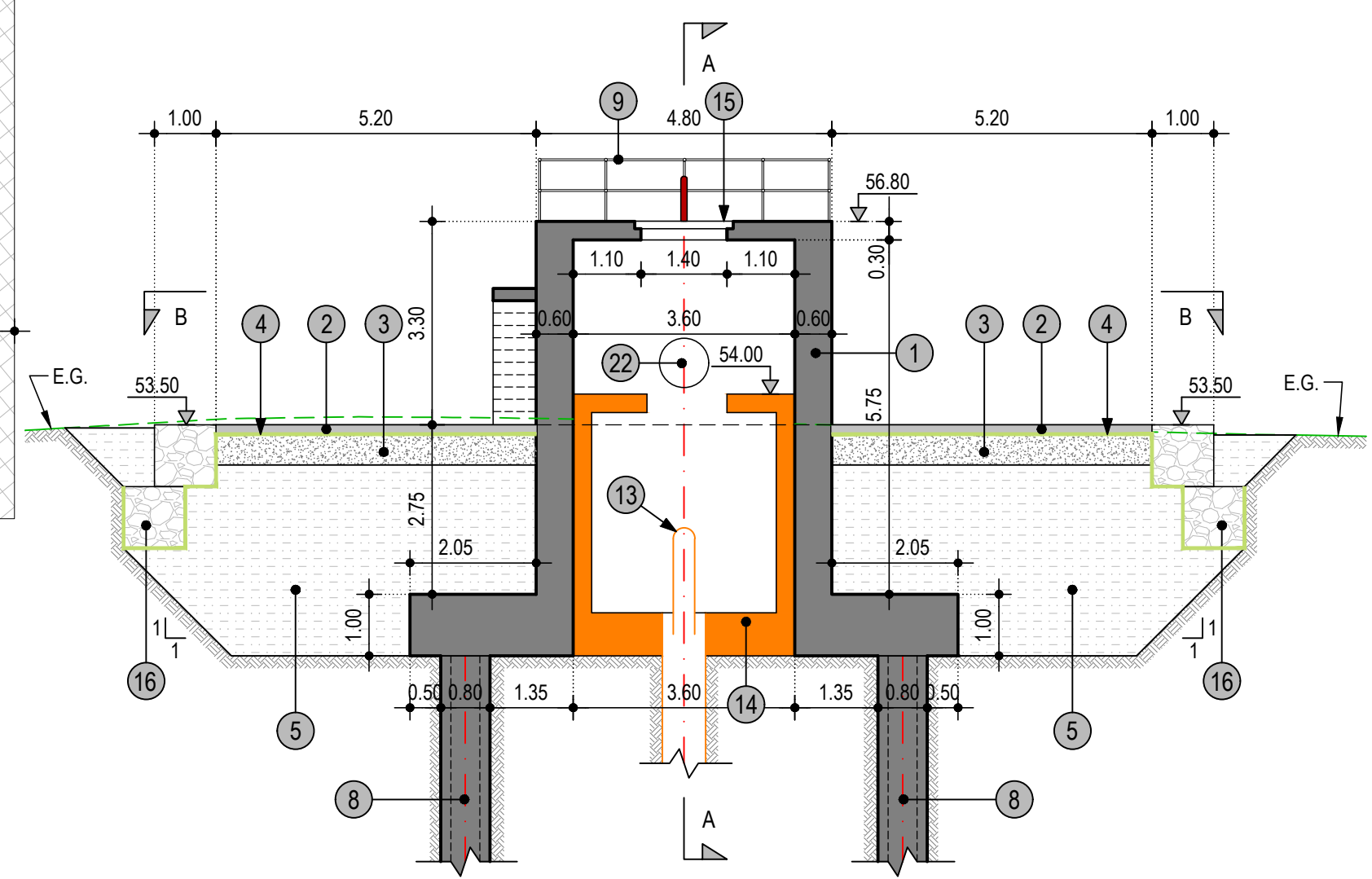
**BH8 - PLAN AND SECTIONS**

Date : JUNE 2021    Scale: 1:100    Drg. No. BWPW-DD-3-170    Sheet No. 1/2



1	Reinforced concrete C37
2	C25 reinforced concrete pavement 150mm
3	Base / Subbase Material
4	Geotextile 400g/m <sup>2</sup>
5	Backfill / Embankment Material
6	New DI Pipe, DN350, PN16
7	Embedding sand material
8	Concrete piles 800mm
9	Metal Rail
10	Ventilation Pipe with Insect Net
11	Steel Ladder
12	Puddle Flange DN350 PN16 two pieces

13	Existing pipe and equipment (not shown)
14	Existing Wellhead
15	Steel cover
16	Gabion Box 1m x 1m x 2m
17	Steel Flexible Stepped Coupling DN350 PN16
18	Existing Chamber
19	Gabion mattress 300mm
20	Flanged Spigot DI Pipe with Puddle Flange DN 350 PN16 L=2.0m
21	Waterstop
22	DN800 Steel Acces Pipe PN10
23	DN800 Flange and Cover PN10
24	Puddle Flange



SECTION C-C

THE REPUBLIC OF KENYA, MINISTRY OF WATER & SANITATION AND IRRIGATION  
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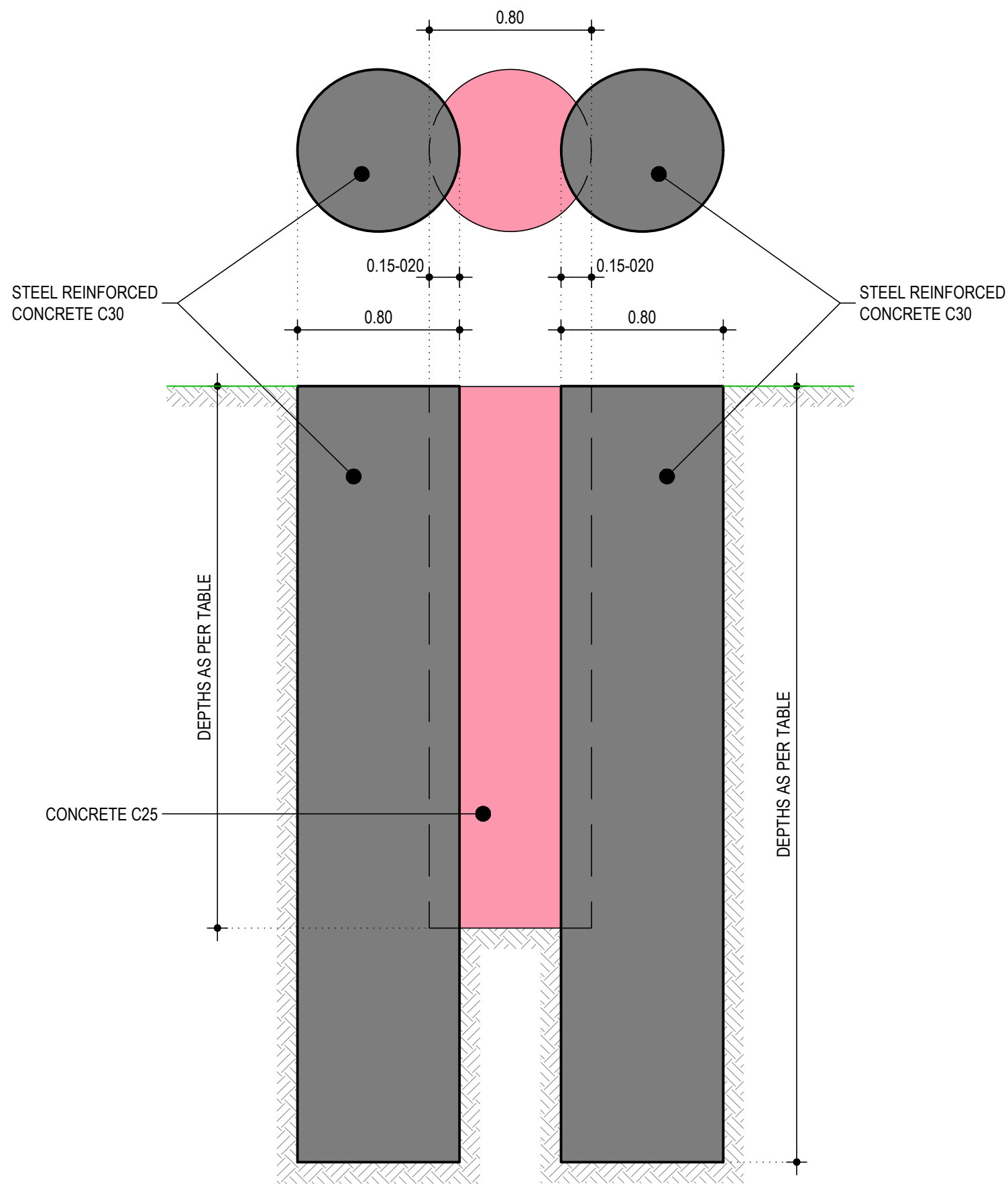
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**BH8 - PLAN AND SECTIONS**





Wells	Reinforced pile depth	Unreinforced pile depth
	(m)	(m)
BH4	16	10
BH5	13	8
BH6	11	7
BH6A	11	7
BH7	10	6
BH8	10	6



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Development Agency

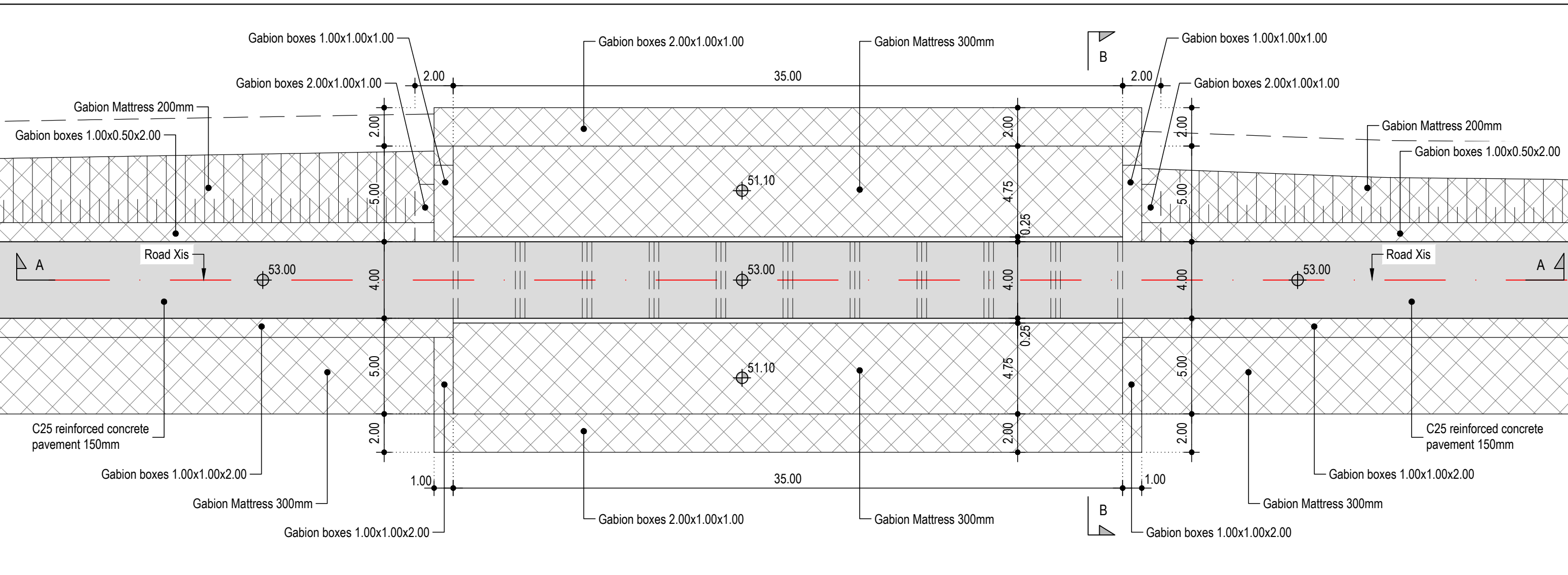


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CONSULTING ENGINEERS

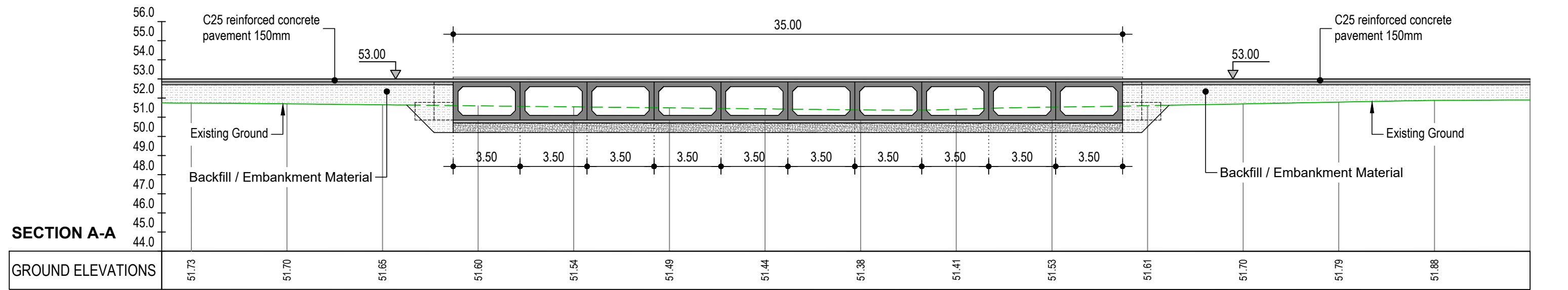
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### DOWNSTREAM WELLFIELD PILE SECTIONS

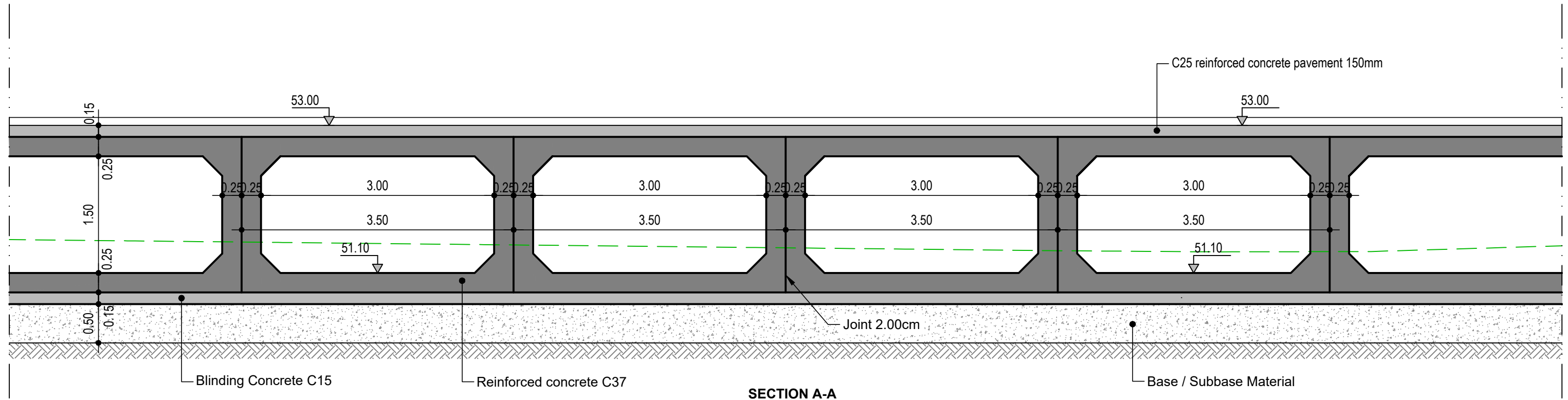


**NOTE:**  
1. For Section B-B see drawings: DWPW-DD-3-210

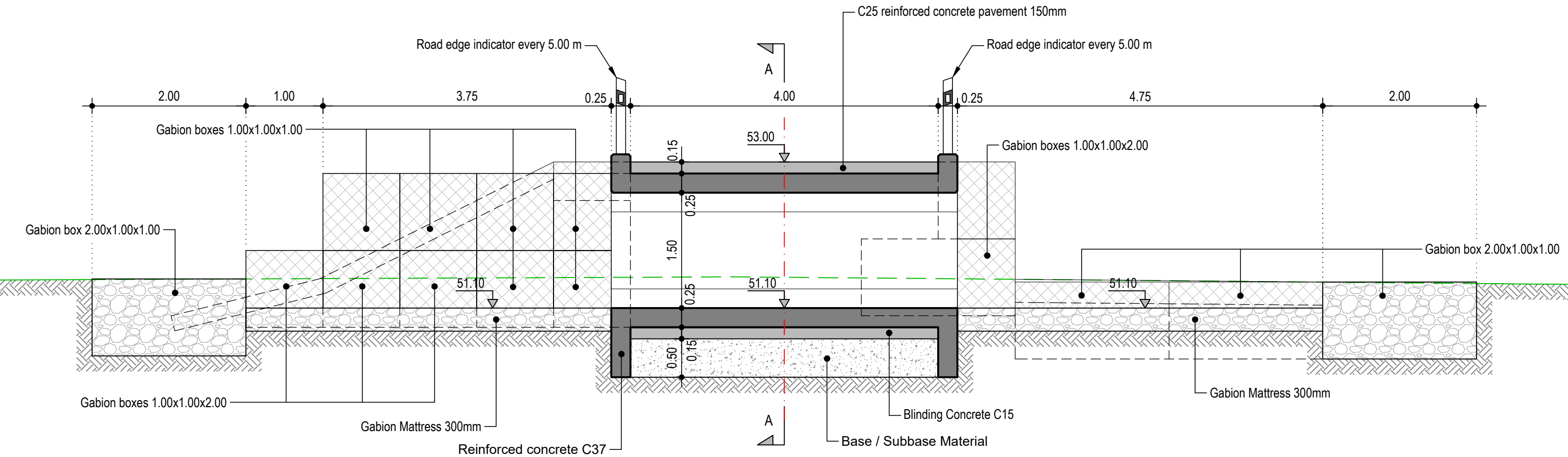


<p>Coast Water Works Development Agency</p>	<p>G. KARAVOKYRIS &amp; PARTNERS CONSULTING ENGINEERS</p>	<p>STRECO Ltd.</p>	THE REPUBLIC OF KENYA, MINISTRY OF WATER & SANITATION AND IRRIGATION Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE			CONSULTANCY SERVICES FOR PREPARATION OF DETAILED DESIGNS, TENDER DOCUMENTS, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (ESIA) AND CONSTRUCTION SUPERVISION OF THE BARICHO WELL-FIELD PROTECTION WORKS - KE-CWWDA-87234-CS-QCBS																					
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SECTION A-A



SECTION B-B



THE REPUBLIC OF KENYA, MINISTRY OF  
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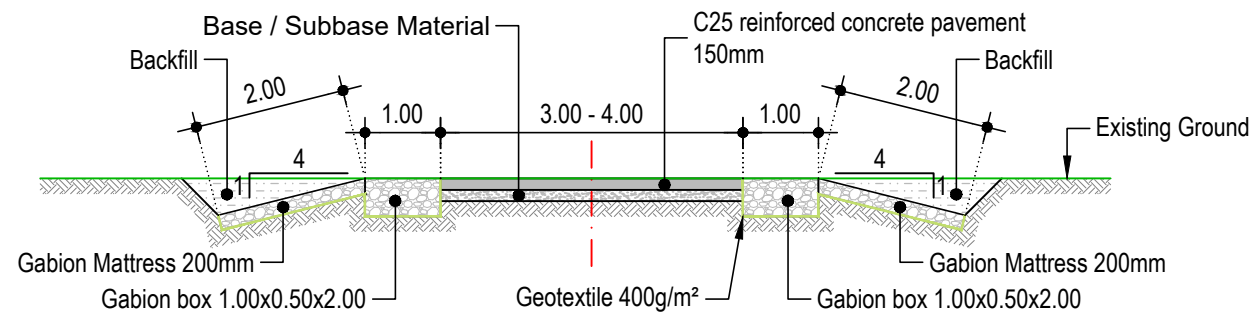


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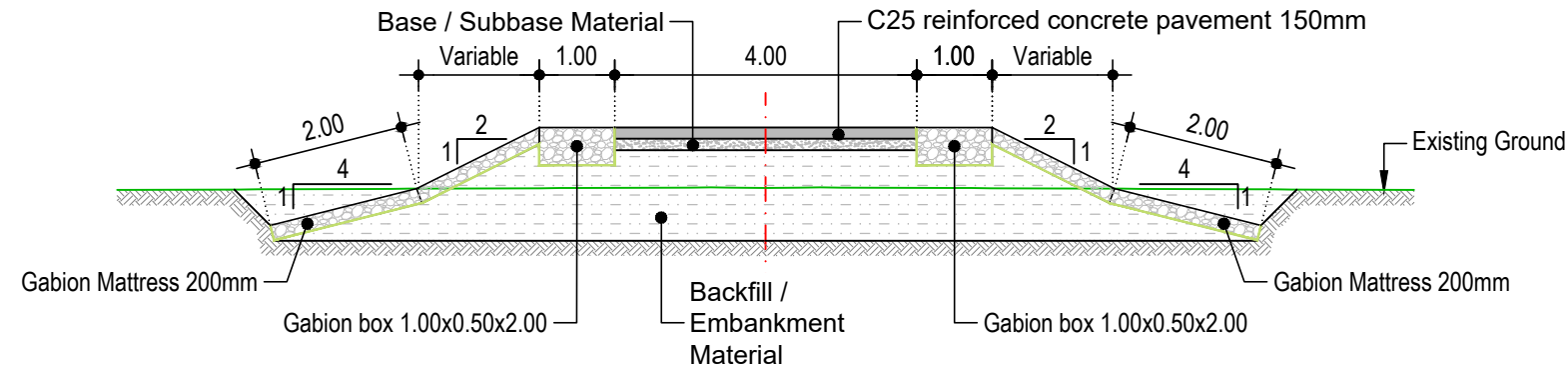
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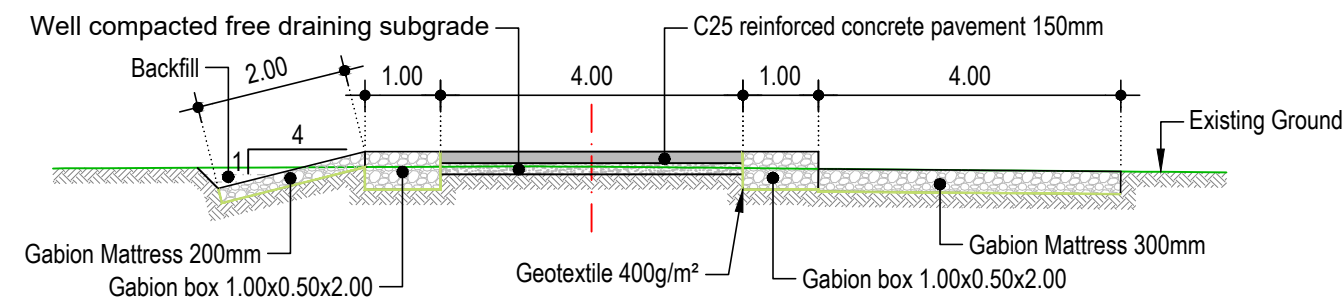
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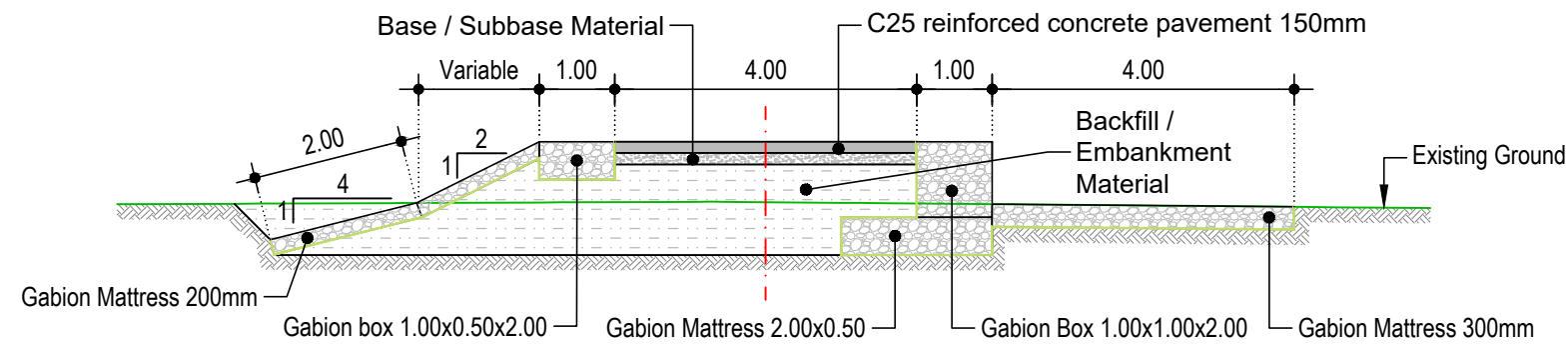
ROAD A - TYPICAL SECTION AT GROUND LEVEL



