



CITY OF TSHWANE

BRONKHORSTSPRUIT WATER
TREATMENT WORKS

WSBU 17 2025/26

TENDER DRAWINGS - PART 1 BRONKHORSTSPRUIT WATER TREATMENT WORKS

COMPILED FOR:

WATER AND SANITATION

CAPITAL TOWERS NORTH
225 MADIBA STREET
PRETORIA CENTRAL
PRETORIA, 0002

COMPILED BY:



RALEMA CONSULTING ENGINEERS

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NO.1 OLIEVENHOUTBOSCH STREET,
HIGHVELD TECHNO PARK, CENTURION
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DRAWING REGISTER : BRONKHORSPRUIT WATER TREATMENT PLANT



DRAWING NUMBER	DESCRIPTION	REVISION	
		00	01
01 - GENERAL ARRANGEMENT DRAWINGS			
General Arrangements			
RAL-BRK-01-Gen-001	Locality Plan	☒	☐
RAL-BRK-01-Gen-002	Site Plan - Water Treatment Plant - Sheet 1 of 2	☒	☐
RAL-BRK-01-Gen-003	Site Plan - Water Treatment Plant - Sheet 2 of 2	☒	☐
RAL-BRK-01-Gen-004	Overall Plant General Arrangement	☒	☐
RAL-BRK-01-Gen-005	Overall Plant Isometric View		
02 - PROCESS ENGINEERING DRAWINGS			
Mechanical - Schematics			
Ral-Brk-02-Mech-01	Sheet 1 - Raw Water Abstraction Pumps - Schematics	☒	☐

DRAWING REGISTER : BRONKHORSPRUIT WATER TREATMENT PLANT



DRAWING NUMBER	DESCRIPTION	REVISION	
		00	01
Ral-Brk-02-Mech-02	Sheet 2 - Inlet Works/Pretreatment and Mixing Tanks	☒	☐
Ral-Brk-02-Mech-03	Sheet 3 - Flocculation Channel	☒	☐
Ral-Brk-02-Mech-04	Sheet 4 - Aeration & Floatation Tanks	☒	☐
Ral-Brk-02-Mech-05	Sheet 5 - Settling Tanks	☒	☐
Ral-Brk-02-Mech-06	Sheet 6 - Filtration/Clarifiers	☒	☐
Ral-Brk-02-Mech-07	Sheet 7 - Back Wash Pumps	☒	☐
Ral-Brk-02-Mech-08	Sheet 8 - High Lift Pumps	☒	☐
Ral-Brk-02-Mech-09	Sheet 9 - Lime Circuit	☒	☐
03 - RAW WATER ABSTRACTION			
Civils			
Ral-Brk-03-Civ-01	Raw Water Pump Station Road	☒	☐
Mechanical			
Ral-Brk-03-Mech-01	Sheet 1 - Raw Water Abstraction Pumps	☒	☐
Ral-Brk-03-Mech-02	Sheet 2 - Raw Water Abstraction Pumps - Piping	☒	☐
04 - INLET WORKS			
Mechanical			
Ral-Brk-04-Mech-03	Inlet Works Pre-Treatment	☒	☐
Ral-Brk-04-Mech-04	Lime Dosing	☒	☐
05 - CLARI-FLOCCULATOR			
Civils			
Ral-Brk-05-Civ-01	Clari-Flocculator - Layout & Sections	☒	☐
Ral-Brk-05-Civ-02	Clari-Flocculator - Pipe Schedules	☒	☐

DRAWING REGISTER : BRONKHORSPRUIT WATER TREATMENT PLANT



DRAWING NUMBER	DESCRIPTION	REVISION	
		00	01
06 - HIGH-RATE CLARIFIER			
Civils			
Ral-Brk-06-Civ-01	High-Rate Clarifier, Layout, Sections & 3D Views	☐	☒
Ral-Brk-06-Str-01	High-Rate Clarifier, General Notes	☒	☐
Ral-Brk-06-Str-02	High-Rate Clarifier, Reinforcement Details	☒	☐
09 - ELECTRICAL, CONTROL & INSTRUMENTATION			
Ral-Brk-09-Ele-04	CS_Block Diagram	☒	☐
Ral-Brk-09-CI-01	Remote IO Panel	☒	☐
Ral-Brk-09-CI-02	Level Switch - Float	☒	☐
Ral-Brk-09-CI-03	Electromagnetic Flow Meter	☒	☐
Ral-Brk-09-ECI-05	Abstraction MCC SLD	☒	☐
Ral-Brk-09-ECI-06	Electrical / Instrumentation drawing		
Ral-Brk-09-DOL-01	DOL Typical Schematic	☒	☐
Ral-Brk-09-ECI-07	VSD Typcal Schematic	☒	☐
Lists		☐	☐
Ral-Brk-09-LL-001	Consumer List PLNT	☒	☐
Ral-Brk-09-LL-002	Consumer List ABST	☒	☐
Ral-Brk-09-LL-006	Instrument List	☒	☐
		☒	☐
10 - HIGH LIFT PUMPS & CLEAR WATER RESERVOIR			
Mechanical			
Ral-Brk-10-Mech-01	High Lift Pumps (Sheet 1 of 2)	☒	☐
Ral-Brk-10-Mech-02	High Lift Pumps (Sheet 2 of 2)	☒	☐

DRAWING REGISTER : BRONKHORSPRUIT WATER TREATMENT PLANT

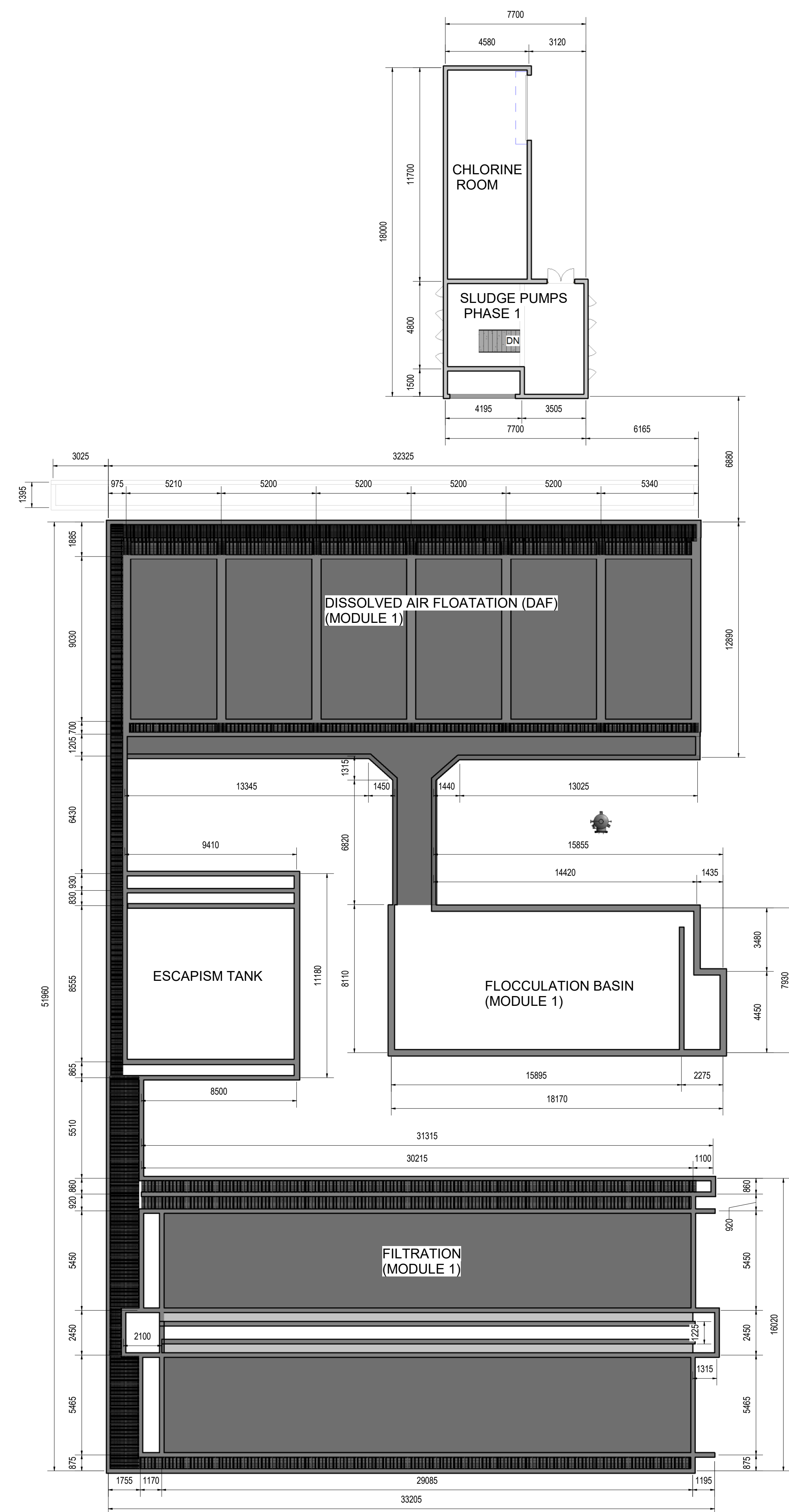


DRAWING NUMBER	DESCRIPTION	REVISION	
		00	01
11 - MISCELLANEOUS			
Civils			
Ral-Brk-11-Civ-01	Septic Tank - Layout and Section	☒	☐
Ral-Brk-11-Civ-02	Septic Tank - French Drain Details	☒	☐
Ral-Brk-11-Civ-03	Water Filling Station - Layout & Sections	☒	☐
Ral-Brk-11-Civ-04	Water Filling Station - Pipe Schedules	☒	☐

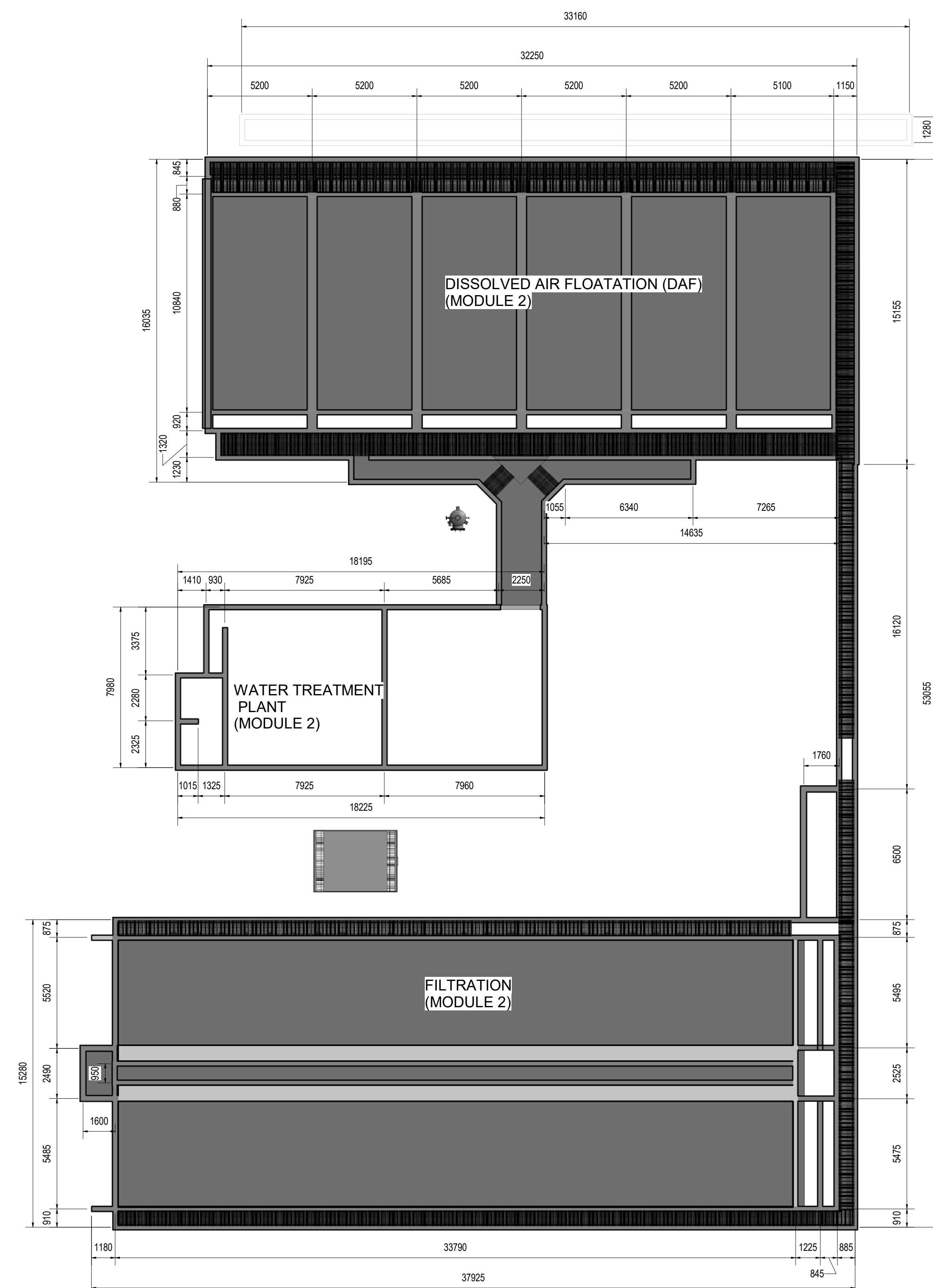
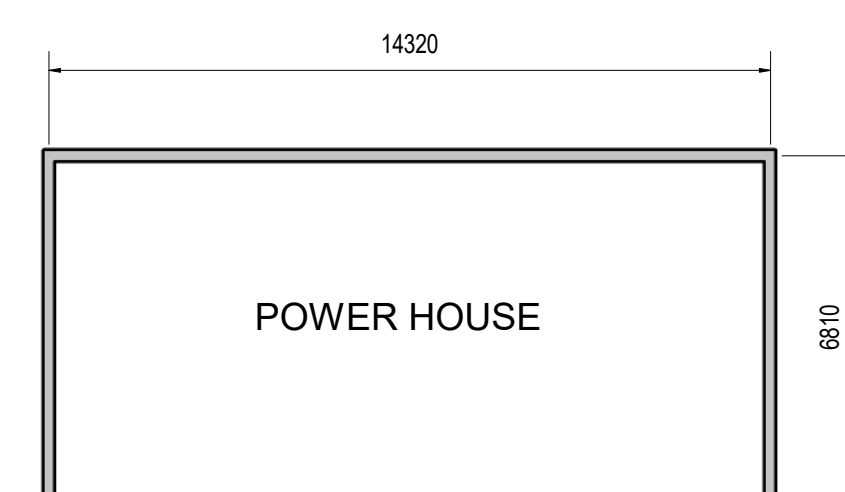
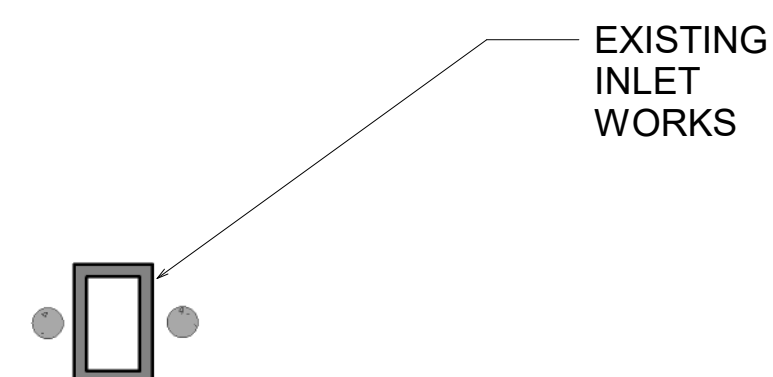
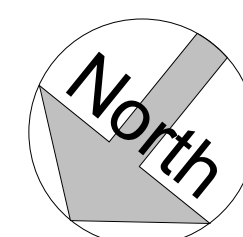
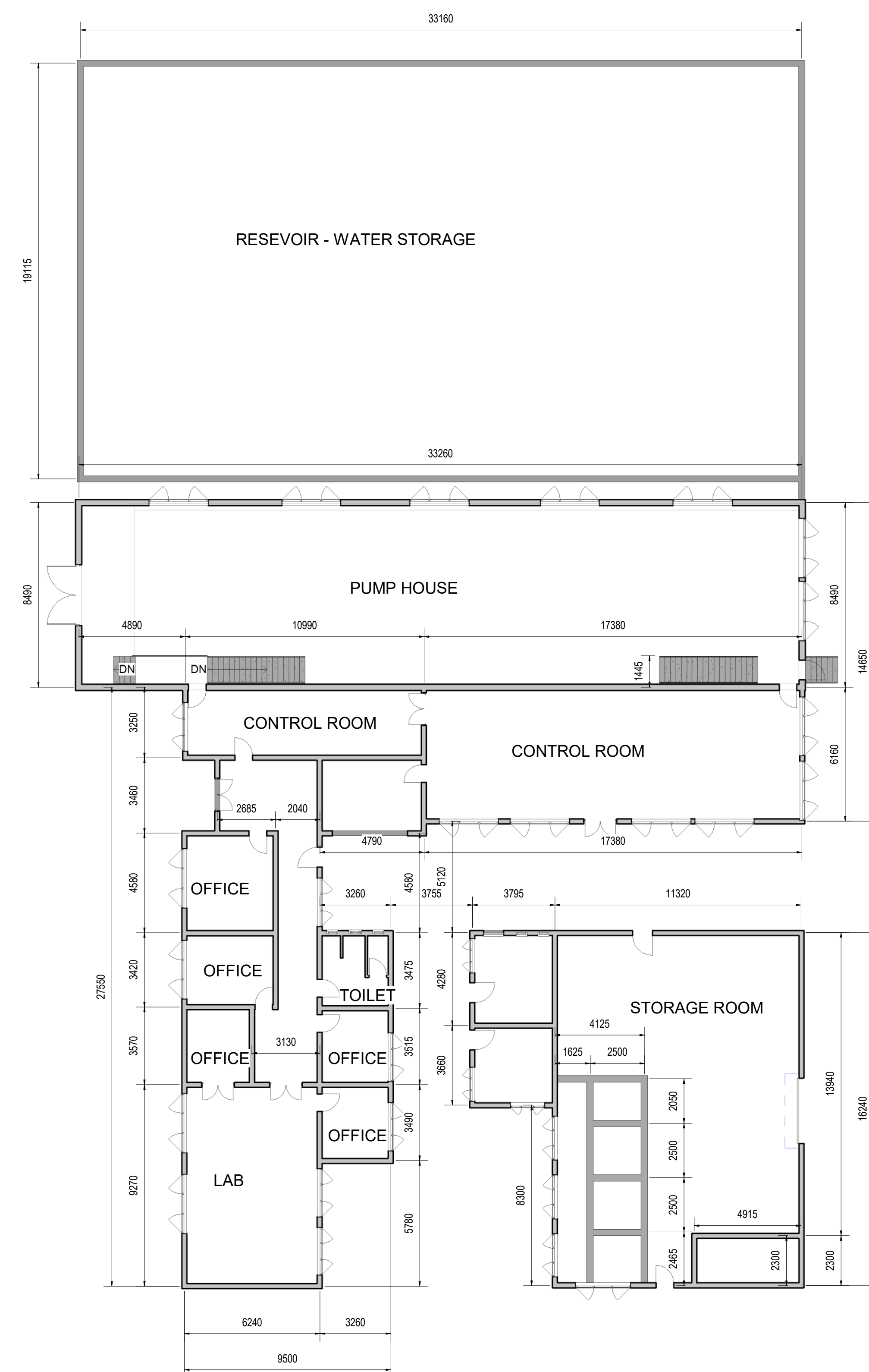
SECTION 01

GENERAL ARRANGEMENT DRAWINGS

[illegible]



OVERALL PLANT GENERAL ARRANGEMENT

[illegible]

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DATE:	DATE:

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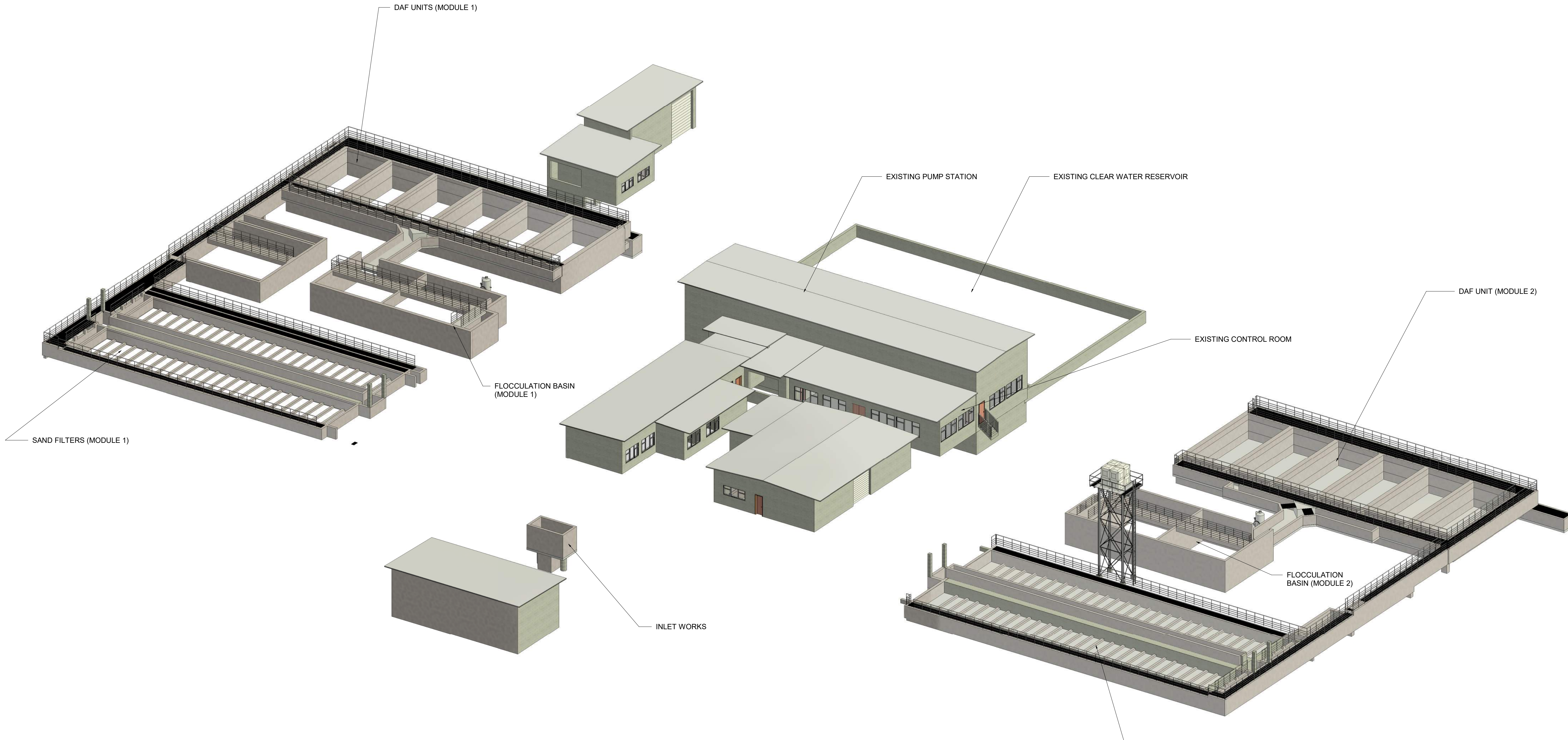
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IGNITING EXCELLENCE

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CLIENT	CITY OF TSHWANE	CONTRACT No.	IPW No.	SHEET
PROJECT TITLE	BRONKHORSTSPRUIT WATER TREATMENT WORKS			
DRAWING TITLE	OVERALL PLANT GENERAL ARRANGEMENT			

SCALE	TYPES OF PLANNING	STATUS
	 PLANNING  CONSTRUCTION  AS-BUILT	 PLANNING
REVISION	PLAN No.	
A	Ral-Brk-01-Gen-04	



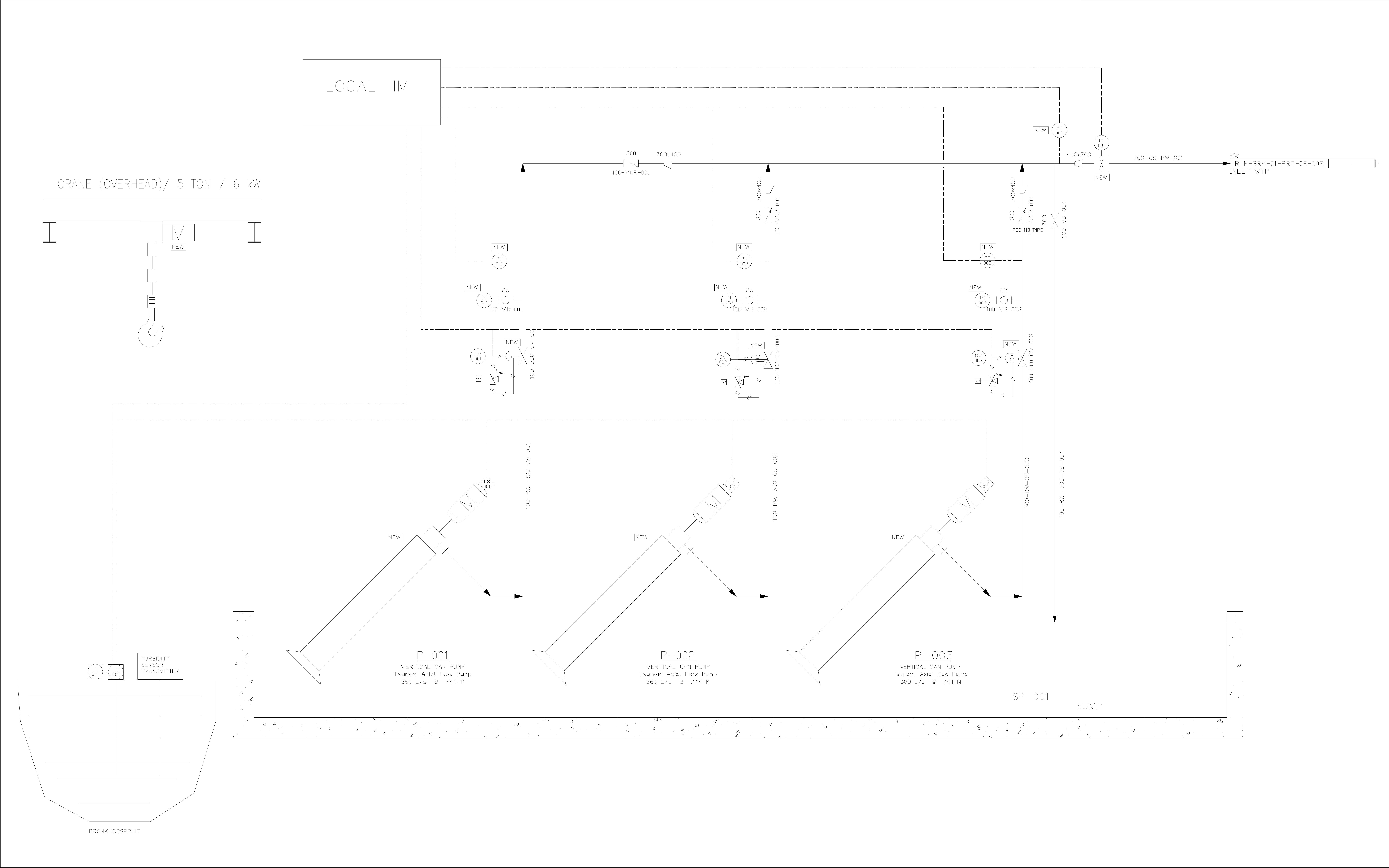
Plant Isometric View

[illegible]

SECTION 02

MECHANICAL SCHEMATICS

MECHANICAL



No.	DATE	ISSUED FOR TENDER	REVISIONS	BT	DM
00	25-06-25	ISSUED FOR TENDER			

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D. Mthapo PE Eng Tech CHECKED

RALEMA CONSULTING	DEPARTMENT OF ROADS AND STORMWATER
ISSUED BY:	RECEIVED BY:
DATE:	DATE:

CLIENT ADDRESS

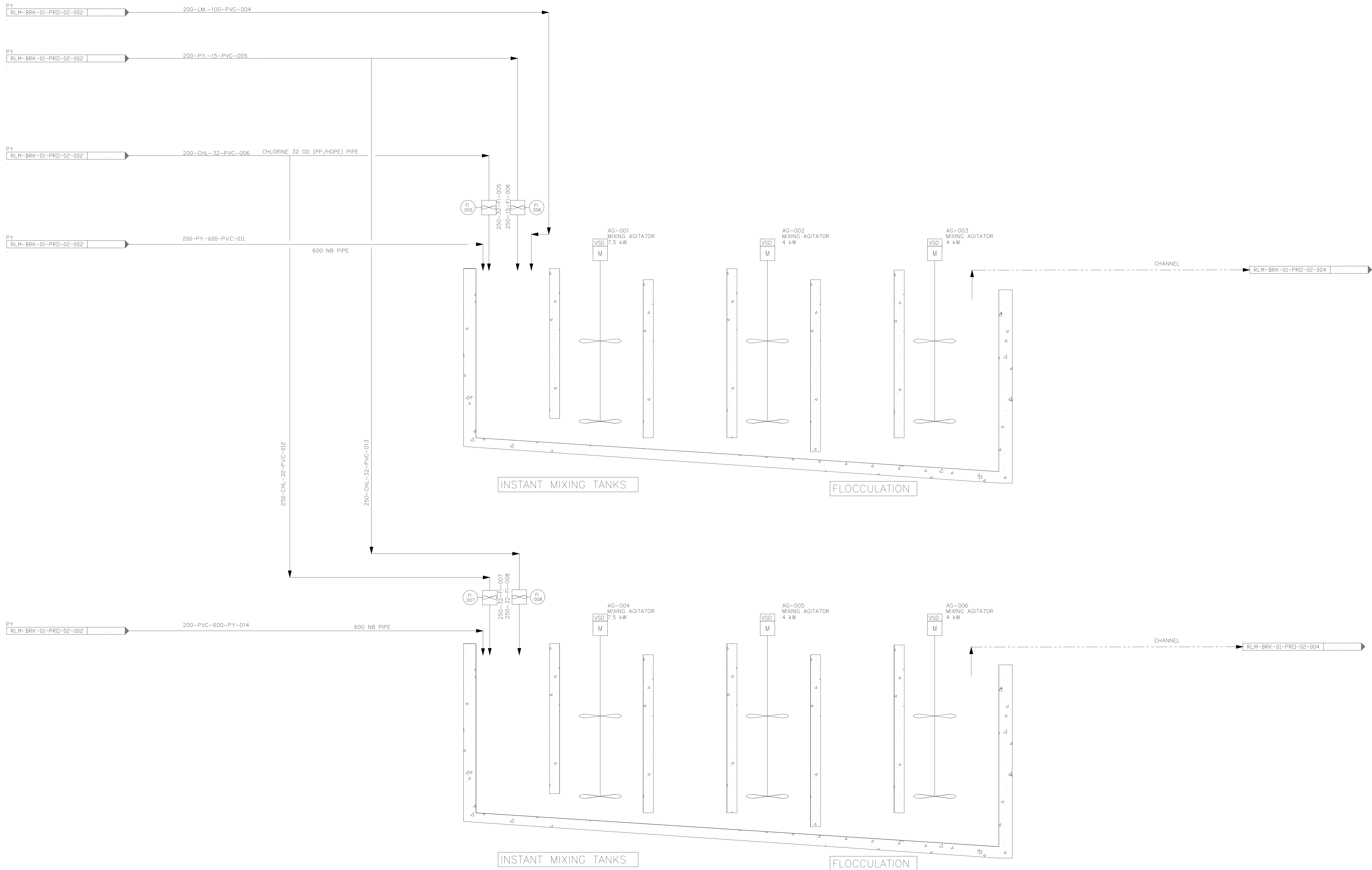


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CLIENT	CITY OF TSHWANE- UTILITY SERVICES DEPARTMENT	CONTRACT No.	SHEET
PROJECT TITLE	BRONKHORSTSPRIT WATER TREATMENT PLANT AREA 100 - RAW WATER ABSTRACTION		
DRAWING TITLE	Ral-Brk-02-Mech-01		

SCALE	TYPES OF PLANNING	STATUS
	● PLANNING ● CONSTRUCTION ● AS-BUILT	PLANNING
REVISION	PLAN No.	
00		



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00		25-06-25	ISSUED FOR TENDER	BT	DM
			REVISIONS	BY	CHECKED BY

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CLIENT CITY OF TSHWANE- UTILITY SERVICES DEPARTMENT

CONTRACT No.

SHEET

PROJECT TITLE BRONKHORSTSPRIT WATER TREATMENT PLANT
AREA 250 - FLOCCULATION CHANNEL

DRAWING TITLE Ral-Brk-02-Mech-03

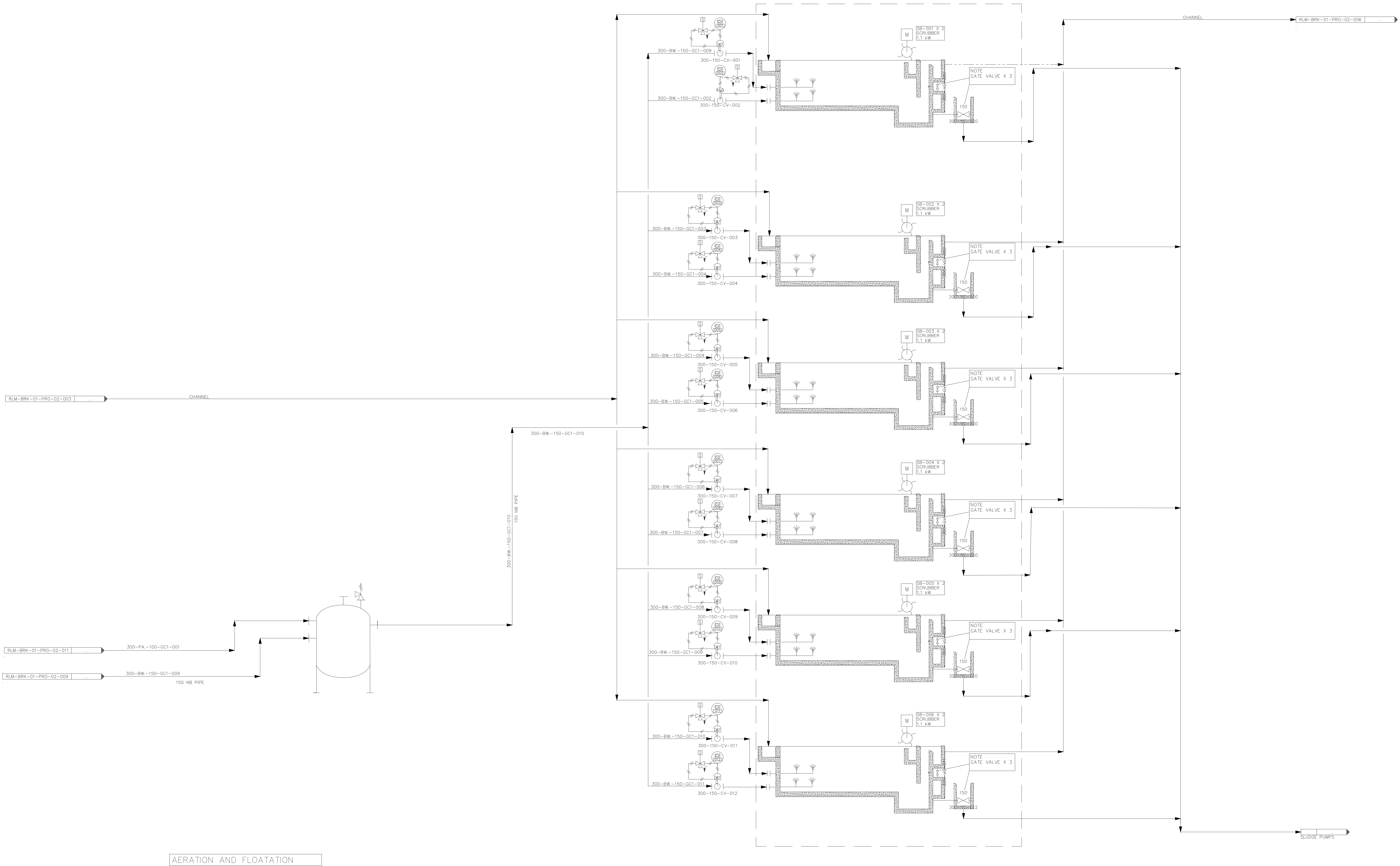
SCALE

TYPES OF PLANNING

STATUS

REVISION

PLAN No.



AERATION AND FLOATATION

No.	DATE	ISSUED FOR TENDER	REVISIONS	BT	DM
00	25-06-25	ISSUED FOR TENDER		BT	DM

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DATE:	DATE:

CLIENT ADDRESS

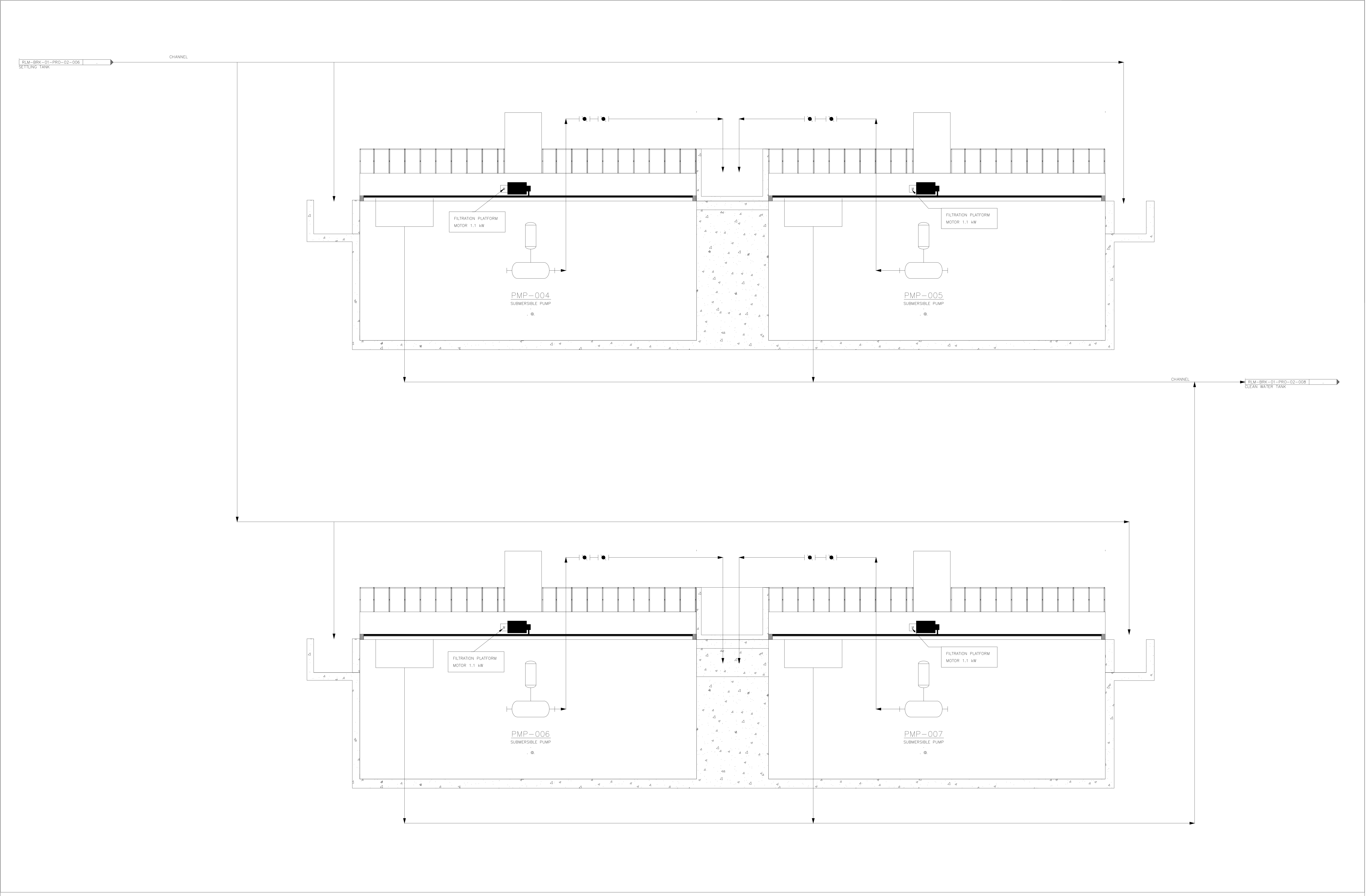


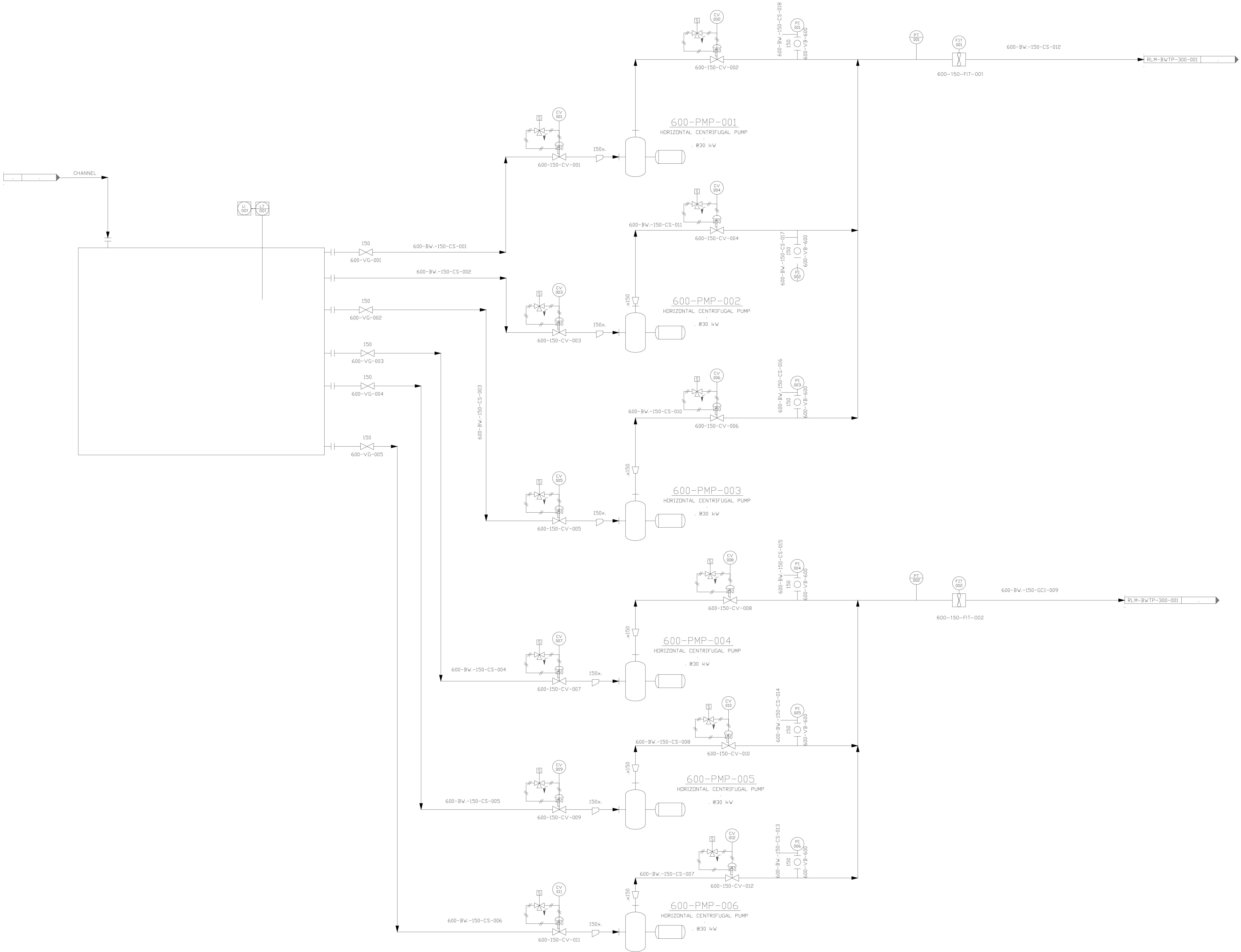
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CLIENT	CITY OF TSHWANE- UTILITY SERVICES DEPARTMENT	CONTRACT No.	SHEET
PROJECT TITLE	BRONKHORSTSPRIT WATER TREATMENT PLANT AREA 300 - AERATION AND FLOATATION		
DRAWING TITLE	RaI-Brk-02-Mech-04		

SCALE	TYPES OF PLANNING	STATUS
	● PLANNING ● CONSTRUCTION ● AS-BUILT	● PLANNING
REVISION	PLAN No.	
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DATE:	DATE:

CLIENT ADDRESS

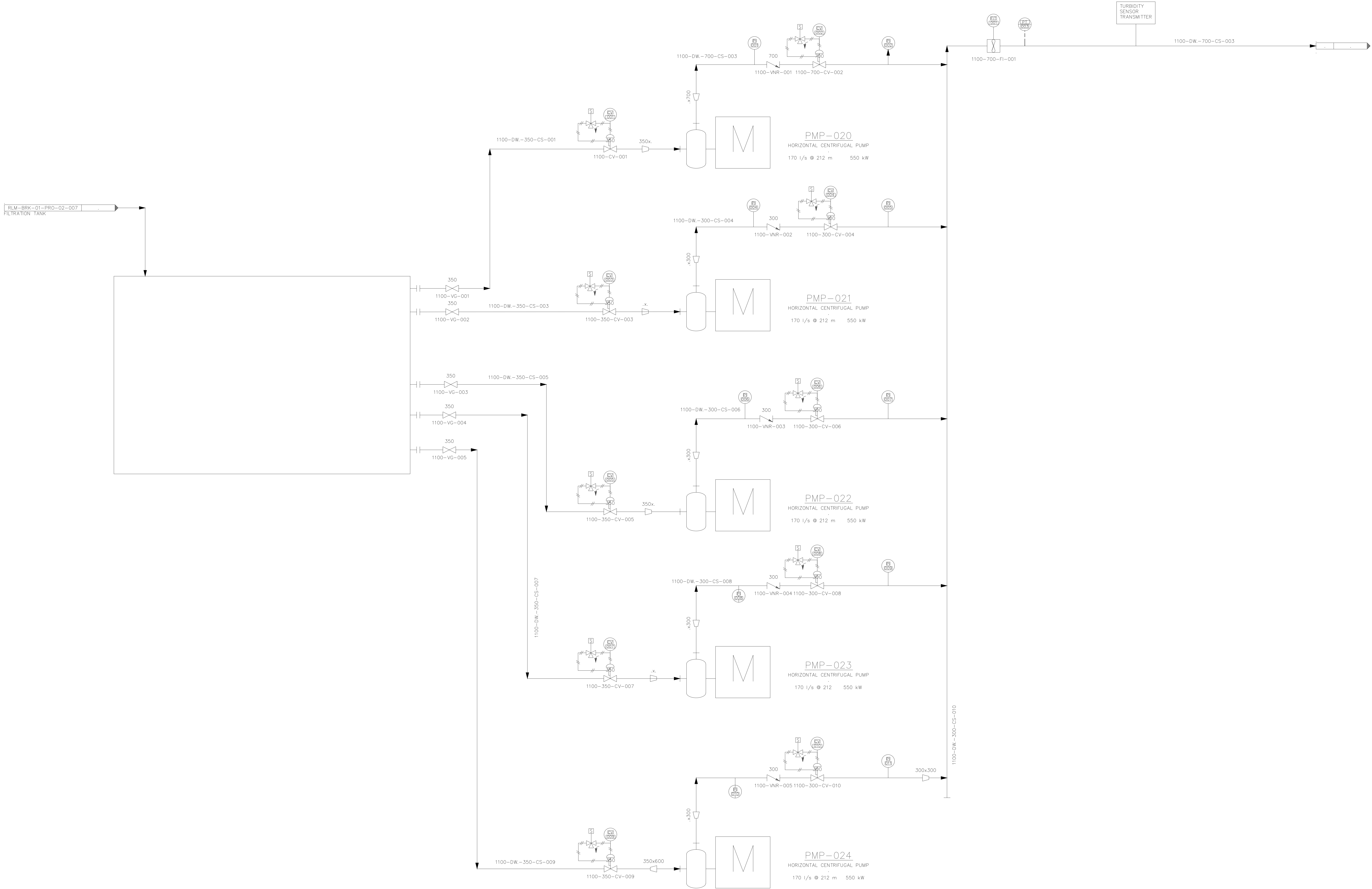


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CLIENT	CITY OF TSHWANE- UTILITY SERVICES DEPARTMENT	CONTRACT No.	SHEET
PROJECT TITLE	BRONKHORSTSPRIT WATER TREATMENT PLANT AREA 600 - BACKWASH PUMPS		
DRAWING TITLE	RaI-Brk-02-Mech-07		

SCALE	TYPES OF PLANNING	STATUS
	- PLANNING - CONSTRUCTION - AS-BUILT	PLANNING
REVISION	PLAN No.	
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DATE:	DATE:

CLIENT ADDRESS

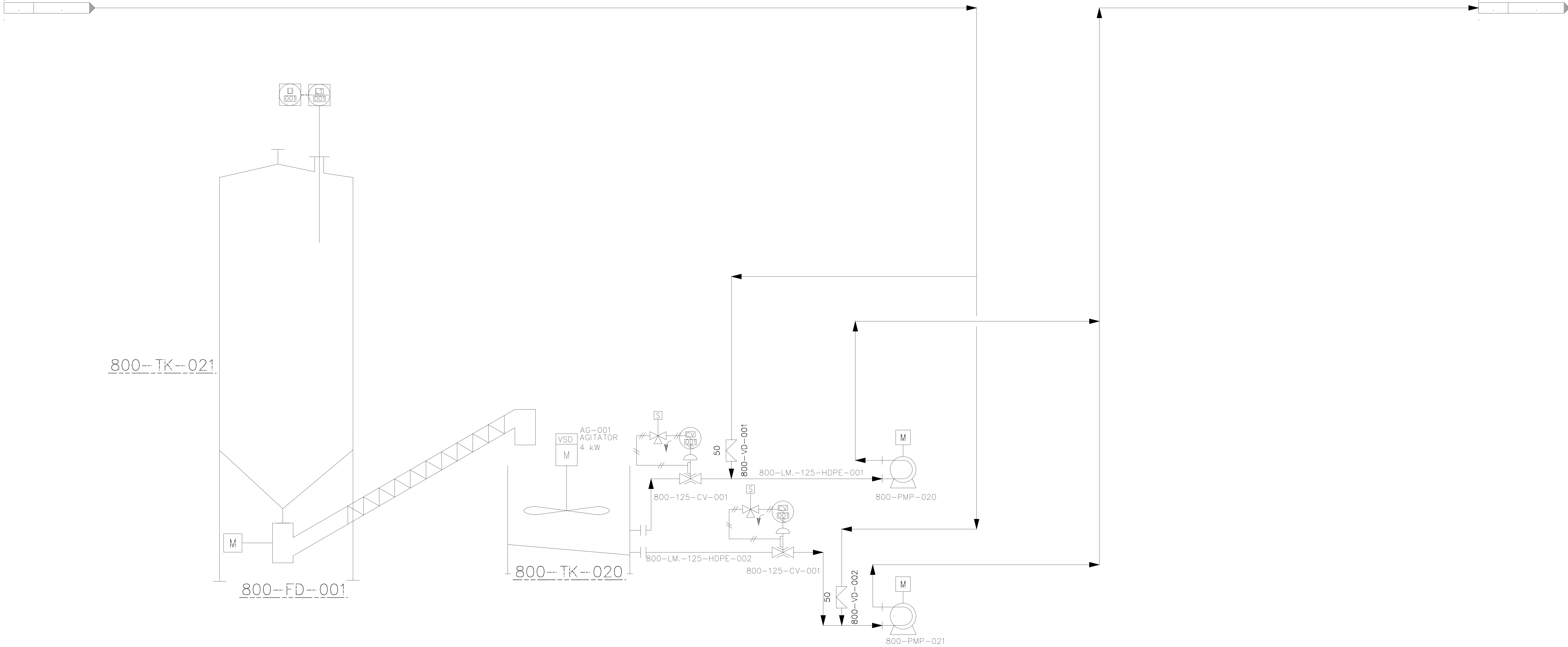


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CLIENT	CITY OF TSHWANE- UTILITY SERVICES DEPARTMENT	CONTRACT No.	SHEET
PROJECT TITLE	BRONKHORSTSPRIT WATER TREATMENT PLANT AREA 1100 - HIGHT LIFT PUMPS		
DRAWING TITLE	Ral-Brk-02-Mech-08		

SCALE	TYPES OF PLANNING	STATUS
	- PLANNING - CONSTRUCTION - AS-BUILT	PLANNING
REVISION	PLAN No.	
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CLIENT	CITY OF TSHWANE- UTILITY SERVICES DEPARTMENT	CONTRACT No.	SHEET
PROJECT TITLE	BRONKHORSTSPRIT WATER TREATMENT PLANT AREA 800 - LIME CIRCUIT		
DRAWING TITLE	RaI-Brk-02-Mech-09		

SCALE	TYPES OF PLANNING	STATUS
	PLANNING CONSTRUCTION AS-BUILT	PLANNING
REVISION	PLAN No.	
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SECTION 03

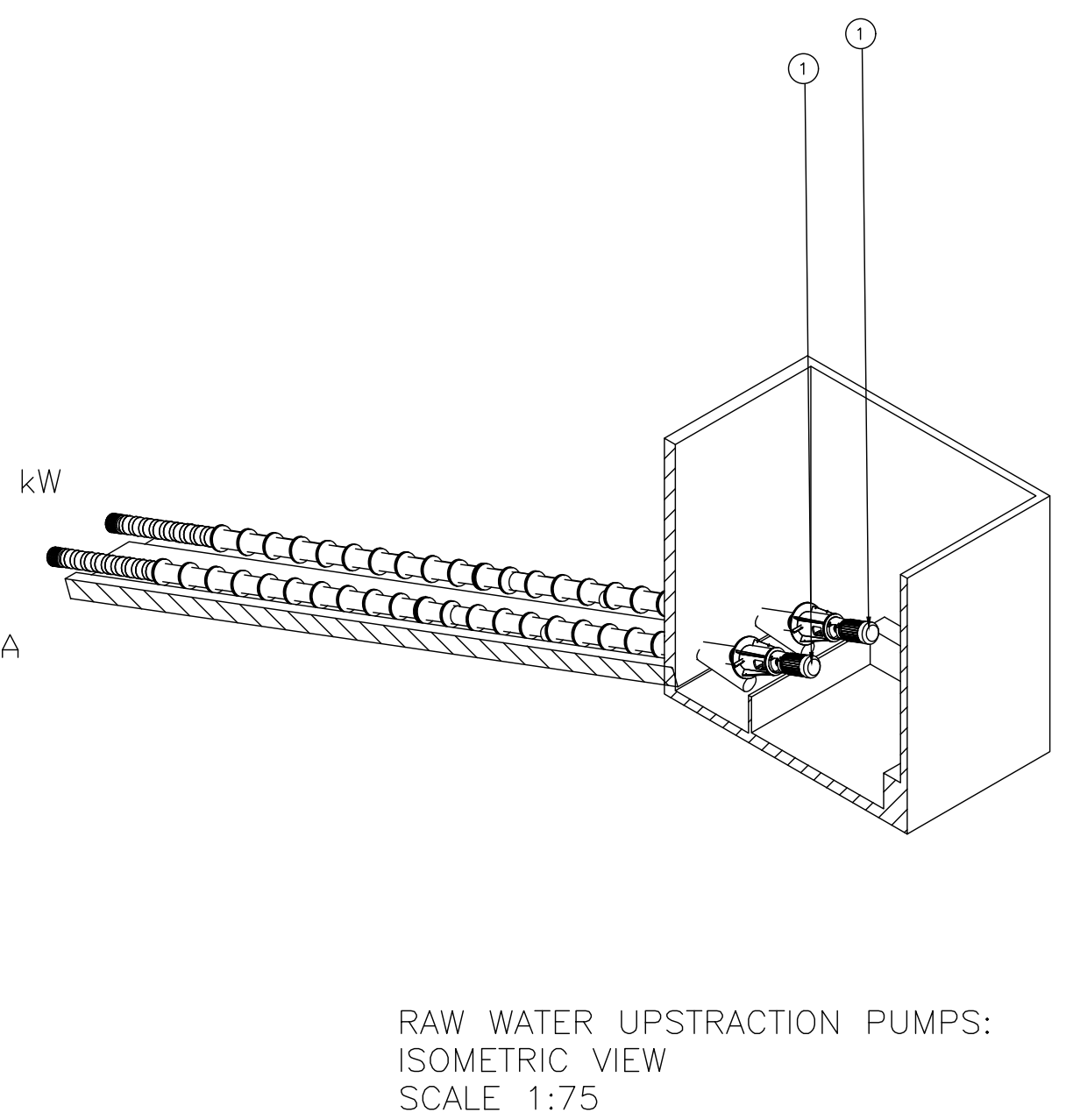
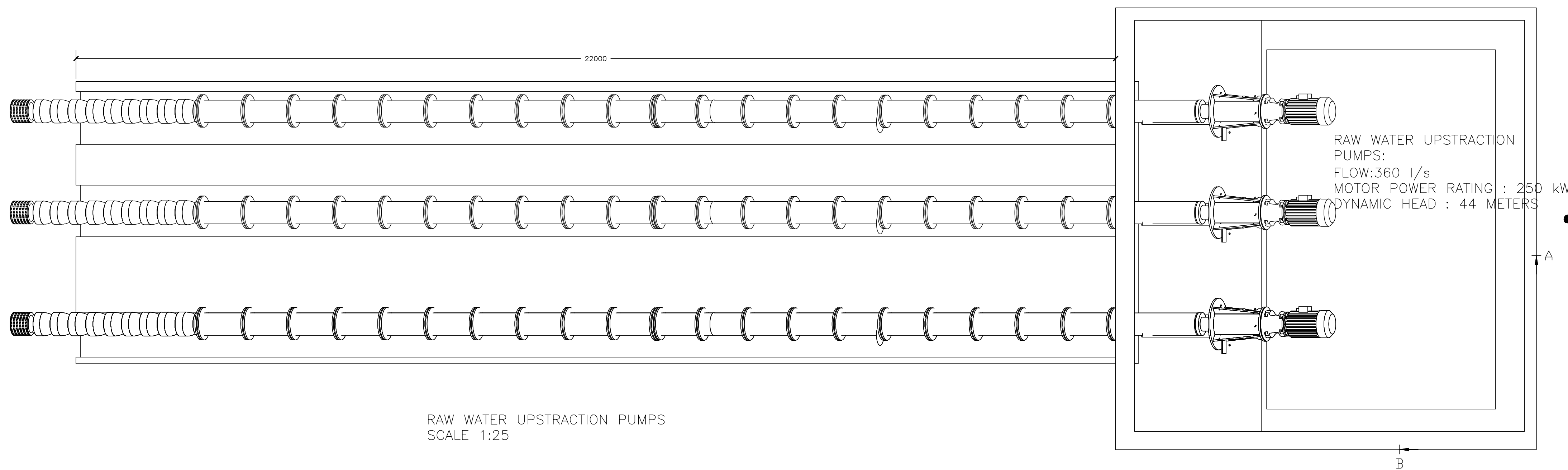
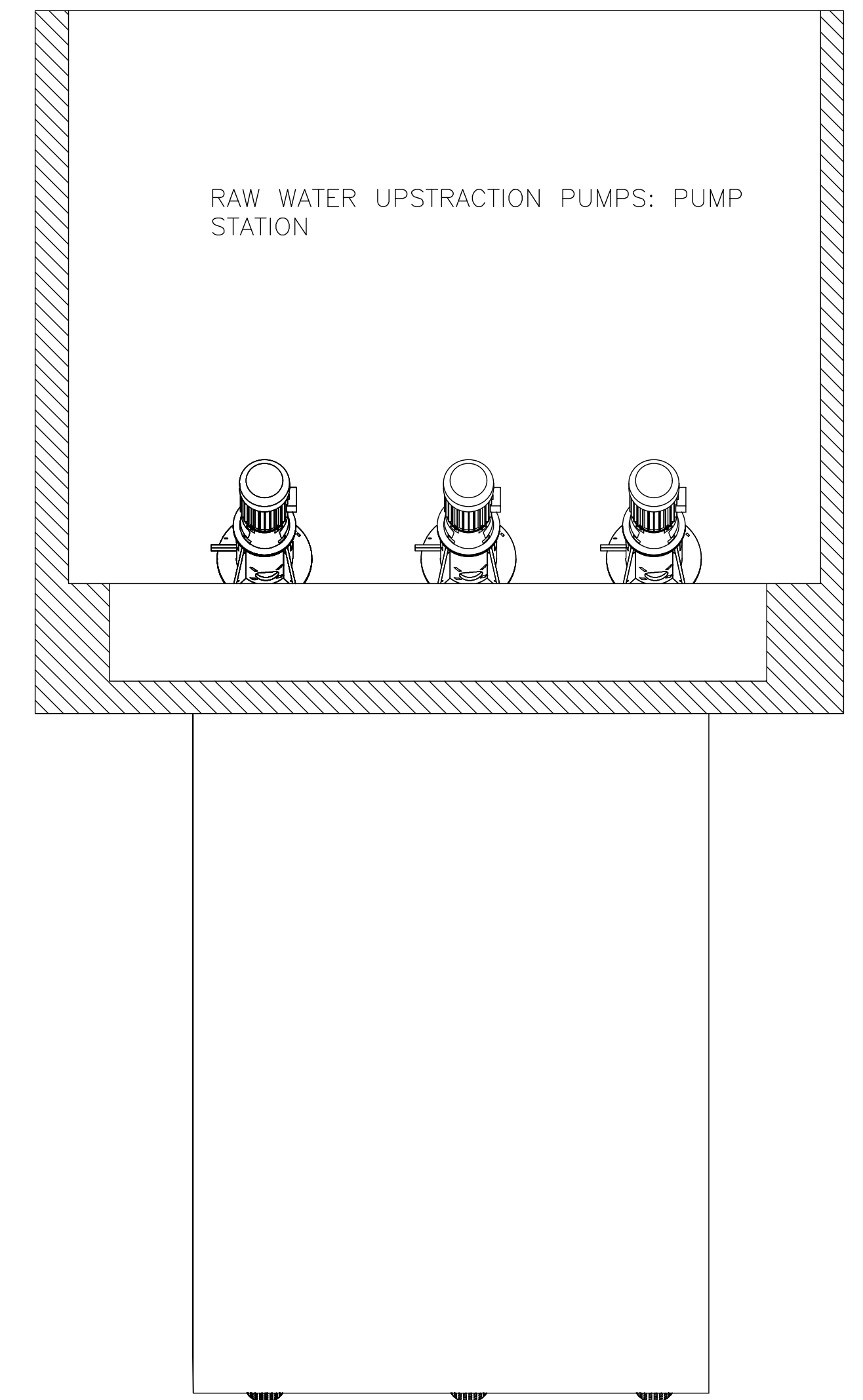
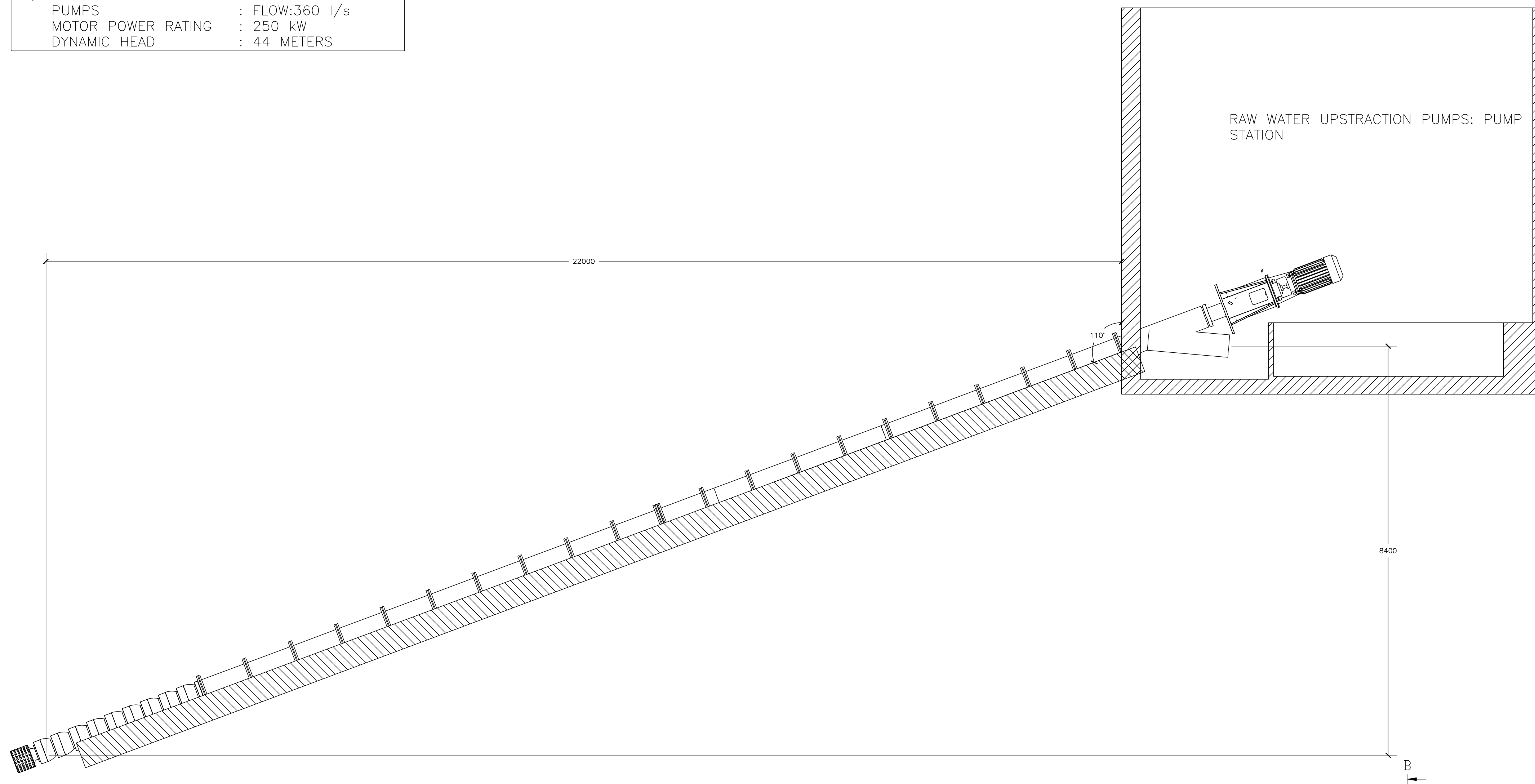
RAW WATER ABSTRACTION

