



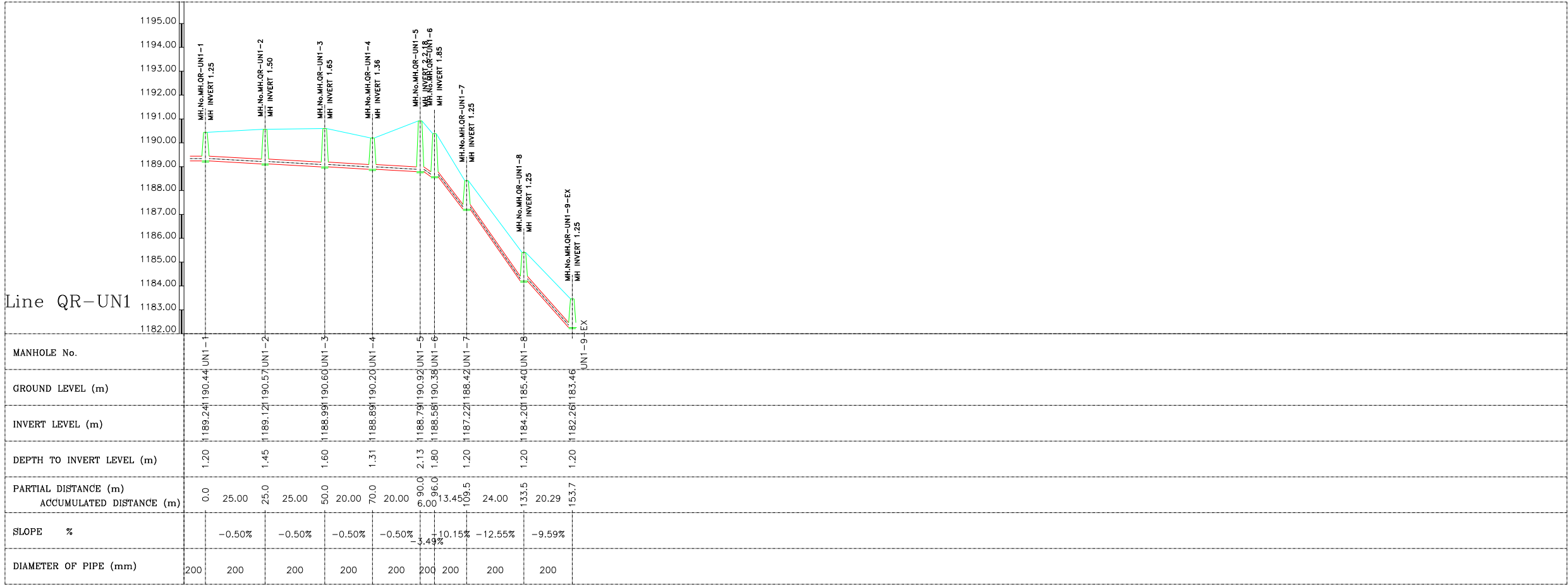
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NOTES:
1- ALL LEVELS AND DISTANCES ARE IN METERS UNLESS OTHERWISE INDICATED.
2- DIMENSIONS MUST NOT BE SCALED ON THIS DRAWING.
3- THE LENGTH OF PIPE IS MEASURED FROM THE CENTER OF MANHOLE TO THE CENTER OF MANHOLE.
4- PROVIDE CONCRETE PROTECTION FOR PIPES ACCORDING TO DRAWING OR WHERE REQUIRED BY THE ENGINEER.
5- FINAL LOCATION OF MANHOLES AND PIPES ARE TO BE DETERMINED ON SITE AND SHALL BE APPROVED BY THE ENGINEER TO SUIT EXISTING SERVICES.
6- PIPES ROUTE MUST BE LOCATED EXCLUSIVELY IN PUBLIC DOMAIN.

PLAN LEGEND:
PROPOSED WASTEWATER UPVC PIPE-200mm
PROPOSED WASTEWATER UPVC PIPE-250mm
PROPOSED WASTEWATER UPVC PIPE-300mm
PROPOSED WASTEWATER CONCRETE PIPE-500mm
PROPOSED WASTEWATER CONCRETE PIPE-600mm
ZH-TA-8
PROPOSED WASTEWATER MANHOLE
PROPOSED HOUSE CONNECTION

PROFILE LEGEND:
PROJECT LEVEL
PIPE LAYOUT
MANHOLE
EXISTING PAVED ROAD
EXISTING CONCRETE ROAD
EXISTING DIRT ROAD
EXISTING CHANNEL
EXISTING FENCE
EXISTING GULLY
RIVER

01			
Rev.	DESCRIPTION	DATE	
FUNDING AGENT:			
			
CLIENT:			
			
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION			
CONSULTANT:			
			
Project Name: P-2111D			
COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)			
Drawing Title:			
WASTEWATER NETWORK QAA EL RIM PLAN VIEW & LONGITUDINAL PROFILE LINE QR-UN1			
Dwg No.: P-2111D-P1-WW-PLP-274		Rev No.: 00	
Date: SEPTEMBER-2026		Scale: A.S.	
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.



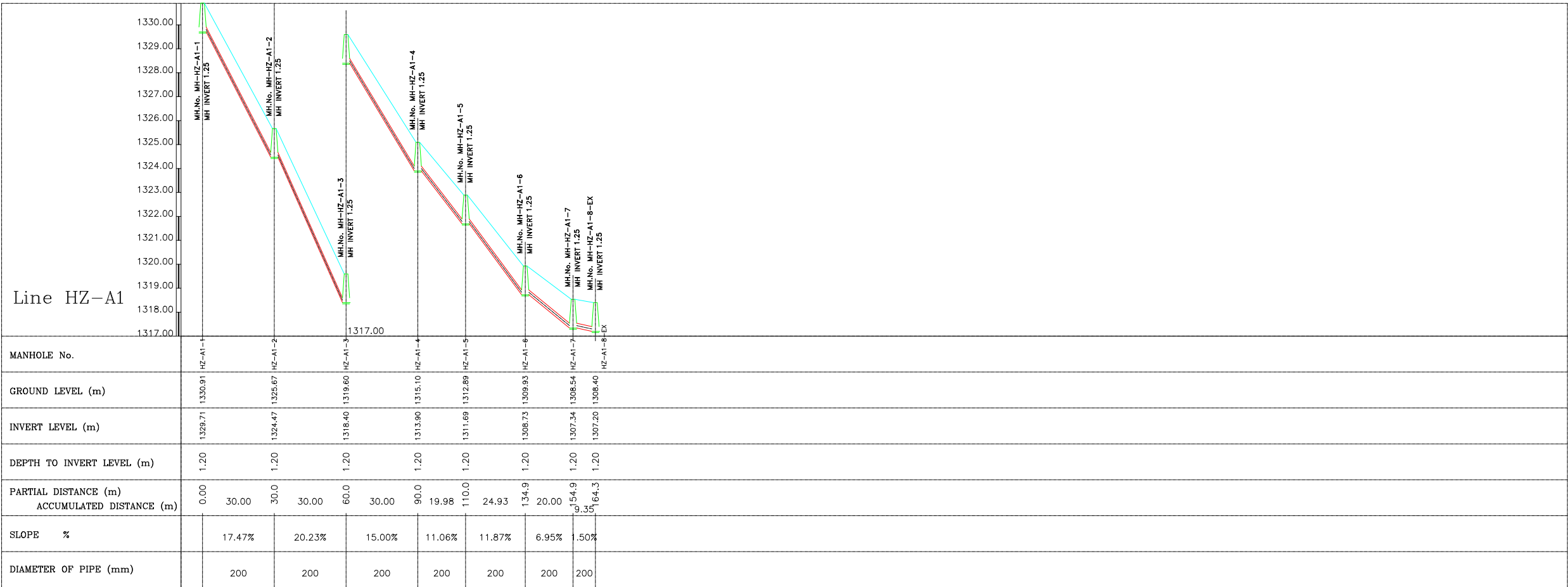
Scale: 1/1000



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- PLAN LEGEND:
- PROPOSED WASTEWATER UPVC PIPE-200mm
 - PROPOSED WASTEWATER UPVC PIPE-250mm
 - PROPOSED WASTEWATER UPVC PIPE-300mm
 - PROPOSED WASTEWATER CONCRETE PIPE-500mm
 - PROPOSED WASTEWATER CONCRETE PIPE-600mm
 - PROPOSED WASTEWATER MANHOLE
 - PROPOSED HOUSE CONNECTION

- PROFILE LEGEND:
- PROJECT LEVEL
 - PIPE LAYOUT
 - MANHOLE
 - EXISTING PAVED ROAD
 - EXISTING CONCRETE ROAD
 - EXISTING DIRT ROAD
 - EXISTING CHANNEL
 - EXISTING FENCE
 - EXISTING GULLY
 - RIVER



Scale: 1/1000

01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



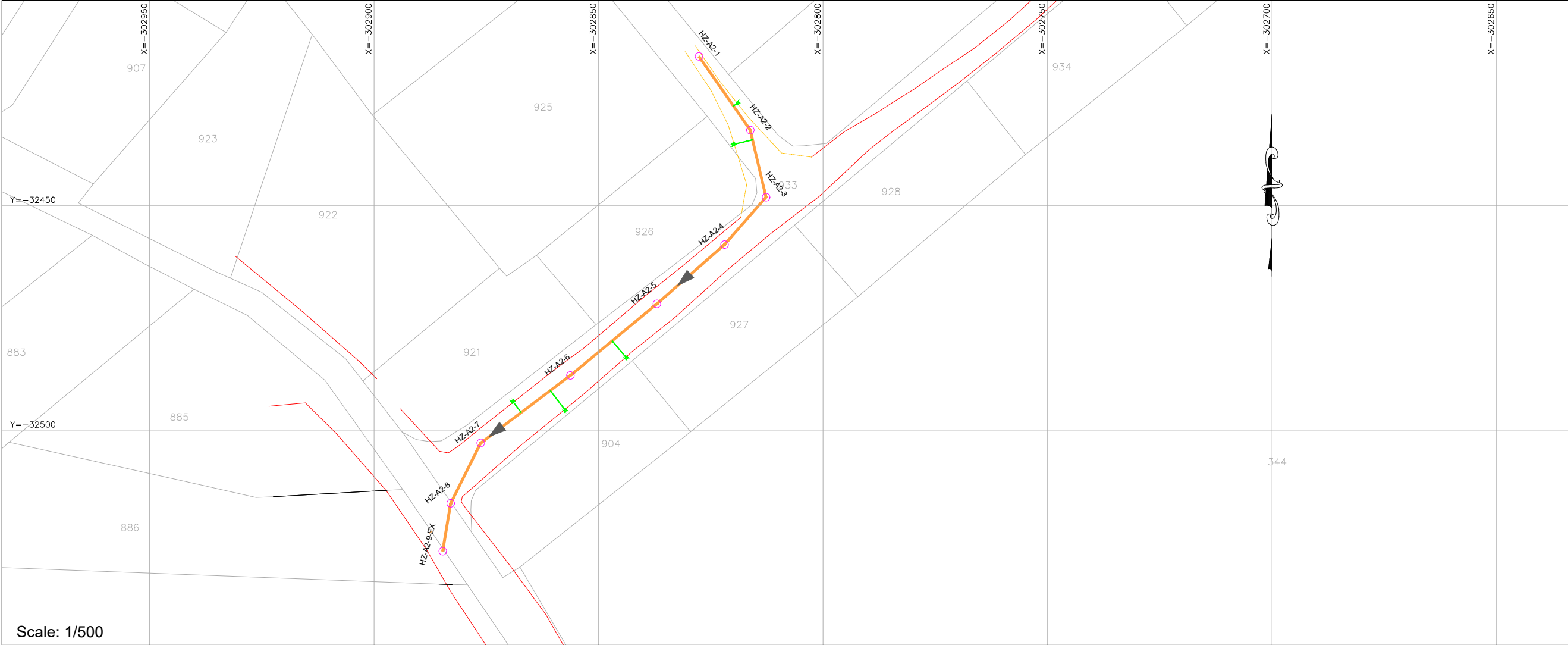
Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

Drawing Title:

WASTEWATER NETWORK
HAZERTA
PLAN VIEW & LONGITUDINAL PROFILE
LINE HZ-A1

Dwg No.: P-2111D-P1-WW-PLP-275			Rev No.: 00
Date: SEPTEMBER-2026			Scale: A.S.
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.



Scale: 1/500

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- PLAN LEGEND:
- PROPOSED WASTEWATER UPVC PIPE-200mm
 - PROPOSED WASTEWATER UPVC PIPE-250mm
 - PROPOSED WASTEWATER UPVC PIPE-300mm
 - PROPOSED WASTEWATER CONCRETE PIPE-500mm
 - PROPOSED WASTEWATER CONCRETE PIPE-600mm
 - PROPOSED WASTEWATER MANHOLE
 - PROPOSED HOUSE CONNECTION

- PROFILE LEGEND:
- EXISTING PAVED ROAD
 - EXISTING CONCRETE ROAD
 - EXISTING DIRT ROAD
 - EXISTING CHANNEL
 - EXISTING FENCE
 - EXISTING GULLY
 - RIVER

01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



Project Name: P-2111D

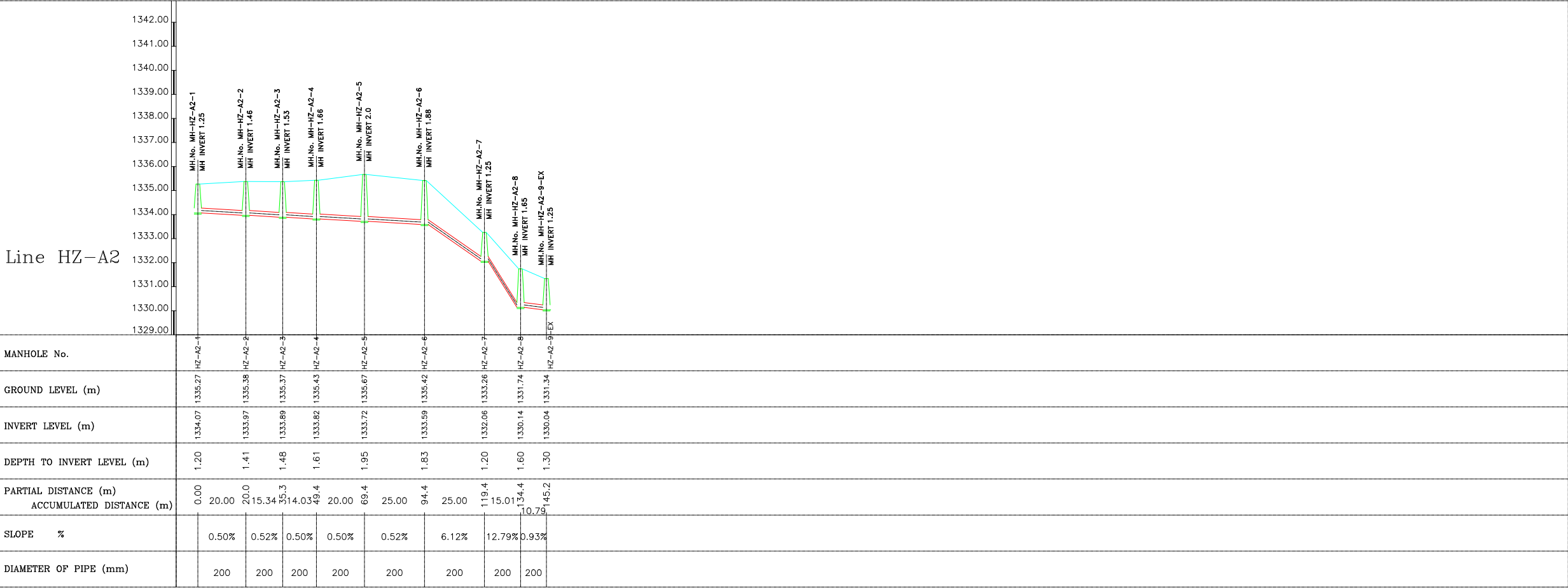
COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

Drawing Title:

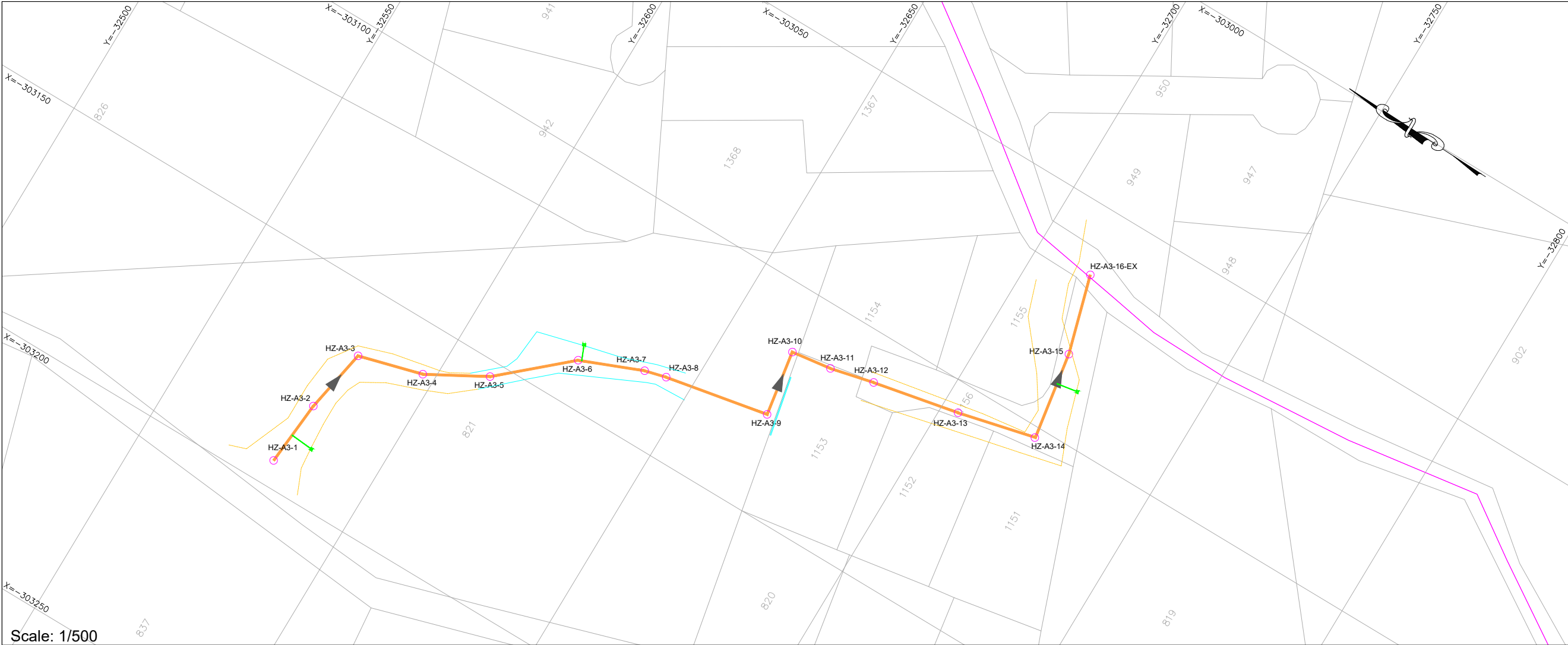
WASTEWATER NETWORK
HAZERTA
PLAN VIEW & LONGITUDINAL PROFILE
LINE HZ-A2

Dwg No.: P-2111D-P1-WW-PLP-276			Rev No.: 00
Date: SEPTEMBER-2026			Scale: A.S.
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.

Line HZ-A2



Scale: 1/1000

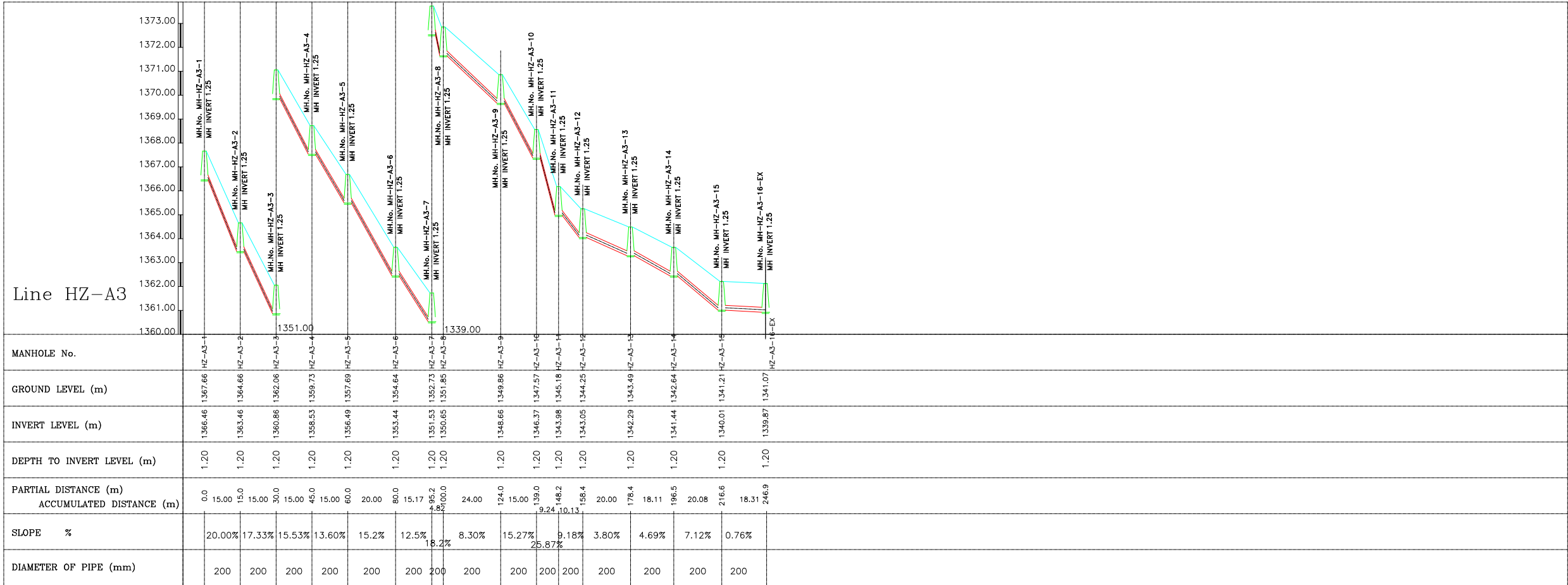


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- PLAN LEGEND:
- PROPOSED WASTEWATER UPVC PIPE-200mm
 - PROPOSED WASTEWATER UPVC PIPE-250mm
 - PROPOSED WASTEWATER UPVC PIPE-300mm
 - PROPOSED WASTEWATER CONCRETE PIPE-500mm
 - PROPOSED WASTEWATER CONCRETE PIPE-600mm
 - PROPOSED WASTEWATER MANHOLE
 - PROPOSED HOUSE CONNECTION

- PROFILE LEGEND:
- EXISTING PAVED ROAD
 - EXISTING CONCRETE ROAD
 - EXISTING DIRT ROAD
 - EXISTING CHANNEL
 - EXISTING FENCE
 - EXISTING GULLY
 - RIVER

Scale: 1/500



Scale: 1/1000

01		
Rev.	DESCRIPTION	DATE
FUNDING AGENT:		
		
CLIENT:		
 COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION		
CONSULTANT:		
		
Project Name: P-2111D		
COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)		
Drawing Title:		
WASTEWATER NETWORK HAZERTA PLAN VIEW & LONGITUDINAL PROFILE LINE HZ-A3		
Dwg No.: P-2111D-P1-WW-PLP-277		Rev No.: 00
Date:	SEPTEMBER-2026	Scale: A.S.
Drawn	Designed	Checked
O.D	M.N	R.S
		Approved
		G.K.

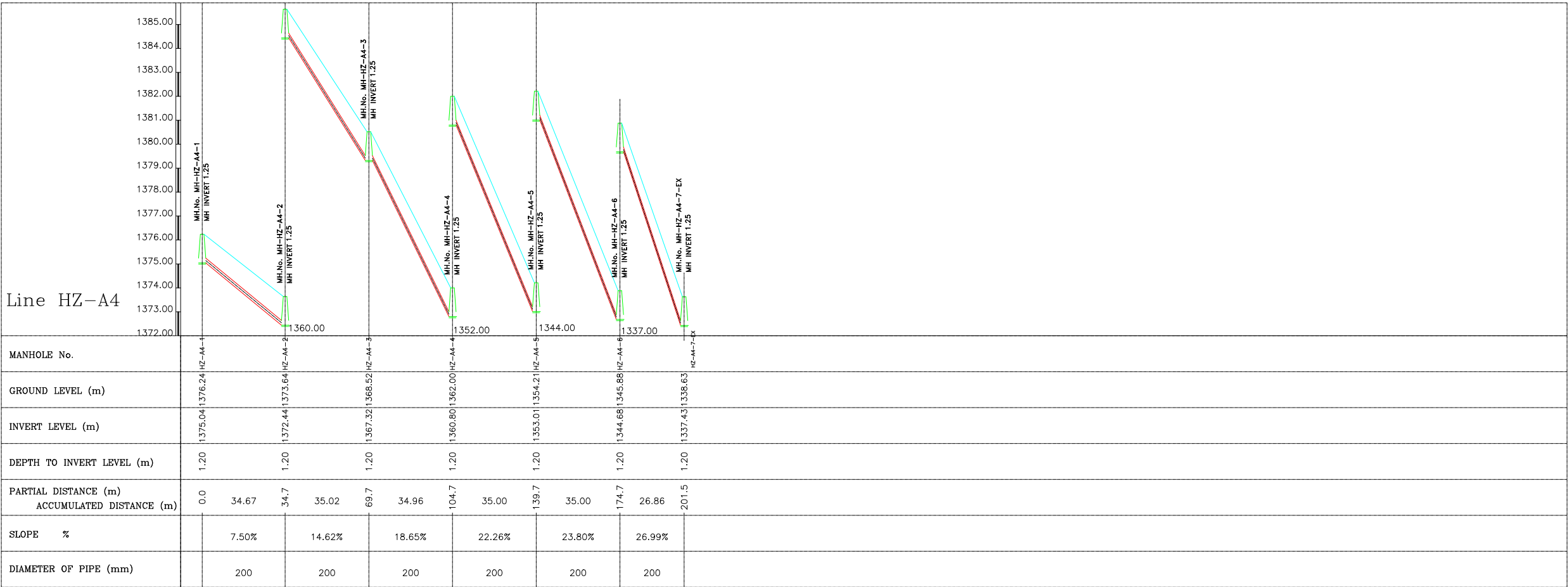


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 - 6- PIPES ROUTE MUST BE LOCATED EXCLUSIVELY IN PUBLIC DOMAIN.

- PLAN LEGEND:
- PROPOSED WASTEWATER UPVC PIPE-200mm
 - PROPOSED WASTEWATER UPVC PIPE-250mm
 - PROPOSED WASTEWATER UPVC PIPE-300mm
 - PROPOSED WASTEWATER CONCRETE PIPE-500mm
 - PROPOSED WASTEWATER CONCRETE PIPE-600mm
 - PROPOSED WASTEWATER MANHOLE
 - PROPOSED HOUSE CONNECTION

- PROFILE LEGEND:
- PROJECT LEVEL
 - PIPE LAYOUT
 - MANHOLE
 - EXISTING PAVED ROAD
 - EXISTING CONCRETE ROAD
 - EXISTING DIRT ROAD
 - EXISTING CHANNEL
 - EXISTING FENCE
 - EXISTING GULLY
 - RIVER

Scale: 1/500



Scale: 1/1000

01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

Drawing Title:

WASTEWATER NETWORK
HAZERTA
PLAN VIEW & LONGITUDINAL PROFILE
LINE HZ-A4

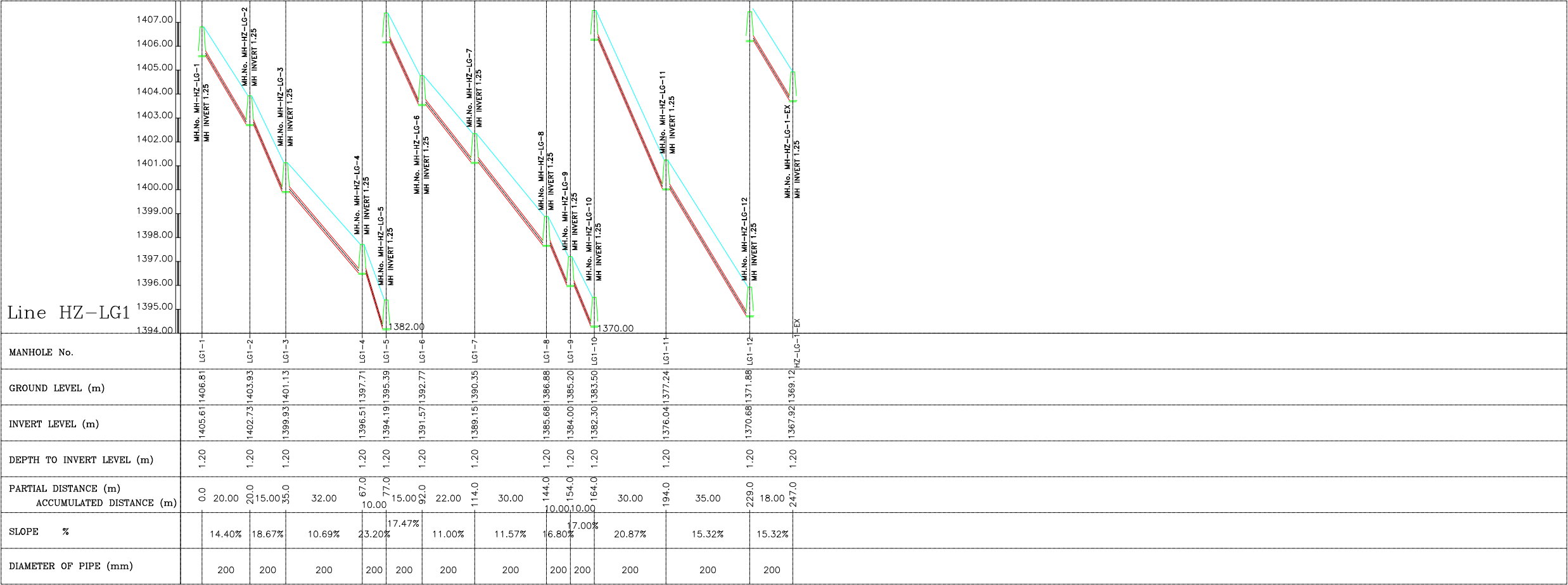
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Date: SEPTEMBER-2026			Scale: A.S.
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.