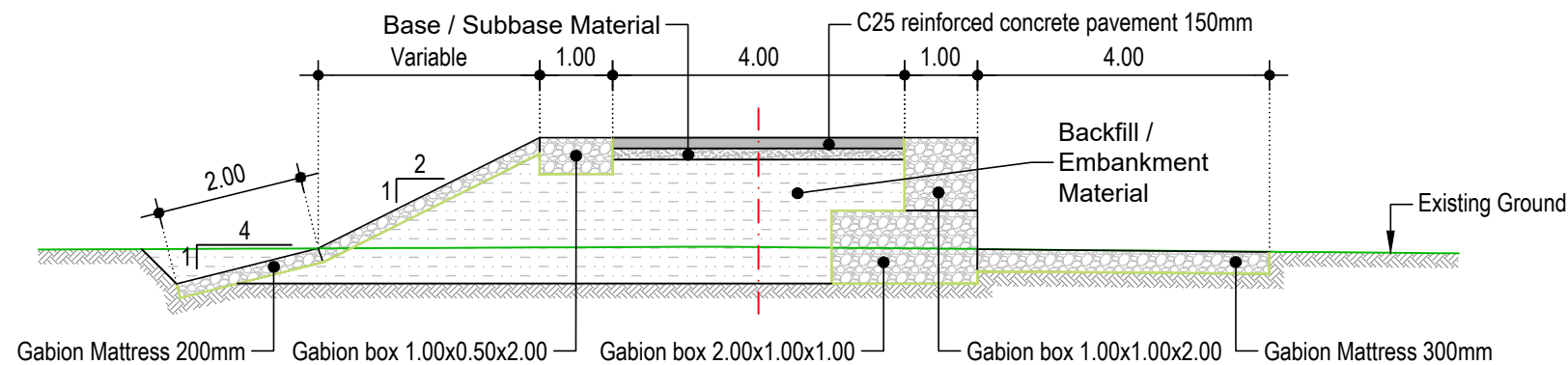
ROAD A - TYPICAL SECTION ABOVE GROUND LEVEL



ROAD B - TYPICAL SECTION UP TO 500mm ABOVE GROUND



ROAD B - TYPICAL SECTION UP TO 1000mm ABOVE GROUND



ROAD B - TYPICAL SECTION UP TO 1500mm ABOVE GROUND



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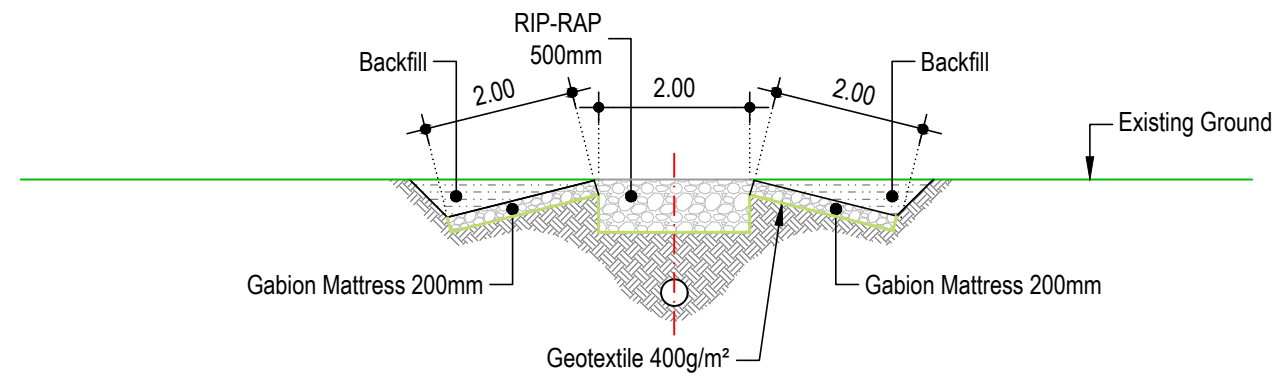
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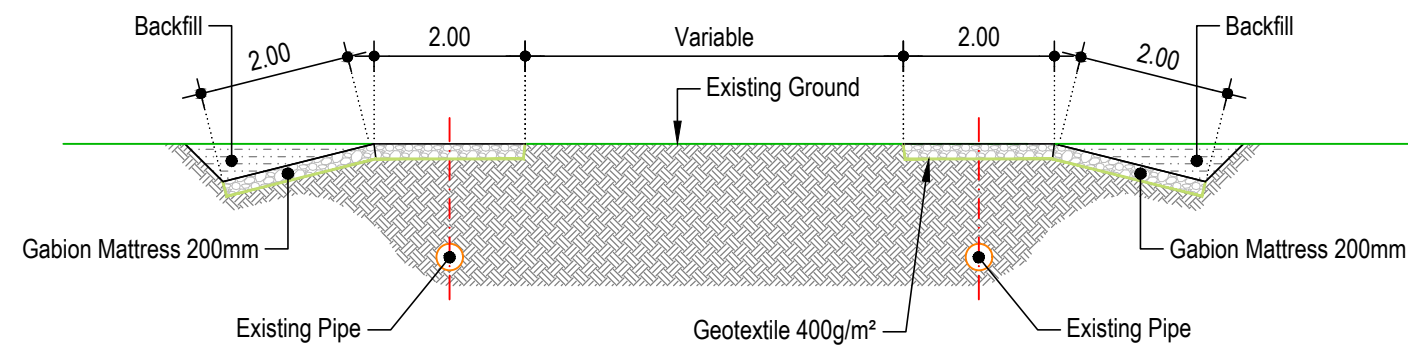
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**DOWNSTREAM WELLFIELD TYPICAL ROAD SECTIONS**





**TYPICAL SECTION FOR SINGLE PIPE CORRIDOR**



**TYPICAL SECTION FOR DUAL PIPE CORRIDOR**



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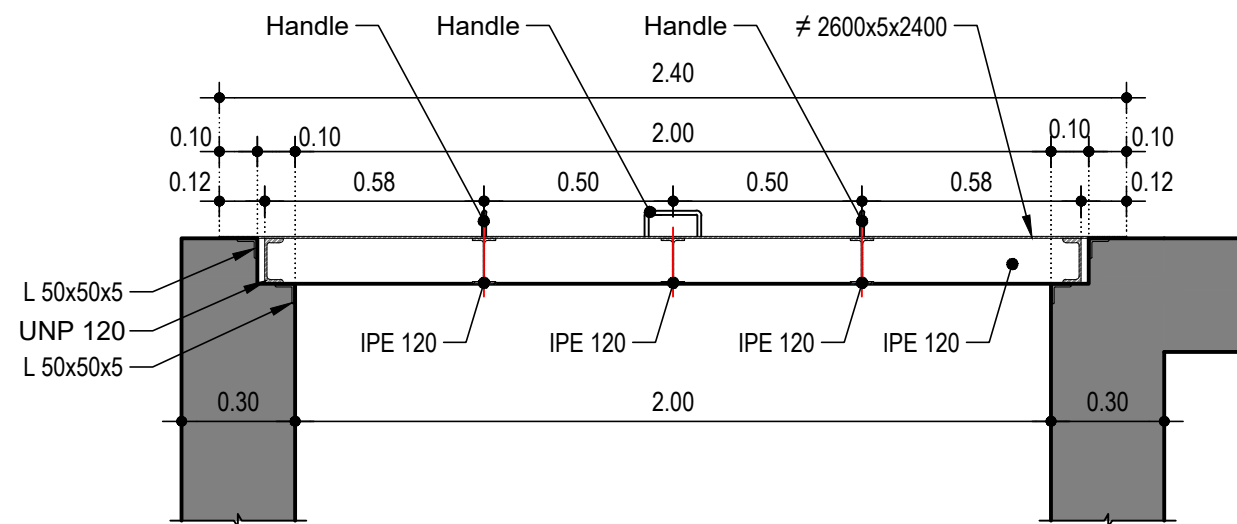
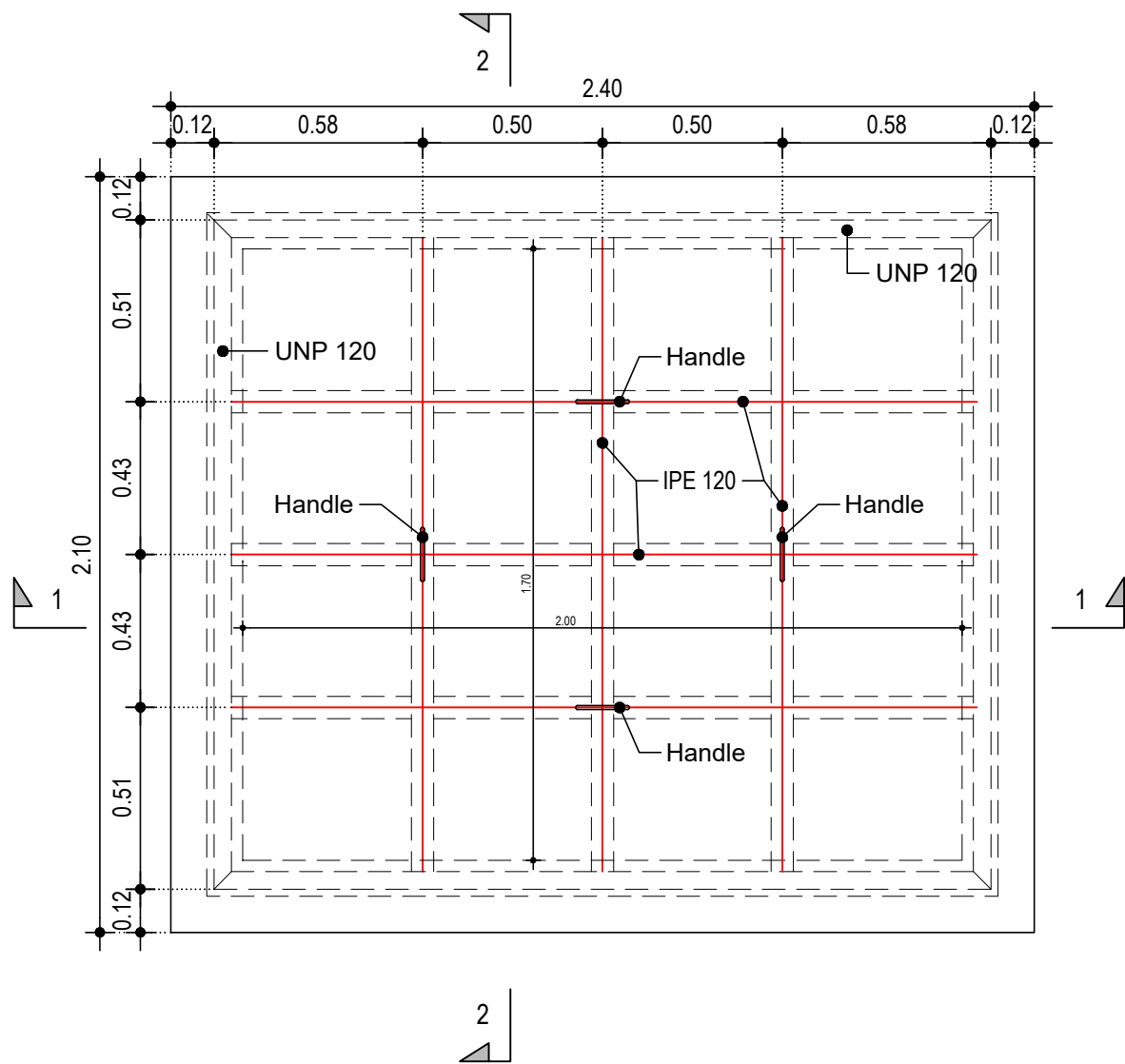
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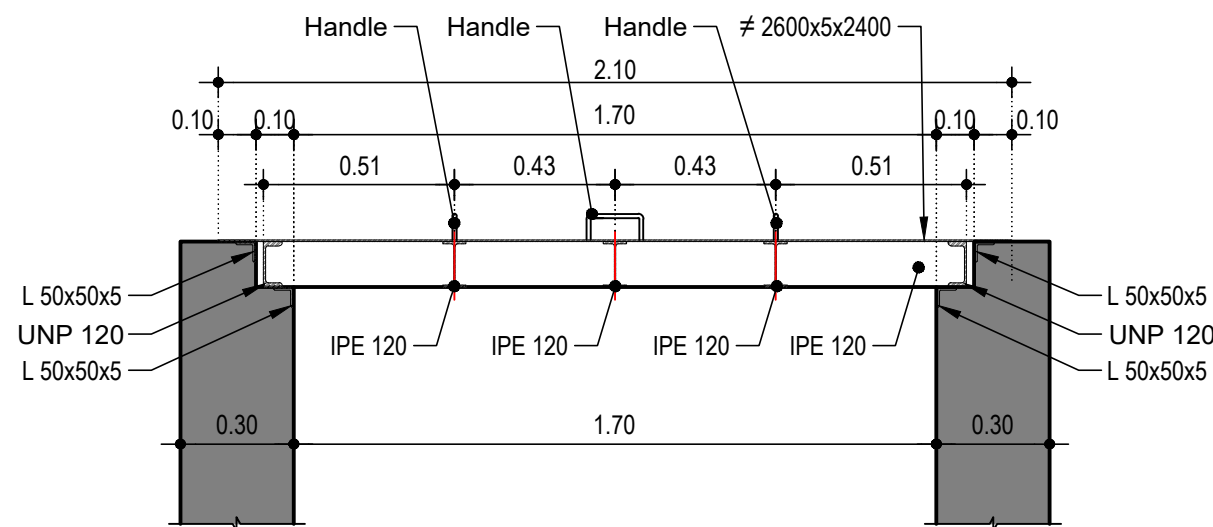
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**DOWNSTREAM WELLFIELD  
TYPICAL PIPE CORRIDOR SECTIONS**

### EQUIPMENT HANDLING OPENING COVER PLAN



SECTION 1-1



SECTION 2-2



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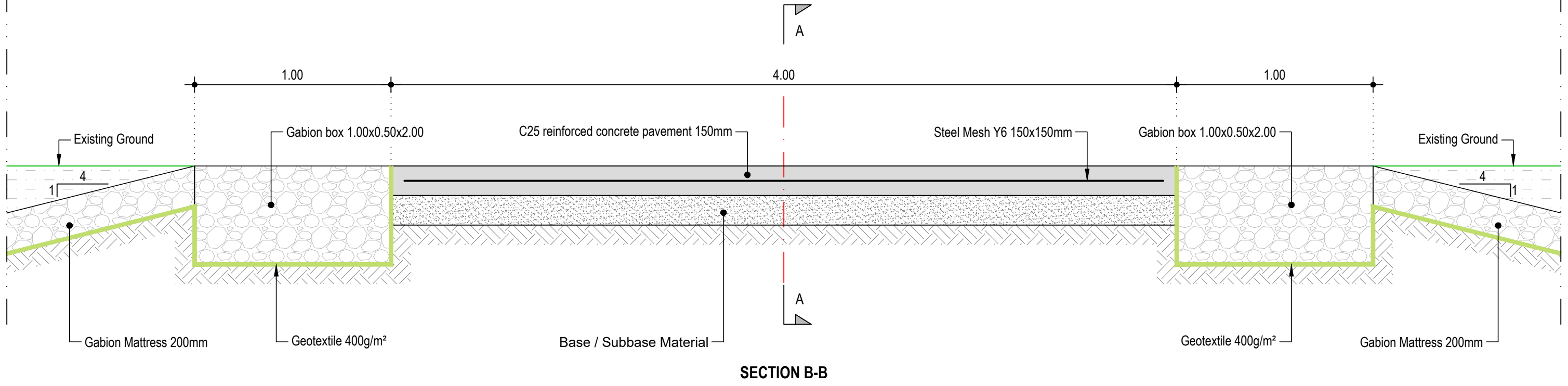
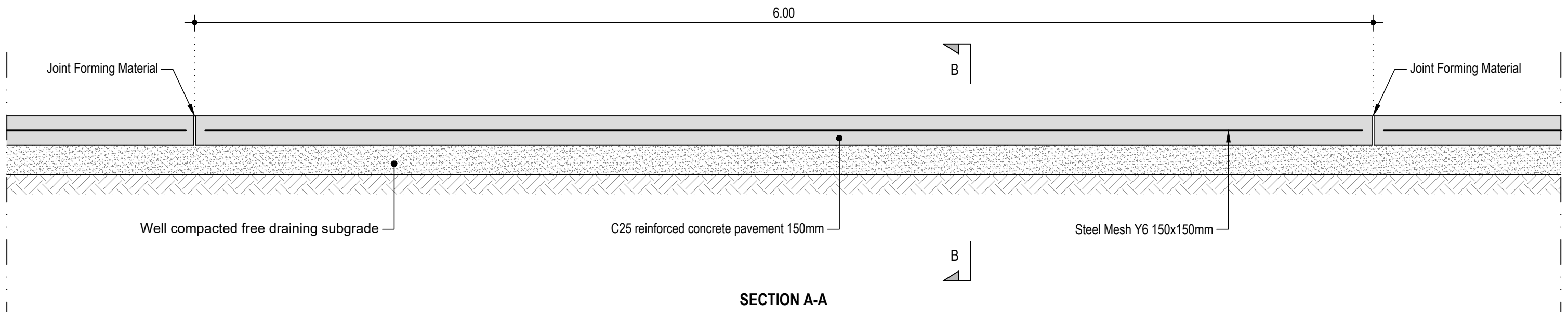
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### NEW WELL - LARGE ACCESS COVER

