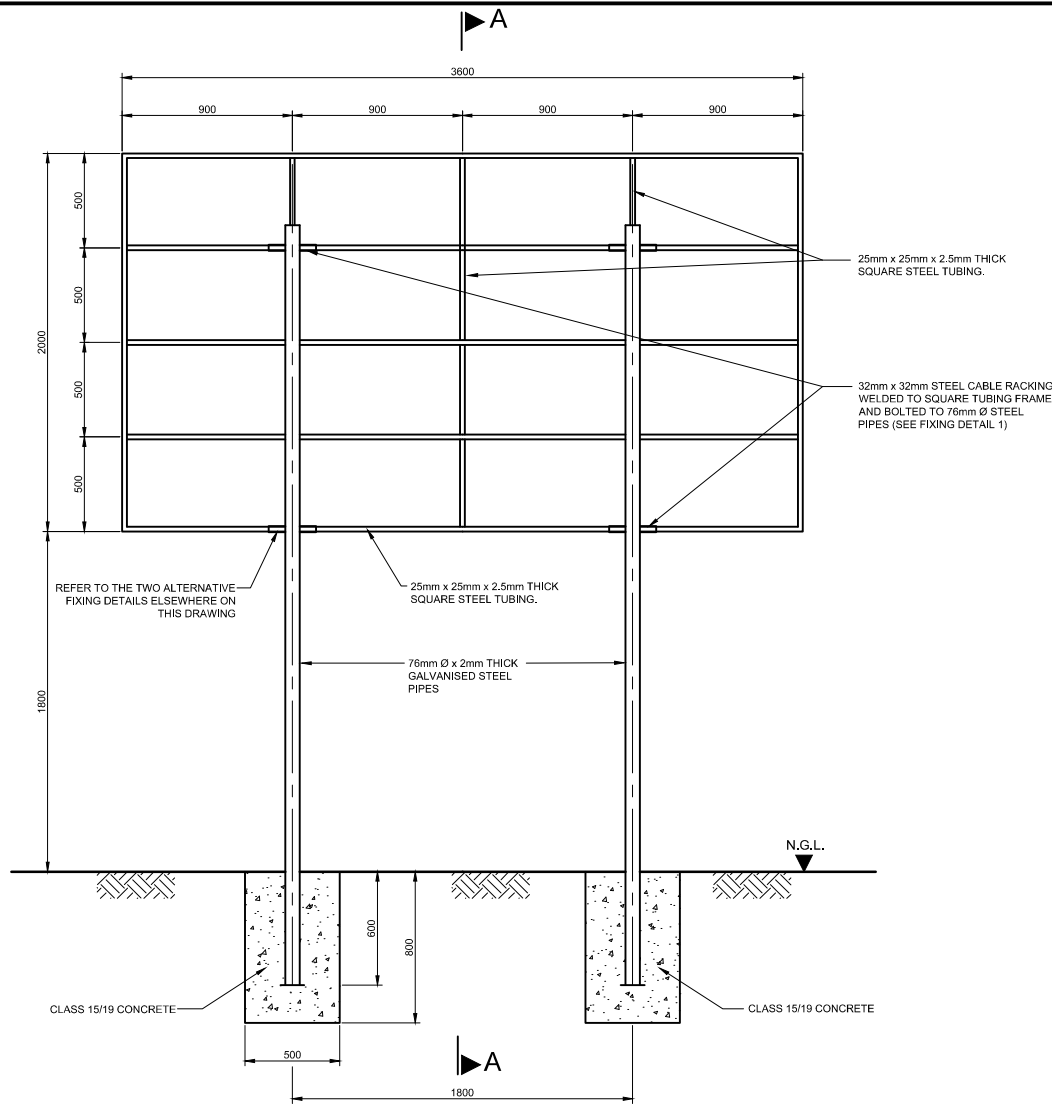
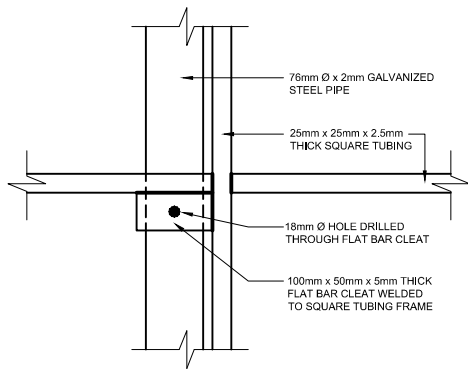
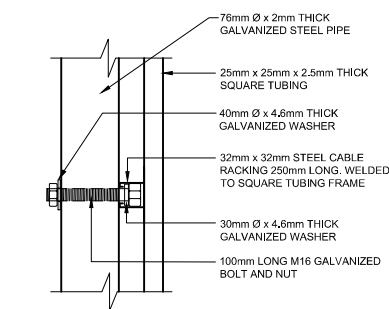


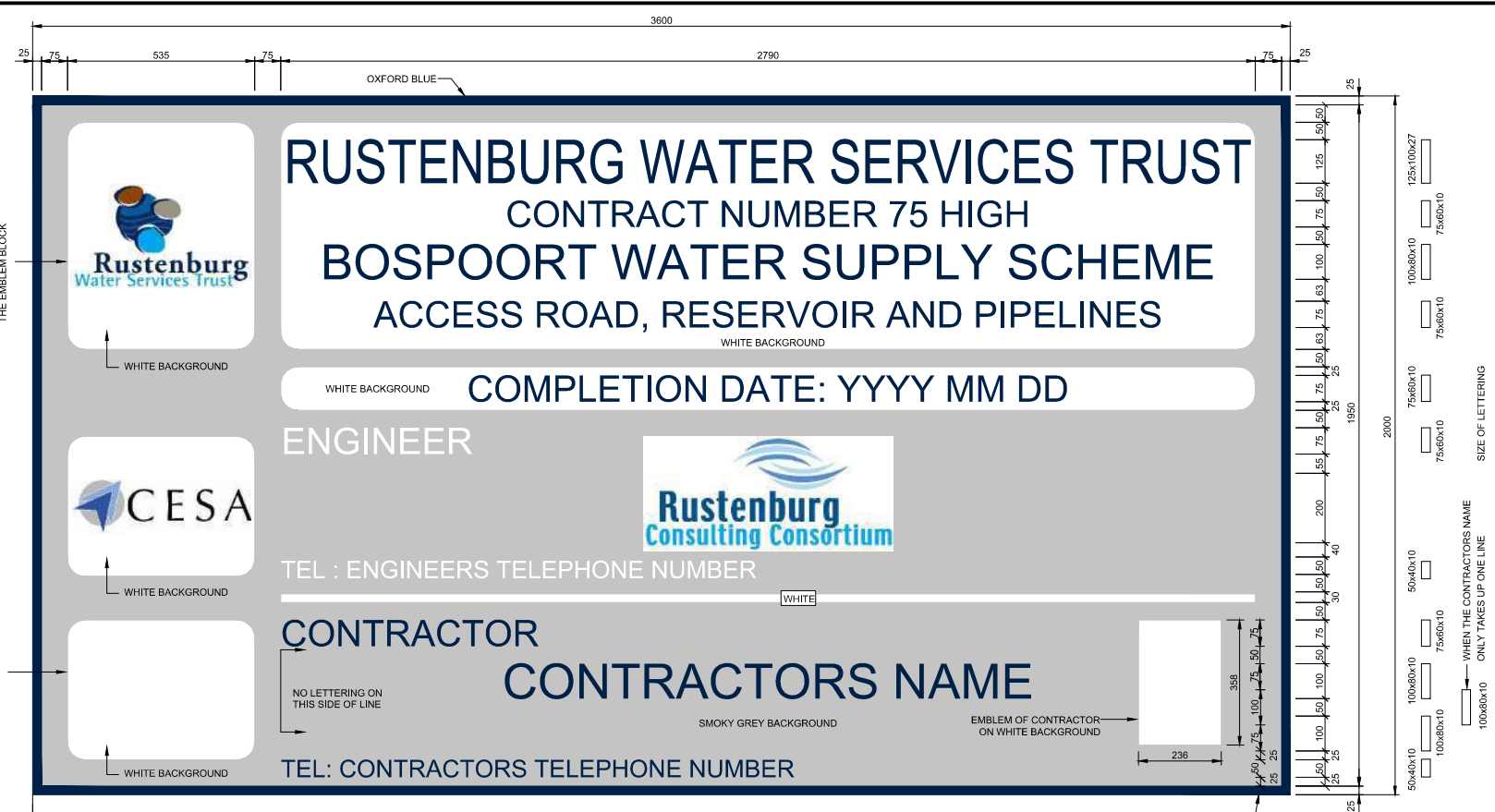
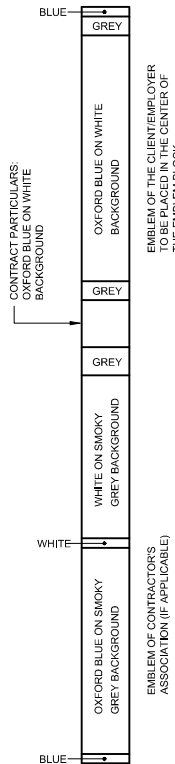




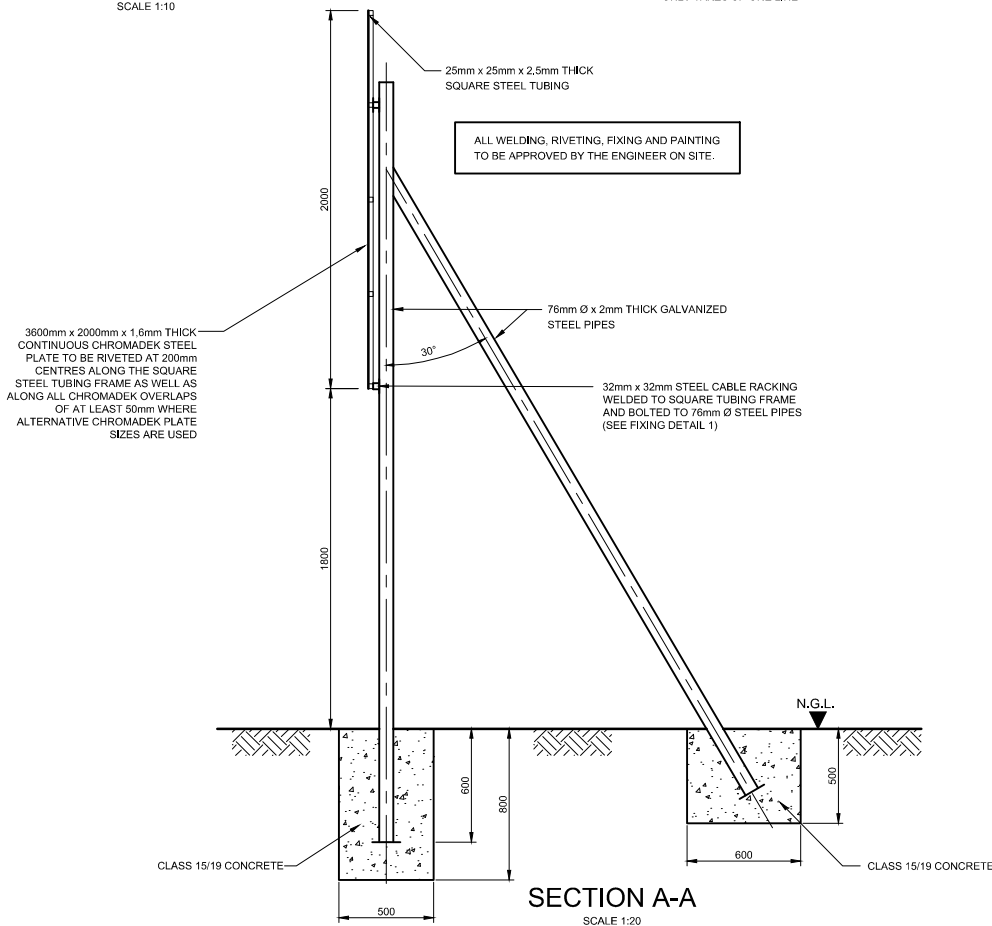
BACK ELEVATION  
SCALE 1:20



FIXING DETAIL 2  
ALTERNATIVE FIXING DETAILS  
SCALE 1:5



FRONT ELEVATION  
SCALE 1:10



| VERSION / AMENDMENTS |         |                             |          |
|----------------------|---------|-----------------------------|----------|
| No.                  | DATE    | DESCRIPTION                 | AUTH. BY |
| 2                    | 2024/01 | PROJECT DESCRIPTION REVISED | CvE      |
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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**CONTRACT NAME BOARD DETAILS**

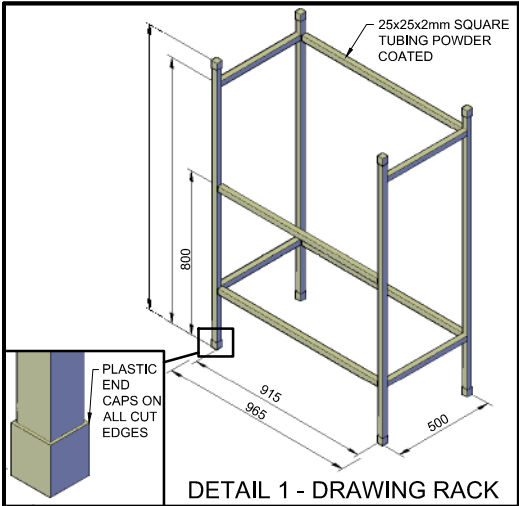


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| APPROVED ON BEHALF OF CLIENT: |                 |
| NAME:                         |                 |
| DATE:                         |                 |
| CLIENT DRAWING No.:           | CLIENT REF No.: |

|                              |                        |          |              |
|------------------------------|------------------------|----------|--------------|
| SURVEYED                     |                        | DESIGNED | C VAN ECK    |
| DRAWN                        | JA SWART               |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27                   | DATE     | MAY 2020     |
| APPROVED ON BEHALF OF BIGEN: |                        |          |              |
| DRAWING No.:                 | 1890.11.00.AAA.01.A010 | VERSION: | 2            |

1890.11.00.AAA.01.A010





**NOTES:**  
(FOR PHOTOS REFER TO DRAWING NO 1890.11.00.AAA.01.U002)

**CAMP**

- CLEAR, GRUB AND GRADE SITE TO BE SELF DRAINING
- 75mm THICK 19mm STONE GRAVELING THROUGHOUT
- MAST LIGHT TO BE PROVIDED 5m HIGH WOODEN MAST, 500 WATT GLOBE & DAY/NIGHT SWITCH
- FENCING TO BE 2.1m HIGH RAZOR MESH WIRE INCL. RAZOR FLAT WRAP ON TOP (SEE PHOTO 1) WITH LOCKED GATE.
- FULL TIME GATE GUARD TO BE PROVIDED WITH GUARD HOUSE (GH), GUARD HOUSE TO BE A 2.1m x 2.1m MODEL FROM RENT A SHED (WWW.RENTASHED.CO.ZA) OR SIMILAR APPROVED INCL CHAIR
- STEPS TO BE PROVIDED AT ALL OFFICE ENTRIES
- 1x FULL TIME CAMP ASSISTANT TO BE PROVIDED FOR CLEANING AND CAR WASH
- 3x CHEMICAL TOILETS TO BE PROVIDED (FLUSHABLE) (T)
- 80% SHADE CLOTH TO BE FIXED ON INSIDE OF FENCING IF SPECIFIED
- GALVANISED ROOF SHEETING (0.6mm THICK) CARPORT TO DRAIN TOWARDS THE BACK OF THE STRUCTURE (OPPOSITE ACCESS POINT). SIDES AND BACK OF CARPORT TO BE CLOSED WITH SHADE NETTING, THE STRUCTURE OF THE CARPORT STRUCTURE TO BE APPROVED BY A REGISTERED STRUCTURAL ENGINEER.
- 20m GARDEN HOSE TO BE PROVIDED
- CLO AND/OR LDO OFFICES NEED TO BE LOCATED OUTSIDE OF THE ENGINEER'S CAMP

- OFFICE (SEE PHOTO 8)**
- OFFICE C1 TO BE KWIKSPACE MODULAR BUILDINGS LTD (WWW.KWIKSPACE.CO.ZA) SINGLE WIDE 3mx12m OFFICE OR SIMILAR APPROVED
  - OFFICE C2 TO BE KWIKSPACE MODULAR BUILDINGS LTD (WWW.KWIKSPACE.CO.ZA) SINGLE WIDE 3mx12m OFFICE OR SIMILAR APPROVED
  - OFFICE C3 TO BE KWIKSPACE MODULAR BUILDING LTD (WWW.KWIKSPACE.CO.ZA) SINGLE WIDE 3mx3m OFFICE OR SIMILAR APPROVED
  - W/C TO BE KWIKSPACE MODULAR BUILDING LTD (WWW.KWIKSPACE.CO.ZA) STANDARD 3mx3m UNIT OR SIMILAR APPROVED
  - 12000 BTU SPLIT AIRCON UNIT (LG) TO BE PROVIDED IN OFFICE C1 & C2
  - KWIKSPACE BLINDS AND BURGLAR PROOFING TO BE INSTALLED
  - OFFICE TO BE CLEANED ON A DAILY BASIS

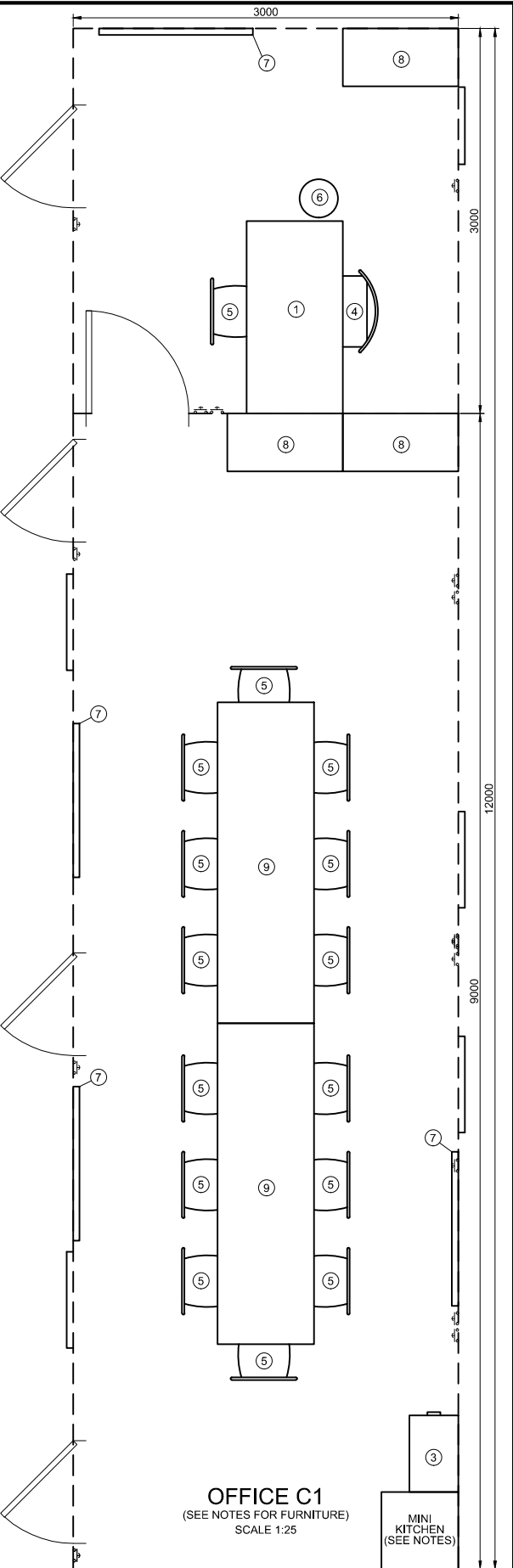
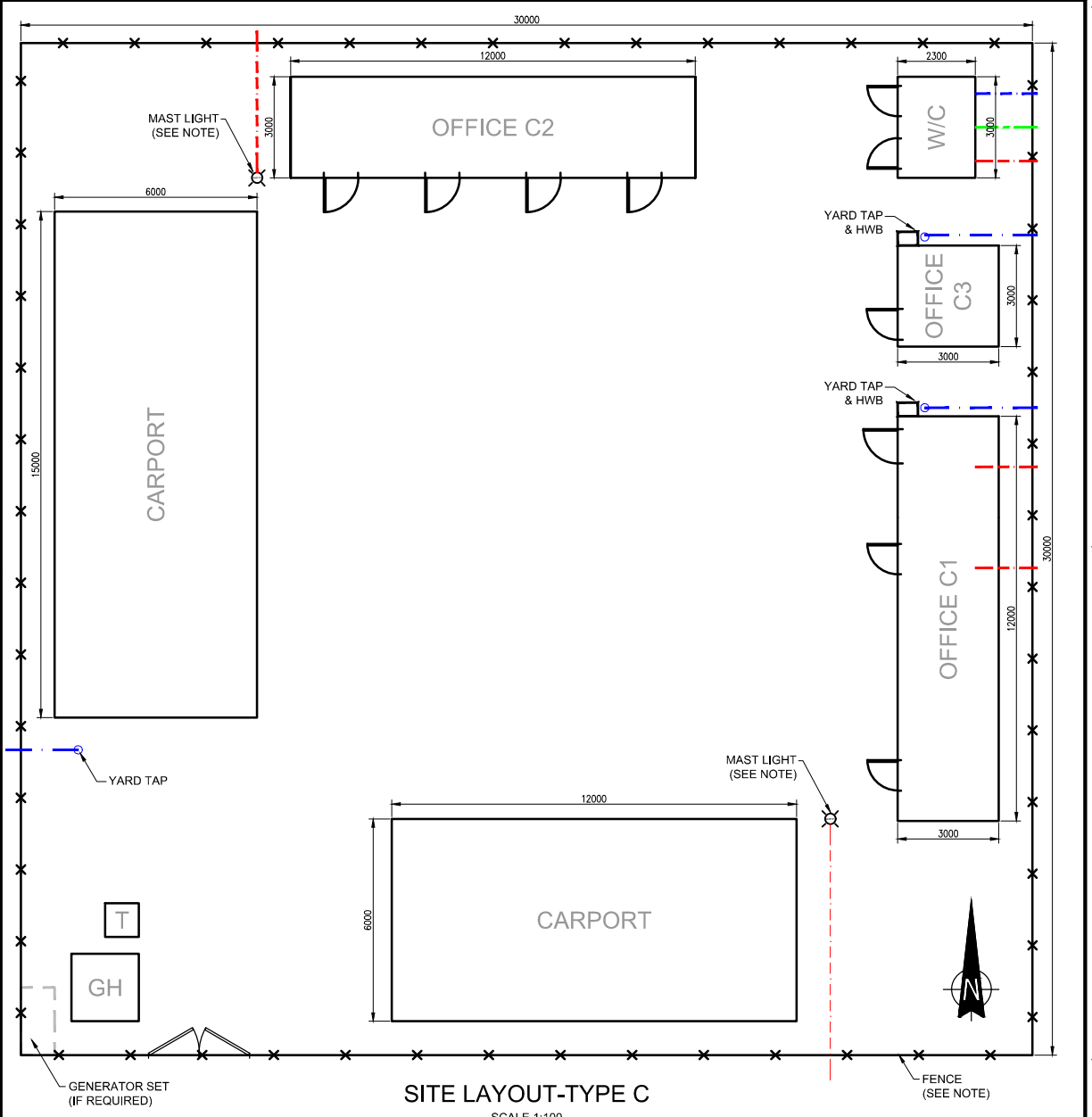
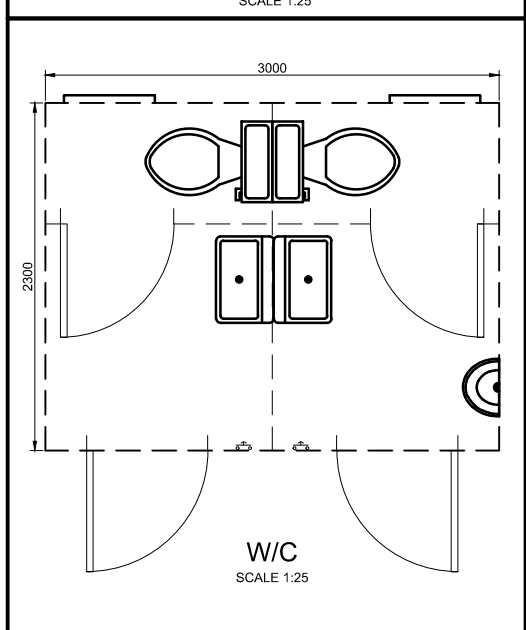
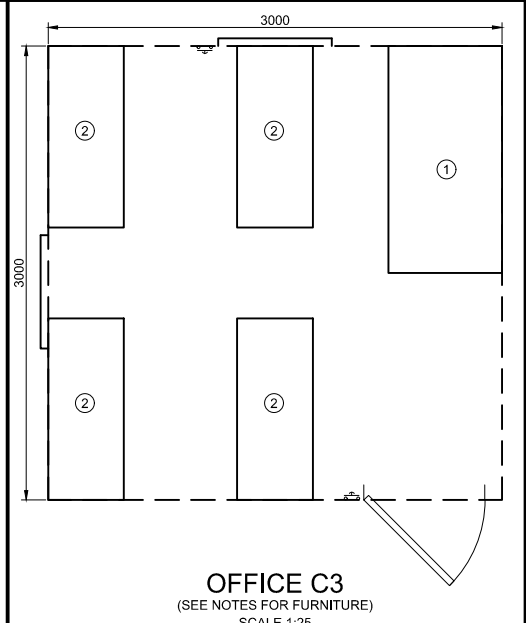
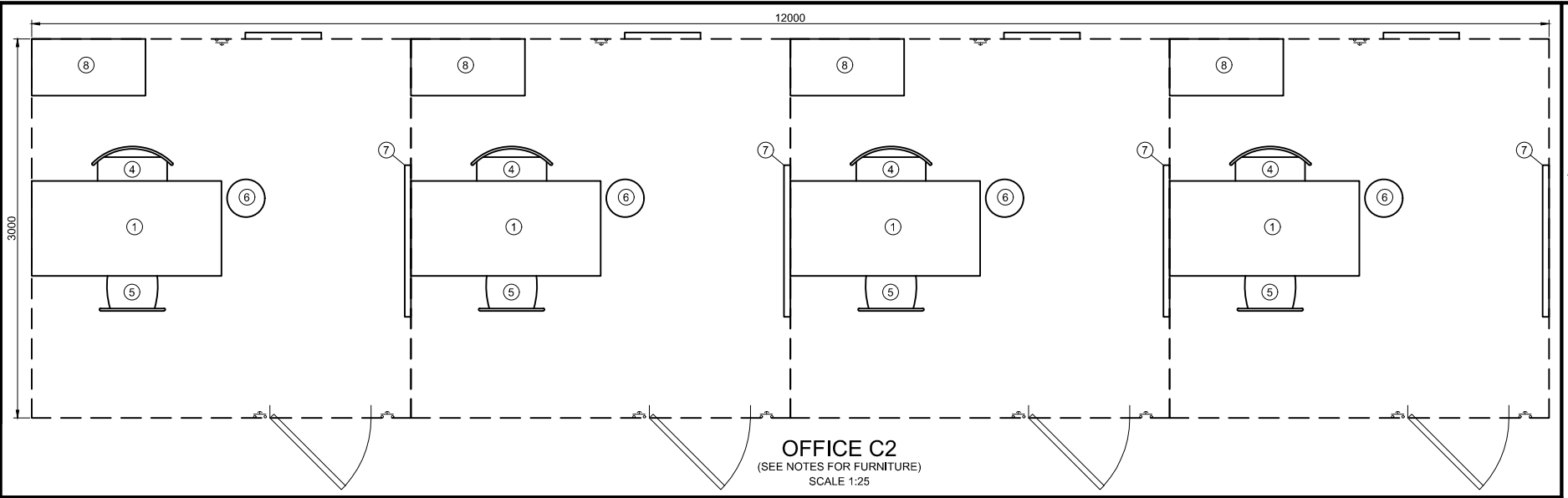
- OFFICE FURNITURE (ALL FURNITURE TO BE NEW)**
1. 1500x900mm OAK MELAMINE DESK
  2. DRAWING RACK - SEE DETAIL 1
  3. HALF FILING CABINET (SEE PHOTO 3)
  4. ROTATING HIGH BACK CHAIR (SEE PHOTO 4)
  5. 20x RICKSTACKER CHAIRS (SEE PHOTO 5)
  6. PLASTIC ROUND WASTE BIN
  7. 2mx1.2m MAGNETIC WHITE BOARD
  8. FULL STATIONERY CUPBOARD (SEE PHOTO 6)
  9. 2500x900mm BOARDROOM TABLE (SEE PHOTO 7)

- STATIONERY PACKAGE (TOTAL # OF SETS SPECIFIED IN TENDER DOCUMENT)**
- 3x PENS (2x BLACK, 1x RED)
  - 1x PENCIL & LEAD
  - 1x ERASER
  - 1x CORRECTION FLUID
  - 1x PRESTIK
  - 1x PRITT
  - 1x SCISSOR
  - 4x MAGNETS
  - 1x STAPLER & BOX OF STAPLES
  - 1x PUNCH
  - 1x BOX RUBBER BANDS
  - 1x BOX A4 PAPER

- KITCHEN (NEW)**
- 1x 220L FREEZER REFRIGERATOR COMBO
  - 1x 20L MANUAL MICROWAVE OVEN (800W)
  - 1x 1.7L KETTLE
  - 1x DOUBLE HOT PLATE (SOLID PLATE)
  - 20x MUGS, PLATES, UTENSILS (KNIVES, FORKS, TEASPOONS)
  - DISPOSABLE CUPS, KNIVES, FORKS, TEASPOONS (PROVIDED AND MAINTAINED ON A MONTHLY BASIS)
  - COFFEE, TEA, BOTTLED WATER & MILK (PROVIDED AND MAINTAINED ON A MONTHLY BASIS)
  - PAPER TOWEL, CLEANING MATERIALS (DISHWASHING LIQUID, HANDY ANDY, FURNITURE POLISH, CLOTHS, SPONGES), HAND SOAP AND TOILET PAPER (PROVIDED AND MAINTAINED ON A MONTHLY BASIS)

**LEGEND**

WATER: Blue dashed line  
SEWER: Red dashed line  
ELECTRICAL: Green dashed line



| VERSION / AMENDMENTS |      |             |          |
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| No.                  | DATE | DESCRIPTION | AUTH. BY |
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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**ENGINEER'S CAMP  
LAYOUT AND DETAILS**



0 50 100  
100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: NA ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_  
DATE: \_\_\_\_\_  
CLIENT DRAWING No.: \_\_\_\_\_ CLIENT REF No.: \_\_\_\_\_

|                                     |              |                 |
|-------------------------------------|--------------|-----------------|
| SURVEYED                            | DESIGNED     | G LANDMAN       |
| DRAWN                               | A STEENBERG  | R ROSSOUW       |
| COORD SYSTEM                        | WG27         | DATE: JULY 2020 |
| APPROVED ON BEHALF OF BIGEN:        |              |                 |
| DRAWING No.: 1890.11.00.AAA.01.U001 | VERSION: 1.0 |                 |

1890.11.00.AAA.01.U001



PHOTO 1 FENCING



PHOTO 2 DESK



PHOTO 3 FILING CABINET



PHOTO 4 ROTATING HIGH BACK CHAIR



PHOTO 8 C1 PARK HOME



PHOTO 7 BOARDROOM TABLE



PHOTO 6 STATIONARY CUPBOARD



PHOTO 5 RICKSTACKER CHAIR

| VERSION / AMENDMENTS |      |             |          |
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| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

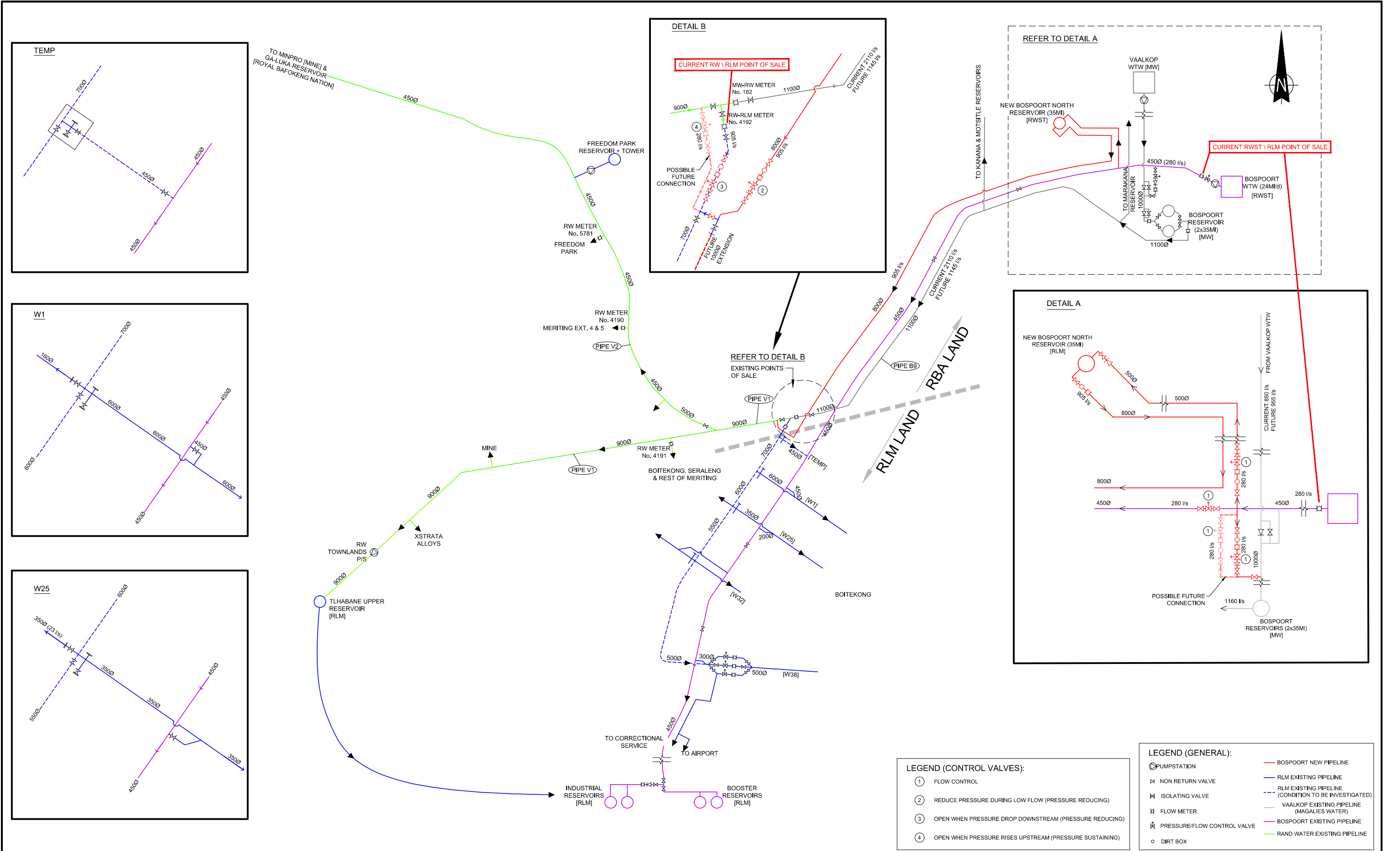
DRAWING TITLE:  
**ENGINEER'S CAMP  
PHOTOS**



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| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME: _____                           |                                 |
| DATE: _____                           |                                 |
| CLIENT DRAWING No.: _____             | CLIENT REF No.: _____           |

|                                     |             |           |           |
|-------------------------------------|-------------|-----------|-----------|
| SURVEYED                            | DESIGNED    | G LANDMAN |           |
| DRAWN                               | A STEENBERG | G LANDMAN |           |
| COORD SYSTEM                        | WG27        | DATE      | JULY 2020 |
| APPROVED ON BEHALF OF BIGEN:        |             |           |           |
| DRAWING No.: 1890.11.00.AAA.01.U002 |             |           |           |
| VERSION: 1.0                        |             |           |           |

1890.11.00.AAA.01.U002



| VERSION / AMENDMENTS |      |             |          |
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PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**SCHEMATIC OF PROPOSED SYSTEM  
(ULTIMATE)**



|                                       |                                 |
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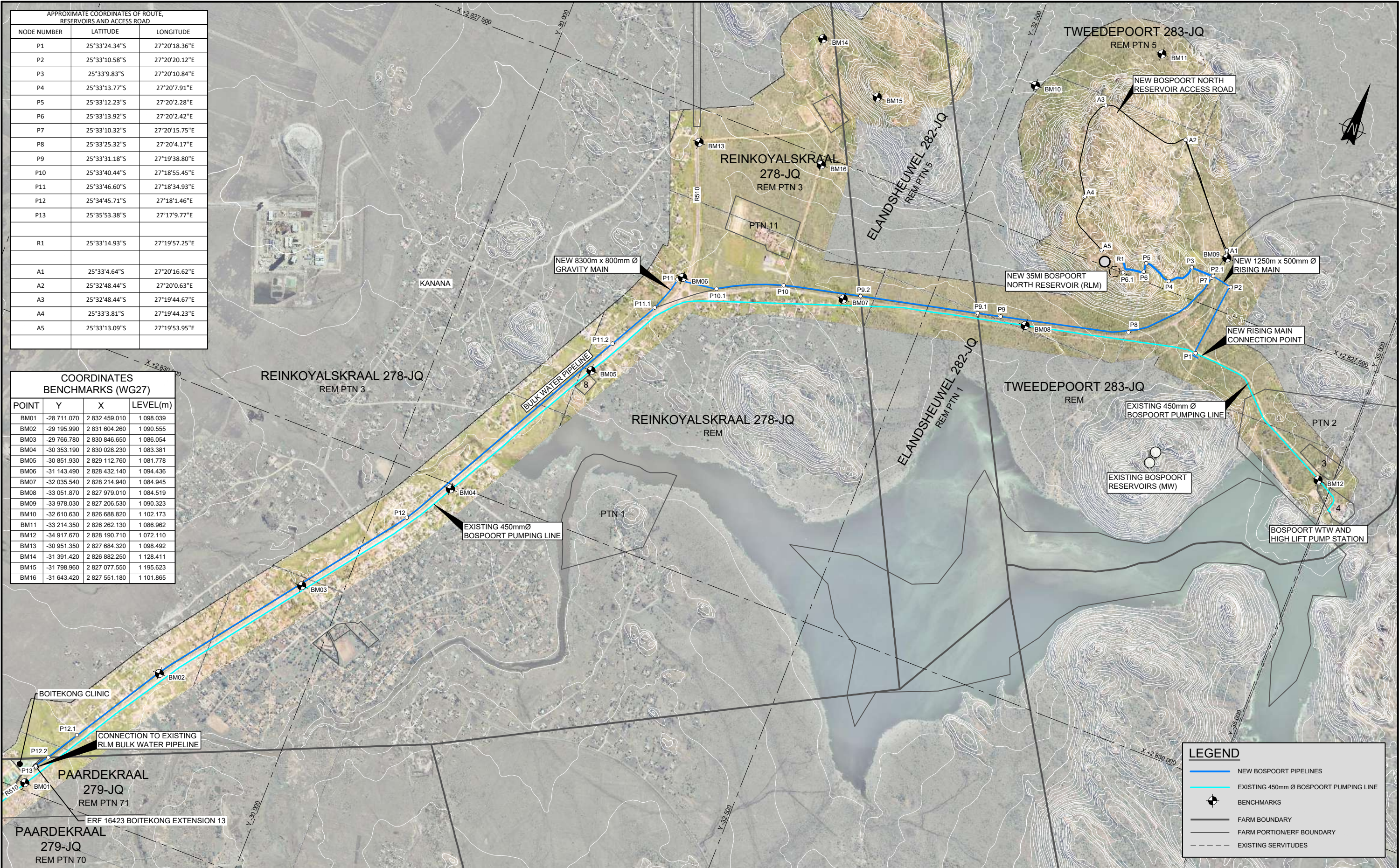
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| SURVEYED                     | SMC                    | DESIGNED | C VAN ECK     |
| DRAWN                        | A STEENBERG            |          | P DU PLESSIS  |
| COORD SYSTEM                 | WG27                   | DATE     | NOVEMBER 2016 |
| APPROVED ON BEHALF OF BIGEN: |                        |          |               |
|                              |                        |          |               |
| DRAWING No.:                 | 1890.11.00.AAA.01.A012 |          | VERSION: 18.0 |

1890.11.00.AAA.01.A012









| APPROXIMATE COORDINATES OF ROUTE, RESERVOIRS AND ACCESS ROAD |               |               |
|--------------------------------------------------------------|---------------|---------------|
| NODE NUMBER                                                  | LATITUDE      | LONGITUDE     |
| P1                                                           | 25°33'24.34"S | 27°20'18.36"E |
| P2                                                           | 25°33'10.58"S | 27°20'20.12"E |
| P3                                                           | 25°33'9.83"S  | 27°20'10.84"E |
| P4                                                           | 25°33'13.77"S | 27°20'7.91"E  |
| P5                                                           | 25°33'12.23"S | 27°20'2.28"E  |
| P6                                                           | 25°33'13.92"S | 27°20'2.42"E  |
| P7                                                           | 25°33'10.32"S | 27°20'15.75"E |
| P8                                                           | 25°33'25.32"S | 27°20'4.17"E  |
| P9                                                           | 25°33'31.18"S | 27°19'38.80"E |
| P10                                                          | 25°33'40.44"S | 27°18'55.45"E |
| P11                                                          | 25°33'46.60"S | 27°18'34.93"E |
| P12                                                          | 25°34'45.71"S | 27°18'1.46"E  |
| P13                                                          | 25°35'53.38"S | 27°17'9.77"E  |
| R1                                                           | 25°33'14.93"S | 27°19'57.25"E |
| A1                                                           | 25°33'4.64"S  | 27°20'16.62"E |
| A2                                                           | 25°32'48.44"S | 27°20'0.63"E  |
| A3                                                           | 25°32'48.44"S | 27°19'44.67"E |
| A4                                                           | 25°33'3.81"S  | 27°19'44.23"E |
| A5                                                           | 25°33'13.09"S | 27°19'53.95"E |

| COORDINATES BENCHMARKS (WG27) |             |               |           |
|-------------------------------|-------------|---------------|-----------|
| POINT                         | Y           | X             | LEVEL(m)  |
| BM01                          | -28 711.070 | 2 832 459.010 | 1 098.039 |
| BM02                          | -29 195.990 | 2 831 604.260 | 1 090.555 |
| BM03                          | -29 766.780 | 2 830 846.650 | 1 086.054 |
| BM04                          | -30 353.190 | 2 830 028.230 | 1 083.381 |
| BM05                          | -30 851.930 | 2 829 112.760 | 1 081.778 |
| BM06                          | -31 143.490 | 2 828 432.140 | 1 094.436 |
| BM07                          | -32 035.540 | 2 828 214.940 | 1 084.945 |
| BM08                          | -33 051.870 | 2 827 979.010 | 1 084.519 |
| BM09                          | -33 978.030 | 2 827 206.530 | 1 090.323 |
| BM10                          | -32 610.630 | 2 826 688.820 | 1 102.173 |
| BM11                          | -33 214.350 | 2 826 262.130 | 1 086.962 |
| BM12                          | -34 917.670 | 2 828 190.710 | 1 072.110 |
| BM13                          | -30 951.350 | 2 827 684.320 | 1 098.492 |
| BM14                          | -31 391.420 | 2 826 882.250 | 1 128.411 |
| BM15                          | -31 798.960 | 2 827 077.550 | 1 195.623 |
| BM16                          | -31 643.420 | 2 827 551.180 | 1 101.865 |

| LEGEND |                                        |
|--------|----------------------------------------|
|        | NEW BOSPOORT PIPELINES                 |
|        | EXISTING 450mm Ø BOSPOORT PUMPING LINE |
|        | BENCHMARKS                             |
|        | FARM BOUNDARY                          |
|        | FARM PORTION/ERF BOUNDARY              |
|        | EXISTING SERVITUDES                    |

| VERSION / AMENDMENTS |      |             |          |
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| No.                  | DATE | DESCRIPTION | AUTH. BY |
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pretoria@bigengroup.com



PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**ROUTE PLAN**

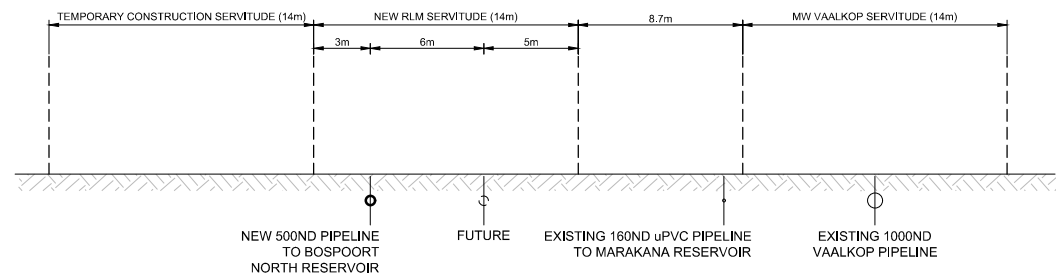


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| DATE:                            |                                 |
| CLIENT DRAWING No.:              | CLIENT REF No.:                 |

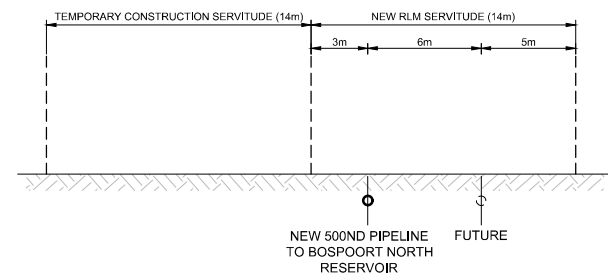
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|------------------------------|------------------------|--------------|
| SURVEYED                     | DESIGNED               | C VAN ECK    |
| DRAWN                        | A STEENBERG            | C VAN ECK    |
| COORD SYSTEM                 | WG27                   | DATE         |
| APPROVED ON BEHALF OF BIGEN: |                        |              |
| DRAWING No.:                 | 1890.11.00.GZA.05.S001 | VERSION: 1.0 |

1890.11.00.GZA.05.S001

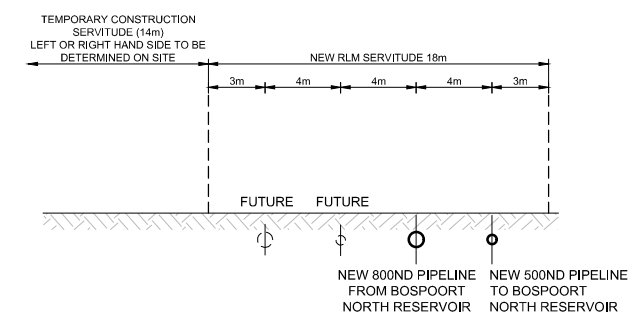




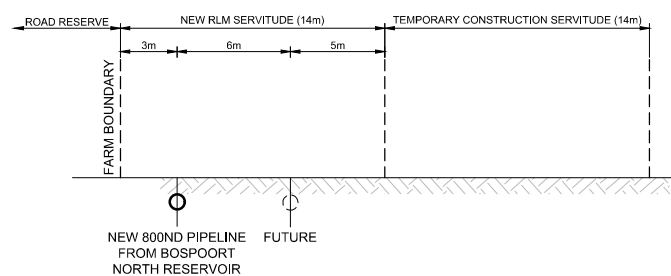
START (CHAINAGE 0 TO 425m - P1 TO P2)



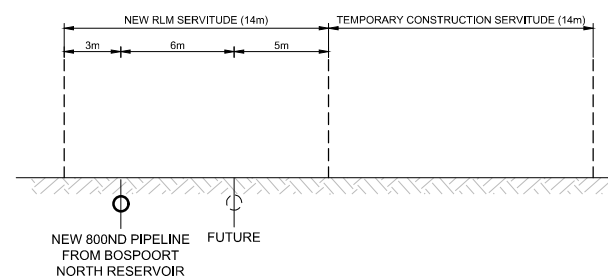
UP TO ROAD CROSSING  
(CHAINAGE 425m TO 539m - P2 TO P2.1)



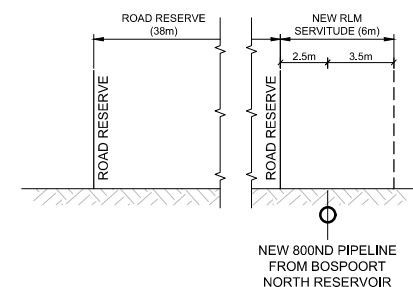
UP TO RESERVOIR  
(CHAINAGE 539m TO 1178m - P2.1 TO P6.1 TO P7)  
VIEW IN DIRECTION  
TOWARDS  
RESERVOIR



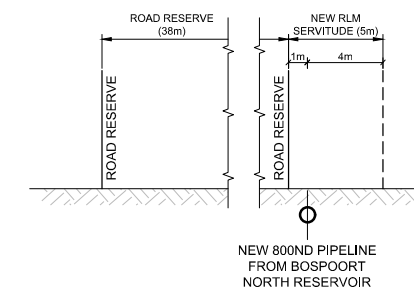
NEXT TO ROAD  
(CHAINAGE 634m TO 3582m - P7 TO P10.1)



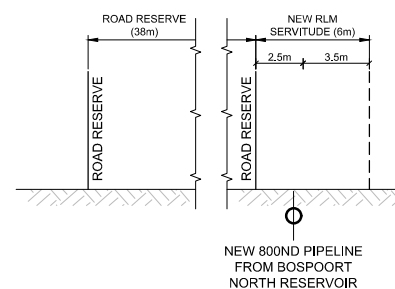
VELD BEFORE ROAD CROSSING  
(CHAINAGE 3582m TO 3800m -  
P10.1 TO P11)



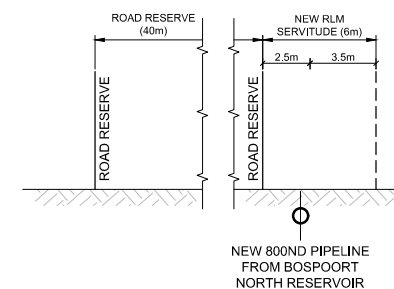
ROAD CROSSING UP TO SECTION PARALLEL  
TO ROAD  
(CHAINAGE 3800m TO 4004m - P11 TO P11.1)



KANANA NORTH UP TO FIRST INTERSECTION  
(CHAINAGE 4004m TO 4320m - P11.1 TO P11.2)



FIRST INTERSECTION TO END  
OF KANANA TOWN  
(CHAINAGE 4320m TO 8090m -  
P11.1 TO P12.1)



END OF KANANA TOWN TO  
PIPELINE END  
(CHAINAGE 8090m TO END -  
P12.1 TO P13)

- NOTES:**
- VIEW IN DIRECTION OF FLOW UNLESS OTHERWISE INDICATED.
  - REFER TO DRAWING 1890.11.00.GZA.05.S001 FOR ROUTE PLAN.