MECHANICAL

1) RAW WATER UPSTRACTION X 3	
PUMPS	: FLOW:360 l/s
MOTOR POWER RATING	: 250 kW
DYNAMIC HEAD	: 44 METERS

A-A
SCALE: 1: 25

B-B -
SCALE: 1: 25



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The logo for Ralema Consulting Engineers features a stylized 'R' and 'E' in green and yellow, with the word 'RALEMA' in black text below it.

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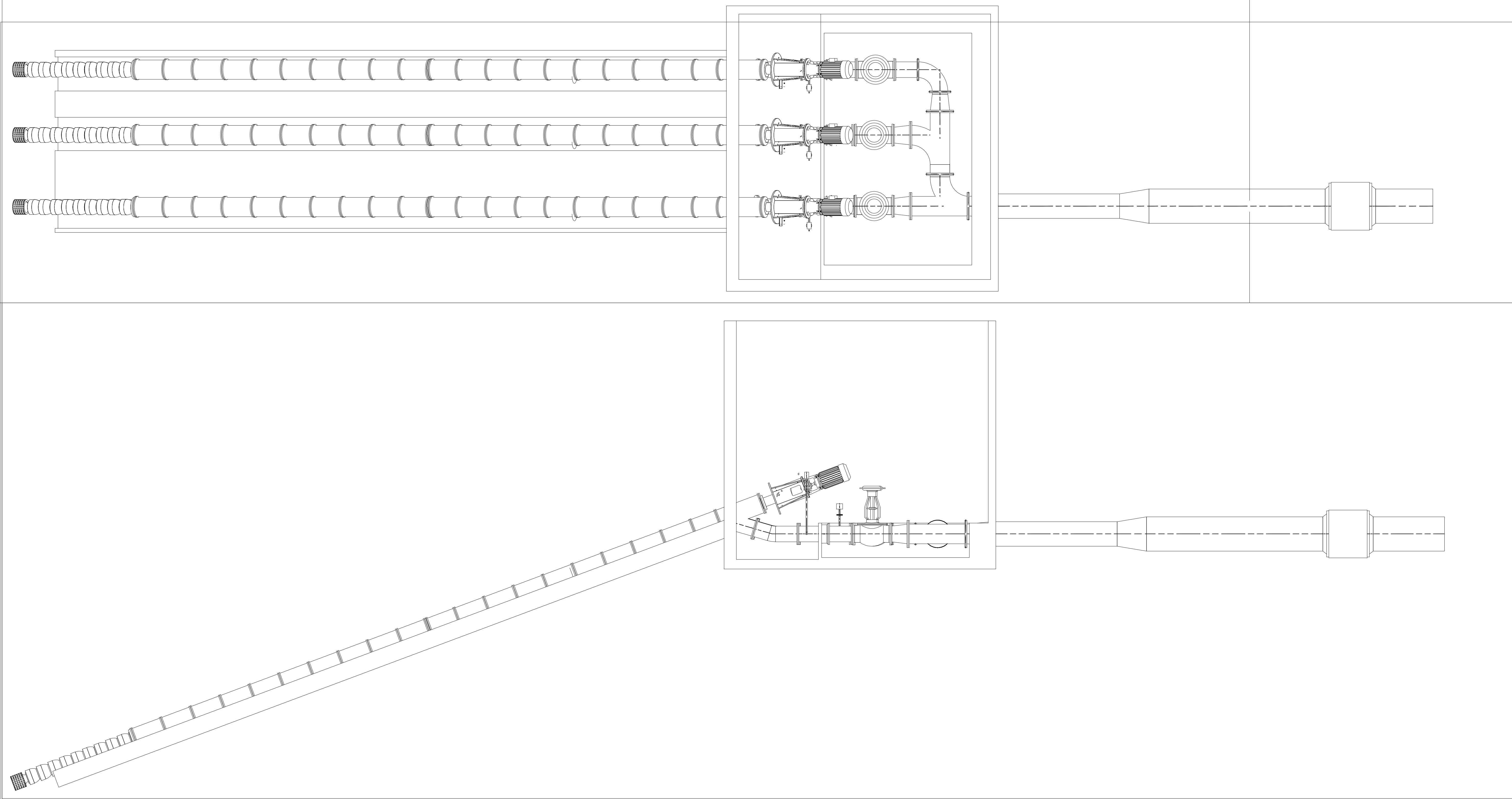
DATE: 06/03/2025

DEPARTMENT OF ROADS AND STORMWATER	
RECEIVED BY: 	
DATE: 	

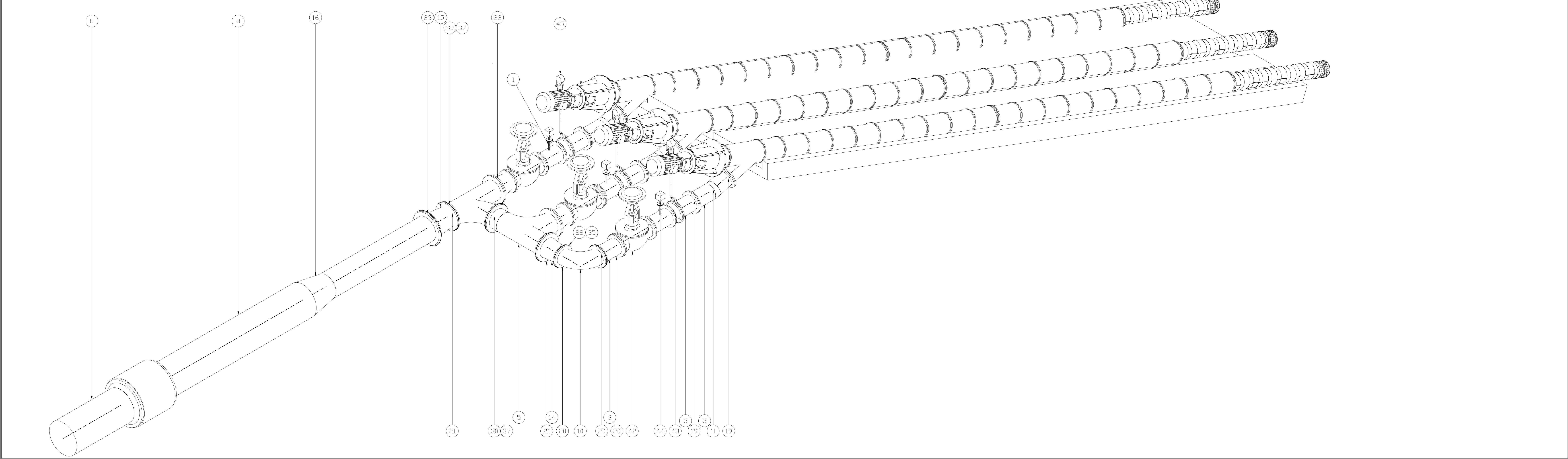
CLIENT	CITY OF TSHWANE- UTILITY SERVICES DEPARTMENT
PROJECT TITLE	BRONKHORSTSPRUIT WATER TREATMENT PLANT ABSTRACTION PUMPS
DRAWING TITLE	Ral-Brk-03-Mech-01-Sheet-1

CONTRACT No.	SHEET

SCALE	TYPES OF PLANNING	STATUS
	 PLANNING  CONSTRUCTION  AS-BUILT	 PLANNING
REVISION	PLAN No.	
	Ral-Brk-03-Mech-01-Sheet 1	



BILL OF MATERIALS				
ID	QTY	ND	SCH/CLASS	DESCRIPTION
1	702.28	25		Pipe, DN25, PL, DIN EN 10220
2	3230.62	25		Pipe – SANS 62 – Heavy – 25
3	7697.02	300		Pipe, DN300, PL, DIN EN 10220
4	48.36	300		Pipe – SANS 719 – 6 – 300
5	1560.44	400		Pipe – SANS 719 – 6 – 400
6	1194.71	400		Pipe, DN400, PL, DIN EN 10220
7	2610.4	500		Pipe, DN500, PL, DIN EN 10220
8	5678.5	700		Pipe, DN700, PL, DIN EN 10220
9	3	25	Schedule 80	Elbow 90° – Schedule 80 – SANS Compatible ANSI B 16.9 – 25
10	1	300	Standard	Elbow 90° – Standard – SANS Compatible ANSI B 16.9 – 300
11	3	300	Standard	Elbow 45° – Standard – SANS Compatible ANSI B 16.9 – 300
12	1	400	Standard	Elbow 90° – Standard – SANS Compatible ANSI B 16.9 – 400
13	1	400	Schedule 80	Elbow 90° – Schedule 80 – SANS Compatible ANSI B 16.9 – 400
14	3	400x300	Schedule 80	Reducer – Concentric – Schedule 80 – SANS Compatible ANSI B 16.9 – 400x300
15	1	500x400	Schedule 80	Reducer – Concentric – Schedule 80 – SANS Compatible ANSI B 16.9 – 500x400
16	1	700x500		PH METRIC Reducer conc. ND 700–500
17	3	25	16	Welding neck flange, DN25, B1, PN16 , DIN EN 1092–1
18	6	25	1000	Flange – SO – FF – SANS 1123 – 1000 – 25
19	12	300	1000	Flange – SO – RF – SANS 1123 – 1000 – 300
20	19	300	1000	Flange – SO – FF – SANS 1123 – 1000 – 300
21	6	400	1000	Flange – SO – FF – SANS 1123 – 1000 – 400
22	4	400	1000	Flange – SO – RF – SANS 1123 – 1000 – 400
23	2	500	1000	Flange – SO – FF – SANS 1123 – 1000 – 500
24	4	700		PH METRIC Flange ND 700
25	12	M12x60	16	Bolt Set, Typ 11–12–13, M12, B1, PN16
26	12	M12x45	1000	Machine Bolt M12 x 45 Lg. w/1 Hex. Nut M12, 2 Washer M12
27	72	M20x75	1000	Machine Bolt M20 x 75 Lg. w/1 Hex. Nut M20, 2 Washer M20
28	24	M20x75	1000	Machine Bolt M20 x 75 Lg. w/1 Hex. Nut M20, 2 Washer M20
29	32	M24x90	1000	Machine Bolt M24 x 90 Lg. w/1 Hex. Nut M24, 2 Washer M24
30	48	M24x90	1000	Machine Bolt M24 x 90 Lg. w/1 Hex. Nut M24, 2 Washer M24
31	20	M24x100	1000	Machine Bolt M24 x 100 Lg. w/1 Hex. Nut M24, 2 Washer M24
32	48	M33x170		PH METRIC Stud Bolt M33x170.0 Lg w/2 Hex. Nut M33
33	3	25	1000	Gasket – Flat – 3 – 35
34	3	25	16	Gasket, flat, DN25, Undefined_ET, B1, PN16 , DIN EN 1514–1
35	2	300	1000	Gasket – Flat – 3 – 300
36	6	300	1000	Gasket – Flat – 3 – 300
37	3	400	1000	Gasket – Flat – 3 – 400
38	2	400	1000	Gasket – Flat – 3 – 400
39	1	500	1000	Gasket – Flat – 3 – 500
40	2	700		PH METRIC Gasket ND 700
41	3	25	16	Flange Ball Valve Hand Level, DN25, PN16 , B1
42	3	300	16	Flange Control Valve, DN300, PN16 , B1
43	3	300	16	Flange Wafer Check Valve, DN300, PN16 , B1
44	3	25		TEMPERATURE TRANSMITTER, DN 25, FPT
45	3	25	150	PRESSURE GAUGE, DN 25, CL 150, RF



No.	DATE	REVISIONS	BY	CHECKED BY
00	28/09/25	ISSUED FOR TENDER	B.T	DM

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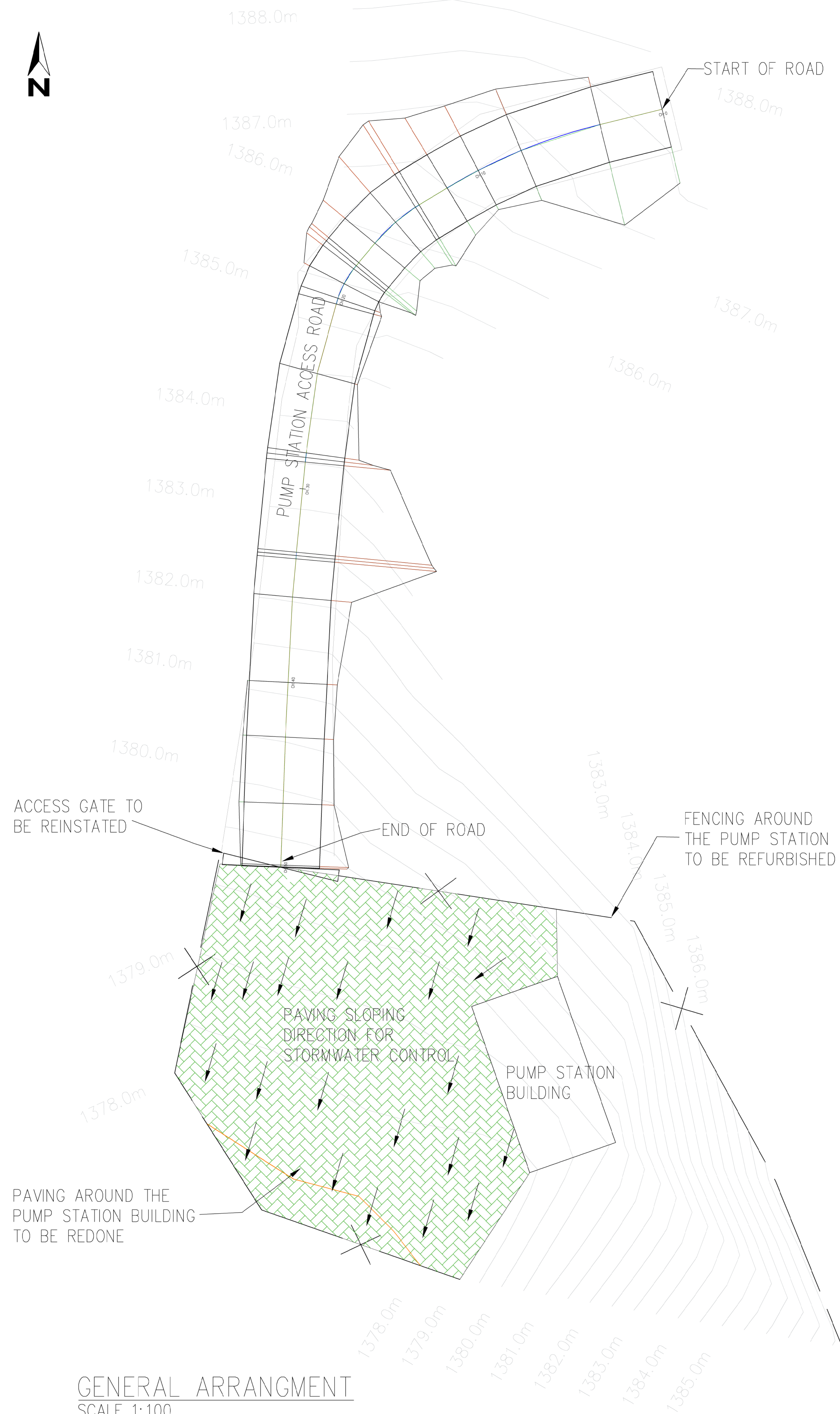
CLIENT	CITY OF TSHWANE- UTILITY SERVICES DEPARTMENT	CONTRACT No.	SHEET
PROJECT TITLE	BRONKHORSTSPRIT WATER TREATMENT PLANT AREA - RAW WATER ABSTRACTION PUMPS - PIPING		
DRAWING TITLE	Ral-Brk-03-Mech-02 - Sheet 2		