Date: JUNE 2021 Scale: 1:20 Drg. No. BWPW-DD-4-100 Sheet No. 1/1





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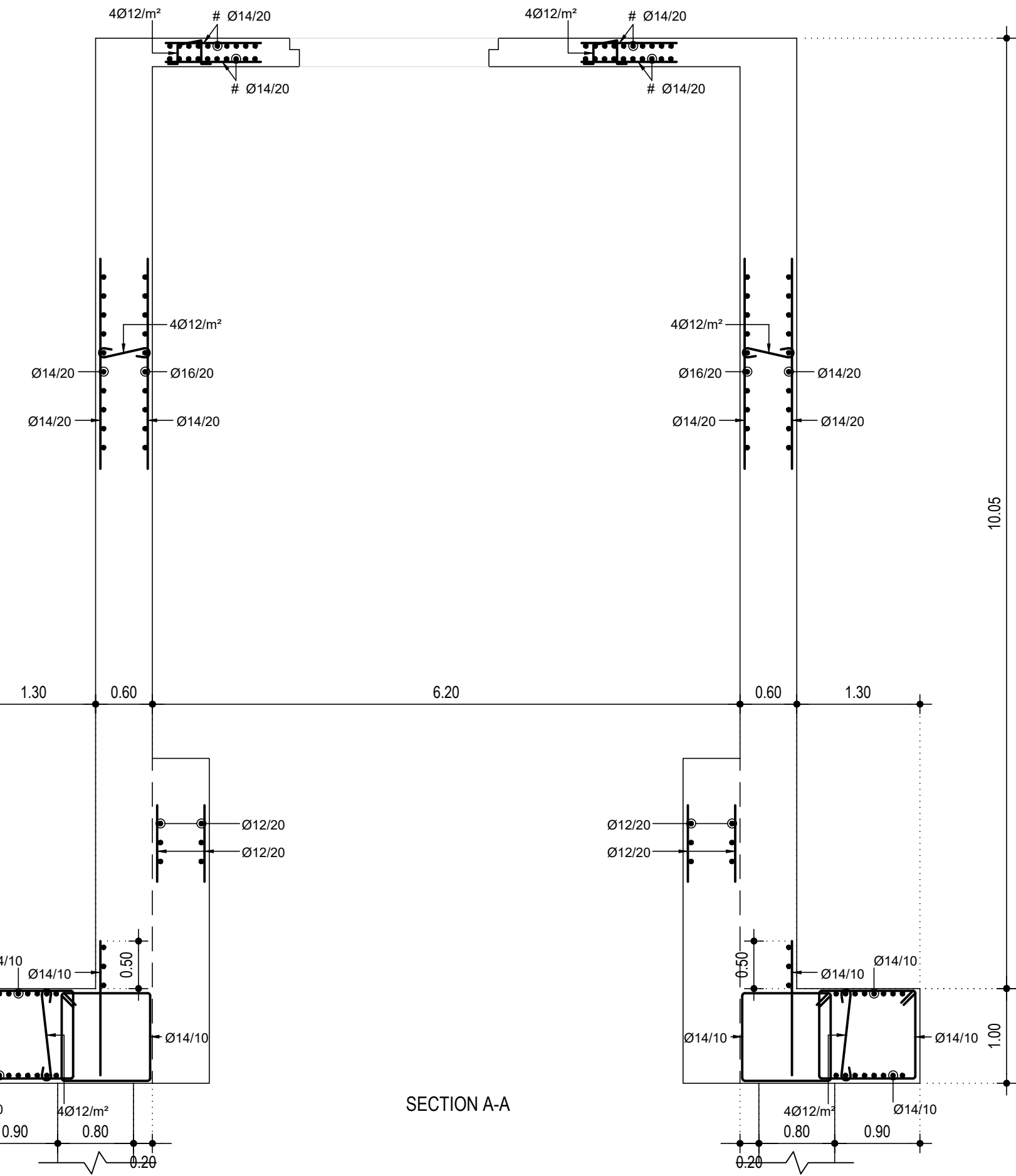
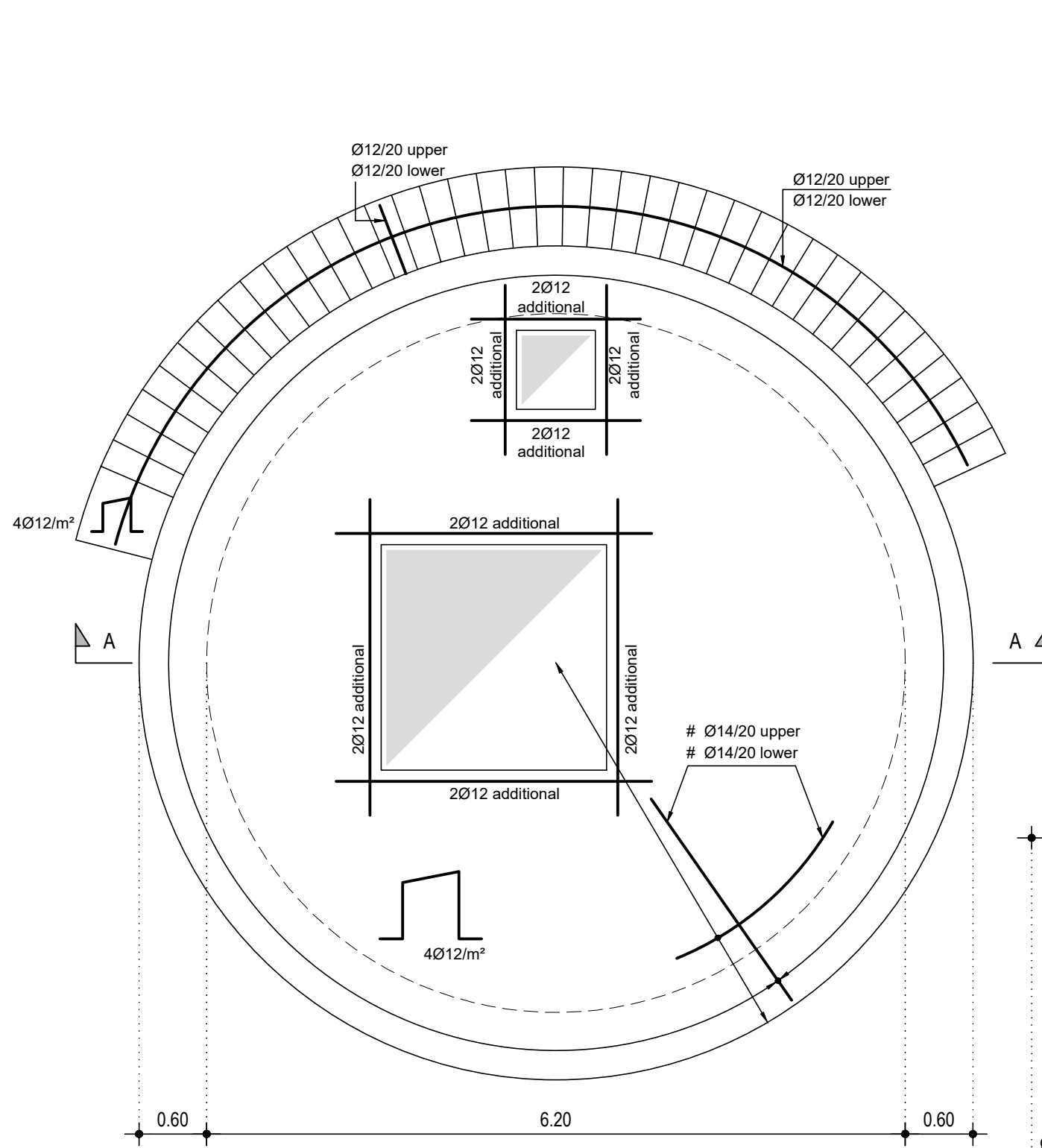
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**ROAD PAVEMENT CONCRETE PAD  
TYPICAL SECTION**



Notes:

- The bar diameters are in millimeters and bars spacing is in centimeters.
- All bendings and hooks are according to EN 1992-1-1:2004
- Cylindrical Structure Concrete class C37
- Secondary Concrete class C25
- Lean Concrete class C15
- Steel class B500C
- Minimum reinforcement cover 5.00 cm



PLAN

SECTION A-A



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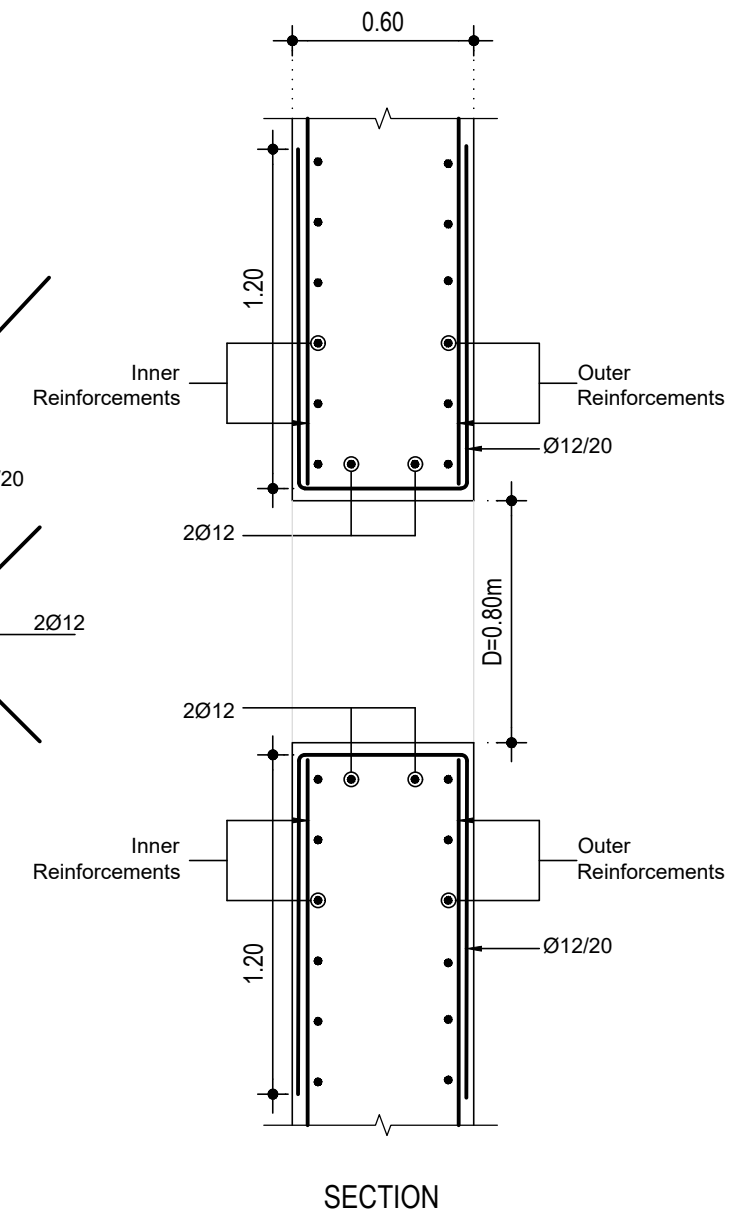
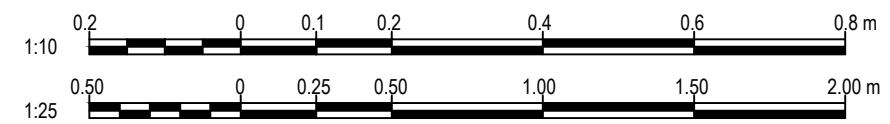
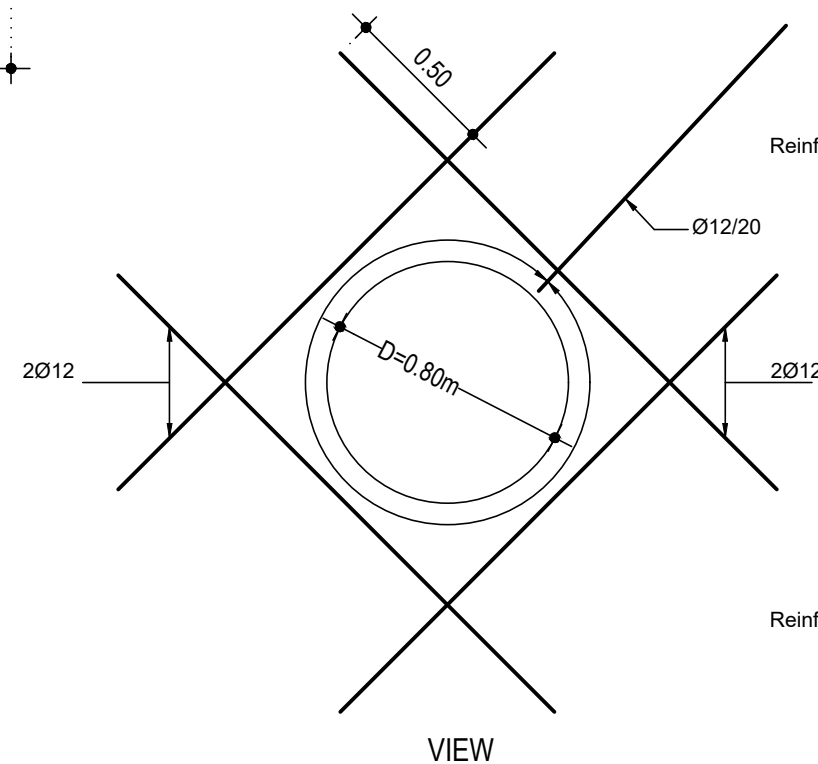
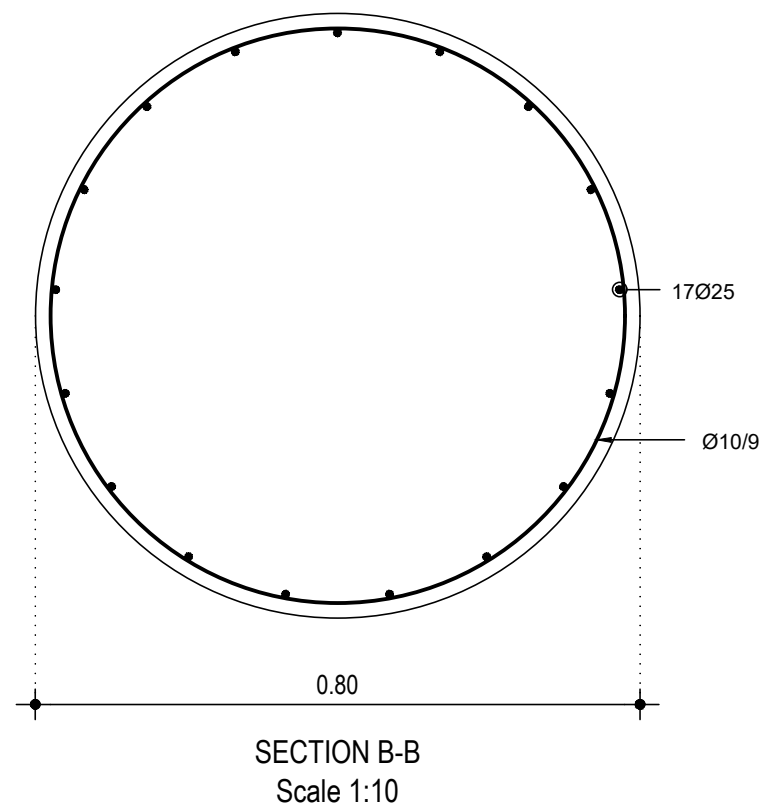
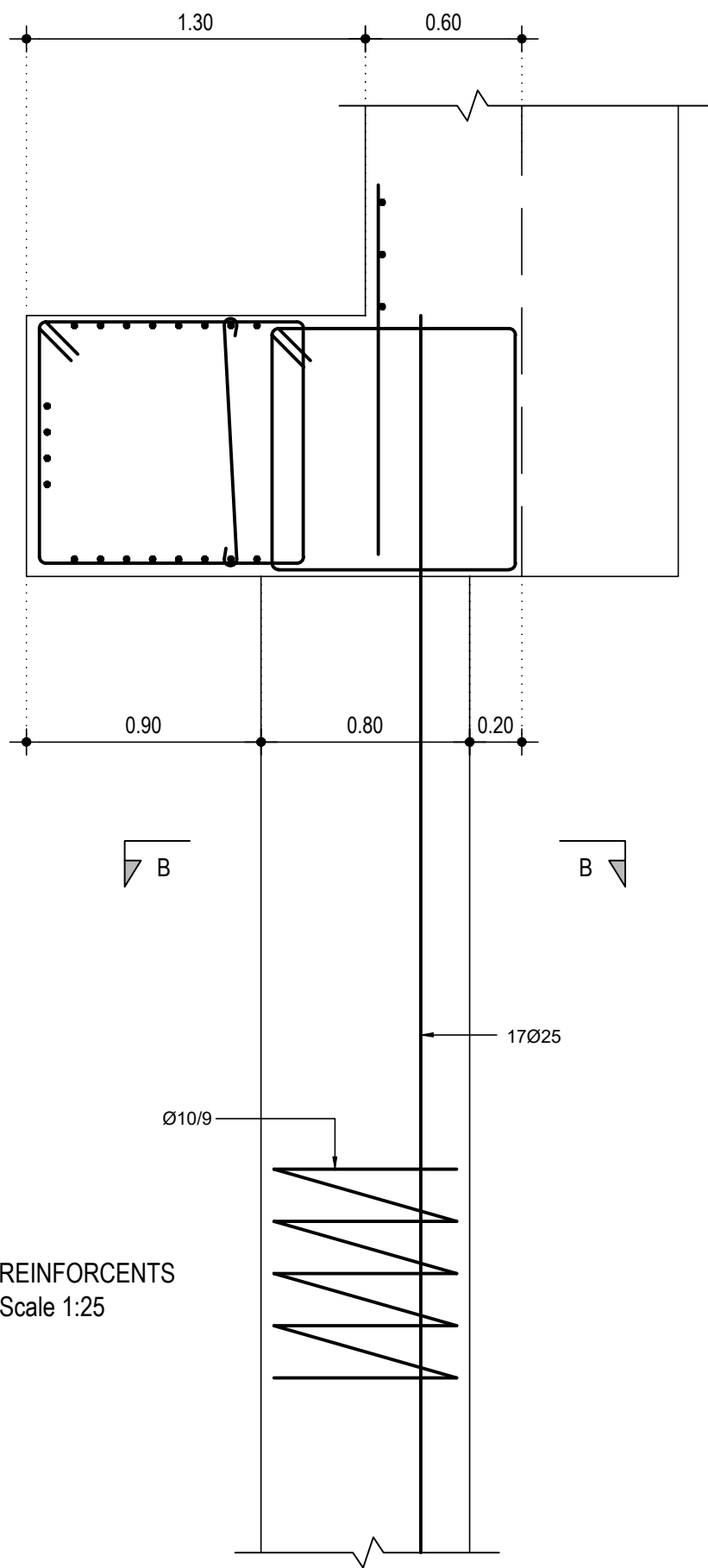
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**BH2 & BH2A REINFORCEMENTS LAYOUT**





REINFORCEMENT DETAIL OF STEEL ACCESS PIPE  
Scale 1:25

- Notes:
- The bar diameters are in millimeters and bars spacing is in centimeters.
  - All bendings and hooks are according to EN 1992-1-1:2004
  - Pilecap reinforcements are given in Sheet no. 1/2
  - Secondary piles concrete class C30
  - Steel class B500C
  - Minimum reinforcement cover 7.50 cm



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Coast Water Works  
Development Agency

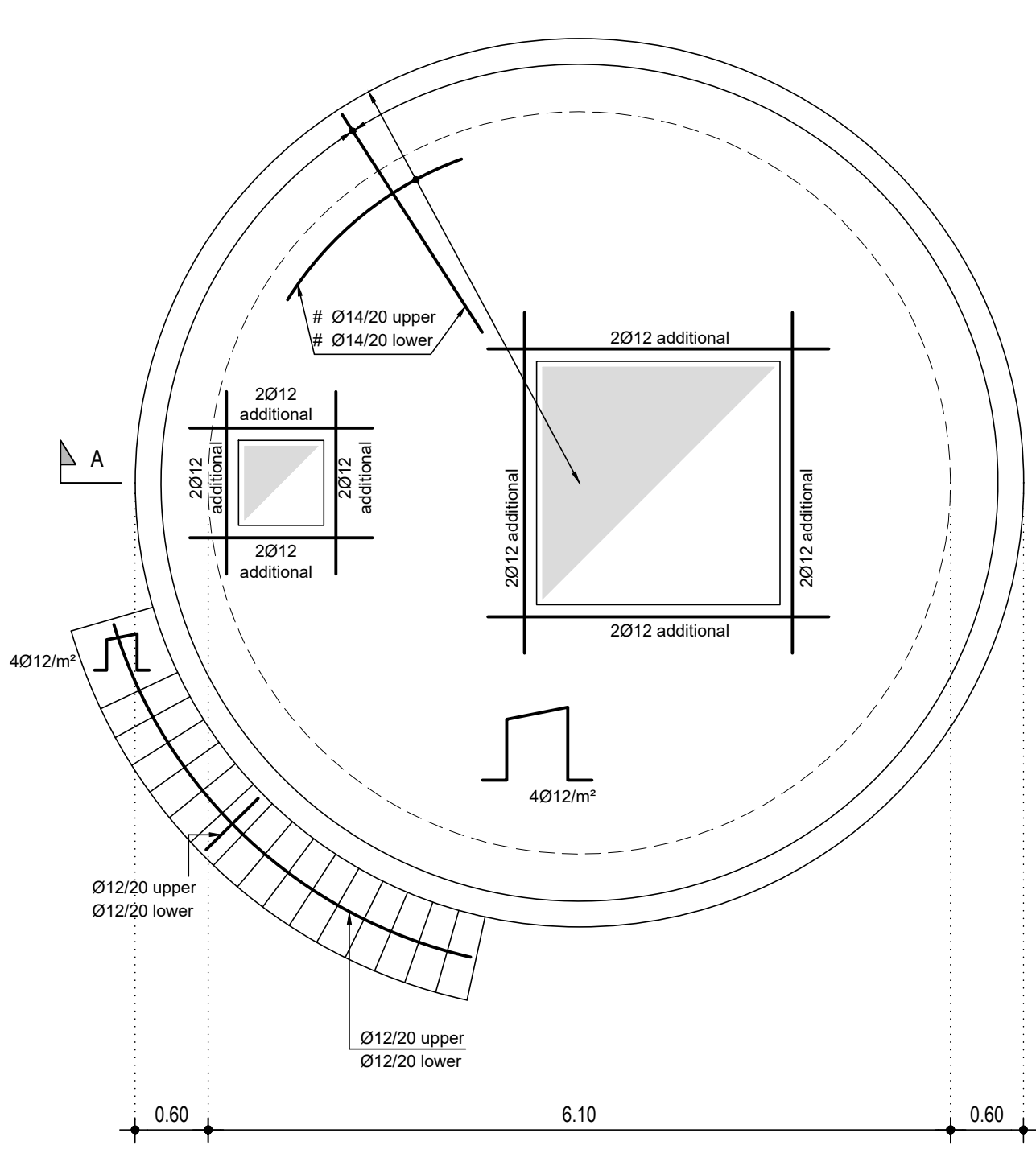


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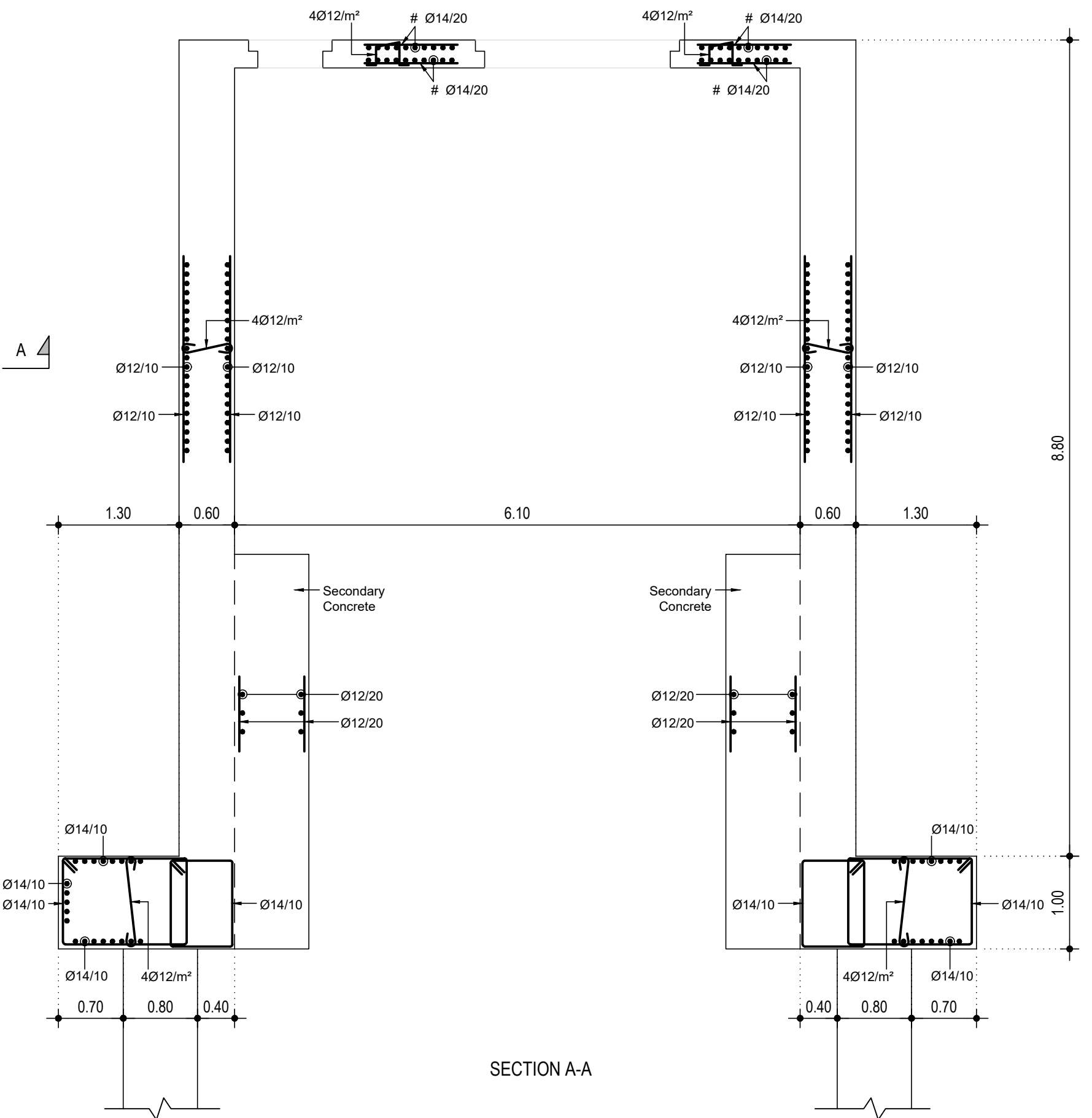
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**BH2 & BH2A  
REINFORCEMENTS LAYOUT**