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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|                                                                              |
|------------------------------------------------------------------------------|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b> |
| DRAWING TITLE:<br><b>TYPICAL PIPELINE SERVITUDE CROSS<br/>SECTIONS</b>       |



|                                       |
|---------------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |
| ORIGINAL DRAWING SCALE: 1:200         |
| ORIGINAL DRAWING SHEET SIZE: A1       |
| APPROVED ON BEHALF OF CLIENT:         |
| NAME:                                 |
| DATE:                                 |
| CLIENT DRAWING No.:                   |
| CLIENT REF No.:                       |

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|-------------------------------------|---------------------|
| SURVEYED: SMG                       | DESIGNED: C VAN ECK |
| DRAWN: A STEENBERG                  | P DU PLESSIS        |
| COORD SYSTEM: WG27                  | DATE: MAY 2020      |
| APPROVED ON BEHALF OF BIGEN:        |                     |
| DRAWING No.: 1890.11.00.GZA.05.X001 | VERSION: 1.0        |

1890.11.00.GZA.05.X001

# RISING MAIN

- MAXIMUM SURGE (Q=278 l/s, NO NRV)
- SURGE (Q=278 l/s, WITH NRV)
- HYDRAULIC GRADE LINE (Q=278 l/s)
- PUMP SWITCH OFF GRADE LINE

# GRAVITY MAIN

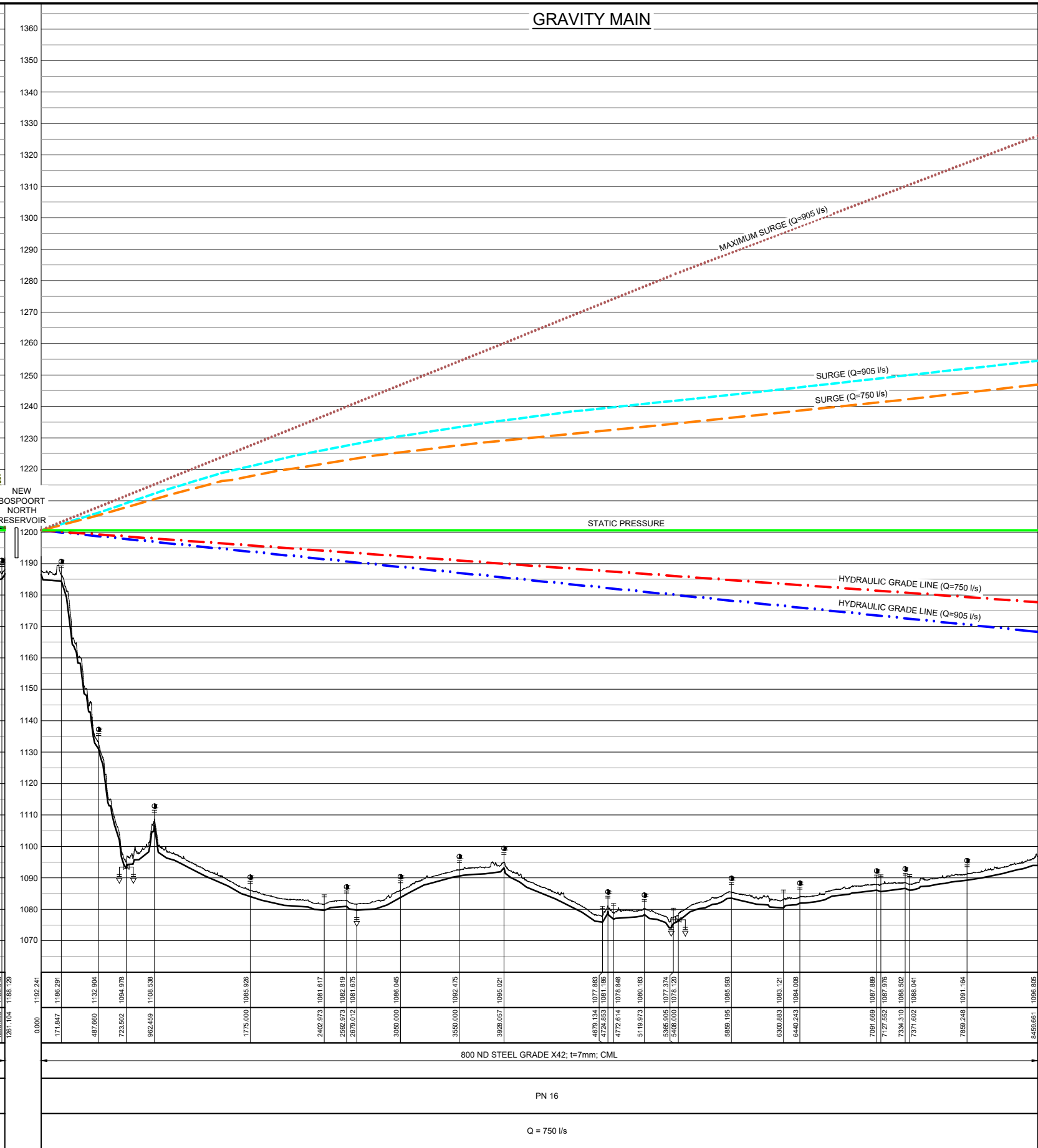
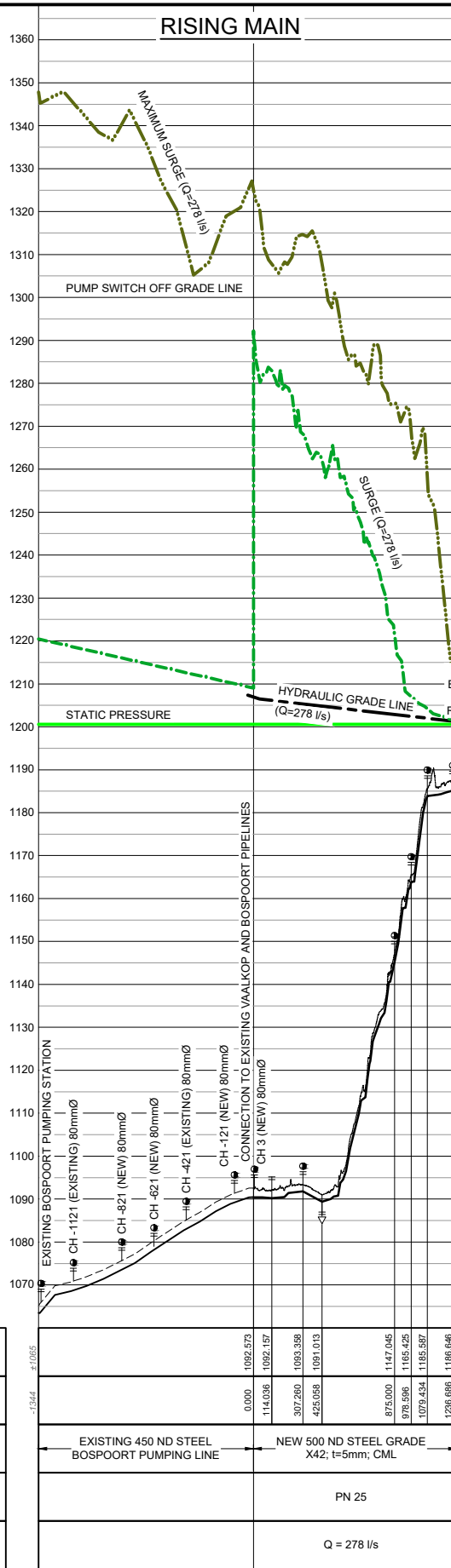
- MAXIMUM SURGE (Q=905 l/s, VALVE CLOSING IN 2 MINUTES)
- SURGE (Q=905 l/s, VALVE CLOSING IN 4 MINUTES)
- HYDRAULIC GRADE LINE (Q=905 l/s)
- SURGE (Q=750 l/s, VALVE CLOSING IN 4 MINUTES)
- HYDRAULIC GRADE LINE (Q=750 l/s)

- STATIC PRESSURE
- NGL
- PIPE INVERT
- AIR VALVE
- SCOUR VALVE
- ACCESS TO PIPELINE
- 2 WAY SCOUR AND ISOLATING VALVE COMBINATION
- NON-RETURN VALVE

SCALES:  
Horizontal 1:20000  
Vertical 1:750

DATUM 1060.000

| C/L GROUND LEVEL |
|------------------|
| DISTANCE (m)     |
| PIPE DETAILS     |
| VALVE RATING     |
| DESIGN FLOW      |



| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
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Phone: + 27 (0) 12 842 8700  
pretoria@bigengroup.com

PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**COMPLETE LONGITUDINAL PROFILE**

ORIGINAL DRAWING SCALE: AS SHOWN  
ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_  
DATE: \_\_\_\_\_  
CLIENT DRAWING No.: \_\_\_\_\_ CLIENT REF No.: \_\_\_\_\_

SURVEYED SMG  
DRAWN JA SWART  
COORD SYSTEM WG27

DESIGNED A STEENBERG  
DATE MAY 2020

APPROVED ON BEHALF OF BIGEN:

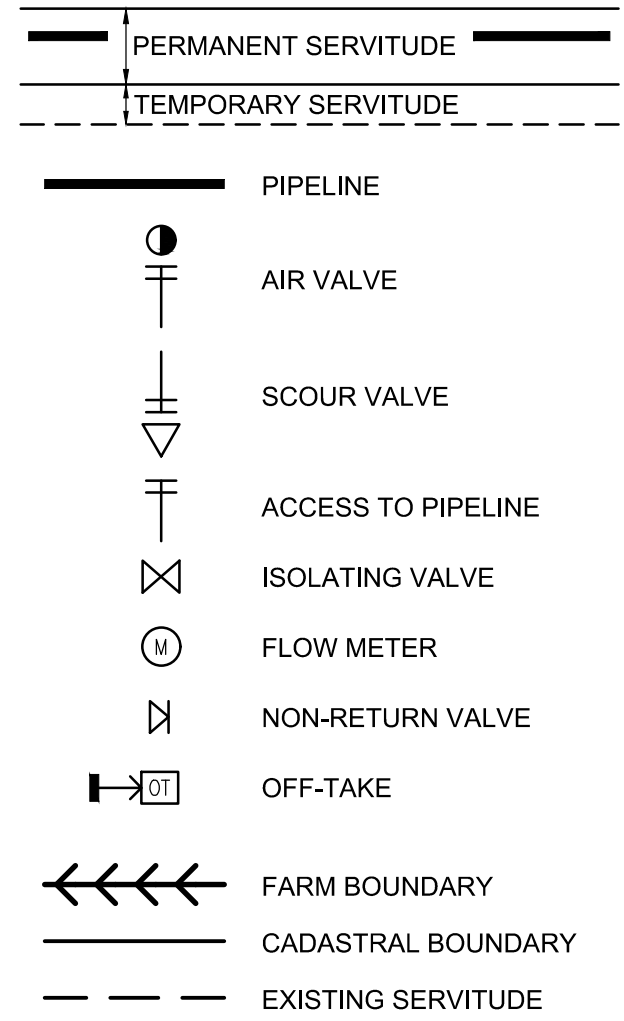
DRAWING No.: **1890.11.00.GZA.05.A001**  
VERSION: **1.0**

1890.11.00.GZA.05.A001



| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| R1          | -34 001.990 | 2 827 773.066 |
| R2          | -34 051.937 | 2 827 350.953 |
| R3          | -33 939.697 | 2 827 328.727 |
| R4          | -33 811.583 | 2 827 327.127 |

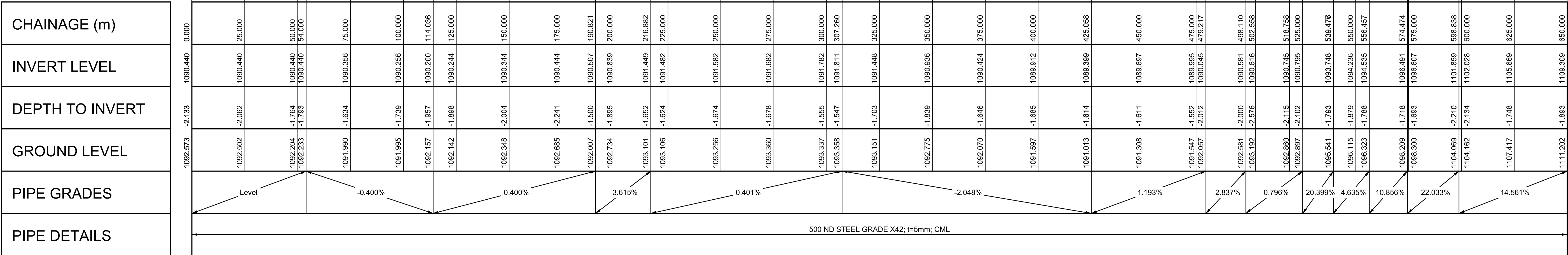
LEGEND



SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1088 m



| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
|                      |      |             |          |
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|                      |      |             |          |

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Pretoria

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pretoria@bigengroup.com



|                                                                                 |  |
|---------------------------------------------------------------------------------|--|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>    |  |
| DRAWING TITLE:<br><b>RIISING MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 1 OF 2</b> |  |

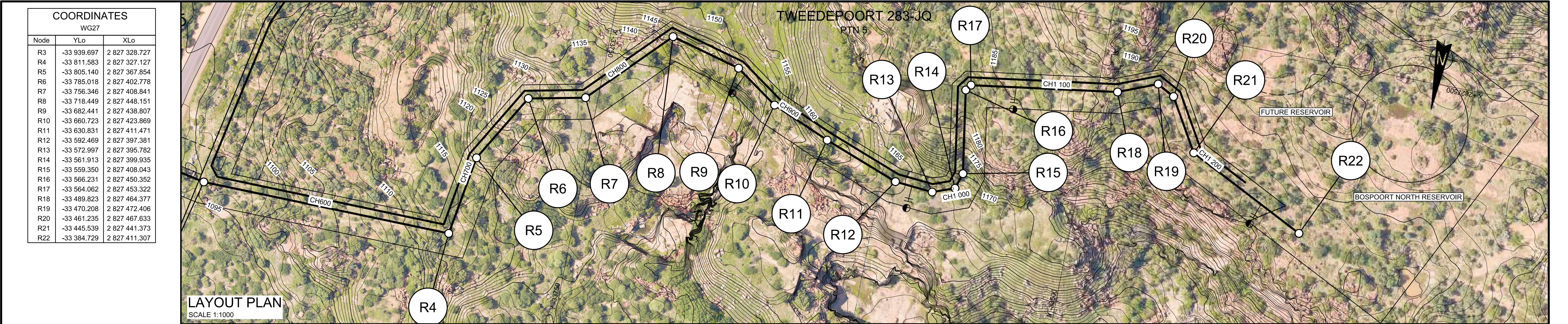


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| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 | DATE:                           |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                                     |             |              |               |
|-------------------------------------|-------------|--------------|---------------|
| SURVEYED                            | SMG         | DESIGNED     | C VAN ECK     |
| DRAWN                               | A STEENBERG | DATE         | P VAN HEERDEN |
| COORD SYSTEM                        | WG27        | DATE         | JULY 2020     |
| APPROVED ON BEHALF OF BIGEN:        |             | REVIEWER:    |               |
| DRAWING No.: 1890.11.00.GZA.05.L001 |             | VERSION: 1.0 |               |

1890.11.00.GZA.05.L001

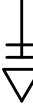






| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W1          | -33 386.544 | 2 827 416.661 |
| W2          | -33 442.710 | 2 827 444.436 |
| W3          | -33 458.373 | 2 827 470.641 |
| W4          | -33 469.986 | 2 827 476.819 |
| W5          | -33 490.890 | 2 827 468.262 |
| W6          | -33 566.305 | 2 827 457.032 |
| W7          | -33 570.448 | 2 827 451.361 |
| W8          | -33 563.451 | 2 827 408.340 |
| W9          | -33 565.140 | 2 827 402.997 |
| W10         | -33 573.562 | 2 827 399.842 |
| W11         | -33 591.600 | 2 827 401.323 |
| W12         | -33 629.374 | 2 827 415.198 |
| W13         | -33 658.803 | 2 827 427.402 |
| W14         | -33 680.754 | 2 827 442.502 |
| W15         | -33 719.707 | 2 827 452.609 |
| W16         | -33 758.374 | 2 827 412.501 |
| W17         | -33 787.592 | 2 827 406.322 |
| W18         | -33 808.976 | 2 827 369.210 |
| W19         | -33 814.993 | 2 827 331.170 |
| W20         | -33 933.421 | 2 827 332.649 |

# LEGEND

|                                                                                     |                     |
|-------------------------------------------------------------------------------------|---------------------|
|     | PERMANENT SERVITUDE |
|     | TEMPORARY SERVITUDE |
|     | PIPELINE            |
|    | AIR VALVE           |
|    | SCOUR VALVE         |
|   | ACCESS TO PIPELINE  |
|  | ISOLATING VALVE     |
|  | FLOW METER          |
|  | NON-RETURN VALVE    |
|  | OFF-TAKE            |
|   | FARM BOUNDARY       |
|   | CADASTRAL BOUNDARY  |
|   | EXISTING SERVITUDE  |

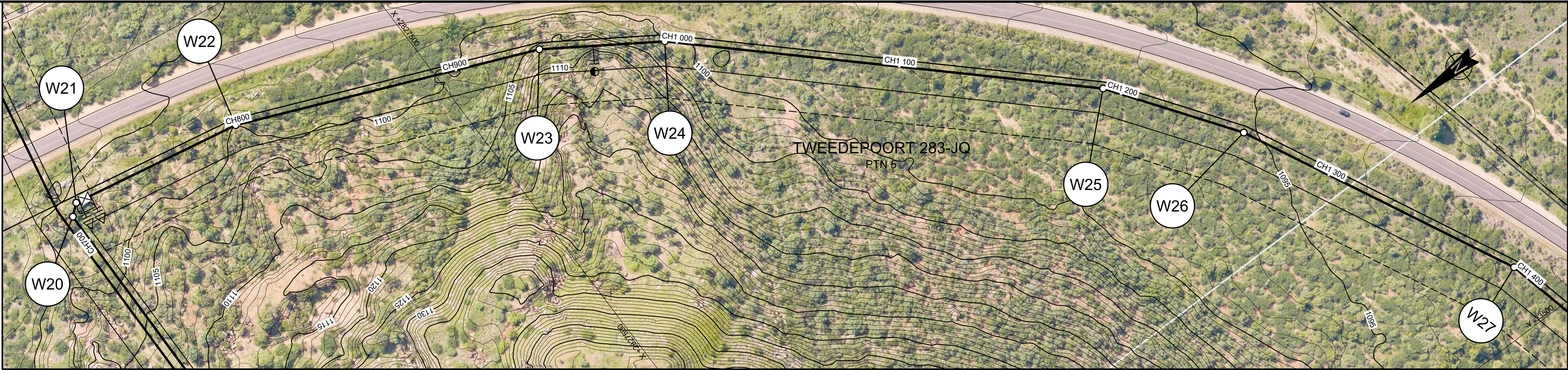
[illegible]

|                                                                |  |
|----------------------------------------------------------------|--|
| <b>PROJECT TITLE:</b>                                          |  |
| <b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>     |  |
| <b>DRAWING TITLE:</b>                                          |  |
| <b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 1 OF 13</b> |  |

|                                                         |                                 |                                                                                                                                                                                                                                                                           |              |               |     |           |           |       |             |  |              |              |      |      |           |
|---------------------------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|-----|-----------|-----------|-------|-------------|--|--------------|--------------|------|------|-----------|
|                                                         |                                 | <table border="1"> <tr> <td>SURVEYED</td> <td>SMG</td> <td>DESIGNED</td> <td>C VAN ECK</td> </tr> <tr> <td>DRAWN</td> <td>A STEENBERG</td> <td></td> <td>P DU PLESSIS</td> </tr> <tr> <td>COORD SYSTEM</td> <td>WG27</td> <td>DATE</td> <td>JULY 2020</td> </tr> </table> |              | SURVEYED      | SMG | DESIGNED  | C VAN ECK | DRAWN | A STEENBERG |  | P DU PLESSIS | COORD SYSTEM | WG27 | DATE | JULY 2020 |
| SURVEYED                                                | SMG                             | DESIGNED                                                                                                                                                                                                                                                                  | C VAN ECK    |               |     |           |           |       |             |  |              |              |      |      |           |
| DRAWN                                                   | A STEENBERG                     |                                                                                                                                                                                                                                                                           | P DU PLESSIS |               |     |           |           |       |             |  |              |              |      |      |           |
| COORD SYSTEM                                            | WG27                            | DATE                                                                                                                                                                                                                                                                      | JULY 2020    |               |     |           |           |       |             |  |              |              |      |      |           |
| ORIGINAL DRAWING SCALE: AS SHOWN                        | ORIGINAL DRAWING SHEET SIZE: A1 |                                                                                                                                                                                                                                                                           |              |               |     |           |           |       |             |  |              |              |      |      |           |
| APPROVED ON BEHALF OF CLIENT:<br><br>NAME:<br><br>DATE: |                                 | APPROVED ON BEHALF OF BIGEN:<br><br><table border="1"> <tr> <td rowspan="2">PRACTITIONER:</td> <td></td> <td rowspan="2">REVIEWER:</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>                                                                           |              | PRACTITIONER: |     | REVIEWER: |           |       |             |  |              |              |      |      |           |
| PRACTITIONER:                                           |                                 | REVIEWER:                                                                                                                                                                                                                                                                 |              |               |     |           |           |       |             |  |              |              |      |      |           |
|                                                         |                                 |                                                                                                                                                                                                                                                                           |              |               |     |           |           |       |             |  |              |              |      |      |           |
| CLIENT DRAWING No.:                                     | CLIENT REF No.:                 | DRAWING No.:<br><b>1890.11.00.GZA.05.L003</b>                                                                                                                                                                                                                             |              |               |     |           |           |       |             |  |              |              |      |      |           |
|                                                         |                                 | VERSION:<br><b>1.0</b>                                                                                                                                                                                                                                                    |              |               |     |           |           |       |             |  |              |              |      |      |           |



| COORDINATES |             |               |  |
|-------------|-------------|---------------|--|
| WG27        |             |               |  |
| Node        | YLo         | XLo           |  |
| W19         | -33 814.993 | 2 827 331.170 |  |
| W20         | -33 933.421 | 2 827 332.649 |  |
| W21         | -33 937.449 | 2 827 337.616 |  |
| W22         | -33 922.058 | 2 827 415.340 |  |
| W23         | -33 867.128 | 2 827 544.000 |  |
| W24         | -33 836.061 | 2 827 590.869 |  |
| W25         | -33 700.949 | 2 827 734.348 |  |
| W26         | -33 647.314 | 2 827 772.528 |  |
| W27         | -33 526.403 | 2 827 832.521 |  |



LAYOUT PLAN  
SCALE 1:1000

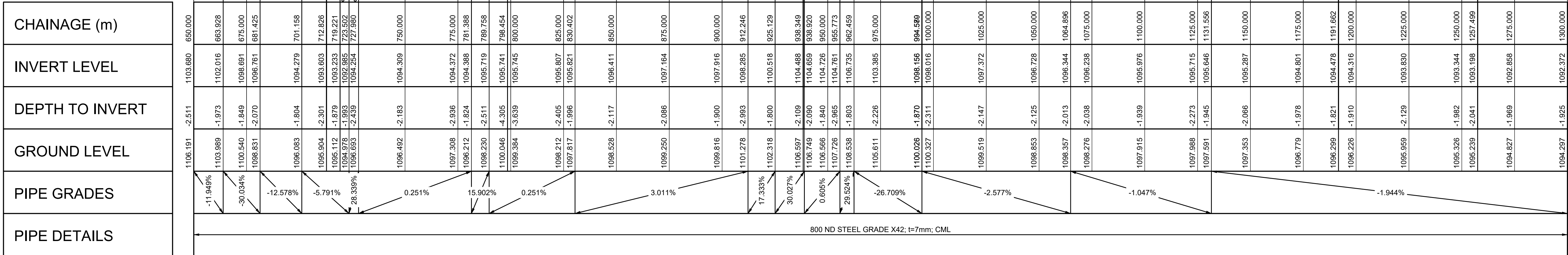
#### LEGEND

|  |                     |
|--|---------------------|
|  | PERMANENT SERVITUDE |
|  | TEMPORARY SERVITUDE |
|  | PIPELINE            |
|  | AIR VALVE           |
|  | SCOUR VALVE         |
|  | ACCESS TO PIPELINE  |
|  | ISOLATING VALVE     |
|  | FLOW METER          |
|  | NON-RETURN VALVE    |
|  | OFF-TAKE            |
|  | FARM BOUNDARY       |
|  | CADASTRAL BOUNDARY  |
|  | EXISTING SERVITUDE  |

#### SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1092 m



| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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pretoria@bigengroup.com

PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**GRAVITY MAIN  
LONGITUDINAL SECTION  
SHEET 2 OF 13**

1990.11.00.GZA.05.L004

ORIGINAL DRAWING SCALE: AS SHOWN  
ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_  
DATE: \_\_\_\_\_  
CLIENT DRAWING No.: \_\_\_\_\_  
CLIENT REF No.: \_\_\_\_\_

SURVEYED SMG  
DRAWN A STEENBERG  
COORD SYSTEM WG27

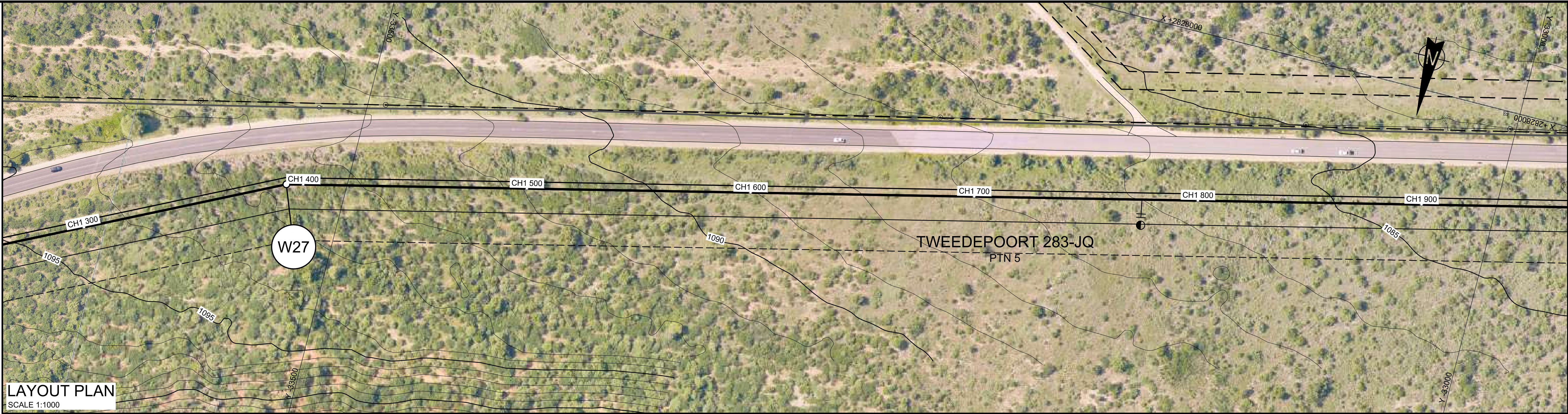
DESIGNED C VAN ECK  
DATE JULY 2020

APPROVED ON BEHALF OF BIGEN:

DRAWING No.: **1890.11.00.GZA.05.L004**  
REVIEWER: \_\_\_\_\_  
VERSION: **1.0**



| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W26         | -33 647.314 | 2 827 772.528 |
| W27         | -33 526.403 | 2 827 832.521 |
| W28         | -32 775.225 | 2 828 011.209 |



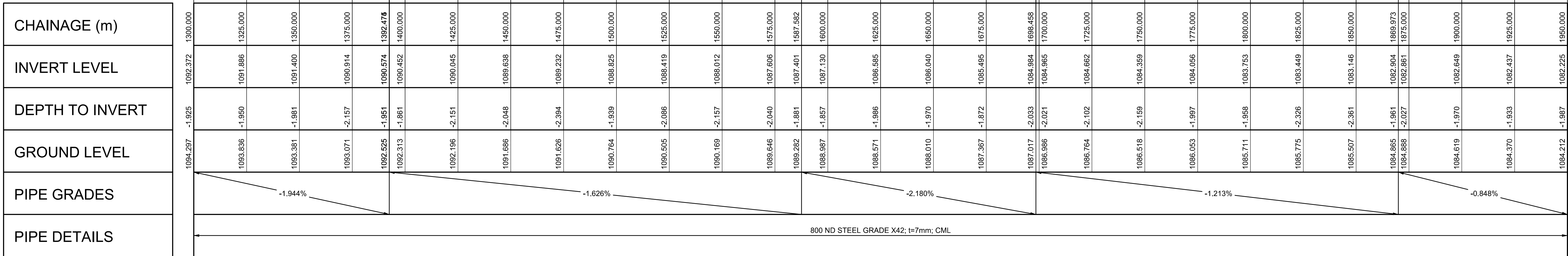
#### LEGEND

|  |                     |
|--|---------------------|
|  | PERMANENT SERVITUDE |
|  | TEMPORARY SERVITUDE |
|  | PIPELINE            |
|  | AIR VALVE           |
|  | SCOUR VALVE         |
|  | ACCESS TO PIPELINE  |
|  | ISOLATING VALVE     |
|  | FLOW METER          |
|  | NON-RETURN VALVE    |
|  | OFF-TAKE            |
|  | FARM BOUNDARY       |
|  | CADASTRAL BOUNDARY  |
|  | EXISTING SERVITUDE  |

#### SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1080 m



| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
|                      |      |             |          |
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pretoria@bigengroup.com



|                                                                                  |
|----------------------------------------------------------------------------------|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>     |
| DRAWING TITLE:<br><b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 3 OF 13</b> |



|                                       |
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| 0 50 100<br>100mm ON ORIGINAL DRAWING |
| ORIGINAL DRAWING SCALE: AS SHOWN      |
| ORIGINAL DRAWING SHEET SIZE: A1       |
| APPROVED ON BEHALF OF CLIENT:         |
| NAME:                                 |
| DATE:                                 |
| CLIENT DRAWING No.:                   |
| CLIENT REF No.:                       |

|                              |                        |          |              |
|------------------------------|------------------------|----------|--------------|
| SURVEYED                     | SMG                    | DESIGNED | C VAN ECK    |
| DRAWN                        | A STEENBERG            |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27                   | DATE     | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN: |                        |          |              |
| NAME:                        |                        |          |              |
| DATE:                        |                        |          |              |
| DRAWING No.:                 | 1890.11.00.GZA.05.L005 | VERSION: | 1.0          |

1890.11.00.GZA.05.L005



| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W27         | -33 526.403 | 2 827 832.521 |
| W28         | -32 775.225 | 2 828 011.209 |
| W29         | -32 121.092 | 2 828 162.618 |



LEGEND

- PERMANENT SERVITUDE
- TEMPORARY SERVITUDE
- PIPELINE
- AIR VALVE
- SCOUR VALVE
- ACCESS TO PIPELINE
- ISOLATING VALVE
- FLOW METER
- NON-RETURN VALVE
- OFF-TAKE
- FARM BOUNDARY
- CADASTRAL BOUNDARY
- EXISTING SERVITUDE

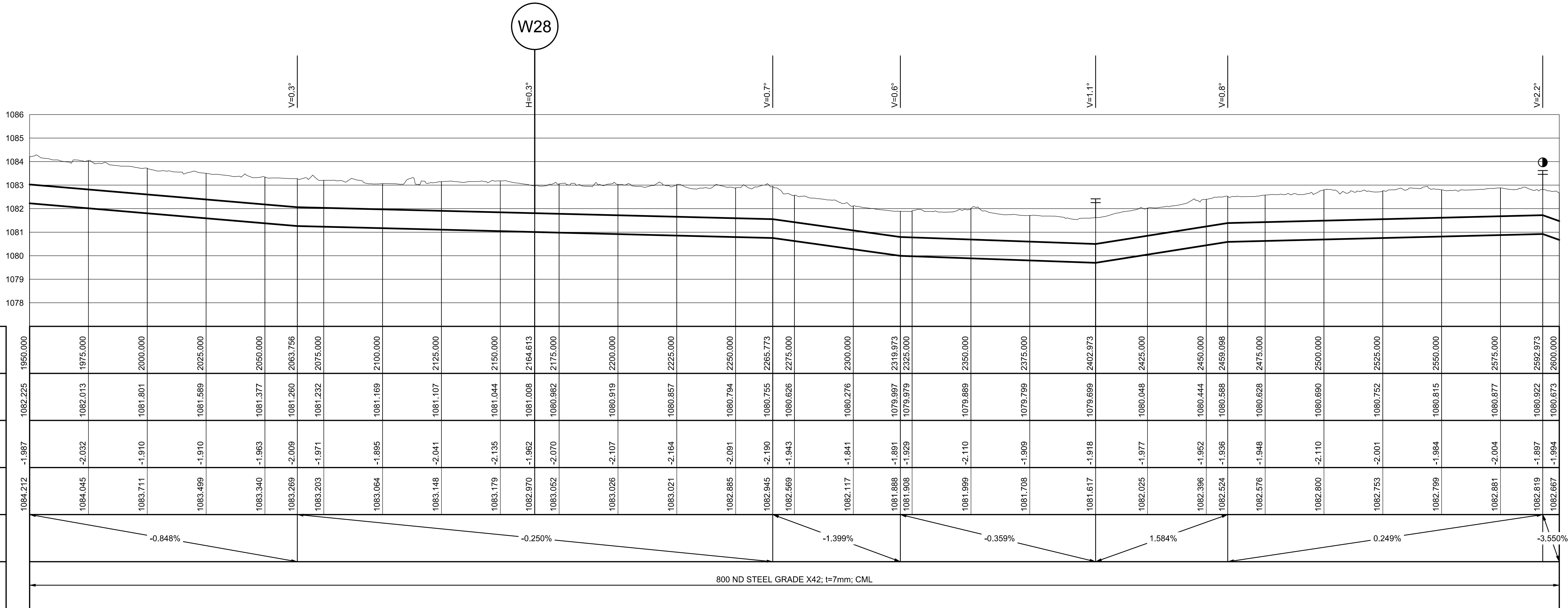
SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1077 m

LAYOUT PLAN

SCALE 1:1000



| CHAINAGE (m) |
|--------------|
| 1950.000     |
| 1975.000     |
| 2000.000     |
| 2025.000     |
| 2050.000     |
| 2063.756     |
| 2075.000     |
| 2100.000     |
| 2125.000     |
| 2150.000     |
| 2164.613     |
| 2175.000     |
| 2200.000     |
| 2225.000     |
| 2250.000     |
| 2275.000     |
| 2300.000     |
| 2319.973     |
| 2325.000     |
| 2350.000     |
| 2375.000     |
| 2402.973     |
| 2425.000     |
| 2450.000     |
| 2459.098     |
| 2475.000     |
| 2500.000     |
| 2525.000     |
| 2550.000     |
| 2575.000     |
| 2592.973     |
| 2600.000     |

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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pretoria@bigengroup.com



|                                                                                  |  |
|----------------------------------------------------------------------------------|--|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>     |  |
| DRAWING TITLE:<br><b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 4 OF 13</b> |  |



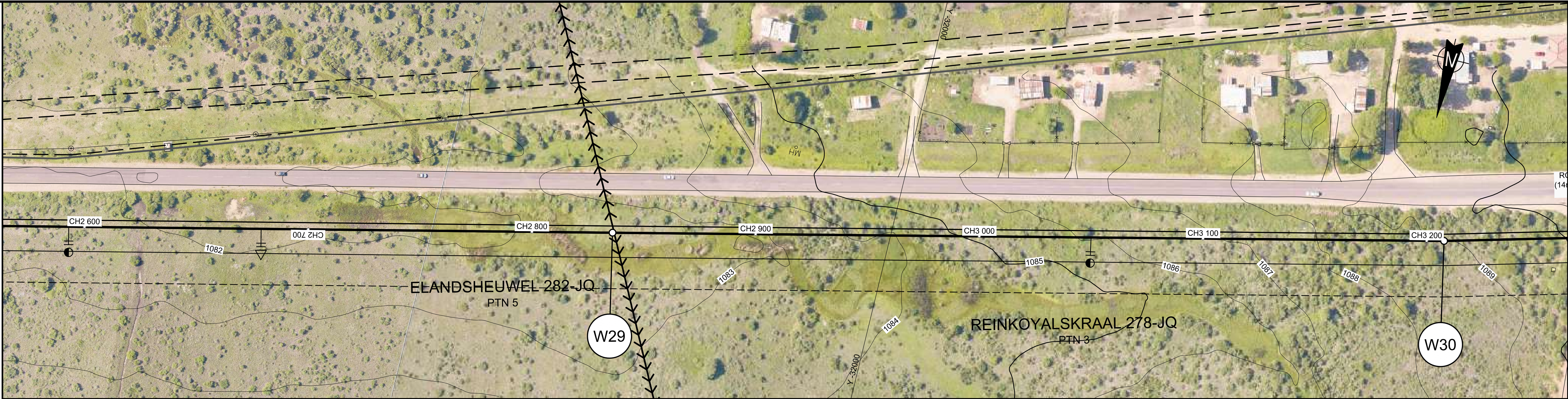
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| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                              |                        |          |              |
|------------------------------|------------------------|----------|--------------|
| SURVEYED                     | SMG                    | DESIGNED | C VAN ECK    |
| DRAWN                        | A STEENBERG            |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27                   | DATE     | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN: |                        |          |              |
| DRAWING No.:                 | 1890.11.00.GZA.05.L006 | VERSION: | 1.0          |

1890.11.00.GZA.05.L006



| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W28         | -32 775.225 | 2 828 011.209 |
| W29         | -32 121.092 | 2 828 162.618 |
| W30         | -31 759.011 | 2 828 246.830 |
| W31         | -31 679.089 | 2 828 268.318 |



LEGEND

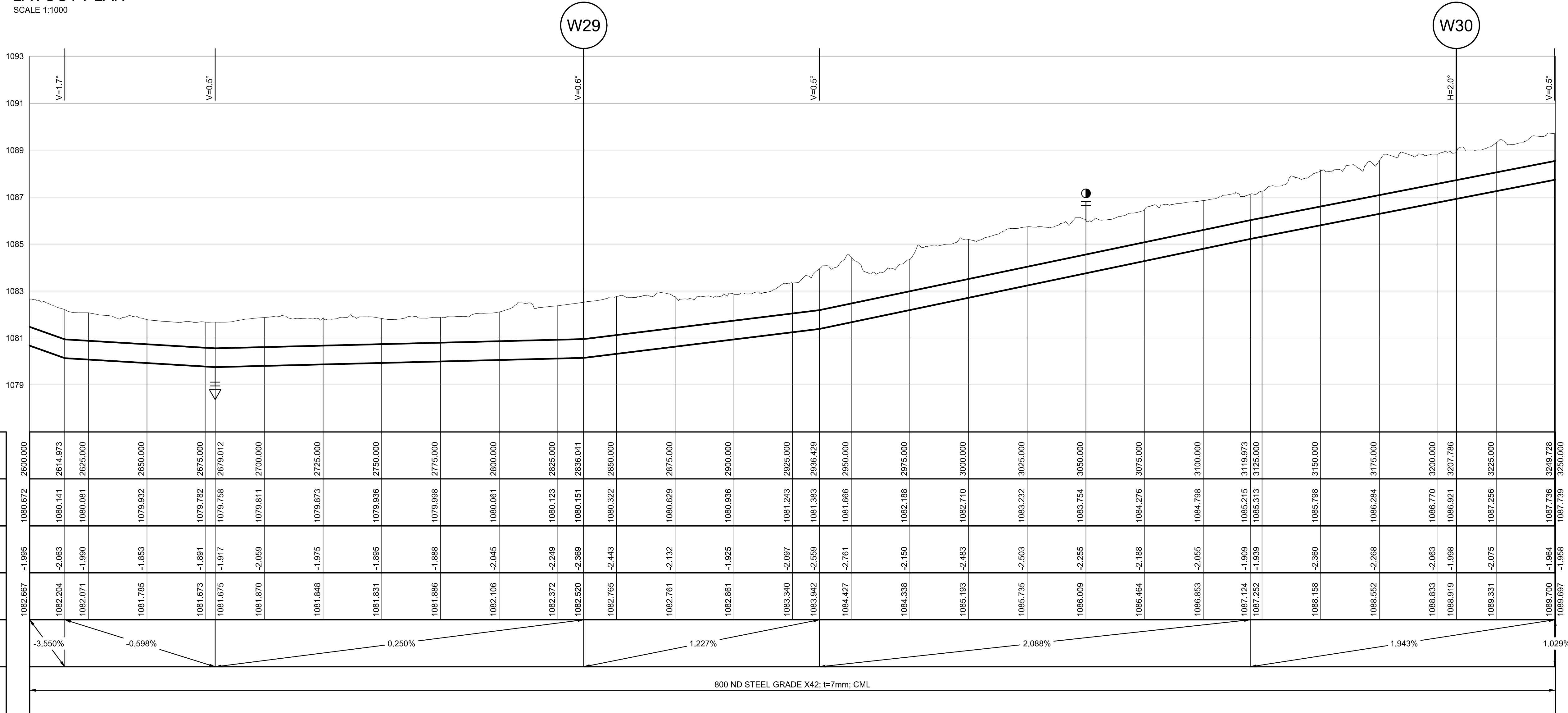
- PERMANENT SERVITUDE
- TEMPORARY SERVITUDE
- PIPELINE
- AIR VALVE
- SCOUR VALVE
- ACCESS TO PIPELINE
- ISOLATING VALVE
- FLOW METER
- NON-RETURN VALVE
- OFF-TAKE
- FARM BOUNDARY
- CADASTRAL BOUNDARY
- EXISTING SERVITUDE

SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1077 m

LAYOUT PLAN  
SCALE 1:1000



CHAINAGE (m)

INVERT LEVEL

DEPTH TO INVERT

GROUND LEVEL

PIPE GRADES

PIPE DETAILS

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
|                      |      |             |          |
|                      |      |             |          |
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|                      |      |             |          |
|                      |      |             |          |

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|                                                                                  |  |
|----------------------------------------------------------------------------------|--|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>     |  |
| DRAWING TITLE:<br><b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 5 OF 13</b> |  |



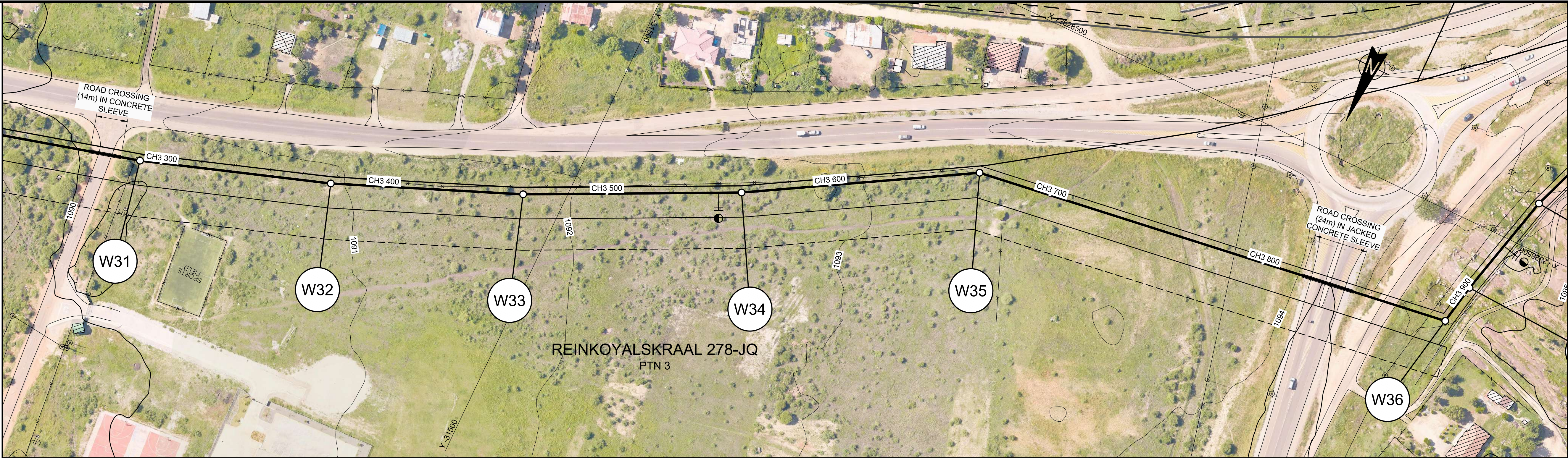
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| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 | DATE:                           |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                              |             |           |           |
|------------------------------|-------------|-----------|-----------|
| SURVEYED                     | SMG         | DESIGNED  | C VAN ECK |
| DRAWN                        | A STEENBERG | DATE      | JULY 2020 |
| COORD SYSTEM                 | WG27        | DATE      | JULY 2020 |
| APPROVED ON BEHALF OF BIGEN: |             | REVIEWER: |           |
| DRAWING No.:                 |             | VERSION:  |           |
| 1890.11.00.GZA.05.L007       |             | 1.0       |           |

1890.11.00.GZA.05.L007



| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W30         | -31 759.011 | 2 828 246.830 |
| W31         | -31 679.089 | 2 828 268.318 |
| W32         | -31 597.721 | 2 828 295.818 |
| W33         | -31 516.013 | 2 828 328.440 |
| W34         | -31 430.235 | 2 828 371.212 |
| W35         | -31 338.005 | 2 828 425.000 |
| W36         | -31 121.606 | 2 828 454.733 |
| W37         | -31 118.150 | 2 828 472.820 |



### LEGEND

|  |                     |
|--|---------------------|
|  | PERMANENT SERVITUDE |
|  | TEMPORARY SERVITUDE |
|  | PIPELINE            |
|  | AIR VALVE           |
|  | SCOUR VALVE         |
|  | ACCESS TO PIPELINE  |
|  | ISOLATING VALVE     |
|  | FLOW METER          |
|  | NON-RETURN VALVE    |
|  | OFF-TAKE            |
|  | FARM BOUNDARY       |
|  | CADASTRAL BOUNDARY  |
|  | EXISTING SERVITUDE  |

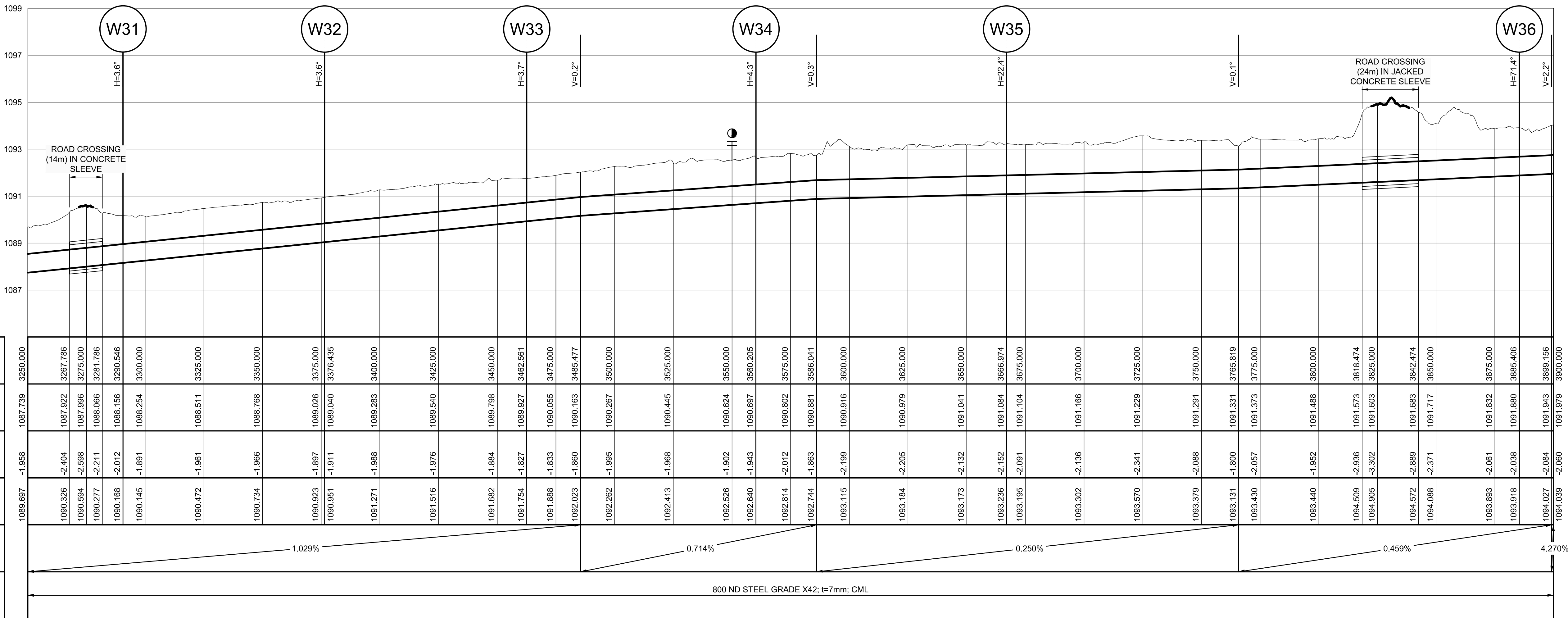
### SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1085 m

### LAYOUT PLAN

SCALE 1:1000



CHAINAGE (m)

INVERT LEVEL

DEPTH TO INVERT

GROUND LEVEL

PIPE GRADES

PIPE DETAILS

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
|                      |      |             |          |
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The Innovation Hub  
Pretoria

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pretoria@bigengroup.com



|                                                                                  |  |
|----------------------------------------------------------------------------------|--|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>     |  |
| DRAWING TITLE:<br><b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 6 OF 13</b> |  |



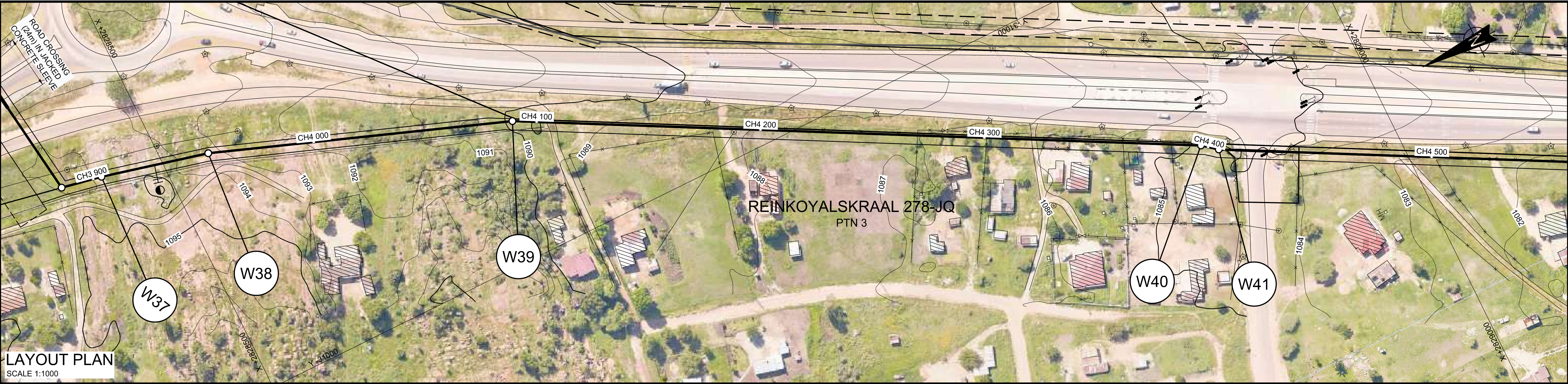
|                                       |                                 |
|---------------------------------------|---------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 | DATE:                           |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                              |                        |           |              |
|------------------------------|------------------------|-----------|--------------|
| SURVEYED                     | SMG                    | DESIGNED  | C VAN ECK    |
| DRAWN                        | A STEENBERG            | DATE      | P DU PLESSIS |
| COORD SYSTEM                 | WG27                   | DATE      | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN: |                        | REVIEWER: |              |
| DRAWING No.:                 | 1890.11.00.GZA.05.L008 | VERSION:  | 1.0          |

1890.11.00.GZA.05.L008



| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W36         | -31 121.606 | 2 828 454.733 |
| W37         | -31 118.150 | 2 828 472.820 |
| W38         | -31 106.423 | 2 828 520.224 |
| W39         | -31 059.245 | 2 828 648.332 |
| W40         | -30 913.446 | 2 828 919.156 |
| W41         | -30 908.315 | 2 828 925.521 |
| W42         | -30 218.950 | 2 830 206.022 |



### LEGEND

|  |                     |
|--|---------------------|
|  | PERMANENT SERVITUDE |
|  | TEMPORARY SERVITUDE |
|  | PIPELINE            |
|  | AIR VALVE           |
|  | SCOUR VALVE         |
|  | ACCESS TO PIPELINE  |
|  | ISOLATING VALVE     |
|  | FLOW METER          |
|  | NON-RETURN VALVE    |
|  | OFF-TAKE            |
|  | FARM BOUNDARY       |
|  | CADASTRAL BOUNDARY  |
|  | EXISTING SERVITUDE  |

### SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1077 m

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| VERSION / AMENDMENTS |      |             |          |
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| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>     |  |
| DRAWING TITLE:<br><b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 7 OF 13</b> |  |



|                                       |                                 |
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| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                              |                        |          |              |
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| SURVEYED                     | SMG                    | DESIGNED | C VAN ECK    |
| DRAWN                        | A STEENBERG            |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27                   | DATE     | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN: |                        |          |              |
| DRAWING No.:                 | 1890.11.00.GZA.05.L009 | VERSION: | 1.0          |

1890.11.00.GZA.05.L009



| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W41         | -30 908.315 | 2 828 925.521 |
| W42         | -30 218.950 | 2 830 206.022 |

LEGEND

|  |                     |
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|  | PERMANENT SERVITUDE |
|  | TEMPORARY SERVITUDE |
|  | PIPELINE            |
|  | AIR VALVE           |
|  | SCOUR VALVE         |
|  | ACCESS TO PIPELINE  |
|  | ISOLATING VALVE     |
|  | FLOW METER          |
|  | NON-RETURN VALVE    |
|  | OFF-TAKE            |
|  | FARM BOUNDARY       |
|  | CADASTRAL BOUNDARY  |
|  | EXISTING SERVITUDE  |

SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1073 m

CHAINAGE (m)

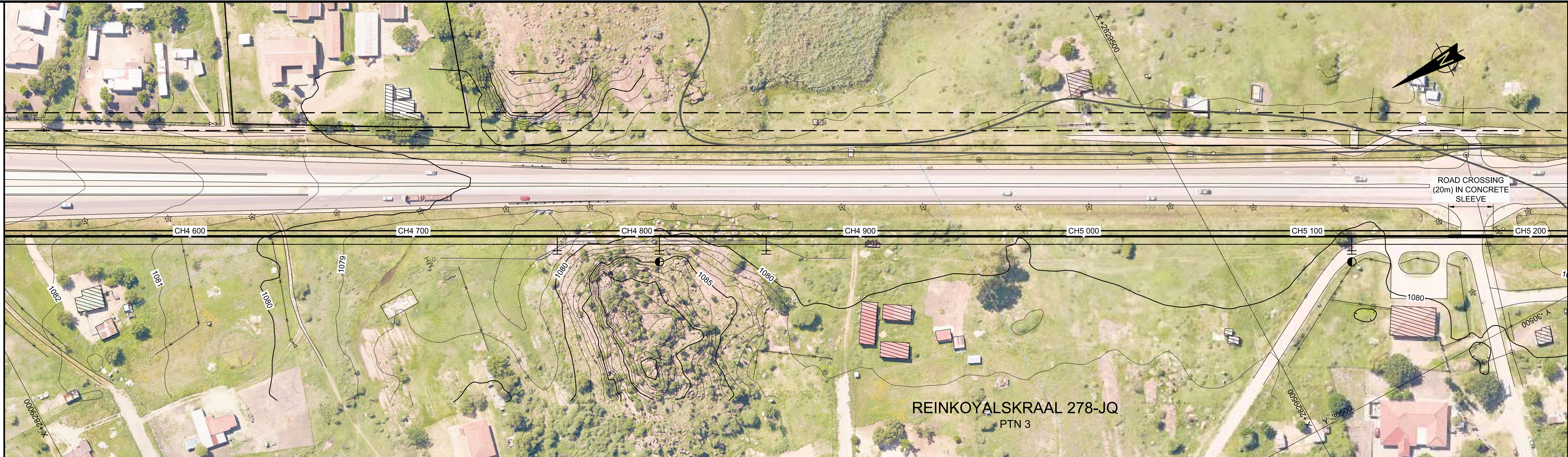
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DEPTH TO INVERT

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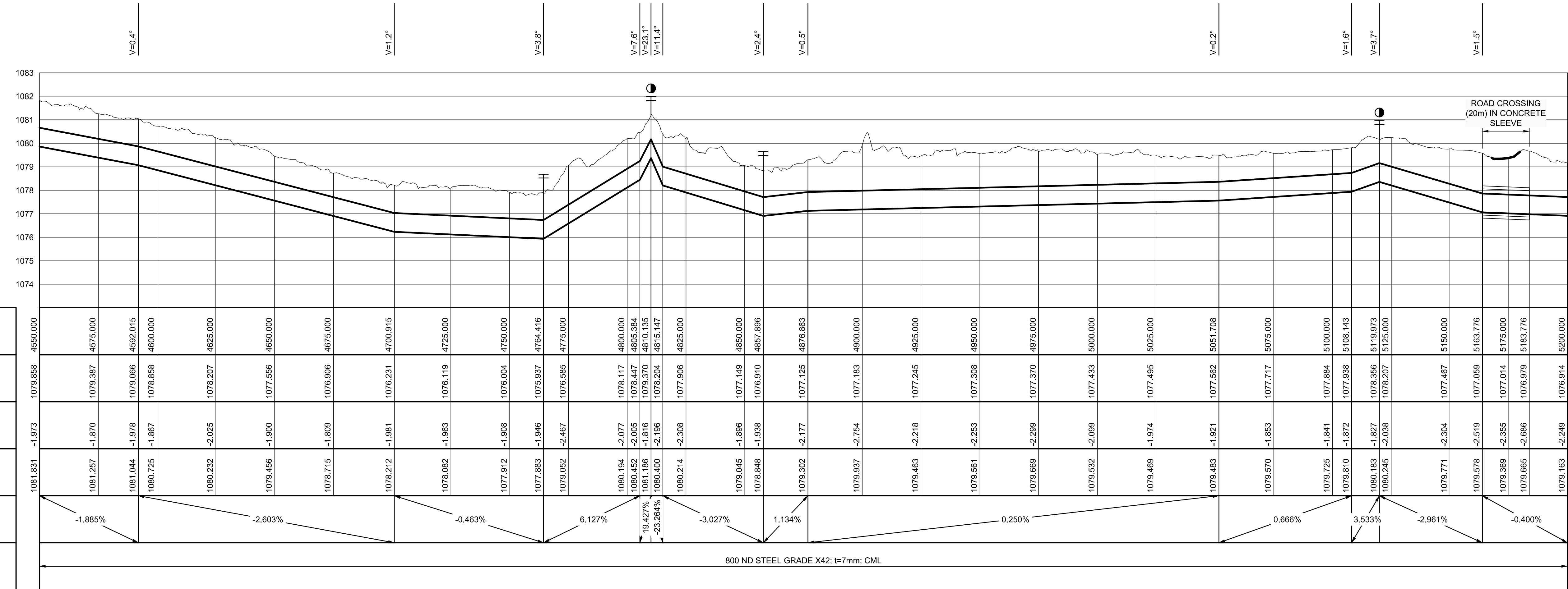
PIPE GRADES

PIPE DETAILS



LAYOUT PLAN

SCALE 1:1000



| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>     |  |
| DRAWING TITLE:<br><b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 8 OF 13</b> |  |



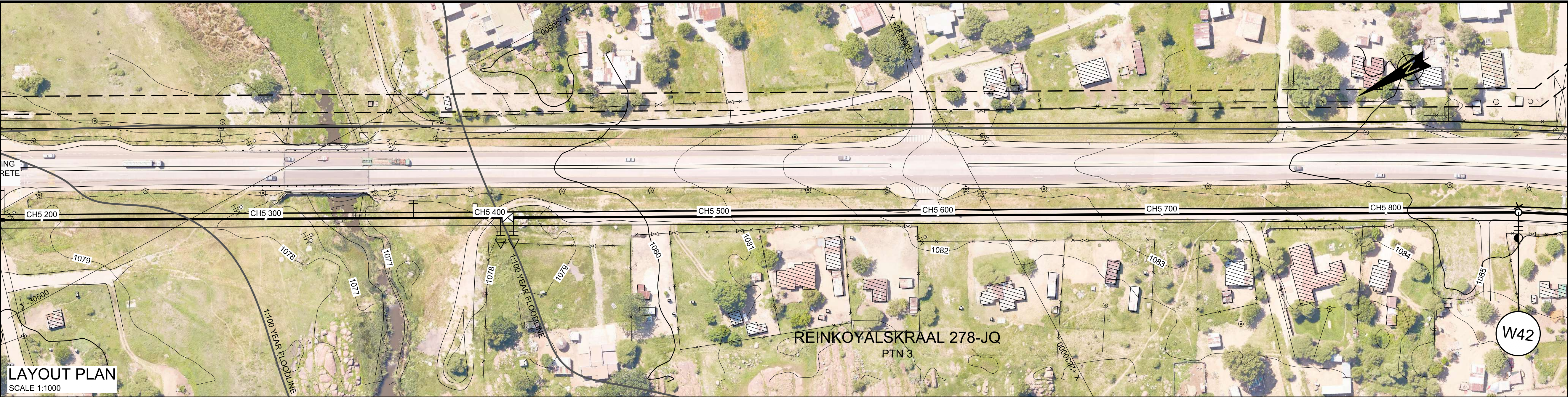
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| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                             |             |           |              |
|-----------------------------|-------------|-----------|--------------|
| SURVEYED                    | SMG         | DESIGNED  | C VAN ECK    |
| DRAWN                       | A STEENBERG |           | P DU PLESSIS |
| COORD SYSTEM                | WG27        | DATE      | JULY 2020    |
| APPROVED ON BEHALF OF BIGH: |             |           |              |
| PRACITIONER:                |             | REVIEWER: |              |
| DRAWING No.:                |             | VERSION:  |              |
| 1890.11.00.GZA.05.L010      |             | 1.0       |              |

1890.11.00.GZA.05.L010



| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W41         | -30 908.315 | 2 828 925.521 |
| W42         | -30 218.950 | 2 830 206.022 |



LEGEND

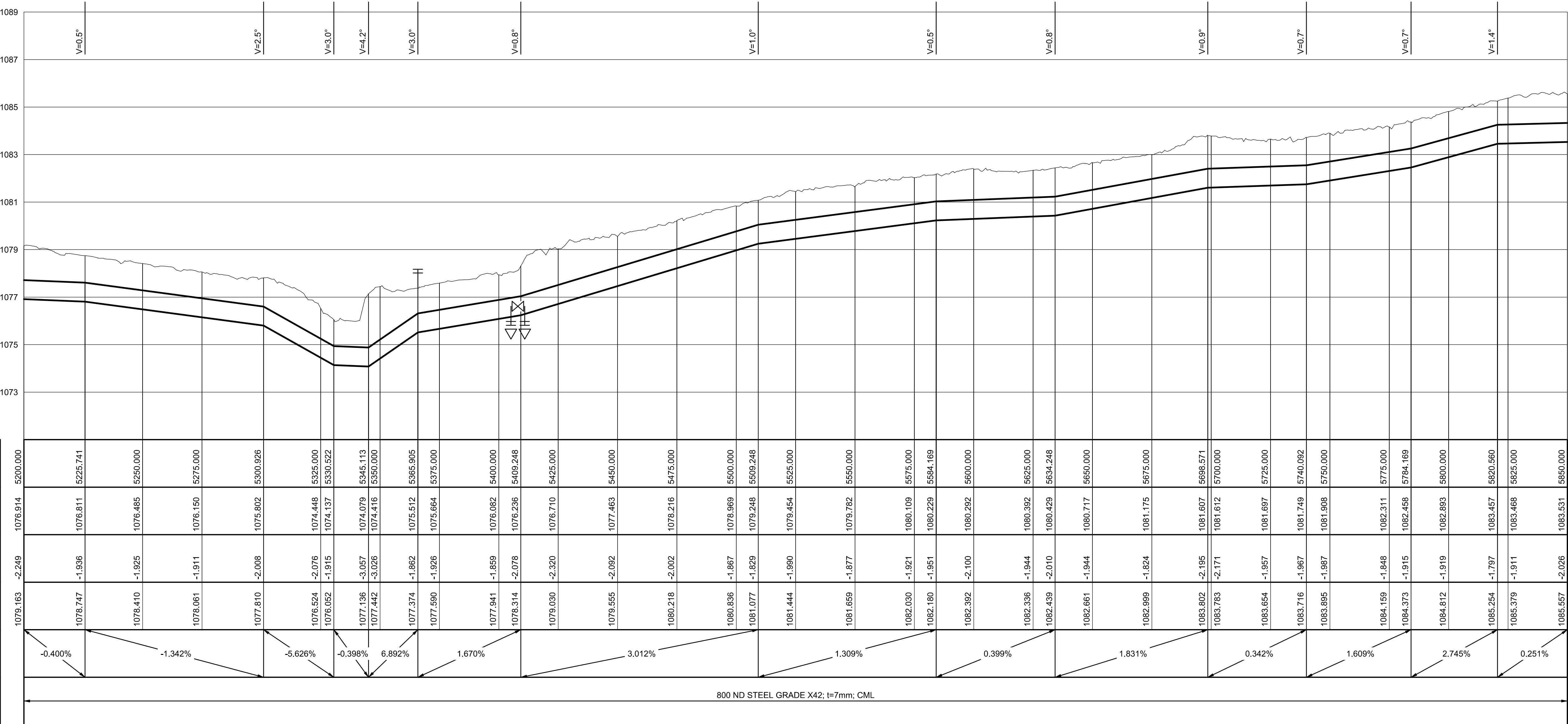
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|  | PERMANENT SERVITUDE |
|  | TEMPORARY SERVITUDE |
|  | PIPELINE            |
|  | AIR VALVE           |
|  | SCOUR VALVE         |
|  | ACCESS TO PIPELINE  |
|  | ISOLATING VALVE     |
|  | FLOW METER          |
|  | NON-RETURN VALVE    |
|  | OFF-TAKE            |
|  | FARM BOUNDARY       |
|  | CADASTRAL BOUNDARY  |
|  | EXISTING SERVITUDE  |

SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1071 m

| CHAINAGE (m)    |
|-----------------|
| INVERT LEVEL    |
| DEPTH TO INVERT |
| GROUND LEVEL    |
| PIPE GRADES     |
| PIPE DETAILS    |



| VERSION / AMENDMENTS |      |             |          |
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| No.                  | DATE | DESCRIPTION | AUTH. BY |
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| DRAWING TITLE:<br><b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 9 OF 13</b> |  |

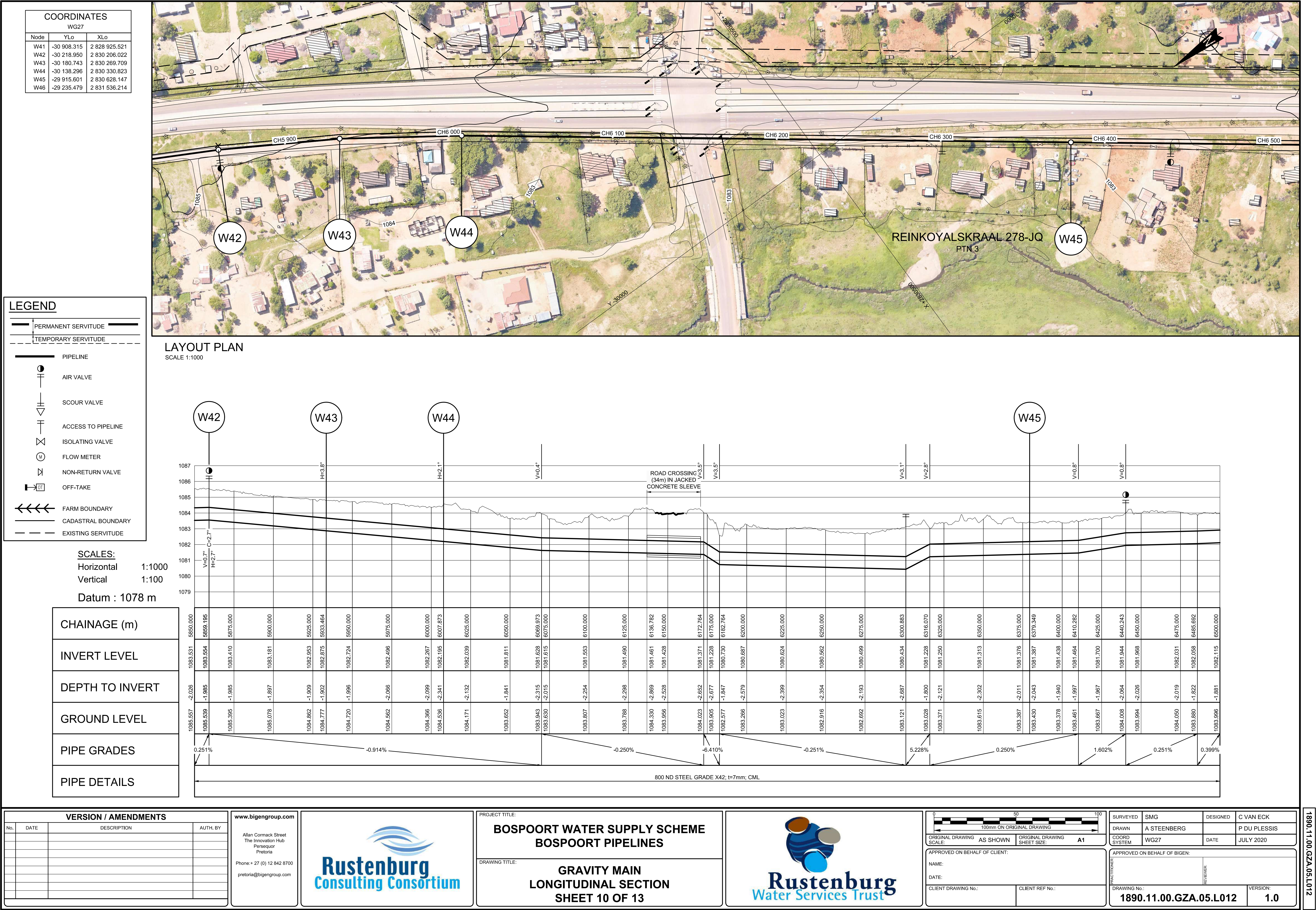


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|---------------------------------------|---------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

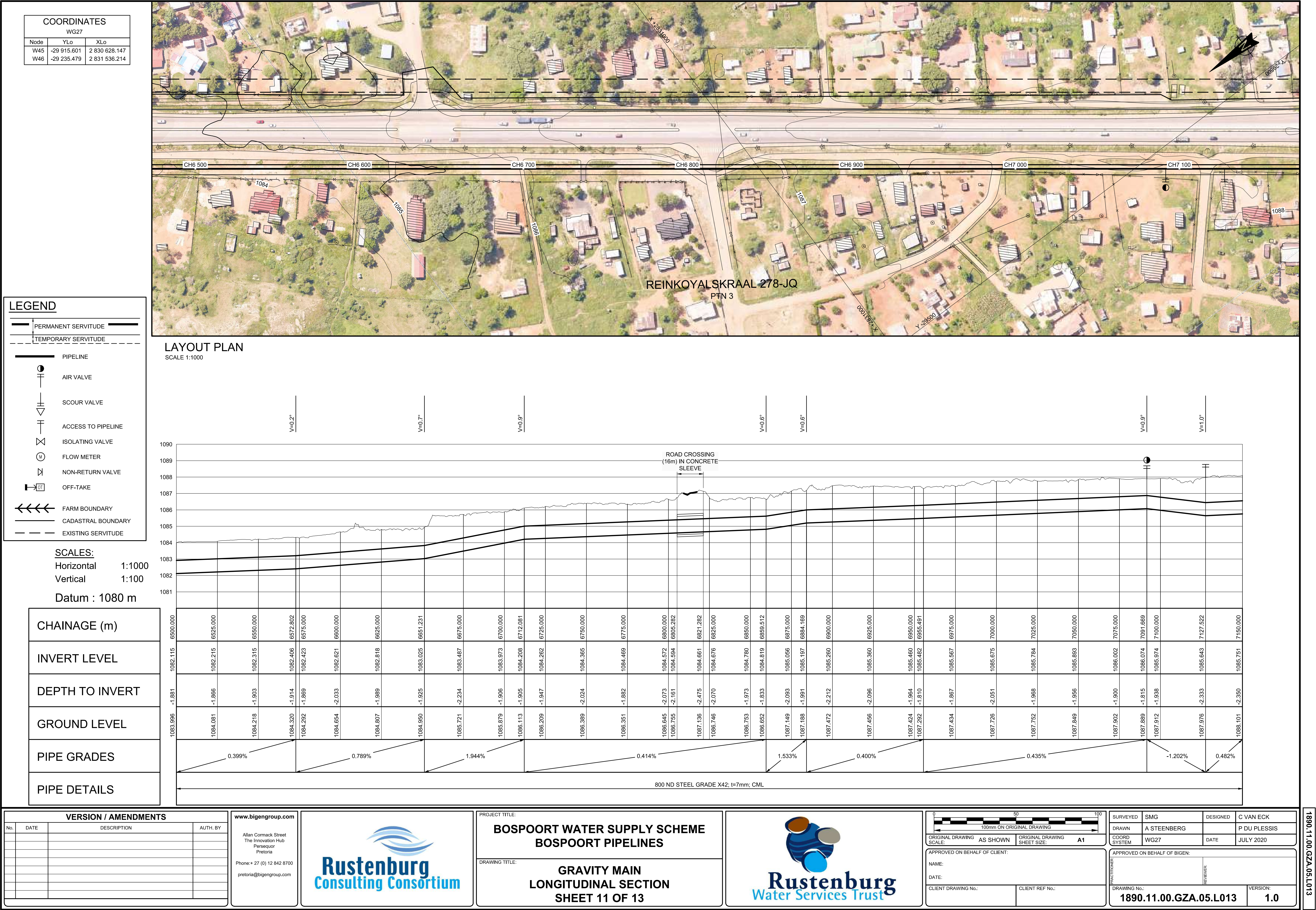
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|------------------------------|------------------------|----------|--------------|
| SURVEYED                     | SMG                    | DESIGNED | C VAN ECK    |
| DRAWN                        | A STEENBERG            |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27                   | DATE     | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN: |                        |          |              |
| DRAWING No.:                 | 1890.11.00.GZA.05.L011 | VERSION: | 1.0          |

1890.11.00.GZA.05.L011











| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W45         | -29 915.601 | 2 830 628.147 |
| W46         | -29 235.479 | 2 831 536.214 |
| W47         | -29 181.089 | 2 831 616.396 |
| W48         | -28 914.334 | 2 832 058.204 |

#### LEGEND

|  |                     |
|--|---------------------|
|  | PERMANENT SERVITUDE |
|  | TEMPORARY SERVITUDE |
|  | PIPELINE            |
|  | AIR VALVE           |
|  | SCOUR VALVE         |
|  | ACCESS TO PIPELINE  |
|  | ISOLATING VALVE     |
|  | FLOW METER          |
|  | NON-RETURN VALVE    |
|  | OFF-TAKE            |
|  | FARM BOUNDARY       |
|  | CADASTRAL BOUNDARY  |
|  | EXISTING SERVITUDE  |

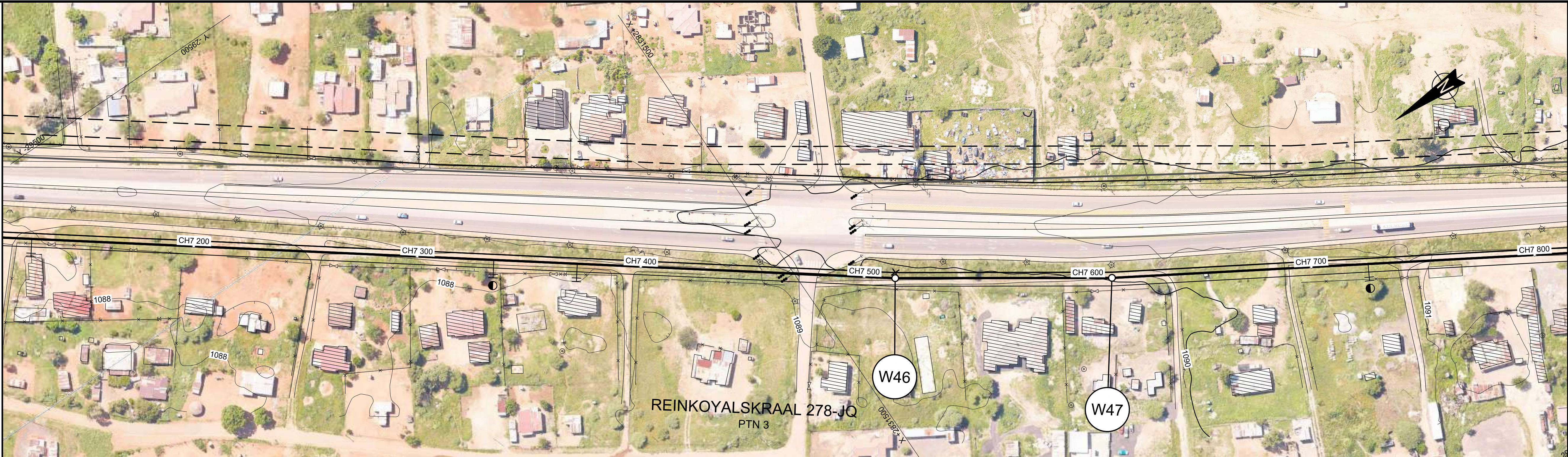
#### SCALES:

Horizontal 1:1000

Vertical 1:100

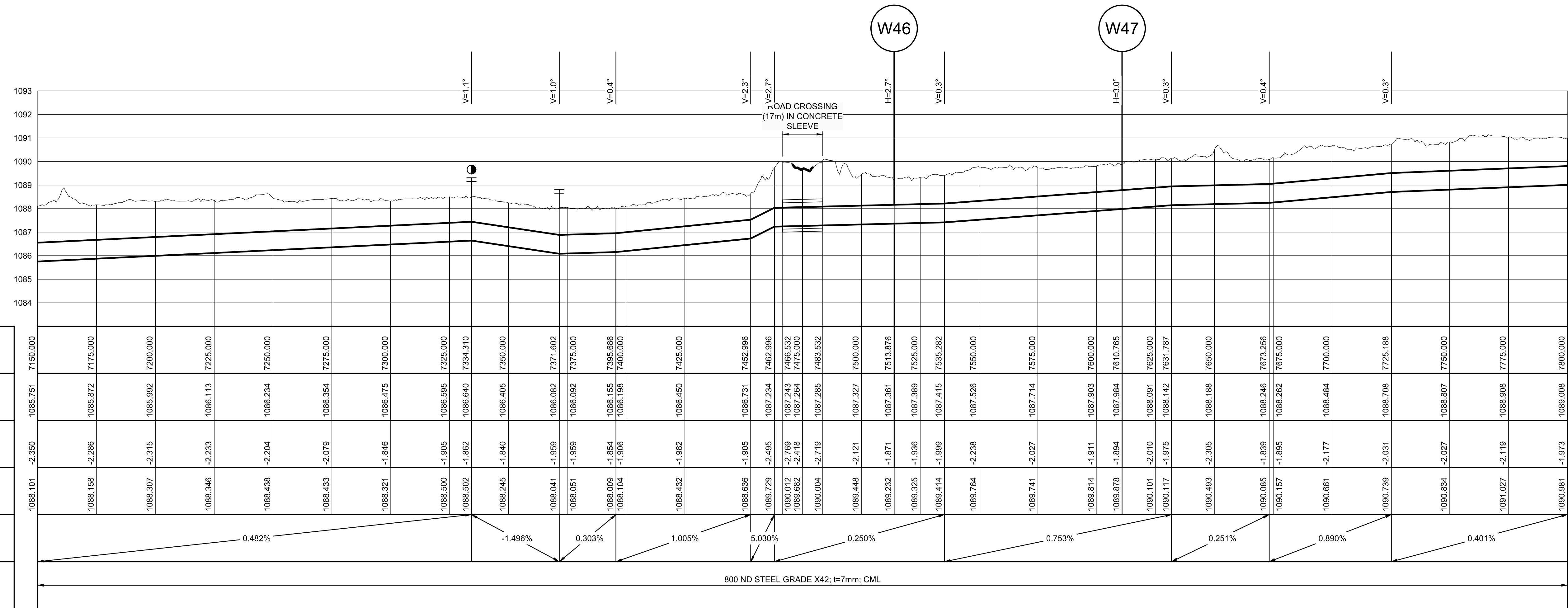
Datum : 1083 m

| CHAINAGE (m)    |
|-----------------|
| INVERT LEVEL    |
| DEPTH TO INVERT |
| GROUND LEVEL    |
| PIPE GRADES     |
| PIPE DETAILS    |



#### LAYOUT PLAN

SCALE 1:1000



| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
|                      |      |             |          |
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|                                                                 |  |
|-----------------------------------------------------------------|--|
| PROJECT TITLE:                                                  |  |
| <b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>      |  |
| DRAWING TITLE:                                                  |  |
| <b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 12 OF 13</b> |  |



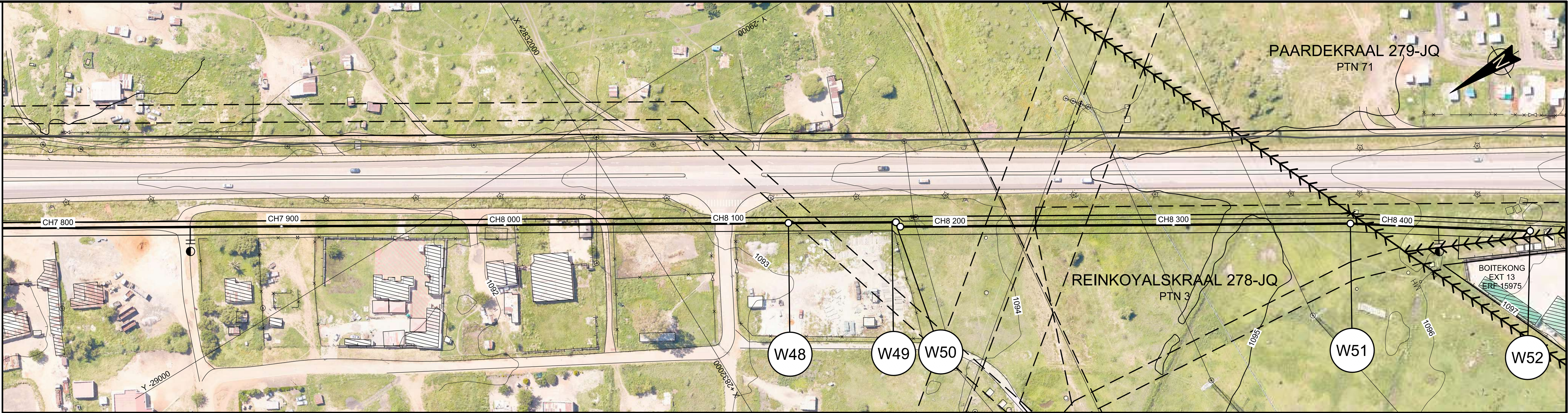
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| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                              |                        |          |              |
|------------------------------|------------------------|----------|--------------|
| SURVEYED                     | SMG                    | DESIGNED | C VAN ECK    |
| DRAWN                        | A STEENBERG            |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27                   | DATE     | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN: |                        |          |              |
| FRACITIONER:                 | REVIEWER:              |          |              |
| DRAWING No.:                 | 1890.11.00.GZA.05.L014 | VERSION: | 1.0          |

1890.11.00.GZA.05.L014



| COORDINATES |             |               |
|-------------|-------------|---------------|
| WG27        |             |               |
| Node        | YLo         | XLo           |
| W47         | -29 181.089 | 2 831 616.396 |
| W48         | -28 914.334 | 2 832 058.204 |
| W49         | -28 889.482 | 2 832 099.381 |
| W50         | -28 886.736 | 2 832 100.060 |
| W51         | -28 782.667 | 2 832 272.491 |
| W52         | -28 737.861 | 2 832 339.341 |



#### LEGEND

|  |                     |
|--|---------------------|
|  | PERMANENT SERVITUDE |
|  | TEMPORARY SERVITUDE |
|  | PIPELINE            |
|  | AIR VALVE           |
|  | SCOUR VALVE         |
|  | ACCESS TO PIPELINE  |
|  | ISOLATING VALVE     |
|  | FLOW METER          |
|  | NON-RETURN VALVE    |
|  | OFF-TAKE            |
|  | FARM BOUNDARY       |
|  | CADASTRAL BOUNDARY  |
|  | EXISTING SERVITUDE  |

#### SCALES:

Horizontal 1:1000  
Vertical 1:100

Datum : 1086 m

CHAINAGE (m)

INVERT LEVEL

DEPTH TO INVERT

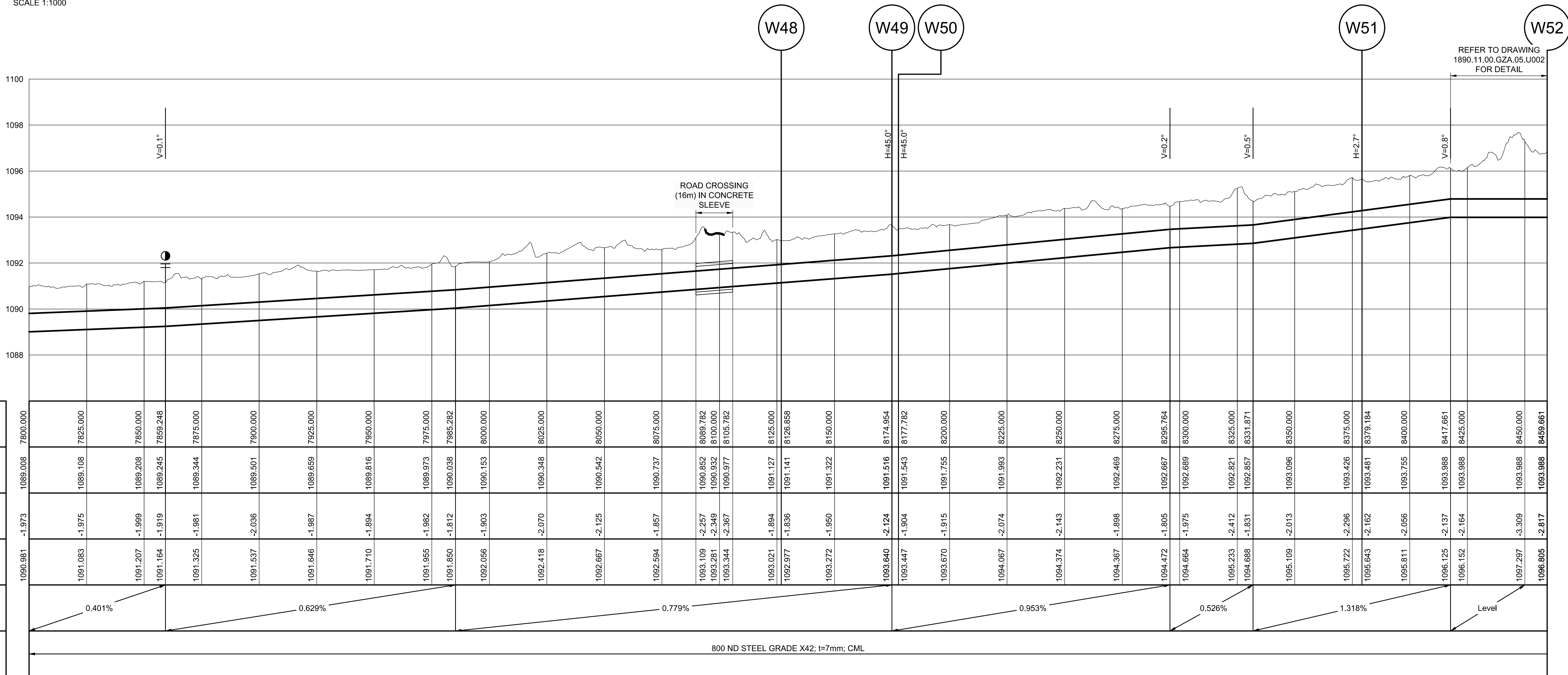
GROUND LEVEL

PIPE GRADES

PIPE DETAILS

#### LAYOUT PLAN

SCALE 1:1000



| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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|                                                                                   |  |
|-----------------------------------------------------------------------------------|--|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>      |  |
| DRAWING TITLE:<br><b>GRAVITY MAIN<br/>LONGITUDINAL SECTION<br/>SHEET 13 OF 13</b> |  |

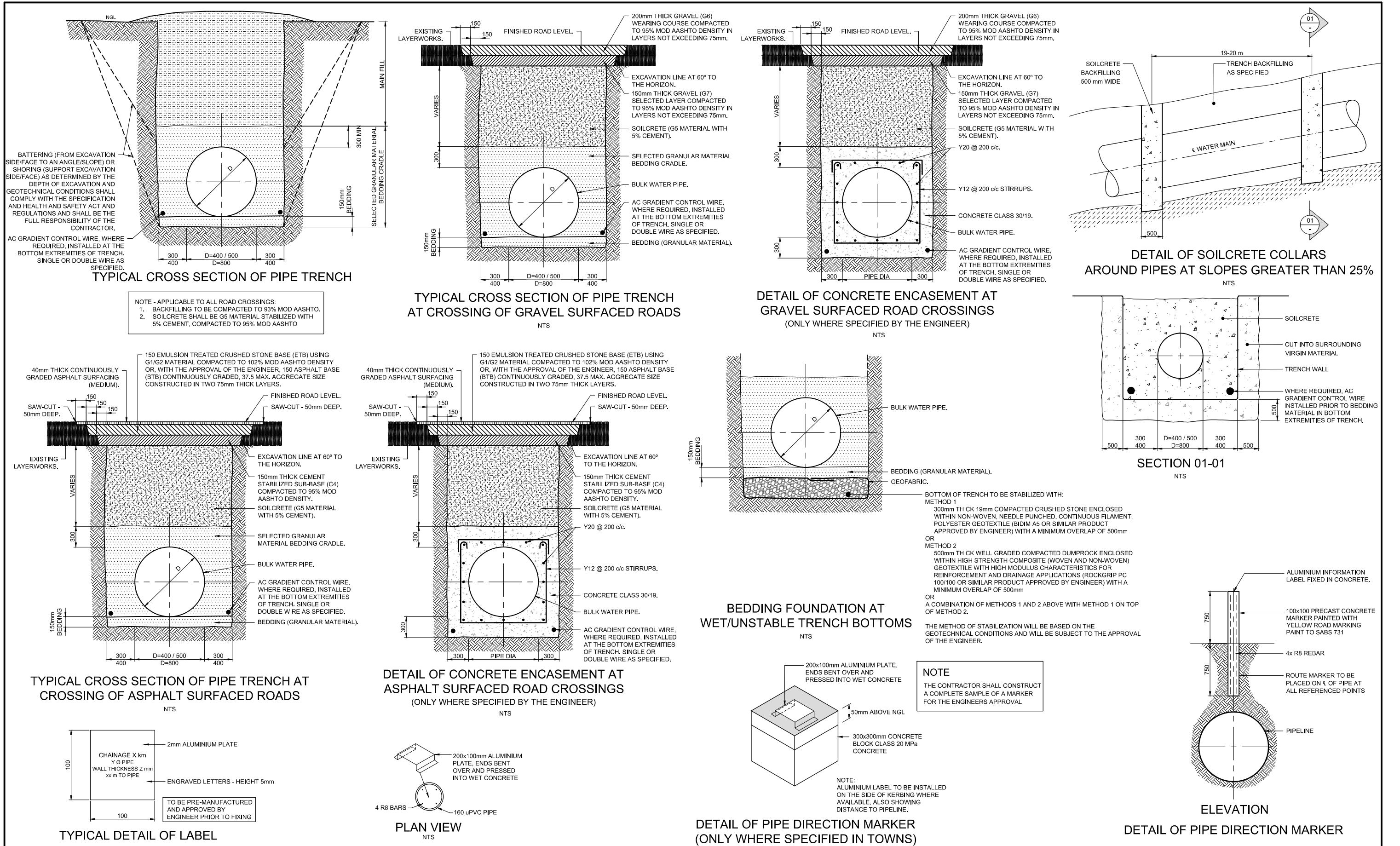


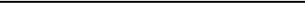
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| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 | DATE:                           |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                              |             |           |              |
|------------------------------|-------------|-----------|--------------|
| SURVEYED                     | SMG         | DESIGNED  | C VAN ECK    |
| DRAWN                        | A STEENBERG | DATE      | P DU PLESSIS |
| COORD SYSTEM                 | WG27        | DATE      | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN: |             | REVIEWER: |              |
| DRAWING No.:                 |             | VERSION:  |              |
| 1890.11.00.GZA.05.L015       |             | 1.0       |              |

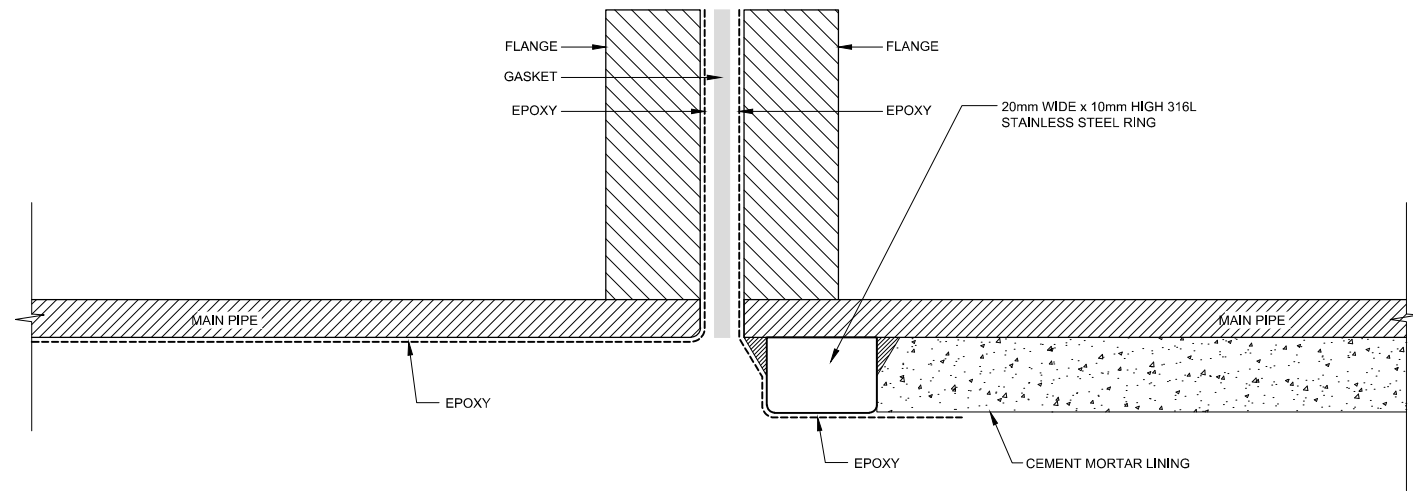
1890.11.00.GZA.05.L015





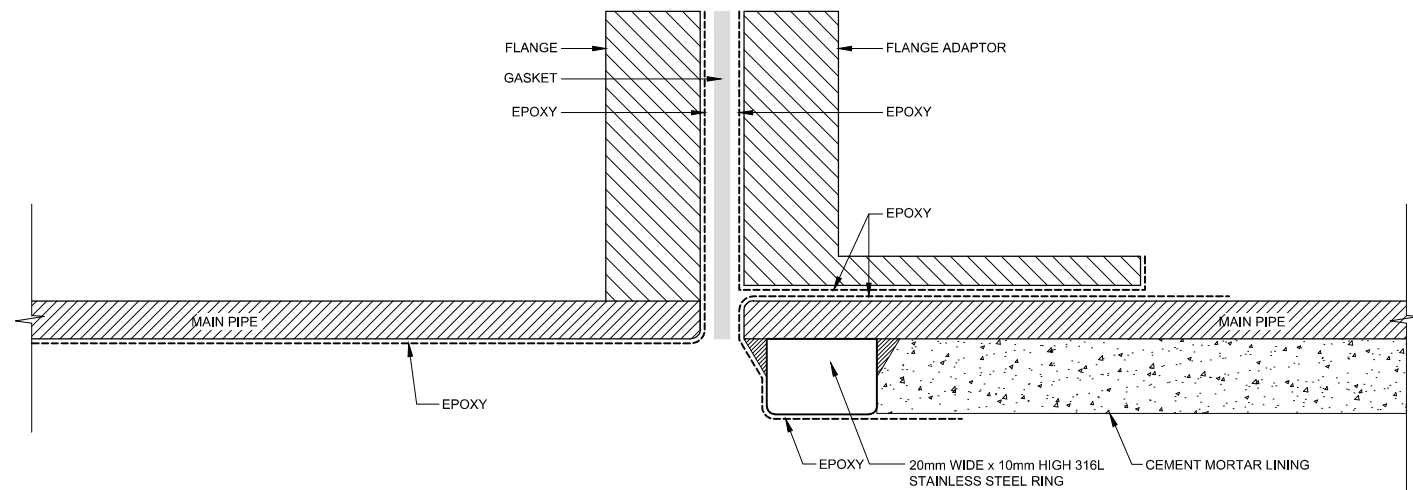
| VERSION / AMENDMENTS |      |             |          | www.bigengroup.com                                                                                                                                                                                                      |  | PROJECT TITLE:                                             |  |  |  | SURVEYED                        |  | DESIGNED |  | P DU PLESSIS |  | 1890.11.00.GZA.05.D001 |           |  |
|----------------------|------|-------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------|--|---------------------------------------------------------------------------------------|--|---------------------------------|--|----------|--|--------------|--|------------------------|-----------|--|
| No.                  | DATE | DESCRIPTION | AUTH. BY | <br>Allan Cormack Street<br>The Innovation Hub<br>Perseus<br>Pretoria<br><br>Phone: + 27 (0) 12 842 8700<br>pretoria@bigengroup.com |  | <b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b> |  | ORIGINAL DRAWING SCALE: NTS                                                           |  | ORIGINAL DRAWING SHEET SIZE: A1 |  | DRAWN    |  | JA SWART     |  |                        | C VAN ECK |  |
|                      |      |             |          |                                                                                                                                                                                                                         |  |                                                            |  | COORD SYSTEM                                                                          |  | WG27                            |  | DATE     |  | MAY 2020     |  |                        |           |  |
|                      |      |             |          |                                                                                                                                                                                                                         |  |                                                            |  | APPROVED ON BEHALF OF CLIENT:                                                         |  | APPROVED ON BEHALF OF BIGEN:    |  |          |  |              |  |                        |           |  |
|                      |      |             |          |                                                                                                                                                                                                                         |  |                                                            |  | NAME:                                                                                 |  | DRAWING No.:                    |  |          |  | VERSION:     |  |                        |           |  |
|                      |      |             |          |                                                                                                                                                                                                                         |  |                                                            |  | DATE:                                                                                 |  | CLIENT REF No.:                 |  |          |  |              |  |                        |           |  |
|                      |      |             |          |                                                                                                                                                                                                                         |  |                                                            |  | CLIENT DRAWING No.:                                                                   |  |                                 |  |          |  |              |  |                        |           |  |
|                      |      |             |          |                                                                                                                                                                                                                         |  | DRAWING TITLE:                                             |  |  |  |                                 |  |          |  |              |  | 1.0                    |           |  |
|                      |      |             |          |                                                                                                                                                                                                                         |  | <b>GENERAL PIPELINE DETAILS</b>                            |  |                                                                                       |  |                                 |  |          |  |              |  |                        |           |  |





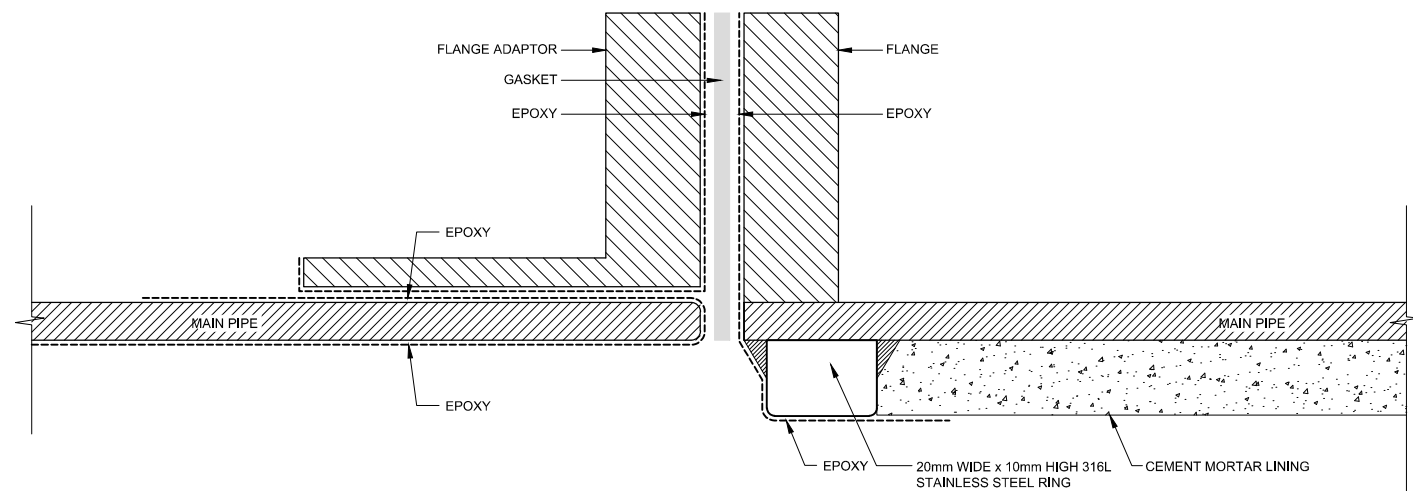
**FLANGED JOINT BETWEEN EPOXY LINED AND CEMENT MORTAR LINED PIPES (BOTH PIPES FLANGED)**

**NOTE:**  
EDGES WITH EPOXY PAINT SHALL HAVE A RADIUS OF 2.5mm.



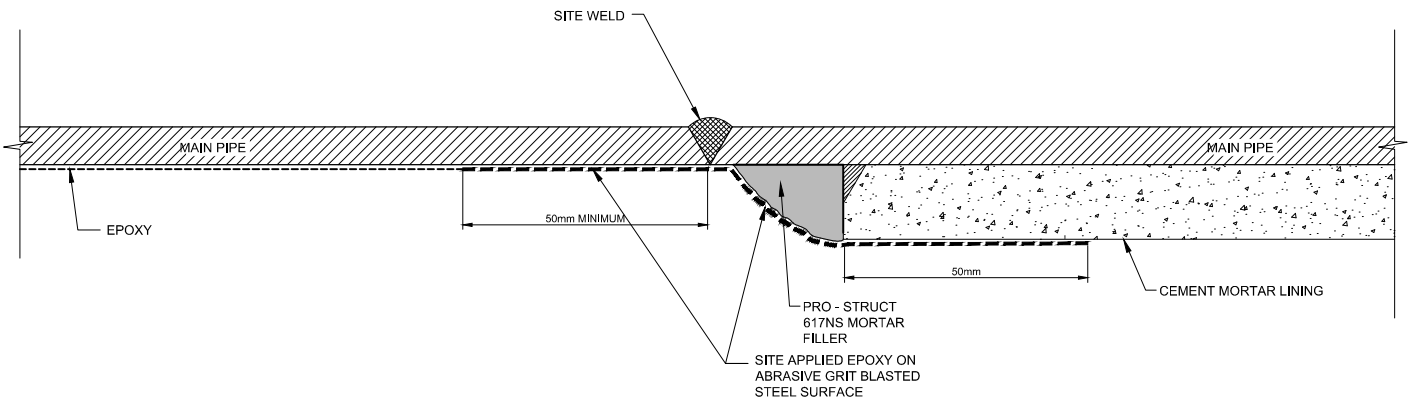
**JOINT BETWEEN FLANGED EPOXY LINED PIPE AND FLANGE ADAPTOR ON CEMENT MORTAR LINED PIPE**

**NOTE:**  
EDGES WITH EPOXY PAINT SHALL HAVE A RADIUS OF 2.5mm.



**JOINT BETWEEN FLANGE ADAPTOR ON EPOXY LINED PIPE AND FLANGED CEMENT MORTAR LINED PIPE**

**NOTE:**  
EDGES WITH EPOXY PAINT SHALL HAVE A RADIUS OF 2.5mm.



**WELDED JOINT BETWEEN EPOXY LINED AND LARGE DIAMETER (D> 500mm) CEMENT MORTAR LINED PIPES**

**NOTE:**  
EDGES WITH EPOXY PAINT SHALL HAVE A RADIUS OF 2.5mm.

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**LINING AT PIPE JOINTS**



0 50 100  
100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: 1:200 ORIGINAL DRAWING SHEET SIZE: A1

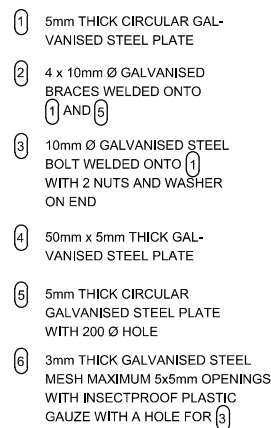
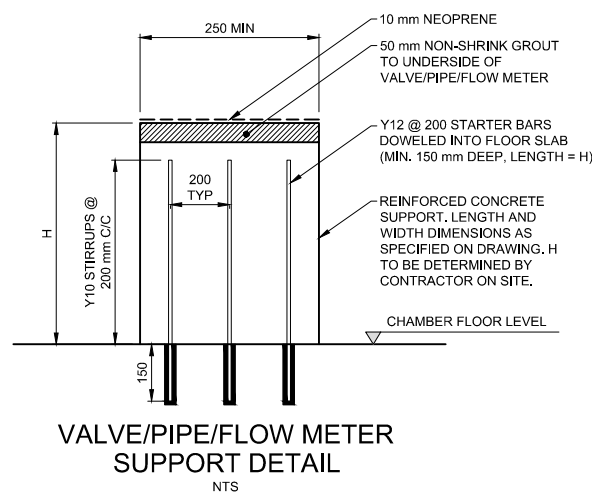
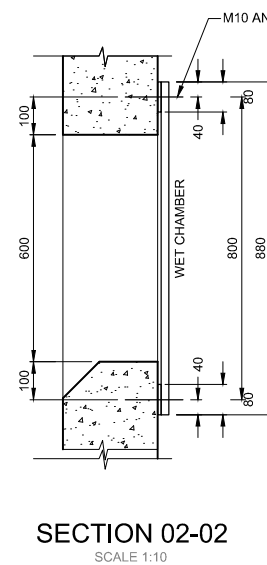
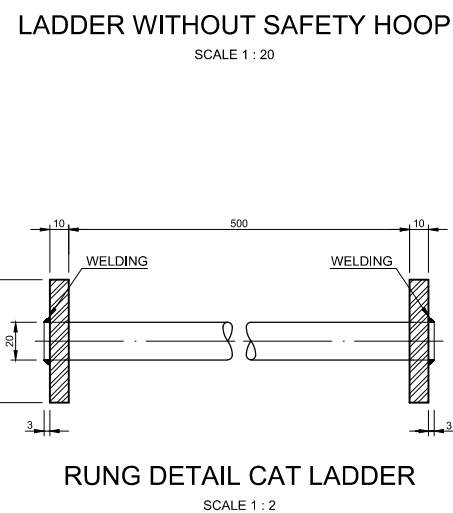
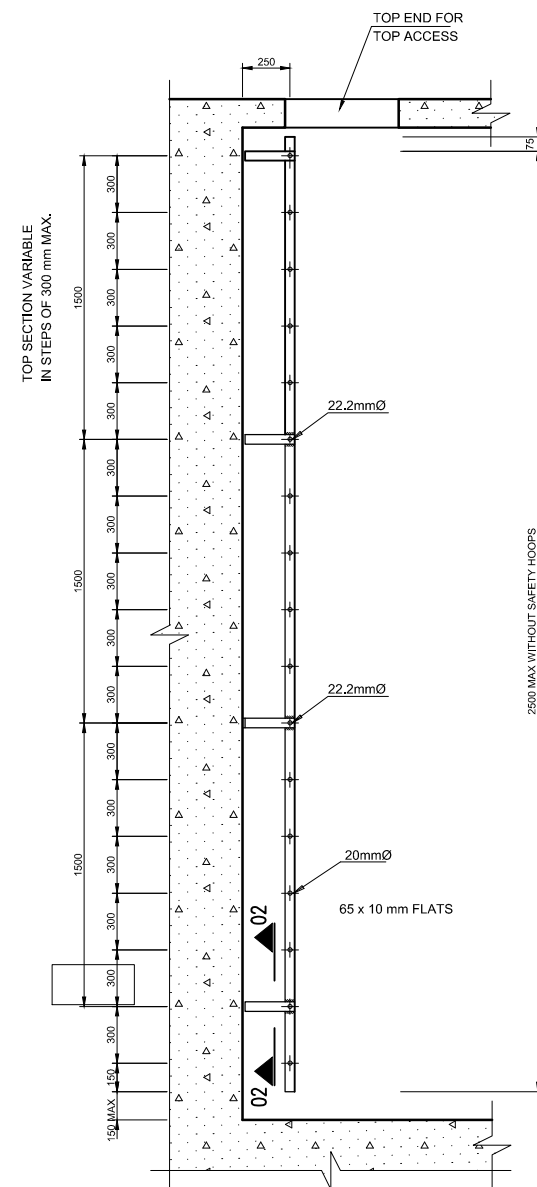
APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_  
DATE: \_\_\_\_\_  
CLIENT DRAWING No.: \_\_\_\_\_ CLIENT REF No.: \_\_\_\_\_

|                              |          |              |
|------------------------------|----------|--------------|
| SURVEYED                     | DESIGNED | P DU PLESSIS |
| DRAWN                        | JA SWART | C VAN ECK    |
| COORD SYSTEM                 | WG27     | DATE         |
| APPROVED ON BEHALF OF BIGEN: |          |              |
| DRAWING No.:                 | VERSION: |              |
| 1890.11.00.GZA.05.D002       | 1.0      |              |

1890.11.00.GZA.05.D002



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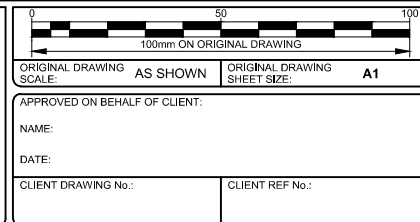
PROJECT TITLE:

## BOSPOORT WATER SUPPLY SCHEME

### BOSPOORT PIPELINES

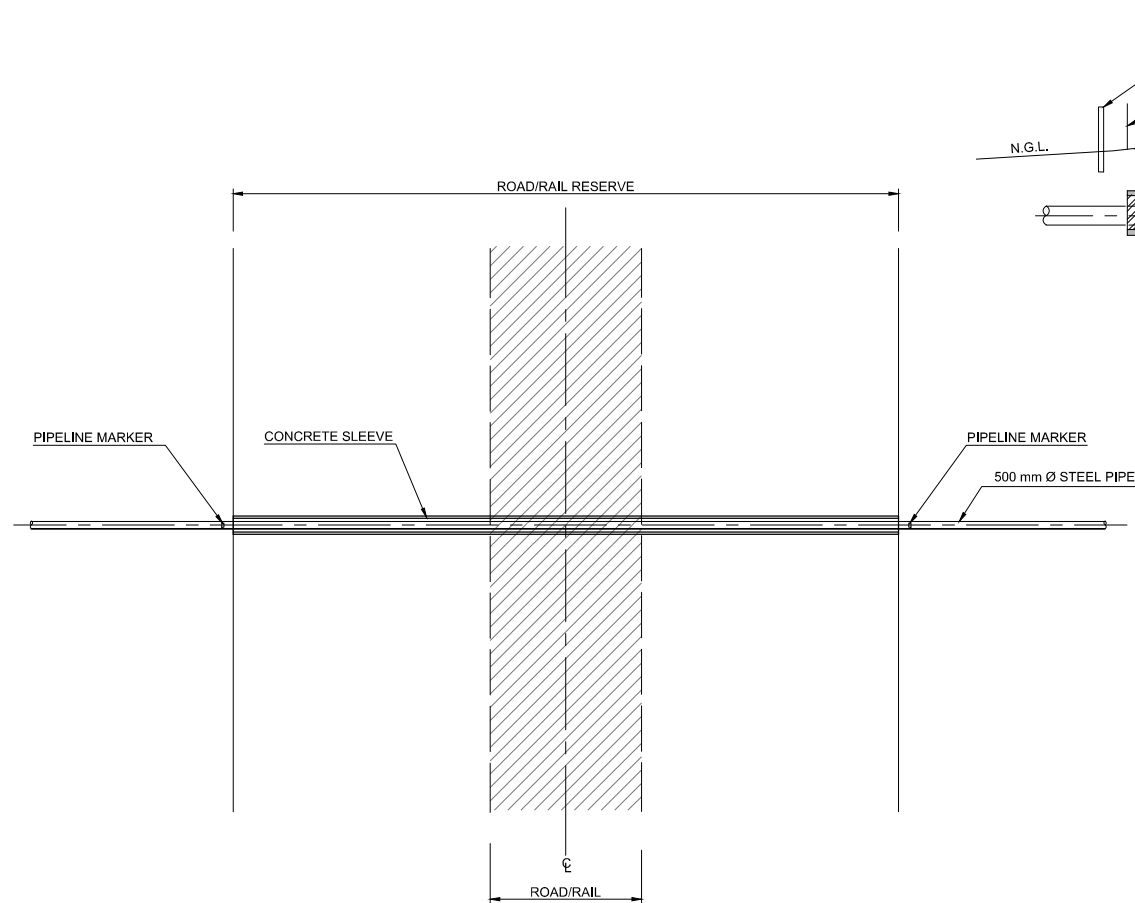
DRAWING TITLE:

**CHAMBER DETAILS - TYPICAL LADDER,  
VENTILATOR, SUPPORT AND SCOUR  
OUTLET OPENING DETAILS**



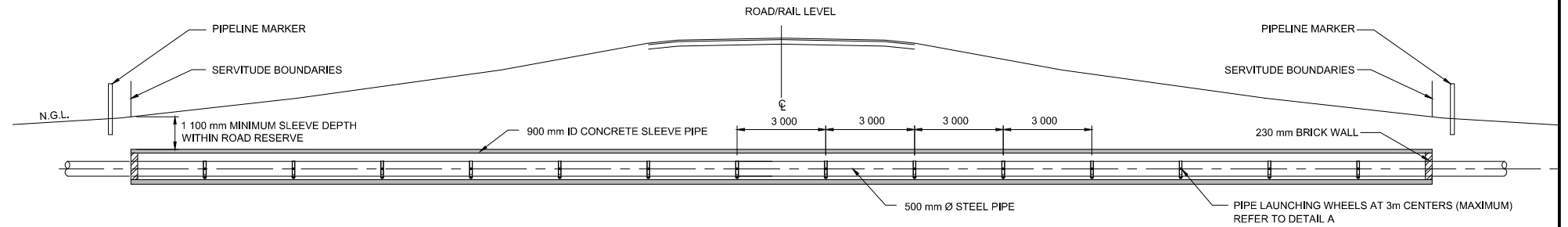
|                                               |          |          |                        |
|-----------------------------------------------|----------|----------|------------------------|
| SURVEYED                                      |          | DESIGNED | C VAN ECK              |
| DRAWN                                         | JA SWART |          | P DU PLESSIS           |
| COORD<br>SYSTEM                               | WG27     | DATE     | MAY 2020               |
| APPROVED ON BEHALF OF BIGEN:                  |          |          |                        |
| PROJECTMANAGER                                |          |          | RELEASED               |
| DRAWING No.:<br><b>1890.11.00.GZA.05.D003</b> |          |          | VERSION:<br><b>1.0</b> |





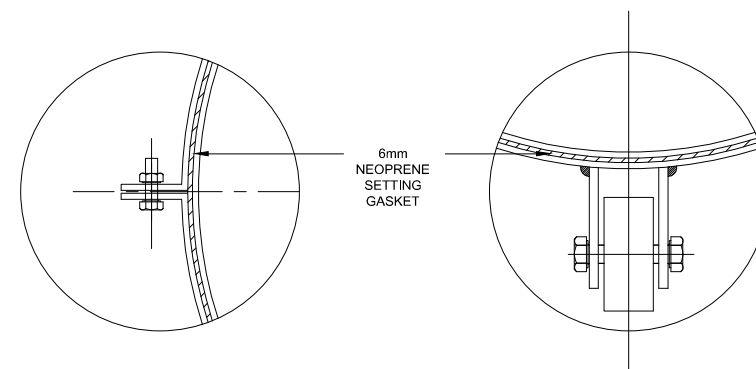
TYPICAL PLAN OF ROAD CROSSING

SCALE 1:250



TYPICAL LONG SECTION OF ROAD CROSSING

SCALE 1:100

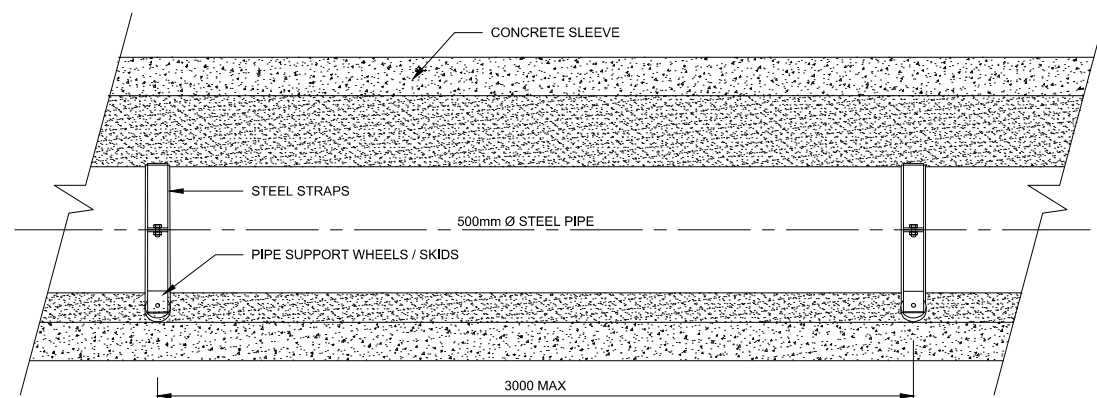


DETAIL 'A'

REFER TO NOTE 2

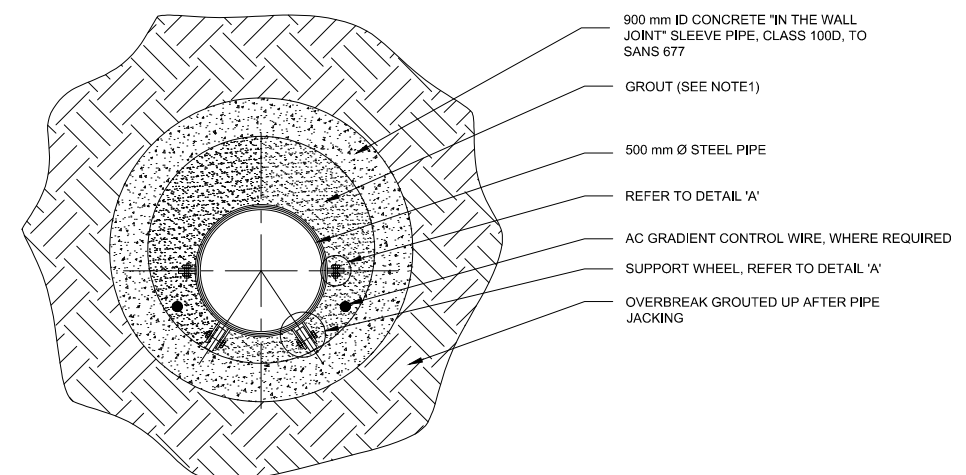
### NOTE:

1. GROUT (6,1 SAND/CEMENT MIX WITH 150 SLUMP) ENDS OF SLEEVE SHUTTERED AFTER INSTALLATION OF STEEL PIPE. ALL AIR TO BE DISPLACED DURING GROUTING. DEFORMATION AND/OR FLOATING OF STEEL PIPE TO BE AVOIDED DURING GROUTING.
2. PIPE STRAPS & SUPPORT WHEELS ARE TYPICAL ONLY. TO BE DESIGNED BY CONSTRUCTION CONTRACTOR FOR REVIEW BY ENGINEER. DESIGN TO BE ADEQUATE FOR PUSHING/PULLING EMPTY PIPE INTO SLEEVE (WITHOUT DAMAGING PIPE CORROSION PROTECTION) AND TO SUPPORT WEIGHT OF PIPE FILLED WITH WATER.