SCALE	TYPES OF PLANNING	STATUS
	● PLANNING ● CONSTRUCTION ● AS-BUILT	PLANNING
REVISION	PLAN No.	
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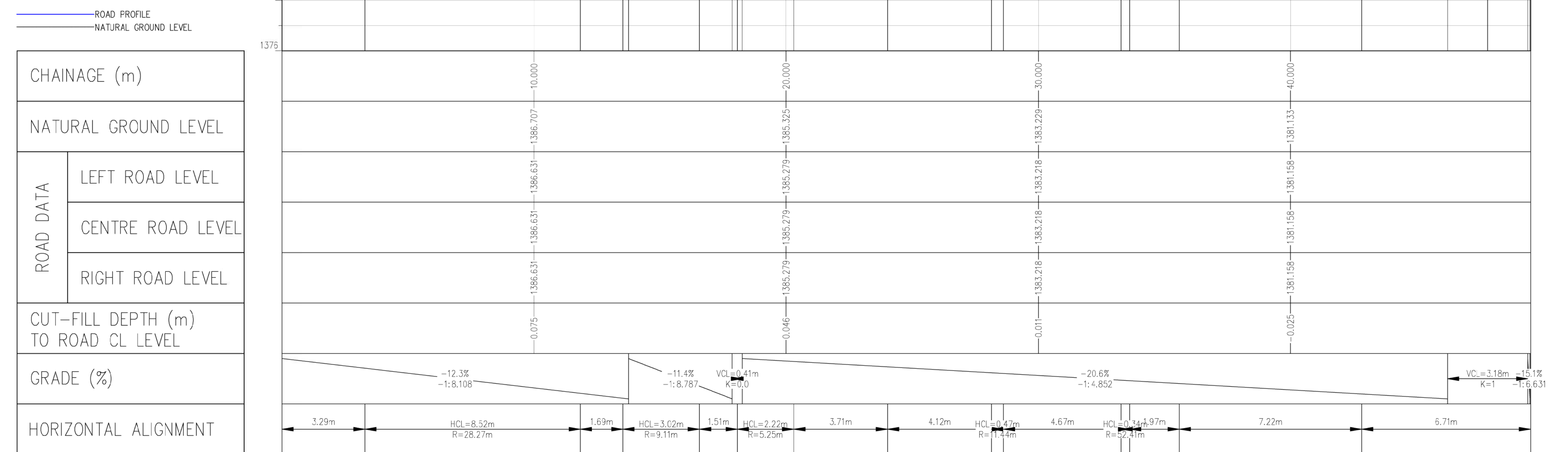
SECTION 03

RAW WATER ABSTRACTION

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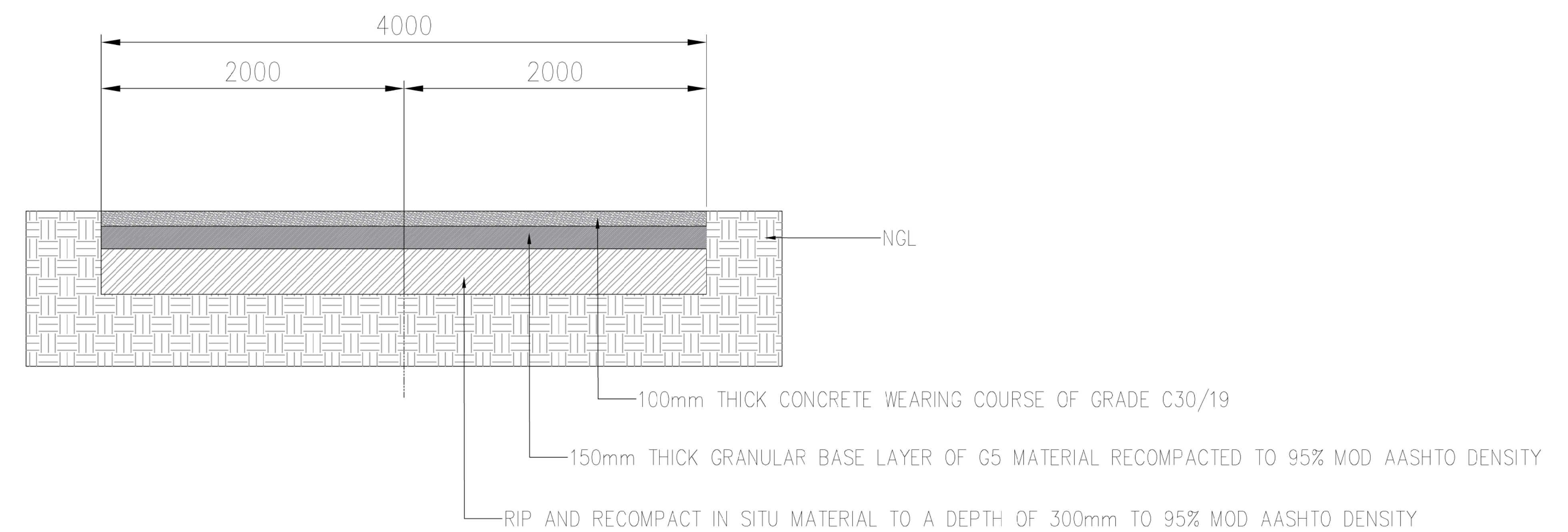


GENERAL ARRANGMENT
SCALE 1:100



ROAD LONG SECTION

SCALE 1:100



ROAD DESIGN SECTION

SCALE 1:20

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DATE:	DATE: *****

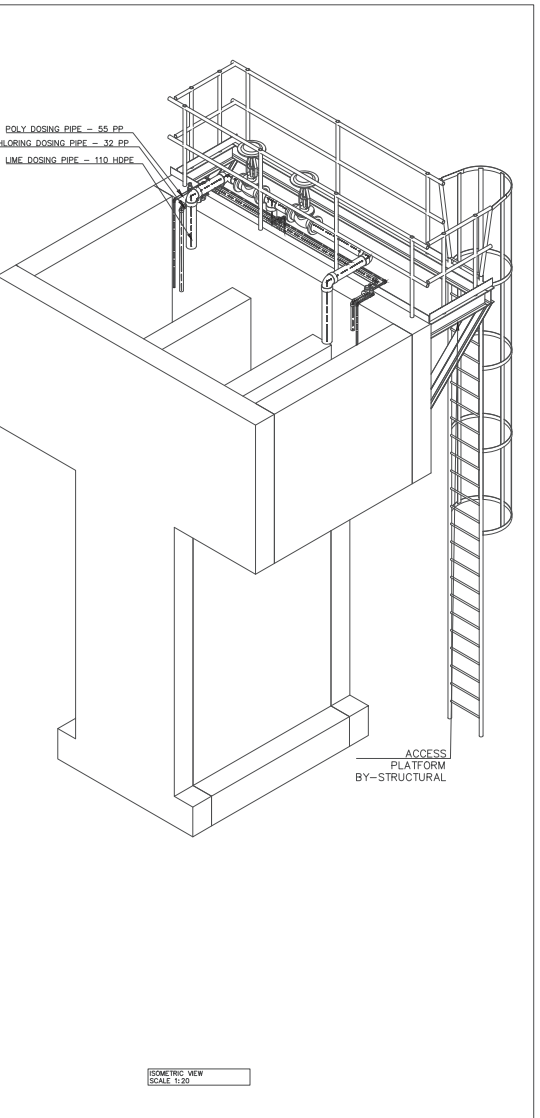
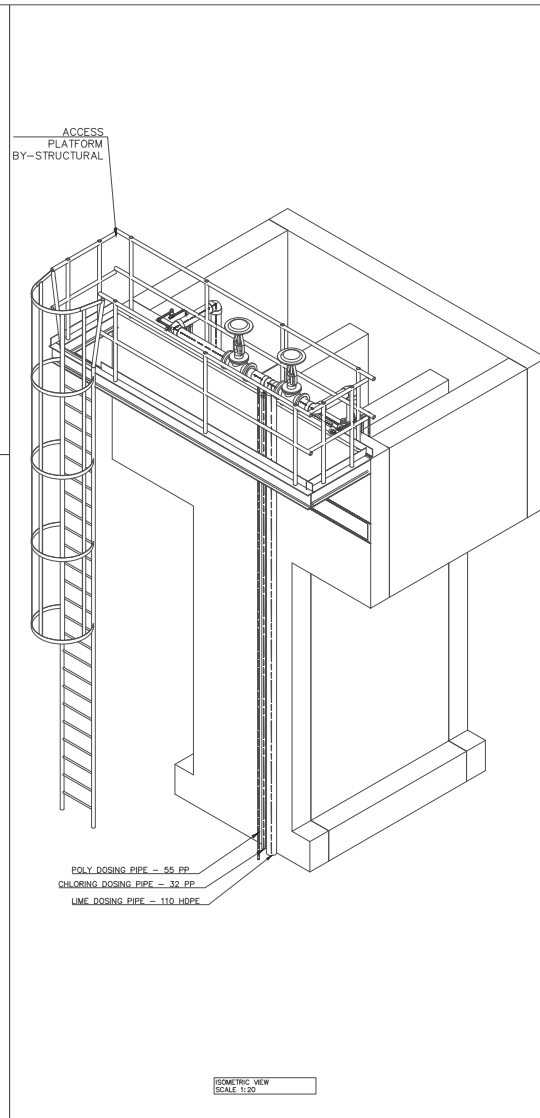
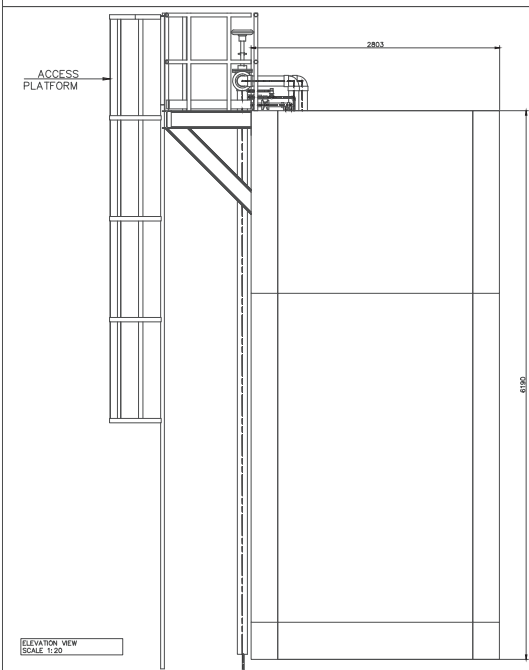
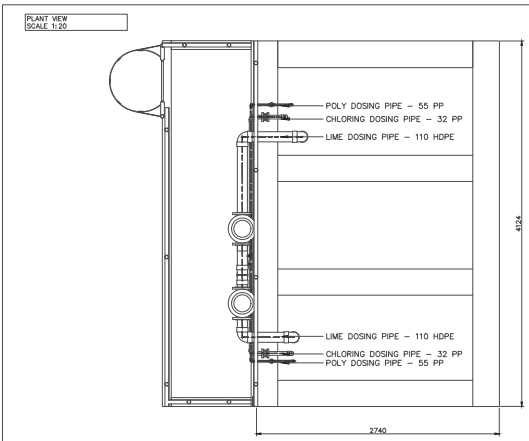
CLIENT	CITY OF TSHWANE	CONTRACT No.	IPW No.	SHEET
PROJECT TITLE	BRONKHORSTSPRUIT WATER TREATMENT WORKS			
DRAWING TITLE	GENERAL ARRANGEMENT & LONG SECTION OF PUMP STATION ACCESS ROAD			

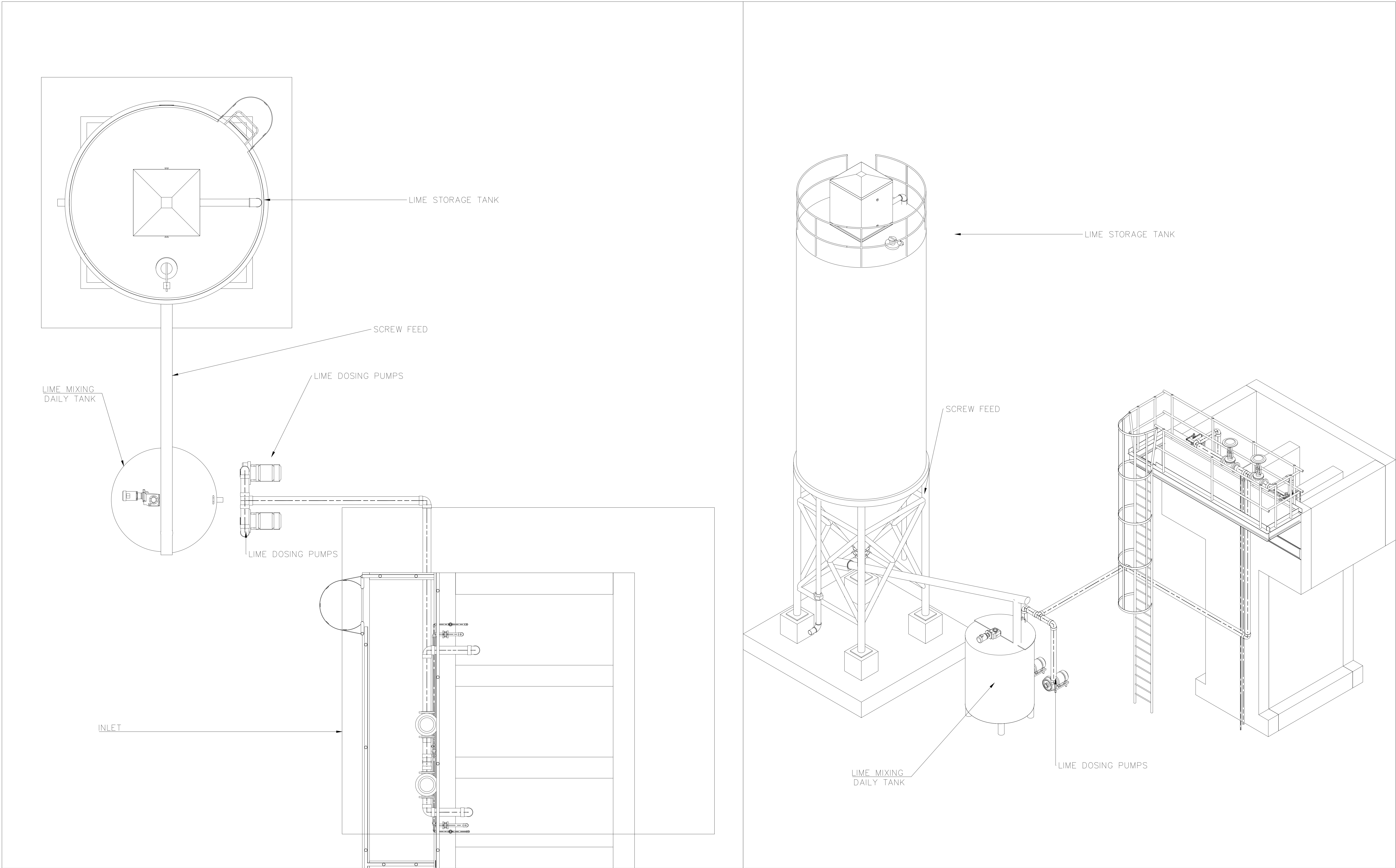
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REVISION	PLAN No.	
A	Ral-Brk-03-Civ-01	

SECTION 04

INLET WORKS

MECHANICAL





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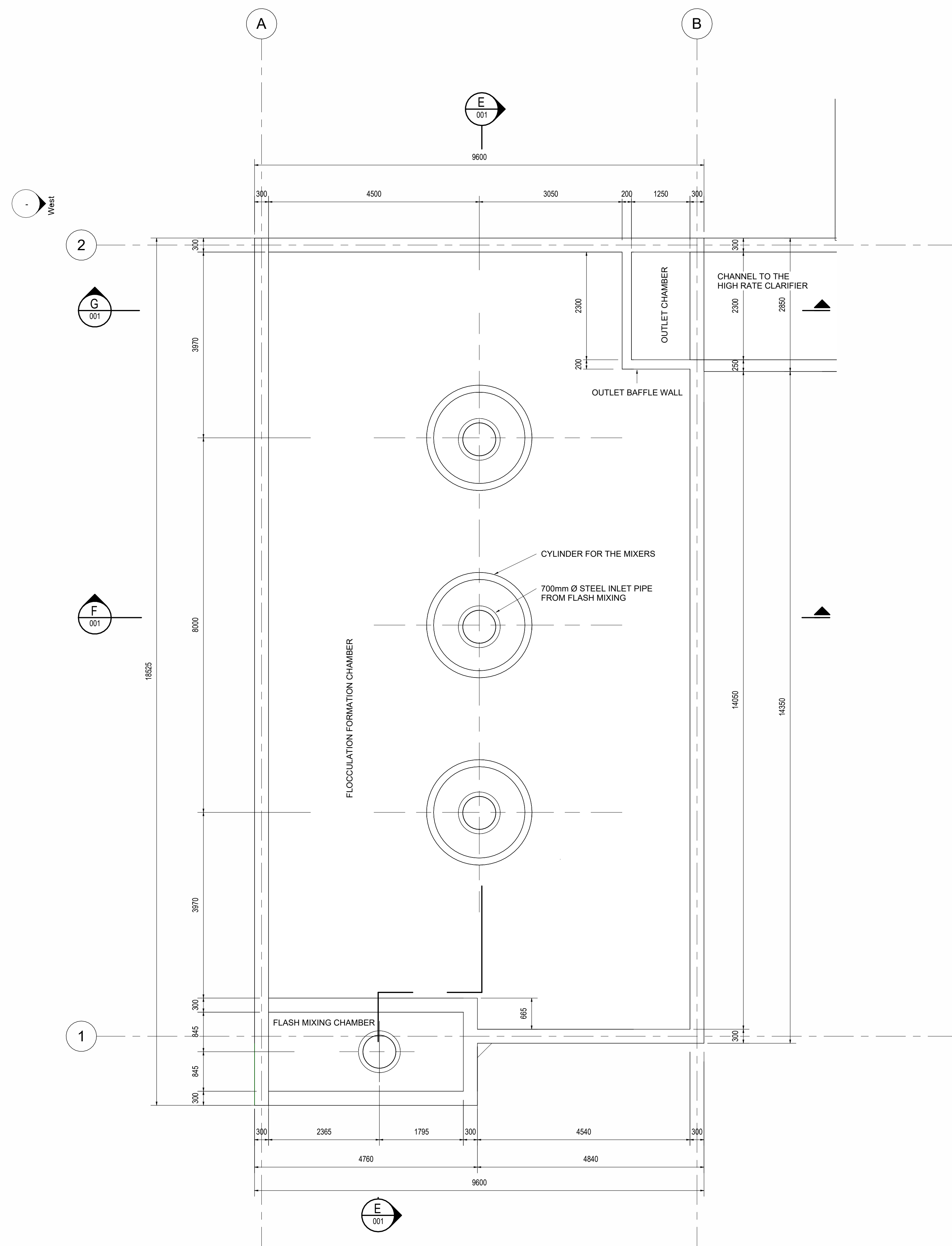
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CLIENT	CITY OF TSHWANE- UTILITY SERVICES DEPARTMENT	CONTRACT No.	SHEET
PROJECT TITLE	BRONKHORSTSPRIT WATER TREATMENT PLANT LIME STORAGE AND DOSING		
DRAWING TITLE	Ral-Brk-04-Mech-04		