PLAN



SECTION A-A

- Notes:
- The bar diameters are in millimeters and bars spacing is in centimeters.
  - All bendings and hooks are according to EN 1992-1-1:2004
  - Cylindrical Structure Concrete class C37
  - Secondary Concrete class C25
  - Lean Concrete class C15
  - Steel class B500C
  - Minimum reinforcement cover 5.00 cm



Coast Water Works Development Agency

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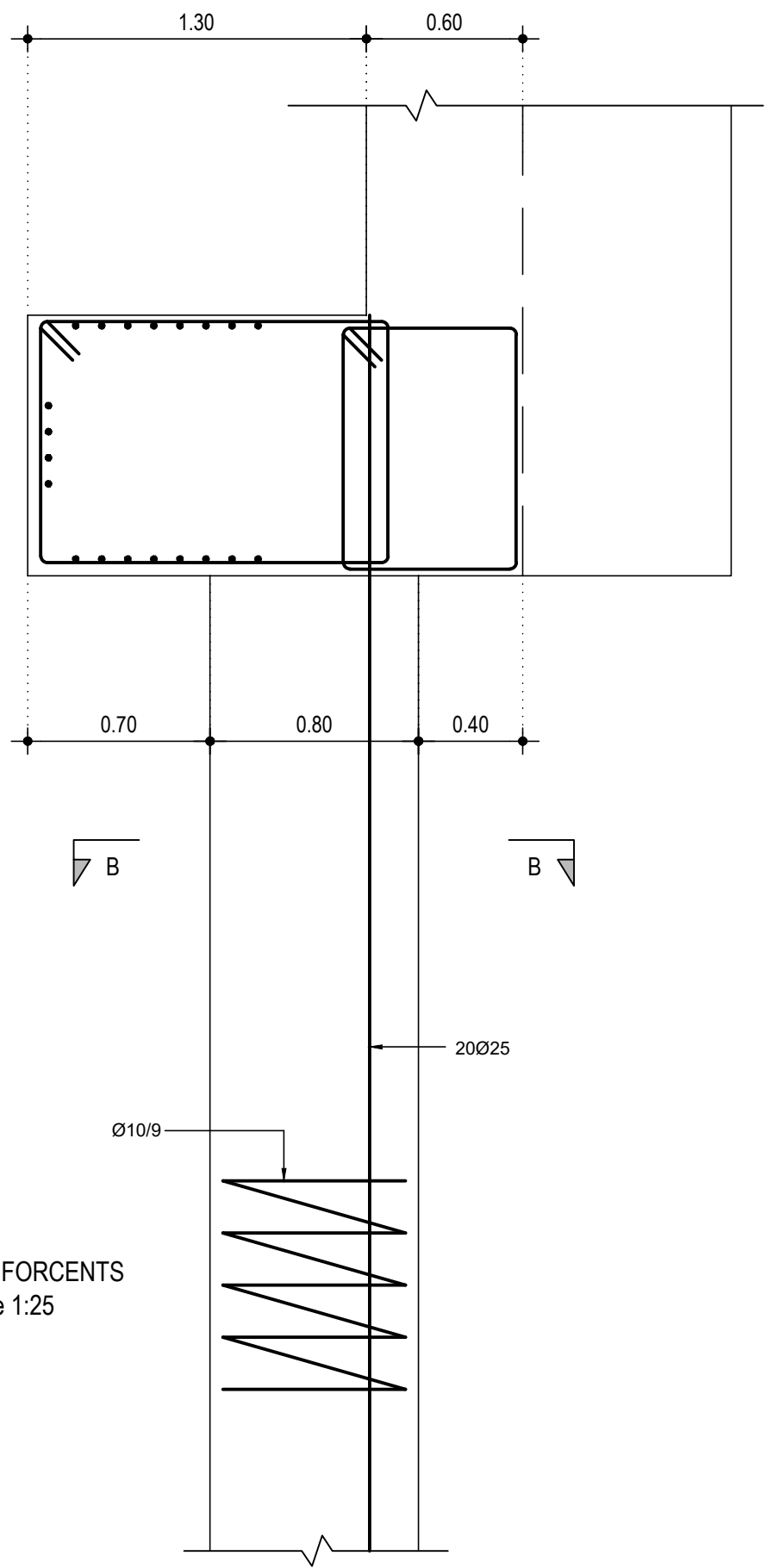
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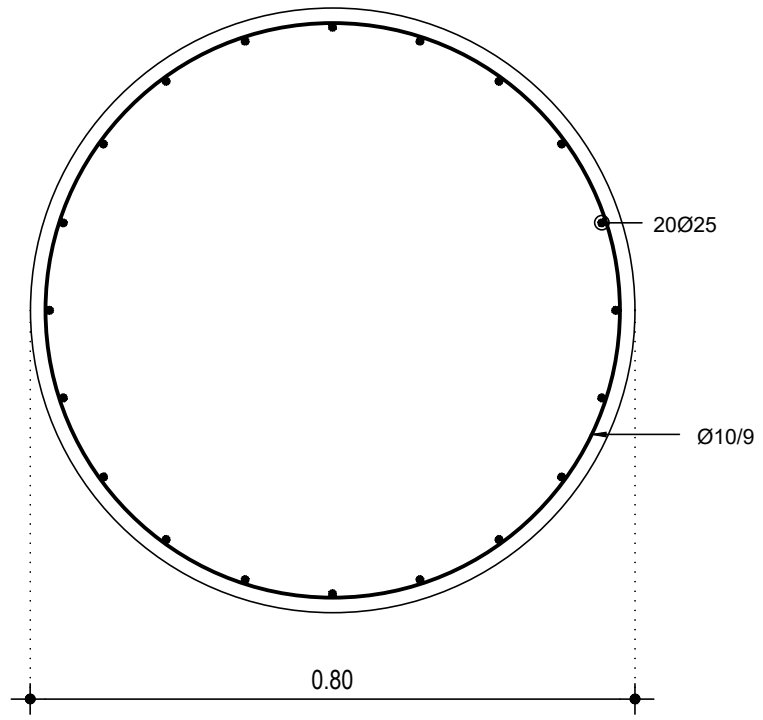
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**BH4  
REINFORCEMENTS LAYOUT**

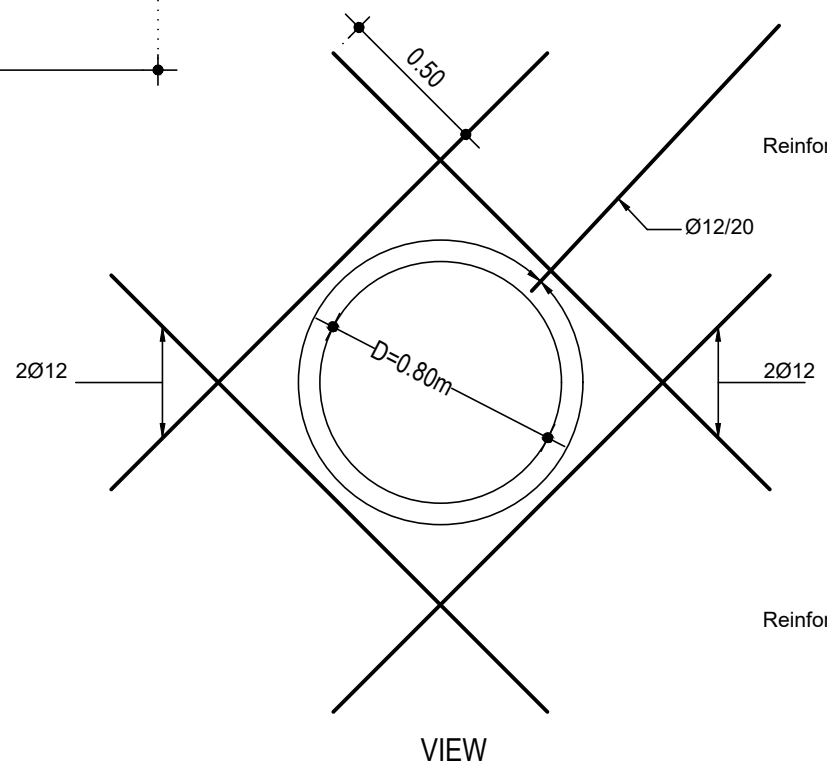




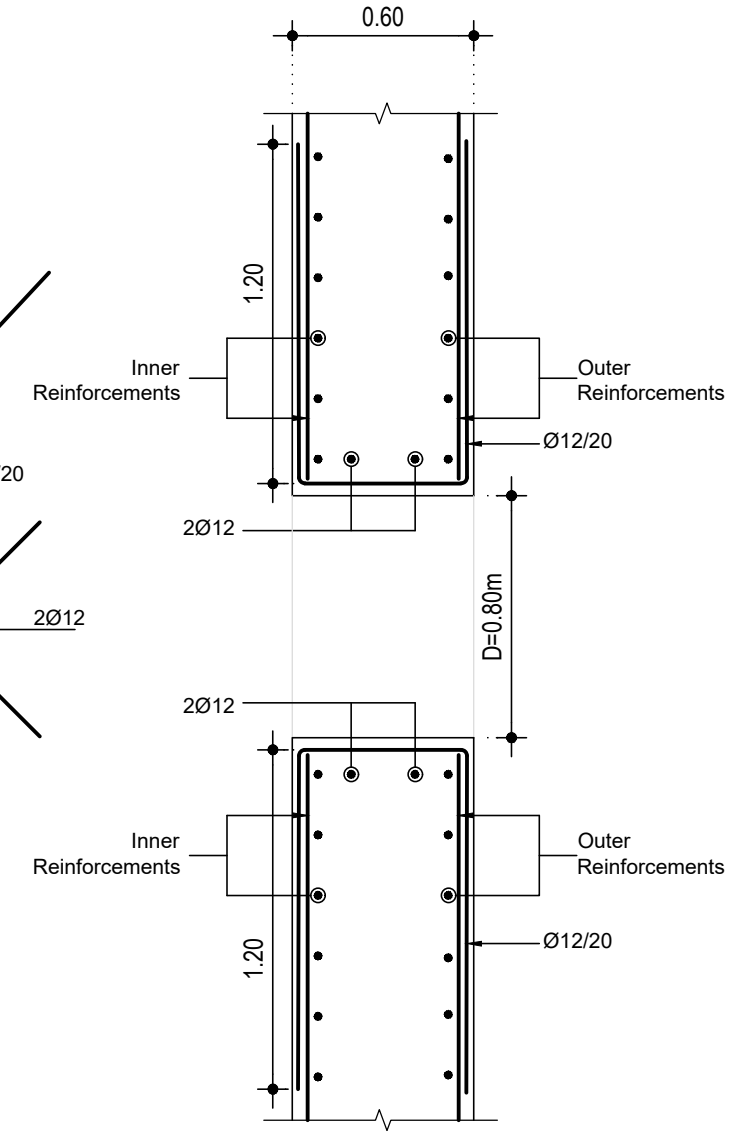
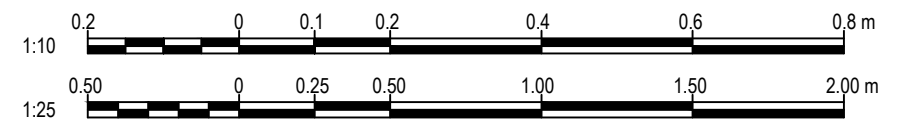
PILES REINFORCENTS  
Scale 1:25



SECTION B-B  
Scale 1:10



VIEW



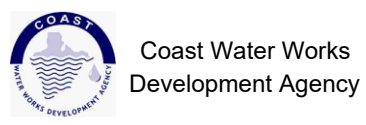
SECTION

REINFORCEMENT DETAIL OF STEEL ACCESS PIPE  
Scale 1:25

- Notes:
- The bar diameters are in millimeters and bars spacing is in centimeters.
  - All bendings and hooks are according to EN 1992-1-1:2004
  - Pilecap reinforcements are given in Sheet no. 1/2
  - Secondary piles concrete class C30
  - Steel class B500C
  - Minimum reinforcement cover 7.50 cm



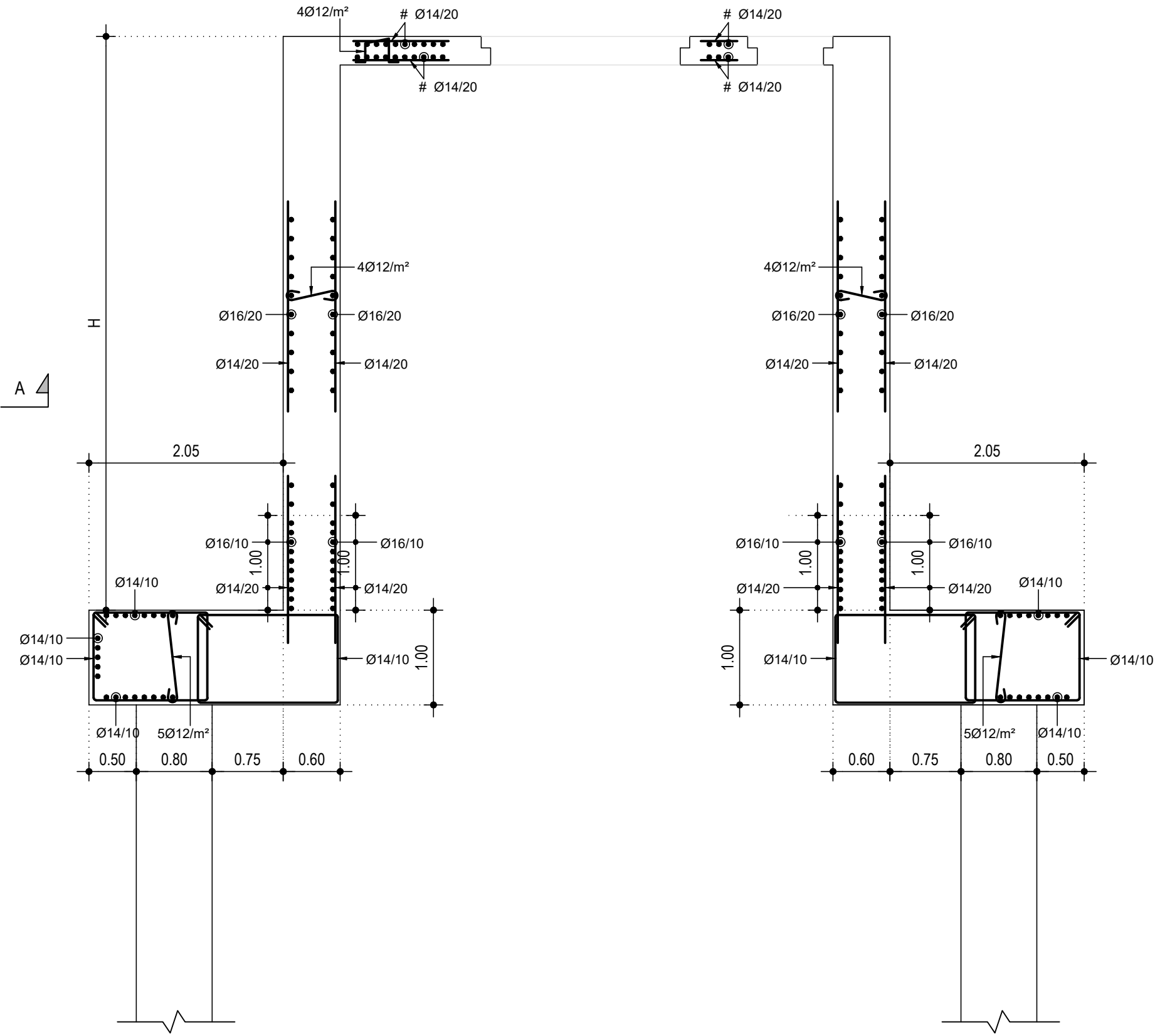
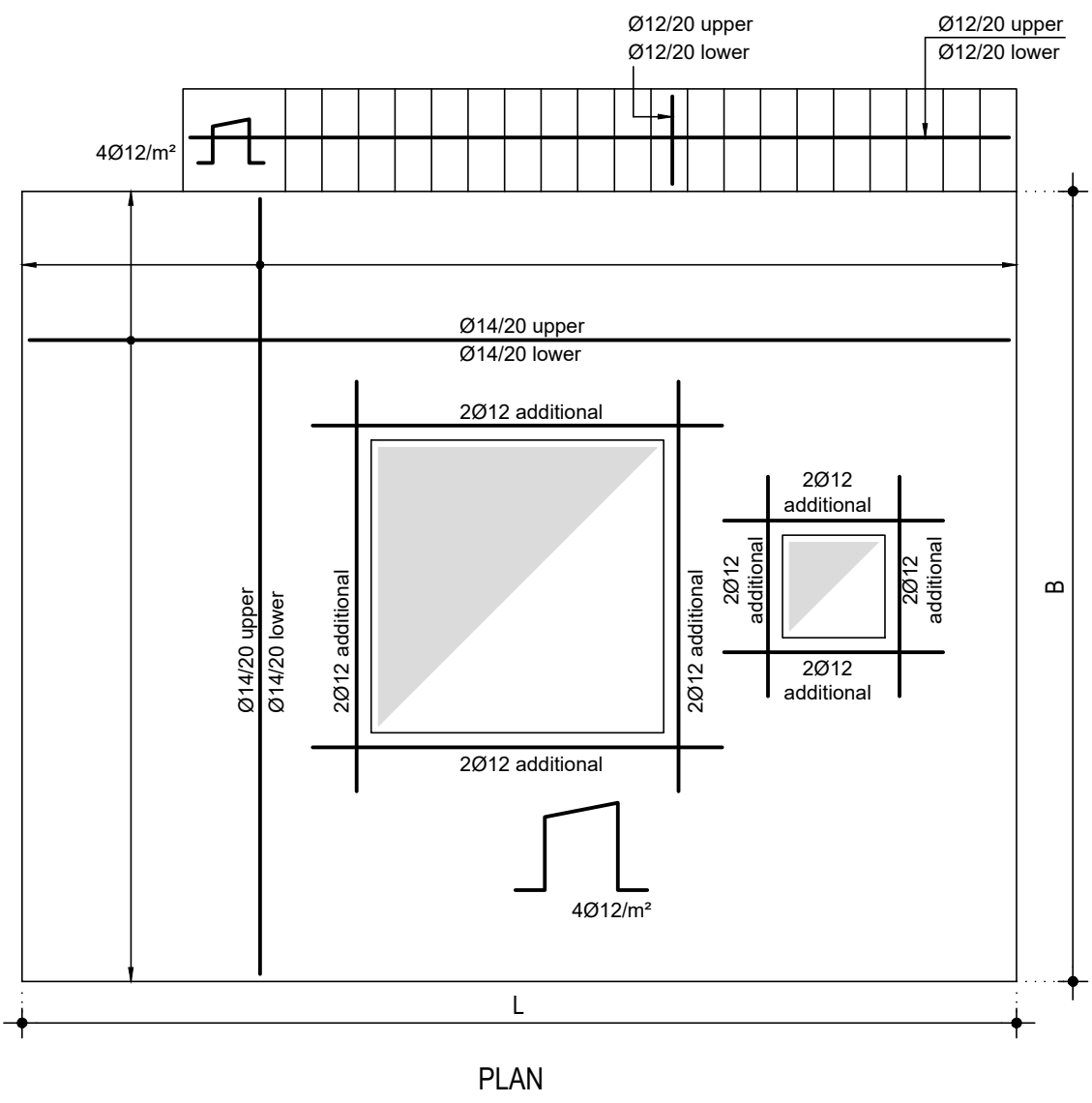
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**BH4  
REINFORCEMENTS LAYOUT**



- Notes:
- The bar diameters are in millimeters and bars spacing is in centimeters.
  - All bendings and hooks are according to EN 1992-1-1:2004
  - Cylindrical Structure Concrete class C37
  - Lean Concrete class C15
  - Steel class B500C
  - Minimum reinforcement cover 5.00 cm