LONG SECTION

SCALE 1:15



CROSS SECTION

SCALE 1:15

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
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|                                                                              |  |
|------------------------------------------------------------------------------|--|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b> |  |
| DRAWING TITLE:<br><b>JACKED ROAD CROSSING<br/>500ND PIPE</b>                 |  |

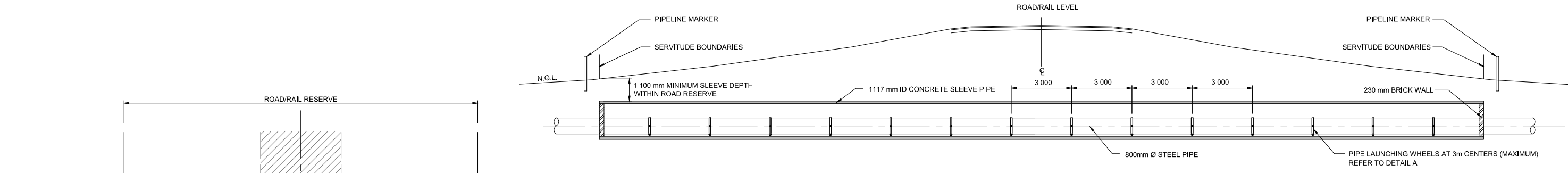


|                                       |                                 |
|---------------------------------------|---------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                              |          |              |
|------------------------------|----------|--------------|
| SURVEYED                     | DESIGNED | P DU PLESSIS |
| DRAWN                        | JA SWART | C VAN ECK    |
| COORD SYSTEM                 | WG27     | DATE         |
| APPROVED ON BEHALF OF BIGEN: |          |              |
| DRAWING No.:                 | VERSION: |              |
| 1890.11.00.GZA.05.D004       | 1.0      |              |

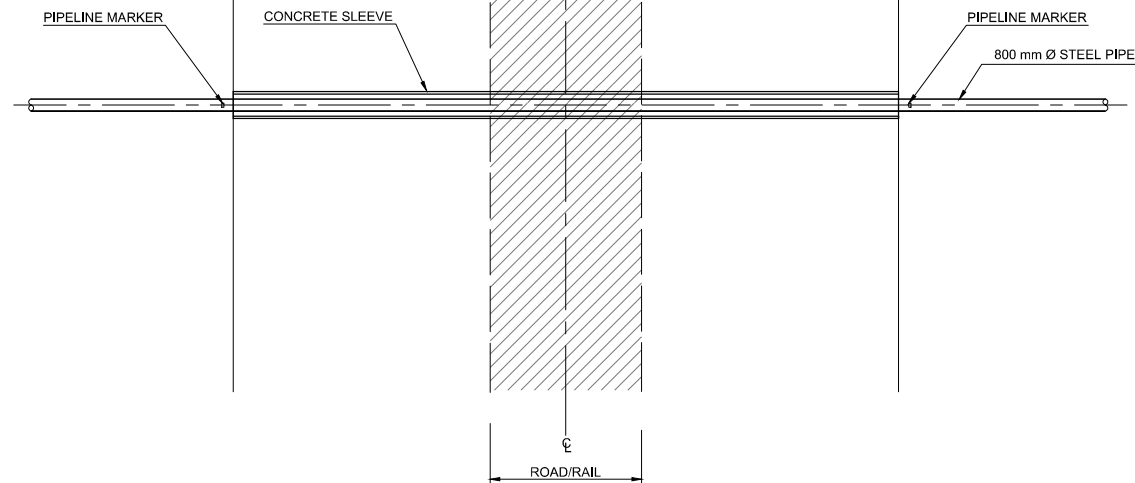
1890.11.00.GZA.05.D004





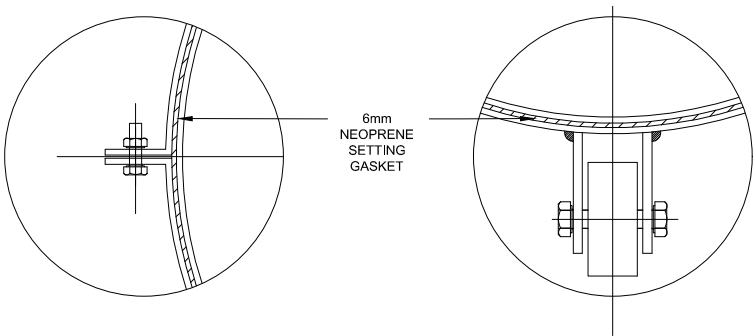
TYPICAL LONG SECTION OF ROAD CROSSING

SCALE 1:100



TYPICAL PLAN OF ROAD CROSSING

SCALE 1:250

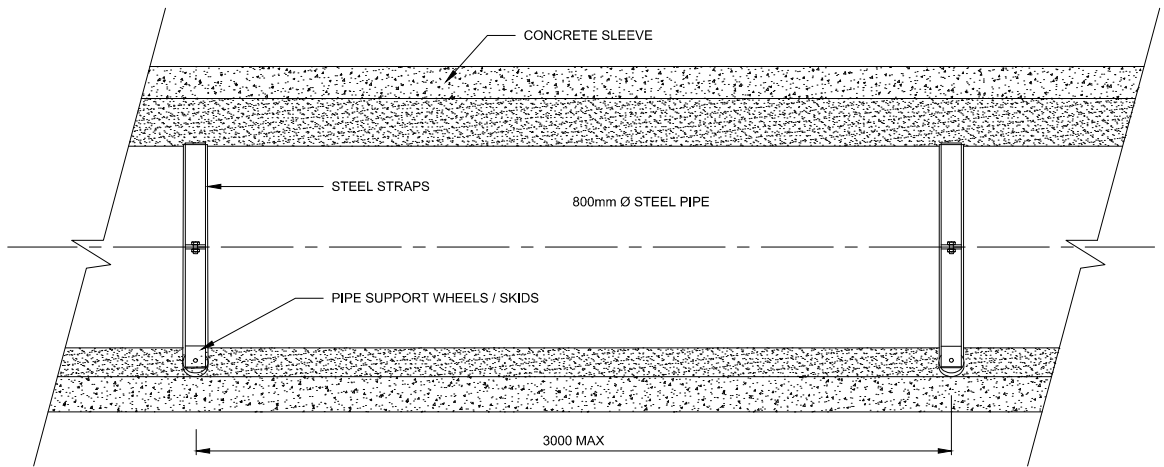


DETAIL 'A'

REFER TO NOTE 2

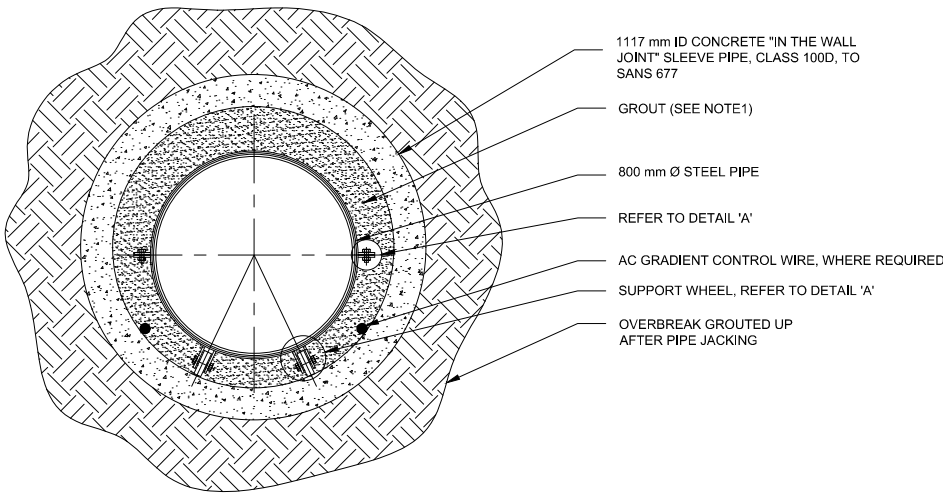
**NOTE:**

1. GROUT (6.1 SAND/CEMENT MIX WITH 150 SLUMP) ENDS OF SLEEVE SHUTTERED AFTER INSTALLATION OF STEEL PIPE. ALL AIR TO BE DISPLACED DURING GROUTING. DEFORMATION AND/OR FLOATING OF STEEL PIPE TO BE AVOIDED DURING GROUTING.
2. PIPE STRAPS & SUPPORT WHEELS ARE TYPICAL ONLY. TO BE DESIGNED BY CONSTRUCTION CONTRACTOR FOR REVIEW BY ENGINEER. DESIGN TO BE ADEQUATE FOR PUSHING/PULLING EMPTY PIPE INTO SLEEVE (WITHOUT DAMAGING PIPE CORROSION PROTECTION) AND TO SUPPORT WEIGHT OF PIPE FILLED WITH WATER.



LONG SECTION

SCALE 1:15



CROSS SECTION

SCALE 1:15

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
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|                      |      |             |          |
|                      |      |             |          |

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PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**JACKED ROAD CROSSING 800ND PIPE**



0 50 100  
100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: AS SHOWN ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_

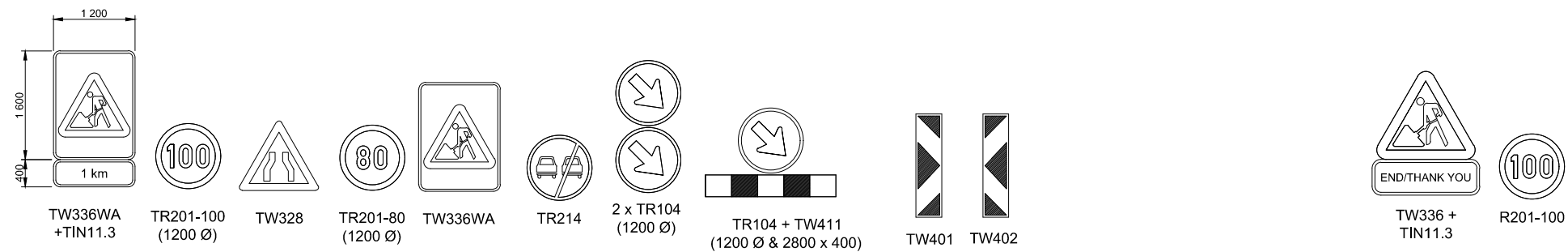
DATE: \_\_\_\_\_

CLIENT DRAWING No.: \_\_\_\_\_ CLIENT REF No.: \_\_\_\_\_

|                              |          |          |              |
|------------------------------|----------|----------|--------------|
| SURVEYED                     |          | DESIGNED | P DU PLESSIS |
| DRAWN                        | JA SWART |          | C VAN ECK    |
| COORD SYSTEM                 | WG27     | DATE     | MAY 2020     |
| APPROVED ON BEHALF OF BIGEN: |          |          |              |
| FUNCTIONER                   |          |          |              |
| ENGINEER                     |          |          |              |
| DRAWING No.:                 |          |          | VERSION:     |
| 1890.11.00.GZA.05.D005       |          |          | 1.0          |

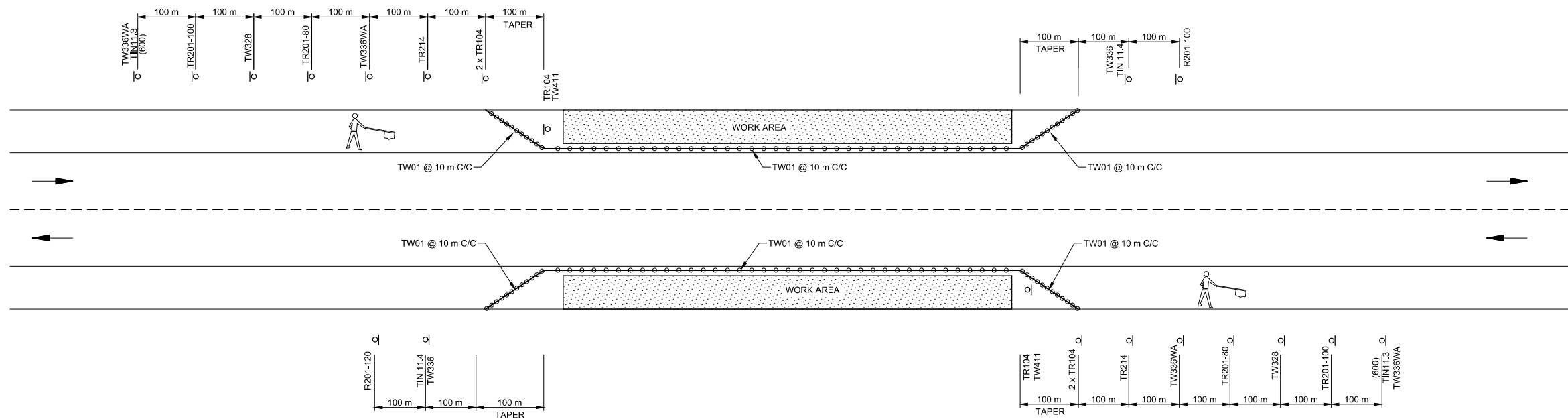
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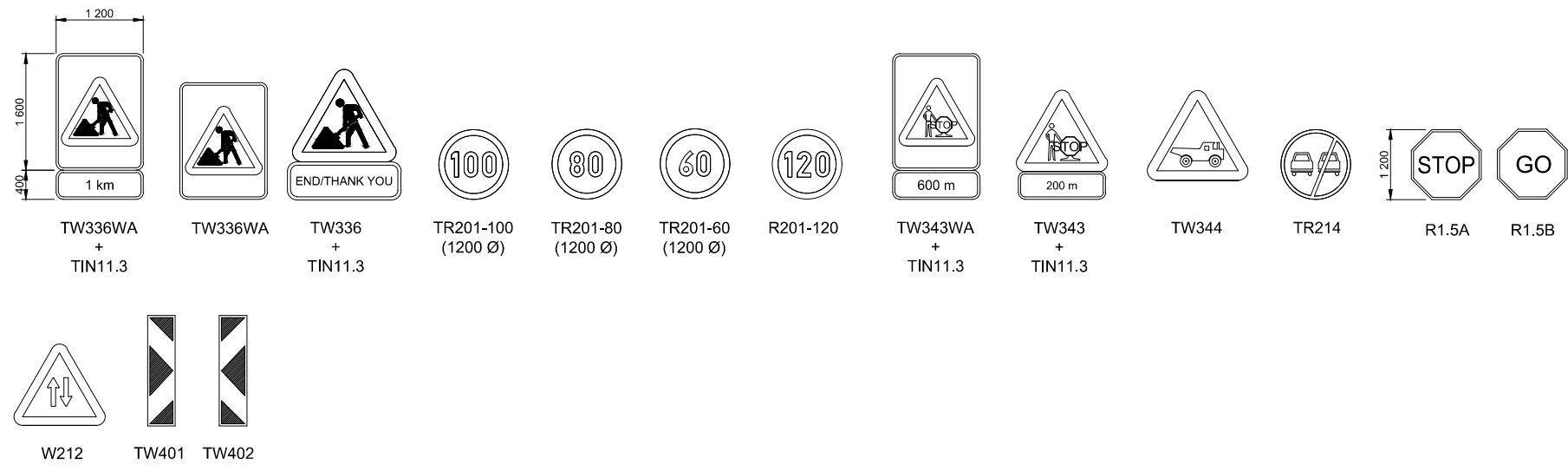
**NOTE:**

- DURING DAY TIME THE TW401 & TW402 CAN BE REPLACED WITH 750 mm CONES. FOR LONG WORK AREAS EVERY 5th CONE MUST BE REPLACED WITH A DELINEATOR.
- TYPICAL DETAILS ARE SHOWN. ROAD SIGNS TO BE ADJUSTED FOR EACH PARTICULAR CASE IN ACCORDANCE WITH SPECIFICATION AND REGULATIONS OF ROAD AUTHORITY.

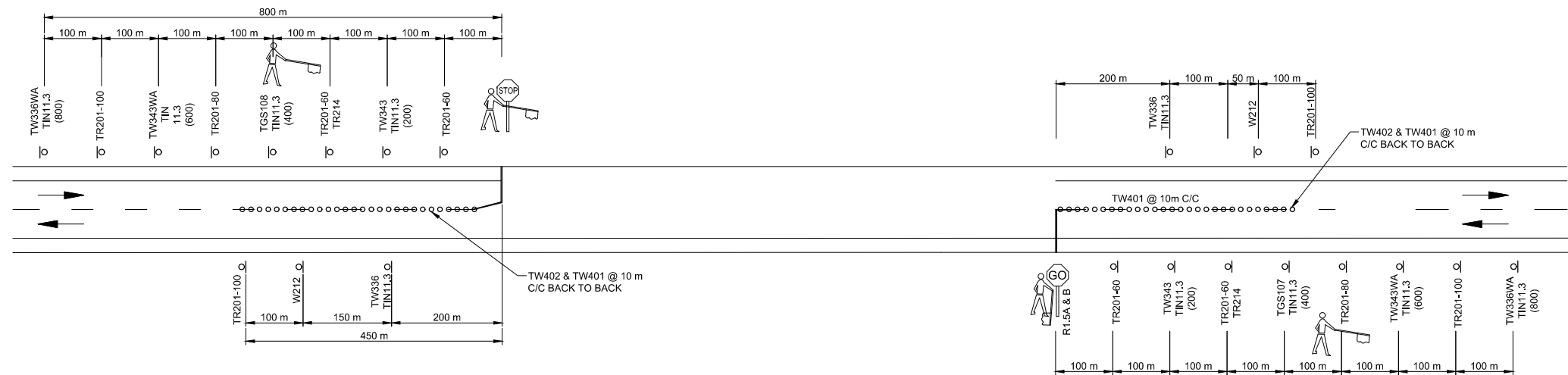


ACCOMMODATION OF TRAFFIC AT WORK TO THE ROAD/SHOULDER





**NOTE:**  
1. TYPICAL DETAILS ARE SHOWN. ROAD SIGNS TO BE ADJUSTED FOR EACH PARTICULAR CASE IN ACCORDANCE WITH SPECIFICATION AND REGULATIONS OF ROAD AUTHORITY.



ACCOMMODATION OF TRAFFIC AT STOP/GO CONTROL

| VERSION / AMENDMENTS |      |             |          |
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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**TYPICAL ROAD DEVIATION  
DETAILS FOR HALF OPEN TRENCH  
ROAD CROSSING**



0 50 100  
100mm ON ORIGINAL DRAWING

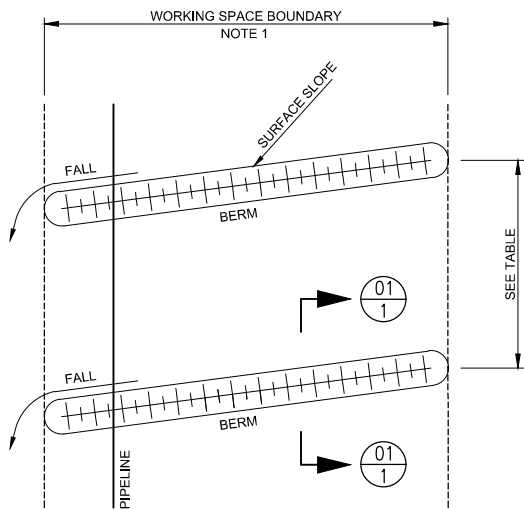
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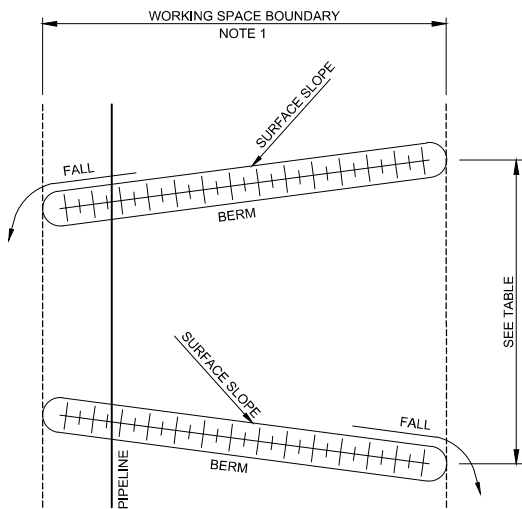
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| SURVEYED                            | DESIGNED | P DU PLESSIS   |
| DRAWN                               | JA SWART | C VAN ECK      |
| COORD SYSTEM                        | WG27     | DATE: MAY 2020 |
| APPROVED ON BEHALF OF BIGEN:        |          | VERSION: 1.0   |
| DRAWING No.: 1890.11.00.GZA.05.D007 |          |                |

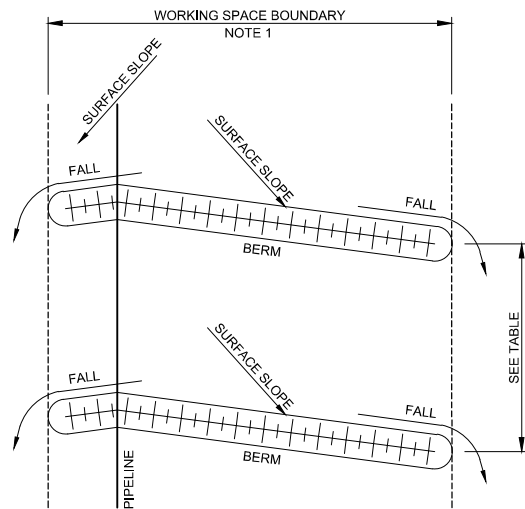




BERM ARRANGEMENT UNIFORM  
SLOPE DIRECTION - NOTE 3



BERM ARRANGEMENT IRREGULAR  
SLOPE DIRECTION - NOTE 3



HERRINGBONE BERM ARRANGEMENT  
OPPOSING SLOPE DIRECTION - NOTE 3

## GENERAL NOTES:

FOR FURTHER DETAILS AND REQUIREMENTS REFER TO:

- CONSTRUCTION SPECIFICATION
- ENVIRONMENTAL MANAGEMENT PLAN (EMP)
- APPROVED METHOD STATEMENT

## CONSTRUCTION NOTES:

- EROSION BERMS SHALL BE CONSTRUCTED TO DIVERT SURFACE RUN OFF TO STABLE, UNDERSTURBED LAND (ie. VEGETATED LAND) BUT SHALL NOT EXTEND OUTSIDE THE APPROVED WORKING SPACE. THE LOCATION AND DIRECTION BERMS SHALL TAKE ACCOUNT OF TOPOGRAPHY, EXISTING DRAINAGE PATTERNS AND TRENCH BREAKER LOCATIONS.
- GRADIENT OF EROSION BERM DRAIN SHALL NOT EXCEED 2%.
- THE DIRECTION OF DRAINAGE SHALL BE SUCH THAT THE DISCHARGED WATER FLOWS AWAY FROM THE DISTURBED WORK AREA. IN THE VICINITY OF WATERCOURSES AND WHERE THERE IS NO CROSSFALL, EROSION BERMS SHALL DISCHARGE TO THE DOWNSTREAM SIDE OF THE RIGHT OF WAY.
- INVERT OF DRAIN SHALL HAVE A BROAD BASE - ie. NOT V-SHAPED.
- EROSION BERMS SHALL BE COMPACTED TO RESIST EROSION.
- WHERE COLLECTED WATER MUST BE DISPERSED AT THE BASE OF SLOPE OR AT DEFINED NATURAL DRAINAGE LOCATIONS, CONTRACTOR SHALL INSTALL COLLECTION DITCHES WITH VELOCITY BREAKERS AS INSTRUCTED.

### TEMPORARY EROSION BERMS

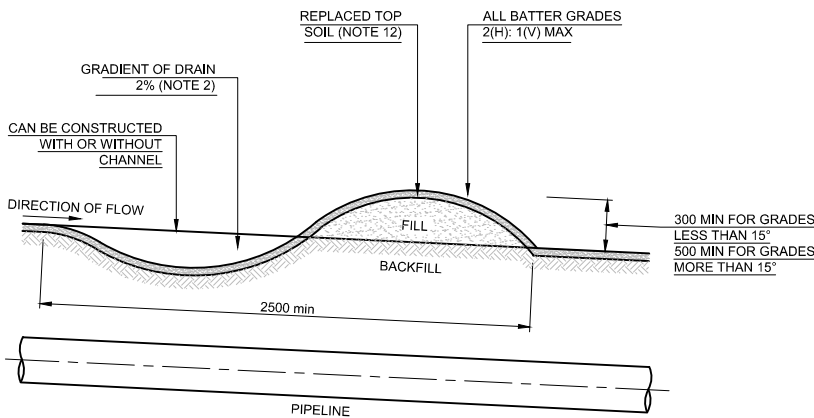
- TEMPORARY EROSION BERMS SHALL BE CONSTRUCTION DURING CLEAR AND GRADE. SPACING SHALL BE AS REQUIRED.
- TEMPORARY EROSION BERMS SHALL BE REINSTATED AFTER EACH OPERATION WHICH DISTURBS THEM (eg TRENCHING, STRINGING, BACKFILL).
- PROFILE OF TEMPORARY EROSION BERMS SHALL PERMIT VEHICLE CROSSING.

### PERMANENT CROSS BERMS.

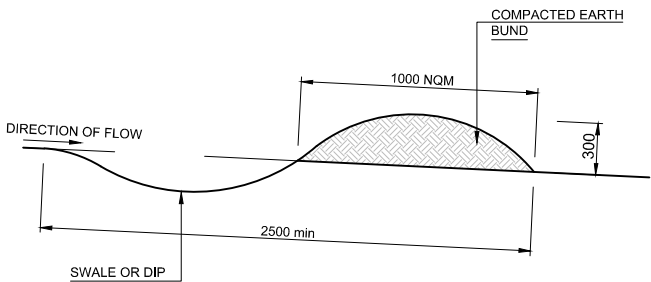
- PERMANENT EROSION BERMS SHALL BE CONSTRUCTED DURING FINAL REHABILITATION. SPACING OF PERMANENT EROSION BERMS SHALL BE IN ACCORDANCE WITH THE TABLE BELOW, OR AS REQUIRED BY LOCATION OF TRENCH BREAKS.
- A PERMANENT EROSION BERM SHALL BE INSTALLED IMMEDIATELY DOWNSLOPE OF EACH TRENCH BARRIER TO COLLECT ANY SEEPAGE FORCED TO THE SURFACE.
- TOPSOIL SHALL BE REPLACED AFTER CONSTRUCTION OF PERMANENT EROSION BERMS. FURTHER EROSION PROTECTION MAY BE REQUIRED WHERE FLOW LEAVES DRAIN IN ERODIVE SOILS.

THE MAXIMUM SEPARATION BETWEEN EROSION BERMS AND TRENCH BREAKERS SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE, OR ADDITIONAL AS REQUIRED BY LOCATION OF TRENCH BREAKS.

| GRADE SLOPE |       | SURFACE SLOPE       |                                                     |                                                               |
|-------------|-------|---------------------|-----------------------------------------------------|---------------------------------------------------------------|
|             |       | LOW                 | MODERATE                                            | HIGH - VERY HIGH                                              |
| Deg         | %     | GRAVEL AND ROCK (m) | CONSOLIDATED CLAYS<br>SILTY CLAYS<br>CLAY LOAMS (m) | UNCONSOLIDATED SANDS<br>COURSE SANDS<br>SANDY SILTS/LOAMS (m) |
| 1-3         | 2-5   | NONE                | AS REQUIRED                                         | 40 OR AS REQUIRED                                             |
| 3-15        | 5-27  | 60                  | 45                                                  | 30                                                            |
| 15-20       | 27-36 | 45                  | 35                                                  | 20                                                            |
| 20-25       | 36-45 | 35                  | 25                                                  | 15                                                            |
| >25         | >45   | 20                  | 15                                                  | 10                                                            |



CROSS SECTION 01-01  
TYPICAL PERMANENT BERM



TYPICAL TEMPORARY DIVERSION  
DRAIN CROSS SECTION

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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|                                                                              |
|------------------------------------------------------------------------------|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b> |
| DRAWING TITLE:<br><b>EROSION BERM</b>                                        |

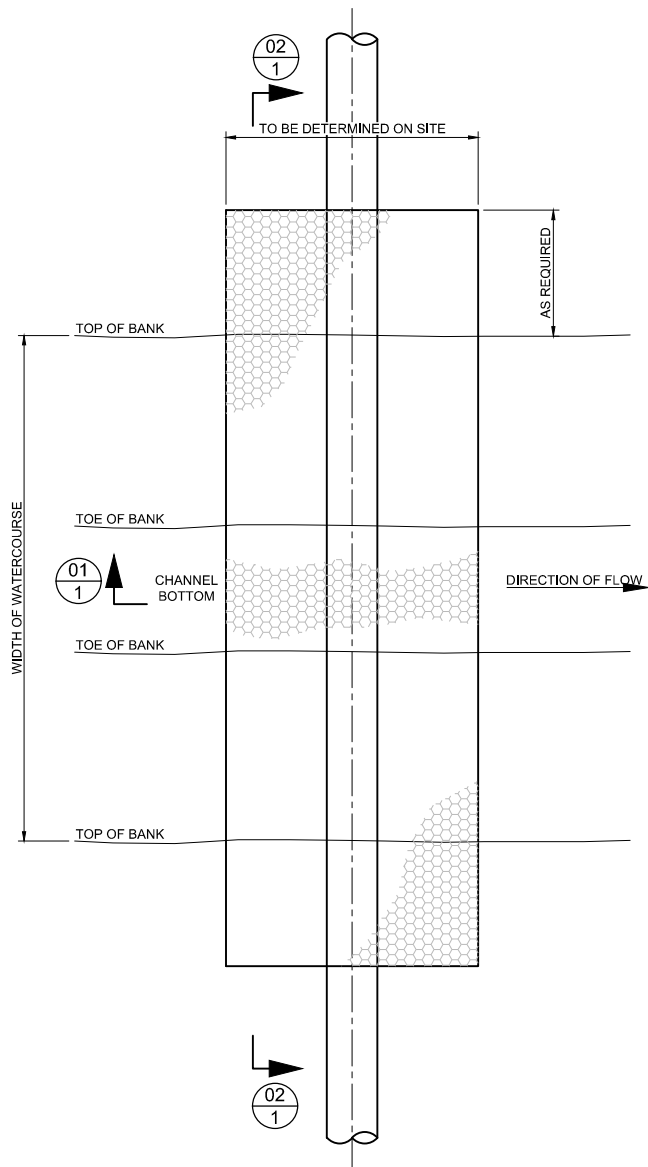


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| ORIGINAL DRAWING SHEET SIZE: A1       |
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| DATE:                                 |
| CLIENT DRAWING No.:                   |
| CLIENT REF No.:                       |

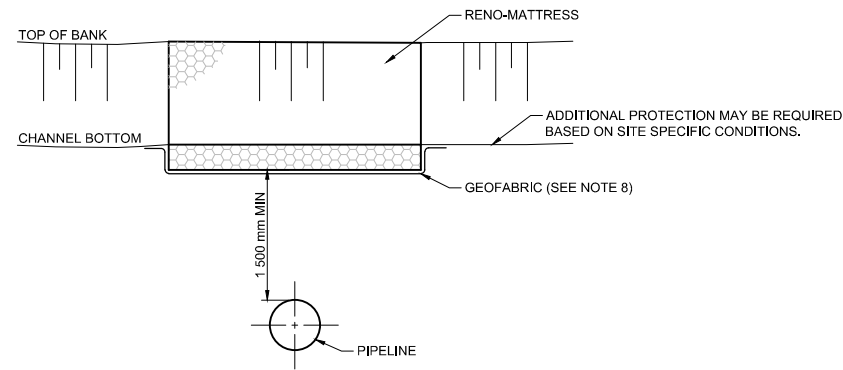
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|------------------------------|-------------------------------------|----------------|
| SURVEYED                     | DESIGNED                            | P DU PLESSIS   |
| DRAWN                        | JA SWART                            | C VAN ECK      |
| COORD SYSTEM                 | WG27                                | DATE: MAY 2020 |
| APPROVED ON BEHALF OF BIGEN: | DRAWING No.: 1890.11.00.GZA.05.D008 |                |
| VERSION: 1.0                 |                                     |                |

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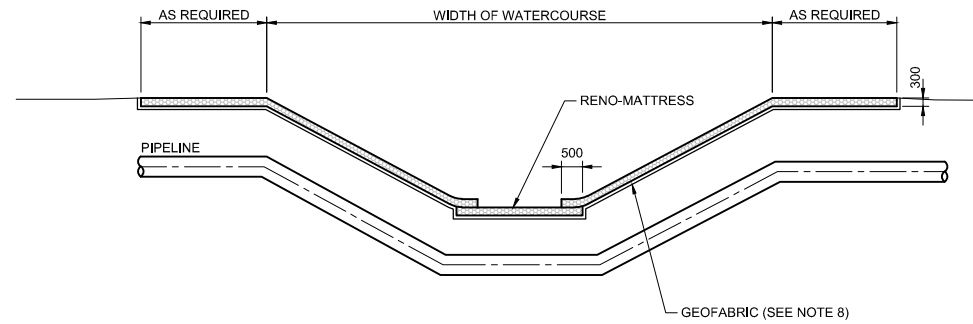




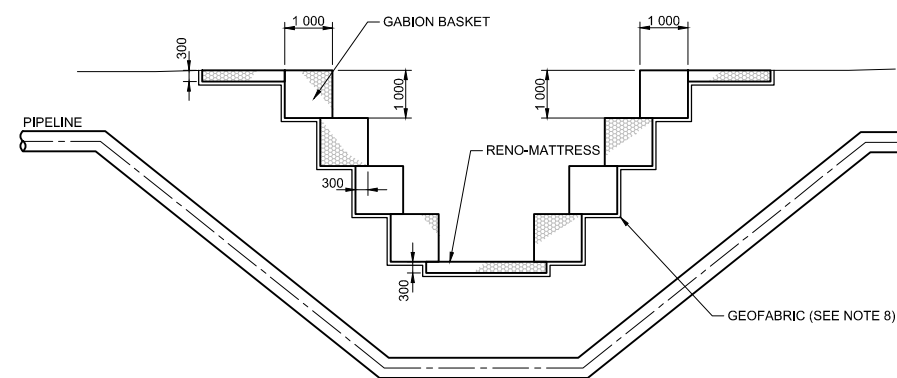
PLAN: RENO-MATTRESS PROTECTION



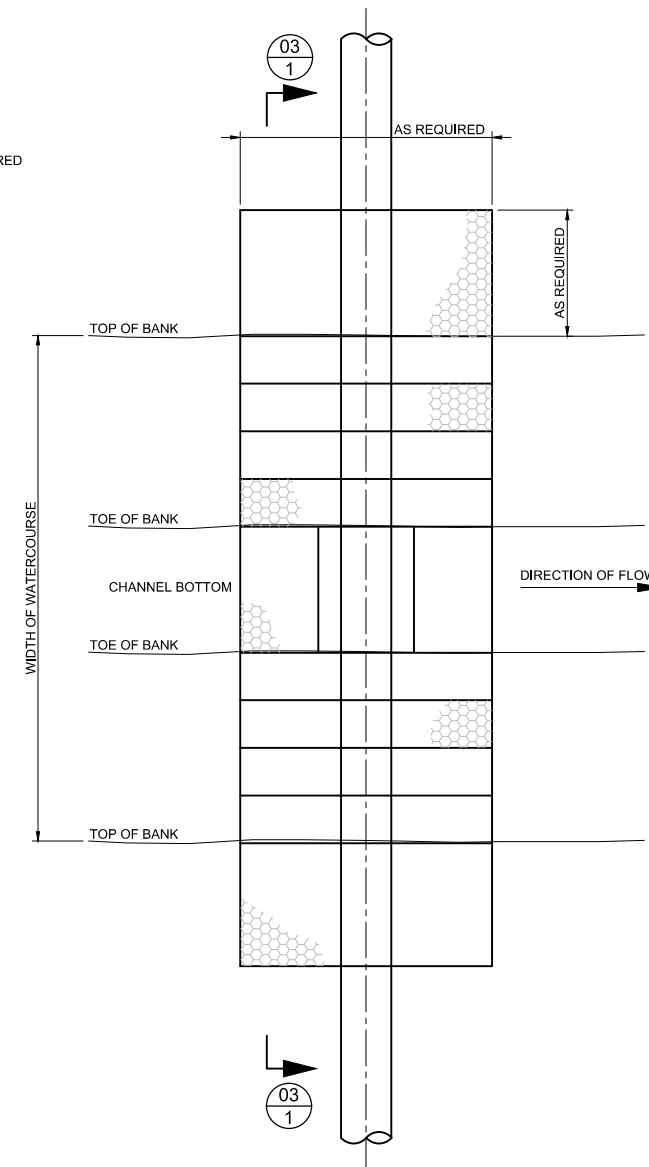
SECTION 01-01



SECTION 02-02



SECTION 03-03



PLAN: GABION PROTECTION

## GENERAL NOTES :

- FOR FURTHER DETAILS AND REQUIREMENTS REFER TO:
- CONSTRUCTION SPECIFICATION
  - ENVIRONMENTAL MANAGEMENT PLAN (EMP)
  - APPROVED METHOD STATEMENT

## CONSTRUCTION NOTES :

- RENO-MATTRESS AND GABION EROSION PROTECTION SHALL BE PROVIDED AS SHOWN ON ALIGNMENT SHEETS, CROSSING DRAWINGS OR AS INSTRUCTED.
- EXTENT OF PROTECTION REQUIRED WILL DEPEND ON LOCATION AND SITE SPECIFIC CONDITIONS.
- GABION BASKETS AND RENO MATTRESSES SHALL BE ACCORDING TO SANS 1200, SECTION DK, INCLUDING ANY VARIATIONS THERETO AS MAY BE SPECIFIED IN THE PROJECT SPECIFICATIONS OR SHOWN ON DRAWINGS.
- STONE USED SHALL BE CLEAN, HARD, UNWEATHERED AND FREE FROM FISSURES OR FLAKING. CAGES SHALL BE GALVANISED TO A MINIMUM MASS OF ZINC COATING PER UNIT AREA OF 260 g/sq. m. PVC COATED WIRE MAY NOT BE USED.
- STONE SIZE FOR RENO MATTRESSES 300 mm DEEP SHALL BE BETWEEN 100 mm AND 150 mm AND FOR GABION BASKETS STONE SIZE SHALL BE BETWEEN 100 mm AND 250 mm.
- RENO-MATTRESSES AND GABIONS SHALL NOT ALTER ELEVATION OF BED OR RESTRICT FLOW AND SHALL HAVE SMOOTH TRANSITIONS TO ADJOINING SURFACES.
- ALL DIMENSIONS IN MILLIMETRES, UNLESS SHOWN OTHERWISE.
- GEOFABRIC (KAYTECH BIDIM A4 OR SIMILAR) SHALL BE PLACED UNDERNEATH ALL GABIONS AND RENO-MATTRESSES, AS WELL AS AT ALL SIDES IN CONTACT WITH SOIL.

| VERSION / AMENDMENTS |      |             |          |
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PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**EROSION PROTECTION  
RENO MATTRESS AND GABION  
PROTECTION**

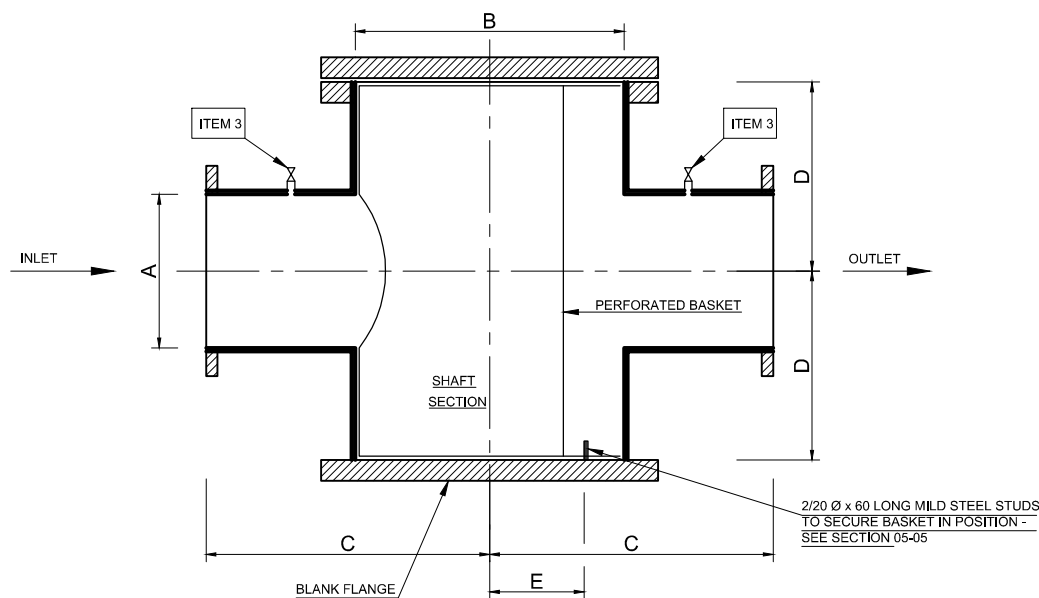


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| SURVEYED                            | DESIGNED | P DU PLESSIS   |
| DRAWN                               | JA SWART | C VAN ECK      |
| COORD SYSTEM                        | WG27     | DATE: MAY 2020 |
| APPROVED ON BEHALF OF BIGEN:        |          |                |
| DRAWING No.: 1890.11.00.GZA.05.D009 |          |                |
| VERSION: 1.0                        |          |                |

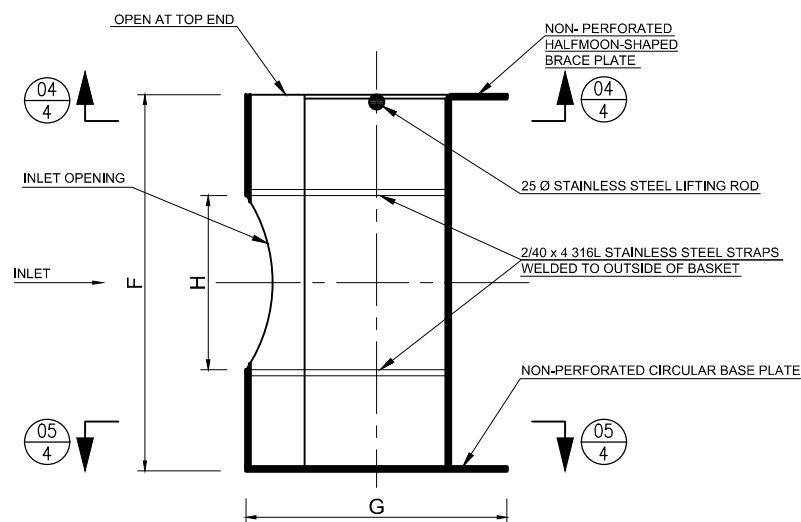
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SECTION THROUGH CONTAINER

ITEM 1  
SCALE 1:25



SECTION THROUGH BASKET

ITEM 1  
SCALE 1:25

GENERAL

Ø - DIAMETER  
OD - PIPE OUTSIDE DIAMETER  
WT - PIPE WALL THICKNESS

ITEM MANUFACTURE

ITEM 1

CONTAINER

CONSTRUCTED OF GRADE 300 WA STEEL.  
A Ø x B Ø CROSS PIECE. 2/A-ENDS AND 1/B-END FLANGED.  
ON OTHER B-END STANDARD BLANK FLANGE WITH 2/20 Ø x 60 LONG MILD STEEL STUDS WELDED TO FLANGE AS SHOWN TO SECURE BASKET IN POSITION. EPOXY LINING AND COATING.

NB. FLANGE SPECIFICATION INDICATED IN PIPE ITEM SCHEDULE

ITEM 2

BASKET

ALL COMPONENTS MANUFACTURED OUT OF 6 mm 316L STAINLESS STEEL PLATE AND 316L STAINLESS STEEL RODS AS SHOWN. BASKET IN SHAFT SECTION PERFORATED WITH 7 mm Ø HOLES AT 15 mm c/c IN ALL DIRECTIONS WITH H Ø OPENING FOR INLET. BOTTOM END OF BASKET WELDED ONTO G Ø PLATE PROVIDED WITH 2/24 mm Ø HOLES. TOP END OF BASKET OPEN WITH HALF-MOON SHAPED BRACE PLATE AND 25 Ø LIFTING ROD FIXED AS SHOWN WITH REINFORCED 2/40 x 4 mm THICK GRADE 316L STRAPS WELDED TO OUTER WALL.

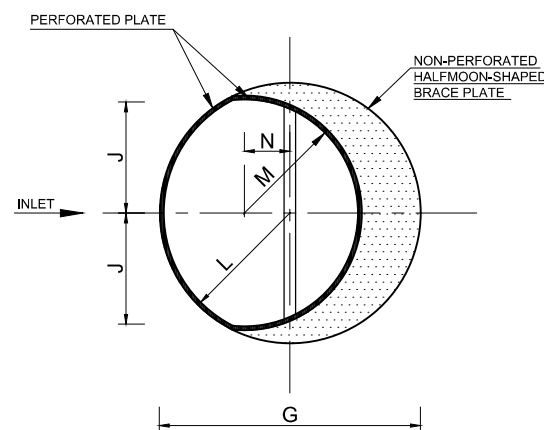
IMPORTANT

BASKET DIMENSIONS TO BE 5 TO 10 mm SMALLER THAN INSIDE OF CONTAINER - THEREFORE CHECK CONTAINER INTERNAL Ø BEFOREHAND AND ALLOW FOR EXTERNAL PROTRUSIONS ON BASKET.

ITEM 3

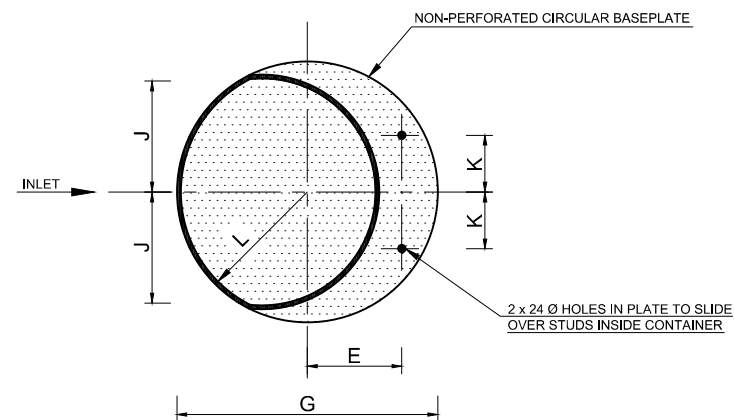
20 Ø STAINLESS STEEL SOCKET WELDED ON TOP OF A Ø PIPE, TOGETHER WITH A SUITABLE STAINLESS STEEL NIPPLE AND 25 BAR STAINLESS STEEL BALL VALVE. SOCKET POSITIONED SO AS NOT TO OBSTRUCT BOLT REMOVAL.

| DIMENSIONS |                   |                   |                   |
|------------|-------------------|-------------------|-------------------|
| A          | 300 mm Ø (324 OD) | 400 mm Ø (406 OD) | 700 mm Ø (711 OD) |
| B          | 500 mm Ø (508 OD) | 700 mm Ø (711 OD) | 800 mm Ø (813 OD) |
| WT         | 10                | 12                | 14                |
| C          | 600               | 750               | 850               |
| D          | 500               | 500               | 650               |
| E          | 170               | 250               | 270               |
| F          | 994               | 994               | 1290              |
| G          | 490               | 690Ø              | 780Ø              |
| H          | 320Ø              | 410Ø              | 710Ø              |
| J          | ±230              | ±290              | ±337              |
| K          | 120               | 150               | 150               |
| L          | 241               | 341               | 390               |
| M          | 230               | 300               | 340               |
| N          | 100               | 120               | 150               |



SECTION 04-04

SCALE 1:25



SECTION 05-05

SCALE 1:25

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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**  
DRAWING TITLE:  
**DIRT TRAP DETAIL**

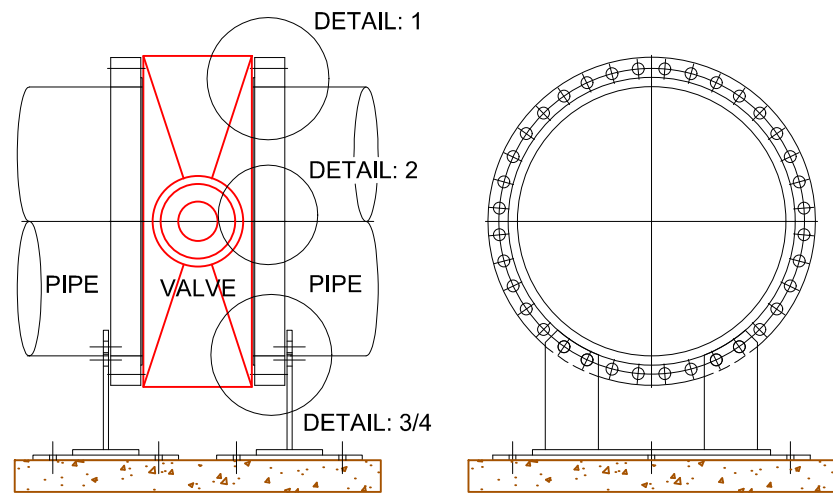


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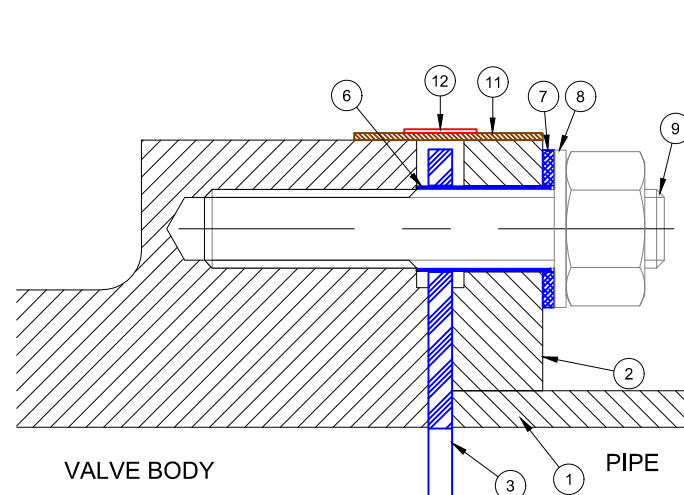
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| SURVEYED                            | DESIGNED | C VAN ECK    |
| DRAWN                               | JA SWART | P DU PLESSIS |
| COORD SYSTEM                        | WG27     | DATE         |
| MAY 2020                            |          |              |
| APPROVED ON BEHALF OF BIGEN:        |          |              |
| DRAWING No.: 1890.11.00.GZA.05.D010 |          |              |
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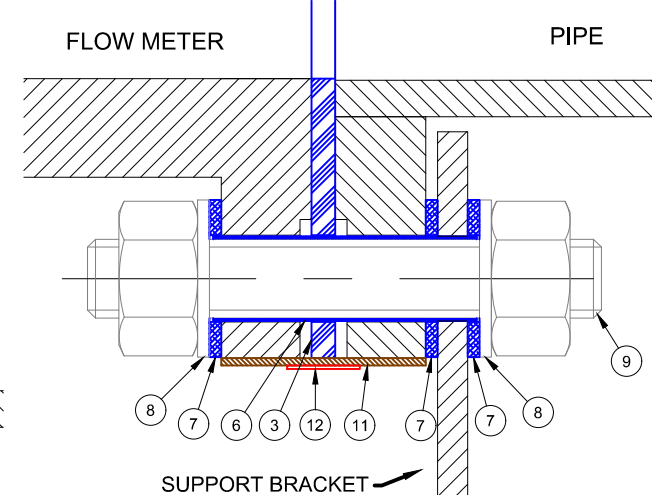




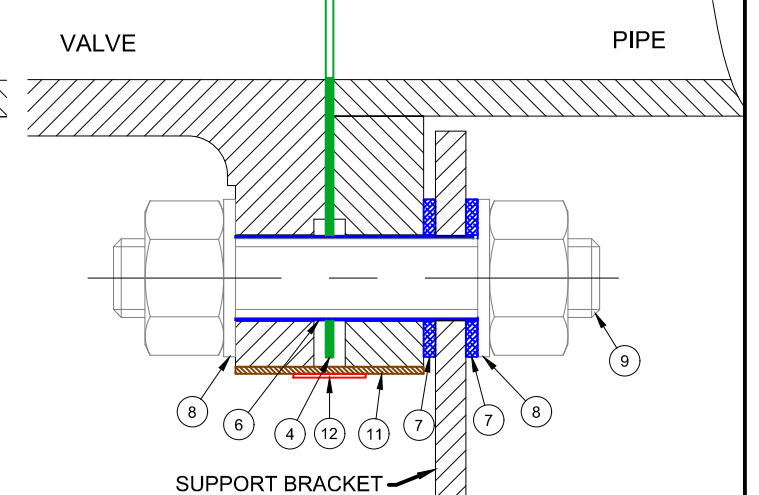
PIPE ISOLATING JOINT TO BUTTERFLY VALVE



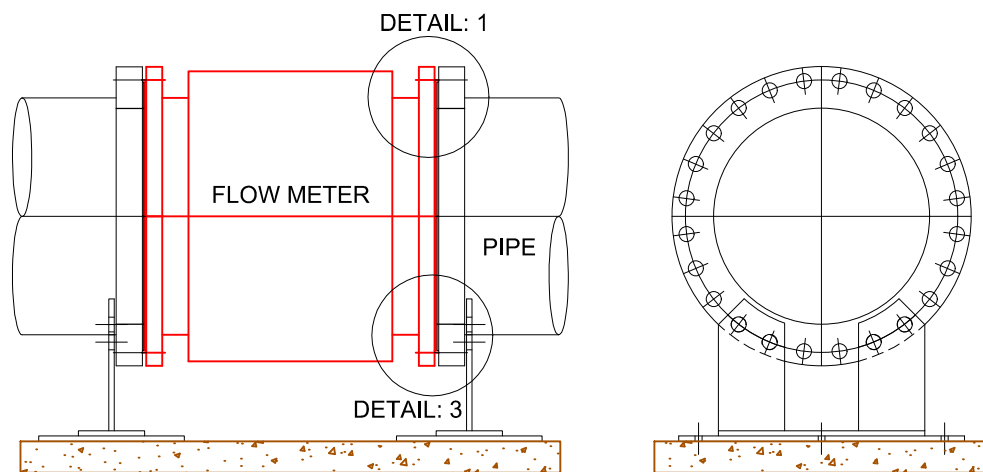
DETAIL: 2 - VALVE BODY WITH TAPPED HOLES



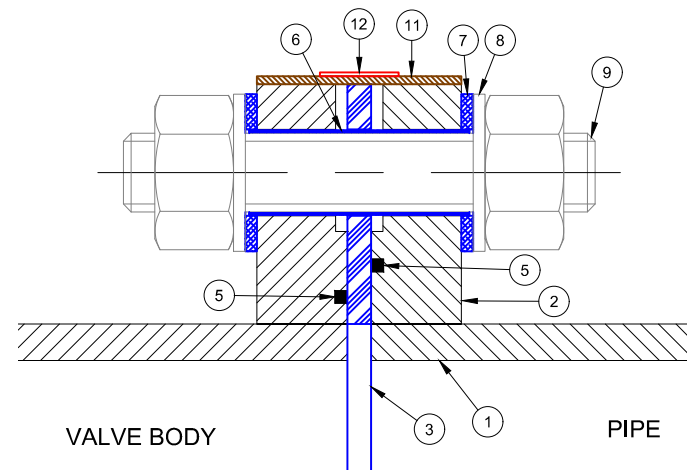
DETAIL: 3 - INSULATED FLANGE & INSULATED SUPPORT BRACKET



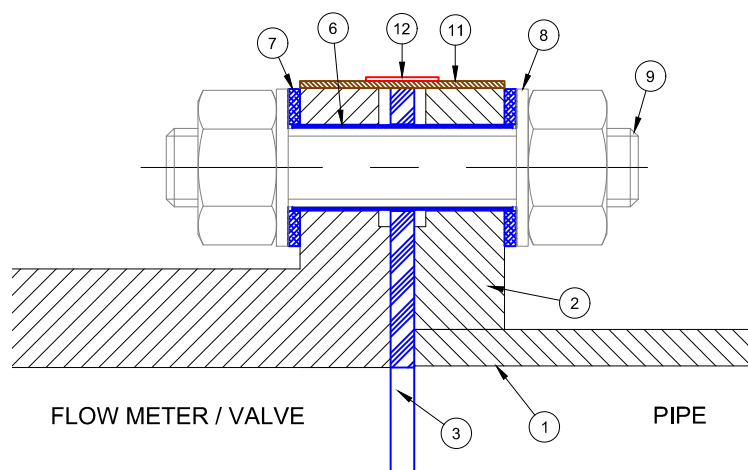
DETAIL: 4 - STANDARD FLANGE & INSULATED SUPPORT BRACKET



PIPE ISOLATING JOINT TO FLOW METER



TYPICAL HIGH PRESSURE VALVE ARRANGEMENT WITH O-RINGS



DETAIL: 1 - FLOW METER FLANGE ARRANGEMENT (NO EARTH RING) + LOW PRESSURE VALVE + STANDARD FLANGE ARRANGEMENT

#### FLANGE INSULATING MATERIAL LIST

1. PIPE - DIAMETER, WALL THICKNESS, STEEL GRADE, PROTECTION AND END PREPARATIONS TO BE SPECIFIED ELSEWHERE.
2. FLANGES - MANUFACTURED AND DRILLED AS PER SPECIFICATIONS, MACHINED ON FRONT, BACK AND OUTSIDE FACES.
3. INSULATING GASKET
4. STANDARD GASKET
5. 'O'-RING - AS PER FLANGE SPECIFICATIONS
6. INSULATING SLEEVE - 1mm TO 1.5mm THICK GLASS FIBRE REINFORCED POLYESTER SLEEVE FOR EACH BOLT. LENGTH OF SLEEVE TO BE SUCH THAT TOTAL GAP ON SLEEVE LENGTH BETWEEN INSIDE FACES OF STEEL WASHERS IS BETWEEN 2 TO 3mm.
7. INSULATING WASHERS - 6.3mm THICK FABRIC REINFORCED PHENOLIC RESIN WASHER WITH O.D. THE SAME AS THAT OF THE MACHINED STEEL WASHER, 2 OFF FOR EACH STUD BOLT: I.D. TO BE A SLIDING FIT OVER O.D. OF ITEM 6.
8. STEEL WASHERS - MACHINED WITH DIAMETER AND THICKNESS TO SABS 1149 TABLE 3.
9. STUD BOLTS & STUDS - GRADE 8.8 AND NUTS GRADE 8 TO SABS 136. STUD BOLT DIAMETERS SHALL BE SELECTED TO THE NEXT SMALLER SIZE FOR INSTALLATION IN STANDARD DRILLED FLANGES.
10. EXPLOSION PROOF SPARK GAP.
11. WHITE PLASTIC BACKED POLYMER MODIFIED BITUMINOUS TAPE - 1mm THICK OR SIMILAR APPROVED WITH A MINIMUM OF 25mm OVERLAP. IN CASE OF SURFACE IRREGULARITIES i.e. STEPPED FLANGES ETC. AN APPROVED MASTIC MATERIAL SHALL BE USED TO PROVIDE A SMOOTH CONTOUR FOR SUBSEQUENT TAPE APPLICATION.
12. CODING RED COLOUR BAND - OF 30mm WIDE PLASTIC BACKED ELECTRICAL TAPE TO SABS 122-1975.

| VERSION / AMENDMENTS |      |             |          |
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| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>              |
| DRAWING TITLE:<br><b>CATHODIC PROTECTION<br/>ELECTRICALLY ISOLATED FLANGED<br/>JOINTS</b> |



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| ORIGINAL DRAWING SHEET SIZE: A1       |
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| DATE:                                 |
| CLIENT DRAWING No.:                   |
| CLIENT REF No.:                       |

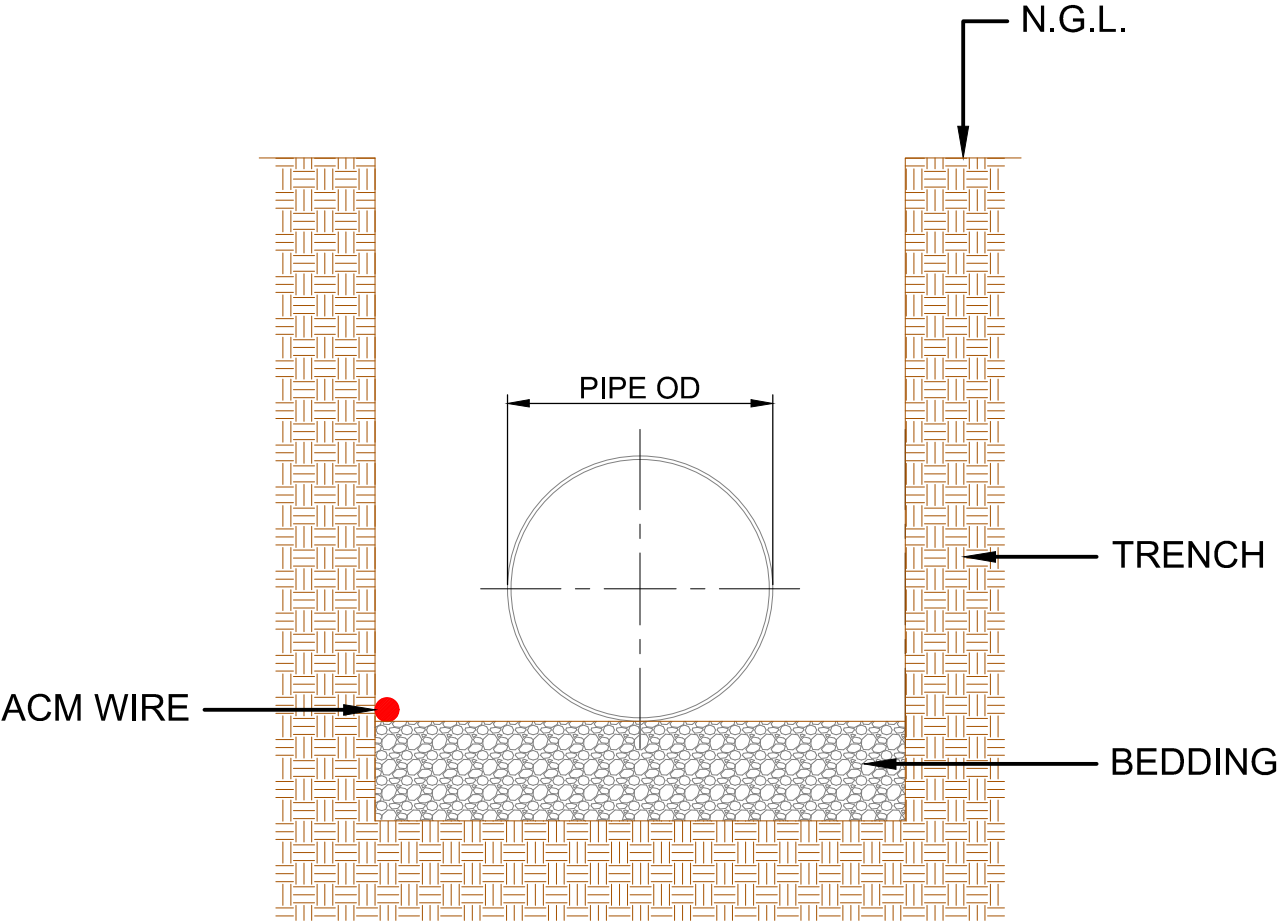
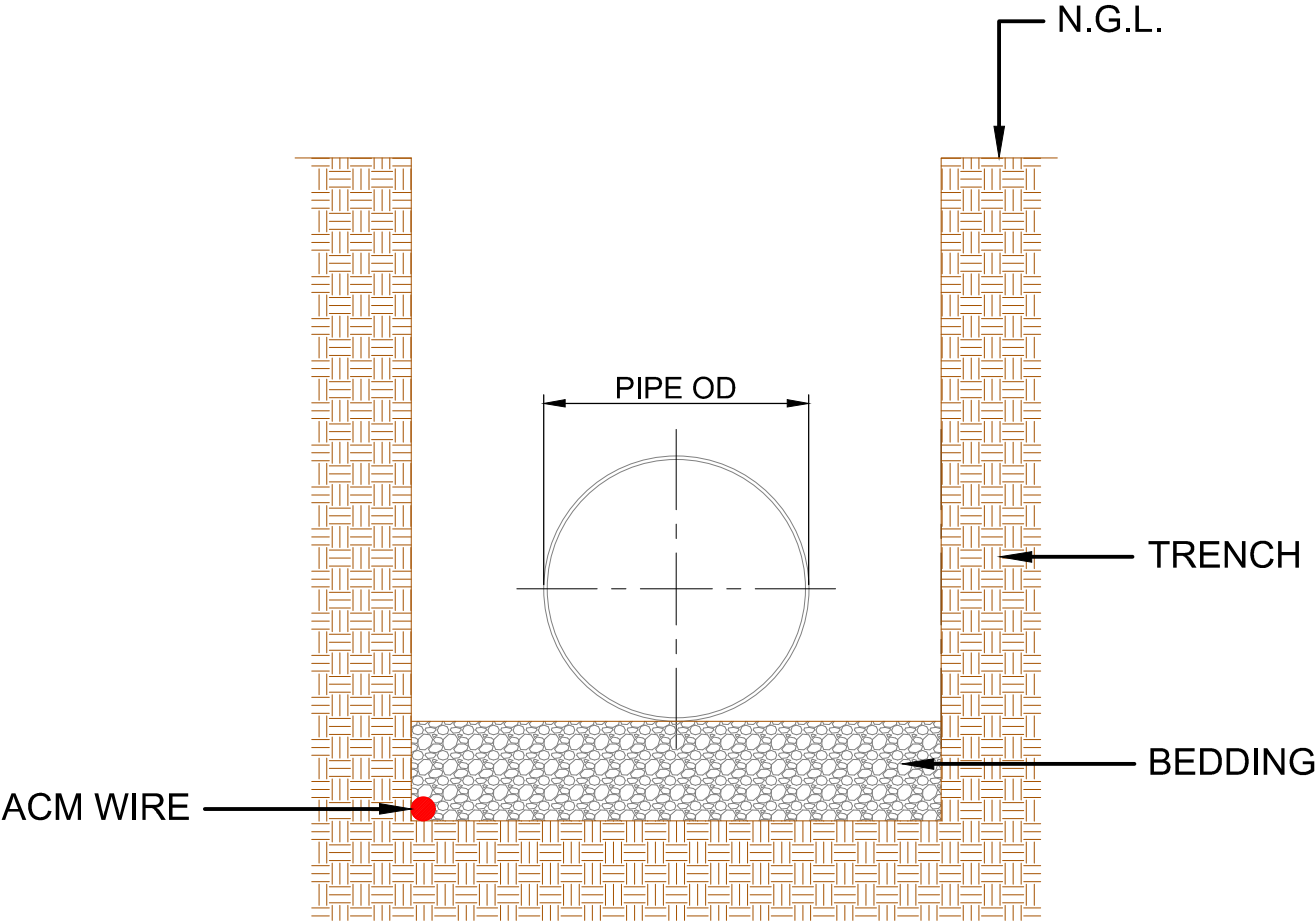
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| SURVEYED: -                         | DESIGNED: S MARAIS |
| DRAWN: A STEENBERG                  | S MARAIS           |
| COORD SYSTEM: WG27                  | DATE: AUGUST 2020  |
| APPROVED ON BEHALF OF BIGEN:        |                    |
| DRAWING No.: 1890.11.00.GZA.05.D050 | VERSION: 1.0       |

1890.11.00.GZA.05.D050



OPTION 1: EXCAVATED TRENCH  
INSTALL ZINC RIBBON AT BOTTOM OF TRENCH IN EXTREMITY  
CLOSEST TO POWER LINE.