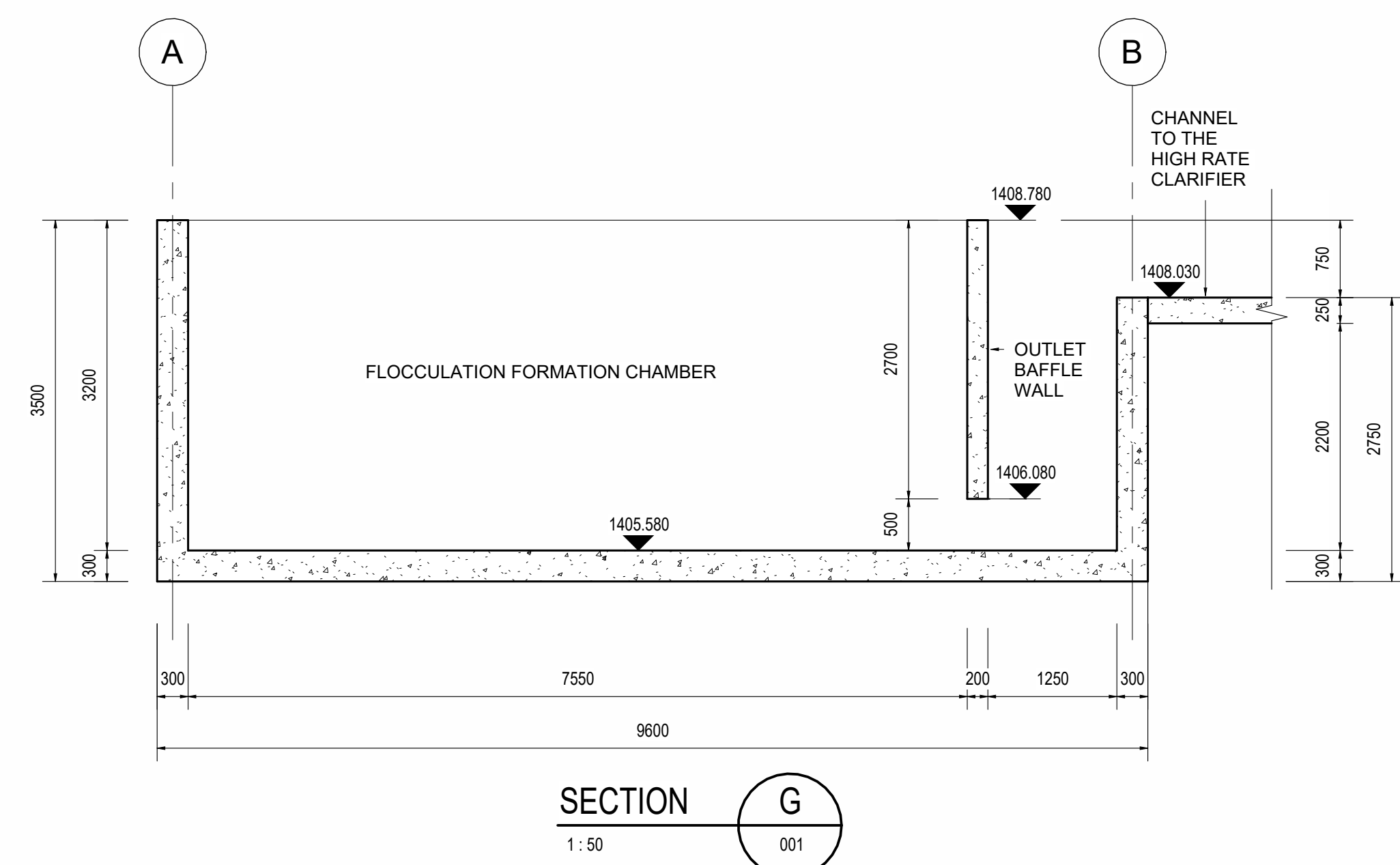
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REVISION	PLAN No.	
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SECTION 05

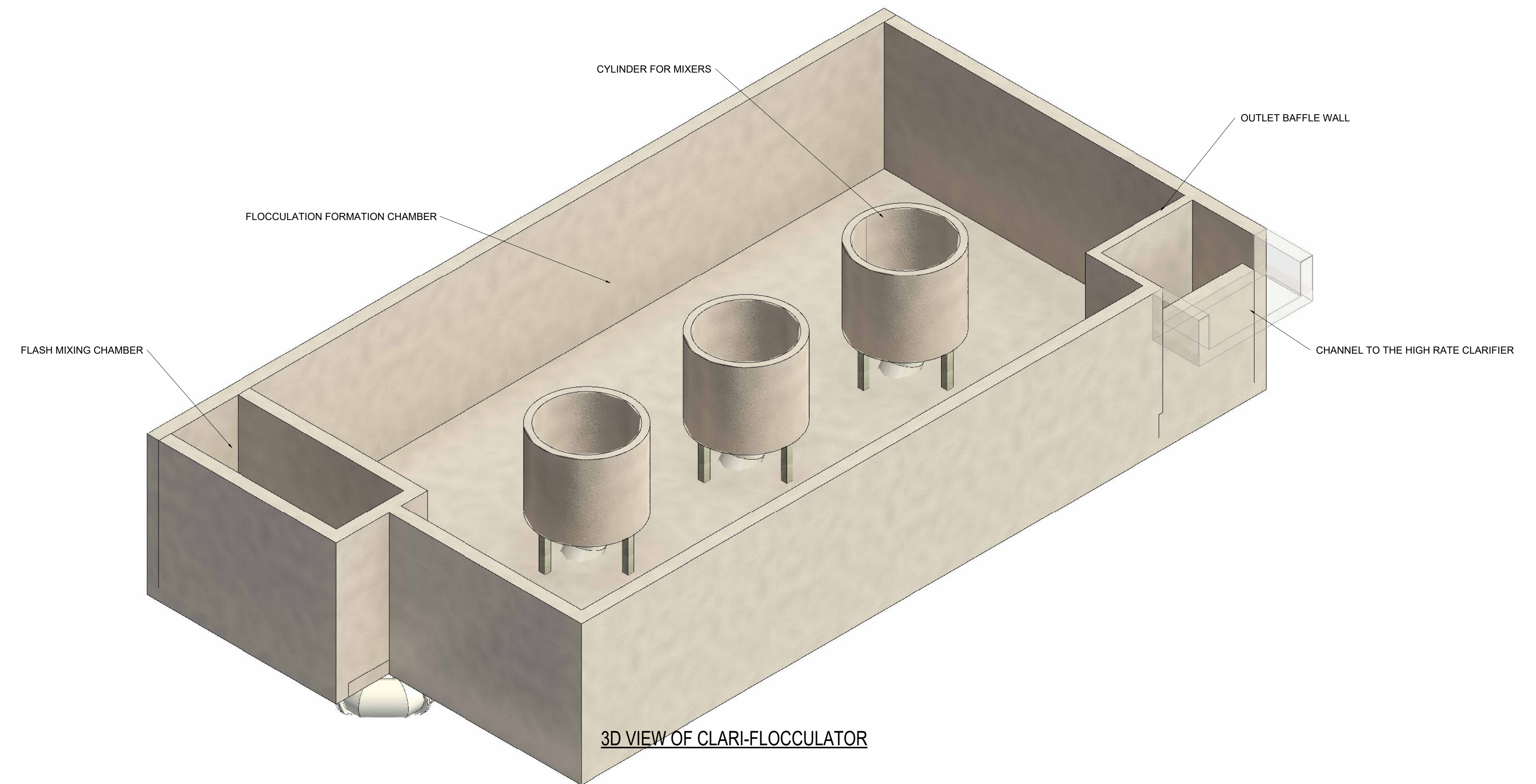
CLARI-FLOCULLATOR



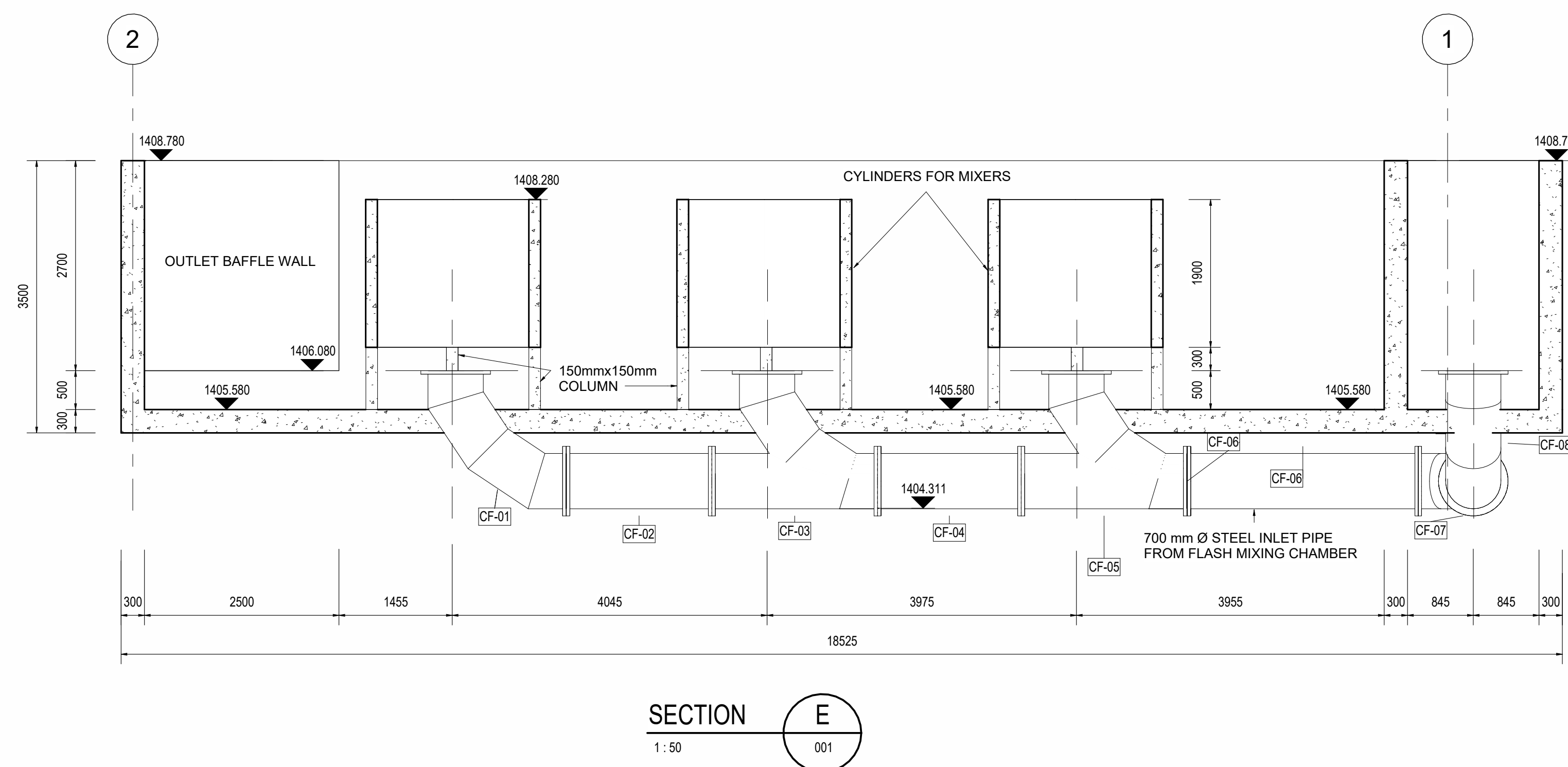
LAYOUT OF CLARI-FLOCCULATOR



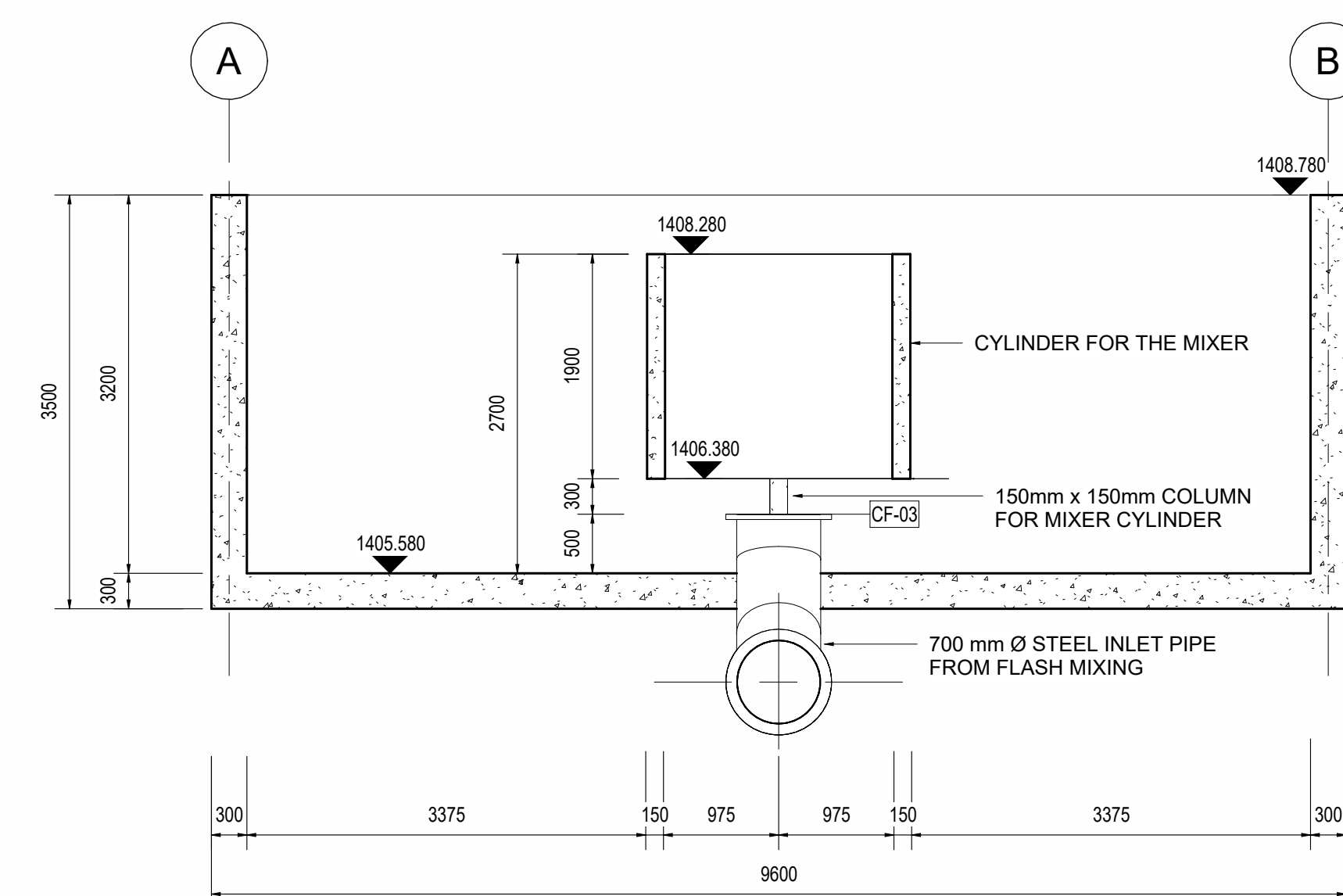
SECTION G
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3D VIEW OF CLARI-FLOCCULATOR



SECTION E
1:50 001



SECTION F
1:50 001

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CLIENT	CITY OF TSHWANE	CONTRACT No.	IPW No.	SHEET 0
PROJECT TITLE BRONKHORSTSPRUIT WATER TREATMENT WORKS				
DRAWING TITLE CLARI-FLOCCULATOR LAYOUT & SECTIONS				

SCALE	 PLANNING  CONSTRUCTION  AS-BUILT	STATUS
		 PLANNING
REVISION	PLAN No.	
00	Ral-Brk-05-Civ-01	

BOLTS, NUTS, WASHERS AND GASKET
SCHEDULE.

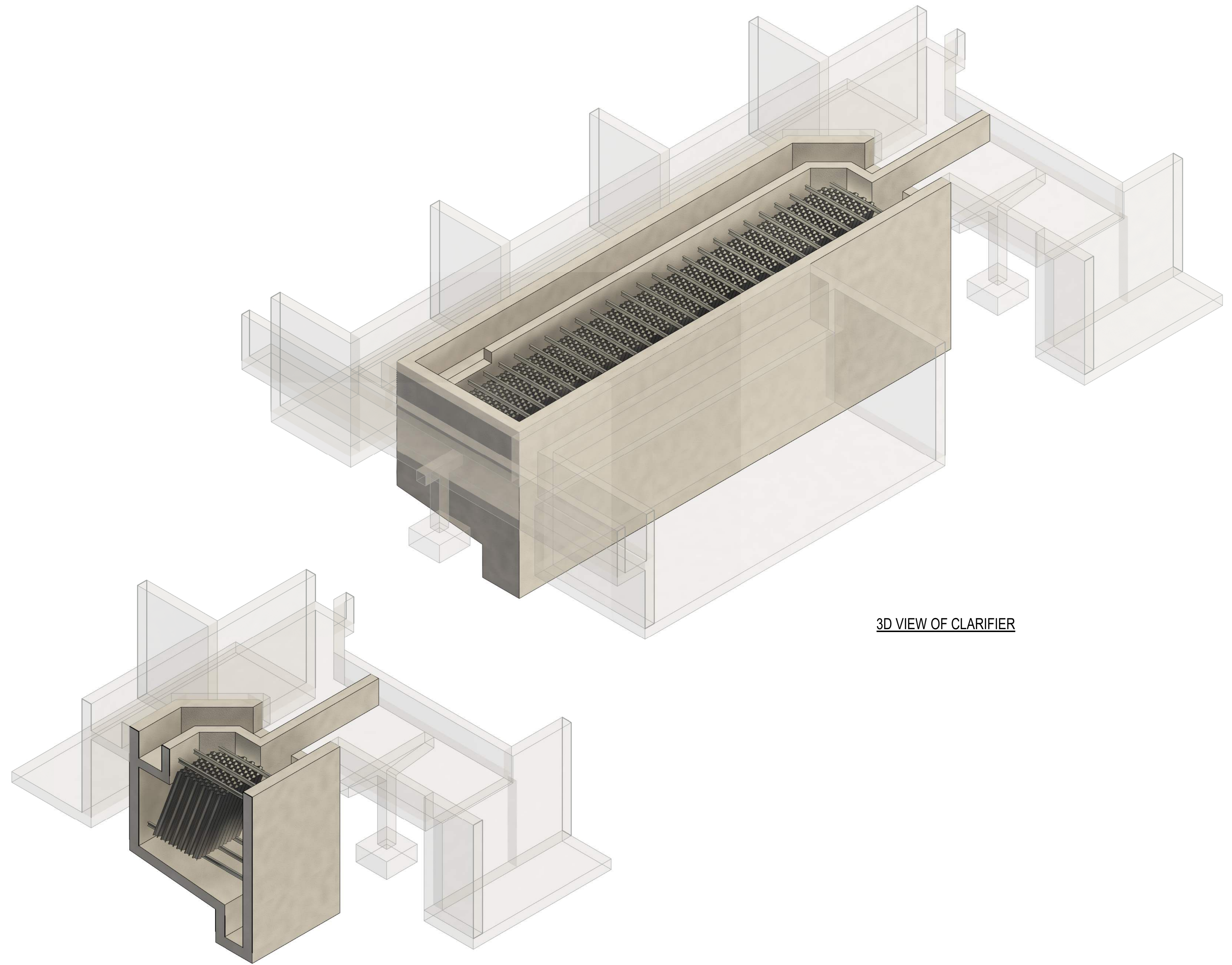
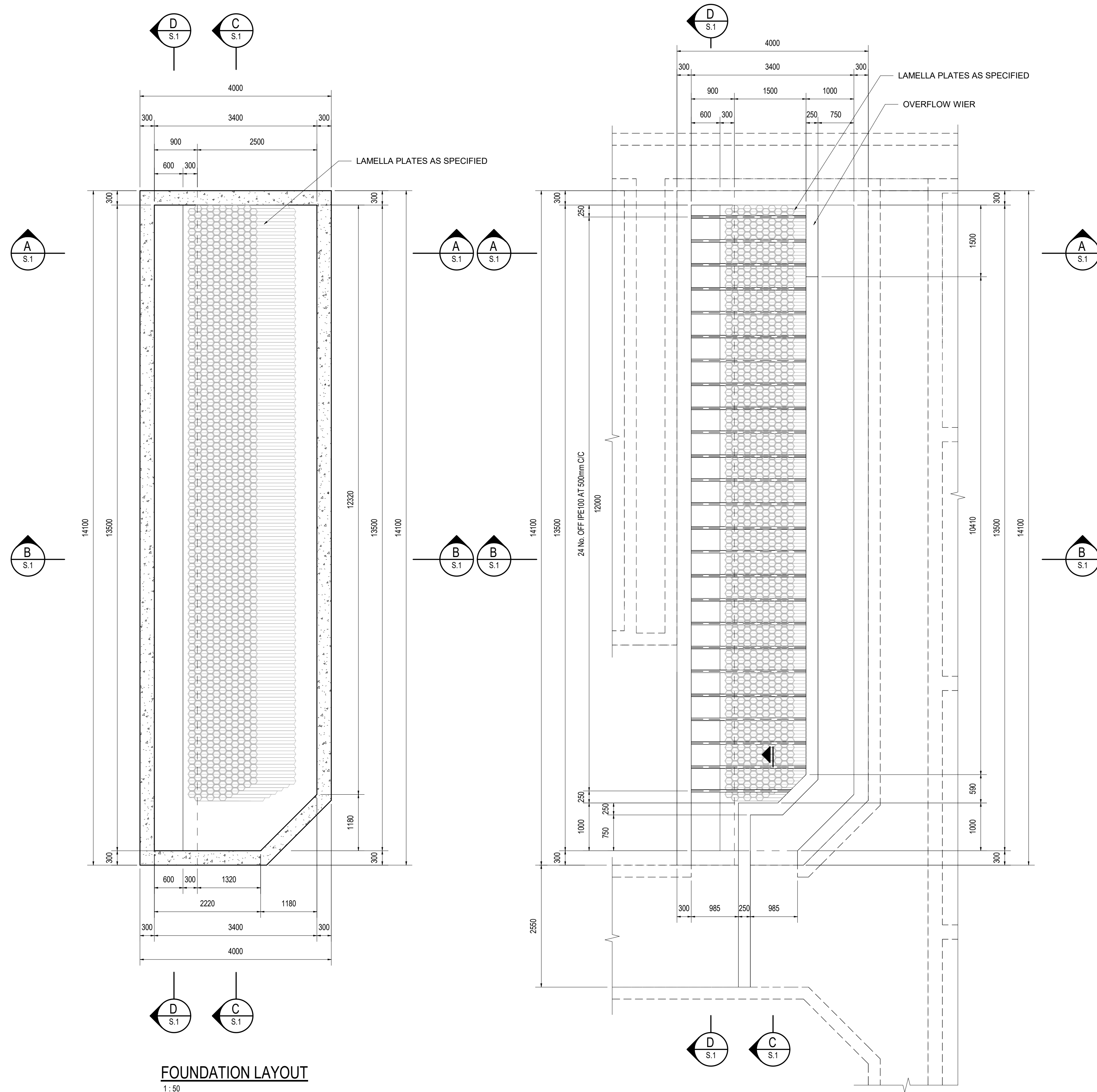
PIPE SCHEDULE ABBREVIATIONS:

MAT	-	MATERIAL.
DIA	-	DIAMETER.
D.F	-	DOUBLE FLANGED.
P.F	-	PUDDLE FLANGE.
O.A	-	OVERALL.
C.TO.F	-	CENTRE TO FACE.
F.TO.F	-	FACE TO FACE.
C.I	-	CAST IRON.
D.I	-	DUCTILE IRON.
M.S	-	MILD STEEL.
S.S	-	STAINLESS STEEL.
G.M.S	-	GALVANISED MILD W.T
-	-	WALL THICKNESS.
N.B	-	NOMINAL BORE.
E.M	-	END MACHINED.
M.T.S	-	MACHINED TO SUITE.

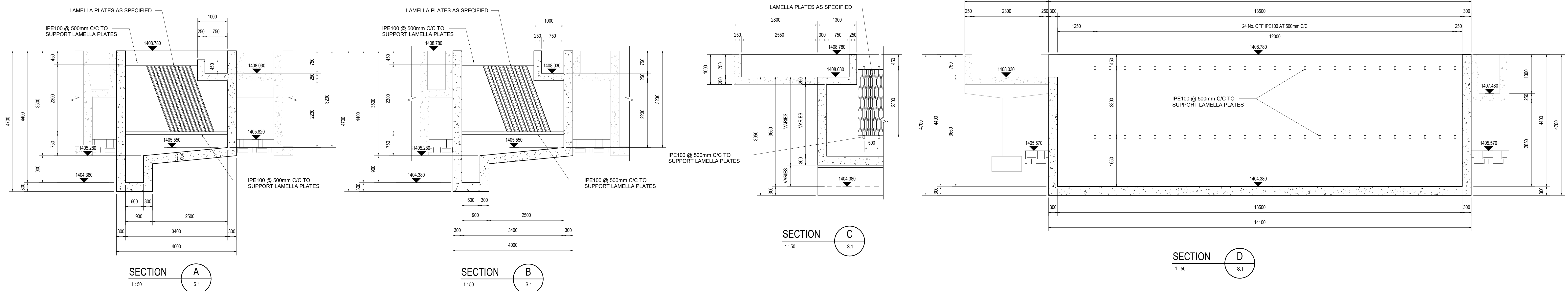
SCALE	TYPES OF PLANNING	STATUS
1:500	 PLANNING  CONSTRUCTION  AS-BUILT	 PLANNING
REVISION	PLAN No.	
A	Ral-Brk-05-Civ-02	

SECTION 06

HIGH-RATE CLARIFIER



SECTIONAL VIEW OF CLARIFIER



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A	2024-09-06	ISSUED FOR INFORMATION		

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CLIENT
CITY OF TSHWANE

CLIENT	CITY OF TSHWANE	CONTRACT No.	IPW No.	SHEET
PROJECT TITLE	BRONKHORSTSPRUIT WATER TREATMENT WORKS			
DRAWING TITLE	NEW CLARIFIER - LAYOUT, SECTIONS AND DETAILS			

SCALE	TYPES OF PLANNING	STATUS
AS SHOWN	PLANNING CONSTRUCTION AS-BUILT	PLANNING
REVISION	PLAN No.	
A	RAL-BRK-06-01	

1 GENERAL

- 1.1. THE CONTRACTOR SHALL CHECK ALL PROJECT DIMENSIONS ON SITE BEFOREHAND. ANY DIFFERENCES SHALL IMMEDIATELY BE REPORTED TO THE ENGINEER.
- 1.2. ALL SANS SPECIFICATIONS MENTIONED IN THE NOTES, ON THE DRAWINGS AND IN THE PROJECT SPECIFICATIONS SHALL BE AVAILABLE ON SITE AT ALL TIMES.
- 1.3. ALL INSTRUCTIONS FROM THE ENGINEER SHALL BE WRITTEN IN THE SITE INSTRUCTION BOOK.
- 1.4. PRODUCTS DIFFERENT TO THOSE SPECIFIED MAY ONLY BE USED WITH THE ENGINEER'S PRIOR WRITTEN APPROVAL.
- 1.5. THESE NOTES ARE TO BE READ IN CONJUNCTION WITH THE DRAWINGS AND PROJECT SPECIFICATIONS.

3 REINFORCEMENT

- 3.1. ALL REINFORCEMENT SHALL COMPLY WITH THE REQUIREMENTS OF SANS 1200G AND THE PROJECT SPECIFICATIONS.
- 3.2. THE CONTRACTOR SHALL GIVE AT LEAST 48 HOURS NOTICE TO THE ENGINEER FOR STEEL INSPECTIONS THAT ARE REQUIRED.
- 3.3. NO HEATING, FLAME CUTTING OR WELDING OF REINFORCEMENT SHALL BE ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
- 3.4. REINFORCEMENT SHALL BE CONTINUOUS THROUGH CONSTRUCTION JOINTS.
- 3.5. SPLICE LENGTHS IN REINFORCEMENT ARE AS FOLLOWS:

WATER- RETAINING STRUCTURES : 60 x SMALLER BAR DIAMETER.
NON-WATER- RETAINING STRUCTURES : 45 x SMALLER BAR DIAMETER.

WHERE APPLICABLE, SPLICES IN REINFORCEMENT SHOULD BE STAGGERED.

- 3.6. INSTALLATION OF TIE-IN DOWELS SHALL COMPLY WITH THE FOLLOWING:

DEPTH OF HOLE : 15 x DIAMETER OF DOWEL
DIAMETER OF HOLE : 1,3 - 1,4 x DIAMETER OF DOWEL
EPOXY VERTICAL UPSIDE DOWN : PRO-STRUCT 617 OR SIKADUR 31
EPOXY VERTICAL INSTALLATION : PRO-STRUCT 618 (OR 632 IF HOLE IS DAMP)
OR SIKADUR 32
EPOXY HORIZONTAL INSTALLATION : PRO-STRUCT 617 OR SIKADUR 31

5 STRUCTURAL STEELWORK

- 5.1. ALL STRUCTURAL STEELWORK SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH SANS 1200H.
- 5.2. ALL DIMENSIONS SHALL BE CHECKED ON SITE BEFORE PREPARATION OF SHOP DRAWINGS COMMENCES. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
- 5.3. A COMPLETE SET OF SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE FABRICATION COMMENCES. THE CONTRACTOR SHALL ALLOW TWO (2) WEEKS FOR CHECKING AND APPROVAL BY THE ENGINEER, AND SHALL ALSO ALLOW FOR ANY POSSIBLE CHANGES TO THE SHOP DRAWINGS.
- 5.4. ALL WELDS SHALL BE A MINIMUM OF 6 mm UNLESS OTHERWISE SHOWN.
- 5.5. THE CONTRACTOR SHALL DESIGN ALL WELDS AND, WHERE NECESSARY, GUSSETS OF SUFFICIENT STRENGTH SHALL BE PROVIDED TO OBTAIN THE REQUIRED LENGTH.
- 5.6. SETTING-OUT POINTS (S.O.P'S) AT MEMBER CENTROIDS SHALL CONFORM TO THOSE SHOWN ON GENERAL ARRANGEMENT DRAWINGS. NO ECCENTRICITIES, EXCEPT THOSE SHOWN ON THE ENGINEER'S DRAWINGS, SHALL BE ALLOWED.
- 5.7. ALL STRUCTURAL STEELWORK SHALL BE GRADE 350WA, EXCEPT COLD FORMED HOLLOW SECTIONS WHICH SHALL BE COMMERCIAL GRADE.
- 5.8. A CERTIFICATE FROM THE STEEL MANUFACTURER IN WHICH THE GRADE OF THE STRUCTURAL STEEL IS VERIFIED SHALL BE HANDED TO THE ENGINEER FOR APPROVAL.
- 5.9. ALL STRUCTURAL BOLTS SHALL BE HOT DIPPED GALVANISED GRADE 4.6 UNLESS OTHERWISE NOTED.
- 5.10. THE PROPOSED METHOD AND SEQUENCE OF ERECTION OF THE STRUCTURE SHALL BE SUBMITTED TO THE ENGINEER FOR WRITTEN APPROVAL. SUCH SUBMISSION IS TO TAKE PLACE AT THE TIME OF SHOP DRAWING SUBMITTAL. THE CONTRACTOR SHALL INDICATE THE PROPOSED METHOD OF PROPPING TO ENSURE STABILITY OF THE STRUCTURE DURING ERECTION. SUCH STABILITY DURING ERECTION REMAINS THE CONTRACTOR'S RESPONSIBILITY. WHERE TEMPORARY BRACING OR PROPPING IS NECESSARY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, ERECTION, MAINTENANCE AND REMOVAL (WHERE NECESSARY) OF SUCH SUPPORTS. PROPOSAL OF SUCH BRACING SHALL BE SUBMITTED TO THE ENGINEER AT AN EARLY STAGE FOR APPROVAL.
- 5.11. SYSTEM NO. 150 FROM SANS 0120: PART 3 SECTION HC-1988 SHALL BE USED FOR THE CORROSION PROTECTION OF STRUCTURAL STEEL, AND IS AS FOLLOWS:
REMOVE ALL SLAG FROM WELDED JOINTS TO EXPOSE THE STEELWORK.
FIRST COAT (100 micron MINIMUM) HEAVY DUTY HOT DIPPED GALVANISING TO SANS 763: THIS LAYER SHALL BE APPLIED WITHIN 4 HOURS AFTER PREPARATION.
- 5.12. WHERE APPLICABLE, GROUT SHALL BE PROVIDED UNDER BASE PLATES BEFORE ANY PRIMARY LOADS ARE APPLIED TO THE STRUCTURE.

2 EARTHWORKS AND FOUNDATIONS

- 2.1. ALL EARTHWORKS ARE TO BE DONE ACCORDING TO SANS 1200D AND THE PROJECT SPECIFICATIONS.
- 2.2. THE MINIMUM REQUIRED SOIL BEARING CAPACITY UNDERNEATH FOUNDATIONS IS 200 kPa:

APPROVED: DATE: PERS.NO.

- 2.3. ALL EXCAVATIONS ARE TO BE INSPECTED AND APPROVED IN WRITING BY THE ENGINEER BEFORE THE BLINDING OR FOUNDATION IS BEING CAST.
- 2.4. OVER-EXCAVATED PORTIONS ARE TO BE FILLED WITH MASS CONCRETE (15MPa/19mm) AT THE CONTRACTOR'S EXPENSE.
- 2.5. A 75 mm THICK BLINDING LAYER OF 15 MPa / 19 mm CONCRETE SHALL BE CAST UNDER ALL FOUNDATIONS FOR THE REINFORCED CONCRETE STRUCTURE WHERE INDICATED ON THE DRAWINGS.
- 2.6. BACKFILLING AROUND STRUCTURES SHALL BE COMPACTED TO 95% MOD AASHTO DENSITY IF NOT OTHERWISE SPECIFIED ON DRAWINGS

4 CONCRETE

- 4.1. ALL CONCRETE WORK SHALL BE DONE ACCORDING TO SANS 1200G AND THE PROJECT SPECIFICATIONS. THE REQUIREMENTS FOR WATERTIGHT CONCRETE SHALL BE FOLLOWED STRICTLY.
- 4.2. CONCRETE SPECIFICATION FOR ALL REINFORCED CONCRETE:

WATER CEMENT RATIO : <= 0,55
WATER DEMAND OF MIX : <= 190 l/ m3
MINIMUM CONCRETE STRENGTH : 30 MPa/ 19 mm
COVER BLOCKS : 30 MPa/ 13 mm
(i.e. CEMENT TYPE :CEM 1 BLEND OF 50% OPC AND 50% GGBS)
OR
CEM II B-V OR CEM II B-W (i.e. BLEND OF
75% OPC AND 25% FLY ASH)
CEMENT CONTENT : (Min: 325kg/m3 max 400kg/m3)

- 4.3. THE VALUE FOR T1, THE FALL IN TEMPERATURE BETWEEN THE HYDRATION PEAK AND AMBIENT AS DEFINED BY BS 8007: 1987, HAS BEEN BASED ON STEEL FORMWORK. THEREFORE ONLY STEEL FORMWORK MAY BE USED, AND THE USE OF TIMBER FORMWORK IS STRICTLY FORBIDDEN.
- 4.4. ALL CASTINGS PROCEDURES, CONSTRUCTION METHODS AND POSITIONS OF CONSTRUCTION JOINTS SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE PROJECT.
- 4.5. THE CONCRETE COVER TO REINFORCING IS AS FOLLOWS (EXCEPT WHERE OTHERWISE NOTED ON THE DRAWINGS) :
WATER RETAINING STRUCTURE : 40 mm
PAD FOUNDATIONS : 50 mm
COLUMN LINKS : 40 mm
BEAM STIRRUPS : 25 mm
ROOF : 25 mm

- 4.6. THE FOLLOWING TOLERANCES SHALL APPLY:
CONCRETE COVER : -0 mm +5 mm
BAR SPACING : -10 mm +10 mm

THE CONTRACTOR SHALL ENSURE THAT THE TOLERANCES ARE STRICTLY ADHERED TO, AND THAT SPACING OF STARTER BARS AND CONCRETE COVER ON STARTER BARS IS WITHIN THE SPECIFIED TOLERANCES BEFORE CONCRETE IS CAST.

- 4.7. BEAM DIMENSIONS ARE GIVEN AS A X B WHERE:
A = WIDTH OF BEAM
B = DEPTH OF BEAM (SLAB INCLUDED)

- 4.8. CONCRETE COVER BLOCKS SHALL BE MADE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.

- 4.9. CURING SHALL BE DONE IN ACCORDANCE WITH THE PROJECT SPECIFICATION.

- 4.10. NO KICKERS FOR COLUMNS OR WALLS WILL BE ALLOWED.

- 4.11. A 25 mm X 25 mm CHAMFER SHALL BE PROVIDED ON ALL VISIBLE CORNERS OF OFF-SHUTTER CONCRETE.

- 4.12. CONSTRUCTION JOINTS SHALL BE TREATED IN ACCORDANCE WITH THE PROJECT SPECIFICATION.

- 4.13. THE FOLLOWING PRE-CAMBERS ARE TO BE PROVIDED UNLESS OTHERWISE SHOWN:
CANTILEVERS BEAMS AND SLABS : SPAN / 150
OTHER BEAMS AND SLABS : SPAN / 400

ABOVE-MENTIONED CAMBERS ARE NOT APPLICABLE TO PRE-STRESSED CONCRETE.

6 MASONRY

- 6.1. MASONRY UNITS SHALL COMPLY WITH THE FOLLOWING SPECIFICATIONS:
SANS 227 : BURNT CLAY MASONRY UNITS
SANS 2885 : CALCIUM SILICATE MASONRY UNITS
SANS 1215 : CONCRETE MASONRY BLOCKS
- 6.2. BRICKWORK SHALL BE BUILT ACCORDING TO SANS 0164.
- 6.3. BRICKWORK SHALL BE REINFORCED WITH BRICK FORCE EVERY FORTH LAYER.
- 6.4. ALL BRICK ANCHORS, WALL TIES AND STRAPS SHALL BE HOT DIPPED GALVANISED.
- 6.5. V-JOINTS ARE TO BE MADE THROUGH PLASTER WORK WHERE BRICKWORK JOINS ONTO CONCRETE.
- 6.6. A JOINT FORMED WITH 15 mm JOINTEX BY SONDOR SHALL BE CREATED BETWEEN THE TOP OF NON-LOADBEARING BRICKWORK AND THE SOFFIT OF CONCRETE ELEMENTS SUCH AS BEAMS AND SLABS. AT FACE BRICK WALLS, THE JOINTEX SHALL BE PROVIDED WITH 15 mm WIDE TEAR-OFF STRIPS, AND THE JOINTS SEALED WITH 15 x 15 mm POLYSULPHIDE. WHERE BRICKWORK IS PLASTERED, THE PLASTER SHALL BE NEATLY CUT LOOSE FROM THE CONCRETE ELEMENT ABOVE TO THE SATISFACTION OF THE ENGINEER IN ORDER TO FORM A GAP OF 15 mm.