NAME	L	B	H
BH5	5.70	5.10	5.95
BH6A	6.80	5.40	4.30
BH6B	5.95	5.25	4.50
BH7	5.70	5.10	4.30
BH8	4.45	5.20	3.30



Coast Water Works Development Agency

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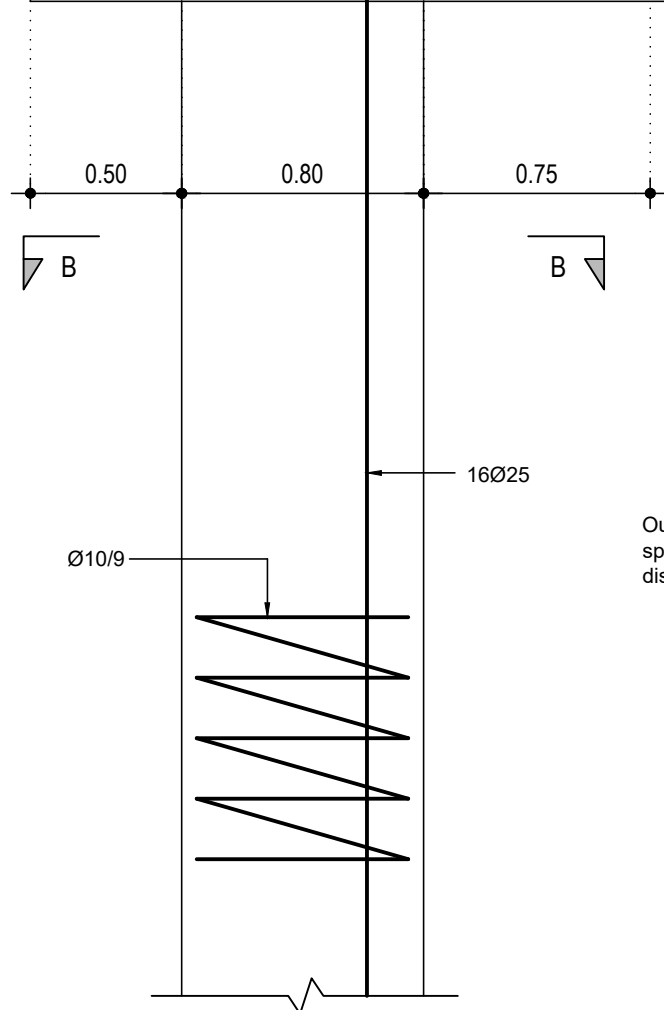
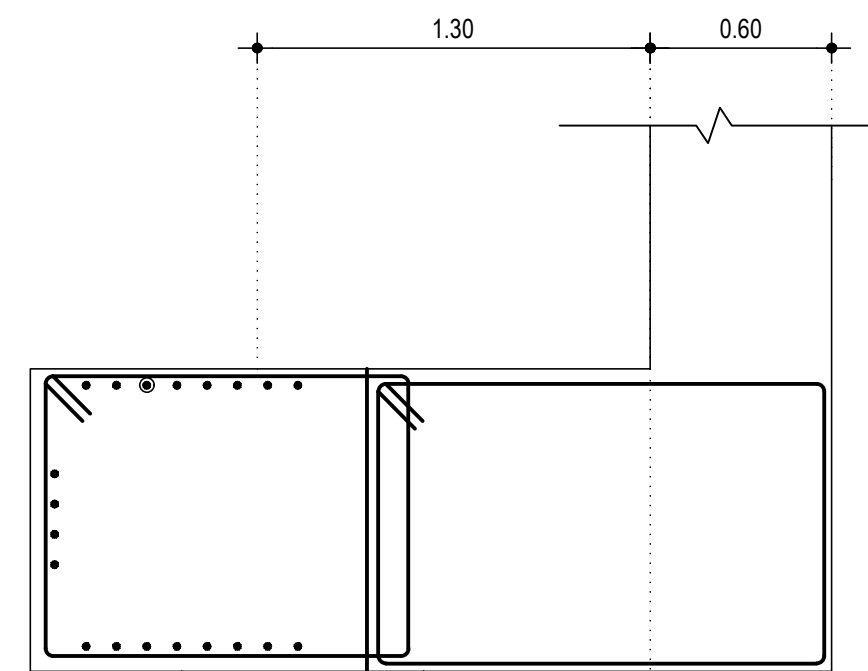
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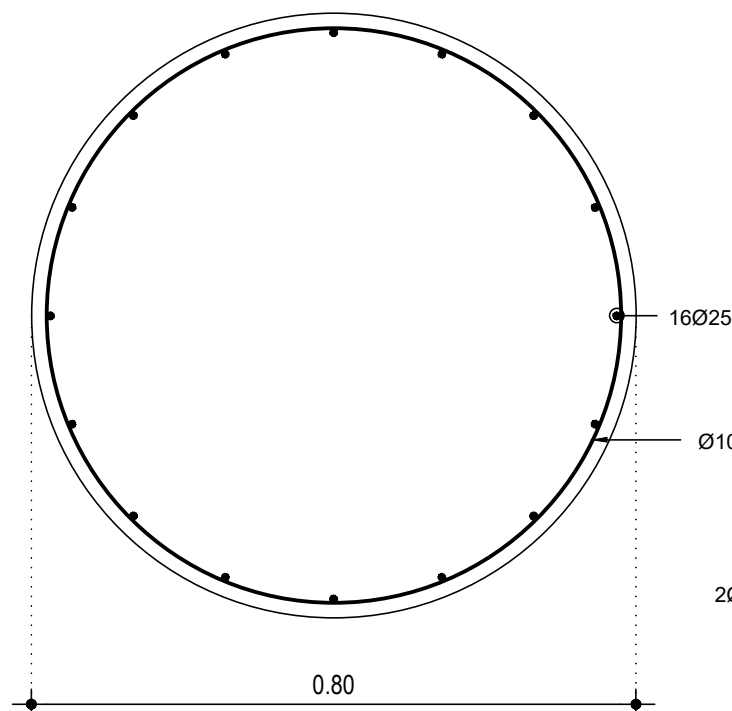
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		CHECKED	
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**BH5, BH6, BH6A, BH7 & BH8 REINFORCEMENTS LAYOUT**

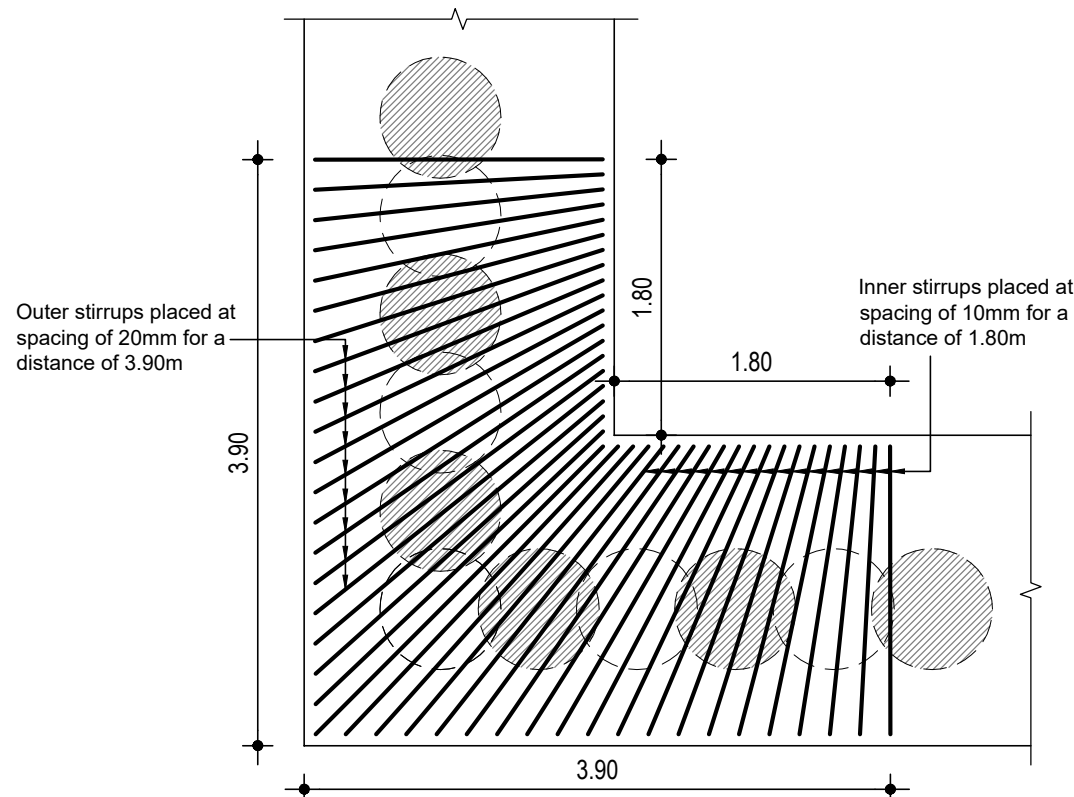




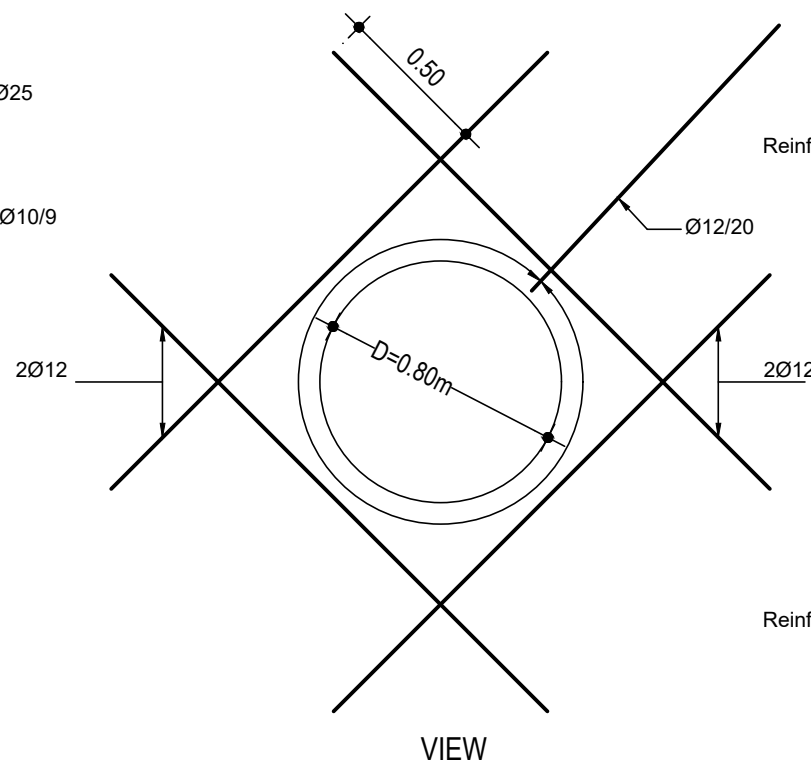
PILES REINFORCENTS  
Scale 1:25



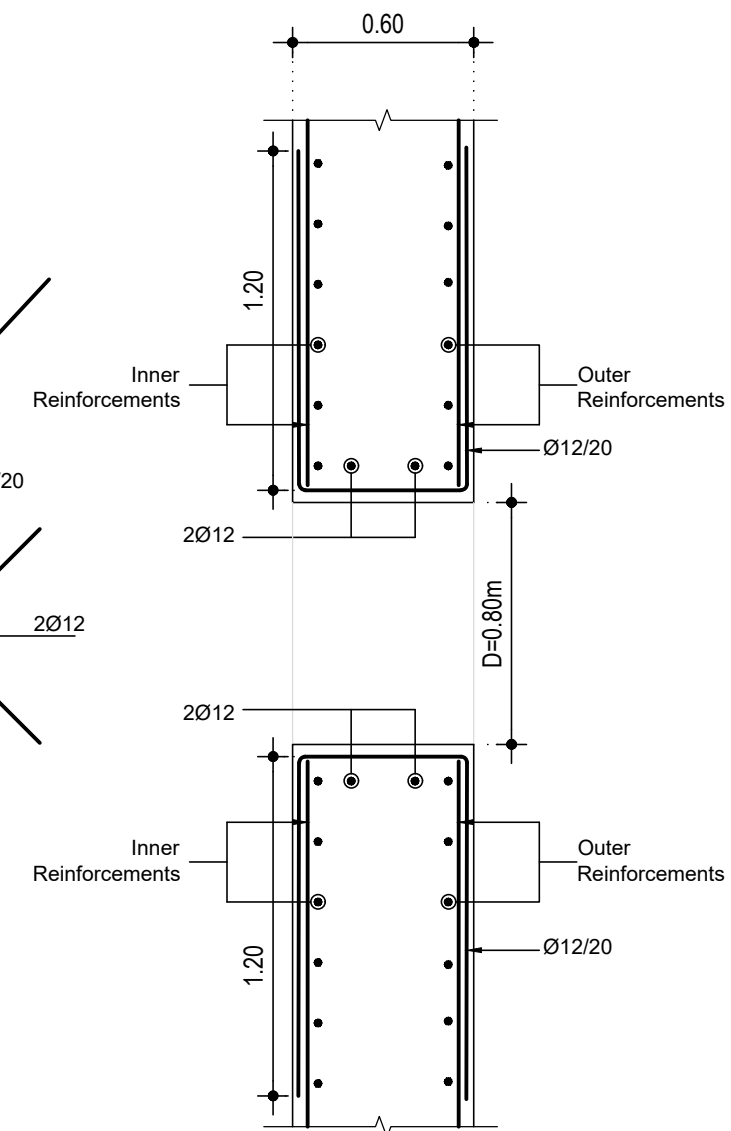
SECTION B-B  
Scale 1:10



INDICATIVE ARRANGEMENT OF STIRRUPS AT PILE CAP CORNERS  
PLAN VIEW  
Scale 1:50



VIEW

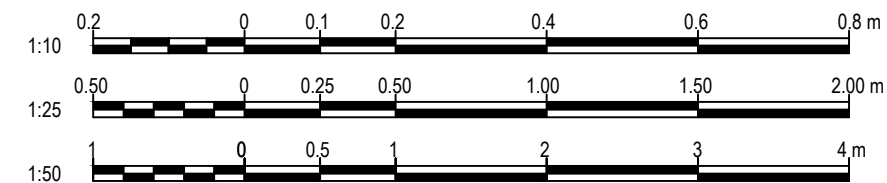


SECTION

REINFORCEMENT DETAIL OF STEEL ACCESS PIPE  
Scale 1:25

Notes:

- The bar diameters are in millimeters and bars spacing is in centimeters.
- All bendings and hooks are according to EN 1992-1-1:2004
- Pilecap reinforcements are given in Sheet no. 1/2
- Secondary piles concrete class C30
- Steel class B500C
- Minimum reinforcement cover 7.50 cm



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Coast Water Works  
Development Agency



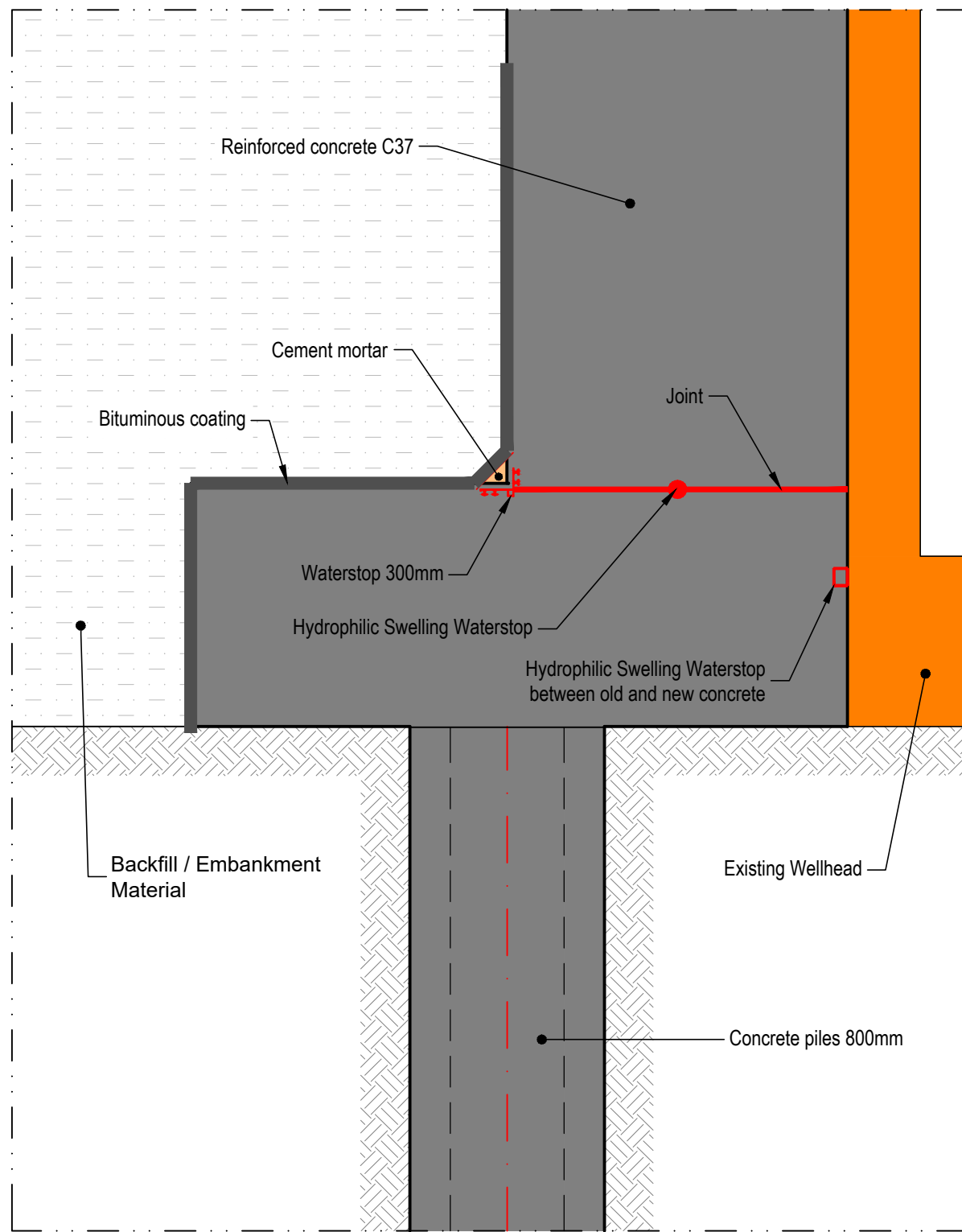
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CONSULTING ENGINEERS

STRECO Ltd.

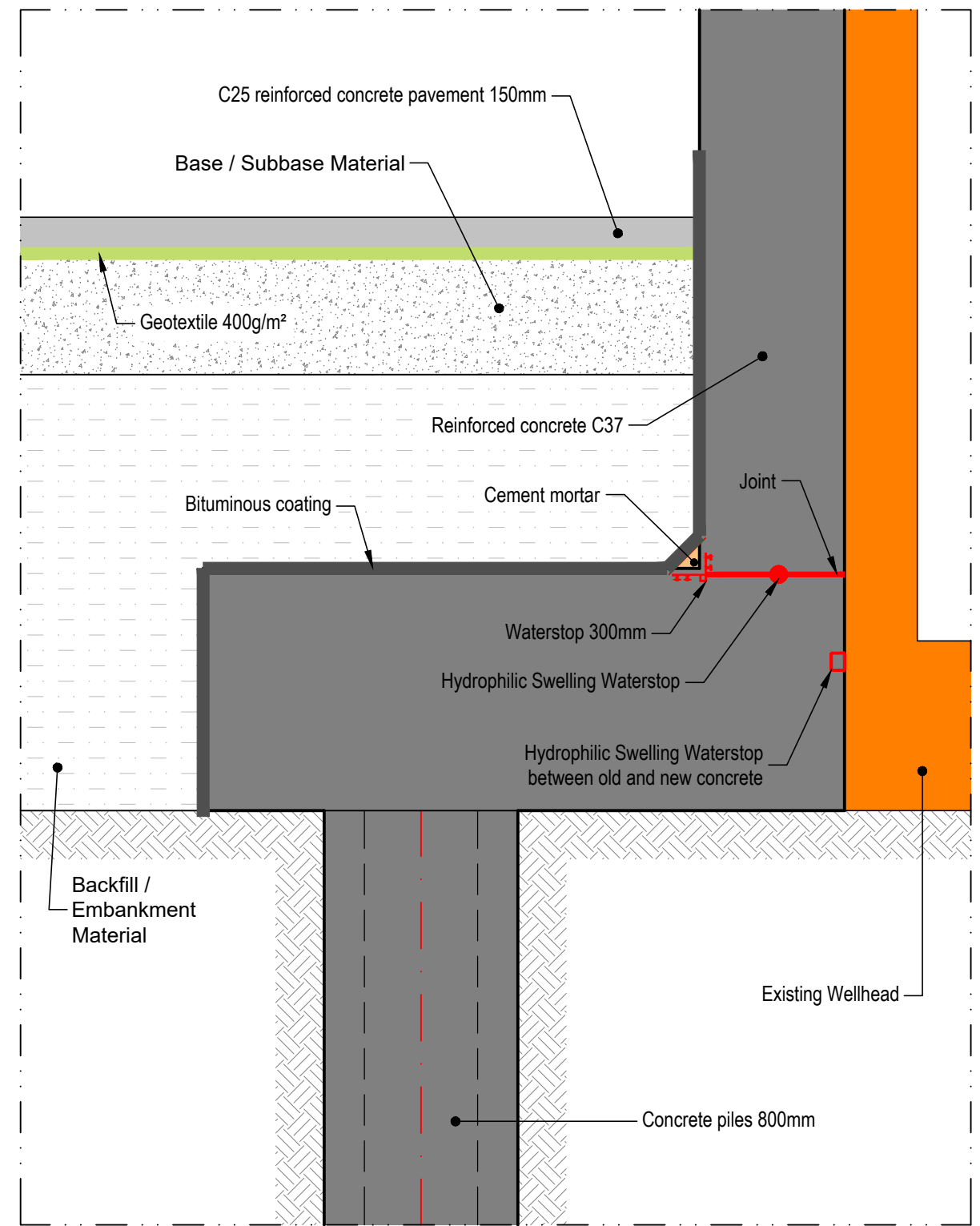
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**BH5, BH6, BH6A, BH7 & BH8  
REINFORCEMENTS LAYOUT**



BH2, BH2A, BH4



BH5, BH6, BH6A, BH7, BH8



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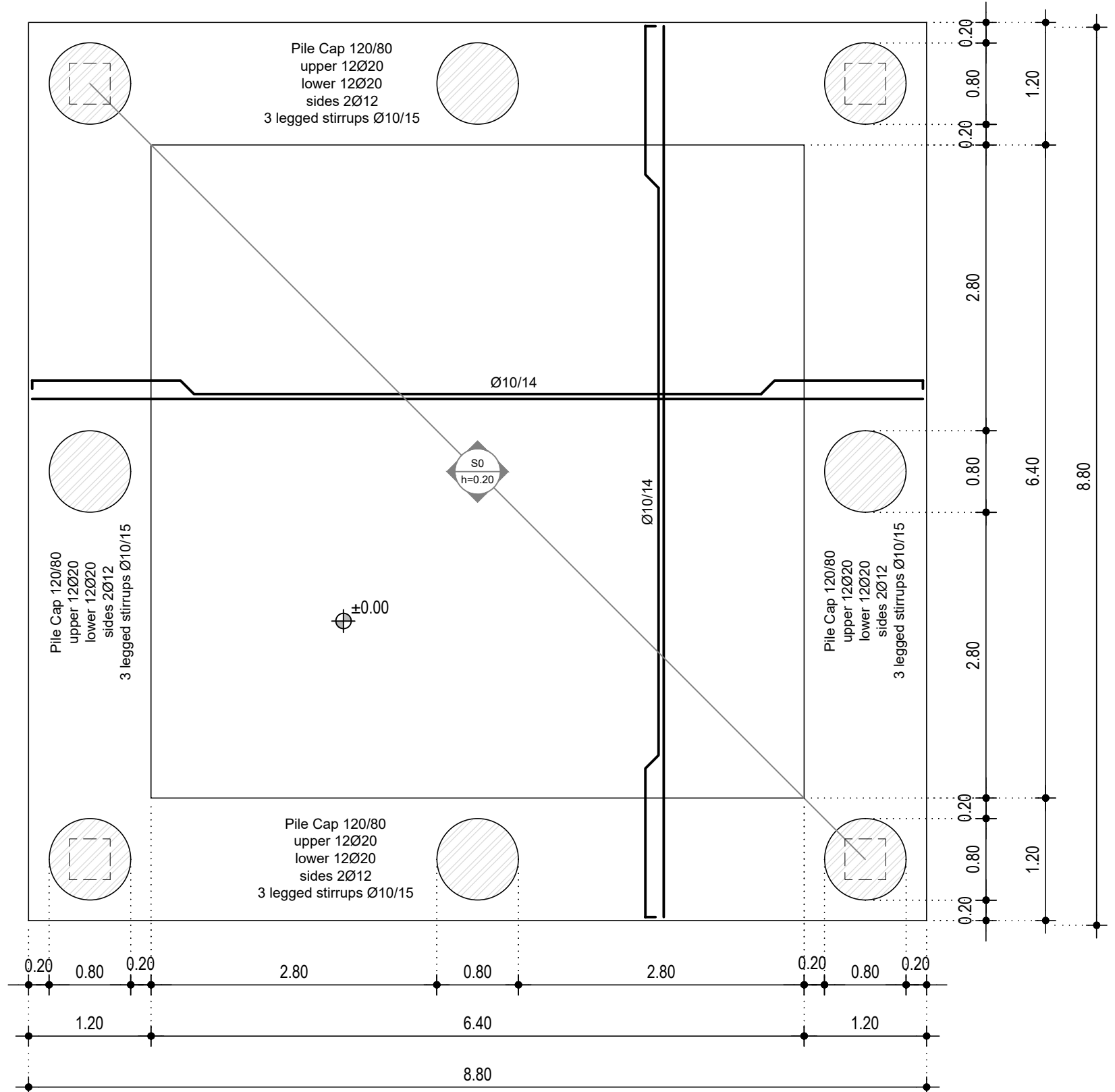
STRECO Ltd.