OPTION 2: INSTALL ZINC RIBBON ON TOP OF BEDDING IN EXTREMITY  
CLOSEST TO POWER LINE.  
THE ZINC RIBBON MUST BE COVERED AS SOON AS  
POSSIBLE TO REDUCE THEFT RISK



PLEASE NOTE: THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THE INTEGRITY OF THE RIBBON IS  
NOT COMPROMISED DUE TO NEGLIGENCE, CONSTRUCTION DAMAGE, VANDALISM OR  
THEFT

| VERSION / AMENDMENTS |      |             |          |
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pretoria@bigengroup.com



PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**CATHODIC PROTECTION  
ZINC RIBBON IN TRENCH  
PLACEMENT DETAIL**

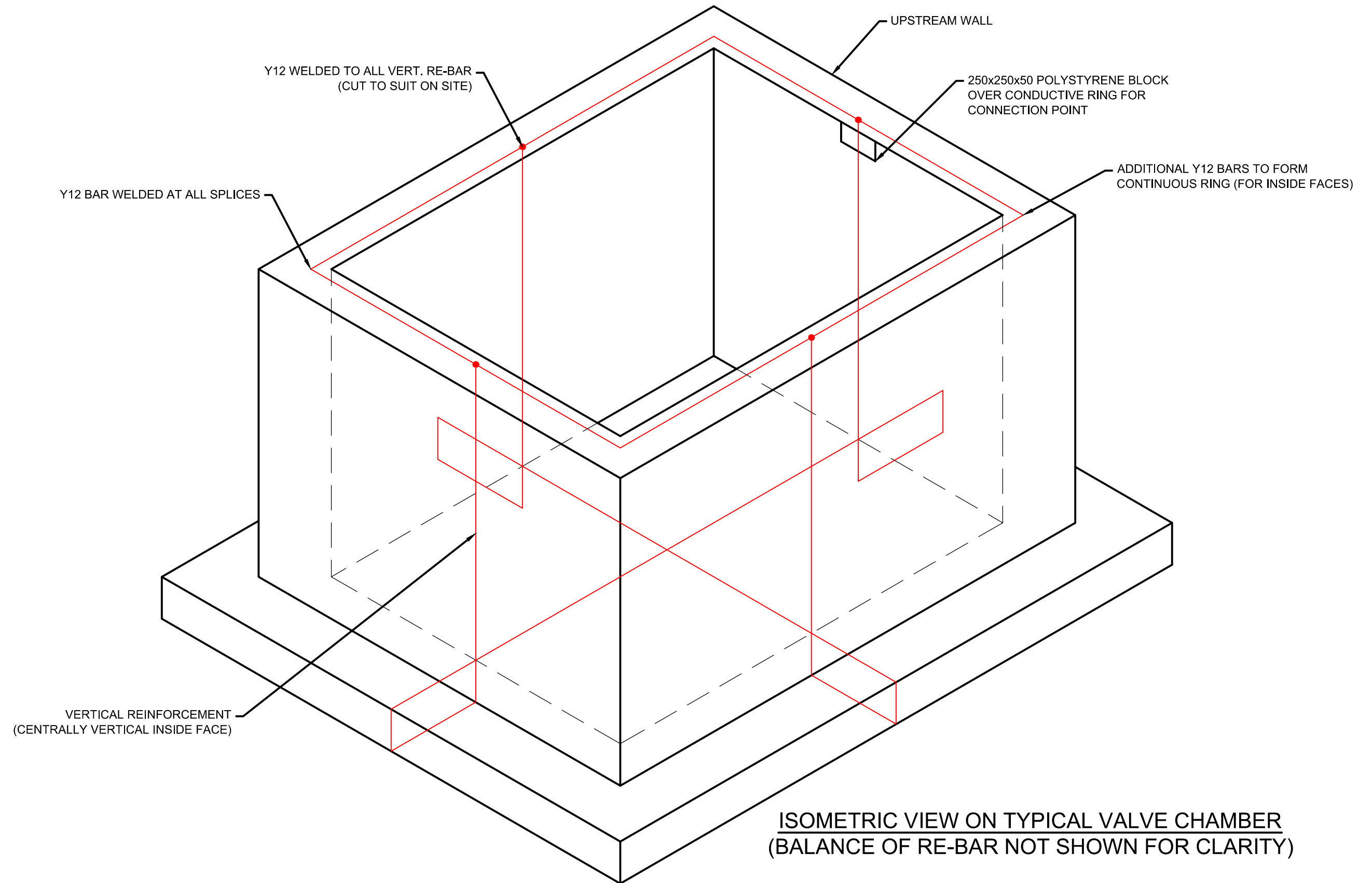


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| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: NTS           | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME: _____                           |                                 |
| DATE: _____                           |                                 |
| CLIENT DRAWING No.: _____             | CLIENT REF No.: _____           |

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| SURVEYED: -                         | DESIGNED: S MARAIS |
| DRAWN: A STEENBERG                  | S MARAIS           |
| COORD SYSTEM: WG27                  | DATE: AUGUST 2020  |
| APPROVED ON BEHALF OF BIGEN:        |                    |
| NAME: _____                         |                    |
| DATE: _____                         |                    |
| DRAWING No.: 1890.11.00.GZA.05.D051 | VERSION: 1.0       |

1890.11.00.GZA.05.D051





**NOTES:**

1: DIMENSIONS IN mm O.U.S.

| VERSION / AMENDMENTS |      |             |          |
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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**CATHODIC PROTECTION  
VALVE CHAMBER EARTHING DETAIL**

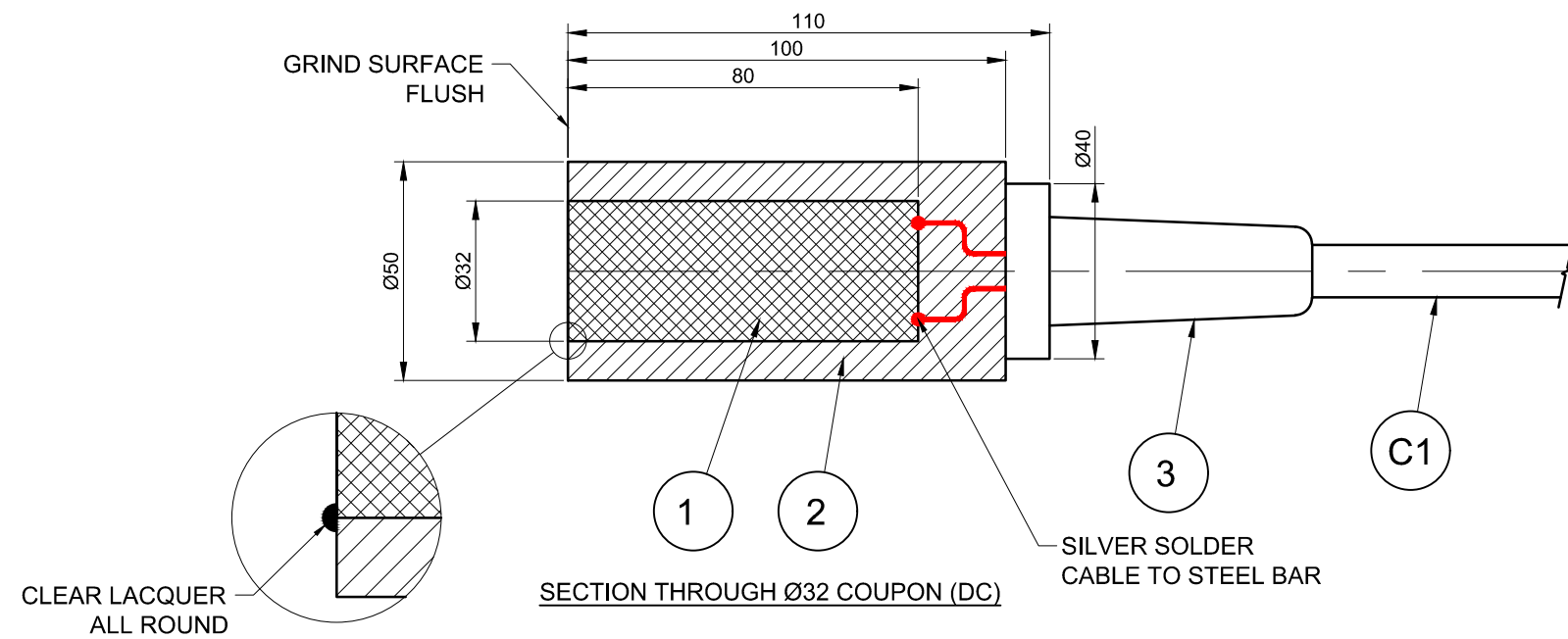


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| ORIGINAL DRAWING SCALE: NTS   | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT: |                                 |
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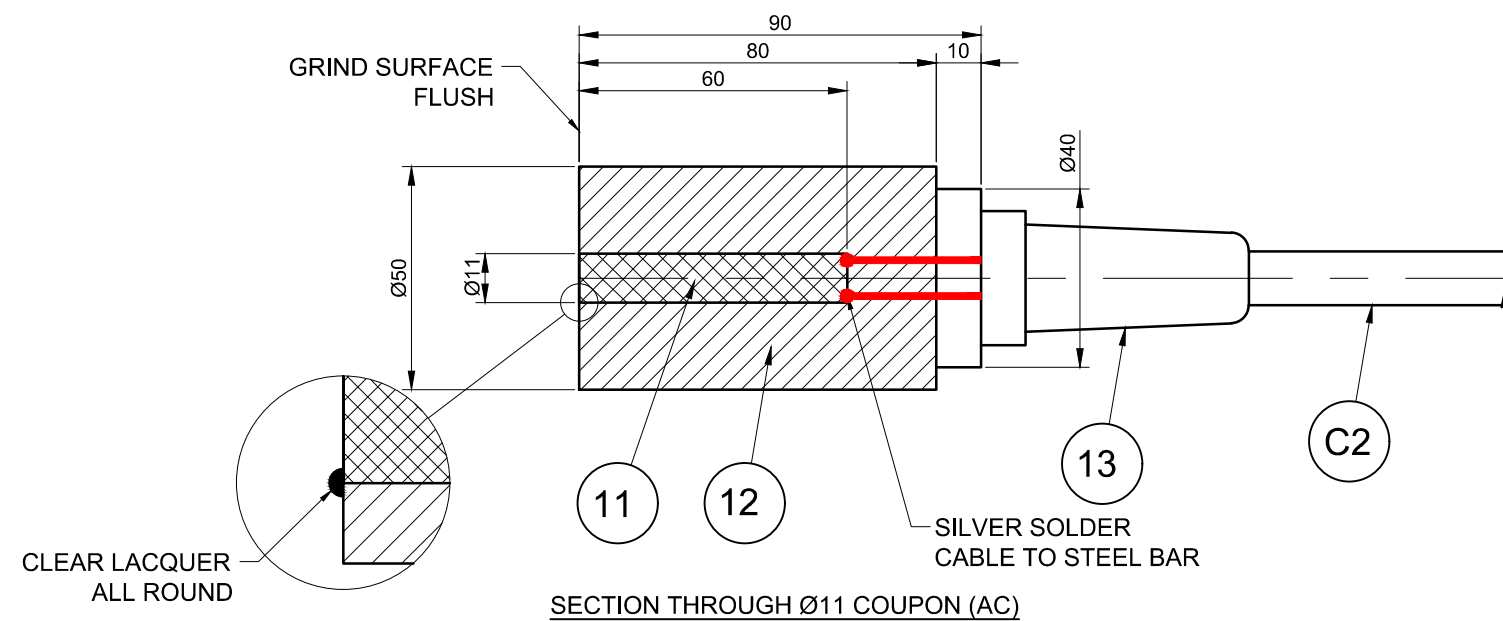
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| SURVEYED                            | -           | DESIGNED     | S MARAIS    |
| DRAWN                               | A STEENBERG |              | S MARAIS    |
| COORD SYSTEM                        | WG27        | DATE         | AUGUST 2020 |
| APPROVED ON BEHALF OF BIGEN:        |             |              |             |
| DRAWING No.: 1890.11.00.GZA.05.D052 |             | VERSION: 1.0 |             |

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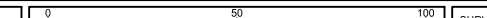




| MATERIAL LIST |     |                                  |                  |
|---------------|-----|----------------------------------|------------------|
| ITEM          | QTY | DESCRIPTION                      | MATERIAL         |
| 1             | 1   | ROD Ø32x80 LG                    | SABS1431 GR.300W |
| 2             | 1   | MOULDING Ø50x100                 | EPOXY            |
| 3             | 1   | CABLE GLAND (BENDING PROTECTION) | POLYAMIDE BLACK  |
| 11            | 1   | ROD Ø11x60 LG                    | SABS1431 GR.300W |
| 12            | 1   | MOULDING Ø50x80                  | EPOXY            |
| 13            | 1   | CABLE GLAND (BENDING PROTECTION) | POLYAMIDE BLACK  |



- NOTES:
1. INSPECT COUPONS FOR DAMAGE BEFORE INSTALLATION.
  2. DIMENSIONS ARE IN mm U.O.S

| VERSION / AMENDMENTS |      |             |          | <p>www.bigengroup.com</p> <p>Allan Cormack Street<br/>The Innovation Hub<br/>Perseus<br/>Pretoria</p> <p>Phone: + 27 (0) 12 842 8700</p> <p>pretoria@bigengroup.com</p> |  | PROJECT TITLE:                                     |  |  |  |                                 | SURVEYED -                          |          | DESIGNED S MARAIS |  |
|----------------------|------|-------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|-------------------------------------|----------|-------------------|--|
| No.                  | DATE | DESCRIPTION | AUTH. BY |                                                                                                                                                                         |                                                                                      | BOSPOORT WATER SUPPLY SCHEME<br>BOSPOORT PIPELINES |  |                                                                                       | ORIGINAL DRAWING SCALE: NTS                                                           | ORIGINAL DRAWING SHEET SIZE: A1 | DRAWN A STEENBERG                   | S MARAIS |                   |  |
|                      |      |             |          |                                                                                                                                                                         |                                                                                      | DRAWING TITLE:                                     |  |                                                                                       | APPROVED ON BEHALF OF CLIENT:                                                         |                                 | COORD SYSTEM WG27                   |          | DATE AUGUST 2020  |  |
|                      |      |             |          |                                                                                                                                                                         |                                                                                      |                                                    |  |                                                                                       | NAME:                                                                                 |                                 | APPROVED ON BEHALF OF BIGEN:        |          |                   |  |
|                      |      |             |          |                                                                                                                                                                         |                                                                                      |                                                    |  |                                                                                       | DATE:                                                                                 |                                 | DRAWING No.: 1890.11.00.GZA.05.D053 |          | VERSION: 1.0      |  |
|                      |      |             |          |                                                                                                                                                                         |                                                                                      | CATHODIC PROTECTION<br>AC & DC COUPON DETAILS      |  |                                                                                       | CLIENT DRAWING No.:                                                                   |                                 | CLIENT REF No.:                     |          |                   |  |
|                      |      |             |          |                                                                                                                                                                         |                                                                                      |                                                    |  |                                                                                       |                                                                                       |                                 |                                     |          |                   |  |
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1890.11.00.GZA.05.D053





LEGEND

EXISTING 450mm Ø BOSPOORT PUMPING LINE

POSITIVE CABLE IN TRENCH

GROUND BED

WATERING SYSTEM WITH PIPE IN TRENCH

TRU

| VERSION / AMENDMENTS |      |             |          |
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PROJECT TITLE:

BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES

DRAWING TITLE:

ICCP SYSTEM



0 50 100

100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: DATE: CLIENT DRAWING No.: CLIENT REF No.:

|                              |             |          |            |
|------------------------------|-------------|----------|------------|
| SURVEYED                     |             | DESIGNED | N WEBB     |
| DRAWN                        | A STEENBERG |          | C VAN ECK  |
| COORD SYSTEM                 | WG27        | DATE     | MARCH 2021 |
| APPROVED ON BEHALF OF BIGEN: |             |          |            |
| PRACTITIONER                 |             | REVIEWER |            |
| DRAWING No.:                 |             |          | VERSION:   |
| 1890.11.00.GZA.05.D054       |             |          | 1.0        |

1890.11.00.GZA.05.D054



NOTES APPLICABLE TO PIPE SPECIALS, VALVES AND METERS

1. THE CONTRACTOR IS RESPONSIBLE TO VERIFY ALL DIMENSIONS AND LEVELS OF PROPOSED PIPEWORK AND THE DESIGN OF PIPEWORK AND CHAMBERS AS FOLLOWS:

- ON SITE AND ESPECIALLY AT EXISTING PIPES, OTHER SERVICES AND STRUCTURES;
  - WITH REGARDS TO DIMENSIONS OF PUMPS, VALVES, FLOW METERS ETC. THAT WILL BE SUPPLIED AND INSTALLED BY THE CONTRACTOR;
  - DRILLING OF EXISTING FLANGES TO BE CONNECTED TO.

2. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED.

3. ALL LEVELS IN METERS ABOVE MEAN SEA LEVEL UNLESS OTHERWISE SHOWN.

4. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELATED SPECIFICATIONS AND DRAWINGS.

5. POSITION AND SIZES OF HOLES, POCKETS, DUCTS ETC. MUST BE DETERMINED ON SITE AMONGST CIVIL, MECHANICAL AND ELECTRICAL CONTRACTORS.

6. DIMENSIONS SHOWN REFER TO:
  - PIPE CENTRE LINES UNLESS OTHERWISE SHOWN;
  - OUTSIDE FACE OF FLANGE ON PIPE END;
  - CENTRE OF RESTRAINING FLANGES (FR) AND PUDDLE FLANGES (FP).

7. PUDDLE / ANCHOR / THRUST FLANGES TO HAVE THE SAME DIMENSIONS AS OTHER FLANGES BUT WITHOUT HOLES AND WITH FLAT FACES.

8. MINIMUM CLEARANCE BETWEEN PIPEWORK AND CONCRETE REINFORCEMENT SHALL BE 40mm.

9. REFER TO PARTICULAR SPECIFICATION PLN (MANUFACTURING, SUPPLY AND TESTING OF STEEL PIPES) FOR FLANGES.

10. CORROSION PROTECTION  
REFER TO PARTICULAR SPECIFICATION PLQ (CORROSION PROTECTION OF STEEL PIPES AND FITTINGS)

ABBREVIATIONS:

CMLCEMENT MORTAR

DPDENSO PETROLATUM TAPE (ONLY UNDERGROUND SECTIONS)

DSRDENSO S43/R23 TAPE SYSTEM (ONLY UNDERGROUND SECTIONS)

EP EPOXY PAINT

FBE FUSION BONDED EPOXY

FMDPE FUSION BONDED MEDIUM DENSITY POLYETHYLENE (SINTAKOTE)

FRBFIBRE REINFORCED BITUMEN

HDG HOT-DIP GALVANISING

IZS INORGANIC ZINC SILICATE

MPEP MULTI-PURPOSE EPOXY PAINT - UV-RESISTANT

PMB POLYMER MODIFIED BITUMEN (BITUGUARD)

PT PETROLATUM TAPE WRAP

PU POLYURETHANE (RE-COATABLE)

RPU RIGID POLYURETHANE

ST STOPAQ TAPE WRAP

11. ABBREVIATIONS FOR PIPEWORK

ALALUMINIUM

AVAIR VALVE

BL LONG RADIUS BEND

BM MEDIUM RADIUS BEND

BVBUTTERFLY VALVE

CLCLASS

CP CROTCH PLATE

CTO CAP TOP OPERATED

CTSPipe LENGTH CUT TO SUIT ON SITE

DJ DISMANTLING JOINT

DN NOMINAL DIAMETER

DWGDWG

EA ELECTRIC ACTUATOR

FA FLANGE ADAPTOR

FB BLIND FLANGE / BLANK FLANGE

FC FLEXIBLE COUPLING

FN FLANGE

FP PUDDLE FLANGE

F/F FACE TO FACE DIMENSION

FDT FLANGE DRILLING TABLE

FR RESTRAINING FLANGE

GR GRADE OF STEEL

GS GALVANISED STEEL

HPWB HANDWHEEL PEDESTAL ON WALL SUPPORT BRACKET

HW HANDWHEEL

HWO HANDWHEEL OPERATED

ID INSIDE DIAMETER

IF INSULATING FLANGE

LF LOOSE FLANGE - WELDED ONTO PIPE END AFTER CUTTING

PIPE LENGTH TO SUIT ON SITE

LH LEFT HAND SIDE GEARBOX LOOKING IN FLOW DIRECTION

LO LEFT HAND OFF-SET GEARBOX LOOKING FROM THE GEARBOX

SIDE TO THE GEARBOX

MWP MAXIMUM WORKING PRESSURE

OD OUTSIDE DIAMETER

PCD PITCH CIRCLE DIAMETER FOR FLANGES

PE PLAIN PIPE END

PMP PLATFORM-MOUNTED HANDWHEEL PEDESTAL

PN NOMINAL PRESSURE

R RADIUS

RB RESTRAINING BOLT

RFA RESTRAINED FLANGE ADAPTOR

RH RIGHT HAND SIDE GEARBOX LOOKING IN FLOW DIRECTION

RO RIGHT HAND OFF-SET GEARBOX LOOKING FROM THE GEARBOX

RSV RESILIENT SEAL GATE VALVE

SB SOLID BODY

SE SPINDLE EXTENSION

SH STUB HANDWHEEL PEDESTAL ON WALL SUPPORT BRACKET

SP SPOOL PIPE

SS STAINLESS STEEL GRADE 316L

SSF SPIGOT AND SOCKETED END PREPARED FOR FILLET WELD, SIMILAR TO MAIN PIPE JOINTING SYSTEM

ST MILD STEEL

ST-C STEPPED COUPLING

SW SITE WELDING - CERTAIN ITEMS WELDED TOGETHER ON SITE

WGV WEDGE GATE VALVE

WT PIPE WALL THICKNESS

| VERSION / AMENDMENTS |      |             |          |
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PROJECT TITLE:

BOSPOORT WATER SUPPLY SCHEME

BOSPOORT PIPELINES

DRAWING TITLE:

NOTES APPLICABLE TO PIPE SPECIALS,

VALVES AND METERS



050100

100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: NTS

ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME:

DATE:

CLIENT DRAWING No.:

CLIENT REF No.:

|                                     |             |              |              |
|-------------------------------------|-------------|--------------|--------------|
| SURVEYED                            |             | DESIGNED     | P DU PLESSIS |
| DRAWN                               | A STEENBERG |              | C VAN ECK    |
| COORD SYSTEM                        | WG27        | DATE         | AUGUST 2020  |
| APPROVED ON BEHALF OF BIGEN:        |             |              |              |
| DRAWING No.: 1890.11.00.GZA.05.A002 |             | VERSION: 1.0 |              |

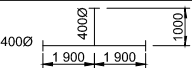
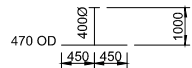
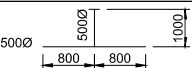






NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                    | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                  | DIMENSIONS                                                                            |
|--------------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                        |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|                                                        |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
| AIR VALVE INSTALLATION - DWG. 1890.11.00.GZA.05.D015   |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
| 400 mm DIAMETER MAIN PIPE                              |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|                                                        | AVS 1.1  | 1                                  | D015          | 400          | 400           | 400                 |                     | F           | F            | F                  |                    |                           |                | ST / 8 / X42                                    | 2500/3          | EP                   | EP + DT          | DT + PU  | SPECIAL TEE                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |
|                                                        | AVS 1.2  | 1                                  | D015          | 80           | 80            |                     |                     | 400Ø F      | 80Ø F        |                    |                    |                           |                | ST / HEAVY                                      | 2500/3          | EP                   | EP               | PU       | SP                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |
|                                                        | AVS 1.3  | 1                                  | D015          | 80           | 80            |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          | FBE                  | FBE              | PU       | RSV<br>HWO                                                                                                                                                                                                                                                                                                                                                                                                                                   | STANDARD                                                                              |
|                                                        | AVS 1.4  | 1                                  | D015          | 80           |               |                     |                     | F           |              |                    |                    |                           |                |                                                 | 2500/3          |                      |                  |          | DOUBLE ACTING AIR VALVE WITH ANTI SHOCK<br>MECHANISM                                                                                                                                                                                                                                                                                                                                                                                         | STANDARD                                                                              |
| 470 mm DIAMETER MAIN PIPE (EXISTING BOSPOORT PIPELINE) |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|                                                        | AVS 2.1  | 1                                  | D015          | 470 (OD)     | 470 (OD)      | 400                 |                     | SW          | PE           | F                  |                    |                           |                | 470 OD: ST / 10 / X42<br>400Ø: ST / 8 / X42     | 2500/3          | CML                  | EP + DT          | PU       | SPECIAL TEE<br>ONE END BUTT-WELDED TO EXISTING<br>BOSPOORT PIPE. OTHER END CONNECTED TO<br>EXISTING PIPE WITH 470mm OD x 100mm WIDE<br>STEEL STRAP (ST / 6 / X42). STRAP TO BE CUT IN<br>HALF AND WELDED ONTO EXISTING PIPE AND<br>NEW TEE-PIECE.<br>THE TOP 650 mm PIECE OF THE 400 mm STUB WITH<br>THE FLANGE TO BE SUPPLIED SEPARATELY AND TO<br>BE BUTT WELDED ON SITE AFTER THE REPAIR OF<br>THE CML JOINTS OF THE 470 mm OD MAIN PIPE. |    |
|                                                        | AVS 2.2  | 1                                  | D015          | 80           | 80            |                     |                     | 400Ø F      | 80Ø F        |                    |                    |                           |                | ST / HEAVY                                      | 2500/3          | EP                   | EP               | PU       | SP                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |
|                                                        | AVS 2.3  | 1                                  | D015          | 80           | 80            |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          | FBE                  | FBE              | PU       | RSV<br>HWO                                                                                                                                                                                                                                                                                                                                                                                                                                   | STANDARD                                                                              |
|                                                        | AVS 2.4  | 1                                  | D015          | 80           |               |                     |                     | F           |              |                    |                    |                           |                |                                                 | 2500/3          |                      |                  |          | DOUBLE ACTING AIR VALVE WITH ANTI SHOCK<br>MECHANISM                                                                                                                                                                                                                                                                                                                                                                                         | STANDARD                                                                              |
| 500 mm DIAMETER MAIN PIPE                              |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|                                                        | AVS 3.1  | 1                                  | D015          | 500          | 500           | 500                 |                     | SSF         | SSF          | F                  |                    |                           |                | ST / 10 / X42                                   | 2500/3          | CML                  | EP + DT          | PU       | SPECIAL TEE                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
|                                                        | AVS 3.2  | 1                                  | D015          | D1           | D1            |                     |                     | 500Ø F      | D1 F         |                    |                    |                           |                | ST / HEAVY                                      | 2500/3          | EP                   | EP               | PU       | SP                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|                                                        | AVS 3.3  | 1                                  | D015          | D1           | D1            |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          | FBE                  | FBE              | PU       | RSV<br>HWO                                                                                                                                                                                                                                                                                                                                                                                                                                   | STANDARD                                                                              |
|                                                        | AVS 3.4  | 1                                  | D015          | D1           |               |                     |                     | F           |              |                    |                    |                           |                |                                                 | 2500/3          |                      |                  |          | DOUBLE ACTING AIR VALVE WITH ANTI SHOCK<br>MECHANISM                                                                                                                                                                                                                                                                                                                                                                                         | STANDARD                                                                              |

| AIR VALVE SCHEDULE |                            |                               |
|--------------------|----------------------------|-------------------------------|
| CHAINAGE<br>(m)    | MAIN PIPE<br>DIAMETER (mm) | AIR VALVE<br>DIAMETER D1 (mm) |
| -821               | 470 OD                     | 80                            |
| -621               | 470 OD                     | 80                            |
| -121               | 470 OD                     | 80                            |
| 3                  | 400                        | 80                            |
| 307                | 500                        | 50                            |
| 875                | 500                        | 50                            |
| 979                | 500                        | 50                            |
| 1079               | 500                        | 80                            |
| 1237               | 500                        | 80                            |

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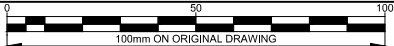
PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**AIR VALVE INSTALLATION  
400 - 500mm Ø PIPELINE  
FITTING LIST**





ORIGINAL DRAWING SCALE: AS SHOWN

ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

CLIENT DRAWING No.: \_\_\_\_\_

CLIENT REF No.: \_\_\_\_\_

SURVEYED: \_\_\_\_\_

DRAWN: A STEENBERG

COORD SYSTEM: WG27

DESIGNED: C VAN ECK

DATE: JULY 2020

APPROVED ON BEHALF OF BIGEN:

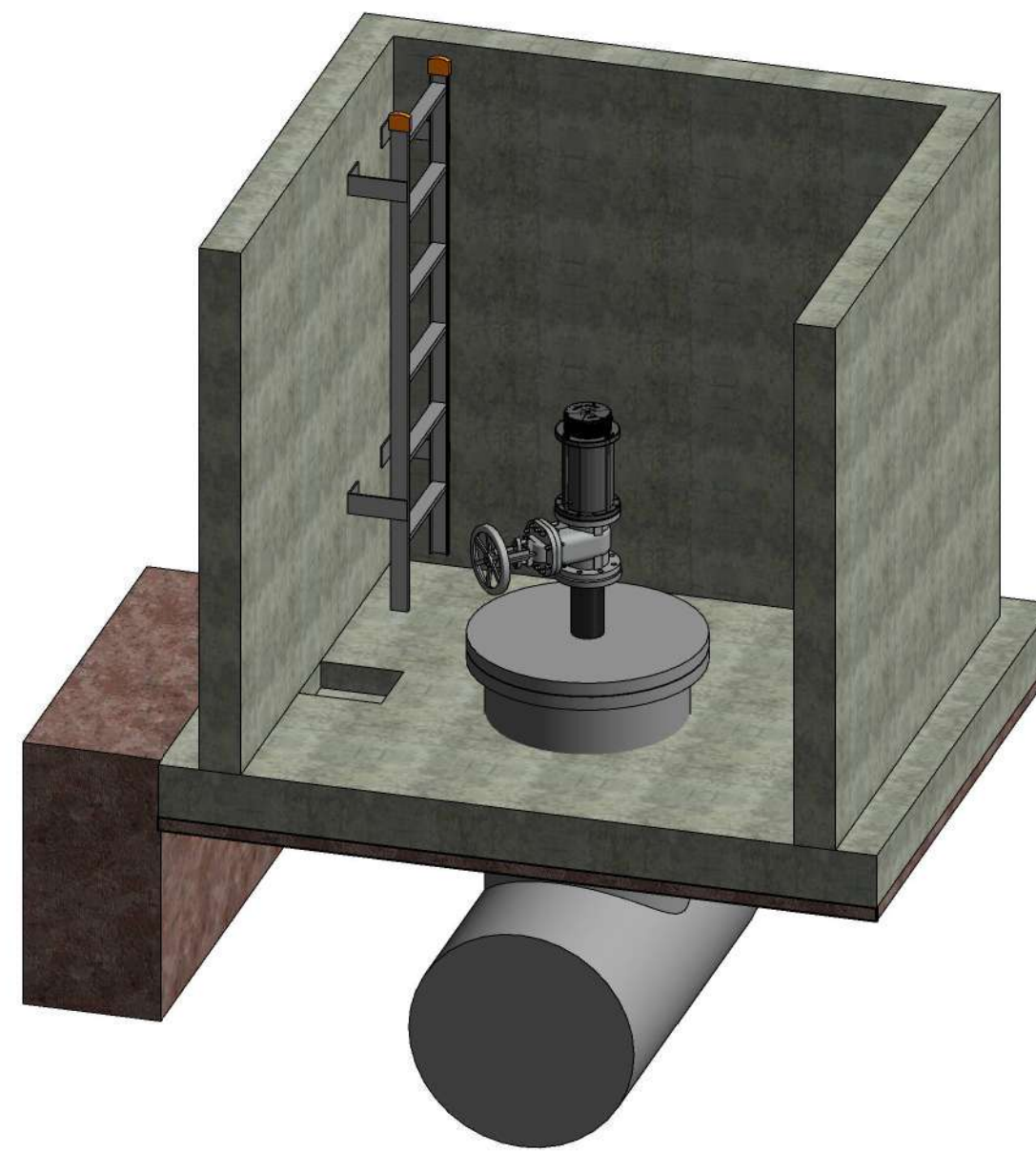
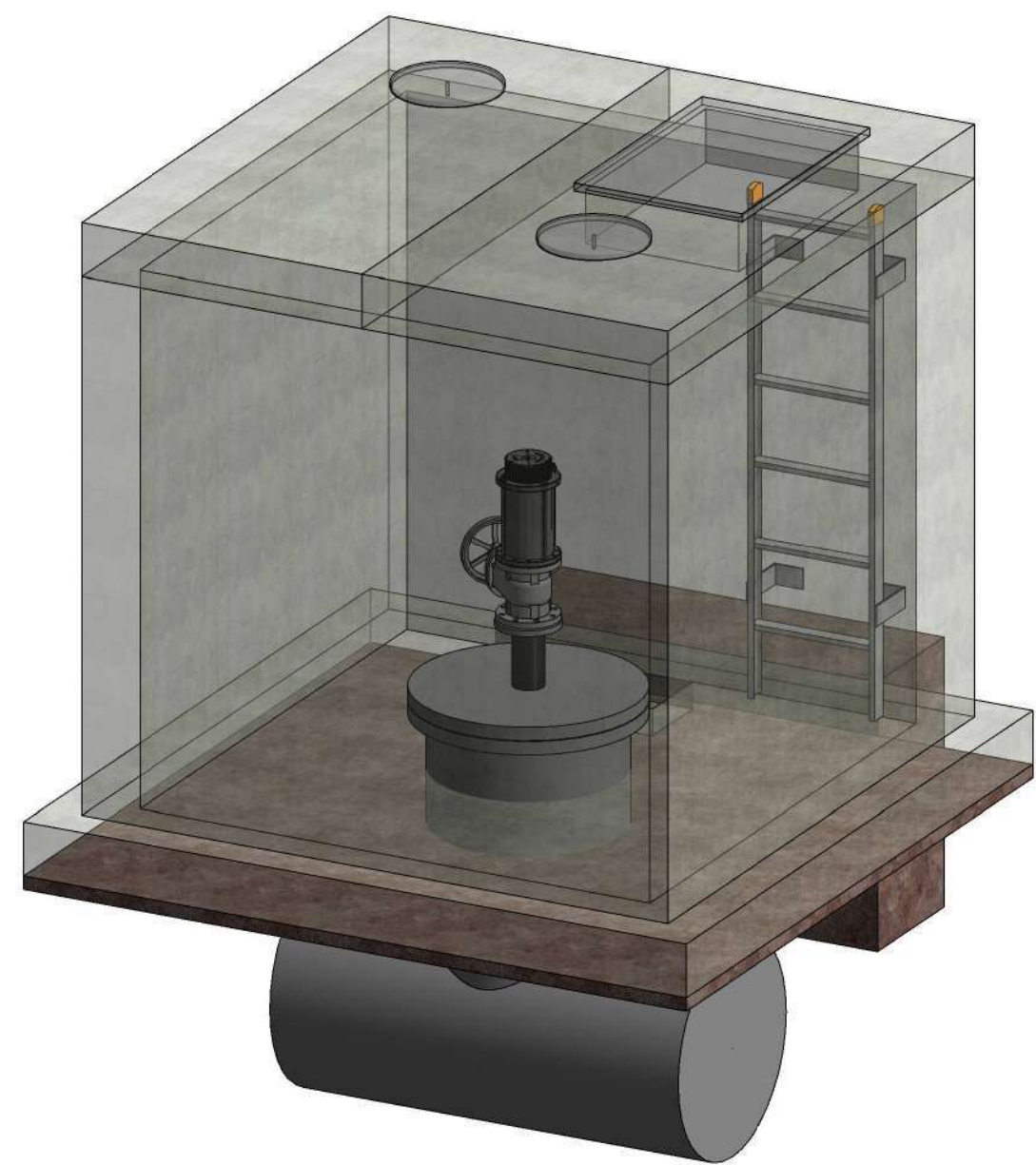
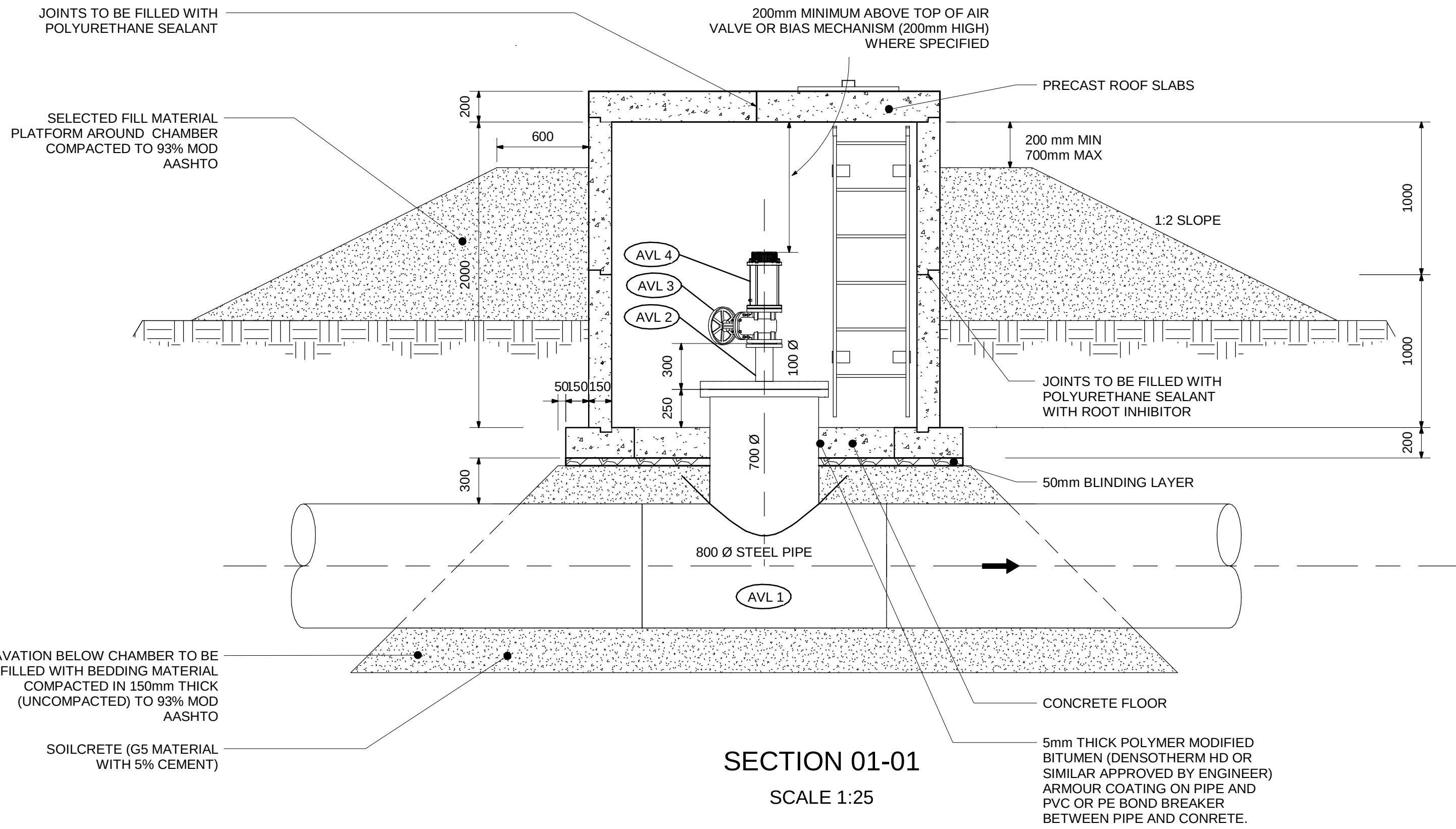
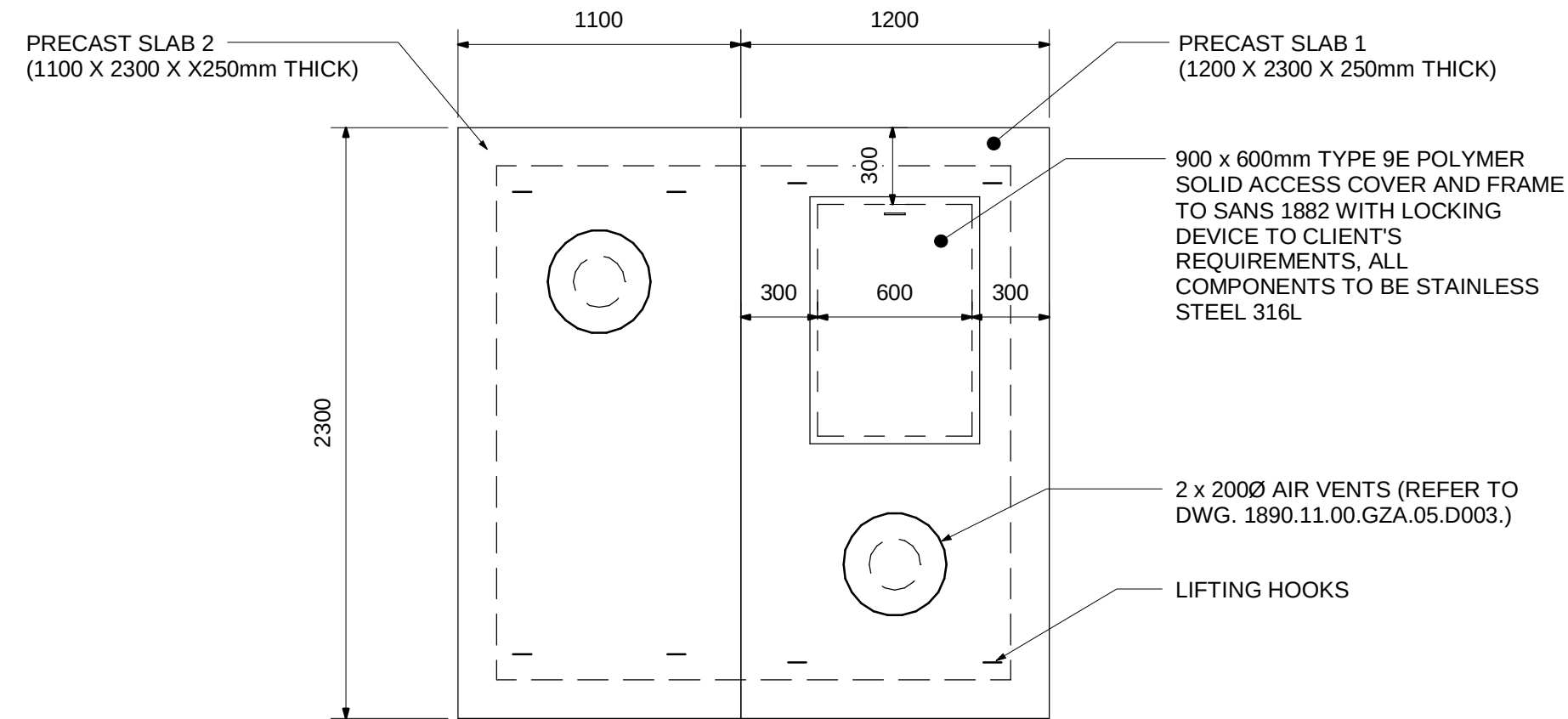
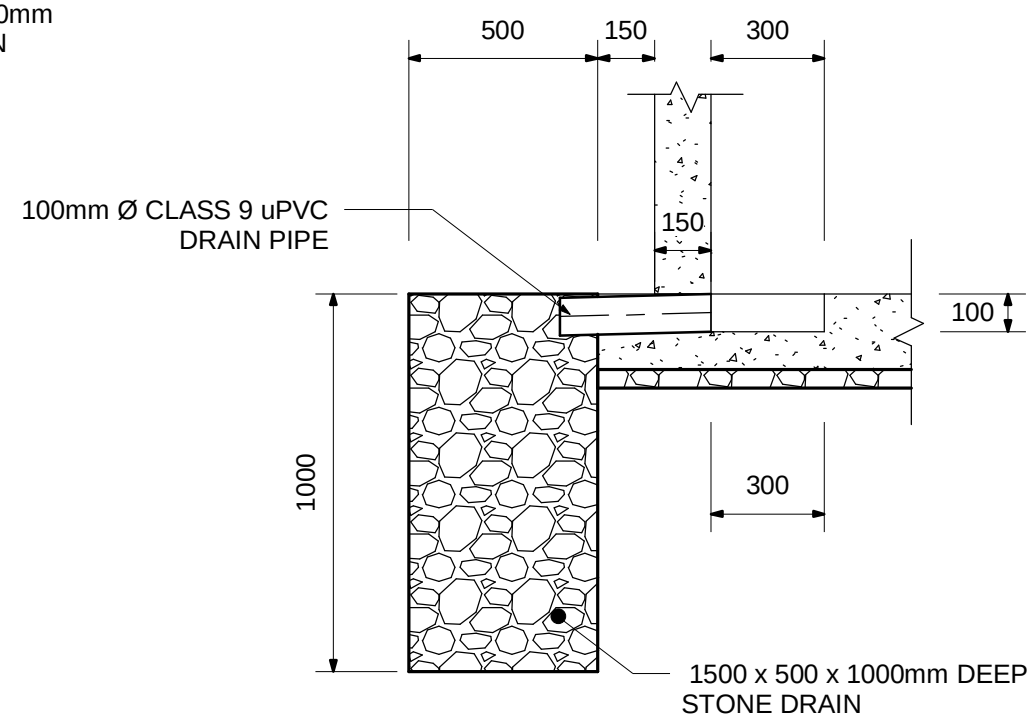
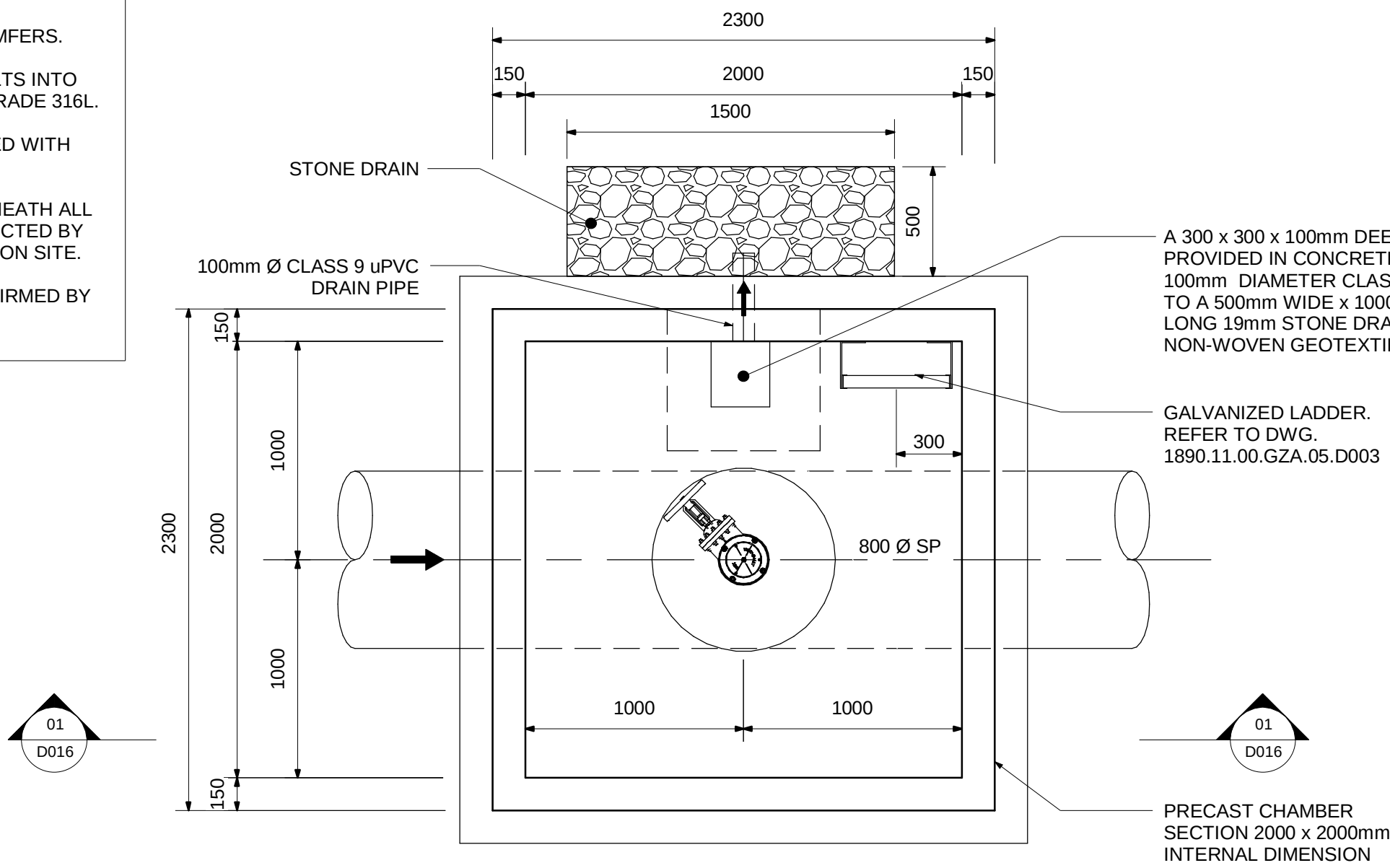
ENGINEER: \_\_\_\_\_

DRAWING No.: **1890.11.00.GZA.05.F015**

VERSION: **1.0**



- NOTES:**
- REFER TO DRAWING 1890.11.00.GZA.05.D003 FOR TYPICAL DETAILS.
  - CONCRETE FINISHES SHALL BE AS FOLLOWS, EXCEPT WHERE OTHERWISE SHOWN: SMOOTH SPECIALLY FOR SURFACES EXPOSED TO VIEW. ROUGH TO SURFACES AGAINST WHICH BACKFILL OR FURTHER CONCRETE WILL BE PLACED. FLOOR FINISHES INSIDE CHAMBERS TO BE WOOD FLOATED.
  - ALL EXPOSED EDGES TO HAVE 20X20 CHAMFERS.
  - ALL STEEL BOLTS, NUTS AND ANCHOR BOLTS INTO CONCRETE SHALL BE STAINLESS STEEL GRADE 316L.
  - ALL JOINTS AT ROOF PANELS TO BE SEALED WITH POLYURETHANE SEALANT.
  - PIPE SUPPORTS TO BE PROVIDED UNDERNEATH ALL VALVES AND FLOW METERS OR AS INSTRUCTED BY ENGINEER ON SITE. H TO BE DETERMINED ON SITE.
  - FINAL POSITION OF CHAMBER TO BE CONFIRMED BY ENGINEER ON SITE.



| Revision Schedule |             |      |          |
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| No.               | DESCRIPTION | DATE | AUTH. BY |
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Pretoria

Phone: +27 (0) 12 842 8700  
pretoria@bigengroup.com



PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
PUMPS, PIPELINES AND RESERVOIR**

DRAWING TITLE:  
**AIR VALVE CHAMBER DETAILS  
800mm Ø PIPELINE**



|                                       |                                 |
|---------------------------------------|---------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                                    |          |          |              |
|------------------------------------|----------|----------|--------------|
| SURVEYED                           |          | DESIGNED | P DU PLESSIS |
| DRAWN                              | JA SWART | CHECKED  | C VAN ECK    |
| COORD SYSTEM                       | WG27     | DATE     | AS SHOWN     |
| APPROVED ON<br>BEHALF OF<br>BIGIN: |          |          |              |
| DRAWING No.:                       |          |          | VERSION:     |
| 1890.11.00.GZA.05.D016             |          |          | 1.0          |