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- PLAN LEGEND:
- PROPOSED WASTEWATER UPVC PIPE-200mm
 - PROPOSED WASTEWATER UPVC PIPE-250mm
 - PROPOSED WASTEWATER UPVC PIPE-300mm
 - PROPOSED WASTEWATER CONCRETE PIPE-500mm
 - PROPOSED WASTEWATER CONCRETE PIPE-600mm
 - PROPOSED WASTEWATER MANHOLE
 - PROPOSED HOUSE CONNECTION

- PROFILE LEGEND:
- EXISTING PAVED ROAD
 - EXISTING CONCRETE ROAD
 - EXISTING DIRT ROAD
 - EXISTING CHANNEL
 - EXISTING FENCE
 - EXISTING GULLY
 - RIVER



01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



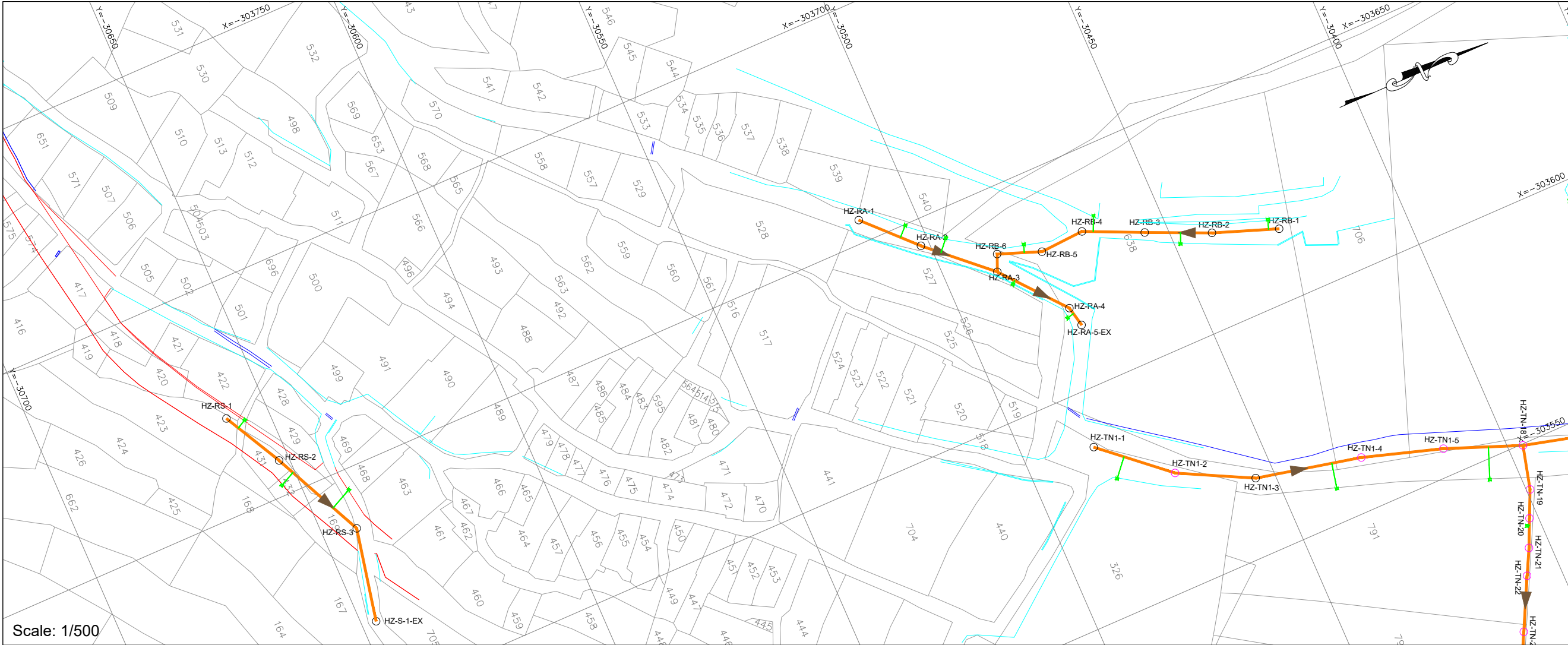
Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

Drawing Title:

WASTEWATER NETWORK
HAZERTA
PLAN VIEW & LONGITUDINAL PROFILE
LINE HZ-LG1

Dwg No.: P-2111D-P1-WW-PLP-279			Rev No.: 00
Date: SEPTEMBER-2026			Scale: A.S.
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.

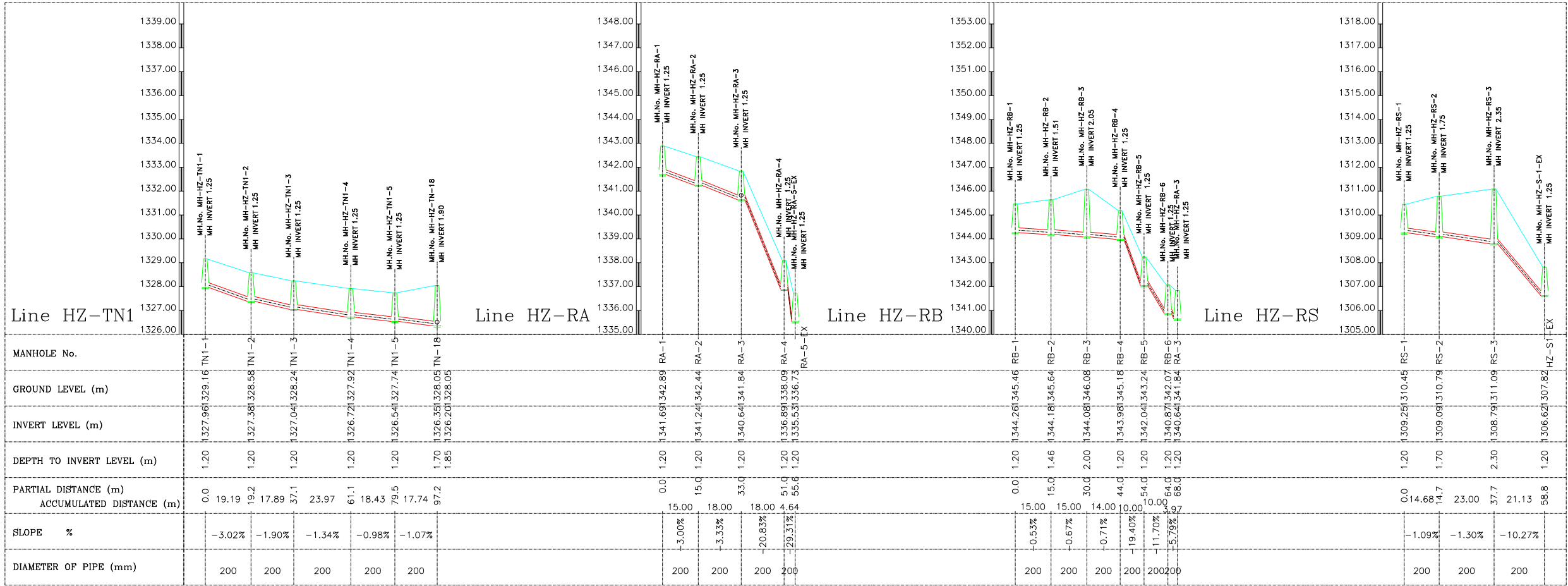


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- PLAN LEGEND:
- PROPOSED WASTEWATER UPVC PIPE-200mm
 - PROPOSED WASTEWATER UPVC PIPE-250mm
 - PROPOSED WASTEWATER UPVC PIPE-300mm
 - PROPOSED WASTEWATER CONCRETE PIPE-500mm
 - PROPOSED WASTEWATER CONCRETE PIPE-600mm
 - PROPOSED WASTEWATER MANHOLE
 - PROPOSED HOUSE CONNECTION

- PROFILE LEGEND:
- PROJECT LEVEL
 - PIPE LAYOUT
 - MANHOLE
 - EXISTING PAVED ROAD
 - EXISTING CONCRETE ROAD
 - EXISTING DIRT ROAD
 - EXISTING CHANNEL
 - EXISTING FENCE
 - EXISTING GULLY
 - RIVER

Scale: 1/500



Scale: 1/1000

01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



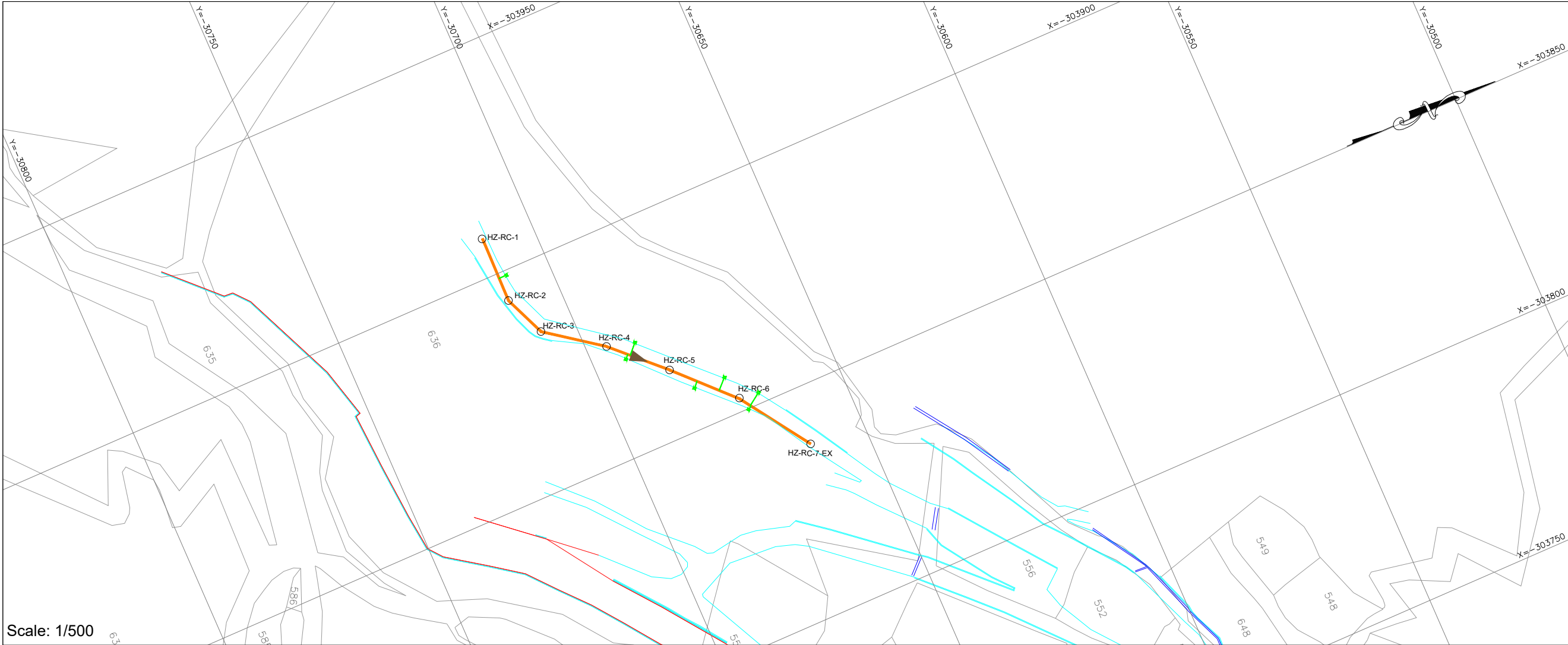
Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND ATANIT WASTEWATER TREATMENT PLANT (GC2W2C)

Drawing Title:

WASTEWATER NETWORK HAZERTA
PLAN VIEW & LONGITUDINAL PROFILE
LINE HZ-TN1, HZ-RA, HZ-RB AND HZ-RS

Dwg No.: P-2111D-P1-WW-PLP-280			Rev No.: 00
Date: SEPTEMBER-2026			Scale: A.S.
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.



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- PLAN LEGEND:
- PROPOSED WASTEWATER UPVC PIPE-200mm
 - PROPOSED WASTEWATER UPVC PIPE-250mm
 - PROPOSED WASTEWATER UPVC PIPE-300mm
 - PROPOSED WASTEWATER CONCRETE PIPE-500mm
 - PROPOSED WASTEWATER CONCRETE PIPE-600mm
 - PROPOSED WASTEWATER MANHOLE
 - PROPOSED HOUSE CONNECTION

- PROFILE LEGEND:
- PROJECT LEVEL
 - PIPE LAYOUT
 - MANHOLE
 - EXISTING PAVED ROAD
 - EXISTING CONCRETE ROAD
 - EXISTING DIRT ROAD
 - EXISTING CHANNEL
 - EXISTING FENCE
 - EXISTING GULLY
 - RIVER

Scale: 1/500



Scale: 1/1000

01		
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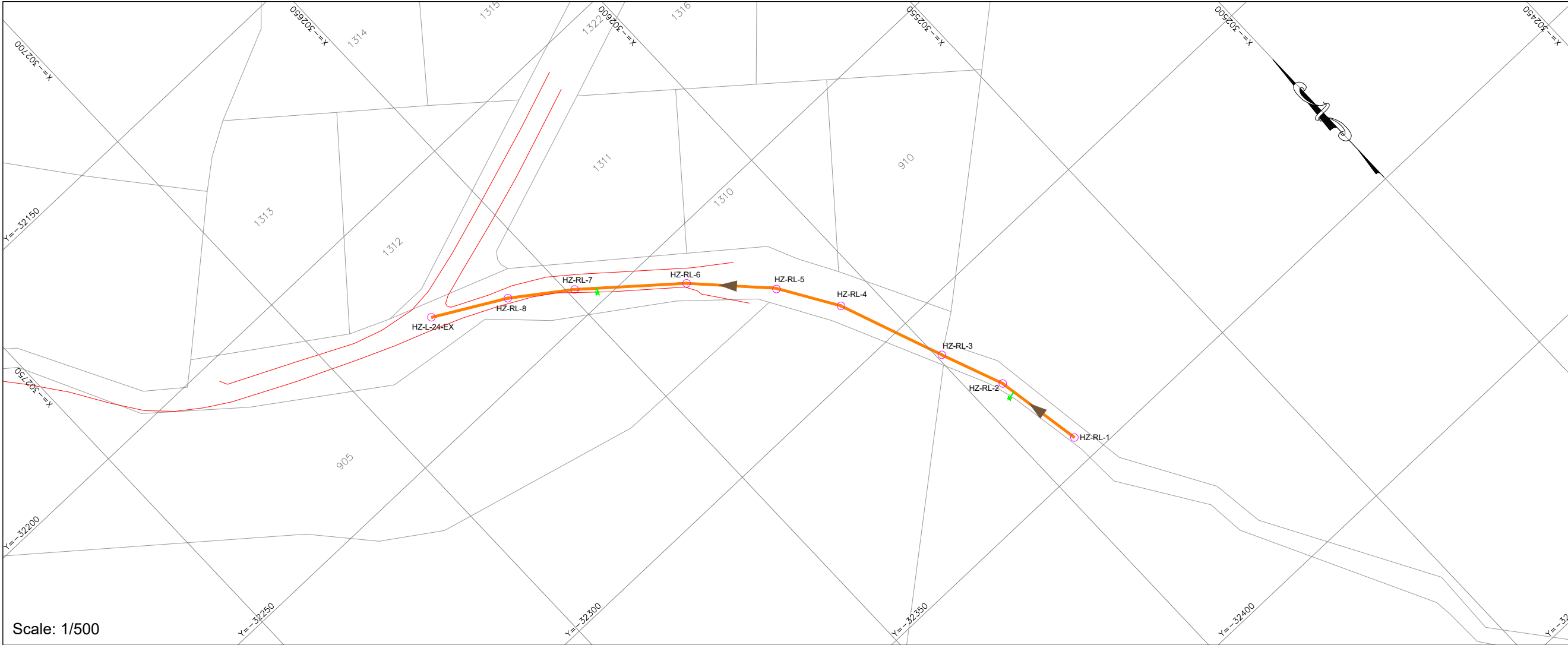
Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

Drawing Title:

WASTEWATER NETWORK
HAZERTA
PLAN VIEW & LONGITUDINAL PROFILE
LINE HZ-RC

Dwg No.: P-2111D-P1-WW-PLP-281			Rev No.: 00
Date: SEPTEMBER-2026			Scale: A.S.
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.