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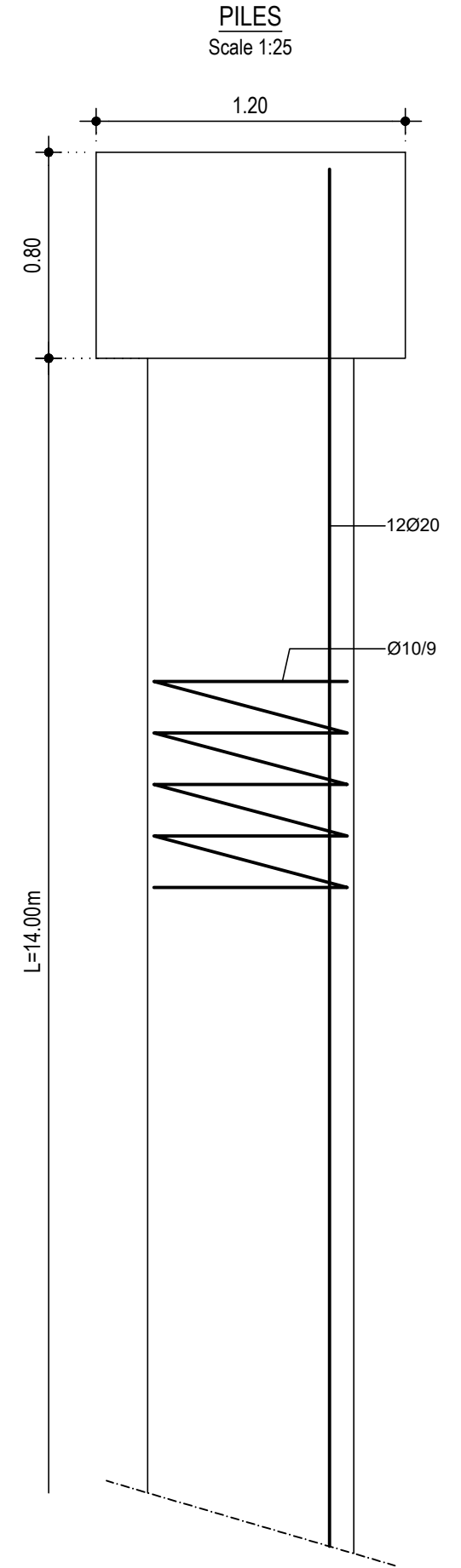
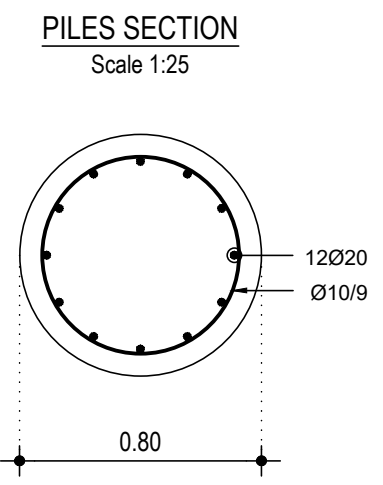
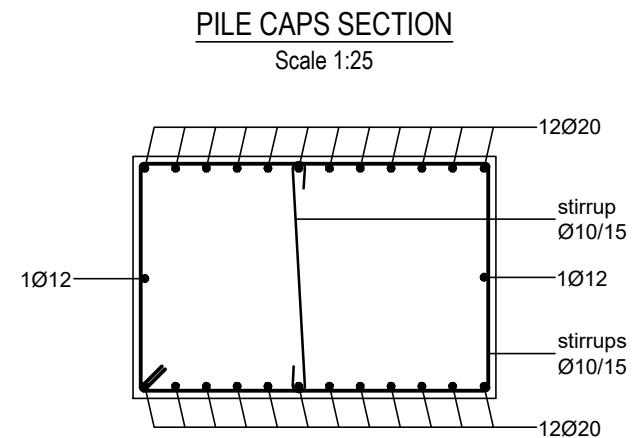
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**WELL STRUCTURES  
WATERPROOFING OF JOINTS**





**SLAB S0**  
Scale 1:50

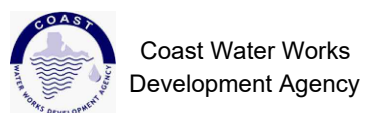


- Notes:
- The bar diameters are in millimeters and bars spacing is in centimeters.
  - All bendings and hooks are according to EN 1992-1-1:2004
  - Platform and pile caps Concrete class C37
  - Piles Concrete class C30
  - Lean Concrete class C15
  - Steel class B500C
  - Beam edge critical length equal to beam height
  - Pile caps, beams and columns minimum reinforcement cover 4.00 cm
  - Slabs minimum reinforcement cover 3.50 cm
  - Piles minimum reinforcement cover 7.50 cm



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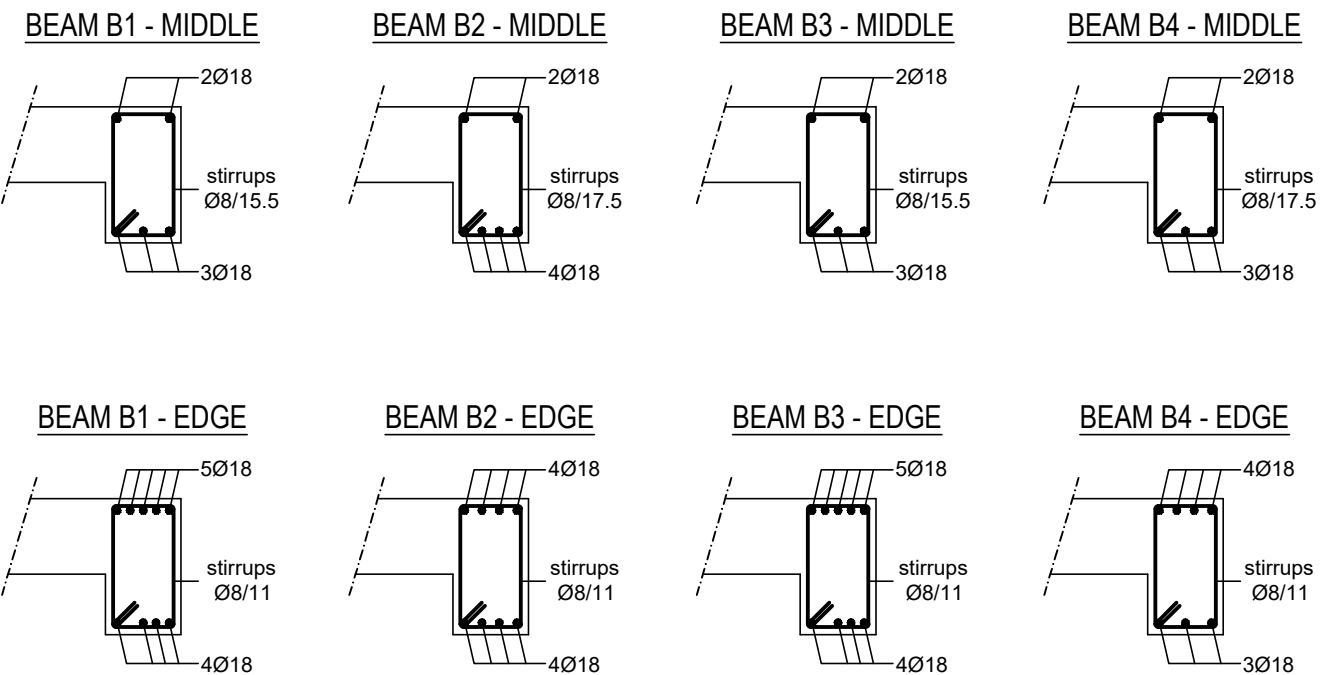
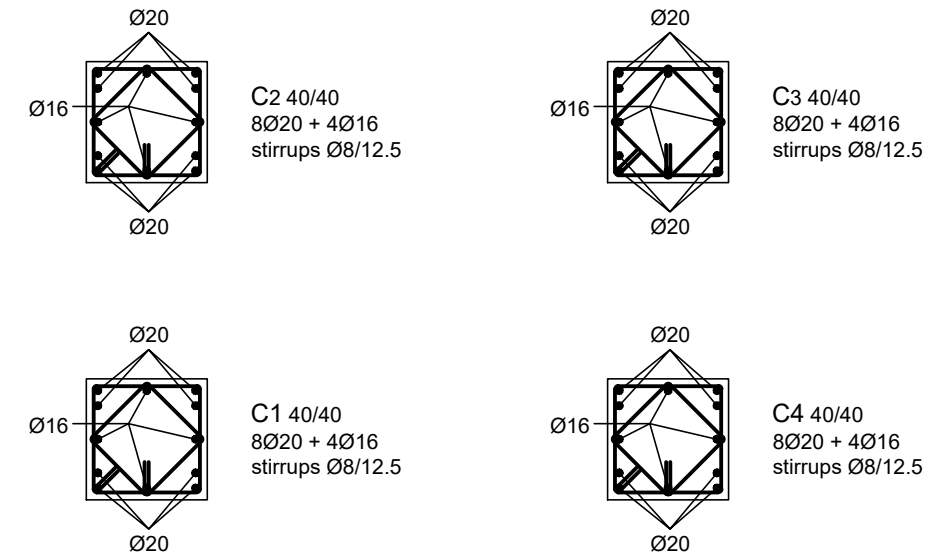
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**UPSTREAM WELLFIELD TRANSFORMER BUILDING  
REINFORCEMENTS**

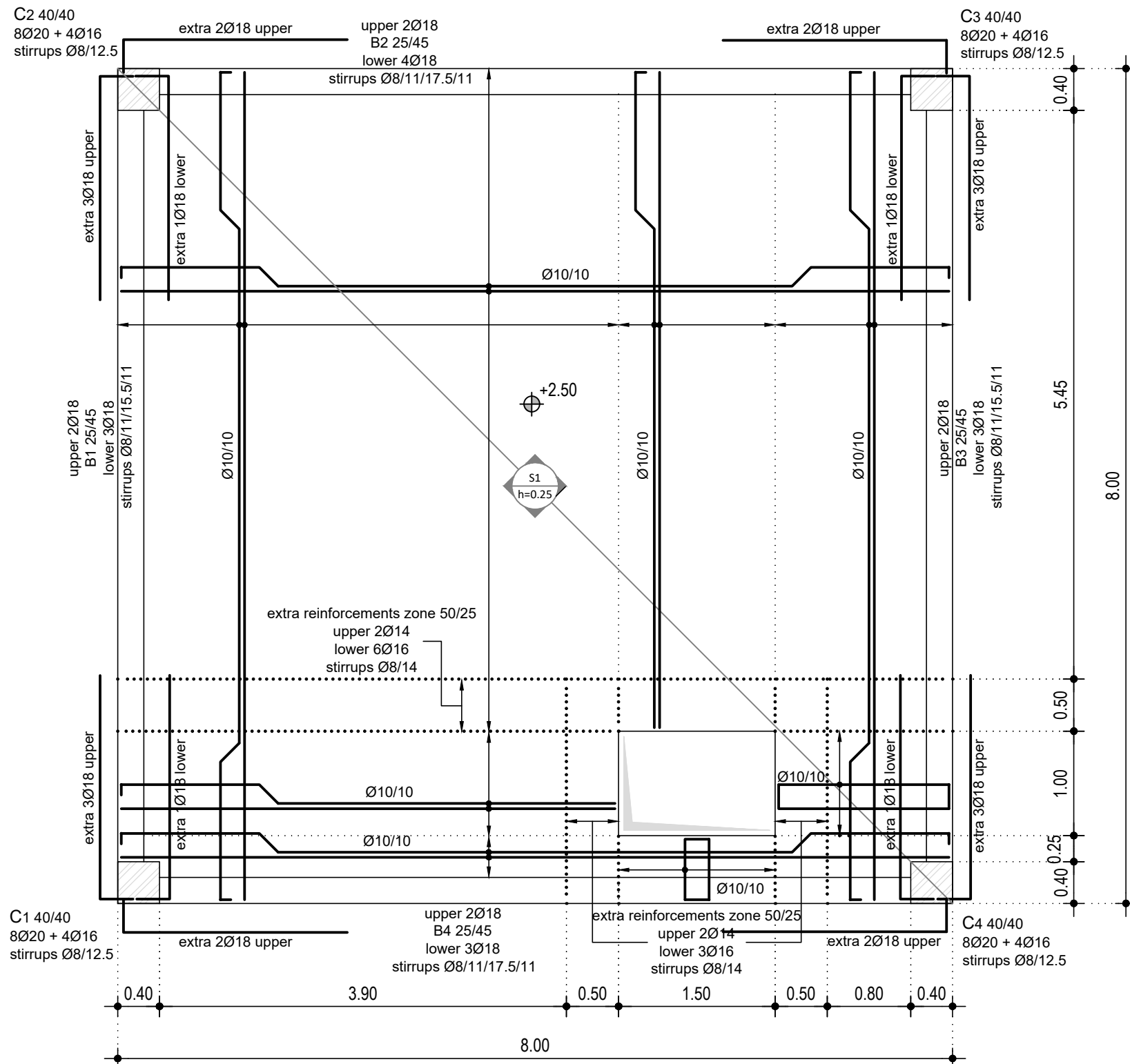
**COLUMNS REINFORCEMENTS**

Scale 1:25



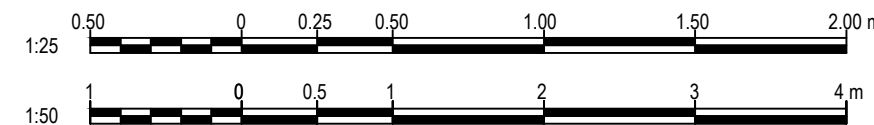
**BEAMS REINFORCEMENTS**

Scale 1:25



**SLAB S1**

Scale 1:50



**Notes:**

- The bar diameters are in millimeters and bars spacing is in centimeters.
- All bendings and hooks are according to EN 1992-1-1:2004
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- Piles Concrete class C30
- Lean Concrete class C15
- Steel class B500C
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- Slabs minimum reinforcement cover 3.50 cm
- Piles minimum reinforcement cover 7.50 cm

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Coast Water Works Development Agency

G. KARAVOKYRIS & PARTNERS CONSULTING ENGINEERS

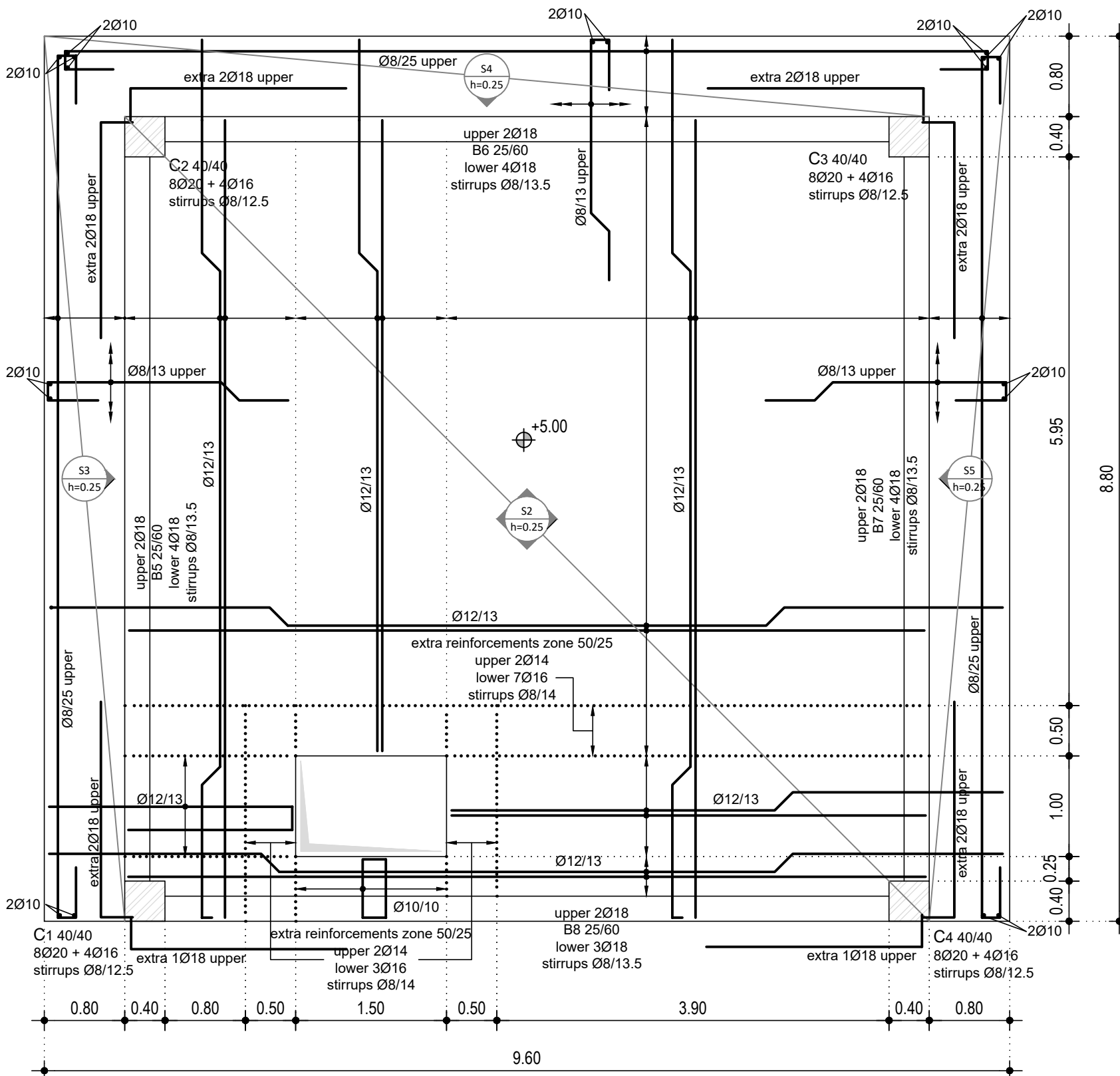
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**UPSTREAM WELLFIELD TRANSFORMER BUILDING REINFORCEMENTS**

Date: JUNE 2021 Scale: 1:50, 1:25 Drg. No. BWPW-DD-5-501 Sheet No. 2/3

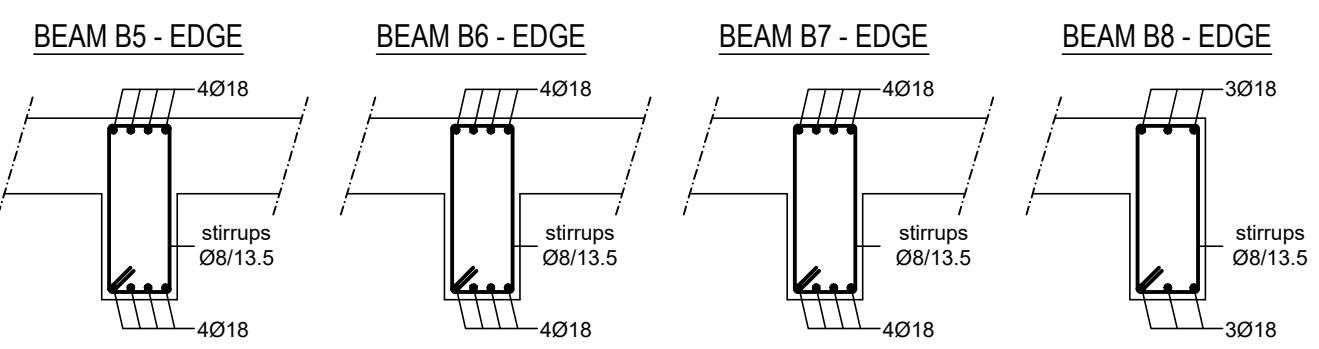
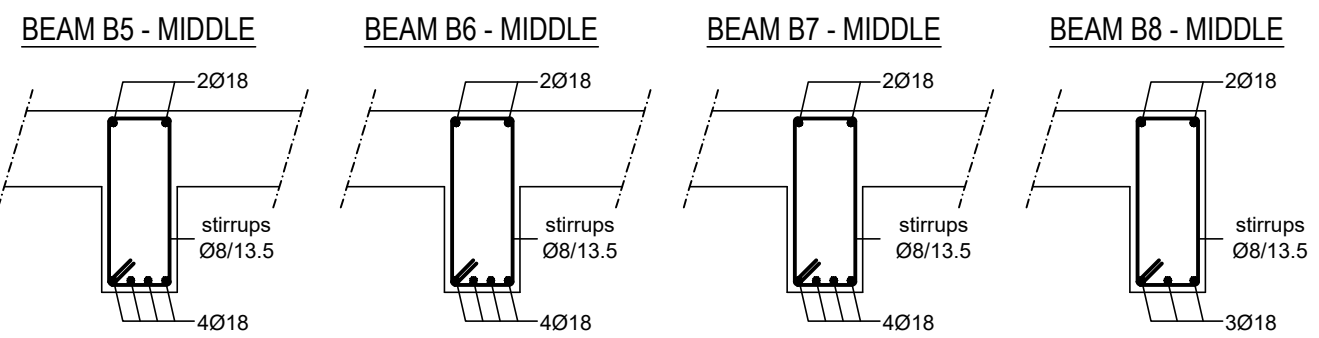
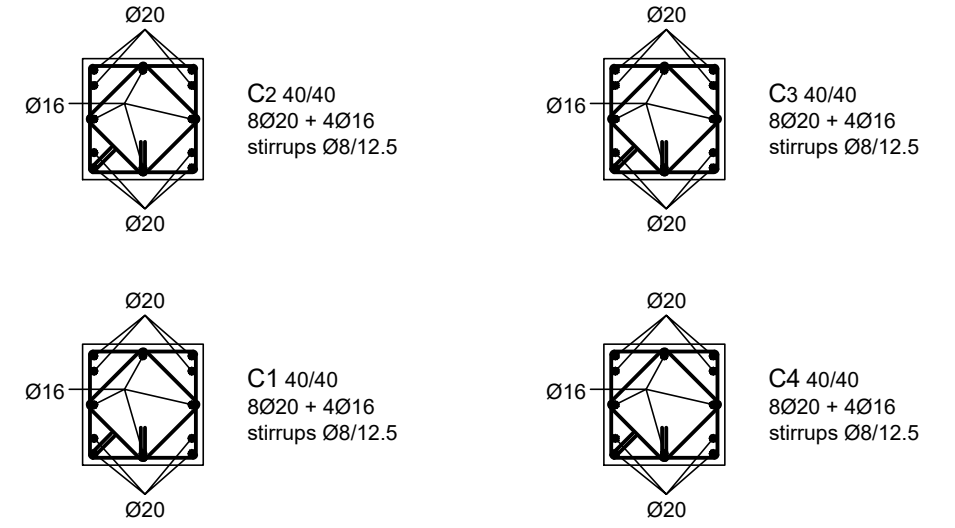