2020/09/03 14:13:10 P:\dms49247\1890.11.00.GZA.05.D016 - AIR VALVE 800 DIA.dwg

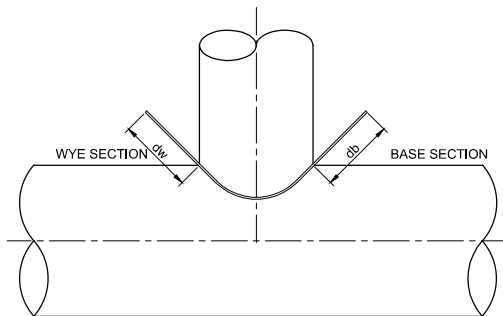
1890.11.00.GZA.05.D016



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                  | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                                                              | DIMENSIONS |
|------------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|--------------------------------------------------------------------------|------------|
|                                                      |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                                                                          |            |
|                                                      |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                          |            |
| AIR VALVE INSTALLATION - DWG. 1890.11.00.GZA.05.D016 |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                          |            |
|                                                      | AVL 1    | 1                                  | D016          | 800          | 800           | 700                 |                     | SW          | SW           | F                  |                    |                           |                | 800Ø: ST / 10 / X42<br>700Ø: ST / 6 / X42       | 1600/3          | CML                  | EP + DT          | PU       | SPECIAL TEE WITH CROTCH PLATE<br>db=260mm; dw=260mm; dt=220mm 25mm THICK |            |
|                                                      | AVL 2    | 1                                  | D016          | 100          | 100           |                     |                     | 700Ø F      | 100Ø F       |                    |                    |                           |                | ST / HEAVY                                      | 1600/3          | EP                   | EP               | PU       | SP                                                                       |            |
|                                                      | AVL 3    | 1                                  | D016          | 100          | 100           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 1600/3          | FBE                  | FBE              | PU       | RSV<br>HWO                                                               | STANDARD   |
|                                                      | AVL 4    | 1                                  | D016          | 100          |               |                     |                     | F           |              |                    |                    |                           |                |                                                 | 1600/3          |                      |                  |          | DOUBLE ACTING AIR VALVE WITH ANTI SHOCK<br>MECHANISM                     | STANDARD   |
|                                                      |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                          |            |



SECTION

NTS

| CROTCH-PLATE DIMENSIONS<br>(SEE AWWA, MII, CHAPTER 13) |        |        |
|--------------------------------------------------------|--------|--------|
|                                                        |        |        |
| MATERIAL :<br>GRADE X42 STEEL<br>THICKNESS = 25 mm     |        |        |
| d't                                                    | d'w    | d'b    |
| 220 mm                                                 | 260 mm | 260 mm |

TYPICAL CROTCH PLATE DETAIL

NTS

| AIR VALVE SCHEDULE |                            |                            |
|--------------------|----------------------------|----------------------------|
| CHAINAGE<br>(m)    | MAIN PIPE<br>DIAMETER (mm) | AIR VALVE<br>DIAMETER (mm) |
| 172                | 800                        | 100                        |
| 488                | 800                        | 100                        |
| 962                | 800                        | 100                        |
| 1775               | 800                        | 100                        |
| 2593               | 800                        | 100                        |
| 3050               | 800                        | 100                        |
| 3550               | 800                        | 100                        |
| 3928               | 800                        | 100                        |
| 4810               | 800                        | 100                        |
| 5120               | 800                        | 100                        |
| 5859               | 800                        | 100                        |
| 6440               | 800                        | 100                        |
| 7092               | 800                        | 100                        |
| 7334               | 800                        | 100                        |
| 7859               | 800                        | 100                        |
| 8420               | 800                        | 100                        |

| VERSION / AMENDMENTS |      |             |          |
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pretoria@bigengroup.com

PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**AIR VALVE INSTALLATION  
800mm Ø PIPELINE  
FITTING LIST**

ORIGINAL DRAWING SCALE: AS SHOWN ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

CLIENT DRAWING No.: \_\_\_\_\_ CLIENT REF No.: \_\_\_\_\_

|              |             |          |              |
|--------------|-------------|----------|--------------|
| SURVEYED     |             | DESIGNED | C VAN ECK    |
| DRAWN        | A STEENBERG |          | P DU PLESSIS |
| COORD SYSTEM | WG27        | DATE     | JULY 2020    |

APPROVED ON BEHALF OF BIGEN:

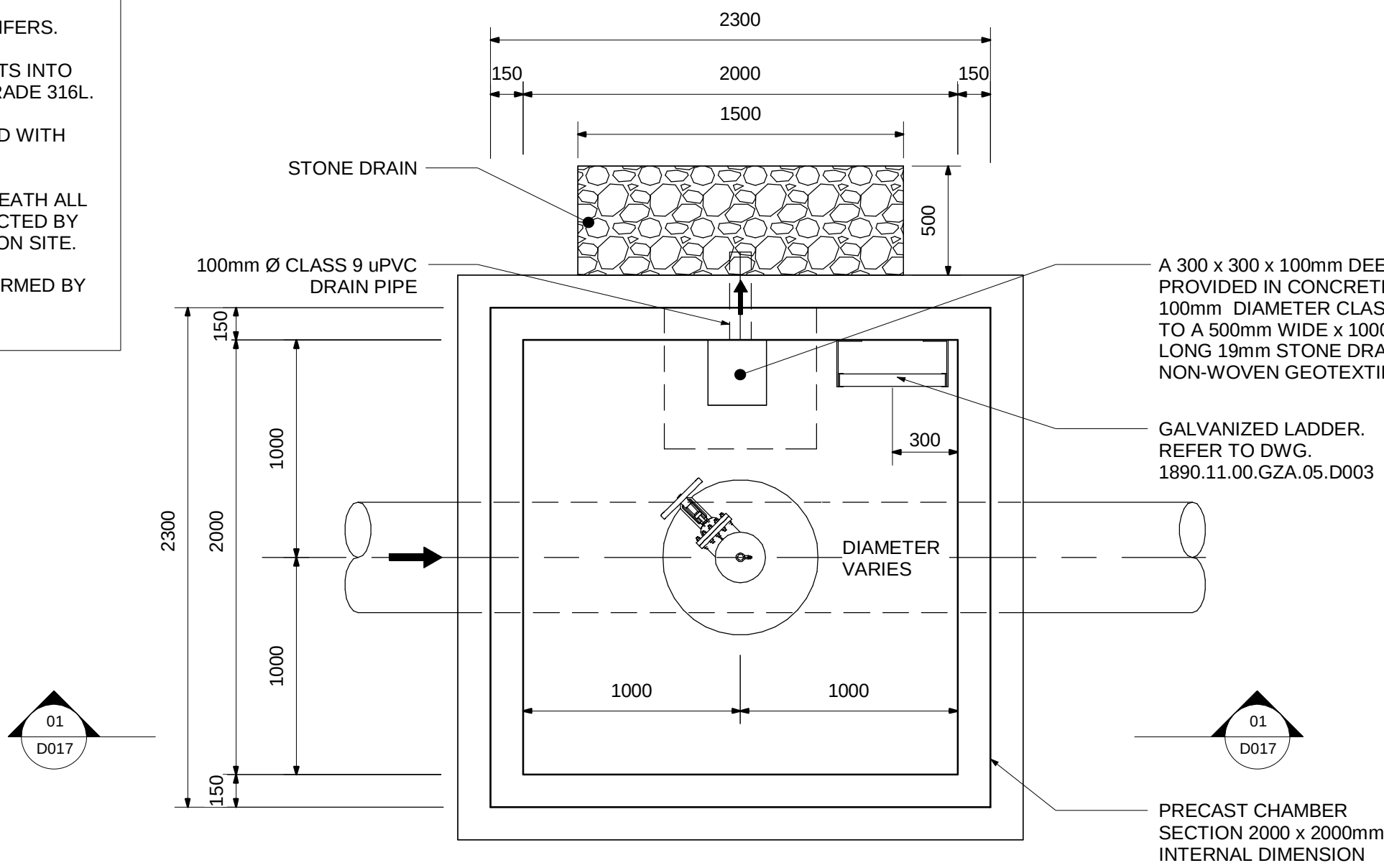
FUNCTION OWNER: \_\_\_\_\_ ENGINEER: \_\_\_\_\_

DRAWING No.: **1890.11.00.GZA.05.F016** VERSION: **1.0**

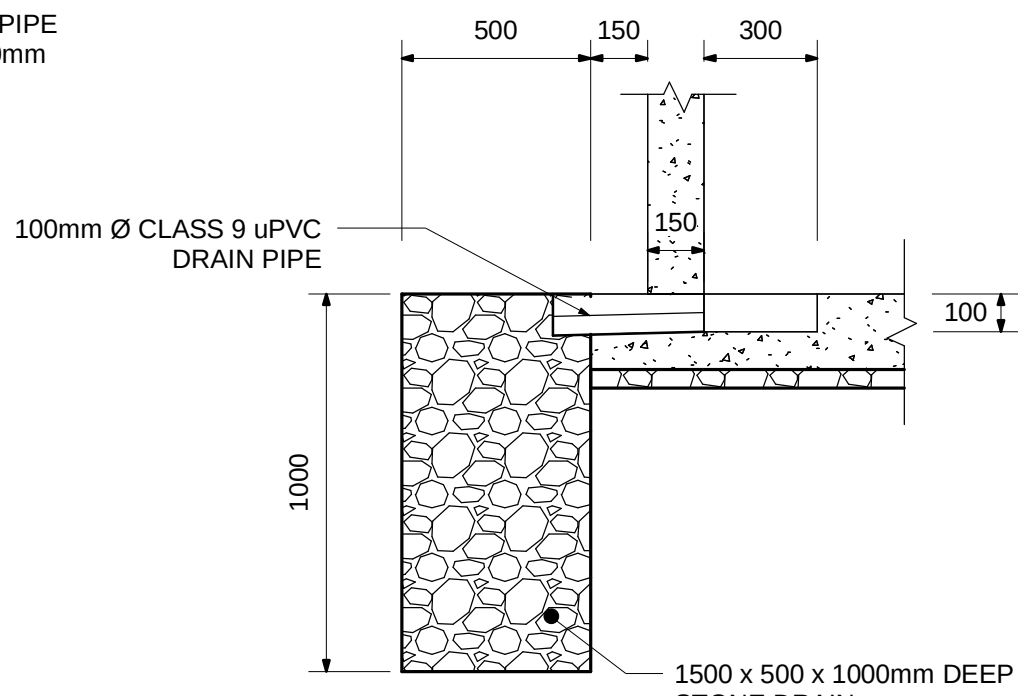
1890.11.00.GZA.05.F016



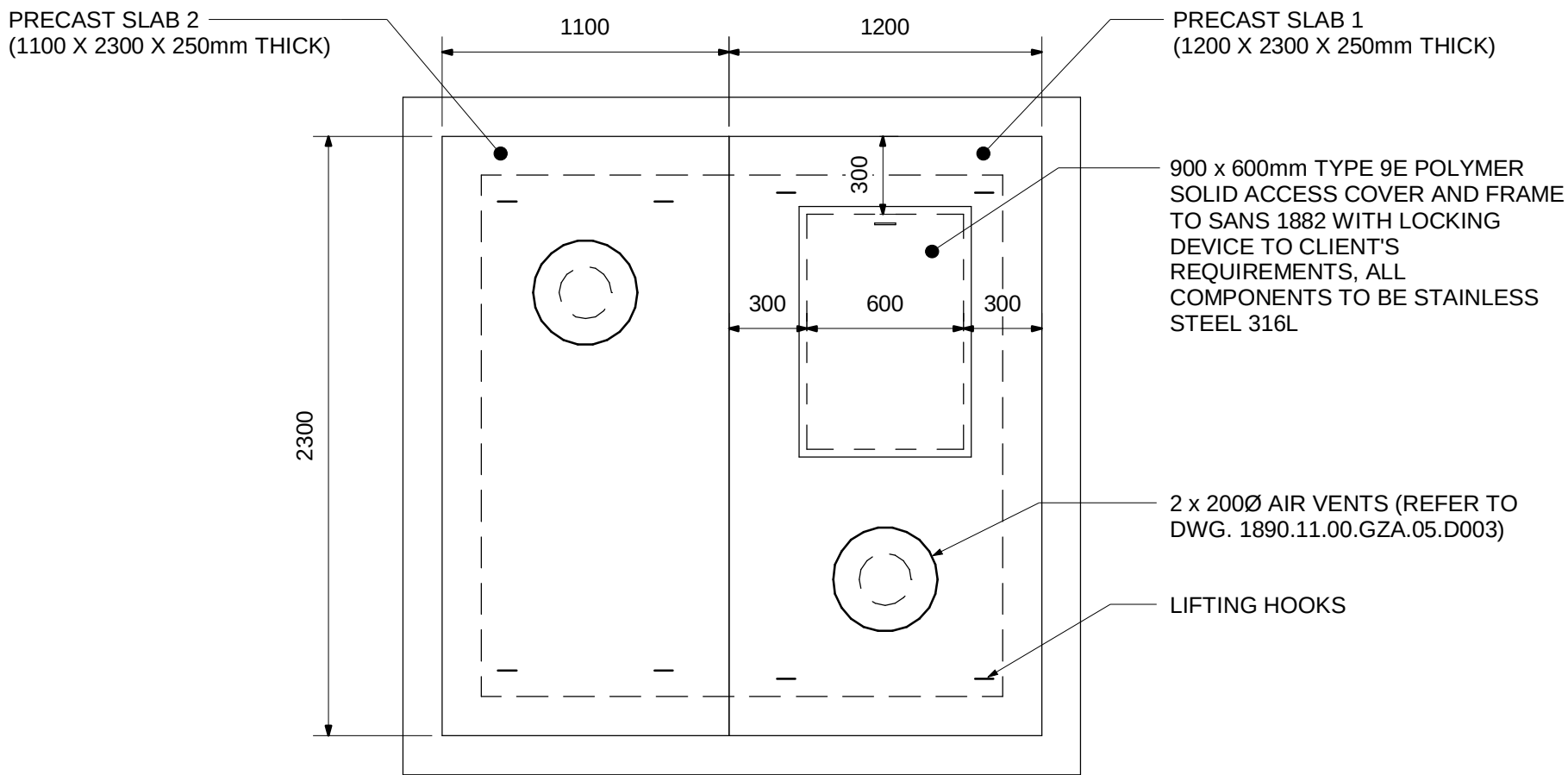
- NOTES:**
1. REFER TO DRAWING 1890.11.00.GZA.05.D003 FOR TYPICAL DETAILS.
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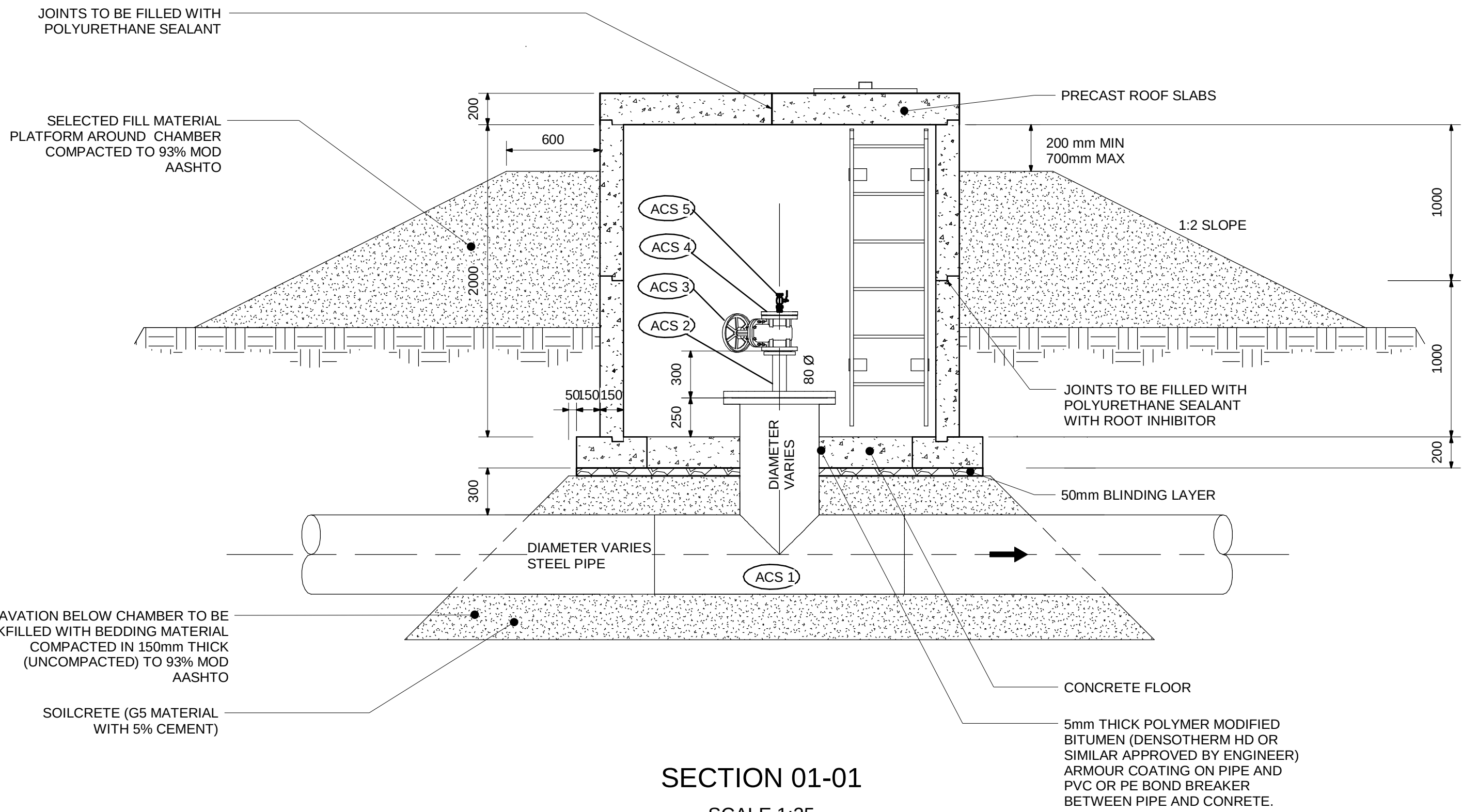
PLAN VIEW WITHOUT ROOF  
SCALE 1:25



SECTION THROUGH SUMP  
SCALE 1:20



PLAN OF ROOF SLABS  
SCALE 1:25



SECTION 01-01  
SCALE 1:25



3D VIEW  
SCALE 1:25



3D SECTION  
SCALE 1:25

| Revision Schedule |             |      |          |
|-------------------|-------------|------|----------|
| No.               | DESCRIPTION | DATE | AUTH. BY |
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pretoria@bigengroup.com



PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
PUMPS, PIPELINES AND RESERVOIR**

DRAWING TITLE:

**ACCESS CHAMBER DETAILS  
500mm Ø PIPELINE**



|                                       |                                 |
|---------------------------------------|---------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
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| SURVEYED                    | DESIGNED    | P DU PLESSIS |           |
| DRAWN                       | A STEENBERG | CHECKED      | C VAN ECK |
| COORD SYSTEM                | WG27        | DATE         | MAY 2020  |
| APPROVED ON BEHALF OF BIGN: |             | DRAWING No.: |           |
| 1890.11.00.GZA.05. D017     |             | VERSION:     |           |
| 1.0                         |             |              |           |



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                               | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT  | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                | DIMENSIONS |
|---------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|---------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|----------------------------|------------|
|                                                   |          |                                    |               |              |               |                     |                     |             |               |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                            |            |
|                                                   |          |                                    |               |              |               |                     |                     |             |               |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                            |            |
| ACCESS INSTALLATION - DWG. 1890.11.00.GZA.05.D017 |          |                                    |               |              |               |                     |                     |             |               |                    |                    |                           |                |                                                 |                 |                      |                  |          |                            |            |
|                                                   | ACS 1    | 1                                  | D017          | 500          | 500           | 500                 |                     | SSF         | SSF           | F                  |                    |                           |                | ST / 10 / X42                                   | 2500/3          | CML                  | EP + DT          | PU       | SPECIAL TEE                |            |
|                                                   | ACS 2    | 1                                  | D017          | 80           | 80            |                     |                     | 500Ø F      | 80Ø F         |                    |                    |                           |                | ST / HEAVY                                      | 2500/3          | EP                   | EP               | PU       | SP                         |            |
|                                                   | ACS 3    | 1                                  | D017          | 80           | 80            |                     |                     | F           | F             |                    |                    |                           |                |                                                 | 2500/3          | FBE                  | FBE              | PU       | RSV<br>HWO                 | STANDARD   |
|                                                   | ACS 4    | 1                                  | D017          | 25           | 25            |                     |                     | 80Ø F       | 25Ø<br>SOCKET |                    |                    |                           |                | SS 316L                                         | 2500/3          |                      |                  |          | 80Ø FLANGE WITH 25Ø SOCKET |            |
|                                                   | ACS 5    | 1                                  | D017          | 25           |               |                     |                     | SCREWED     |               |                    |                    |                           |                | SS 316L                                         |                 |                      |                  |          | SS BALL VALVE              |            |

| ACCESS SCHEDULE |                            |
|-----------------|----------------------------|
| CHAINAGE<br>(m) | MAIN PIPE<br>DIAMETER (mm) |
| 114             | 500                        |

| VERSION / AMENDMENTS |      |             |          |
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| No.                  | DATE | DESCRIPTION | AUTH. BY |
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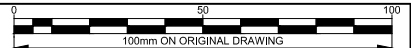
PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**ACCESS INSTALLATION  
500mm Ø PIPELINE  
FITTING LIST**





ORIGINAL DRAWING SCALE: AS SHOWN

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

CLIENT DRAWING No.: \_\_\_\_\_

ORIGINAL DRAWING SHEET SIZE: **A1**

APPROVED ON BEHALF OF BIGEN:

CLIENT REF No.: \_\_\_\_\_

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| SURVEYED     |             | DESIGNED | C VAN ECK    |
| DRAWN        | A STEENBERG |          | P DU PLESSIS |
| COORD SYSTEM | WG27        | DATE     | JULY 2020    |

APPROVED ON BEHALF OF BIGEN:

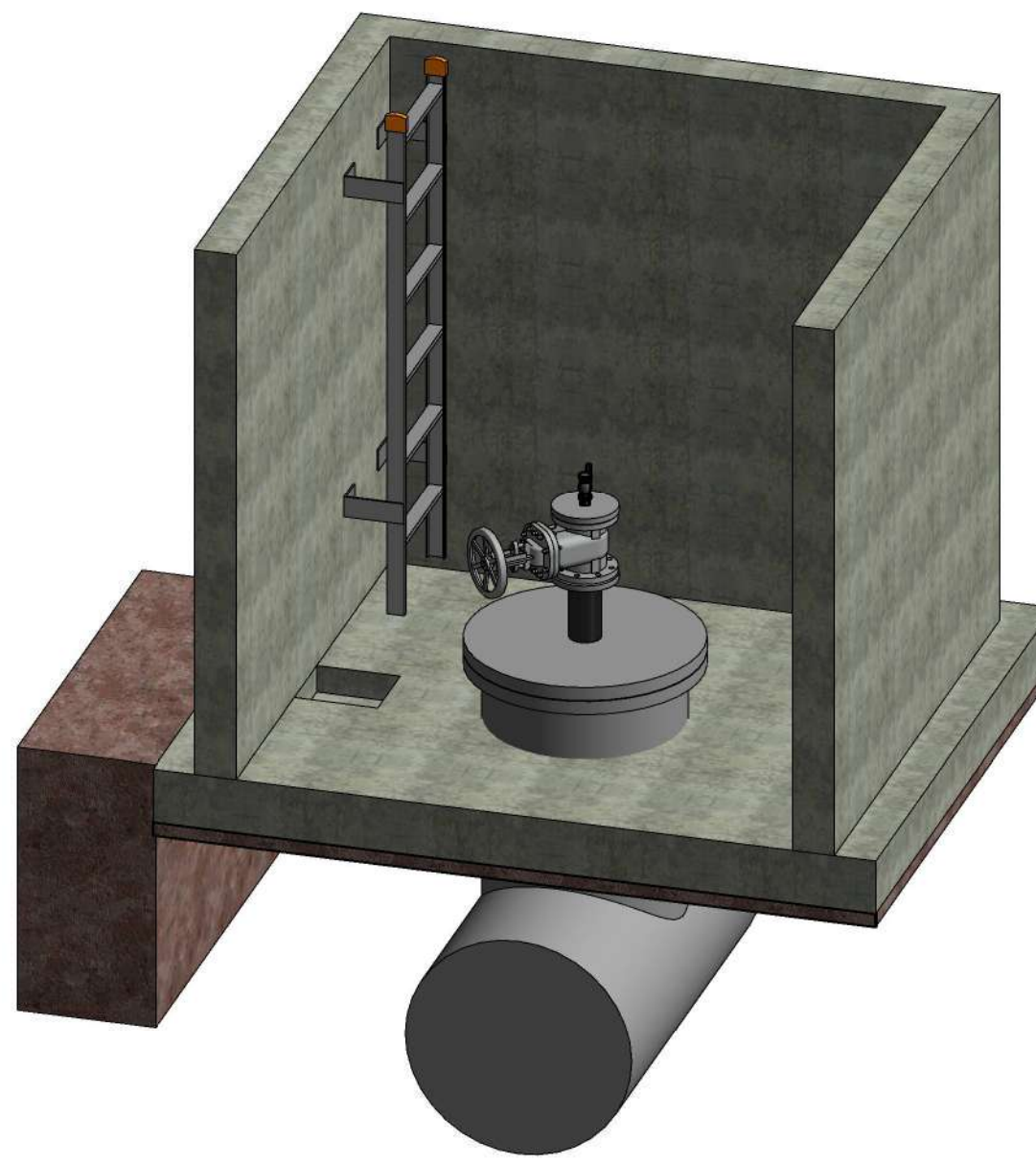
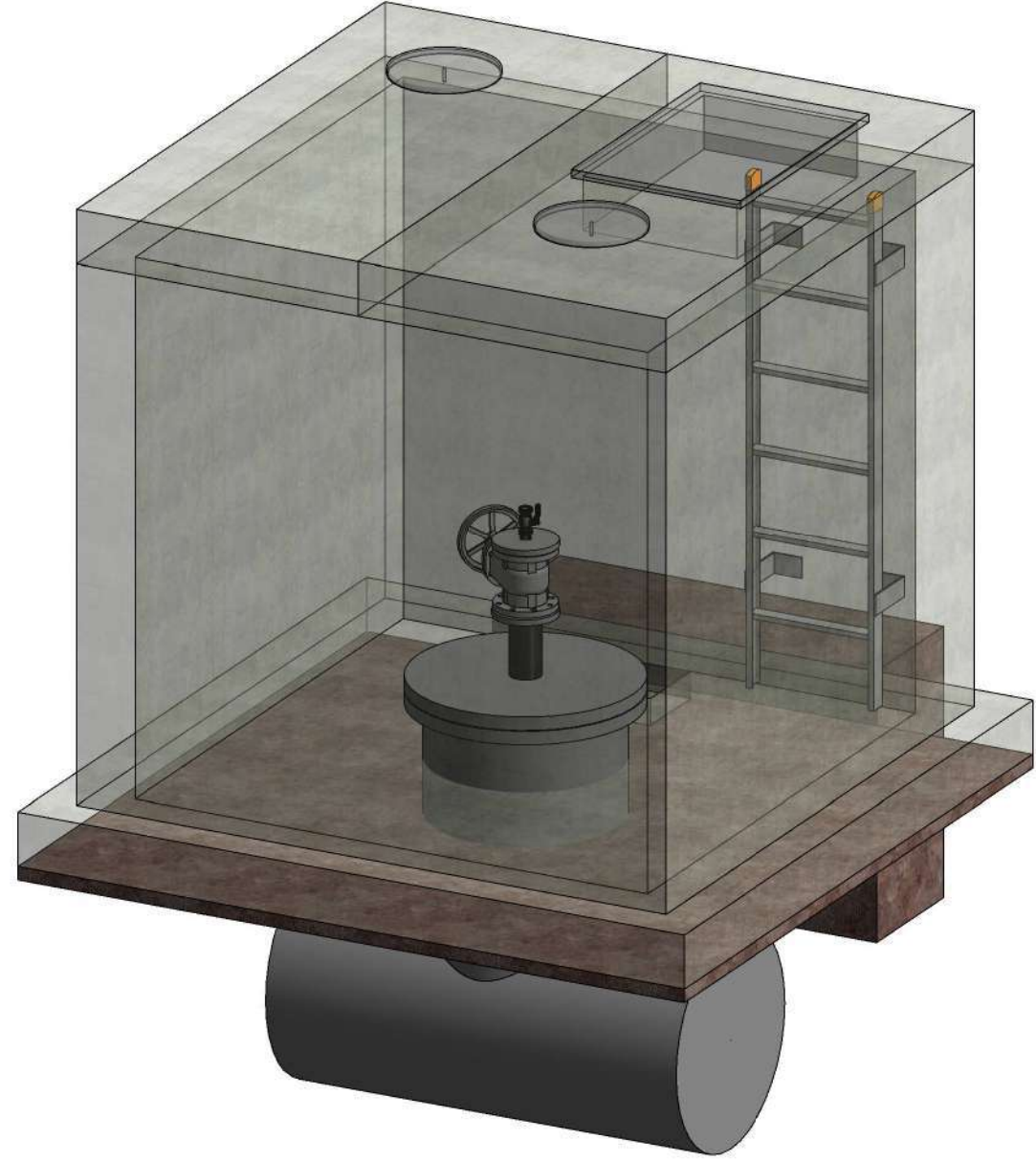
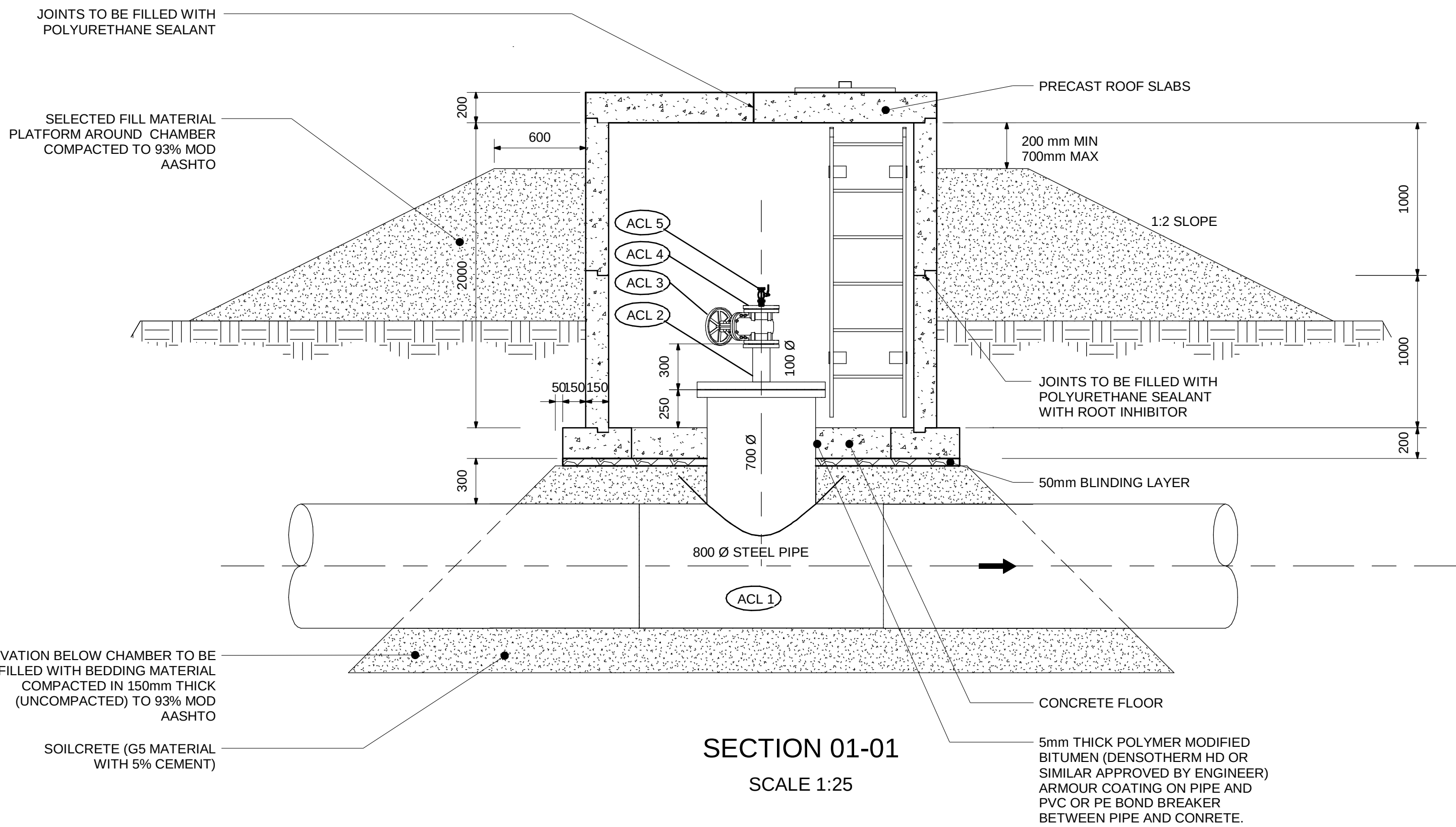
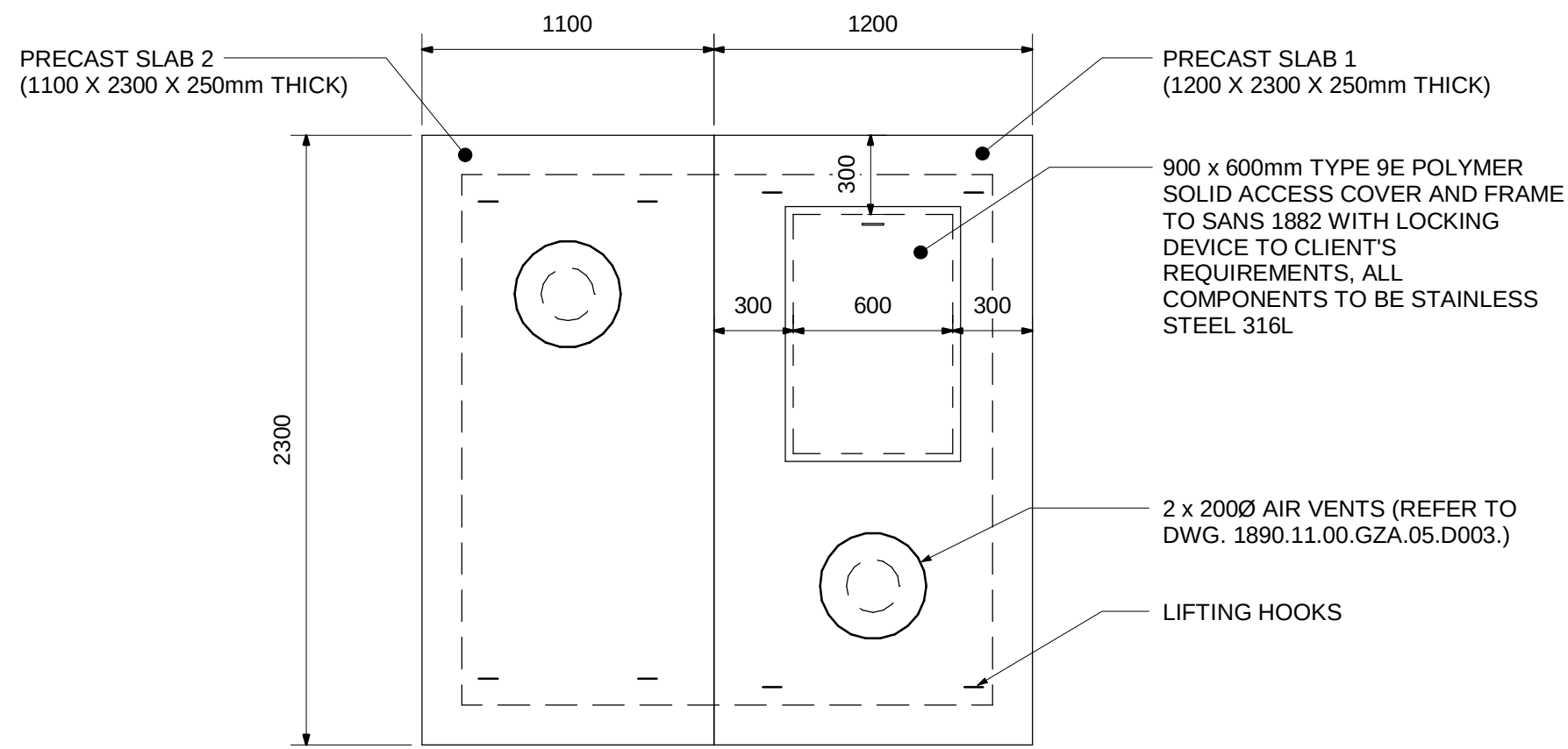
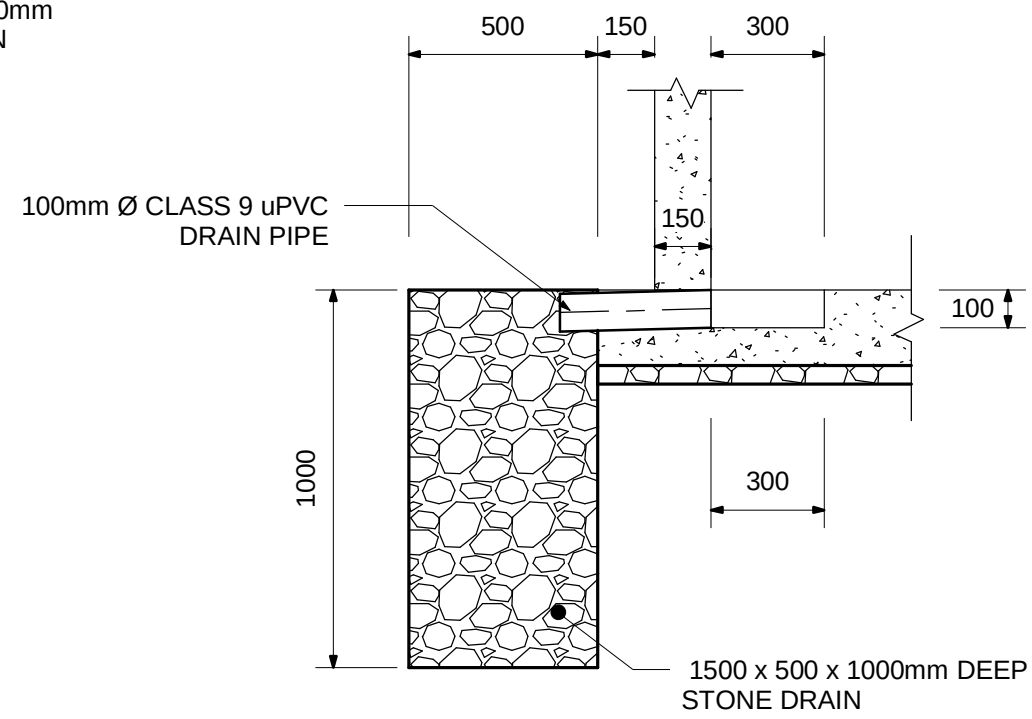
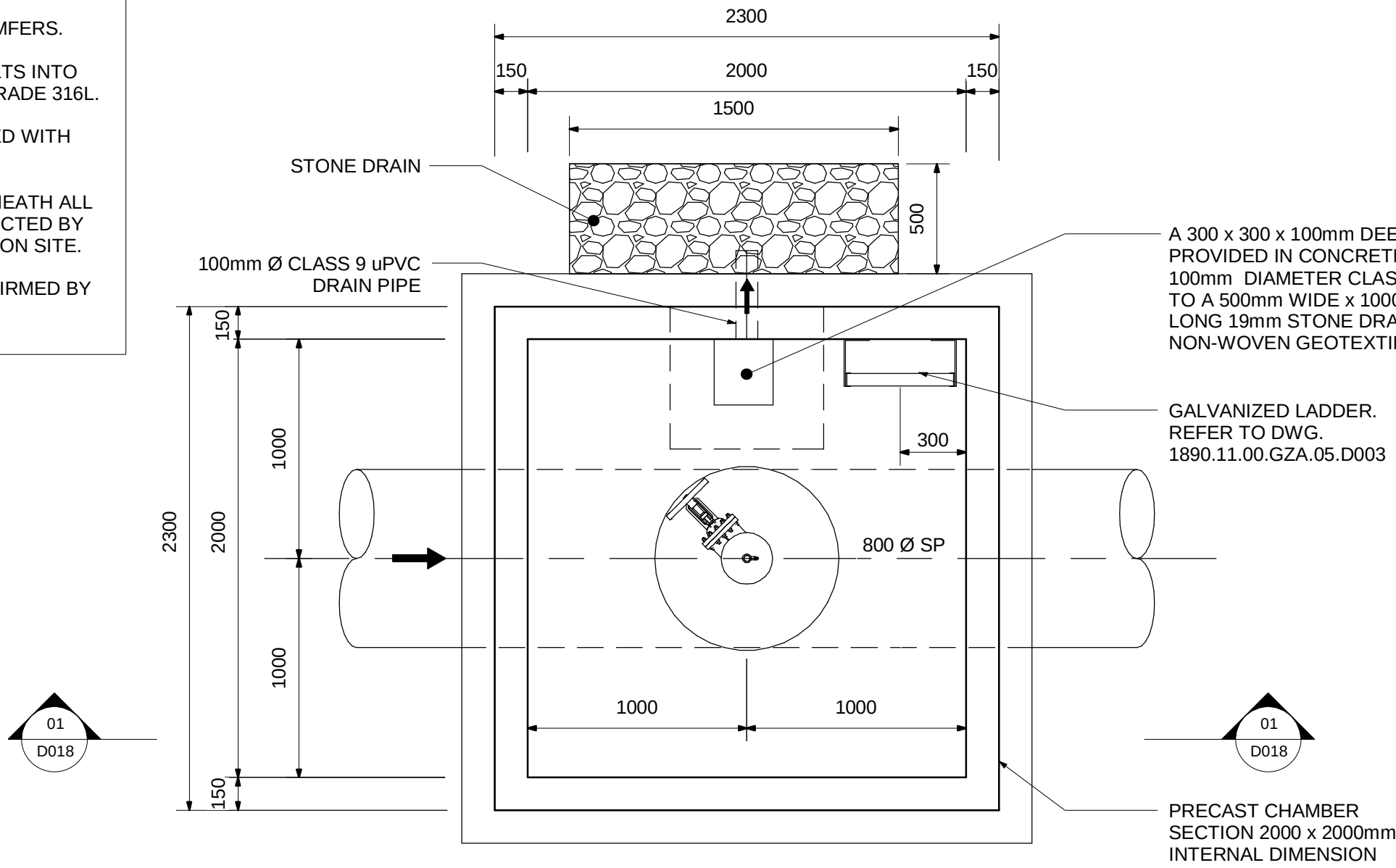
PRACITIONER

REGISTERED

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| DRAWING No.: <b>1890.11.00.GZA.05.F017</b> | VERSION: <b>1.0</b> |
|--------------------------------------------|---------------------|



- NOTES:**
1. REFER TO DRAWING 1890.11.00.GZA.05.D003 FOR TYPICAL DETAILS.
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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
PUMPS, PIPELINES AND RESERVOIR**

DRAWING TITLE:  
**ACCESS CHAMBER DETAILS  
800mm Ø PIPELINE**



|                                       |                                 |
|---------------------------------------|---------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

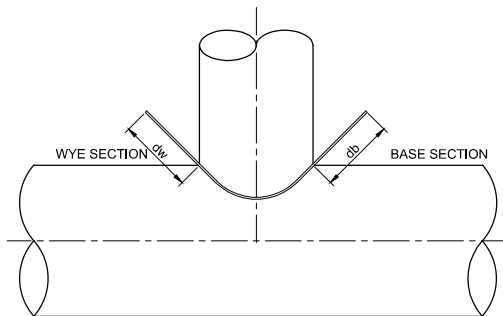
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|-------------------------------------|-------------|--------------|--------------|
| SURVEYED                            | DESIGNED    | P DU PLESSIS |              |
| DRAWN                               | A STEENBERG | CHECKED      | C VAN ECK    |
| COORD SYSTEM                        | WG27        | DATE         | AS SHOWN     |
| APPROVED ON BEHALF OF BIGEN:        |             |              |              |
| DRAWING No.: 1890.11.00.GZA.05.D018 |             |              | VERSION: 1.0 |



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                               | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT  | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                                                              | DIMENSIONS |
|---------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|---------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|--------------------------------------------------------------------------|------------|
|                                                   |          |                                    |               |              |               |                     |                     |             |               |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                                                                          |            |
|                                                   |          |                                    |               |              |               |                     |                     |             |               |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                          |            |
| ACCESS INSTALLATION - DWG. 1890.11.00.GZA.05.D018 |          |                                    |               |              |               |                     |                     |             |               |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                          |            |
|                                                   | ACL 1    | 1                                  | D018          | 800          | 800           | 700                 |                     | SW          | SW            | F                  |                    |                           |                | 800Ø: ST / 10 / X42<br>700Ø: ST / 6 / X42       | 1600/3          | CML                  | EP + DT          | PU       | SPECIAL TEE WITH CROTCH PLATE<br>db=260mm; dw=260mm; dt=220mm 25mm THICK |            |
|                                                   | ACL 2    | 1                                  | D018          | 100          | 100           |                     |                     | 700Ø F      | 100Ø F        |                    |                    |                           |                | ST / HEAVY                                      | 1600/3          | EP                   | EP               | PU       | SP                                                                       |            |
|                                                   | ACL 3    | 1                                  | D018          | 100          | 100           |                     |                     | F           | F             |                    |                    |                           |                |                                                 | 1600/3          | FBE                  | FBE              | PU       | RSV<br>HWO                                                               | STANDARD   |
|                                                   | ACL 4    | 1                                  | D018          | 25           | 25            |                     |                     | 100Ø F      | 25Ø<br>SOCKET |                    |                    |                           |                | SS 316L                                         | 1600/3          |                      |                  |          | 100Ø FLANGE WITH 25Ø SOCKET                                              |            |
|                                                   | ACL 5    | 1                                  | D018          | 25           |               |                     |                     | SCREWED     |               |                    |                    |                           |                | SS 316L                                         |                 |                      |                  |          | SS BALL VALVE                                                            |            |



SECTION

NTS

| CROTCH-PLATE DIMENSIONS<br>(SEE AWWA, MII, CHAPTER 13) |        |        |
|--------------------------------------------------------|--------|--------|
|                                                        |        |        |
| MATERIAL :<br>GRADE X42 STEEL<br>THICKNESS = 25 mm     |        |        |
| d't                                                    | d'w    | d'b    |
| 220 mm                                                 | 260 mm | 260 mm |

TYPICAL CROTCH PLATE DETAIL

NTS

| ACCESS SCHEDULE |                            |
|-----------------|----------------------------|
| CHAINAGE<br>(m) | MAIN PIPE<br>DIAMETER (mm) |
| 2403            | 800                        |
| 4764            | 800                        |
| 4858            | 800                        |
| 6301            | 800                        |
| 7128            | 800                        |
| 7372            | 800                        |

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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Pretoria

Phone: + 27 (0) 12 842 8700  
pretoria@bigengroup.com

PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**ACCESS INSTALLATION  
800mm Ø PIPELINE  
FITTING LIST**

0 50 100  
100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: AS SHOWN ORIGINAL DRAWING SHEET SIZE: **A1**

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

CLIENT DRAWING No.: \_\_\_\_\_ CLIENT REF No.: \_\_\_\_\_

|              |             |          |              |
|--------------|-------------|----------|--------------|
| SURVEYED     |             | DESIGNED | C VAN ECK    |
| DRAWN        | A STEENBERG |          | P DU PLESSIS |
| COORD SYSTEM | WG27        | DATE     | JULY 2020    |

APPROVED ON BEHALF OF BIGEN:

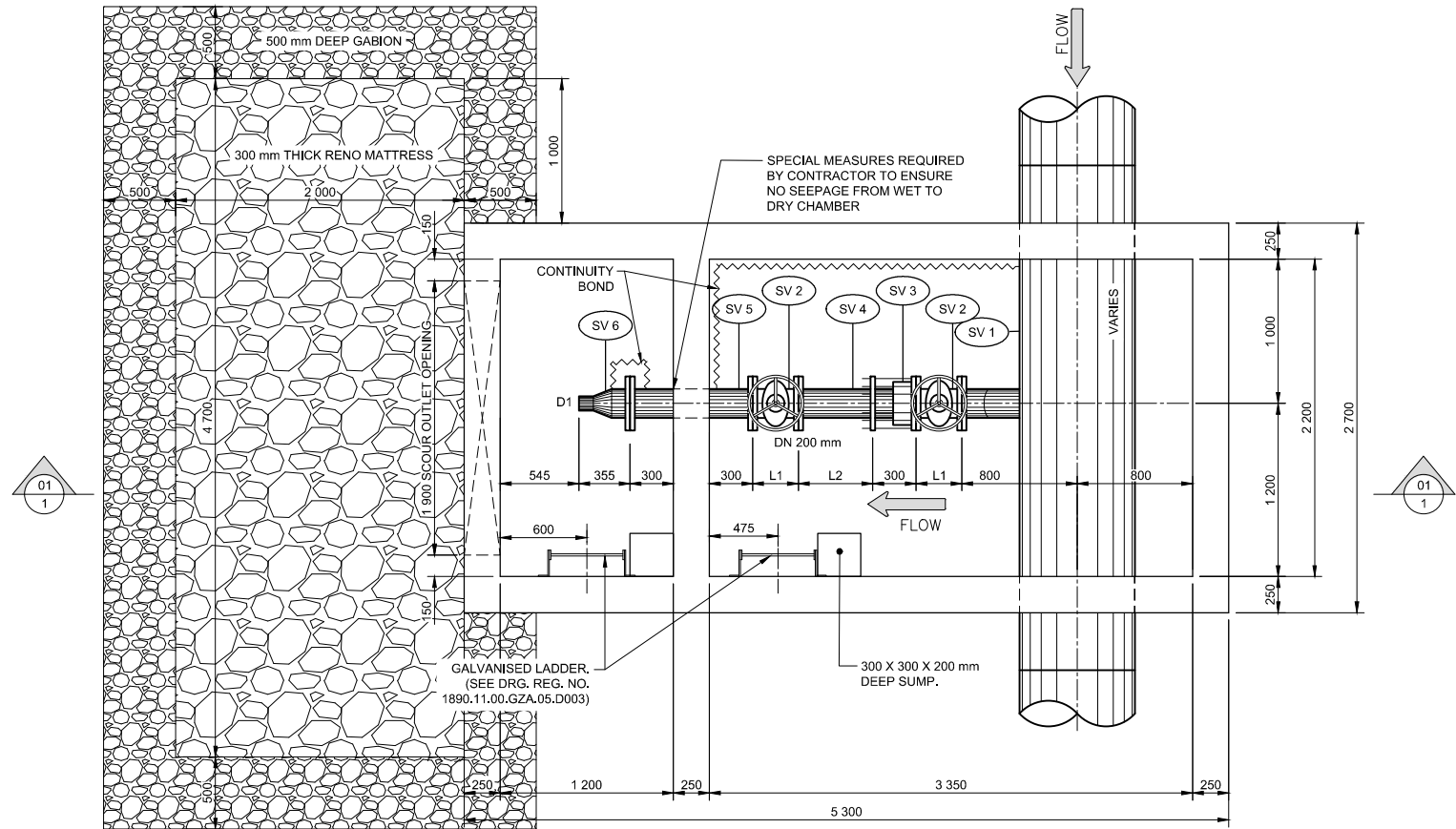
FUNCTIONER: \_\_\_\_\_ ENGINEER: \_\_\_\_\_

DRAWING No.: **1890.11.00.GZA.05.F018** VERSION: **1.0**

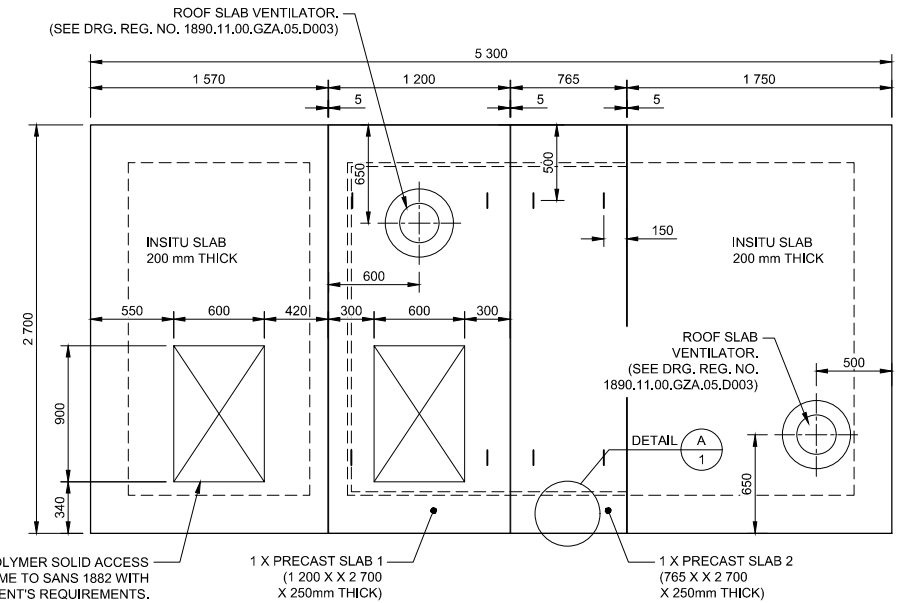




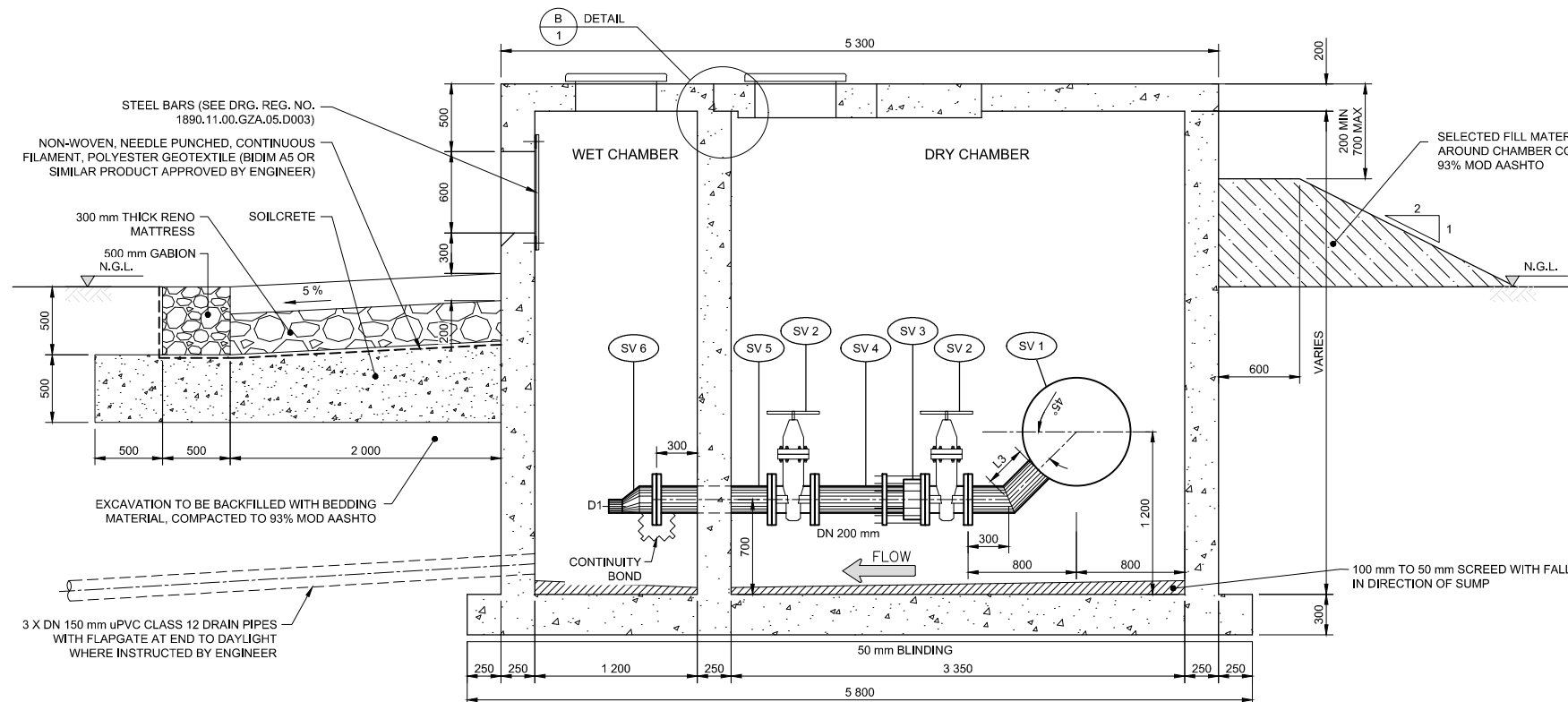




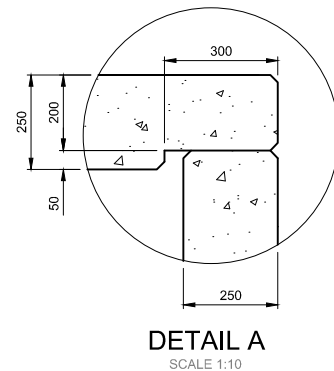
PLAN VIEW (WITHOUT ROOF SLABS)  
SCALE 1:25



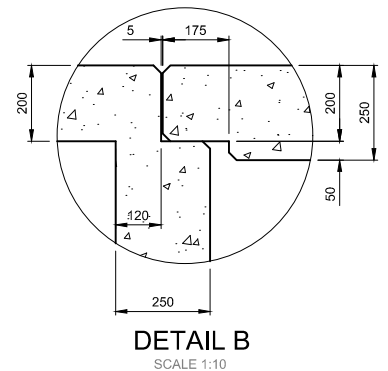
PLAN VIEW OF ROOF SLABS  
SCALE 1:25



SECTION 01-01  
SCALE 1:25



DETAIL A  
SCALE 1:10



DETAIL B  
SCALE 1:10

#### NOTES:

1. REFER TO DRAWING 1890.11.00.GZA.05.D003 FOR TYPICAL DETAILS.
2. CONCRETE FINISHES SHALL BE AS FOLLOWS, EXCEPT WHERE OTHERWISE SHOWN: SMOOTH SPECIALLY FOR SURFACES EXPOSED TO VIEW, ROUGH TO SURFACES AGAINST WHICH BACKFILL OR FURTHER CONCRETE WILL BE PLACED. FLOOR FINISHES INSIDE CHAMBERS TO BE WOOD FLOATED.
3. ALL EXPOSED EDGES TO HAVE 20X20 CHAMFERS.
4. ALL STEEL BOLTS, NUTS AND ANCHOR BOLTS INTO CONCRETE SHALL BE STAINLESS STEEL GRADE 316L.
5. ALL JOINTS AT ROOF PANELS TO BE SEALED WITH POLYURETHANE SEALANT.
6. PIPE SUPPORTS TO BE PROVIDED UNDERNEATH ALL VALVES AND FLOW METERS OR AS INSTRUCTED BY ENGINEER ON SITE. H TO BE DETERMINED ON SITE.
7. FINAL POSITION OF CHAMBER TO BE CONFIRMED BY ENGINEER ON SITE.