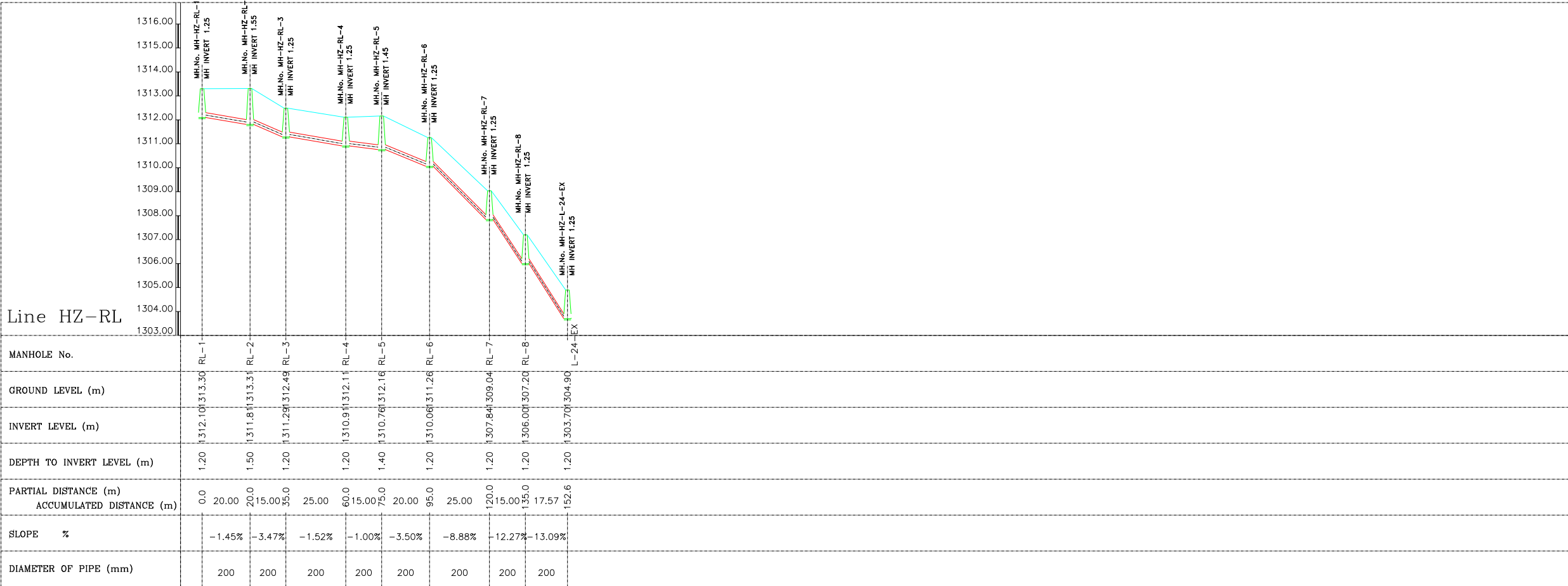


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 - PROPOSED WASTEWATER CONCRETE PIPE-500mm
 - PROPOSED WASTEWATER CONCRETE PIPE-600mm
 - PROPOSED WASTEWATER MANHOLE
 - PROPOSED HOUSE CONNECTION

- PROFILE LEGEND:
- PROJECT LEVEL
 - PIPE LAYOUT
 - MANHOLE
 - EXISTING PAVED ROAD
 - EXISTING CONCRETE ROAD
 - EXISTING DIRT ROAD
 - EXISTING CHANNEL
 - EXISTING FENCE
 - EXISTING GULLY
 - RIVER



Scale: 1/1000

01		
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COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



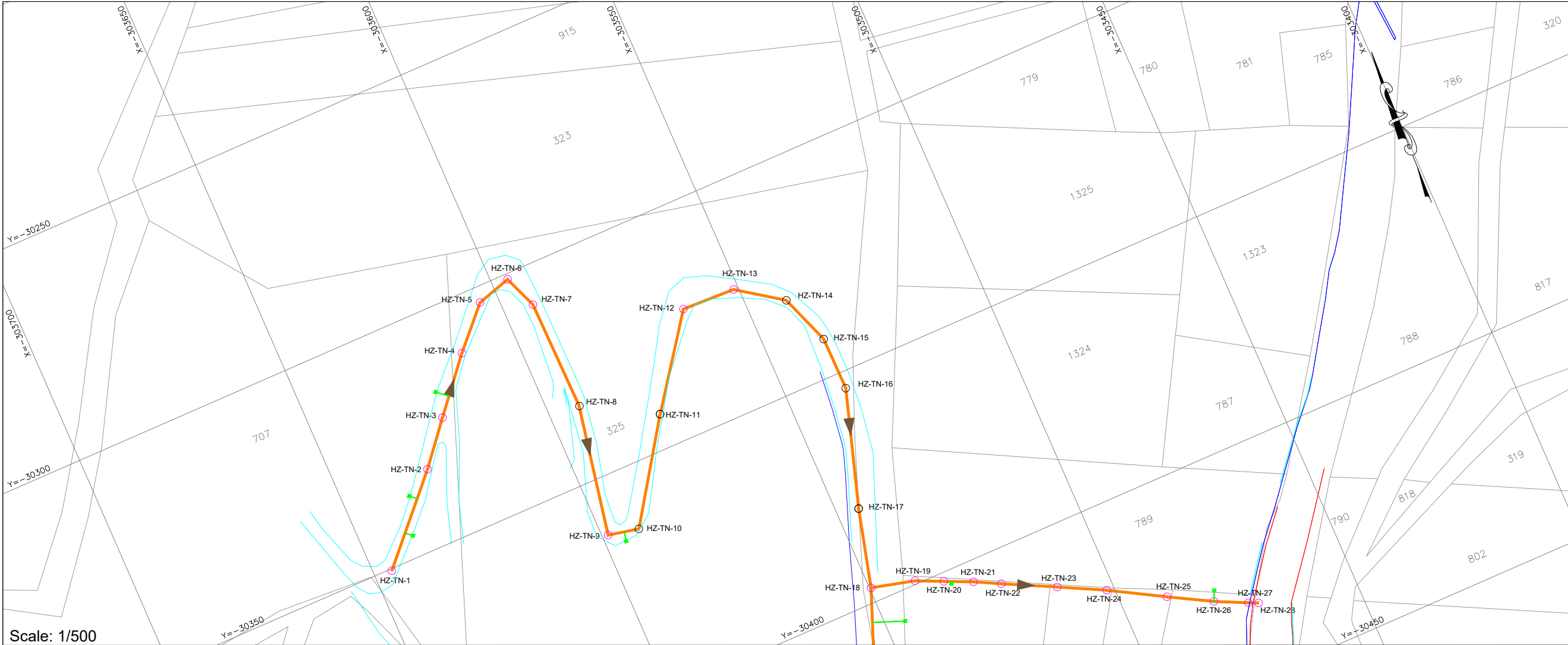
Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

Drawing Title:

WASTEWATER NETWORK
HAZERTA
PLAN VIEW & LONGITUDINAL PROFILE
LINE HZ-RL

Dwg No.: P-2111D-P1-WW-PLP-282			Rev No.: 00
Date: SEPTEMBER-2026			Scale: A.S.
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.

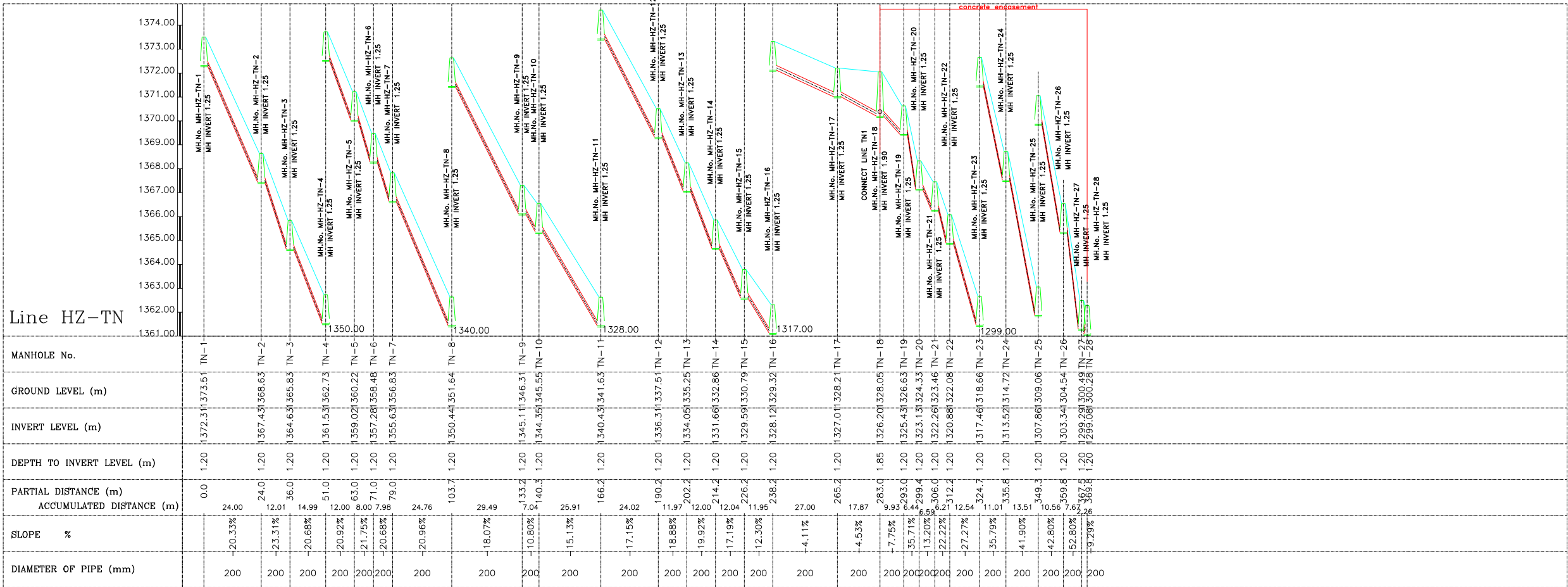


Scale: 1/500

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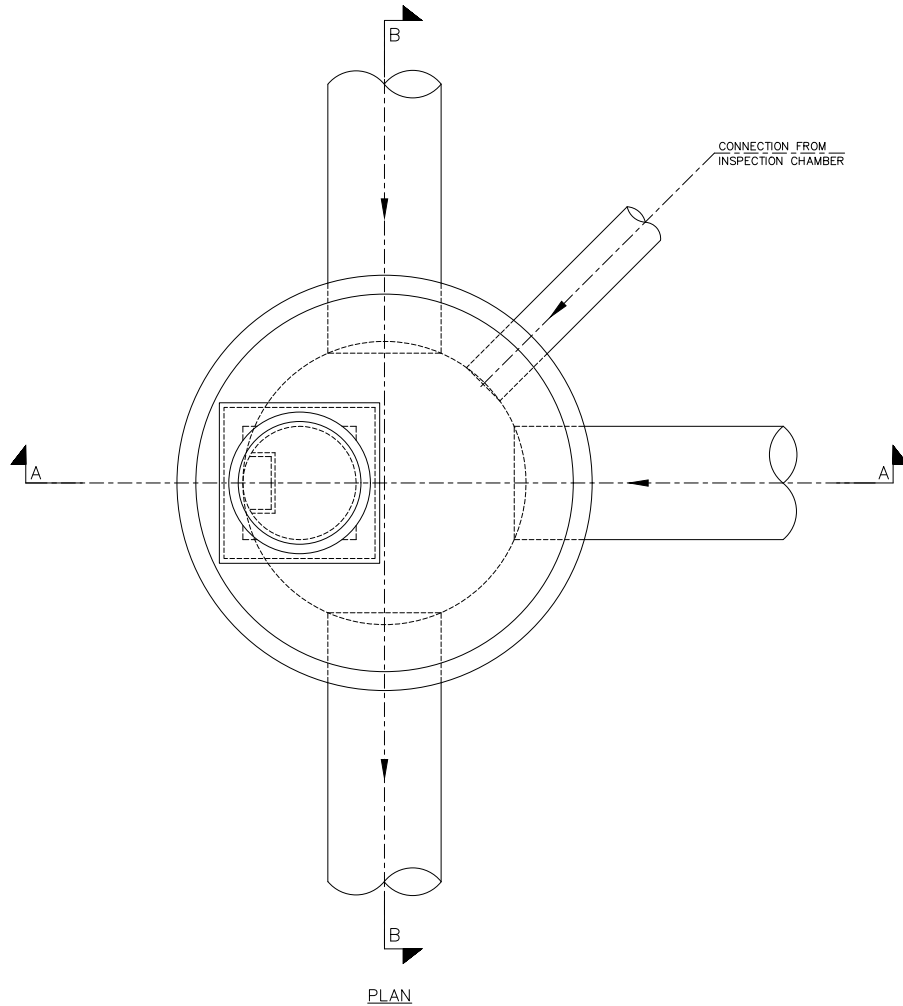
- PLAN LEGEND:
- PROPOSED WASTEWATER UPVC PIPE-200mm
 - PROPOSED WASTEWATER UPVC PIPE-250mm
 - PROPOSED WASTEWATER UPVC PIPE-300mm
 - PROPOSED WASTEWATER CONCRETE PIPE-500mm
 - PROPOSED WASTEWATER CONCRETE PIPE-600mm
 - PROPOSED WASTEWATER MANHOLE
 - PROPOSED HOUSE CONNECTION

- PROFILE LEGEND:
- PROJECT LEVEL
 - PIPE LAYOUT
 - MANHOLE
 - EXISTING PAVED ROAD
 - EXISTING CONCRETE ROAD
 - EXISTING DIRT ROAD
 - EXISTING CHANNEL
 - EXISTING FENCE
 - EXISTING GULLY
 - RIVER

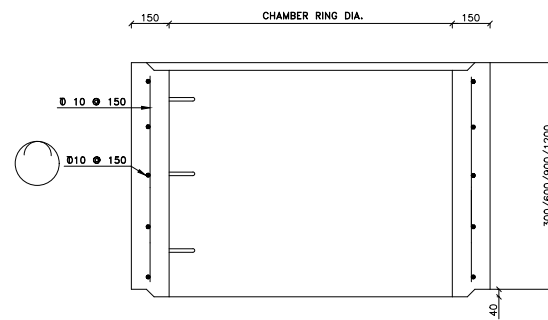
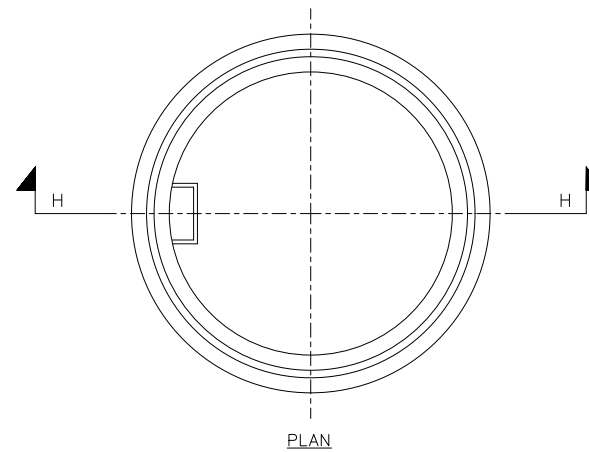