SLAB S2  
Scale 1:50



COLUMNS REINFORCEMENTS

Scale 1:25



BEAMS REINFORCEMENTS

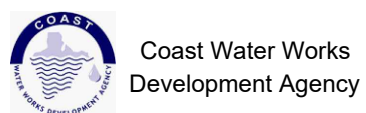
Scale 1:25

Notes:

- The bar diameters are in millimeters and bars spacing is in centimeters.
- All bendings and hooks are according to EN 1992-1-1:2004
- Platform and pile caps Concrete class C37
- Piles Concrete class C30
- Lean Concrete class C15
- Steel class B500C
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- Pile caps, beams and columns minimum reinforcement cover 4.00 cm
- Slabs minimum reinforcement cover 3.50 cm
- Piles minimum reinforcement cover 7.50 cm

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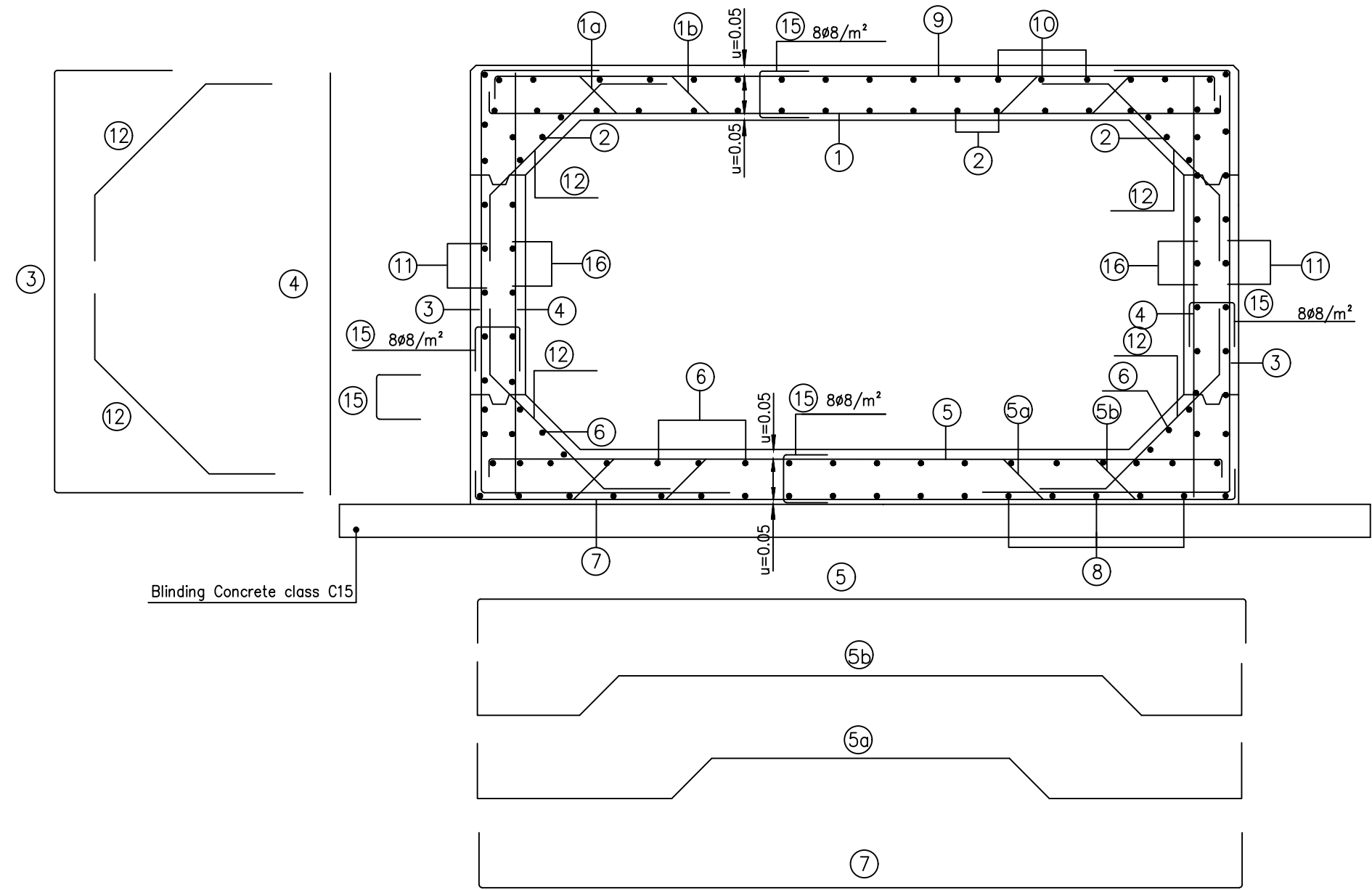
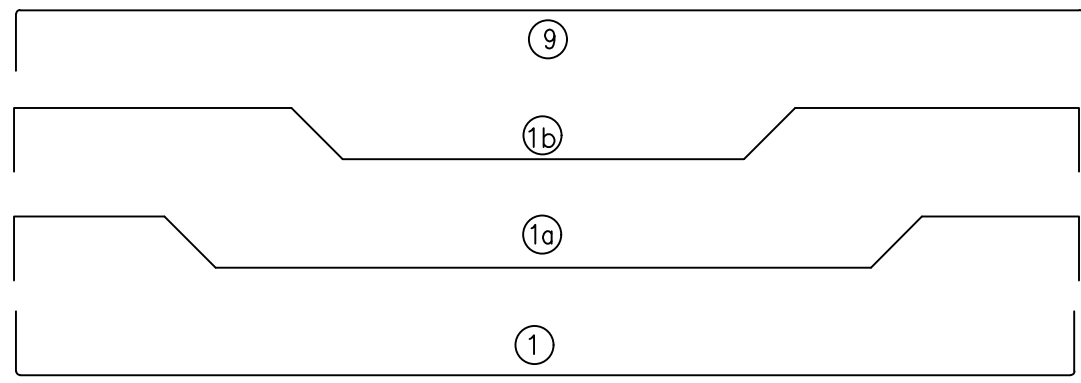


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UPSTREAM WELLFIELD TRANSFORMER BUILDING  
REINFORCEMENTS





	REINFORCEMENT BAR SHAPE	REINFORCEMENT BARS
①		ø16/18
①a		ø16/70
①b		ø16/70
②	1.00 *(EVERY 1.00m)	ø10/20
③		ø14/17
④	1.90	ø10/20
⑤		ø16/19
⑤a		ø16/70
⑤b		ø16/70
⑥	1.00 *(EVERY 1.00m)	ø10/20
⑦		ø10/20
⑧	1.00 *(EVERY 1.00m)	ø10/20
⑨		ø10/20
⑩	1.00 *(EVERY 1.00m)	ø10/20
⑪	1.00 *(EVERY 1.00m)	ø10/20
⑫		ø10/20
⑮		ø8
⑯	1.00 *(EVERY 1.00m)	ø10/20

- Notes:
- The bar diameters are in millimeters and bars spacing is in centimeters.
  - All bendings and hooks are according to EN 1992-1-1:2004
  - Structure Concrete class C37
  - Blinding Concrete class C15
  - Steel class B500C
  - Minimum reinforcement cover 5.00 cm



Coast Water Works Development Agency

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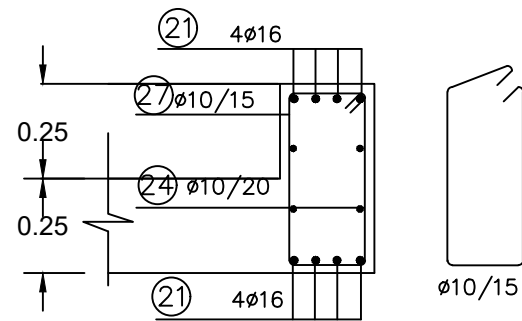
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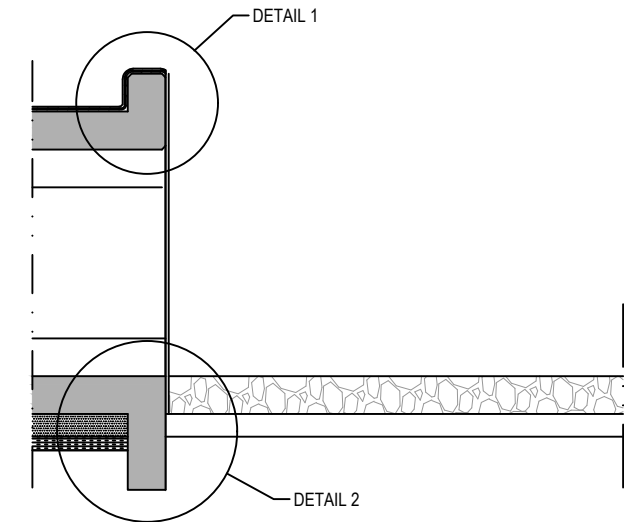
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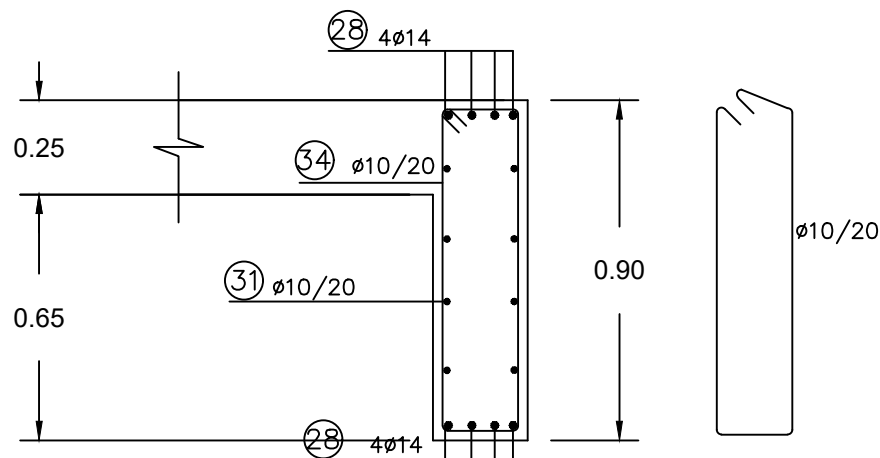
**CULVERT REINFORCEMENT DETAILS**



	REINFORCEMENT BAR SHAPE	REINFORCEMENT BARS
(21)	[0.55      3.40      0.55]	Ø16
(24)	_____ 3.40 _____	Ø10/20
(27)	0.17 [      0.42      0.17 ] 0.17/Ø15	Ø10/15



DETAIL 1  
CULVET CROWN  
Scale 1:20



	REINFORCEMENT BAR SHAPE	REINFORCEMENT BARS
(28)	[0.65      3.40      0.65]	Ø14
(31)	_____ 3.40 _____	Ø10/20
(34)	0.17 [      0.81      0.17 ] 0.17/Ø15	Ø10/20

DETAIL 2  
CULVERT CUT-OFF  
Scale 1:20

Notes:

- The bar diameters are in millimeters and bars spacing is in centimeters.
- All bendings and hooks are according to EN 1992-1-1:2004
- Structure Concrete class C37
- Blinding Concrete class C15
- Steel class B500C
- Minimum reinforcement cover 5.00 cm



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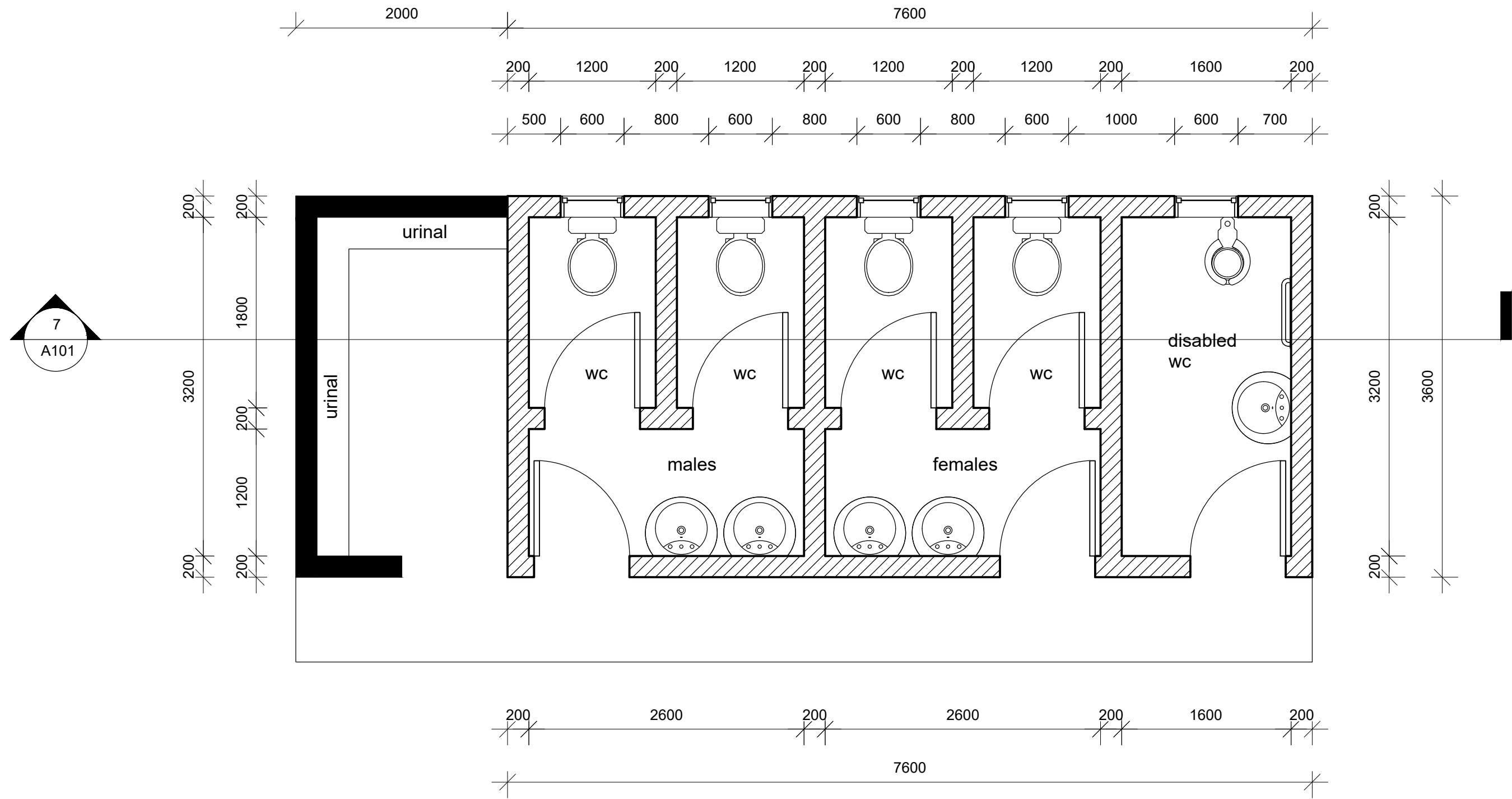
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**CULVERT  
REINFORCEMENT DETAILS**



### FLOOR PLAN



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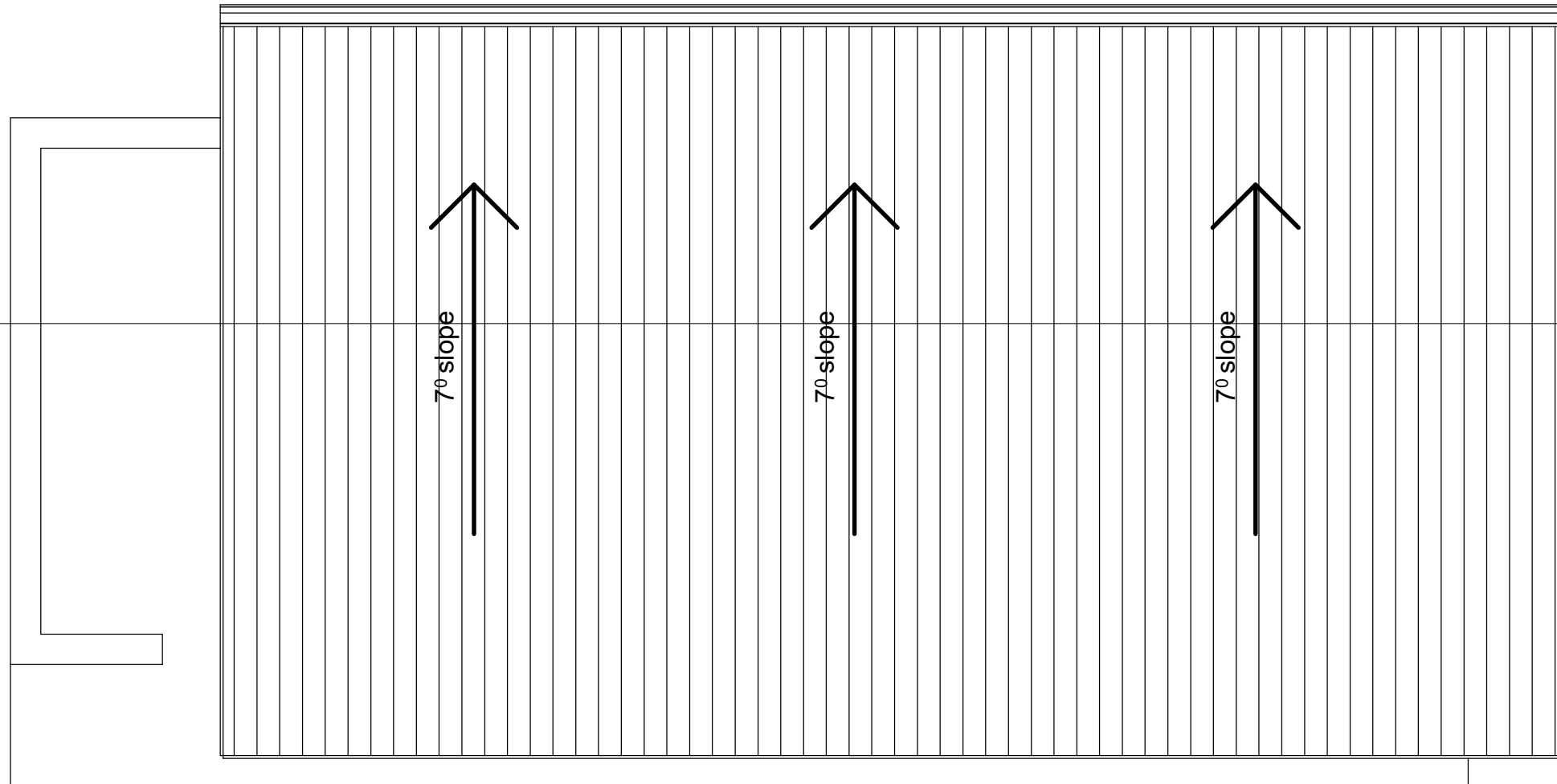
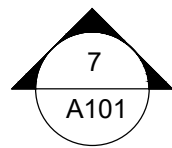
**G. KARAVOKYRIS & PARTNERS**  
CONSULTING ENGINEERS

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### BARICHO TOILET BLOCK - FLOOR PLAN





ROOF PLAN



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WATER & SANITATION AND IRRIGATION  
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Coast Water Works  
Development Agency



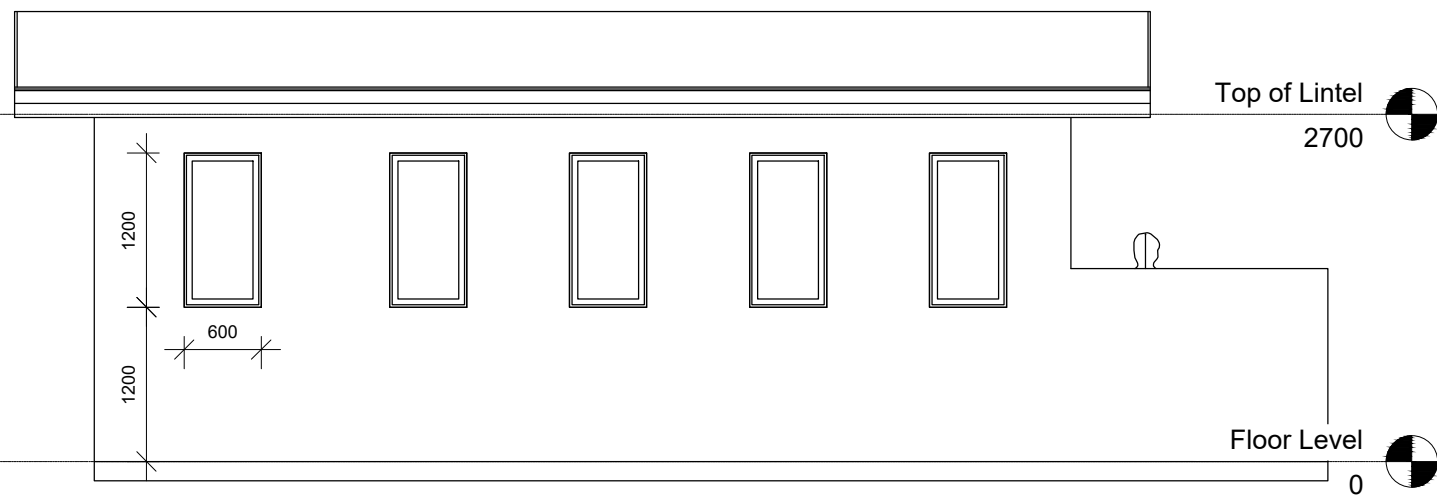
**G. KARAVOKYRIS & PARTNERS**  
CONSULTING ENGINEERS