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
|                      |      |             |          |
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|                                                                                                        |
|--------------------------------------------------------------------------------------------------------|
| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>                           |
| DRAWING TITLE:<br><b>SINGLE SCOUR VALVE INSTALLATION:<br/>500 mm AND 800 mm Ø<br/>PLAN AND DETAILS</b> |



|                                       |
|---------------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |
| ORIGINAL DRAWING SCALE: AS SHOWN      |
| ORIGINAL DRAWING SHEET SIZE: A1       |
| APPROVED ON BEHALF OF CLIENT:         |
| NAME:                                 |
| DATE:                                 |
| CLIENT DRAWING No.:                   |
| CLIENT REF No.:                       |

|                                     |                     |
|-------------------------------------|---------------------|
| SURVEYED: -                         | DESIGNED: C VAN ECK |
| DRAWN: JA SWART                     | P DU PLESSIS        |
| COORD SYSTEM: WG27                  | DATE: MAY 2020      |
| APPROVED ON BEHALF OF BIGEN:        |                     |
| DRAWING No.: 1890.11.00.GZA.05.D020 | VERSION: 1.0        |

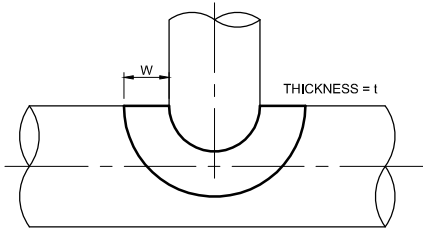
1890.11.00.GZA.05.D020



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                             | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                                               | DIMENSIONS |
|-----------------------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|-----------------------------------------------------------|------------|
|                                                                 |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                                                           |            |
|                                                                 |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                           |            |
| SCOUR INSTALLATION - DWG. 1890.11.00.GZA.05.D020 - RISING MAIN  |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                           |            |
|                                                                 | SV 1     | 1                                  | D020          | 500          | 500           | 200                 |                     | SSF         | SSF          | F                  |                    | 45                        | 230            | 500Ø: ST / 5 / X42<br>200Ø: ST / 4.5 / X42      | 2500/3          | CML                  | EP + DT          | PU       | SPECIAL SCOUR TEE WITH COLLAR PLATE<br>(W=110mm; t=4.5mm) |            |
|                                                                 | SV 2     | 2                                  | D020          | 200          | 200           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          | FBE                  | FBE              | PU       | WGV<br>HWO                                                | STANDARD   |
|                                                                 | SV 3     | 1                                  | D020          | 200          |               |                     |                     | FA          |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PU       | FLANGE ADAPTOR                                            | STANDARD   |
|                                                                 | SV 4     | 1                                  | D020          | 200          | 200           |                     |                     | PE + RF     | F            |                    |                    |                           |                | ST / 4.5 / X42                                  | 2500/3          | EP                   | EP               | PU       | SP WITH RF AND RESTRAINING BOLTS                          |            |
|                                                                 | SV 5     | 1                                  | D020          | 200          | 200           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4.5 / X42                                  | 2500/3          | EP                   | EP               | PU       | SP                                                        |            |
|                                                                 | SV 6     | 1                                  | D020          | 200          | D1            |                     |                     | F           | PE           |                    |                    |                           |                | ST / 4.5 / X42                                  | 2500/3          | EP                   | EP               | PU       | ECCENTRIC REDUCER                                         |            |
| SCOUR INSTALLATION - DWG. 1890.11.00.GZA.05.D020 - GRAVITY MAIN |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                           |            |
|                                                                 | SV 1     | 1                                  | D020          | 800          | 800           | 200                 |                     | SW          | SW           | F                  |                    | 45                        | 230            | 800Ø: ST / 7 / X42<br>200Ø: ST / 4.5 / X42      | 1600/3          | CML                  | EP + DT          | PU       | SPECIAL SCOUR TEE WITH COLLAR PLATE<br>(W=110mm; t=4.5mm) |            |
|                                                                 | SV 2     | 2                                  | D020          | 200          | 200           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 1600/3          | FBE                  | FBE              | PU       | WGV<br>HWO                                                | STANDARD   |
|                                                                 | SV 3     | 1                                  | D020          | 200          |               |                     |                     | FA          |              |                    |                    |                           |                |                                                 | 1600/3          | EP                   | EP               | PU       | FLANGE ADAPTOR                                            | STANDARD   |
|                                                                 | SV 4     | 1                                  | D020          | 200          | 200           |                     |                     | PE + RF     | F            |                    |                    |                           |                | ST / 4.5 / X42                                  | 1600/3          | EP                   | EP               | PU       | SP WITH RF AND RESTRAINING BOLTS                          |            |
|                                                                 | SV 5     | 1                                  | D020          | 200          | 200           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4.5 / X42                                  | 1600/3          | EP                   | EP               | PU       | SP                                                        |            |
|                                                                 | SV 6     | 1                                  | D020          | 200          | D1            |                     |                     | F           | PE           |                    |                    |                           |                | ST / 4.5 / X42                                  | 1600/3          | EP                   | EP               | PU       | ECCENTRIC REDUCER                                         |            |



TYPICAL COLLAR PLATE  
NTS

| SINGLE SCOUR VALVE SCHEDULE |              |                         |                       |         |         |         |         |
|-----------------------------|--------------|-------------------------|-----------------------|---------|---------|---------|---------|
| PIPE PORTION                | CHAINAGE (m) | MAIN PIPE DIAMETER (mm) | PRESSURE RATING (kPa) | L1 (mm) | L2 (mm) | L3 (mm) | D1 (mm) |
| RISING MAIN                 | 420          | 500                     | 2500                  | 419     | 320     | 455     | 100     |
| GRAVITY MAIN                | 2679         | 800                     | 1600                  | 317     | 520     | 305     | 150     |

| VERSION / AMENDMENTS |      |             |          |
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| No.                  | DATE | DESCRIPTION | AUTH. BY |
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PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**SINGLE SCOUR VALVE INSTALLATION  
FITTING LIST**

ORIGINAL DRAWING SCALE: AS SHOWN  
ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_  
DATE: \_\_\_\_\_  
CLIENT DRAWING No.: \_\_\_\_\_  
CLIENT REF No.: \_\_\_\_\_

|              |             |          |              |
|--------------|-------------|----------|--------------|
| SURVEYED     |             | DESIGNED | C VAN ECK    |
| DRAWN        | A STEENBERG |          | P DU PLESSIS |
| COORD SYSTEM | WG27        | DATE     | JULY 2020    |

APPROVED ON BEHALF OF BIGEN:

DRAWING No.: **1890.11.00.GZA.05.F020**  
VERSION: **1.0**











NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION | DIMENSIONS |
|-----|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|-------------|------------|
|     |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |             |            |
|     |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |             |            |

| SCOUR INSTALLATION - DWG. 1890.11.00.GZA.05.D021/D022 - 800mm Ø GRAVITY MAIN | | | | | | | | | | | | | | | | | | | | |
|  | DSV 1 | 2 | D021 | 800 | 700 |  |  | SW | SW |  |  |  |  | ST / 8 / X42 | 1600/3 | CML | EP + DT |  | CONCENTRIC REDUCER |  |
|  | DSV 2 | 1 | D021 | 700 | 700 | 600 | 200 | SW | PE + RF | F | F | 45 | 230 | 700Ø: ST / 12 / X42 600Ø: ST / 6 / X42 200Ø: ST / 4.5 / X42 | 1600/3 | CML | EP + DT | PU | SPECIAL AIR AND SCOUR TEE MAIN PIPE WITH RF AND RESTRAINING BOLTS |  |
|  | DSV 3 | 1 | D021 | 700 |  |  |  | FA |  |  |  |  |  |  | 1600/3 | EP | EP | PU | FLANGE ADAPTOR | STANDARD |
|  | DSV 4 | 1 | D021 | 700 | 700 |  |  | F | F |  |  |  |  |  | 1600/3 | FBE | FBE |  | BUTTERFLY VALVE RH AND RO GEARBOX GEARING TO ENSURE VALVE CLOSURE EXCEEDS 4 MINUTES | STANDARD |
|  | DSV 5 | 1 | D021 | 700 | 700 | 600 | 200 | F | SW | F | F | 45 | 230 | 700Ø: ST / 12 / X42 600Ø: ST / 6 / X42 200Ø: ST / 4.5 / X42 | 1600/3 | CML | EP + DT | PU | SPECIAL AIR AND SCOUR TEE |  |
|  | DSV 7 | 1 | D021 | 200 | 200 | 200 |  | F | F | F |  |  |  | ST / 6 / X42 | 1600/3 | EP | EP | PU | EQUAL TEE |  |
|  | DSV 8 | 5 | D021 D022 | 200 | 200 |  |  | F | F |  |  |  |  |  | 1600/3 | FBE | FBE | PU | WGV HWO | STANDARD |
|  | DSV 9 | 3 | D021 D022 | 200 |  |  |  | FA |  |  |  |  |  |  | 1600/3 | EP | EP | PU | FLANGE ADAPTOR | STANDARD |
|  | DSV 10 | 2 | D021 D022 | 200 | 200 |  |  | PE + RF | F |  |  |  |  | ST / 6 / X42 | 1600/3 | EP | EP | PU | SP WITH RF AND RESTRAINING BOLTS |  |
|  | DSV 11 | 2 | D021 D022 | 200 | 200 |  |  | F | F |  |  |  |  | ST / 4.5 / X42 | 1600/3 | EP | EP | PU | SP |  |
|  | DSV 12 | 2 | D021 D022 | 200 | D1 |  |  | F | PE |  |  |  |  | ST / 4.5 / X42 | 1600/3 | EP | EP | PU | ECCENTRIC REDUCER |  |
|  | DSV 13 | 1 | D021 D022 | 200 | 200 | 200 |  | F | F | PE + RF |  |  |  | ST / 6 / X42 | 1600/3 | EP | EP | PU | SPECIAL EQUAL TEE |  |
|  | DSV 14 | 2 | D021 D022 | 100 | 100 |  |  | 600Ø F | 100Ø F |  |  |  |  | ST / HEAVY | 1600/3 | EP | EP | PU | SP |  |
|  | DSV 15 | 2 | D021 D022 | 100 | 100 |  |  | F | F |  |  |  |  | SS 316L | 1600/3 |  |  |  | RSV HWO | STANDARD |
|  | DSV 16 | 2 | D021 D022 | 25 | 25 |  |  | 100Ø F | 25Ø SOCKET |  |  |  |  | SS 316L | 1600/3 |  |  |  | 100Ø FLANGE WITH 25Ø SOCKET |  |
|  | DSV 17 | 2 | D021 D022 | 25 |  |  |  | SCREWED |  |  |  |  |  | SS 316L |  |  |  |  | SS BALL VALVE | STANDARD |

| SCOUR, ISOLATING VALVE & ACCESS SCHEDULE |                            |                          |         |
|------------------------------------------|----------------------------|--------------------------|---------|
| CHAINAGE<br>(m)                          | MAIN PIPE<br>DIAMETER (mm) | PRESSURE<br>RATING (kPa) | D1 (mm) |
| 723                                      | 800                        | 1600                     | 100     |
| 5409                                     | 800                        | 1600                     | 150     |

| VERSION / AMENDMENTS |      |             |          |
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| No.                  | DATE | DESCRIPTION | AUTH. BY |
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pretoria@bigengroup.com

PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**DOUBLE SCOUR VALVE & ISOLATING  
VALVE INSTALLATION: 800mm Ø  
FITTING LIST**

ORIGINAL DRAWING SCALE: AS SHOWN

ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

CLIENT DRAWING No.: \_\_\_\_\_

CLIENT REF No.: \_\_\_\_\_

|                                     |             |              |              |
|-------------------------------------|-------------|--------------|--------------|
| SURVEYED                            |             | DESIGNED     | C VAN ECK    |
| DRAWN                               | A STEENBERG |              | P DU PLESSIS |
| COORD SYSTEM                        | WG27        | DATE         | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN:        |             |              |              |
| DRAWING No.: 1890.11.00.GZA.05.F021 |             | VERSION: 1.0 |              |

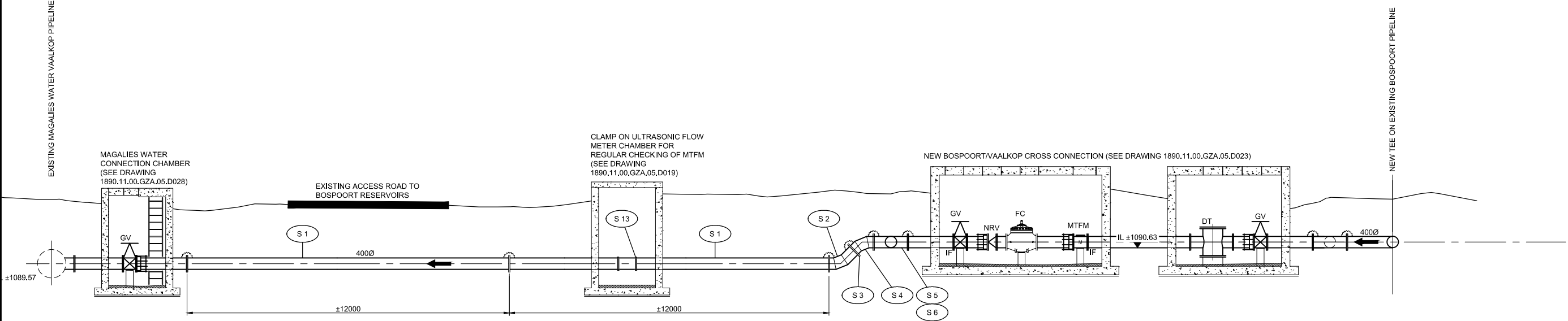
1890.11.00.GZA.05.F021



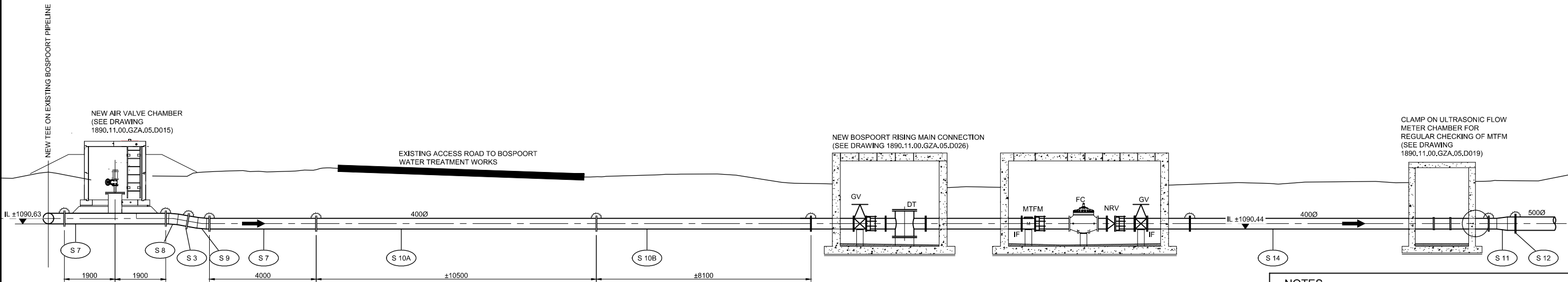




| LEGEND |                               |
|--------|-------------------------------|
| FC     | FLOW CONTROL VALVE            |
| MTFM   | MECHANICAL TURBINE FLOW METER |
| GV     | GATE VALVE                    |
| DT     | DIRT TRAP                     |
| NRV    | NON RETURN VALVE              |
| IF     | INSULATING FLANGE             |
| -----  | CONTINUITY BOND               |



SECTION 01-01



SECTION 02-02

- NOTES**
1. THE SHOWN POSITION OF THE EXISTING SERVICES IS APPROXIMATE AND INDICATIVE ONLY. THE CONTRACTOR SHALL EXPOSE EXISTING SERVICES BY HAND TO VERIFY SAME AND CONFIRM THE LEVELS, DIAMETERS AND MATERIALS THEREOF. SHOULD ANY DISCREPANCIES BE FOUND THAT WILL INFLUENCE THE LEVELS OF THE PIPELINE, THIS INFORMATION MUST BE FORWARDED TO THE ENGINEER THREE WEEKS IN ADVANCE OF THE CONSTRUCTION OR ORDERING OF MATERIAL (AS APPLICABLE) TO ALLOW FOR AMENDMENTS TO THE DESIGN.
  2. LEVELS OF THE NEW PIPEWORK AND CHAMBERS WILL ONLY BE FINALIZED AND SHOWN ON THE DRAWING ONCE THE INFORMATION REQUIRED IN NOTE 1 HAS BEEN PROVIDED BY THE CONTRACTOR TO THE ENGINEER.

| VERSION / AMENDMENTS |         |                  |          |
|----------------------|---------|------------------|----------|
| No.                  | DATE    | DESCRIPTION      | AUTH. BY |
| 2                    | 2024/01 | CONTRACT AMENDED | CvE      |
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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**BOSPOORT PIPELINE  
CONNECTIONS LAYOUT  
SECTIONS**



0 50 100  
100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: 1:75 ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

CLIENT DRAWING No.: \_\_\_\_\_ CLIENT REF No.: \_\_\_\_\_

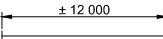
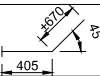
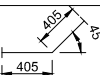
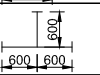
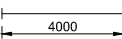
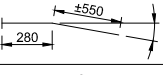
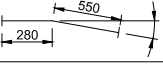
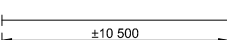
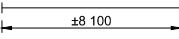
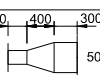
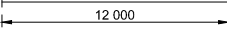
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|------------------------------|-------------|----------|--------------|
| SURVEYED                     |             | DESIGNED | C VAN ECK    |
| DRAWN                        | A STEENBERG |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27        | DATE     | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN: |             |          |              |
| DRAWING No.:                 | REVIEWER    |          | VERSION:     |
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| 1890.11.00.GZA.05.E001       |             |          | 2            |

1890.11.00.GZA.05.E001



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                                   | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                                                                                 | DIMENSIONS                                                                                 |
|-----------------------------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
|                                                                       |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                                                                                             |                                                                                            |
|                                                                       |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                                             |                                                                                            |
| NEW BOSPOORT PIPELINE CONNECTION - DWG. 1890.11.00.GZA.05.U001 & E001 |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                                             |                                                                                            |
|                                                                       | S 1      | 2                                  | U001<br>E001  | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PT       | SP<br>EXACT LENGTH TO BE DETERMINED ON SITE BY<br>CONTRACTOR                                | 400Ø    |
|                                                                       | S 2      | 1                                  | U001<br>E001  | 400          | 400           |                     |                     | F           | LF           |                    |                    | 45                        | 815            | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PT       | MEDIUM RADIUS BEND (CTS)                                                                    | 400Ø    |
|                                                                       | S 3      | 2                                  | U001<br>E001  | 400          |               |                     |                     | LF          |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PT       | LOOSE FLANGE                                                                                | STANDARD                                                                                   |
|                                                                       | S 4      | 1                                  | U001<br>E001  | 400          | 400           |                     |                     | F           | F            |                    |                    | 45                        | 815            | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PT       | MEDIUM RADIUS BEND                                                                          | 400Ø    |
|                                                                       | S 5      | 1                                  | U001<br>E001  | 400          | 400           | 400                 |                     | F           | F            | F                  |                    |                           |                | ST / 8 / X42                                    | 2500/3          | EP                   | EP + DT          | PT       | EQUAL TEE                                                                                   | 400Ø    |
|                                                                       | S 6      | 1                                  | U001<br>E001  | 400          |               |                     |                     | FB          |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PT       | BLANK FLANGE                                                                                | STANDARD                                                                                   |
|                                                                       | S 7      | 1                                  | U001<br>E001  | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PT       | SP                                                                                          | 400Ø    |
|                                                                       | S 8      | 1                                  | U001<br>E001  | 400          | 400           |                     |                     | F           | LF           |                    |                    | 10                        | 815            | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PT       | MEDIUM RADIUS BEND (CTS)                                                                    | 400Ø    |
|                                                                       | S 9      | 1                                  | U001<br>E001  | 400          | 400           |                     |                     | F           | F            |                    |                    | 10                        | 815            | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PT       | MEDIUM RADIUS BEND                                                                          | 400Ø    |
|                                                                       | S 10A    | 1                                  | U001<br>E001  | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PT       | SP<br>EXACT LENGTH TO BE DETERMINED ON SITE BY<br>CONTRACTOR                                | 400Ø    |
|                                                                       | S 10B    | 1                                  | U001<br>E001  | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PT       | SP<br>EXACT LENGTH TO BE DETERMINED ON SITE BY<br>CONTRACTOR                                | 400Ø  |
|                                                                       | S 11     | 1                                  | U001<br>E001  | 400          | 500           |                     |                     | F           | F            |                    |                    |                           |                | ST / 6 / X42                                    | 2500/3          | EP                   | EP + DT          | PT       | CONCENTRIC REDUCER                                                                          | 400Ø  |
|                                                                       | S 12     | 1                                  | U001<br>E001  | 500          |               |                     |                     | LF          |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PT       | LOOSE FLANGE                                                                                | STANDARD                                                                                   |
|                                                                       | S 13     | 1                                  | U001<br>E001  | 400          |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          | CLAMP ON ULTRASONIC FLOW METER<br>(TO FIT 400Ø PIPE)                                        | STANDARD                                                                                   |
|                                                                       | S 14     | 1                                  | U001<br>E001  | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PT       | SP                                                                                          | 400Ø  |
|                                                                       | S 15     | 1                                  | U001          | 200          |               |                     |                     | F           |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PT       | BLANK FLANGE. TO FIT EXISTING FLANGE<br>DRILLING TO BE DETERMINED ON SITE BY<br>CONTRACTOR. |                                                                                            |

| VERSION / AMENDMENTS |      |             |          |
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Pretoria

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pretoria@bigengroup.com



PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**BOSPOORT PIPELINE CONNECTIONS  
LAYOUT  
FITTING LIST**



ORIGINAL DRAWING SCALE: AS SHOWNORIGINAL DRAWING SHEET SIZE: A1

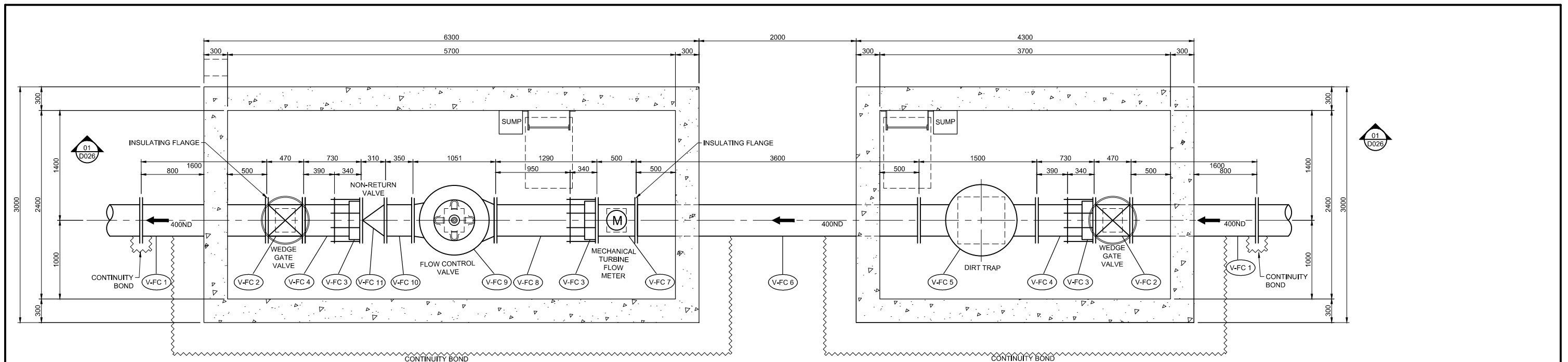
APPROVED ON BEHALF OF CLIENT:  
NAME: \_\_\_\_\_  
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| SURVEYED     |             | DESIGNED | C VAN ECK    |
| DRAWN        | A STEENBERG |          | P DU PLESSIS |
| COORD SYSTEM | WG27        | DATE     | JULY 2020    |

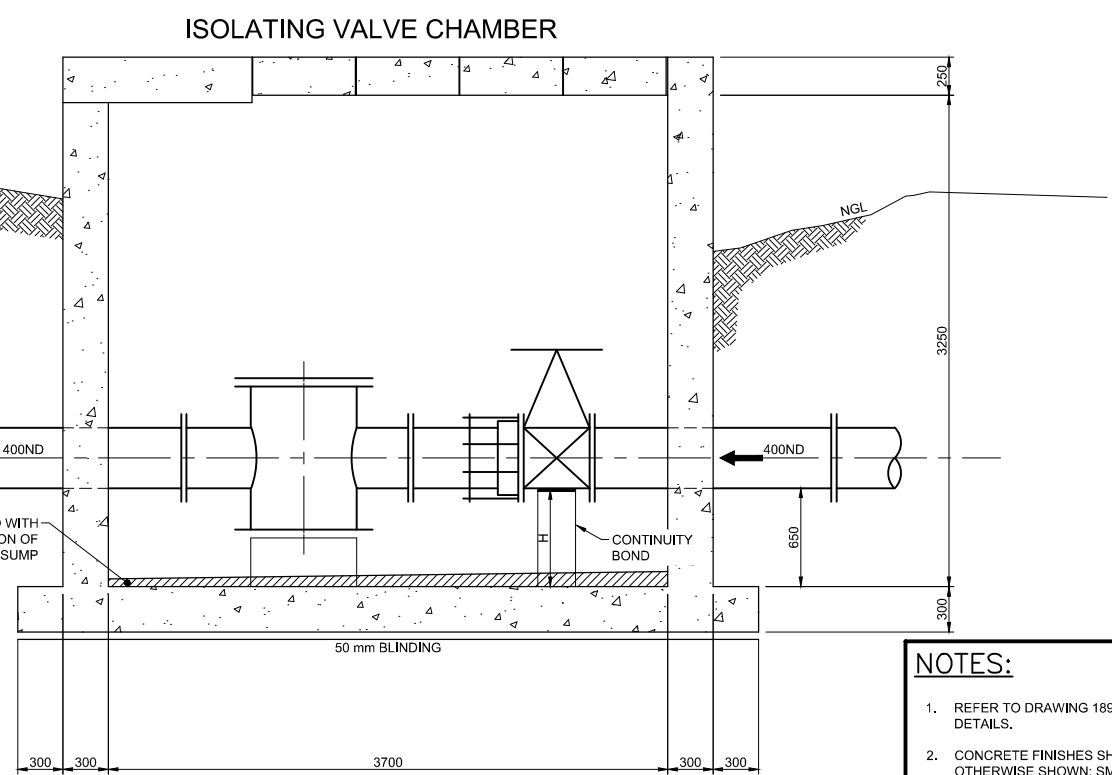
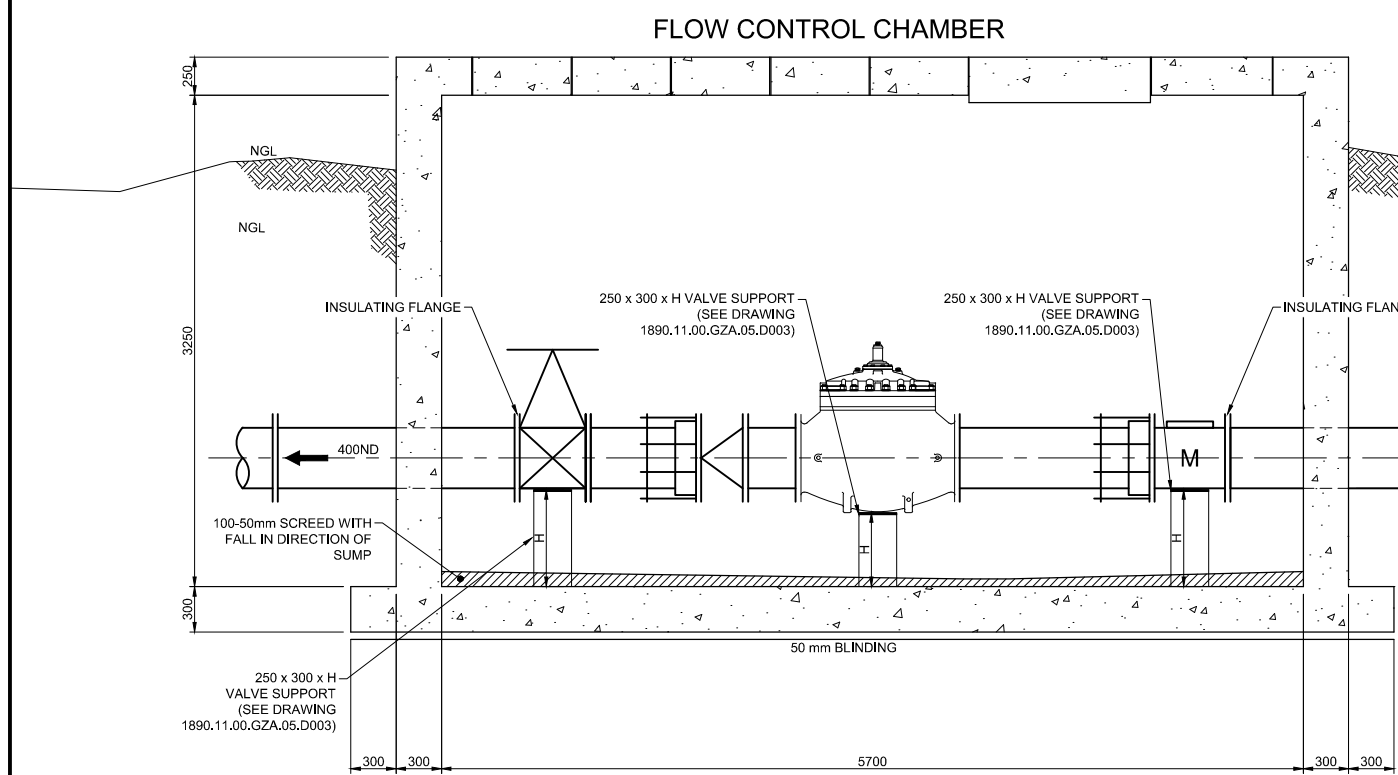
APPROVED ON BEHALF OF BIGEN:  
DRAWING No.: **1890.11.00.GZA.05.F001**VERSION: **1.0**

1890.11.00.GZA.05.F001





PLAN  
SCALE 1:25



SECTION 01-01  
SCALE 1:25

- NOTES:**
1. REFER TO DRAWING 1890.11.00.GZA.05.D003 FOR TYPICAL DETAILS.
  2. CONCRETE FINISHES SHALL BE AS FOLLOWS, EXCEPT WHERE OTHERWISE SHOWN: SMOOTH SPECIALLY FOR SURFACES EXPOSED TO VIEW, ROUGH TO SURFACES AGAINST WHICH BACKFILL OR FURTHER CONCRETE WILL BE PLACED. FLOOR FINISHES INSIDE CHAMBERS TO BE WOOD FLOATED.
  3. ALL EXPOSED EDGES TO HAVE 20X20 CHAMFERS.
  4. ALL STEEL BOLTS, NUTS AND ANCHOR BOLTS INTO CONCRETE SHALL BE STAINLESS STEEL GRADE 316L.
  5. ALL JOINTS AT ROOF PANELS TO BE SEALED WITH POLYURETHANE SEALANT.
  6. PIPE SUPPORTS TO BE PROVIDED UNDERNEATH ALL VALVES AND FLOW METERS OR AS INSTRUCTED BY ENGINEER ON SITE. H TO BE DETERMINED ON SITE.
  7. FINAL POSITION OF CHAMBER TO BE CONFIRMED BY ENGINEER ON SITE.

| VERSION / AMENDMENTS |      |             |          |
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Phone: + 27 (0) 12 842 8700  
pretoria@bigengroup.com



PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**NEW BOSPOORT / VAALKOP  
CROSS CONNECTION  
SHEET 1 OF 2**



0 50 100  
100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: 1:25 ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_

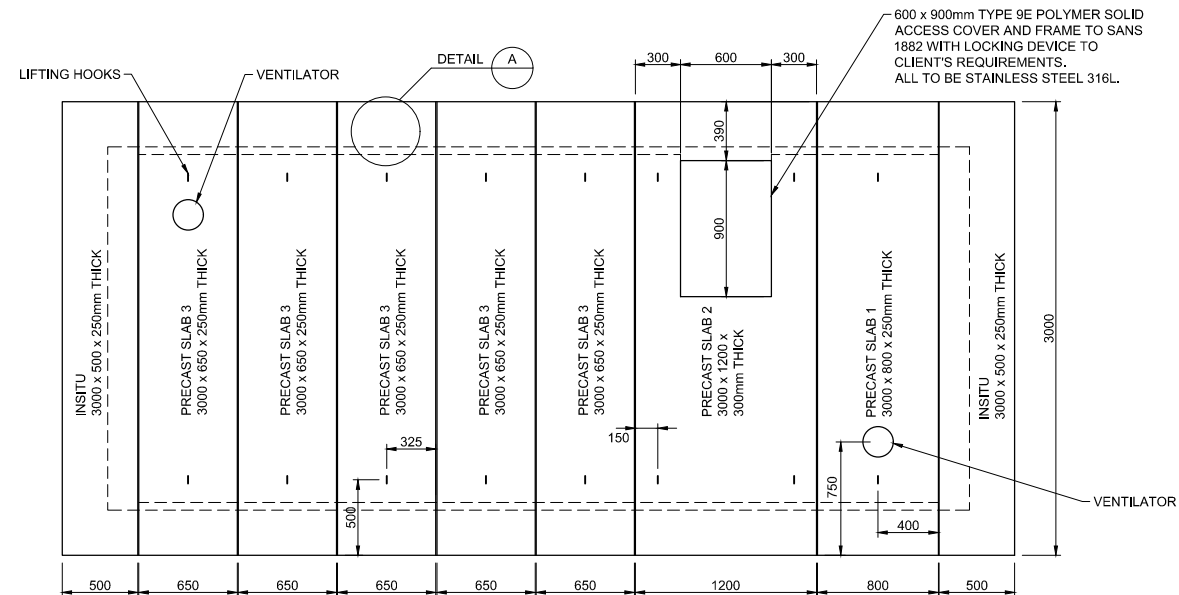
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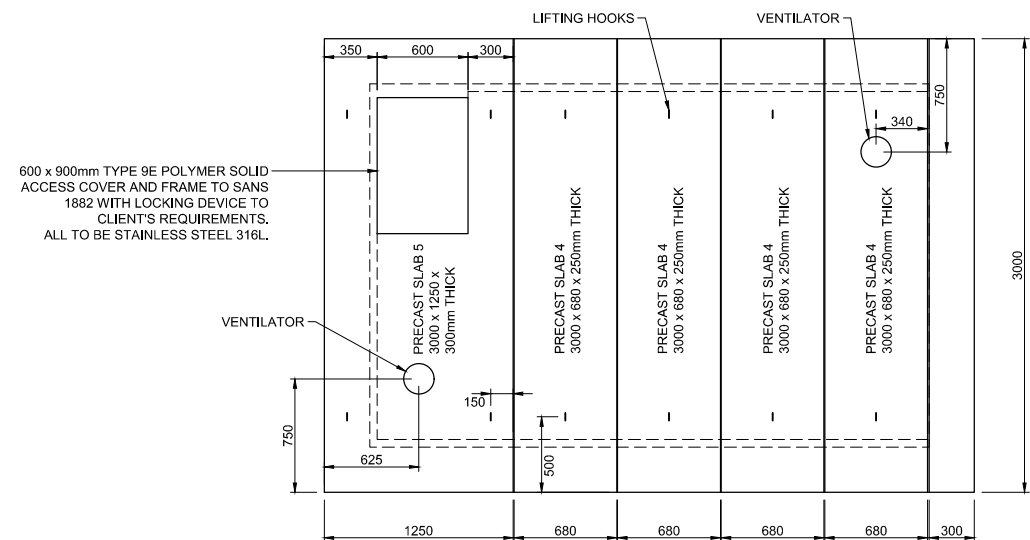
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| SURVEYED                     | DESIGNED  | C VAN ECK    |
| DRAWN                        | P DIKGALE | P DU PLESSIS |
| COORD SYSTEM                 | WG27      | DATE         |
| APPROVED ON BEHALF OF BIGEN: |           |              |
| DRAWING No.:                 | VERSION:  |              |
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1890.11.00.GZA.05.D023



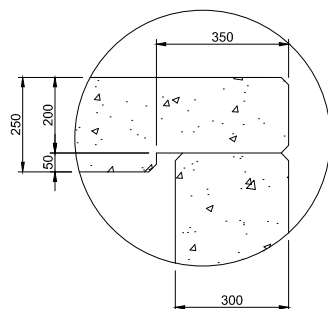


FLOW CONTROL CHAMBER



ISOLATING VALVE CHAMBER

PLAN ON ROOF SLABS  
SCALE 1:25



| VERSION / AMENDMENTS |      |             |          |
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| No.                  | DATE | DESCRIPTION | AUTH. BY |
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| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>          |  |
| DRAWING TITLE:<br><b>NEW BOSPOORT / VAALKOP<br/>CROSS CONNECTION<br/>SHEET 2 OF 2</b> |  |



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| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: 1:25          | ORIGINAL DRAWING SHEET SIZE: A1 |
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| SURVEYED                            | DESIGNED  | C VAN ECK    |
| DRAWN                               | P DIKGALE | P DU PLESSIS |
| COORD SYSTEM                        | WG27      | DATE         |
| APPROVED ON BEHALF OF BIGEN:        |           |              |
| DRAWING No.: 1890.11.00.GZA.05.D024 |           |              |
| VERSION: 1.0                        |           |              |

1890.11.00.GZA.05.D024



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                     | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                                                                                                                                                                                                                                                         | DIMENSIONS                                                        |
|---------------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
|                                                         |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                                                                                                                                                                                                                                                                     |                                                                   |
|                                                         |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                                                                                                                                                                                                                     |                                                                   |
| FLOW CONTROL INSTALLATION - DWG. 1890.11.00.GZA.05.D023 |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                                                                                                                                                                                                                     |                                                                   |
|                                                         | V-FC 1   | 2                                  | D023          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PU / PT  | SP                                                                                                                                                                                                                                                                  | <div><div>400Ø</div><div><div>1600</div></div></div>              |
|                                                         | V-FC 2   | 2                                  | D023          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          | FBE                  | FBE              | PU       | WEDGE GATE VALVE<br>HWO                                                                                                                                                                                                                                             | STANDARD                                                          |
|                                                         | V-FC 3   | 3                                  | D023          | 400          |               |                     |                     | FA          |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PU       | FLANGE ADAPTOR                                                                                                                                                                                                                                                      | STANDARD                                                          |
|                                                         | V-FC 4   | 2                                  | D023          | 400          | 400           |                     |                     | PE + RF     | F            |                    |                    |                           |                | ST / 6 / X42                                    | 2500/3          | EP                   | EP               | PU       | SP WITH RF AND RESTRAINING BOLTS                                                                                                                                                                                                                                    | <div><div>400Ø</div><div><div>320</div><div>390</div></div></div> |
|                                                         | V-FC 5   | 1                                  | D023          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PU       | DIRT TRAP                                                                                                                                                                                                                                                           | SEE DRAWING 1890.11.00.GZA.05.D010                                |
|                                                         | V-FC 6   | 1                                  | D023          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PU / PT  | SP                                                                                                                                                                                                                                                                  | <div><div>400Ø</div><div><div>3600</div></div></div>              |
|                                                         | V-FC 7   | 1                                  | D023          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          |                      |                  |          | SENSUS WPD MECHANICAL TURBINE FLOW<br>METER (OR SIMILAR APPROVED BY ENGINEER)                                                                                                                                                                                       | STANDARD                                                          |
|                                                         | V-FC 8   | 1                                  | D023          | 400          | 400           |                     |                     | PE + RF     | F            |                    |                    |                           |                | ST / 6 / X42                                    | 2500/3          | EP                   | EP               | PU       | SP WITH RF AND RESTRAINING BOLTS                                                                                                                                                                                                                                    | <div><div>400Ø</div><div><div>320</div><div>950</div></div></div> |
|                                                         | V-FC 9   | 1                                  | D023          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PU       | FLOW CONTROL VALVE (SINGER OR SIMILAR<br>APPROVED BY ENGINEER) INCLUDING:<br>• LIMIT SWITCH INDICATOR (SINGER MODEL<br>X129, OR SIMILAR APPROVED BY ENGINEER)<br>• LINEAR INDUCTIVE POSITION TRANSMITTER<br>(SINGER MODEL X156, OR SIMILAR<br>APPROVED BY ENGINEER) | STANDARD                                                          |
|                                                         | V-FC 10  | 1                                  | D023          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP               | PU       | SP                                                                                                                                                                                                                                                                  | <div><div>400Ø</div><div><div>350</div></div></div>               |
|                                                         | V-FC 11  | 1                                  | D023          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          |                      |                  |          | VAG, SLANTED SEAT TILTING DISK NON-RETURN<br>VALVE (OR SIMILAR APPROVED BY ENGINEER)                                                                                                                                                                                | STANDARD                                                          |

| VERSION / AMENDMENTS |         |                             |          |
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PROJECT TITLE:

BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES

DRAWING TITLE:

NEW BOSPOORT / VAALKOP  
CROSS CONNECTION  
FITTING LIST



ORIGINAL DRAWING SCALE: AS SHOWN

ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

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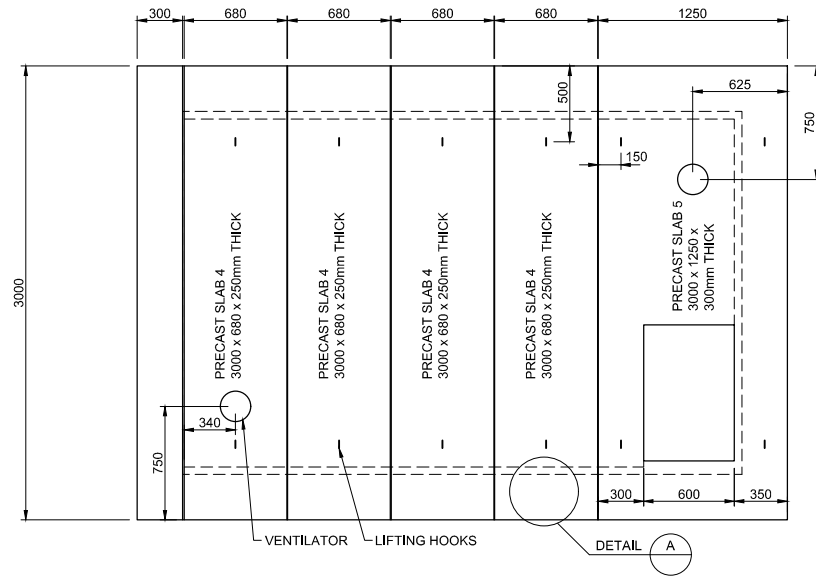
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| SURVEYED                            |             | DESIGNED   | C VAN ECK    |
| DRAWN                               | A STEENBERG |            | P DU PLESSIS |
| COORD SYSTEM                        | WG27        | DATE       | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN:        |             |            |              |
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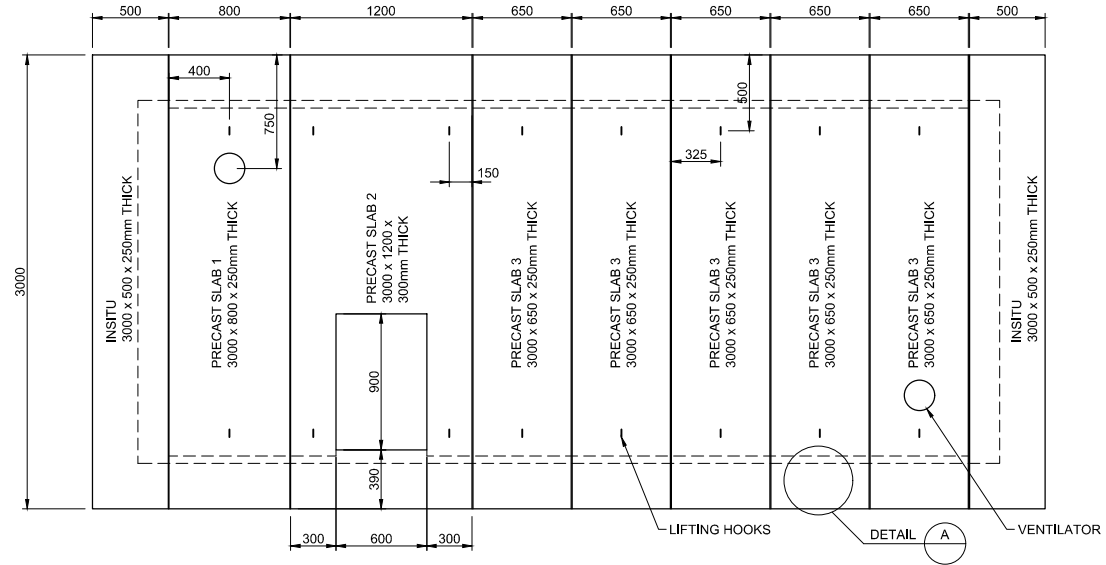






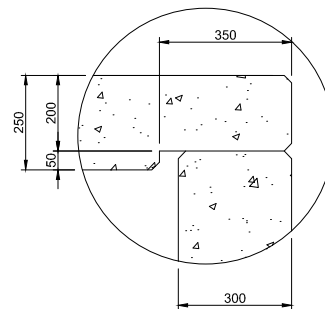


ISOLATING VALVE CHAMBER



FLOW CONTROL CHAMBER

PLAN ON ROOF SLABS  
SCALE 1:25



DETAIL A  
SCALE 1:10

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Pretoria

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pretoria@bigengroup.com



PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**NEW BOSPOORT RISING MAIN  
CONNECTION  
SHEET 2 OF 2**



|                                       |                                 |
|---------------------------------------|---------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: 1:25          | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                              |             |          |                |
|------------------------------|-------------|----------|----------------|
| SURVEYED                     |             | DESIGNED | C VAN ECK      |
| DRAWN                        | A STEENBERG |          | P DU PLESSIS   |
| COORD SYSTEM                 | WG27        | DATE     | JULY 2020      |
| APPROVED ON BEHALF OF BIGEN: |             |          |                |
| PRACTITIONER                 |             |          | REC'D REVIEWER |
|                              |             |          |                |
| DRAWING No.:                 |             | VERSION: |                |
| 1890.11.00.GZA.05.D026       |             | 1.0      |                |

1890.11.00.GZA.05.D026



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION | DIMENSIONS |
|-----|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|-------------|------------|
|     |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |             |            |
|     |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |             |            |

|                                                         |         |   |      |     |     |  |  |         |   |  |  |  |  |                |        |     |         |         |                                                                                                                                                                                                                                                                                                                      |                                                                   |
|---------------------------------------------------------|---------|---|------|-----|-----|--|--|---------|---|--|--|--|--|----------------|--------|-----|---------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| FLOW CONTROL INSTALLATION - DWG. 1890.11.00.GZA.05.D025 |         |   |      |     |     |  |  |         |   |  |  |  |  |                |        |     |         |         |                                                                                                                                                                                                                                                                                                                      |                                                                   |
|                                                         | S-FC 1  | 2 | D025 | 400 | 400 |  |  | F       | F |  |  |  |  | ST / 4,5 / X42 | 2500/3 | EP  | EP + DT | PU / PT | SP                                                                                                                                                                                                                                                                                                                   | <div><div>400Ø</div><div><div>1600</div></div></div>              |
|                                                         | S-FC 2  | 2 | D025 | 400 | 400 |  |  | F       | F |  |  |  |  |                | 2500/3 | FBE | FBE     | PU      | WEDGE GATE VALVE<br>HWO                                                                                                                                                                                                                                                                                              | STANDARD                                                          |
|                                                         | S-FC 3  | 3 | D025 | 400 |     |  |  | FA      |   |  |  |  |  |                | 2500/3 | EP  | EP      | PU      | FLANGE ADAPTOR                                                                                                                                                                                                                                                                                                       | STANDARD                                                          |
|                                                         | S-FC 4  | 2 | D025 | 400 | 400 |  |  | PE + RF | F |  |  |  |  | ST / 6 / X42   | 2500/3 | EP  | EP      | PU      | SP WITH RF AND RESTRAINING BOLTS                                                                                                                                                                                                                                                                                     | <div><div>400Ø</div><div><div>320</div><div>390</div></div></div> |
|                                                         | S-FC 5  | 1 | D025 | 400 | 400 |  |  | F       | F |  |  |  |  |                | 2500/3 | EP  | EP      | PU      | DIRT TRAP                                                                                                                                                                                                                                                                                                            | SEE DRAWING 1890.11.00.GZA.05.D010                                |
|                                                         | S-FC 6  | 1 | D025 | 400 | 400 |  |  | F       | F |  |  |  |  | ST / 4,5 / X42 | 2500/3 | EP  | EP + DT | PU / PT | SP                                                                                                                                                                                                                                                                                                                   | <div><div>400Ø</div><div><div>3600</div></div></div>              |
|                                                         | S-FC 7  | 1 | D025 | 400 | 400 |  |  | F       | F |  |  |  |  |                | 2500/3 |     |         |         | SENSUS WPD MECHANICAL TURBINE FLOW<br>METER (OR SIMILAR APPROVED BY ENGINEER)                                                                                                                                                                                                                                        | STANDARD                                                          |
|                                                         | S-FC 8  | 1 | D025 | 400 | 400 |  |  | PE + RF | F |  |  |  |  | ST / 6 / X42   | 2500/3 | EP  | EP      | PU      | SP WITH RF AND RESTRAINING BOLTS                                                                                                                                                                                                                                                                                     | <div><div>400Ø</div><div><div>320</div><div>950</div></div></div> |
|                                                         | S-FC 9  | 1 | D025 | 400 | 400 |  |  | F       | F |  |  |  |  |                | 2500/3 | EP  | EP      | PU      | FLOW CONTROL VALVE (SINGER OR SIMILAR<br>APPROVED BY ENGINEER) INCLUDING: <ul style="list-style-type: none"><li>LIMIT SWITCH INDICATOR (SINGER MODEL<br/>X129, OR SIMILAR APPROVED BY ENGINEER)</li><li>LINEAR INDUCTIVE POSITION TRANSMITTER<br/>(SINGER MODEL X156, OR SIMILAR<br/>APPROVED BY ENGINEER)</li></ul> | STANDARD                                                          |
|                                                         | S-FC 10 | 1 | D025 | 400 | 400 |  |  | F       | F |  |  |  |  | ST / 4,5 / X42 | 2500/3 | EP  | EP      | PU      | SP                                                                                                                                                                                                                                                                                                                   | <div><div>400Ø</div><div><div>350</div></div></div>               |
|                                                         | S-FC 11 | 1 | D025 | 400 | 400 |  |  | F       | F |  |  |  |  |                | 2500/3 |     |         |         | VAG, SLANTED SEAT TILTING DISK NON-RETURN<br>VALVE (OR SIMILAR APPROVED BY ENGINEER)                                                                                                                                                                                                                                 | STANDARD                                                          |

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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Phone: + 27 (0) 12 842 8700  
pretoria@bigengroup.com



PROJECT TITLE:

BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES

DRAWING TITLE:

NEW BOSPOORT RISING MAIN  
CONNECTION  
FITTING LIST



0100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: AS SHOWN

ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: DATE: CLIENT DRAWING No.: CLIENT REF No.:

SURVEYED: DESIGNED: C VAN ECK

DRAWN: A STEENBERG DESIGNED: P DU PLESSIS

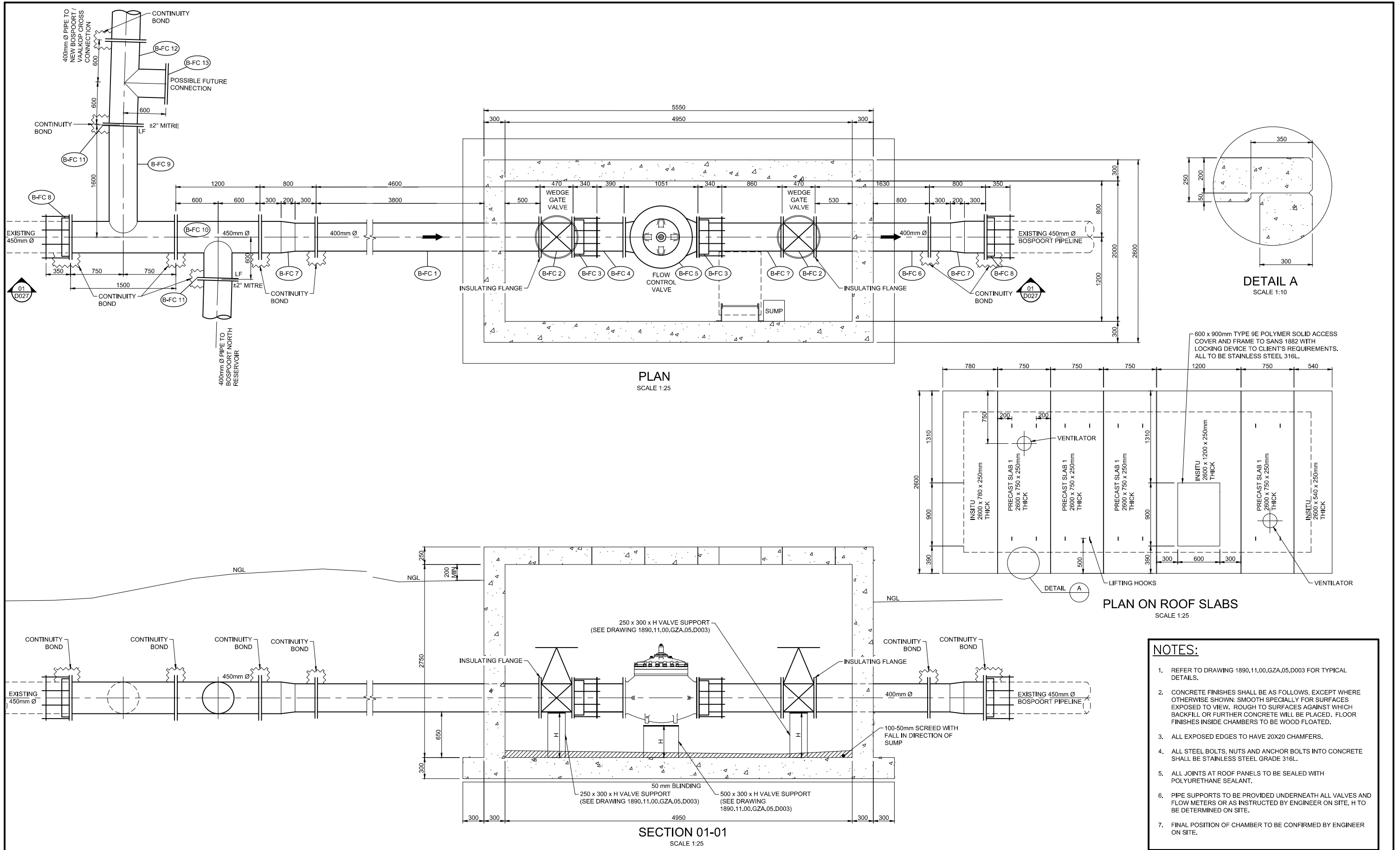
COORD SYSTEM: WG27 DATE: JULY 2020

APPROVED ON BEHALF OF BIGEN:

PROJECT OWNER: ENGINEER:

DRAWING No.: 1890.11.00.GZA.05.F025 VERSION: 1.0





| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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pretoria@bigengroup.com



PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**NEW FLOW CONTROL ON EXISTING  
BOSPOORT PIPELINE**



|                                       |                                 |
|---------------------------------------|---------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME: _____                           |                                 |
| DATE: _____                           |                                 |
| CLIENT DRAWING No.: _____             | CLIENT REF No.: _____           |

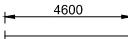
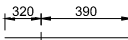
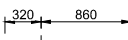
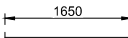
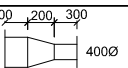
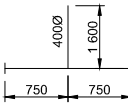
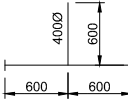
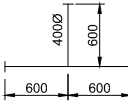
|                                     |             |                 |
|-------------------------------------|-------------|-----------------|
| SURVEYED                            | DESIGNED    | C VAN ECK       |
| DRAWN                               | A STEENBERG | P DU PLESSIS    |
| COORD SYSTEM                        | WG27        | DATE: JULY 2020 |
| APPROVED ON BEHALF OF BIGEN:        |             |                 |
| DRAWING No.: 1890.11.00.GZA.05.D027 |             |                 |
| VERSION: 1.0                        |             |                 |