Scale: 1/1000

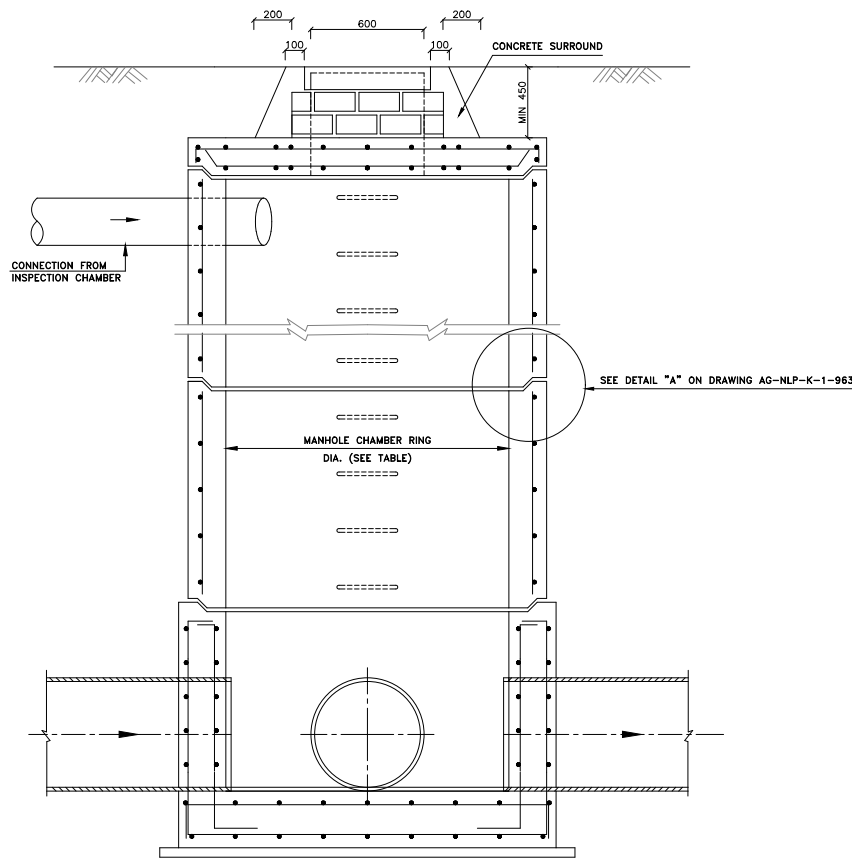
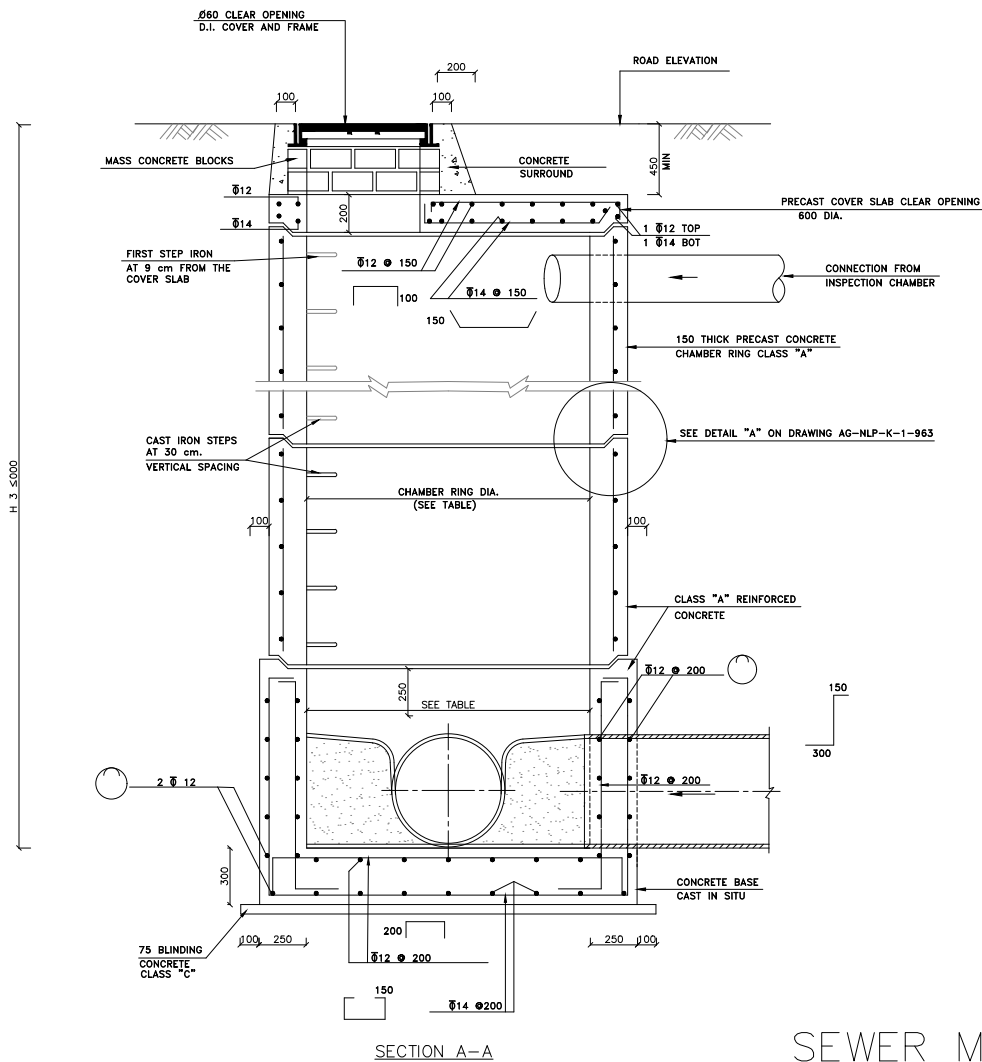
01		
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Project Name: P-2111D		
COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)		
Drawing Title:		
WASTEWATER NETWORK HAZERTA PLAN VIEW & LONGITUDINAL PROFILE LINE HZ-TN		
Dwg No.: P-2111D-P1-WW-PLP-283		Rev No.: 00
Date:	SEPTEMBER-2026	Scale: A.S.
Drawn	Designed	Checked
O.D	M.N	R.S
		Approved
		G.K.



MANHOLE CHAMBER RINGS FOR DEPTH $\leq 3\text{m}$	
DIAMETER OF LARGEST PIPE (mm)	CHAMBER RING DIAMETER (mm)
$\phi \leq 400$	1200
$500 \leq \phi \leq 700$	1500
$750 \leq \phi \leq 900$	1800



STANDARD CHAMBER RING



SEWER MANHOLE – DEPTH: $H \leq 3\text{m}$

NOTES:

- 1-ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED. LEVELS ARE INDICATED IN METERS ASL (ABOVE SEA LEVEL). DIMENSIONS MUST NOT BE SCALED ON THE DRAWINGS.
- 2-LEAN CONCRETE SHALL HAVE COMPRESSIVE STRENGTH OF 14 MPa. ALL OTHER CONCRETE USED SHALL HAVE COMPRESSIVE STRENGTH OF 25 MPa.
- 3-CONCRETE IS AS PER STRUCTURAL CONCRETE AND REINFORCING SPECIFICATION.
- 4-HIGH TENSILE REINFORCEMENT (INDICATED ON DRAWINGS BY T) MUST HAVE A MINIMUM GUARANTEED YIELD STRENGTH OF 420MPa.
- 5-ALL UNDERGROUND CONCRETE IN CONTACT WITH THE GROUND AND SEWAGE TO BE SULPHATE RESISTING.
- 6-OVERLAPPING LENGTH OF REINFORCEMENT ARE THESE SHOWN ON THE DRAWINGS BUT NOT LESS THAN 50 TIMES DIAMETER OF THE BAR.
- 7-MINIMUM COVER OF REINFORCEMENT TO INSIDE & OUTSIDE FACES SHALL NOT BE LESS THAN 50MM AND MAXIMUM COVER SHALL NOT BE MORE THAN ONE THIRD OF THE WALL THICKNESS.
- 8-A FLEXIBLE PIPE JOINT SHALL BE PROVIDED AS CLOSE AS IS PRACTICABLE TO THE OUTSIDE FACE OF THE MANHOLE. IN ANY CASE THE DISTANCE FROM THE MANHOLE SHALL NOT EXCEED HALF THE NOMINAL DIAMETER OF THE PIPE. THE LENGTH OF THE NEXT PIPE (ROCKER PIPE) SHALL BE 2 TO 3 TIMES THE DIAMETER OF THE PIPE.
- 9-BACKFILL PIPES AFTER INSTALLATION TO A MINIMUM COVER OF 800MM IN ROADS AND ELSEWHERE.
- 10-ENCASEMENT IS REQUIRED ON PIPE WHICH HAS A COVER FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, OF LESS THAN 800MM OR MORE THAN 500MM.
- 11-MANHOLE SHALL BE PROVIDED WITH 20MM DIAMETER HOT GALVANIZED STEEL RUNGS SPACED AT 300MM C/C FOR ACCESS AT THE INDICATED LOCATIONS IN THE REINFORCED CONCRETE WALLS.
- 12-RUNGS AND LADDERS SHALL BE PLASTIC COATED OR MADE FROM AN APPROVED CORROSION RESISTANT MATERIAL.
- 13-MANHOLE COVER AND STEPS SHALL BE LOCATED ON THE SIDE WHERE NO INLET/OUTLET PIPES OCCURS. IN THE CASE WHERE INLET/OUTLET PIPES OCCURS ON THE FOUR SIDES ON THE MANHOLE, THE COVER AND LADDER RUNGS SHALL BE INSTALLED ON THE FACE WHERE THE SMALLEST PIPE EXISTS.
- 14-TWO COATS OF APPROVED BITUMINOUS PAINT SHALL BE BRUSH APPLIED ON CONCRETE SURFACES IN CONTACT WITH SOIL.
- 15-GRP OR HDPE LINER SHALL BE APPLIED TO ALL INTERNAL SURFACES OF SEWER STRUCTURES.
- 16-THE GAP/VOID BETWEEN PIPE AND CONCRETE SHALL BE FILLED/GROUTED WITH APPROVED TYPE OF EXPANSIVE GROUT TO SEAL THE GAPS PROPERLY.
- 17-SEWERS CROSSING WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE BETWEEN THE BOTTOM OF THE WATER MAIN & THE TOP OF THE SEWER.

N.T.S. : NOT TO SCALE
D.I. : DUCTILE IRON
DIA. : DIAMETER

01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



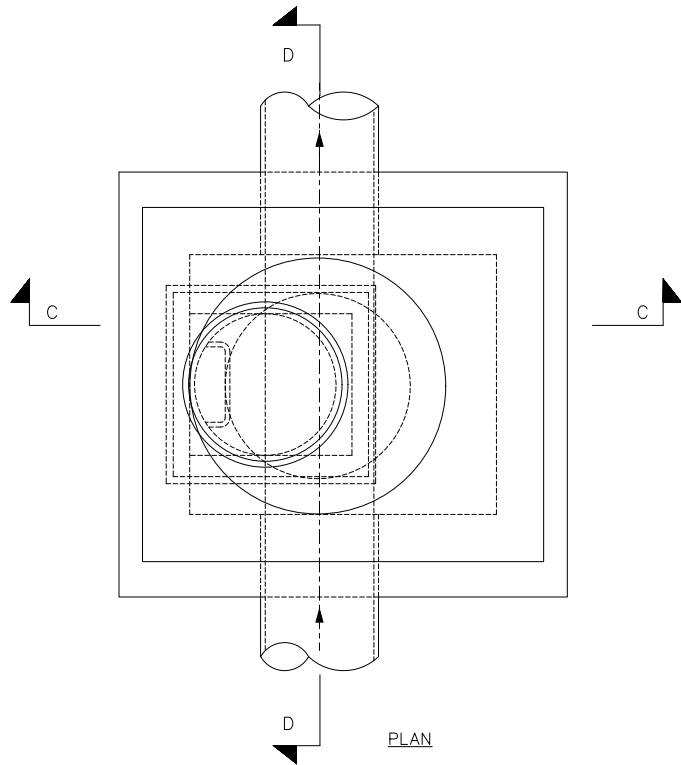
Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

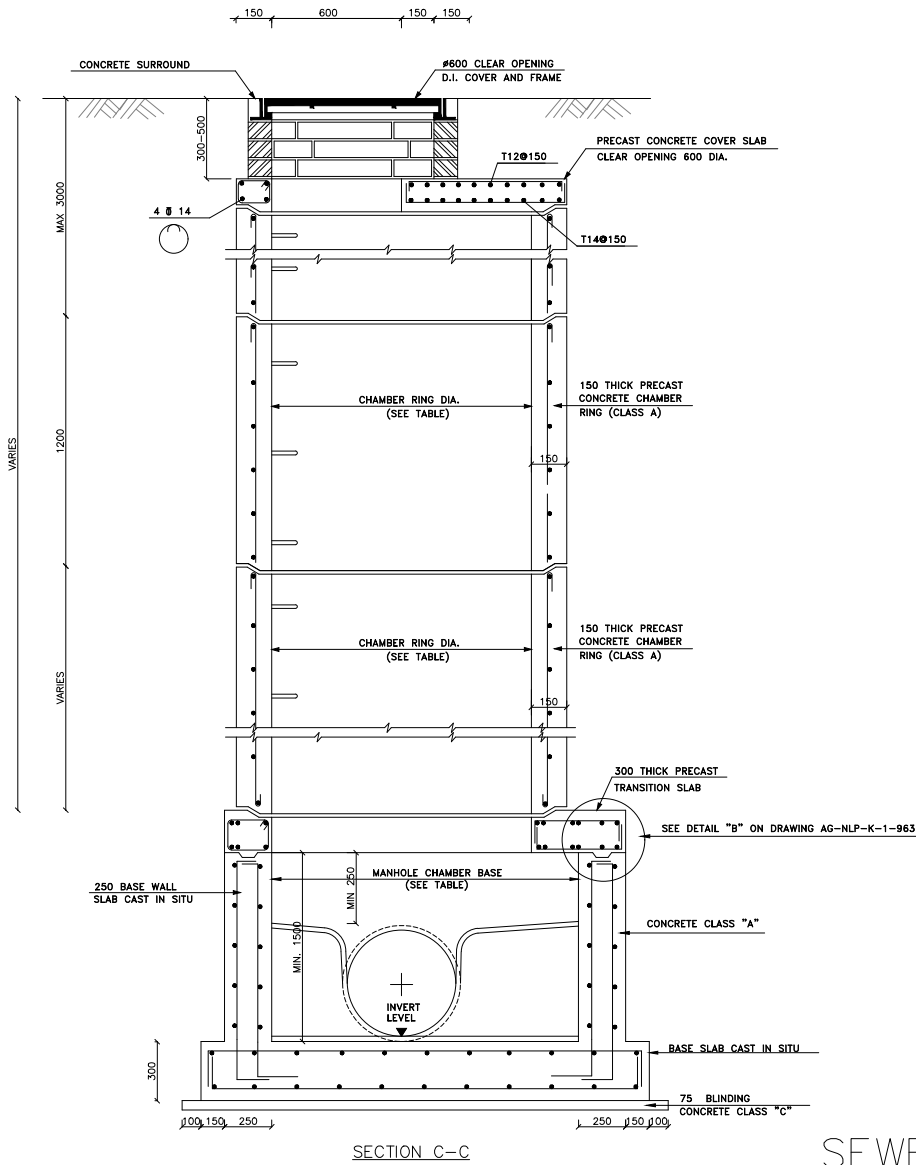
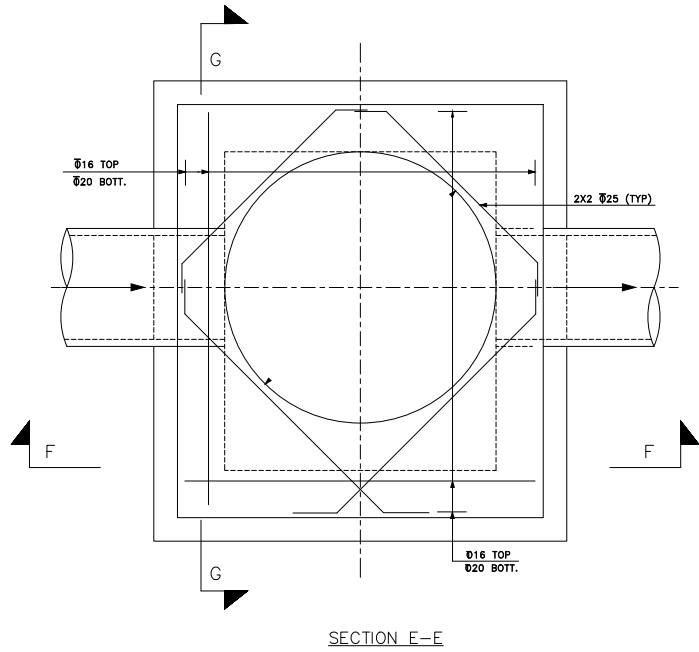
Drawing Title:

WASTEWATER NETWORK PRECAST MANHOLES REINFORCEMENT & TYPICAL DETAILS
SHEET 1 OF 3

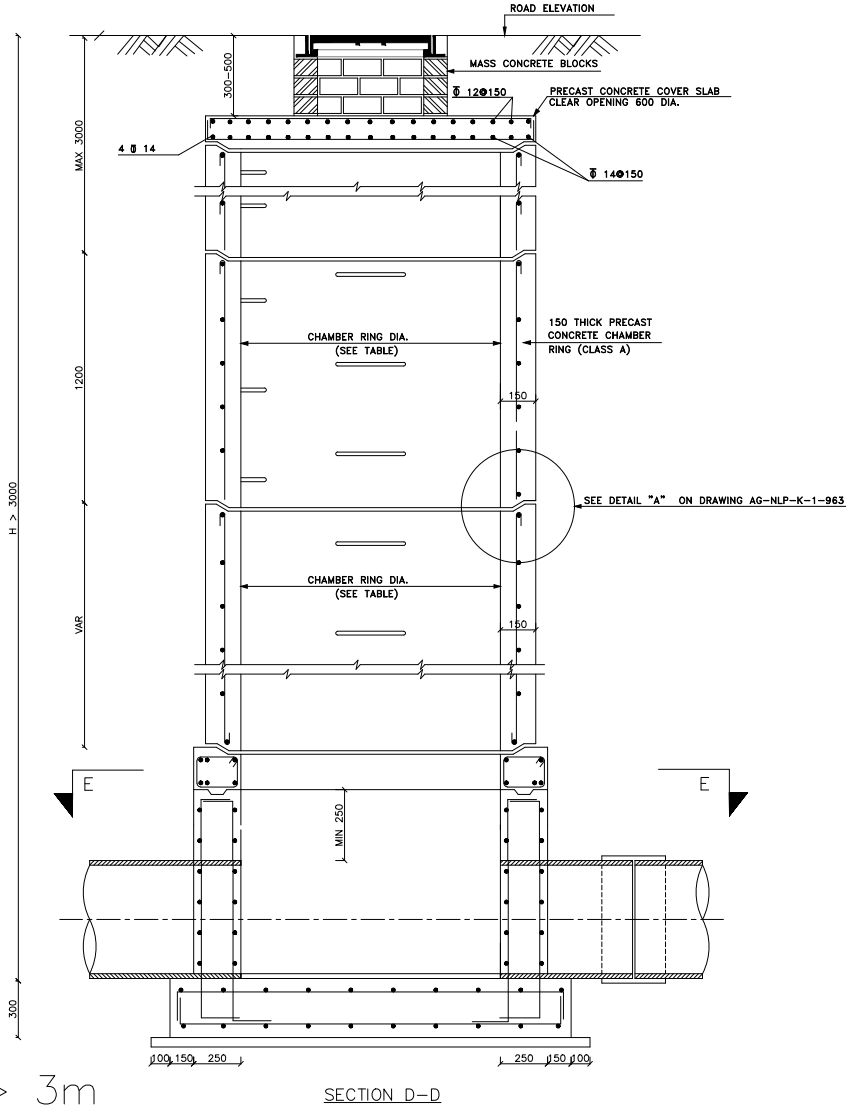
Dwg No.: P-2111D-P1-WW-DET-301			Rev No.: 00
Date: SEPTEMBER-2026			Scale: 1/20
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.



DIAMETER OF LARGEST PIPE (mm)	3m < DEPTH	CHAMBER BASE
	CHAMBER RING DIAMETER (mm)	
$\phi \leq 400$	1500	1500x1500
$500 \leq \phi \leq 700$	1500	1500x1500
$750 \leq \phi \leq 900$	1800	1800x1800



SEWER MANHOLE – DEPTH: $H > 3m$



NOTES:

- 1-ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED. LEVELS ARE INDICATED IN METERS ASL (ABOVE SEA LEVEL). DIMENSIONS MUST NOT BE SCALED ON THE DRAWINGS.
- 2-LEAN CONCRETE SHALL HAVE COMPRESSIVE STRENGTH OF 14 MPA. ALL OTHER CONCRETE USED SHALL HAVE COMPRESSIVE STRENGTH OF 25 MPA.
- 3-CONCRETE IS AS PER STRUCTURAL CONCRETE AND REINFORCING SPECIFICATION.
- 4-HIGH TENSILE REINFORCEMENT (INDICATED ON DRAWINGS BY T) MUST HAVE A MINIMUM GUARANTEED YIELD STRENGTH OF 420MPa.
- 5-ALL UNDERGROUND CONCRETE IN CONTACT WITH THE GROUND AND SEWAGE TO BE SULPHATE RESISTING.
- 6-OVERLAPPING LENGTH OF REINFORCEMENT ARE THESE SHOWN ON THE DRAWINGS BUT NOT LESS THAN 50 TIMES DIAMETER OF THE BAR.
- 7-MINIMUM COVER OF REINFORCEMENT TO INSIDE & OUTSIDE FACES SHALL NOT BE LESS THAN 50MM AND MAXIMUM COVER SHALL NOT BE MORE THAN ONE THIRD OF THE WALL THICKNESS.
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- 11-MANHOLE SHALL BE PROVIDED WITH 20MM DIAMETER HOT GALVANIZED STEEL RUNGS SPACED AT 300MM C/C FOR ACCESS AT THE INDICATED LOCATIONS IN THE REINFORCED CONCRETE WALLS.
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- 14-TWO COATS OF APPROVED BITUMINOUS PAINT SHALL BE BRUSH APPLIED ON CONCRETE SURFACES IN CONTACT WITH SOIL.
- 15-GRP OR HDPE LINER SHALL BE APPLIED TO ALL INTERNAL SURFACES OF SEWER STRUCTURES.
- 16-THE GAP/VOID BETWEEN PIPE AND CONCRETE SHALL BE FILLED/GROUTED WITH APPROVED TYPE OF EXPANSIVE GROUT TO SEAL THE GAPS PROPERLY.
- 17-SEWERS CROSSING WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE BETWEEN THE BOTTOM OF THE WATER MAIN & THE TOP OF THE SEWER.

N.T.S. : NOT TO SCALE
D.I. : DUCTILE IRON
DIA. : DIAMETER

01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



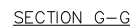
Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

Drawing Title:

WASTEWATER NETWORK PRECAST MANHOLES REINFORCEMENT & TYPICAL DETAILS
SHEET 2 OF 3

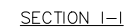
Dwg No.: P-2111D-P1-WW-DET-302			Rev No.: 00
Date: SEPTEMBER-2026			Scale: 1/20
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.



SCALE (1/20)



TRANSITION SLAB FOR MANHOLES $H > 3000$

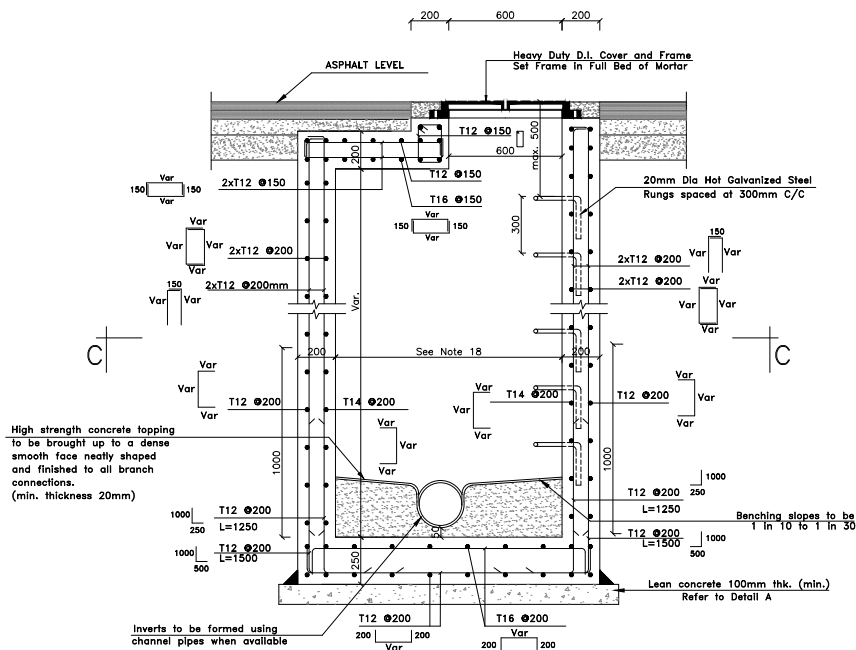


SCALE (1/20)

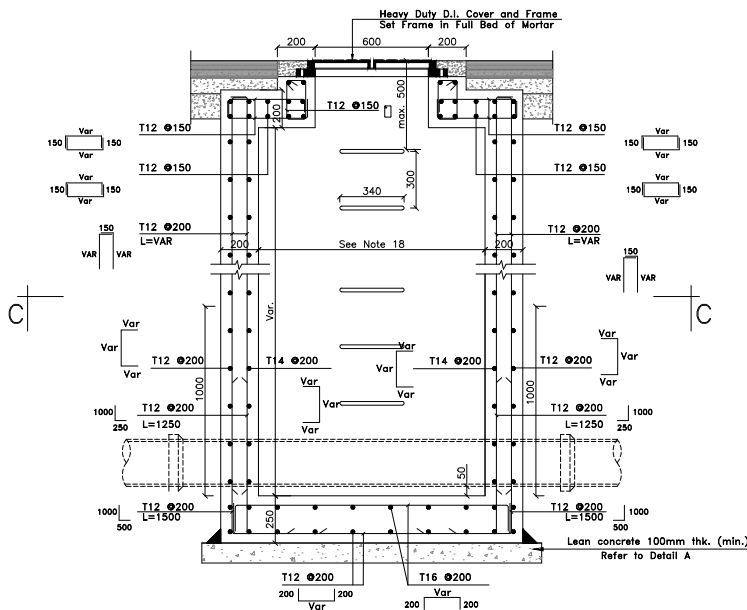


N.T.S. : NOT TO SCALE
D.I. : DUCTILE IRON
DIA. : DIAMETER

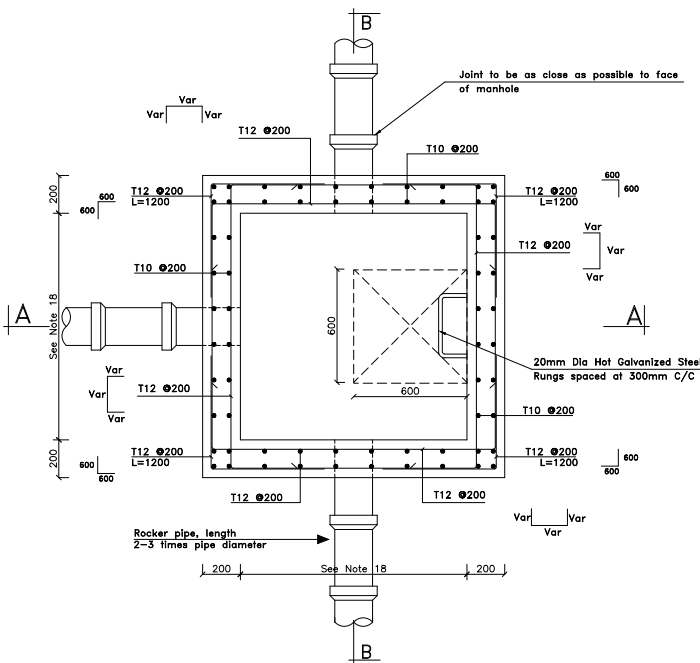
Dwg No.:P-2111D-P1-WW-DET-303			Rev No.: 00
Date: SEPTEMBER-2026			Scale: 1/20
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.



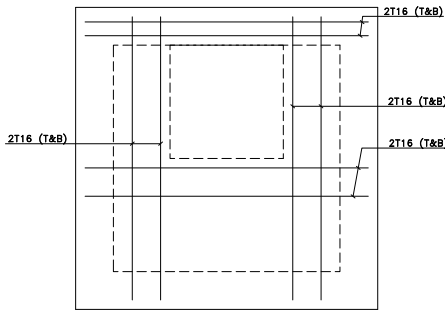
SECTION A-A
SCALE :1/20



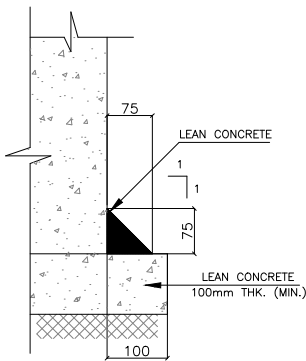
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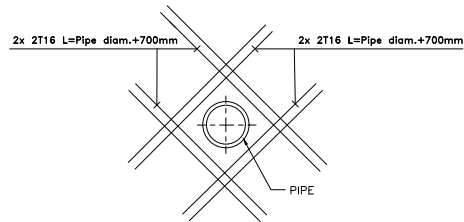
SECTION C-C
SCALE :1/20



TYPICAL ADDITIONAL REINFORCEMENT
AT TOP SLAB OPENINGS



DETAIL A



TYPICAL ADDITIONAL REINFORCEMENT
AT PIPE OPENINGS IN WALL

NOTES:

- 1-ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED. LEVELS ARE INDICATED IN METERS ASL (ABOVE SEA LEVEL). DIMENSIONS MUST NOT BE SCALED ON THE DRAWINGS.
- 2-LEAN CONCRETE SHALL HAVE COMPRESSIVE STRENGTH OF 14 MPa. ALL OTHER CONCRETE USED SHALL HAVE COMPRESSIVE STRENGTH OF 23 MPa.
- 3-CONCRETE IS AS PER STRUCTURAL CONCRETE AND REINFORCING SPECIFICATION.
- 4-HIGH TENSILE REINFORCEMENT (INDICATED ON DRAWINGS BY T) MUST HAVE A MINIMUM GUARANTEED YIELD STRENGTH OF 420MPa.
- 5-ALL UNDERGROUND CONCRETE IN CONTACT WITH THE GROUND AND SEWAGE TO BE SULPHATE RESISTING.
- 6-OVERLAPPING LENGTH OF REINFORCEMENT ARE THESE SHOWN ON THE DRAWINGS BUT NOT LESS THAN 50 TIMES DIAMETER OF THE BAR.
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- 9-BACKFILL PIPES AFTER INSTALLATION TO A MINIMUM COVER OF 900MM IN ROADS AND ELSEWHERE.
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- 11-MANHOLE SHALL BE PROVIDED WITH 20MM DIAMETER HOT GALVANIZED STEEL RUNGS SPACED AT 300MM C/C FOR ACCESS AT THE INDICATED LOCATIONS IN THE REINFORCED CONCRETE WALLS.
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- 17-SEWERS CROSSING WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE BETWEEN THE BOTTOM OF THE WATER MAIN & THE TOP OF THE SEWER.
- 18-PIPE DIAMETER AND INTERNAL DIMENSIONS:

PIPE DIAMETER (mm)	MINIMUM INTERNAL DIMENSIONS		
	H ≤ 3m (mm)	3m < H ≤ 6m (mm)	H > 6m (mm)
100	1200x1200	1500x1500	2400x2400
150	1300x1300	1500x1500	2400x2400
200	1500x1500	1800x1800	2400x2400
250	1800x1800	1800x1800	2400x2400

IT SHOULD BE NOTED THAT THE ABOVE SIZES ARE MINIMUMS AND THE CHAMBER SIZE SHALL BE SUFFICIENT TO ACCOMMODATE ADEQUATE BENCHING.