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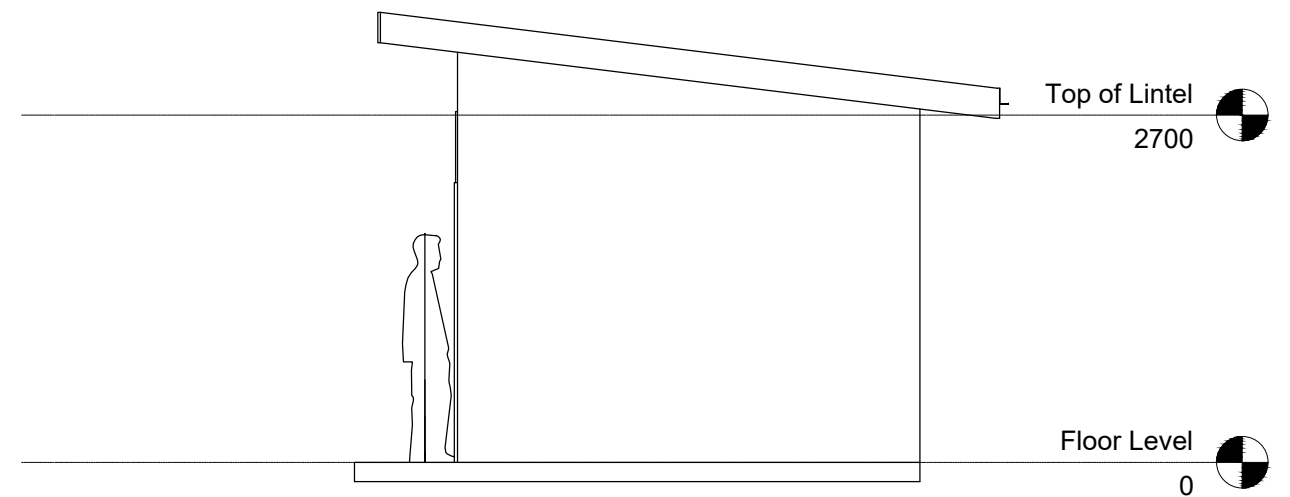
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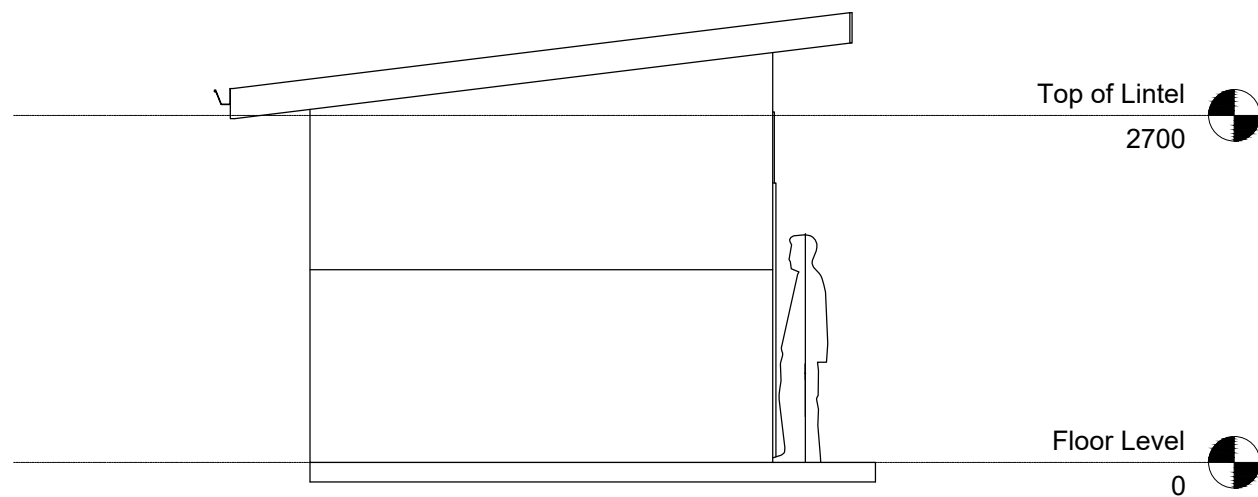
**BARICHO TOILET BLOCK - ROOF PLAN**



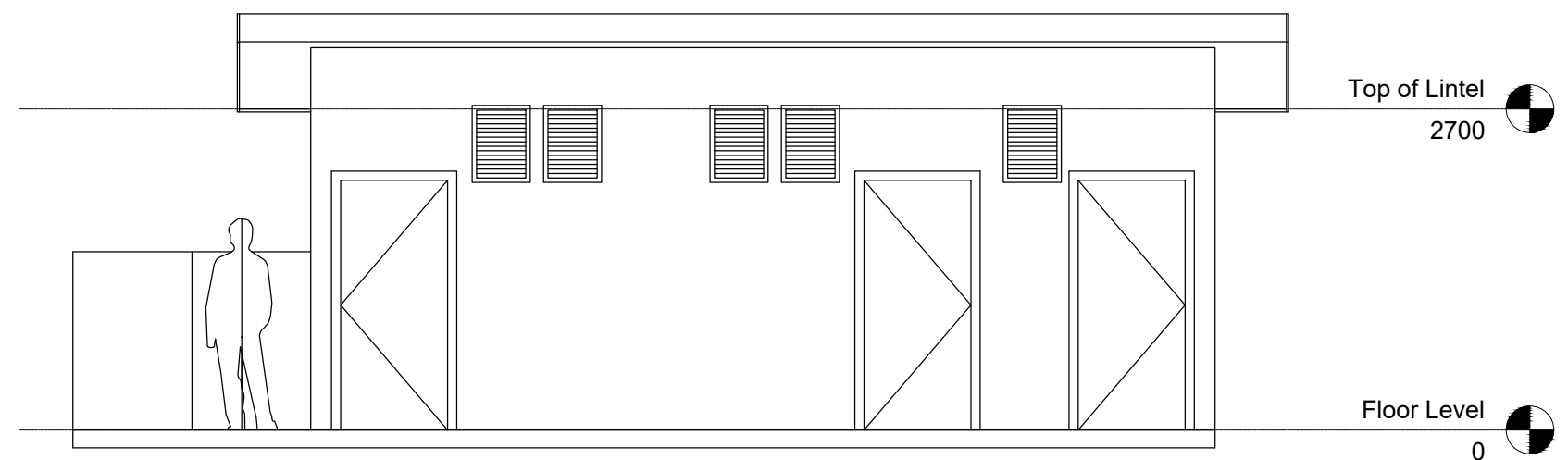
NORTH ELEVATION



EAST ELEVATION



WEST ELEVATION



SOUTH ELEVATION



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Coast Water Works  
Development Agency

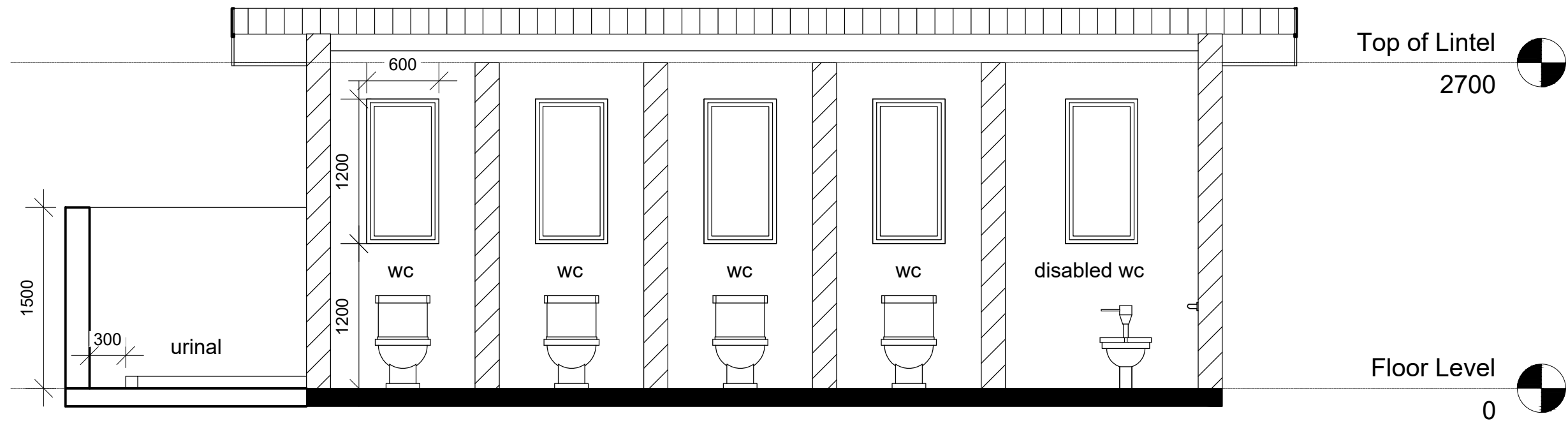


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**BARICHO TOILET BLOCK - ELEVATIONS**



**SECTION**



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Coast Water Works  
Development Agency



**G. KARAVOKYRIS & PARTNERS**  
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**BARICHO TOILET BLOCK - SECTIONS**



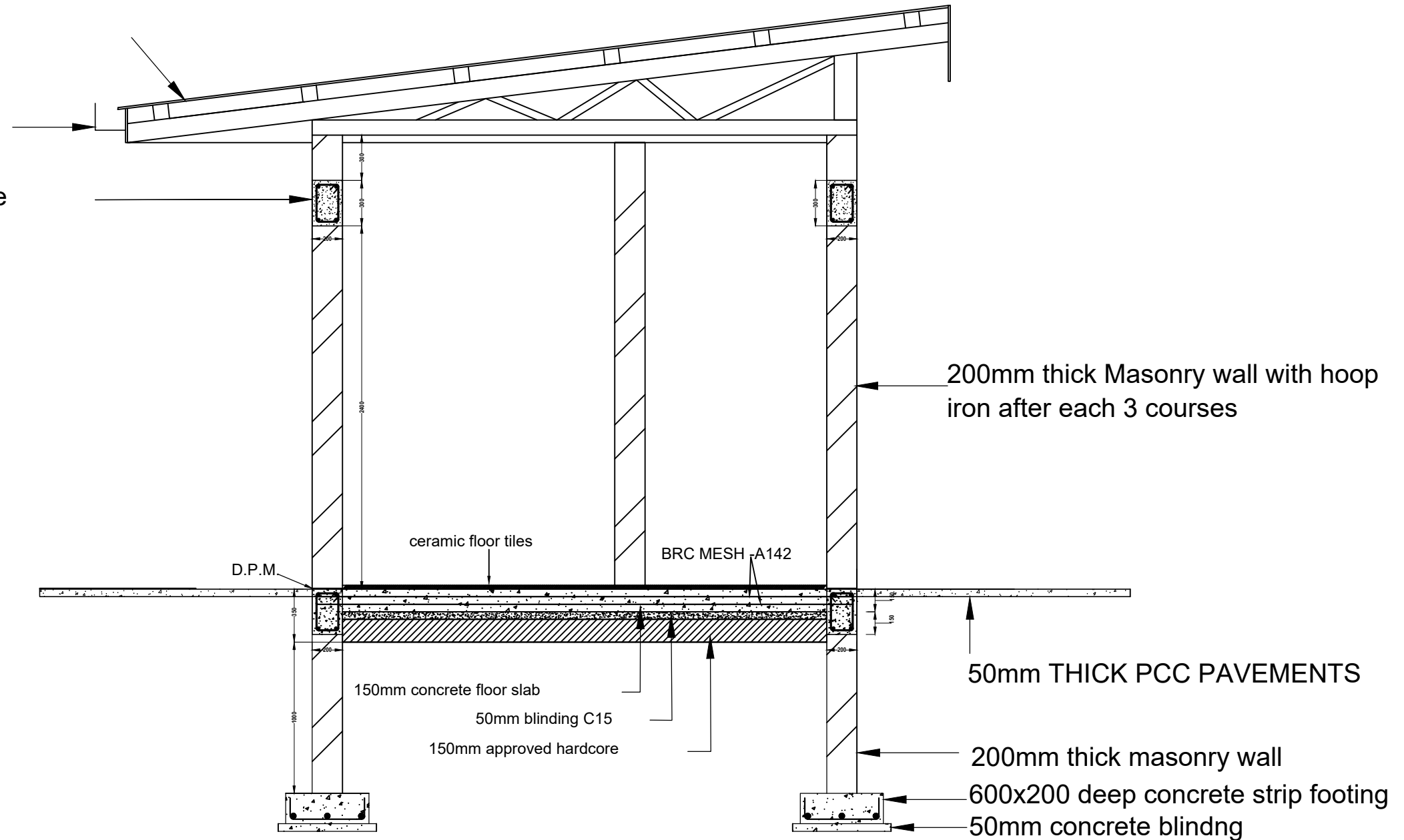
**NOTES**

1. All dimensions are in millimeters unless otherwise shown
2. One primer and one finish coat of bituminous paint applied on all concrete surfaces exposed to soil
3. All windows are sliding barred windows with burglar bars on the outside.

LT5 (gauge 26) sheeting roof

GMS square gutter fixed with W.I. bracket

300 deep x 200 wide R.C. Ring beam



200mm thick Masonry wall with hoop iron after each 3 courses

50mm THICK PCC PAVEMENTS

200mm thick masonry wall

600x200 deep concrete strip footing

50mm concrete blinding



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Coast Water Works Development Agency

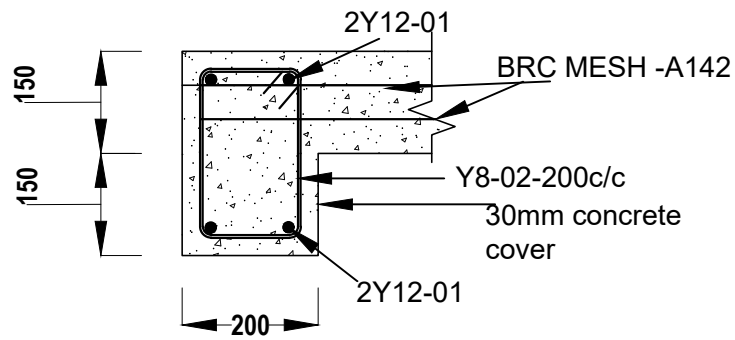


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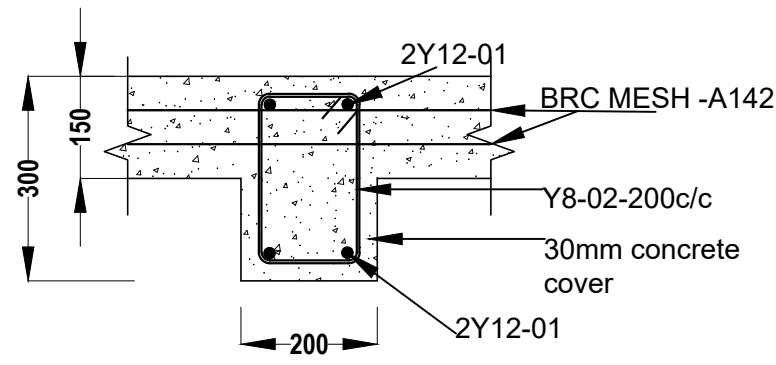
REVISIONS		PHASE	PHASE I - DETAILED DESIGN NOT APPROVED FOR CONSTRUCTION
DATE	DESCRIPTION	PAPER	A3
		DESIGNED	
		DRAWN	
		CHECKED	
		APPROVED	

**BARICHO TOILET BLOCK - STRUCTURAL**



EXTERNAL SECTION  
TIE BEAM -FLOOR SLAB DETAILS

300X200  
scale 1:10

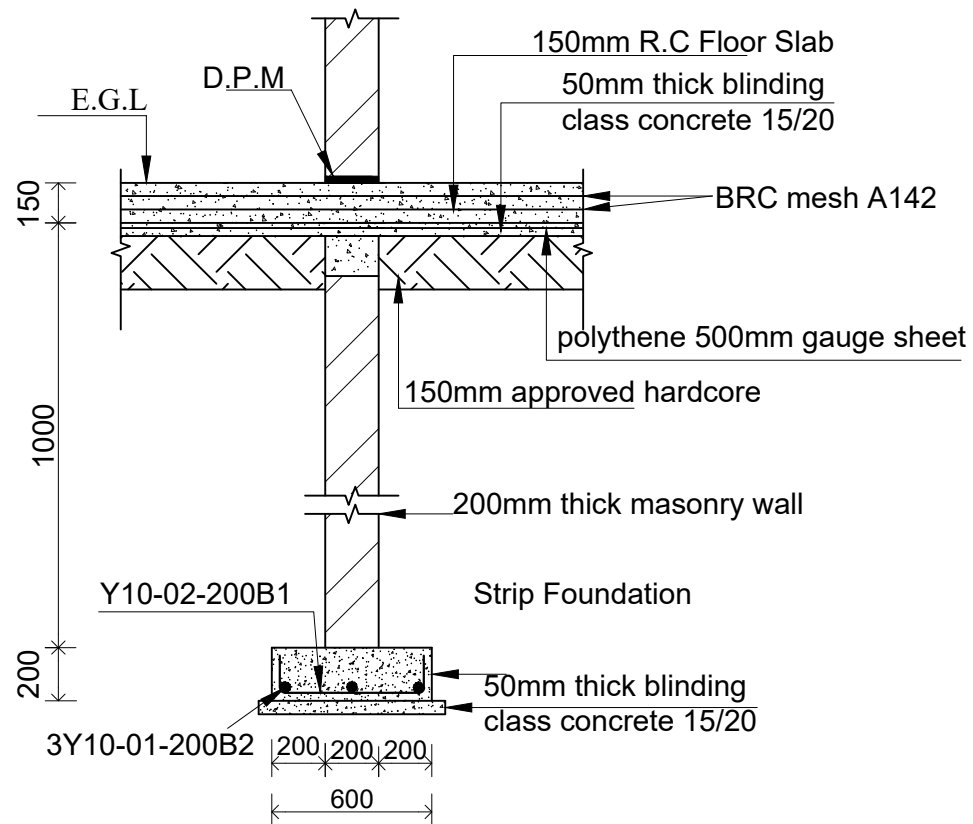


INTERNAL SECTION  
TIE BEAM -FLOOR SLAB DETAILS

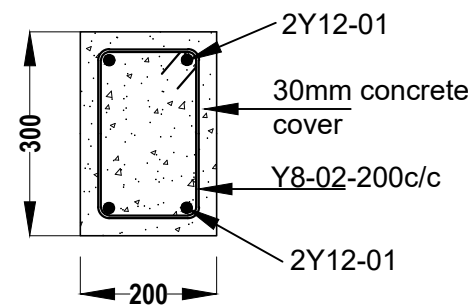
300X200  
scale 1:10

**NOTES**

1. All dimensions are in millimeters unless otherwise shown
2. One primer and one finish coat of bituminous paint applied on all concrete surfaces exposed to soil
3. All windows are sliding barred windows with burglar bars on the outside.

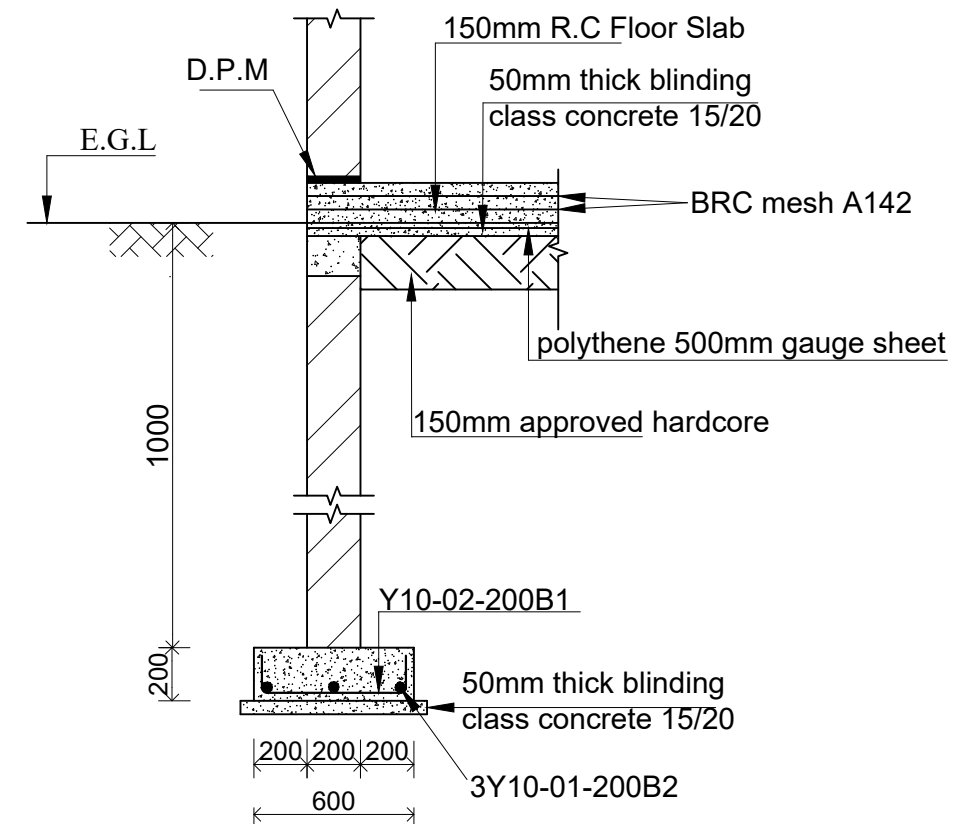


INTERNAL WALL SECTION  
scale 1:25



RING BEAM DETAILS

300X200  
scale 1:10



EXTERNAL WALL SECTION  
scale 1:25



THE REPUBLIC OF KENYA, MINISTRY OF  
WATER & SANITATION AND IRRIGATION  
Water and Sanitation Development Project (WSDP) Credit No.: IDA - 6030 KE



Coast Water Works  
Development Agency



G. KARAVOKYRIS & PARTNERS  
CONSULTING ENGINEERS

STRECO Ltd.

CONSULTANCY SERVICES FOR PREPARATION OF DETAILED DESIGNS, TENDER DOCUMENTS, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT (ESIA) AND CONSTRUCTION SUPERVISION OF THE BARICHO WELL-FIELD PROTECTION WORKS - KE-CWWDA-87234-CS-QCBS

REVISIONS		PHASE	PHASE I - DETAILED DESIGN NOT APPROVED FOR CONSTRUCTION
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**BARICHO TOILET BLOCK - STRUCTURAL**