1890.11.00.GZA.05.D027



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                                   | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT     | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                                                                                                                                                                                                                                                         | DIMENSIONS                                                                            |
|-----------------------------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-----------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                                       |          |                                    |               |              |               |                     |                     |                 |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                                                                                                                                                                                                                                                                     |                                                                                       |
|                                                                       |          |                                    |               |              |               |                     |                     |                 |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                                                                                                                                                                                                                     |                                                                                       |
| FLOW CONTROL INSTALLATION - DWG. 1890.11.00.GZA.05.D027 - RISING MAIN |          |                                    |               |              |               |                     |                     |                 |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                                                                                                                                                                                                                     |                                                                                       |
|                                                                       | B-FC 1   | 1                                  | D027          | 400          | 400           |                     |                     | F               | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PU / PT  | SP                                                                                                                                                                                                                                                                  |    |
|                                                                       | B-FC 2   | 2                                  | D027          | 400          | 400           |                     |                     | F               | F            |                    |                    |                           |                |                                                 | 2500/3          | FBE                  | FBE              | PU       | WEDGE GATE VALVE<br>HWO                                                                                                                                                                                                                                             | STANDARD                                                                              |
|                                                                       | B-FC 3   | 2                                  | D027          | 400          |               |                     |                     | FA              |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PU       | FLANGE ADAPTOR                                                                                                                                                                                                                                                      | STANDARD                                                                              |
|                                                                       | B-FC 4   | 1                                  | D027          | 400          | 400           |                     |                     | PE + RF         | F            |                    |                    |                           |                | ST / 6 / X42                                    | 2500/3          | EP                   | EP               | PU       | SP WITH RF AND RESTRAINING BOLTS                                                                                                                                                                                                                                    |    |
|                                                                       | B-FC 5   | 1                                  | D027          | 400          | 400           |                     |                     | F               | F            |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PU       | FLOW CONTROL VALVE (SINGER OR SIMILAR<br>APPROVED BY ENGINEER) INCLUDING:<br>• LIMIT SWITCH INDICATOR (SINGER MODEL<br>X129, OR SIMILAR APPROVED BY ENGINEER)<br>• LINEAR INDUCTIVE POSITION TRANSMITTER<br>(SINGER MODEL X156, OR SIMILAR APPROVED<br>BY ENGINEER) | STANDARD                                                                              |
|                                                                       | B-FC 6   | 1                                  | D027          | 400          | 400           |                     |                     | PE + RF         | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP               | PU       | SP WITH RF AND RESTRAINING BOLTS                                                                                                                                                                                                                                    |    |
|                                                                       | B-FC 7   | 1                                  | D027          | 400          | 400           |                     |                     | F               | F            |                    |                    |                           |                | ST / 4,5 / X42                                  | 2500/3          | EP                   | EP + DT          | PU / PT  | SP                                                                                                                                                                                                                                                                  |    |
|                                                                       | B-FC 8   | 2                                  | D027          | 450          | 400           |                     |                     | F               | F            |                    |                    |                           |                | ST / 6 / X42                                    | 2500/3          | EP                   | EP + DT          | PT       | CONCENTRIC REDUCER                                                                                                                                                                                                                                                  |    |
|                                                                       | B-FC 9   | 2                                  | D027          | 450          |               |                     |                     | RF + FA         |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PT       | FLANGE ADAPTOR, RF AND RESTAINING BOLTS.<br>RF TO BE WELDED 350mm AWAY FROM PLAIN<br>END ON EXISTING 450mm Ø STEEL PIPE                                                                                                                                             |                                                                                       |
|                                                                       | B-FC 10  | 1                                  | D027          | 450          | 450           | 400                 |                     | F               | F            | LF                 |                    |                           |                | 450Ø: ST / 8 / X42<br>400Ø: ST / 4,5 / X42      | 2500/3          | EP                   | EP + DT          | PT       | SPECIAL REDUCING TEE                                                                                                                                                                                                                                                |  |
|                                                                       | B-FC 11  | 1                                  | D027          | 450          | 450           | 400                 |                     | F               | F            | LF                 |                    |                           |                | 450Ø: ST / 8 / X42<br>400Ø: ST / 4,5 / X42      | 2500/3          | EP                   | EP + DT          | PT       | SPECIAL REDUCING TEE                                                                                                                                                                                                                                                |  |
|                                                                       | B-FC 12  | 2                                  | D027          | 400          |               |                     |                     | LF              |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PT       | LF                                                                                                                                                                                                                                                                  | STANDARD                                                                              |
|                                                                       | B-FC 13  | 1                                  | D027          | 400          | 400           | 400                 |                     | F               | F            | F                  |                    |                           |                | ST / 8 / X42                                    | 2500/3          | EP                   | EP + DT          | PT       | EQUAL TEE                                                                                                                                                                                                                                                           |  |
|                                                                       | B-FC 14  | 1                                  | D027          | 400          |               |                     |                     | BLANK<br>FLANGE |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PT       | BLANK FLANGE                                                                                                                                                                                                                                                        | STANDARD                                                                              |

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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Allan Cormack Street  
The Innovation Hub  
Pretoria

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pretoria@bigengroup.com



PROJECT TITLE:

BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES

DRAWING TITLE:

NEW FLOW CONTROL ON EXISTING  
BOSPOORT PIPELINE - FITTING LIST



ORIGINAL DRAWING SCALE: AS SHOWN  
ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_  
DATE: \_\_\_\_\_  
CLIENT DRAWING No.: \_\_\_\_\_  
CLIENT REF No.: \_\_\_\_\_

|              |             |          |              |
|--------------|-------------|----------|--------------|
| SURVEYED     |             | DESIGNED | C VAN ECK    |
| DRAWN        | A STEENBERG |          | P DU PLESSIS |
| COORD SYSTEM | WG27        | DATE     | JULY 2020    |

APPROVED ON BEHALF OF BIGEN:

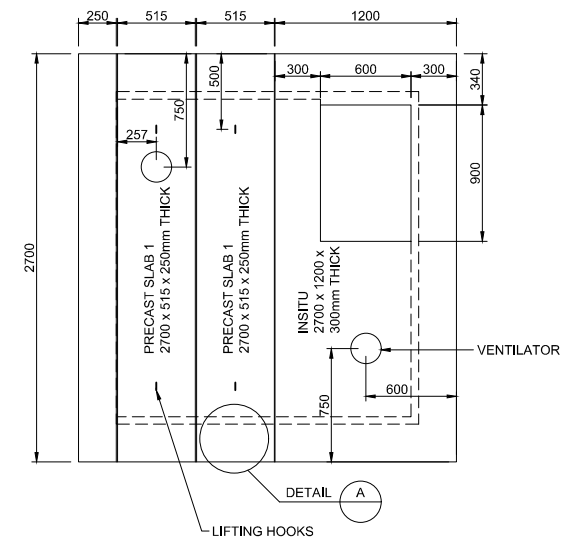
PROJECT OWNER

ENGINEER

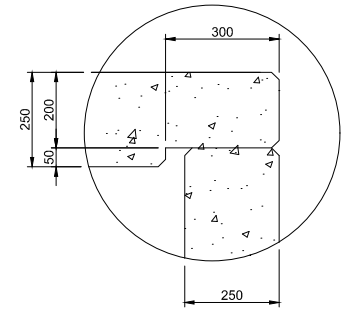
DRAWING No.: 1890.11.00.GZA.05.F027  
VERSION: 1.0

1890.11.00.GZA.05.F027

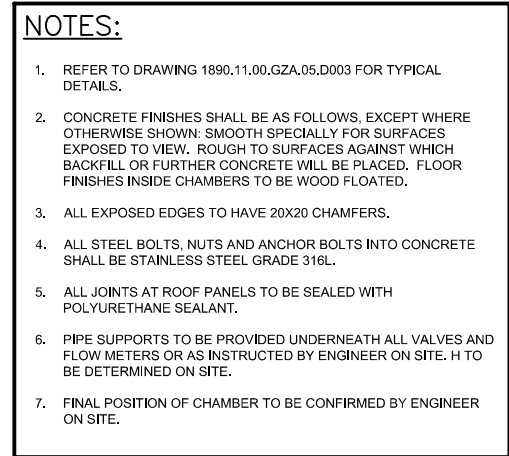




## PLAN ON ROOF SLABS

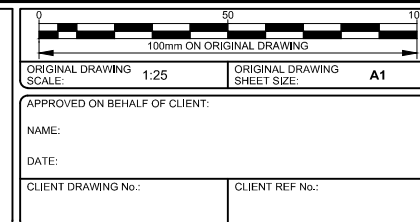


DETAIL A  
SCALE 1:10

[illegible]

**Rustenburg**  
Consulting Consortium

|                                                            |
|------------------------------------------------------------|
| PROJECT TITLE:                                             |
| <b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b> |
| DRAWING TITLE:                                             |
| <b>MAGALIES WATER CONNECTION<br/>CHAMBER</b>               |



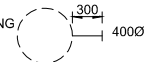
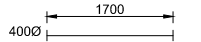
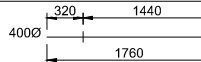
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| SURVEYED                     |  | DESIGNED    |  | C VAN ECK      |  |
| DRAWN                        |  | A STEENBERG |  | P DU PLESSIS   |  |
| COORD SYSTEM                 |  | WG27        |  | DATE JULY 2020 |  |
| APPROVED ON BEHALF OF BIGEN: |  |             |  |                |  |
| PROJECT NUMBER               |  | REVIEWER    |  |                |  |
| DRAWING No.:                 |  |             |  | VERSION:       |  |
| 1890.11.00.GZA.05.D028       |  |             |  | 1.0            |  |

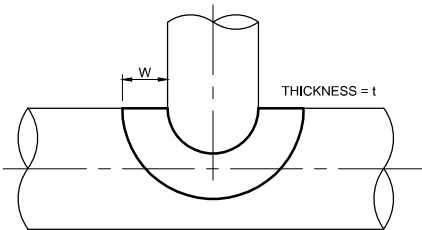
1890 11 00 GZA 05 D028



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                                           | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                                                                                                                        | DIMENSIONS                                                                          |
|-------------------------------------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-----------------|----------------------|------------------|----------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                                               |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                                                                                                                                    |                                                                                     |
|                                                                               |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                                                                                    |                                                                                     |
| MAGALIES WATER CONNECTION CHAMBER - DWG. 1890.11.00.GZA.05.D028 - RISING MAIN |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                                                                                    |                                                                                     |
|                                                                               | IV 1     | 1                                  | D028          | 400          | 400           |                     |                     | SW          | F            |                    |                    |                           |                | ST / 4.5 / X42                                  | 2500/3          | CML                  | EP               | PT       | STUB TO BE WELDED ONTO EXISTING PIPE,<br>WITH COLLAR PLATE (W=260mm; t=6mm)<br>LINING TO MATCH EXISTING 1000 Ø PIPE (CML<br>OR EP) |  |
|                                                                               | IV 2     | 1                                  | D028          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                | ST / 4.5 / X42                                  | 2500/3          | EP                   | EP + DT          | PU / PT  | SP                                                                                                                                 |  |
|                                                                               | IV 3     | 1                                  | D028          | 400          | 400           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 2500/3          | FBE                  | FBE              | PU       | WEDGE GATE VALVE<br>HWO                                                                                                            | STANDARD                                                                            |
|                                                                               | IV 4     | 1                                  | D028          | 400          |               |                     |                     | FA          |              |                    |                    |                           |                |                                                 | 2500/3          | EP                   | EP               | PU       | FLANGE ADAPTOR                                                                                                                     | STANDARD                                                                            |
|                                                                               | IV 5     | 1                                  | D028          | 400          | 400           |                     |                     | PE + RF     | F            |                    |                    |                           |                | ST / 6 / X42                                    | 2500/3          | CML                  | EP + DT          | PU / PT  | SP WITH RF AND RESTRAINING BOLTS                                                                                                   |  |



TYPICAL COLLAR PLATE  
NTS

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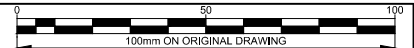
PROJECT TITLE:

BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES

DRAWING TITLE:

MAGALIES WATER CONNECTION  
CHAMBER  
FITTING LIST



  
100mm ON ORIGINAL DRAWING

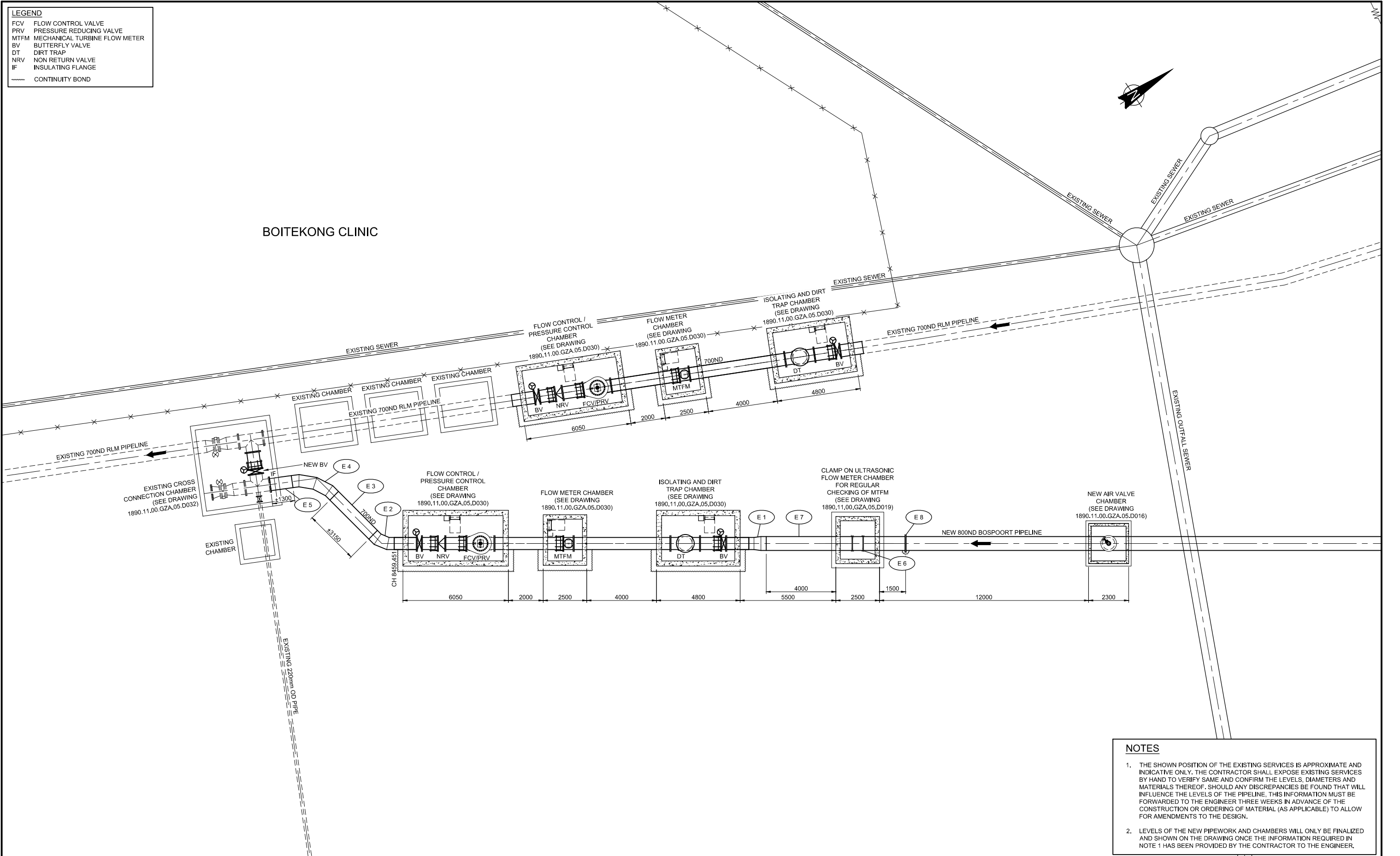
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NAME:DATE:CLIENT DRAWING No.:CLIENT REF No.:

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| SURVEYED                            |             | DESIGNED     | C VAN ECK    |
| DRAWN                               | A STEENBERG |              | P DU PLESSIS |
| COORD SYSTEM                        | WG27        | DATE         | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN:        |             |              |              |
| DRAWING No.: 1890.11.00.GZA.05.F028 |             | VERSION: 1.0 |              |





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PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**CONNECTION AT END POINT  
LAYOUT PLAN**



0 50 100  
100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: 1:100 ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_

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CLIENT DRAWING No.: \_\_\_\_\_ CLIENT REF No.: \_\_\_\_\_

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| SURVEYED                     |             | DESIGNED | C VAN ECK    |
| DRAWN                        | A STEENBERG |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27        | DATE     | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN: |             |          |              |
| DRAWING No.:                 |             | REVIEWER | VERSION:     |
| 1890.11.00.GZA.05.U002       |             |          | 1.0          |

1890.11.00.GZA.05.U002



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                               | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE         | CORROSION PROTECTION |                  |          | DESCRIPTION                                                       | DIMENSIONS |
|-------------------------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-------------------------|----------------------|------------------|----------|-------------------------------------------------------------------|------------|
|                                                                   |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                         | FACTORY              |                  | SITE APP |                                                                   |            |
|                                                                   |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                         | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                   |            |
| END POINT CONNECTION - DWG. 1890.11.00.GZA.05.U002 - GRAVITY MAIN |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                         |                      |                  |          |                                                                   |            |
|                                                                   | E 1      | 1                                  | U002          | 800          | 700           |                     |                     | SW          | SW           |                    |                    |                           |                | ST / 8 / X42                                    |                         | CML                  | EP + DT          |          | CONCENTRIC REDUCER                                                |            |
|                                                                   | E 2      | 1                                  | U002          | 700          | 700           |                     |                     | SW          | SW           |                    |                    | 45                        | 1420           | ST / 8 / X42                                    |                         | EP                   | EP + DT          |          | MEDIUM RADIUS BEND                                                |            |
|                                                                   | E 3      | 1                                  | U002          | 700          | 700           |                     |                     | SW          | SW           |                    |                    |                           |                | ST / 8 / X42                                    |                         | EP                   | EP + DT          |          | SP, CTS<br>EXACT LENGTH TO BE DETERMINED ON SITE BY<br>CONTRACTOR |            |
|                                                                   | E 4      | 1                                  | U002          | 700          | 700           |                     |                     | SW          | SW           |                    |                    | 53                        | 1420           | ST / 8 / X42                                    |                         | EP                   | EP + DT          |          | MEDIUM RADIUS BEND                                                |            |
|                                                                   | E 5      | 1                                  | U002          | 700          | 700           |                     |                     | SW          | F            |                    |                    |                           |                | ST / 8 / X42                                    | TO<br>MATCH<br>EXISTING | EP                   | EP + DT          | PU       | SP, CTS<br>EXACT LENGTH TO BE DETERMINED ON SITE BY<br>CONTRACTOR |            |
|                                                                   | E 6      | 1                                  | U002          | 800          |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                         |                      |                  |          | CLAMP ON ULTRASONIC FLOW METER                                    | STANDARD   |
|                                                                   | E 7      | 1                                  | U002          | 800          | 800           |                     |                     | SW          | F            |                    |                    |                           |                | ST / 8 / X42                                    | 1600/3                  | EP                   | EP + DT          | PT       | SP                                                                |            |
|                                                                   | E 8      | 1                                  | U002          | 800          |               |                     |                     |             |              |                    |                    |                           |                |                                                 | 1600/3                  | EP                   | EP               | PT       | LF                                                                | STANDARD   |

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**Rustenburg**  
Consulting Consortium

PROJECT TITLE:

**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:

**CONNECTION AT END POINT  
FITTING LIST**

**Rustenburg**  
Water Services Trust

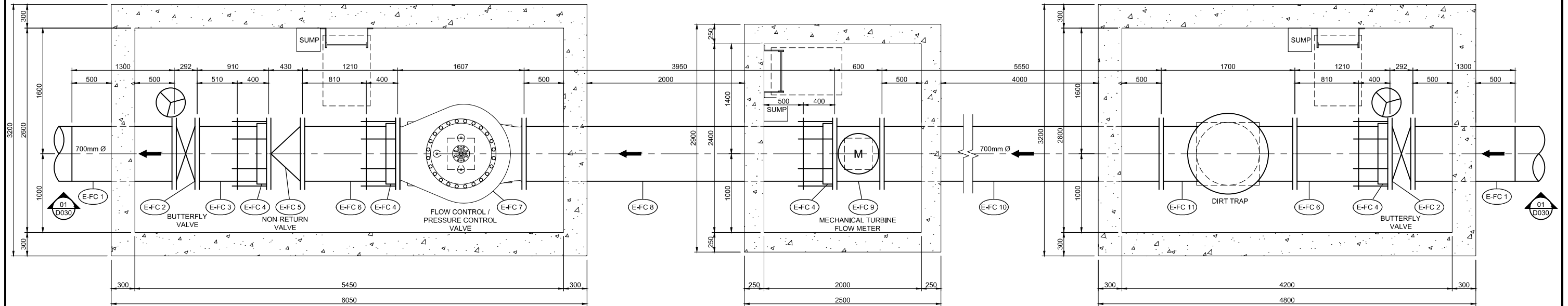
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APPROVED ON BEHALF OF CLIENT:

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| SURVEYED                            |             | DESIGNED     | C VAN ECK    |
| DRAWN                               | A STEENBERG |              | P DU PLESSIS |
| COORD SYSTEM                        | WG27        | DATE         | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN:        |             |              |              |
| DRAWING No.: 1890.11.00.GZA.05.F002 |             | VERSION: 1.0 |              |



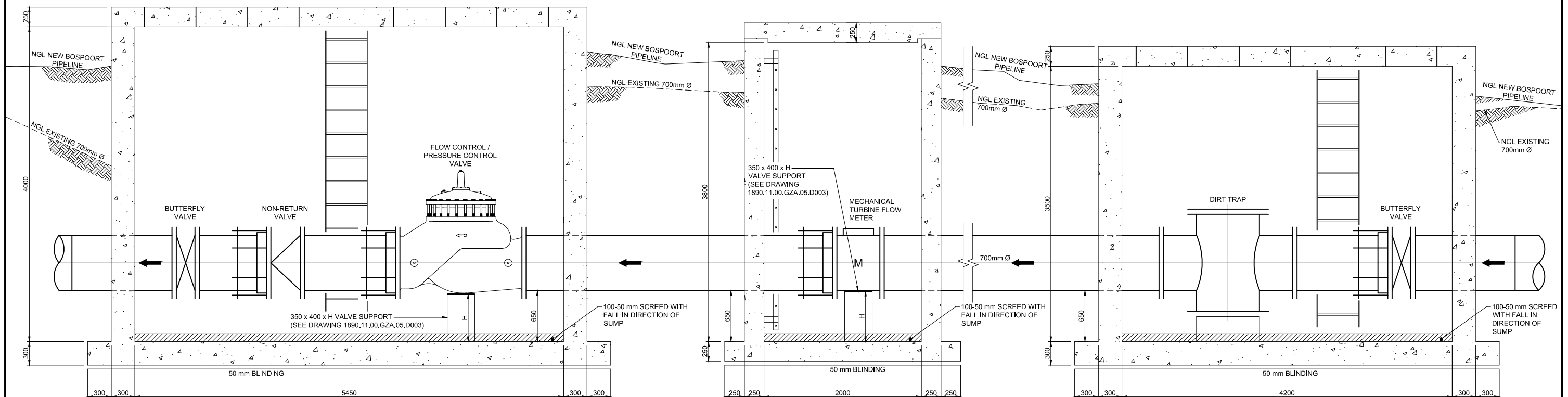


PLAN  
SCALE 1:25

FLOW CONTROL CHAMBER

FLOW METER CHAMBER

ISOLATING VALVE CHAMBER



SECTION 01-01  
SCALE 1:25

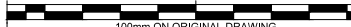
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| PROJECT TITLE:<br><b>BOSPOORT WATER SUPPLY SCHEME<br/>BOSPOORT PIPELINES</b>                                                         |
| DRAWING TITLE:<br><b>END POINT CONNECTION - ISOLATING,<br/>FLOW METER &amp; PRESSURE CONTROL<br/>CHAMBERS (2x): PLAN AND SECTION</b> |

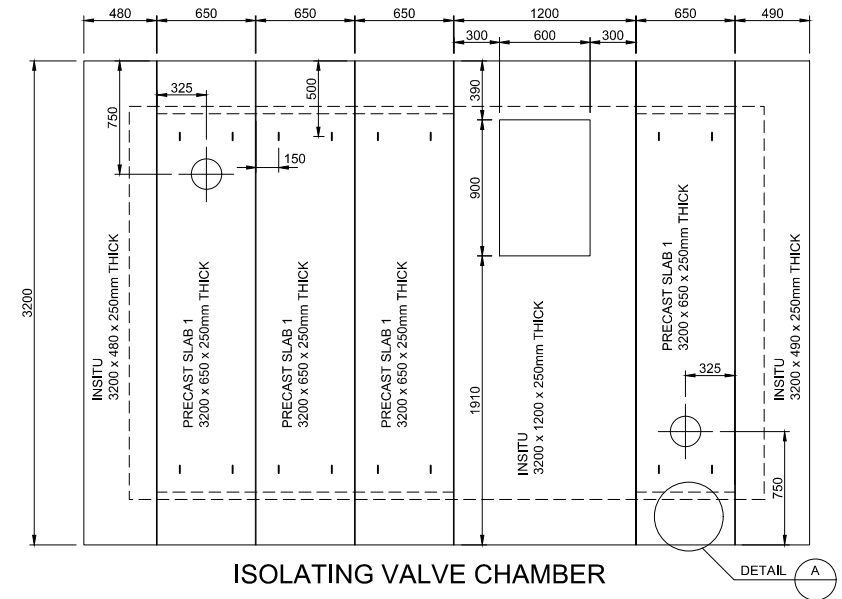
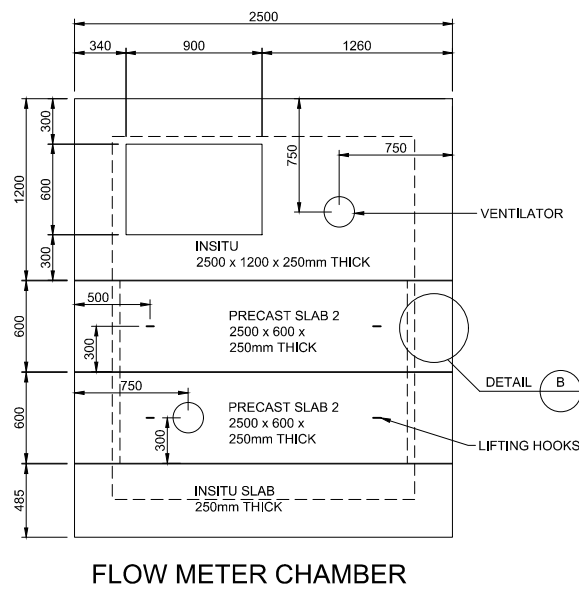
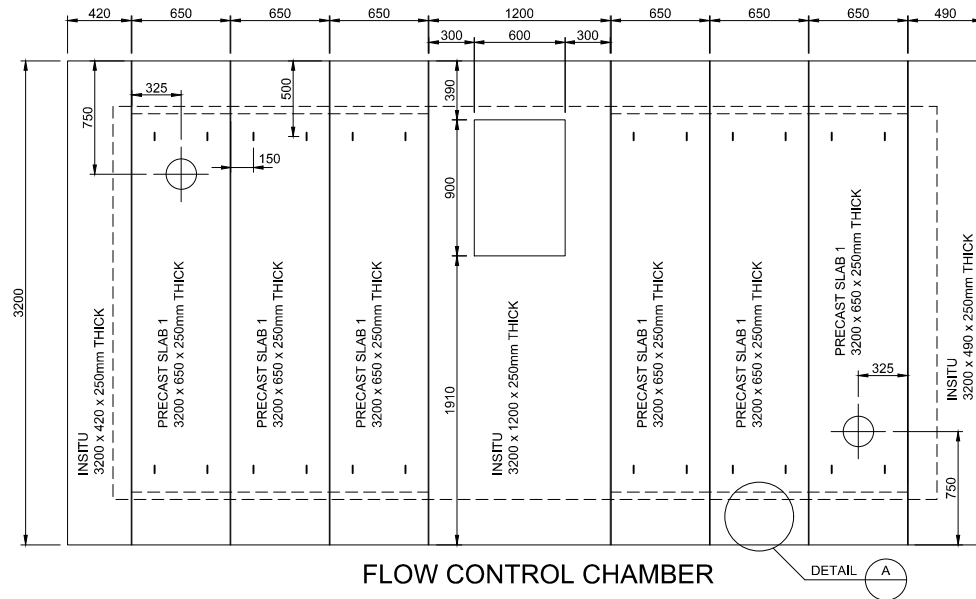


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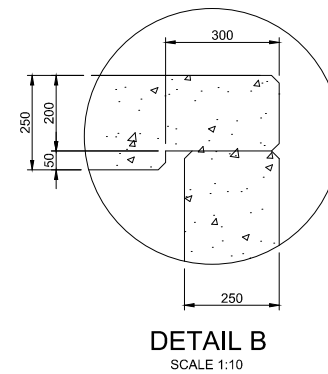
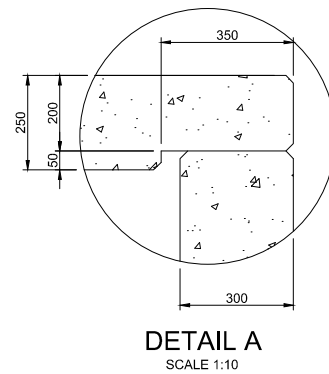
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| SURVEYED                     | DESIGNED    | C VAN ECK       |
| DRAWN                        | A STEENBERG | P DU PLESSIS    |
| COORD SYSTEM                 | WG27        | DATE: JULY 2020 |
| APPROVED ON BEHALF OF BIGEN: |             |                 |
| FUNCTION OWNER               | ENGINEER    |                 |
| DRAWING No.:                 | VERSION:    |                 |
| 1890.11.00.GZA.05.D030       | 1.0         |                 |

1890.11.00.GZA.05.D030





PLAN ON ROOF SLABS  
SCALE 1:25



- NOTES:**
- REFER TO DRAWING 1890.11.00.GZA.05.D003 FOR TYPICAL DETAILS.
  - CONCRETE FINISHES SHALL BE AS FOLLOWS, EXCEPT WHERE OTHERWISE SHOWN: SMOOTH SPECIALLY FOR SURFACES EXPOSED TO VIEW, ROUGH TO SURFACES AGAINST WHICH BACKFILL OR FURTHER CONCRETE WILL BE PLACED. FLOOR FINISHES INSIDE CHAMBERS TO BE WOOD FLOATED.
  - ALL EXPOSED EDGES TO HAVE 20X20 CHAMFERS.
  - ALL STEEL BOLTS, NUTS AND ANCHOR BOLTS INTO CONCRETE SHALL BE STAINLESS STEEL GRADE 316L.
  - ALL JOINTS AT ROOF PANELS TO BE SEALED WITH POLYURETHANE SEALANT.
  - PIPE SUPPORTS TO BE PROVIDED UNDERNEATH ALL VALVES AND FLOW METERS OR AS INSTRUCTED BY ENGINEER ON SITE. H TO BE DETERMINED ON SITE.
  - FINAL POSITION OF CHAMBER TO BE CONFIRMED BY ENGINEER ON SITE.

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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**END POINT CONNECTION: ISOLATING,  
FLOW METER & PRESSURE CONTROL  
CHAMBERS (2x): ROOF PLAN & DETAILS**



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100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: AS SHOWN ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

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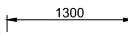
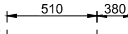
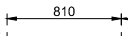
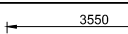
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| SURVEYED                            | DESIGNED     | C VAN ECK       |
| DRAWN                               | A STEENBERG  | P DU PLESSIS    |
| COORD SYSTEM                        | WG27         | DATE: JULY 2020 |
| APPROVED ON BEHALF OF BIGEN:        |              |                 |
| ENGINEER                            | ENGINEER     |                 |
| DRAWING No.: 1890.11.00.GZA.05.D031 | VERSION: 1.0 |                 |

1890.11.00.GZA.05.D031



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                                                                         | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE | CORROSION PROTECTION |                  |          | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | DIMENSIONS                                                                                 |
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|                                                                                                             |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | FACTORY              |                  | SITE APP |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                            |
|                                                                                                             |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                            |
| PRESSURE CONTROL INSTALLATION - DWG. 1890.11.00.GZA.05.D030 - BOSPOORT GRAVITY MAIN & EXISTING RLM PIPELINE |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                 |                      |                  |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                            |
|                                                                                                             | E-FC 1   | 2                                  | D030          | 700          | 700           |                     |                     | PE          | F            |                    |                    |                           |                | ST / 6 / X42                                    | 1600/3          |                      | EP + DT          | PU       | SP<br>LINING TO MATCH THE EXISTING PIPE<br>(EP OR CML)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 700Ø    |
|                                                                                                             | E-FC 2   | 2                                  | D030          | 700          | 700           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 1600/3          | FBE                  | FBE              | PU       | BUTTERFLY VALVE<br>RH & RO WITH GEARING TO ENSURE VALVE<br>CLOSURE EXCEEDS 4 MINUTES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | STANDARD                                                                                   |
|                                                                                                             | E-FC 3   | 1                                  | D030          | 700          | 700           |                     |                     | F           | PE + RF      |                    |                    |                           |                | ST / 8 / X42                                    | 1600/3          | EP                   | EP               | PU       | SP WITH RF AND RESTRAINING BOLTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 700Ø    |
|                                                                                                             | E-FC 4   | 4                                  | D030          | 700          |               |                     |                     | FA          |              |                    |                    |                           |                |                                                 | 1600/3          | EP                   | EP               | PU       | FLANGE ADAPTOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | STANDARD                                                                                   |
|                                                                                                             | E-FC 5   | 1                                  | D030          | 700          | 700           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 1600/3          | EP                   | EP               | PU       | VAG SLANTED SEAT TILTING DISK NON-RETURN<br>VALVE (OR SIMILAR APPROVED BY ENGINEER)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | STANDARD                                                                                   |
|                                                                                                             | E-FC 6   | 2                                  | D030          | 700          | 700           |                     |                     | F           | PE + RF      |                    |                    |                           |                | ST / 8 / X42                                    | 1600/3          | EP                   | EP               | PU       | SP WITH RF AND RESTRAINING BOLTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 700Ø    |
|                                                                                                             | E-FC 7   | 1                                  | D030          | 700          | 700           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 1600/3          | EP                   | EP               | PU       | BOSPOORT GRAVITY MAIN: PRESSURE<br>REDUCING/CONTROL VALVE (SINGER OR<br>SIMILAR APPROVED BY ENGINEER) INCLUDING<br>• LIMIT SWITCH INDICATOR (SINGER MODEL<br>X129, OR SIMILAR APPROVED BY ENGINEER)<br>• LINEAR INDUCTIVE POSITION TRANSMITTER<br>(SINGER MODEL X156, OR SIMILAR<br>APPROVED BY ENGINEER)<br><br>EXISING RLM PIPELINE: PRESSURE<br>REDUCING/CONTROL VALVE (SINGER OR<br>SIMILAR APPROVED BY ENGINEER) INCLUDING<br>• LIMIT SWITCH INDICATOR (SINGER MODEL<br>X129, OR SIMILAR APPROVED BY ENGINEER)<br>• LINEAR INDUCTIVE POSITION TRANSMITTER<br>(SINGER MODEL X156, OR SIMILAR<br>APPROVED BY ENGINEER) | STANDARD                                                                                   |
|                                                                                                             | E-FC 8   | 1                                  | D030          | 700          | 700           |                     |                     | F           | PE + RF      |                    |                    |                           |                | ST / 8 / X42                                    | 1600/3          | EP                   | EP + DT          | PU       | SP WITH RF AND RESTRAINING BOLTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 700Ø  |
|                                                                                                             | E-FC 9   | 1                                  | D030          | 700          | 700           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | 1600/3          | EP                   | EP               | PU       | SENSUS MECHANICAL TURBINE FLOW METER<br>(OR SIMILAR APPROVED BY ENGINEER)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | STANDARD                                                                                   |
|                                                                                                             | E-FC 10  | 1                                  | D030          | 700          | 700           |                     |                     | F           | F            |                    |                    |                           |                | ST / 6 / X42                                    | 1600/3          | EP                   | EP + DT          | PU       | SP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 700Ø  |
|                                                                                                             | E-FC 11  | 1                                  | D030          | 700          | 700           |                     |                     | F           | F            |                    |                    |                           |                | ST / 6 / X42                                    | 1600/3          | EP                   | EP               | PU       | DIRT TRAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | SEE DRAWING 1890.11.00.GZA.05.D010                                                         |

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PROJECT TITLE:

BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES

DRAWING TITLE:

END POINT CONNECTION  
PRESSURE CONTROL CHAMBERS  
FITTING LIST



ORIGINAL DRAWING SCALE: AS SHOWNORIGINAL DRAWING SHEET SIZE: A1

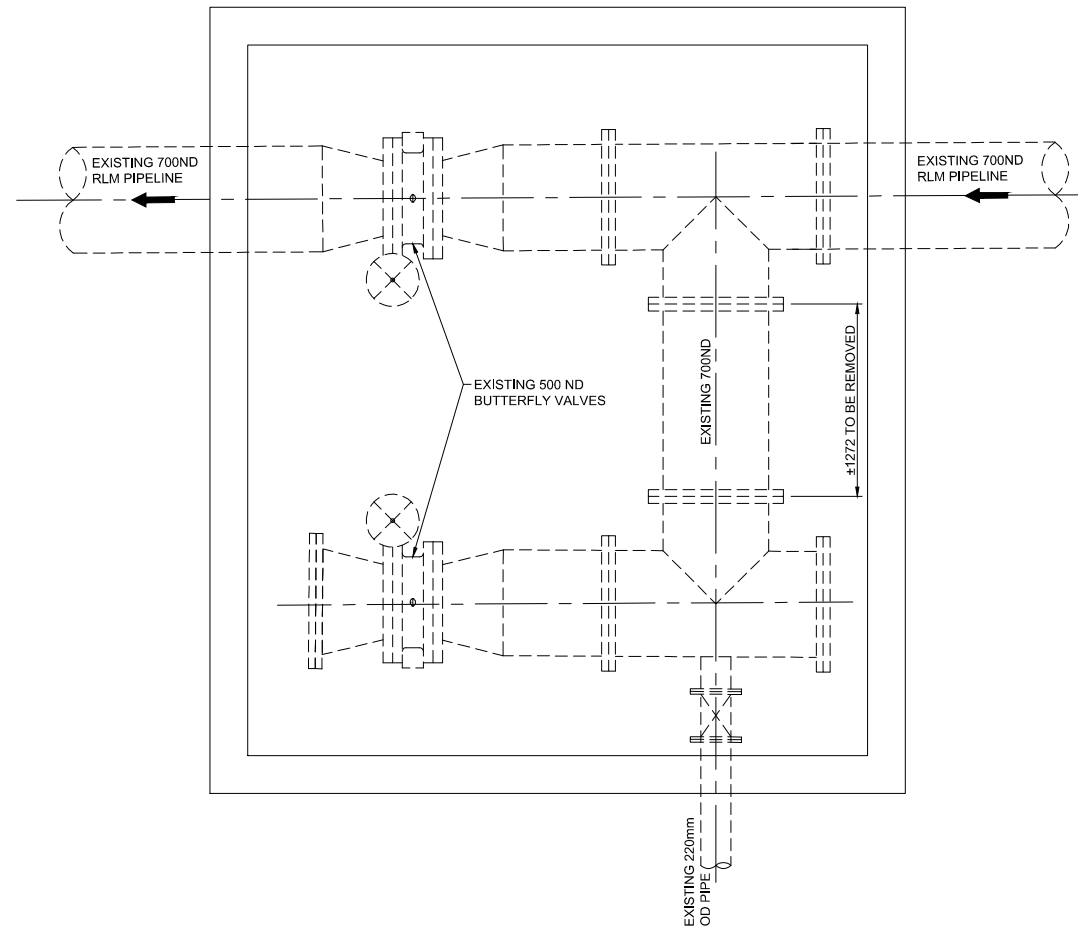
APPROVED ON BEHALF OF CLIENT:

NAME:DATE:CLIENT DRAWING No.:CLIENT REF No.:

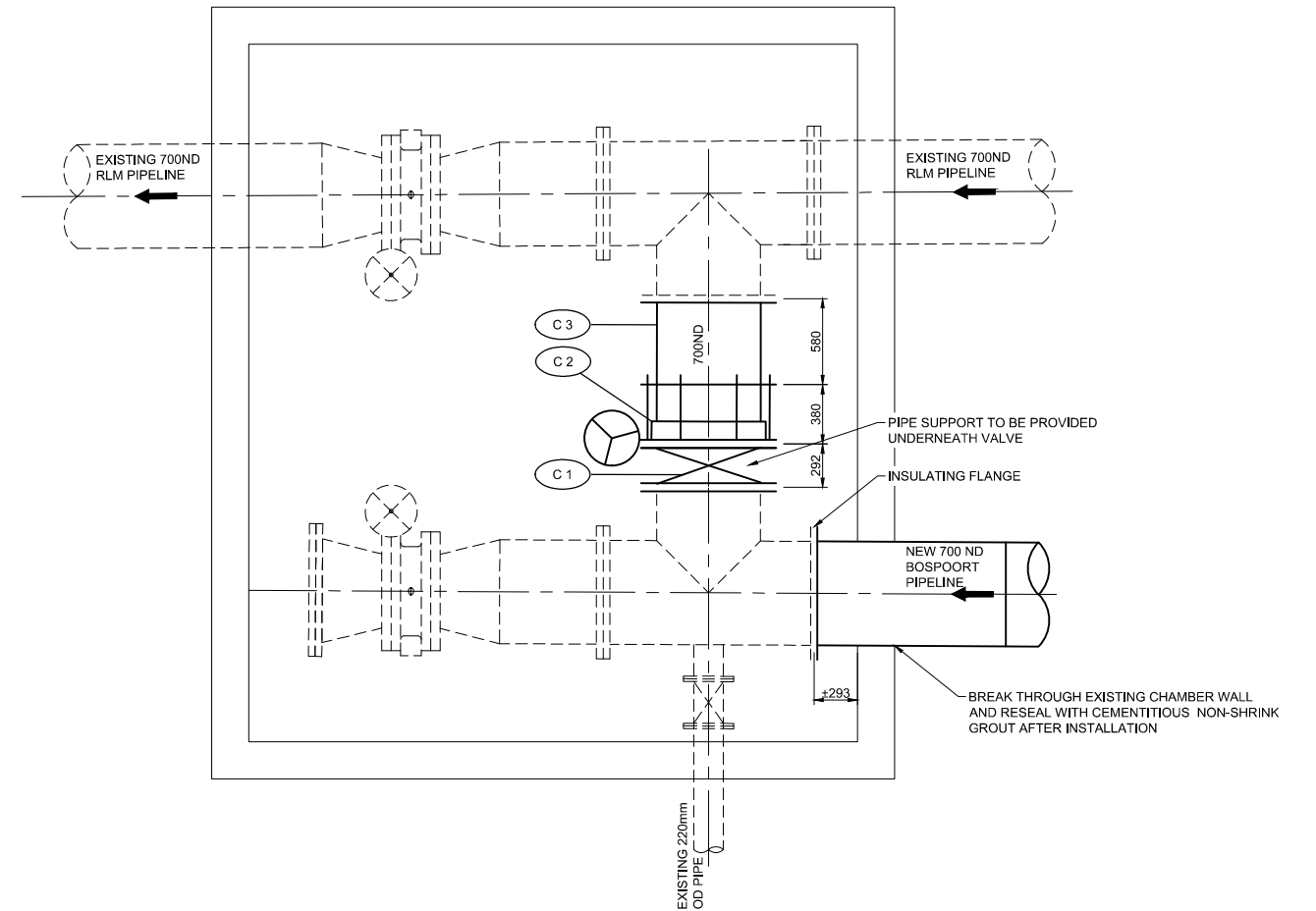
|                                     |             |              |              |
|-------------------------------------|-------------|--------------|--------------|
| SURVEYED                            |             | DESIGNED     | C VAN ECK    |
| DRAWN                               | A STEENBERG |              | P DU PLESSIS |
| COORD SYSTEM                        | WG27        | DATE         | JULY 2020    |
| APPROVED ON BEHALF OF BIGEN:        |             |              |              |
| DRAWING No.: 1890.11.00.GZA.05.F030 |             | VERSION: 1.0 |              |

1890.11.00.GZA.05.F030





PLAN - EXISTING PIPEWORK  
SCALE 1:25



PLAN - NEW PIPEWORK  
SCALE 1:25

**NOTE:**  
EXTERIOR AND INTERIOR CONDITION OF EXISTING PIPEWORK TO BE INSPECTED BY CONTRACTOR AND ENGINEER AT START OF CONSTRUCTION CONTRACT TO DETERMINE EXTENT OF REFURBISHMENT OR POSSIBLE REPLACEMENT.

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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pretoria@bigengroup.com



PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**END POINT CONNECTION  
EXISTING CROSS CONNECTION CHAMBER**



0 50 100  
100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: 1:25 ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME: \_\_\_\_\_  
DATE: \_\_\_\_\_  
CLIENT DRAWING No.: \_\_\_\_\_ CLIENT REF No.: \_\_\_\_\_

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|------------------------------|-------------|----------|--------------|
| SURVEYED                     |             | DESIGNED | C VAN ECK    |
| DRAWN                        | A STEENBERG |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27        | DATE     | AUGUST 2020  |
| APPROVED ON BEHALF OF BIGEN: |             |          |              |
| FUNCTION OWNER:              |             | REVIEWER |              |
|                              |             |          |              |
| DRAWING No.:                 |             |          | VERSION:     |
| 1890.11.00.GZA.05.D032       |             |          | 1.0          |

1890.11.00.GZA.05.D032



NOTE:

REFER TO DRAWING 1890.11.00.GZA.05.A002 FOR NOTES.

| REV                                                                                    | ITEM NO. | TOTAL<br>(FOR ONE<br>INSTALLATION) | REFER<br>DRG. | DIA.<br>LEFT | DIA.<br>RIGHT | DIA.<br>BRANCH<br>1 | DIA.<br>BRANCH<br>2 | END<br>LEFT | END<br>RIGHT | END<br>BRANCH<br>1 | END<br>BRANCH<br>2 | BEND<br>ANGLE<br>(DEGREE) | BEND<br>RADIUS | MATERIAL / WT<br>OR PIPE CLASS /<br>STEEL GRADE | FLANGE<br>TABLE         | CORROSION PROTECTION |                  |          | DESCRIPTION                                                                                   | DIMENSIONS                                                                                                                |
|----------------------------------------------------------------------------------------|----------|------------------------------------|---------------|--------------|---------------|---------------------|---------------------|-------------|--------------|--------------------|--------------------|---------------------------|----------------|-------------------------------------------------|-------------------------|----------------------|------------------|----------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
|                                                                                        |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                         | FACTORY              |                  | SITE APP |                                                                                               |                                                                                                                           |
|                                                                                        |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                         | INTERNAL<br>LINING   | EXTERNAL<br>COAT |          |                                                                                               |                                                                                                                           |
| END POINT CONNECTION - EXISTING CROSS CONNECTION CHAMBER - DWG. 1890.11.00.GZA.05.D032 |          |                                    |               |              |               |                     |                     |             |              |                    |                    |                           |                |                                                 |                         |                      |                  |          |                                                                                               |                                                                                                                           |
|                                                                                        | C 1      | 1                                  | U002          | 700          | 700           |                     |                     | F           | F            |                    |                    |                           |                |                                                 | TO<br>MATCH<br>EXISTING | FBE                  | FBE              | PU       | BUTTERFLY VALVE<br>HWO, LH & LO GEARBOX, GEARING TO ENSURE<br>VALVE CLOSURE EXCEEDS 4 MINUTES | STANDARD                                                                                                                  |
|                                                                                        | C 2      | 1                                  | U002          | 700          |               |                     |                     | FA          |              |                    |                    |                           |                |                                                 | TO<br>MATCH<br>EXISTING | EP                   | EP               | PU       | FA                                                                                            | STANDARD                                                                                                                  |
|                                                                                        | C 3      | 1                                  | U002          | 700          | 700           |                     |                     | PE + RF     | F            |                    |                    |                           |                | ST / 8 / X42                                    | TO<br>MATCH<br>EXISTING | EP                   | EP               | PU       | SP WITH RF AND RESTRAINING BOLTS                                                              | <div><div><div>380</div><div>580</div></div><div>700Ø</div></div> <div>LENGTH TO BE CONFIRMED ON SITE BY CONTRACTOR</div> |

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
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PROJECT TITLE:

BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES

DRAWING TITLE:

END POINT CONNECTION  
EXISTING CROSS CONNECTION CHAMBER  
FITTING LIST



050100

100mm ON ORIGINAL DRAWING

ORIGINAL DRAWING SCALE: AS SHOWN

ORIGINAL DRAWING SHEET SIZE: A1

APPROVED ON BEHALF OF CLIENT:

NAME:

DATE:

CLIENT DRAWING No.:

CLIENT REF No.:

SURVEYED

DESIGNED

C VAN ECK

DRAWN

A STEENBERG

P DU PLESSIS

COORD SYSTEM

WG27

DATE

AUGUST 2020

APPROVED ON BEHALF OF BIGEN:

PRACITIONER:

ENGINEER:

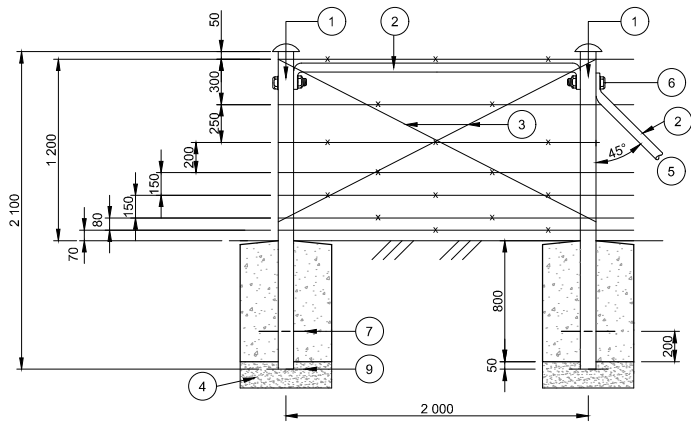
DRAWING No.:

1890.11.00.GZA.05.F032

VERSION:

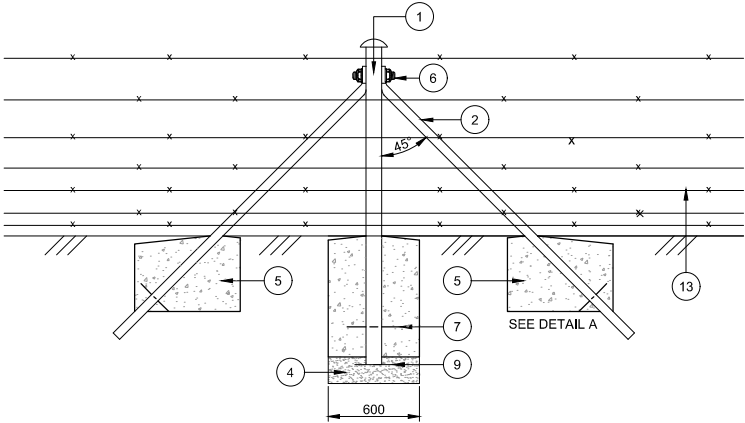
1.0





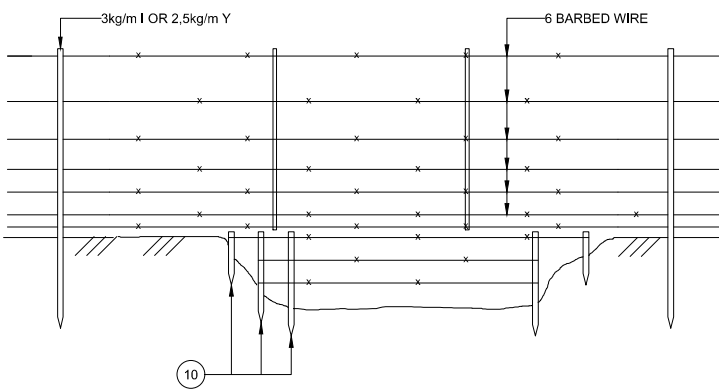
CORNER POST

SCALE 1:25



STRAINING POST (400 m C/C MAX)

SCALE 1:25



ACROSS CHANNELS AND TRENCHES

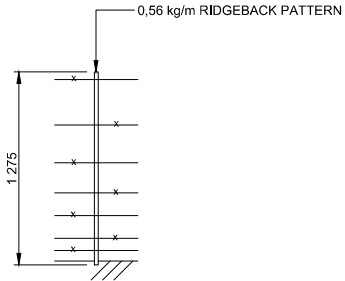
SCALE 1:25

## NOTES:

- ALL POSTS ARE TO BE SEALED BY WELDING A STEEL CAP OVER THE OPENING AT THE TOP.
- 3 kg/m I SECTION STANDARDS MAY BE USED INSTEAD OF 2,5 kg/m Y SECTION STANDARDS.
- CONCRETE MUST HAVE BEVELLED EDGES.
- BOUNDARY BEACONS CONSISTING OF HALVED IRON STANDARDS IN CONCRETE OR WITHOUT CONCRETE MAY NOT BE TAMPERED WITH.
- BOUNDARY BEACONS CONSISTING OF WOODEN PEGS IN CONCRETE OR WITHOUT CONCRETE MAY BE REPLACED BY A CORNER POST AND TWO STRAINING POSTS.
- CADASTRAL BEACONS MAY NOT BE TAMPERED WITH UNDER ANY CIRCUMSTANCES.
- CORROSION PROTECTION AS PER SPECIFICATION.

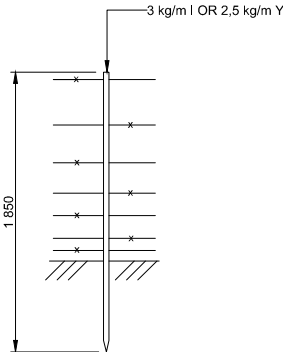
## LEGEND:

- 101,6 mm OUTSIDE Ø STEEL PIPE, WALL THICKNESS 2,95 mm (RAIL IS NOT SUITABLE FOR GATE POST).
- 60,33 mm OUTSIDE dia. STEEL PIPE, WALL THICKNESS 2,95 mm.
- 6-CORD STRAINING WIRE.
- 150 mm GRAVEL FOR DRAINAGE UNDERNEETH CONCRETE.
- SEE DETAIL 'A'.
- 12 mm Ø STEEL BOLT.
- 10 mm Ø x 300 mm ANCHOR PIN.
- CLASS 15/38 CONCRETE.
- 230 x 230 x 6 mm FOOTPLATE WITH 40 mm Ø OPENING.
- STANDARDS TO SUIT GROUND.
- 42,86 mm OUTSIDE Ø STEEL PIPE, WALL THICKNESS 2,64 mm.
- 21,43 mm OUTSIDE Ø STEEL PIPE, WALL THICKNESS 2,03 mm.
- GALVANIZED WIRE AS PER SPECIFICATION



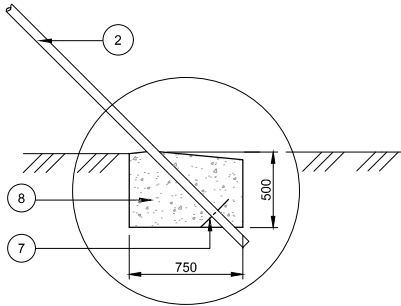
DROPPER (4 m C/C MAX)

SCALE 1:25



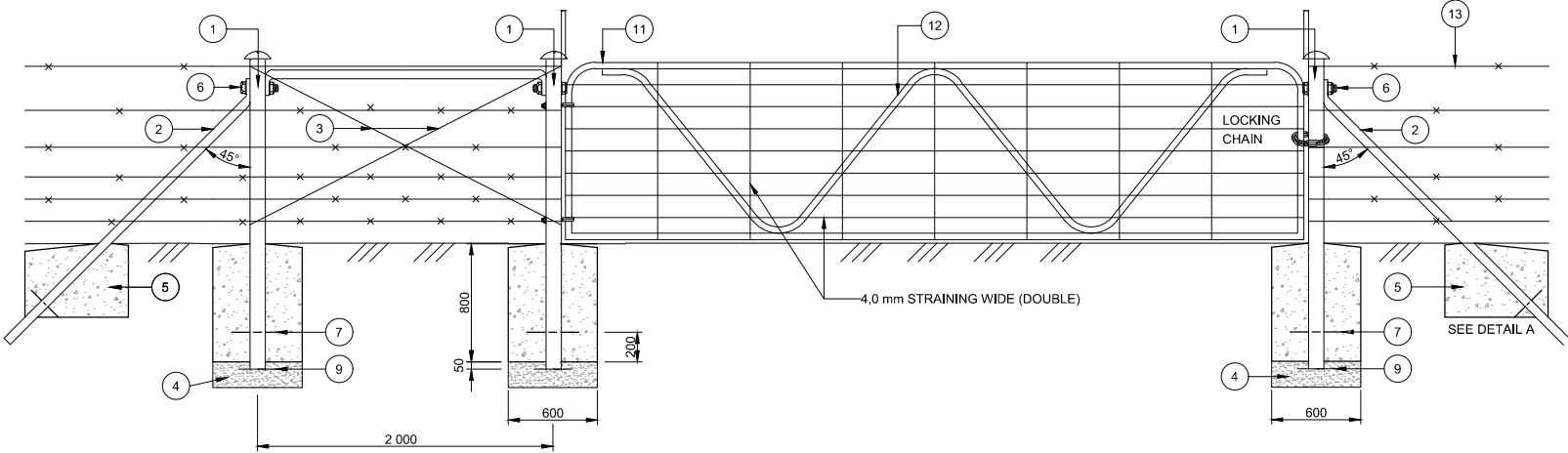
STANDARD (12 m C/C MAX)

SCALE 1:25



DETAIL 'A'

SCALE 1:25



STRAINING POST

SCALE 1:25

GATE (4,3 x 1,2 m)

SCALE 1:25

STRAINING POST

SCALE 1:25

| VERSION / AMENDMENTS |      |             |          |
|----------------------|------|-------------|----------|
| No.                  | DATE | DESCRIPTION | AUTH. BY |
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PROJECT TITLE:  
**BOSPOORT WATER SUPPLY SCHEME  
BOSPOORT PIPELINES**

DRAWING TITLE:  
**STOCK PROOF FENCE 1.2m HIGH**



|                                       |                                 |
|---------------------------------------|---------------------------------|
| 0 50 100<br>100mm ON ORIGINAL DRAWING |                                 |
| ORIGINAL DRAWING SCALE: AS SHOWN      | ORIGINAL DRAWING SHEET SIZE: A1 |
| APPROVED ON BEHALF OF CLIENT:         |                                 |
| NAME:                                 |                                 |
| DATE:                                 |                                 |
| CLIENT DRAWING No.:                   | CLIENT REF No.:                 |

|                              |          |          |              |
|------------------------------|----------|----------|--------------|
| SURVEYED                     |          | DESIGNED | C VAN ECK    |
| DRAWN                        | JA SWART |          | P DU PLESSIS |
| COORD SYSTEM                 | WG27     | DATE     | MAY 2020     |
| APPROVED ON BEHALF OF BIGEN: |          |          |              |
| PROJECT OWNER                |          |          |              |
|                              |          |          |              |
| DRAWING No.:                 |          | VERSION: |              |
| 1890.11.00.GZA.17.D001       |          | 1.0      |              |

1890.11.00.GZA.17.D001