N.T.S. : NOT TO SCALE
D.I. : DUCTILE IRON
DIA. : DIAMETER

01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

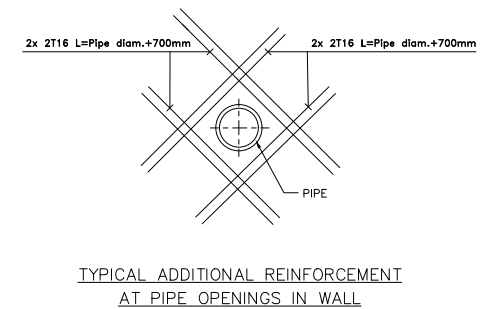
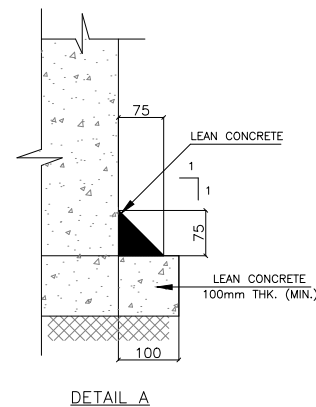
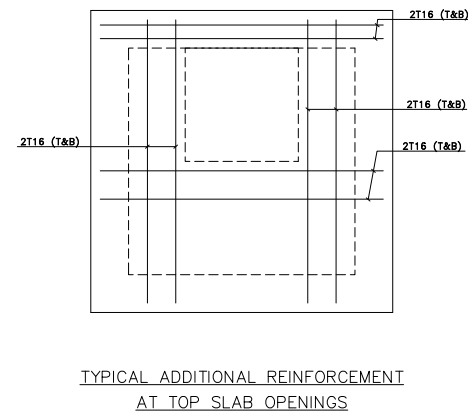
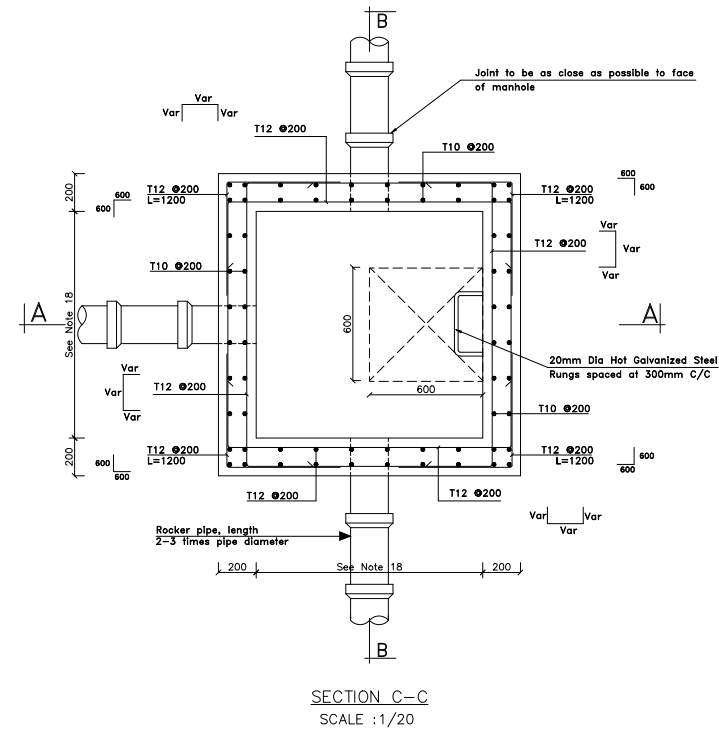
Drawing Title:

WASTEWATER NETWORK CAST IN SITU MANHOLES REINFORCEMENT & TYPICAL DETAILS

SHEET 1 OF 3

Dwg No.: P-2111D-P1-VW-DET-304			Rev No.: 00
Date: SEPTEMBER-2026			Scale: 1/20
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.

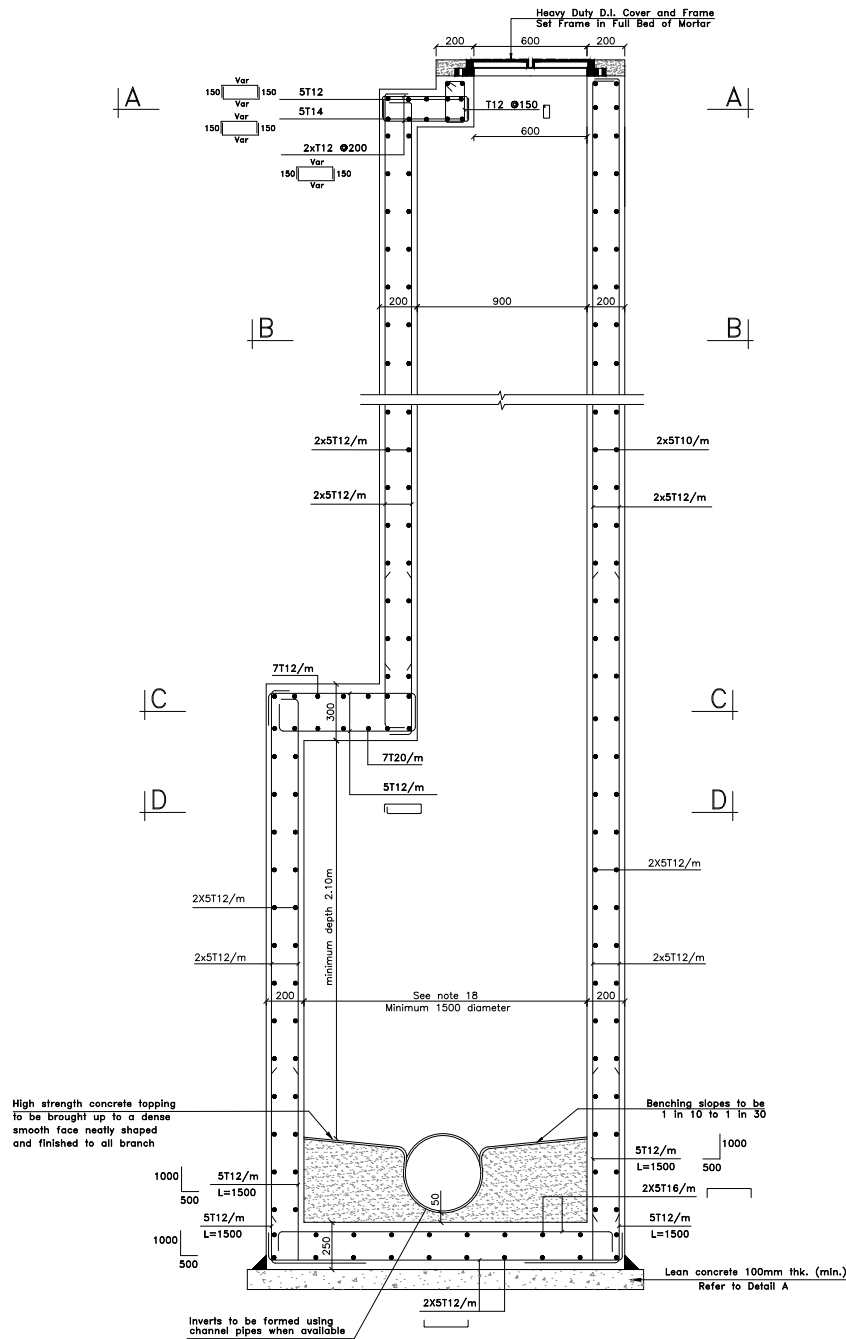
SEWER MANHOLE – DEPTH: $H \leq 3m$



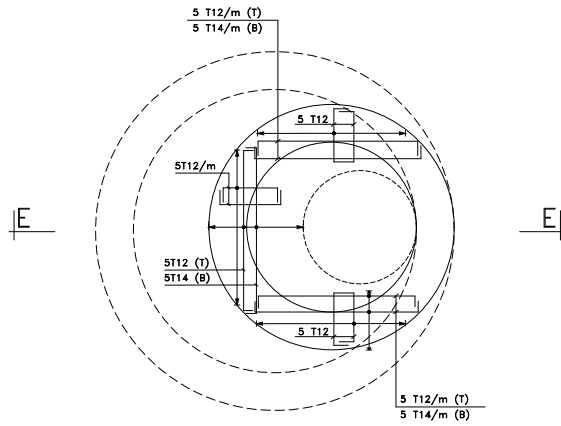
N.T.S. : NOT TO SCALE
D.I. : DUCTILE IRON
DIA. : DIAMETER

Drawn	Designed	Checked	Approved
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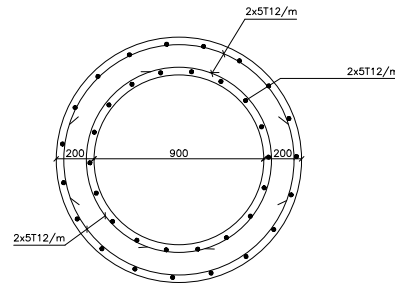
SEWER MANHOLE – DEPTH: $3\text{m} < H \leq 4\text{m}$



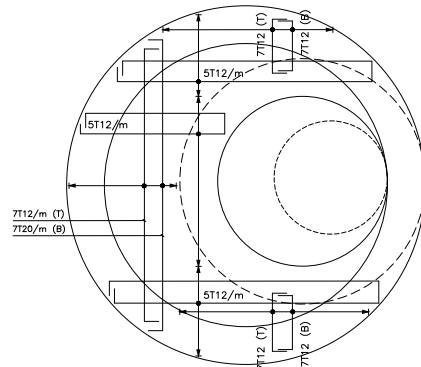
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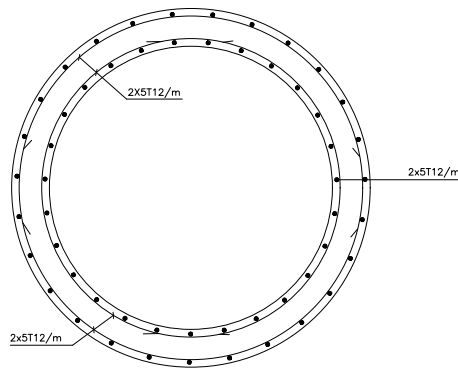
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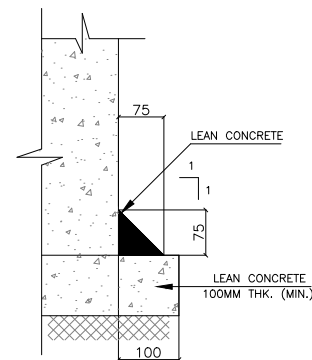
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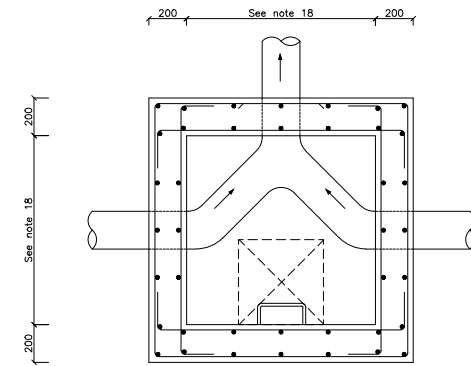
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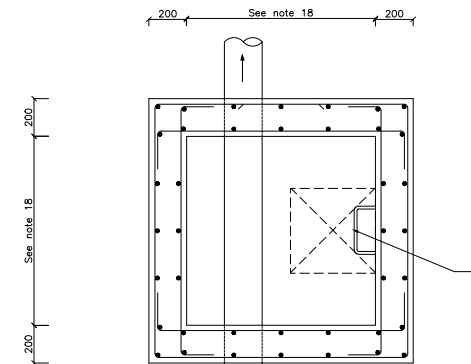
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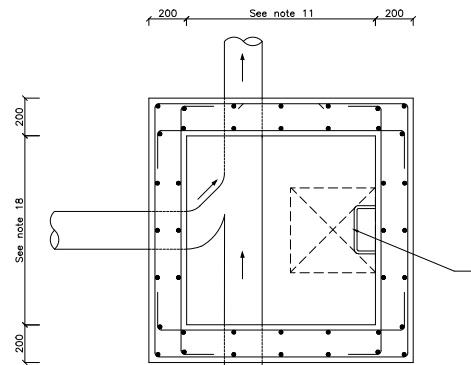
DETAIL A



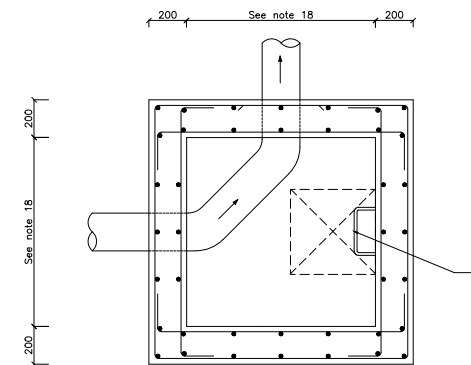
TYPICAL ARRANGEMENT A



TYPICAL ARRANGEMENT B



TYPICAL ARRANGEMENT C



TYPICAL ARRANGEMENT D

NOTES:

- 1-ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED. LEVELS ARE INDICATED IN METERS ASL (ABOVE SEA LEVEL). DIMENSIONS MUST NOT BE SCALED ON THE DRAWINGS.
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- 4-HIGH TENSILE REINFORCEMENT (INDICATED ON DRAWINGS BY T) MUST HAVE A MINIMUM GUARANTEED YIELD STRENGTH OF 420MPa.
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- 17-SEWERS CROSSING WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE BETWEEN THE BOTTOM OF THE WATER MAIN & THE TOP OF THE SEWER.
- 18-PIPE DIAMETER AND INTERNAL DIMENSIONS:

PIPE DIAMETER (mm)	MINIMUM INTERNAL DIMENSIONS		
	H ≤ 3m (mm)	3m < H ≤ 6m (mm)	H > 6m (mm)
# < 375	1200x1200	1500x1500	2400x2400
375 ≤ # ≤ 450	1300x1300	1500x1500	2400x2400
450 ≤ # ≤ 700	1500x1500	1500x1500	2400x2400
700 ≤ # ≤ 800	1800x1800	1800x1800	2400x2400

IT SHOULD BE NOTED THAT THE ABOVE SIZES ARE MINIMUMS AND THE CHAMBER SIZE SHALL BE SUFFICIENT TO ACCOMMODATE ADEQUATE BENCHING.

N.T.S. : NOT TO SCALE
D.I. : DUCTILE IRON
DIA. : DIAMETER

01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONSULTANT:



Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE EXPANSION OF THE SEWAGE COLLECTION NETWORK TO CONNECT TO THE ZAHLE WASTEWATER TREATMENT PLANT AND AITANIT WASTEWATER TREATMENT PLANT (GC2W2C)

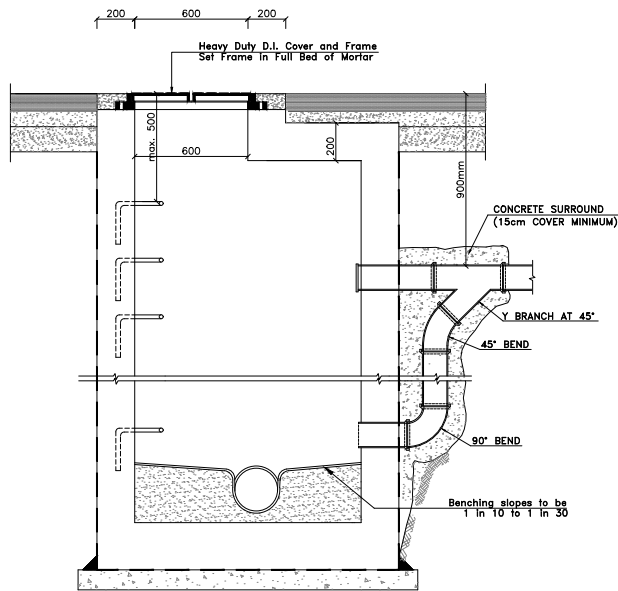
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WASTEWATER NETWORK CAST IN SITU MANHOLES REINFORCEMENT & TYPICAL DETAILS

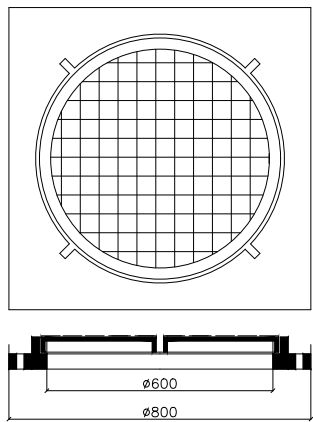
SHEET 3 OF 3

Dwg No.:P-2111D-P1-WW-DET-306			Rev No.: 00
Date: SEPTEMBER-2026			Scale: 1/20
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.