7 WATER PROOFING SYSTEM

- 7.1. WATERPROOFING SHALL COMPLY WITH THE FOLLOWING SPECIFICATIONS:
WATER ABSORPTION (BS 1881: PART 2)
CHLORIDE PERMEABILITY (ASTM D1411)
DIN 1048-5 TEST PROCEDURE (0,5 MPA FOR 72 HOURS).
- WATERPROOFING SYSTEM APPLIED CONCRETE SURFACES. (KRYSTOL T1 AND T2: APPLICATION POSITIVE SIDE OR SIMILAR)

8. PIPE WORK

- 8.1 ALL FACE TO FACE DIMENSIONS SHALL BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER. DIMENSION MAY VARY DEPENDING ON THE TYPE AND MAKE OF ITEMS SUCH AS VALVES.
- 8.2 CORROSION PROTECTION OF PIPES, SPECIALS, COUPLINGS AND VALVES:
- 8.2.1 ALL STEEL PIPES WITH NOMINAL DIAMETER UP TO AND INCLUDING 150mm SHALL BE TREATED ACCORDANCE TO SANS 1200 L UNLESS OTHERWISE SPECIFIED.
- 8.2.2 ALL STEEL PIPES WITH NOMINAL DIAMETER OVER 150mm SHALL BE TREATED WITH A POLYAMIDE-CURED EPOXY SYSTEM SIMILAR AND EQUAL TO COPON EP2300 OR AMERCOAT 385 TO A THICKNESS OF 300µm.
- 8.2.2 ALL MILD STEEL PIPE WORK BURIED IN THE GROUND SHALL EXTERNALLY BE PROTECTED BY A DENSO TAPE SYSTEM ALL OVER AND ABOVE GALVANIZING OR EPOXY COATING.
- 8.2.3 ALL VALVES INCLUDING CHECK VALVES SHALL HAVE SINISTER EPOXY POWDER COATING ON THE INTERIOR AND EXTERIOR METAL SURFACES.
- 8.2.4 ALL PIPES INSIDE PUMP STATION THAT ARE EXPOSED SHALL BE EXTERNALLY PAINTED BY ACRYLIC MODIFIED POLYURETHANE PAINT (COLOUR TO BE SPECIFIED BY THE CLIENT).
- 8.3 ALL FLANGE DRILLING SHALL COMPLY WITH SANS 1123 TABLES (1600/3) RESTRAINING FLANGES INCLUDED, BUT PUDDLE FLANGES EXCLUDED.
- 8.4 ALL STEEL PIPES WITH NOMINAL DIAMETER LARGER THAN 150mm SHALL BE MILD STEEL PIPE IN ACCORDANCE WITH SANS 719 AND HAVE A WALL THICKNESS OF 6.0mm UNLESS OTHERWISE SPECIFIED.
- 8.5 ALL STEEL PIPES WITH NOMINAL DIAMETER SMALLER THAN 150mm SHALL BE MEDIUM DUTY QUALITY PIPE IN ACCORDANCE WITH SANS 62 AND HAVE A WALL THICKNESS OF 4.5mm UNLESS OTHERWISE SPECIFIED.
- 8.6 THE POSITION OF PRESSURE GAUGES WILL BE DETERMINED IN CONJUNCTION WITH THE CONTRACTOR BEFORE MANUFACTURING OF PIPES.

01	1/7/25	Issued for Detailed Design	SS	LK
No.	DATE	REVISIONS	BY	CHECKED BY

DESIGNED BY: RALEMA CONSULTING ENGINEERS



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Sekaniso Sidira DRAWN
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DATE:	DATE:

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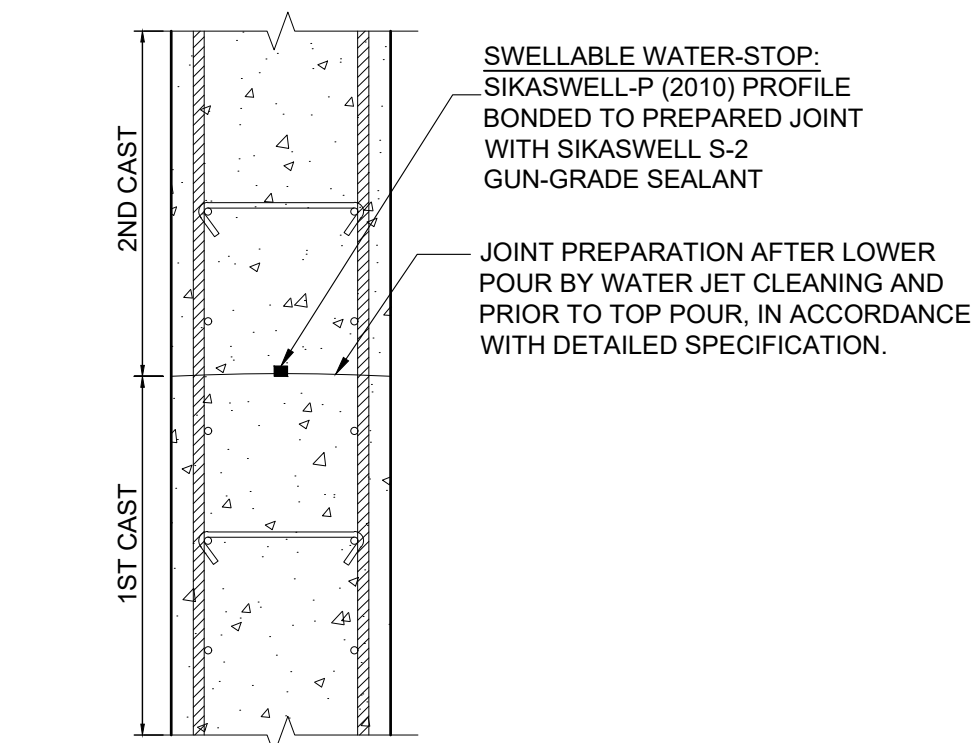
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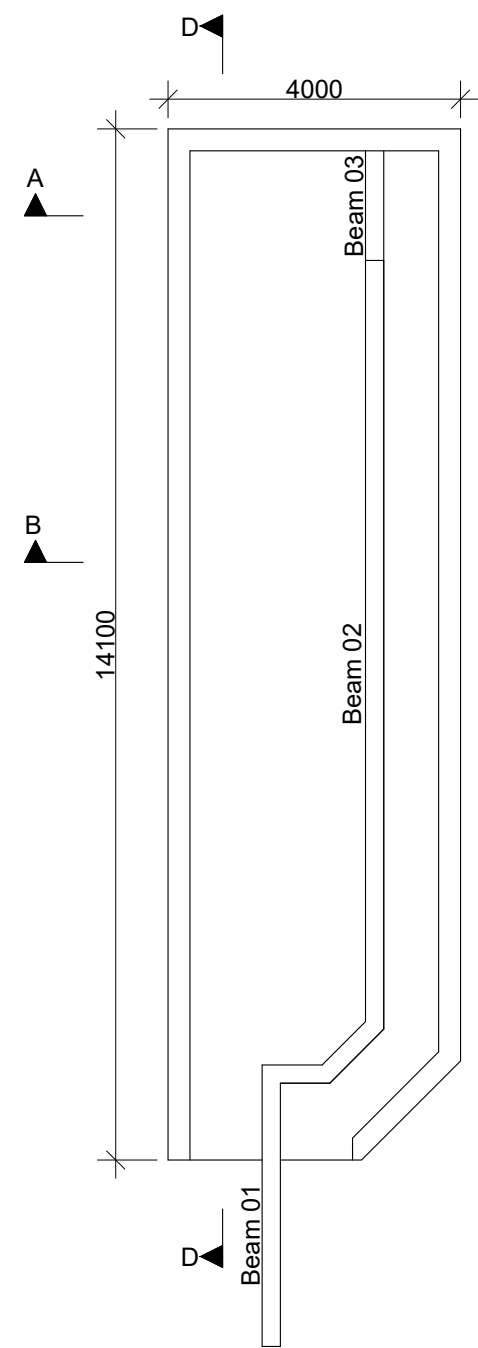
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CLIENT	CITY OF TSHWANE	CONTRACT No.	IPW No.	SHEET
PROJECT TITLE	BRONKHORSTSPRUIT WATER TREATMENT WORKS			
DRAWING TITLE	GENERAL NOTES			

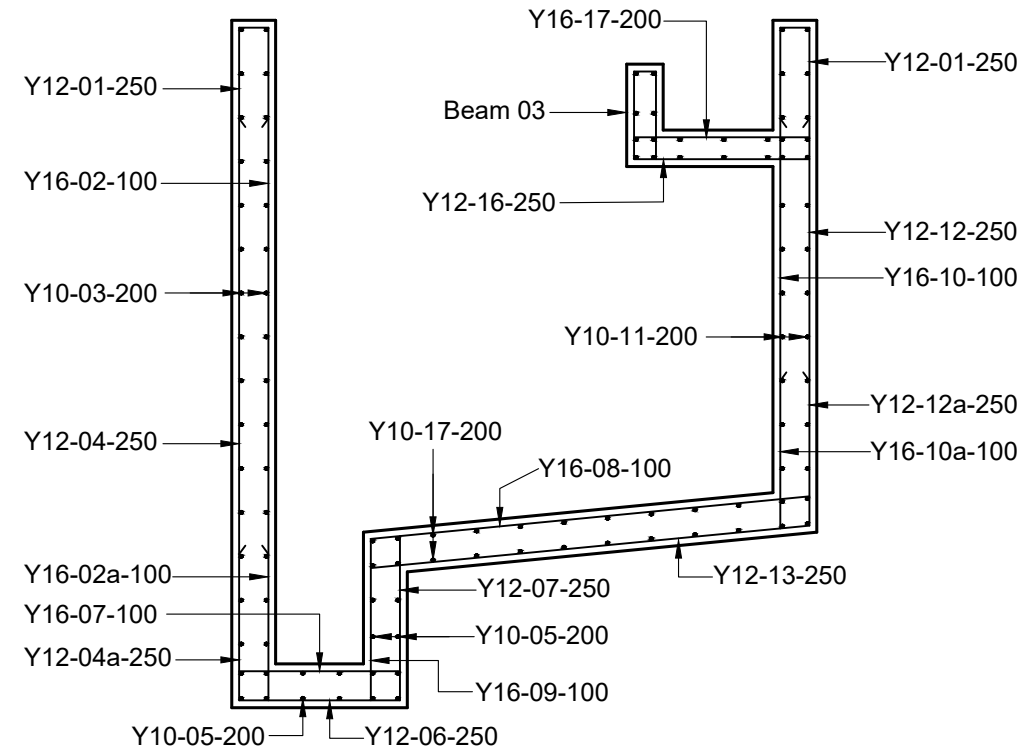
SCALE	TYPES OF PLANNING	STATUS
	PLANNING CONSTRUCTION AS-BUILT	PLANNING
REVISION	PLAN No.	
0	Ral-Brk-06-Str-001	



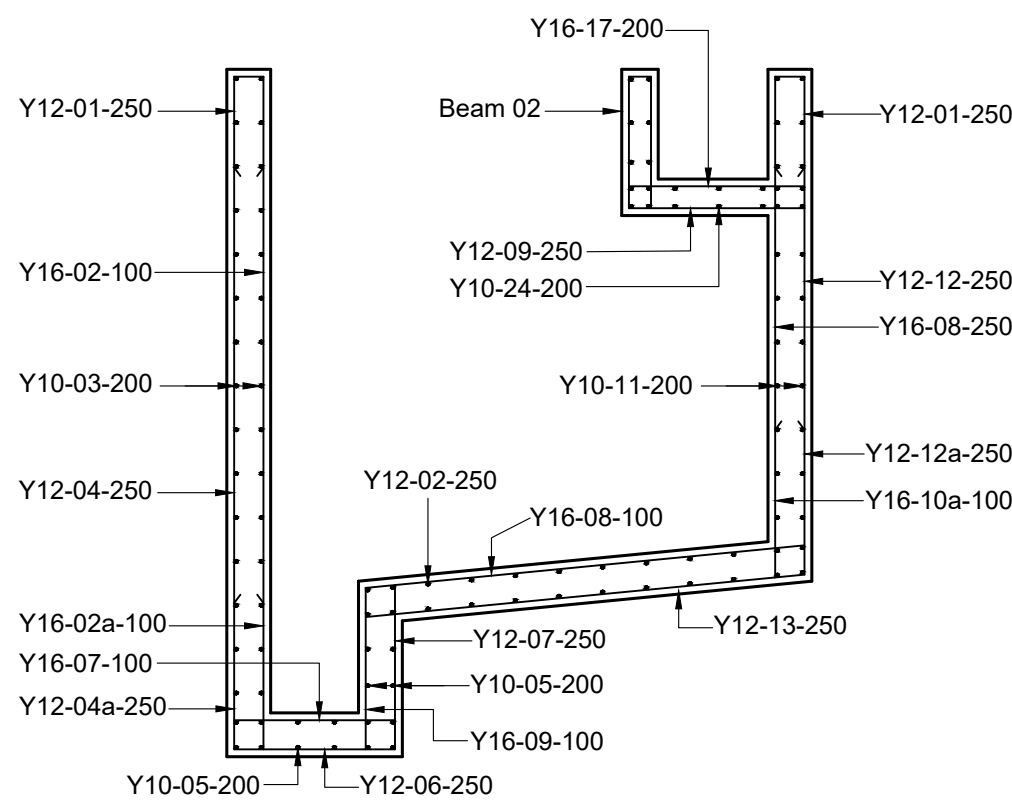
HORIZONTAL / VERTICAL WALL JOINT DETAIL
Scale 1:10



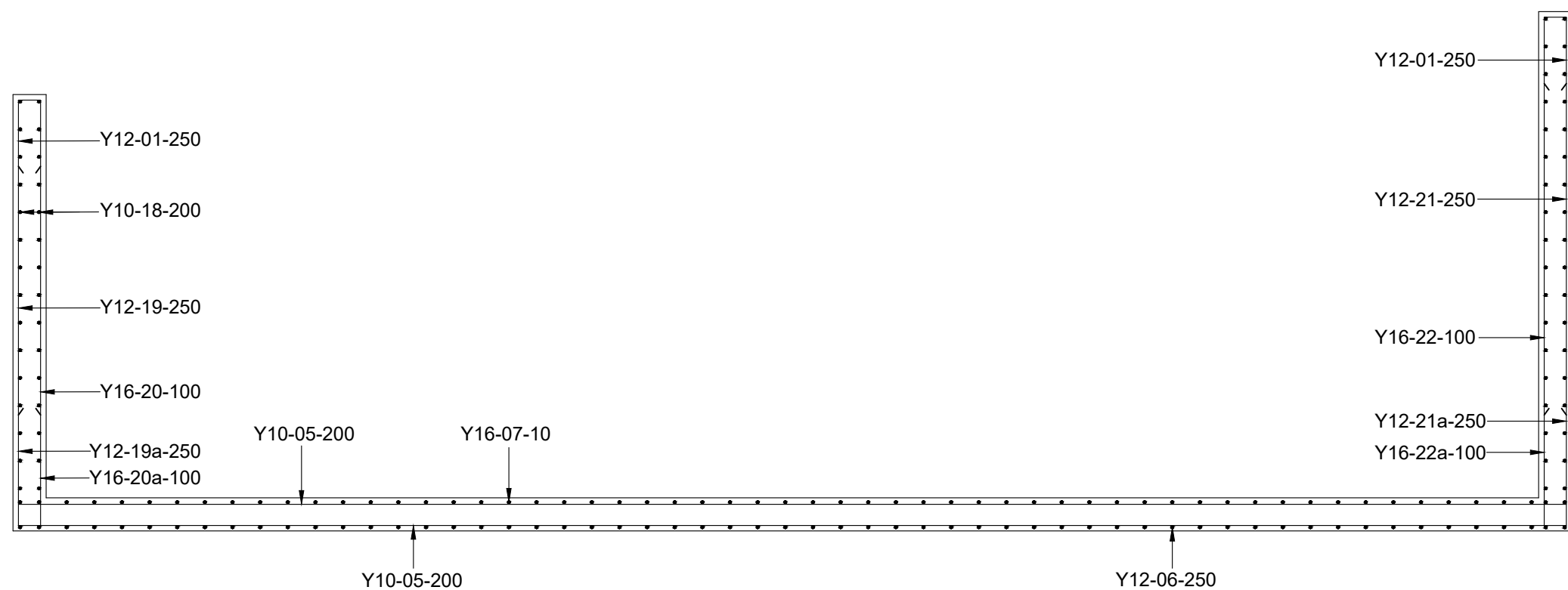
BEAM LAYOUT
Scale 1:100



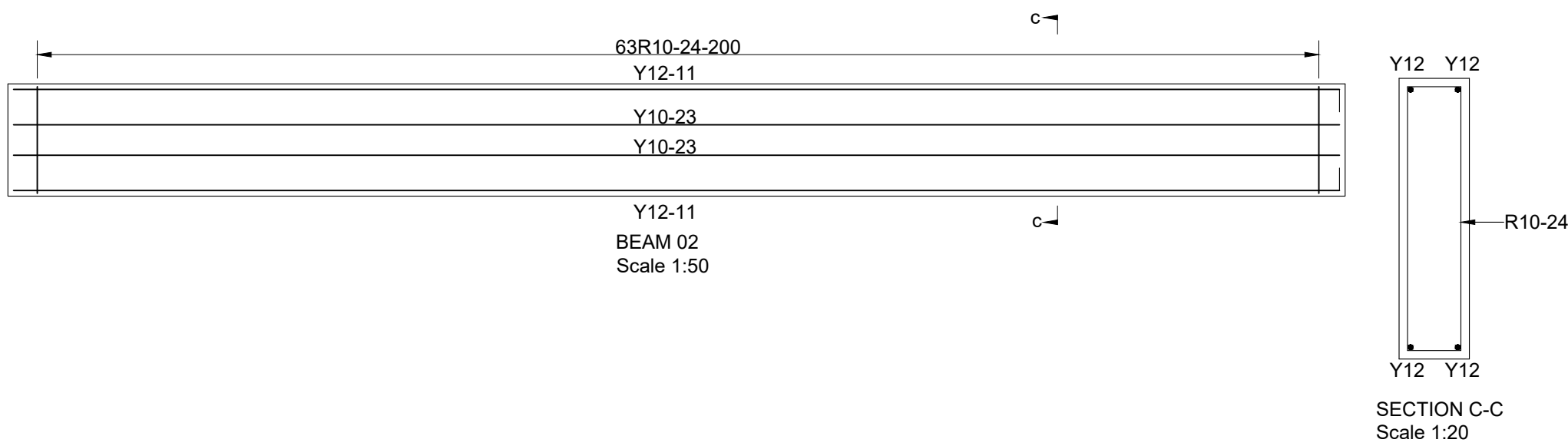
SECTION A-A
Scale 1:50



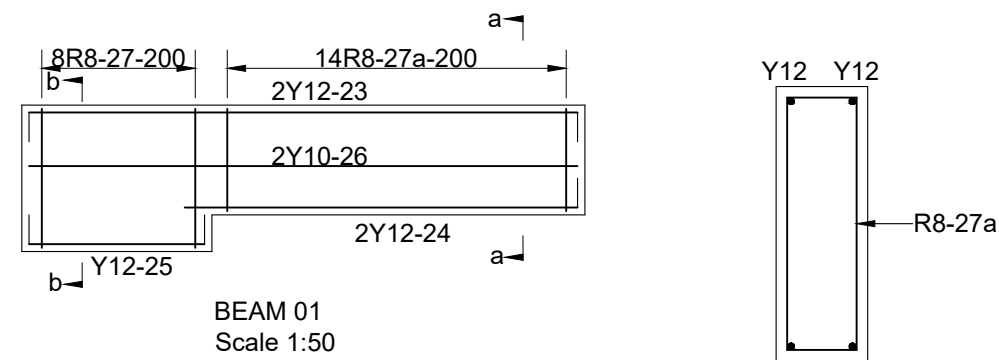
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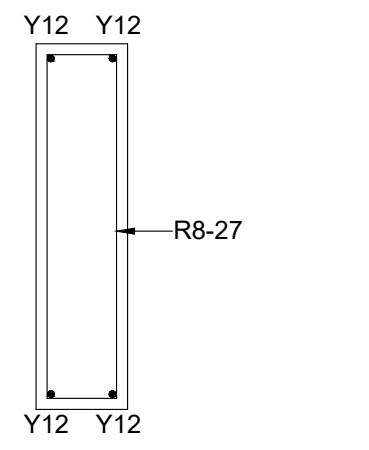
SECTION D-D
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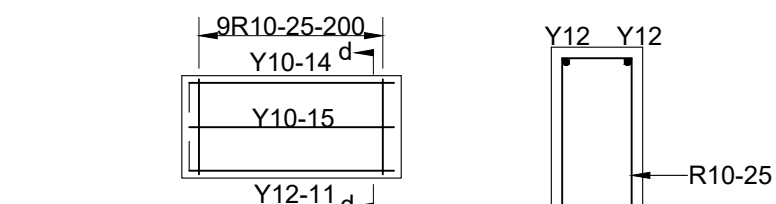
SECTION C-C
Scale 1:20



SECTION a-a
Scale 1:20



SECTION b-b
Scale 1:20



SECTION d-d
Scale 1:20

REINFORCING STEEL (REBAR) SHAPE CODES TO SANS 282			
1	2	3	4
20	39	52	73
32 (see note)	41	53	74
33 (see note)	42	54	75
34 (see note)	43	55	76
35 (see note)	44	56	77
36	45	57	78
37	46	58	79
38	47	59	80
39	48	60	81
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