SEWER MANHOLE – DEPTH: $4m < H \leq 6m$

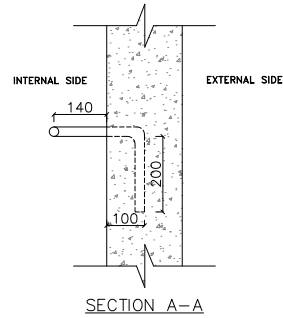


DROP MANHOLE
EXCESSIVE DROP > 1000mm
SCALE :1/20

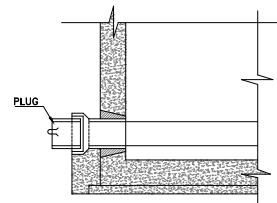
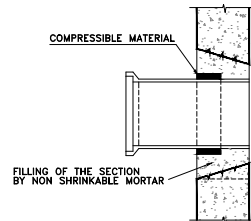
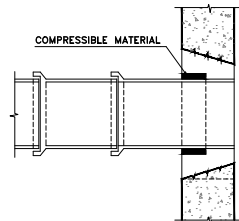
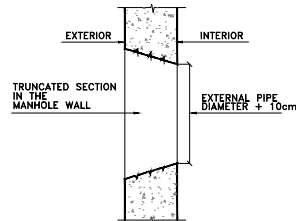
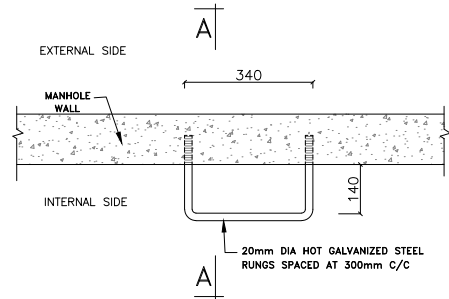


HEAVY DUTY COVER
ON MANHOLES
SCALE :1/10

SET FRAME IN FULL BED OF MORTAR
(FOR HEAVY TRAFFIC ONLY)

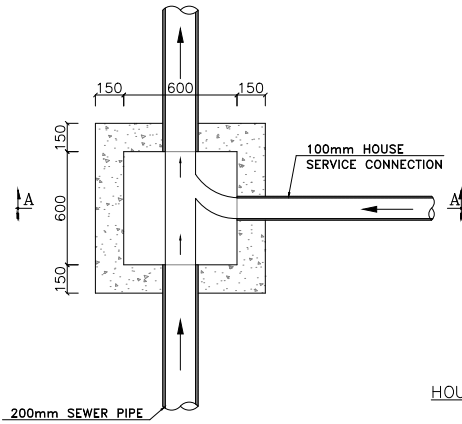


MANHOLE STEP
DETAIL B
SCALE: 1/10

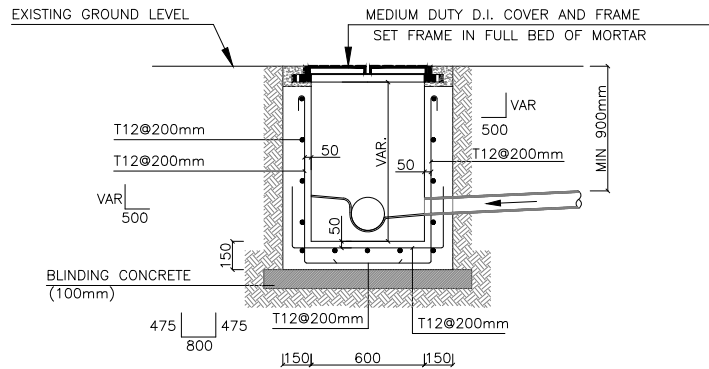
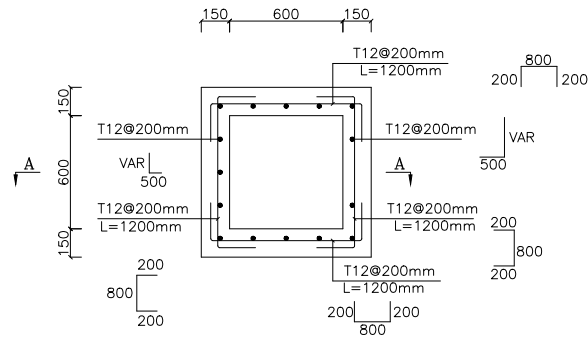


SECTION
PLUG FOR FUTURE CONNECTION
FOR THE UPPER MOST MANHOLE

DETAILS FOR THE CONNECTION
OF A PIPE TO A MANHOLE



HOUSE CONNECTION
PLAN VIEW



SECTION A-A

HOUSE CONNECTION
SCALE 1/20

NOTES:

- 1-ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED. LEVELS ARE INDICATED IN METERS ASL (ABOVE SEA LEVEL). DIMENSIONS MUST NOT BE SCALED ON THE DRAWINGS.
- 2-LEAN CONCRETE SHALL HAVE COMPRESSIVE STRENGTH OF 14 MPA. ALL OTHER CONCRETE USED SHALL HAVE COMPRESSIVE STRENGTH OF 25 MPA.
- 3-CONCRETE IS AS PER STRUCTURAL CONCRETE AND REINFORCING SPECIFICATION.
- 4-HIGH TENSILE REINFORCEMENT (INDICATED ON DRAWINGS BY T) MUST HAVE A MINIMUM GUARANTEED YIELD STRENGTH OF 420MPa.
- 5-ALL UNDERGROUND CONCRETE IN CONTACT WITH THE GROUND AND SEWAGE TO BE SULPHATE RESISTING.
- 6-OVERLAPPING LENGTH OF REINFORCEMENT ARE THOSE SHOWN ON THE DRAWINGS BUT NOT LESS THAN 50 TIMES DIAMETER OF THE BARS.
- 7-MINIMUM COVER OF REINFORCEMENT TO INSIDE & OUTSIDE FACES SHALL NOT BE LESS THAN 50MM AND MAXIMUM COVER SHALL NOT BE MORE THAN ONE THIRD OF THE WALL THICKNESS.
- 8-A FLEXIBLE PIPE JOINT SHALL BE PROVIDED AS CLOSE AS IS PRACTICABLE TO THE OUTSIDE FACE OF THE MANHOLE. IN ANY CASE THE DISTANCE FROM THE MANHOLE SHALL NOT EXCEED HALF THE NOMINAL DIAMETER OF THE PIPE THE LENGTH OF THE NEXT PIPE (ROCKER PIPE) SHALL BE 2 TO 3 TIMES THE DIAMETER OF THE PIPE.
- 9-BACKFILL PIPES AFTER INSTALLATION TO A MINIMUM COVER OF 800MM IN ROADS AND ELSEWHERE.
- 10-ENCASMENT IS REQUIRED ON PIPE WHICH HAS A COVER FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE. OF LESS THAN 800MM OR MORE THAN 800MM.
- 11-MANHOLES SHALL BE PROVIDED WITH 20MM DIAMETER HOT GALVANIZED STEEL RUNGS SPACED AT 300MM C/C FOR ACCESS AT THE INDICATED LOCATIONS IN THE REINFORCED CONCRETE WALLS.
- 12-RUNGS AND LADDERS SHALL BE PLASTIC COATED OR MADE FROM AN APPROVED CORROSION RESISTANT MATERIAL.
- 13-MANHOLE COVER AND STEPS SHALL BE LOCATED ON THE SIDE WHERE NO INLET/OUTLET PIPES OCCURS. IN THE CASE WHERE INLET/OUTLET PIPES OCCURS ON THE FOUR SIDES ON THE MANHOLE, THE COVER AND LADDER RUNGS SHALL BE INSTALLED ON THE FACE WHERE THE SMALLEST PIPE EXISTS.
- 14-TWO COATS OF APPROVED BITUMINOUS PAINT SHALL BE BRUSH APPLIED ON CONCRETE SURFACES IN CONTACT WITH SOIL.
- 15-GRP OR HDPE LINER SHALL BE APPLIED TO ALL INTERNAL SURFACES OF SEWER STRUCTURES.
- 16-THE GAP/VOID BETWEEN PIPE AND CONCRETE SHALL BE FILLED/GROUTED WITH APPROVED TYPE OF EXPANSIVE GROUT TO SEAL THE GAPS PROPERLY.
- 17-SEWERS CROSSING WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE BETWEEN THE BOTTOM OF THE WATER MAIN & THE TOP OF THE SEWER.

N.T.S. : NOT TO SCALE
D.I. : DUCTILE IRON
DIA. : DIAMETER

01		
Rev.	DESCRIPTION	DATE

FUNDING AGENT:



CLIENT:



COUNCIL FOR DEVELOPMENT
AND RECONSTRUCTION

CONSULTANT:



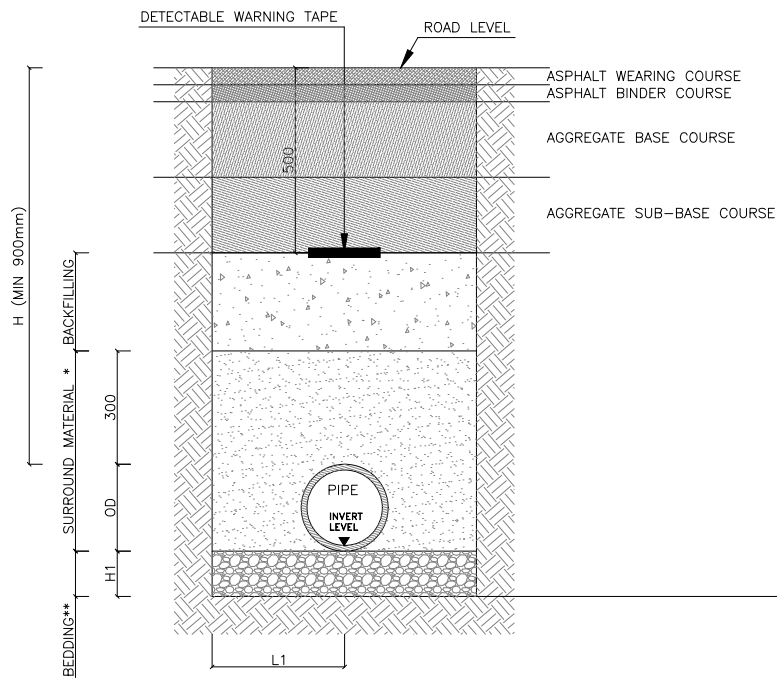
Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE
EXPANSION OF THE SEWAGE COLLECTION
NETWORK TO CONNECT TO THE ZAHLE
WASTEWATER TREATMENT PLANT AND
AITANIT WASTEWATER TREATMENT PLANT
(GC2W2C)

Drawing Title:

WASTEWATER NETWORK
MANHOLES TYPICAL DETAILS

Dwg No.: P-2111D-P1-VV-DET-307			Rev No.: 00
Date: SEPTEMBER-2026			Scale: A.S.
Drawn	Designed	Checked	Approved
O.D	M.N	R.S	G.K.



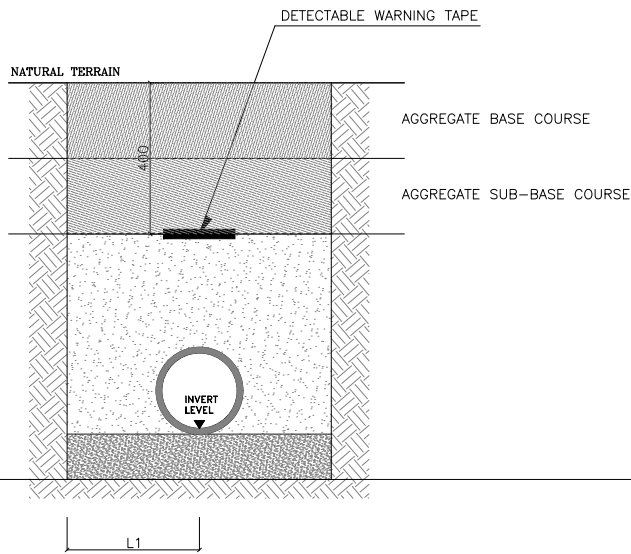
TRENCH IN ASPHALTED ROADS
CROSS SECTION
SCALE 1/10

L1 = MIN 2/3 OD + 230mm
= FROM PIPE CENTER TO TRENCH EDGE

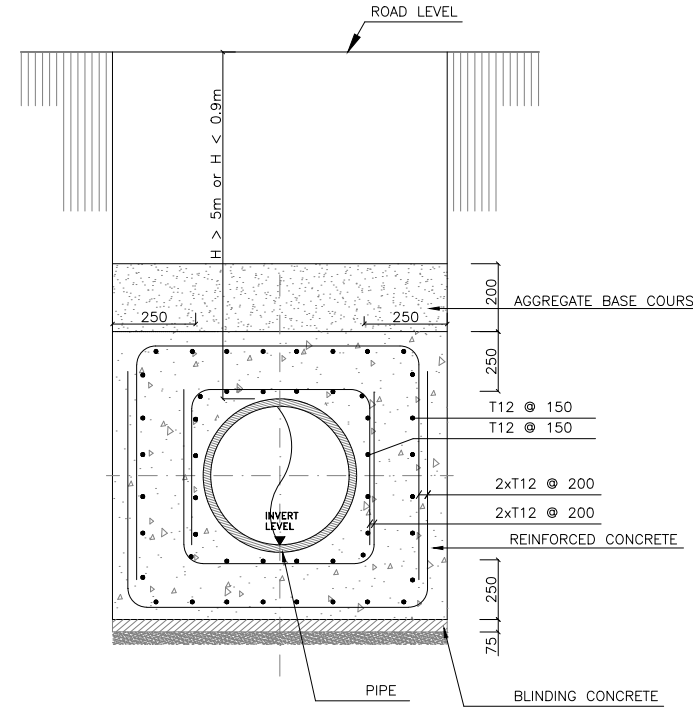
H1 = 100 + $\frac{\text{MAX}(\text{DN1}, \text{DN2})}{10}$

* THE SURROUND MATERIAL IS AS SPECIFIED
IN THE TECHNICAL SPECIFICATIONS

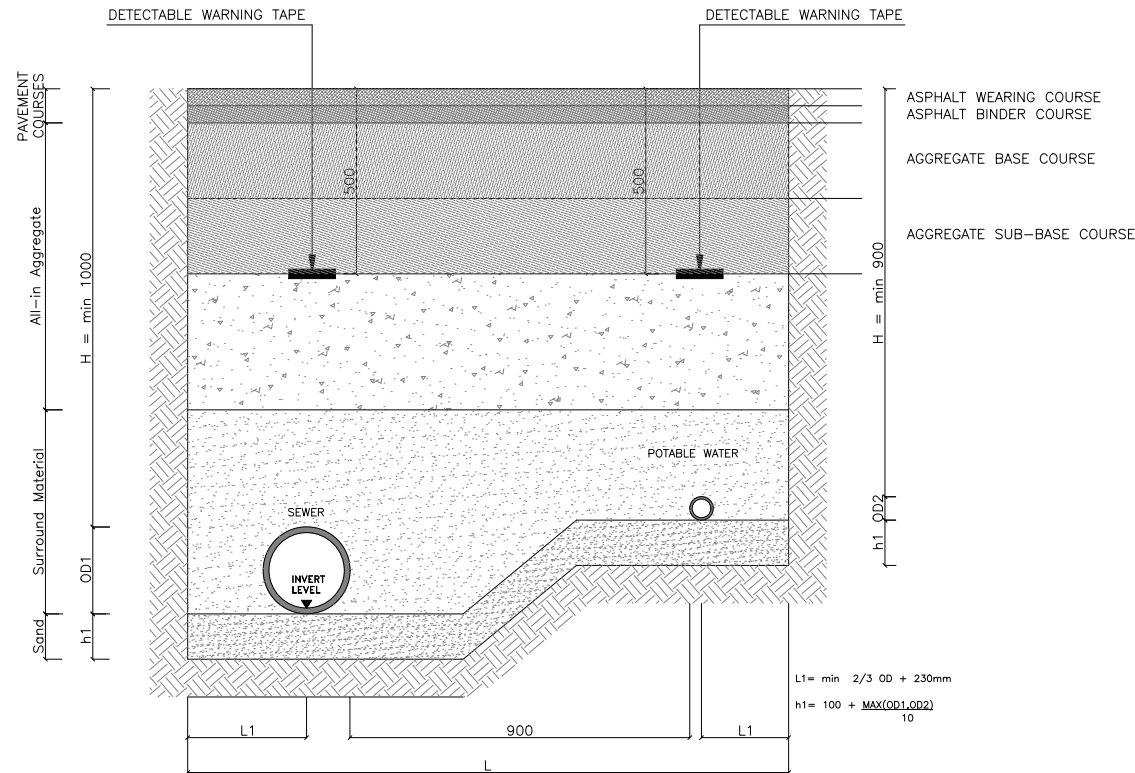
** SAND BEDDING : IF PIPE IS ABOVE WATER TABLE
GRAVEL : IF PIPE IS BELOW WATER TABLE



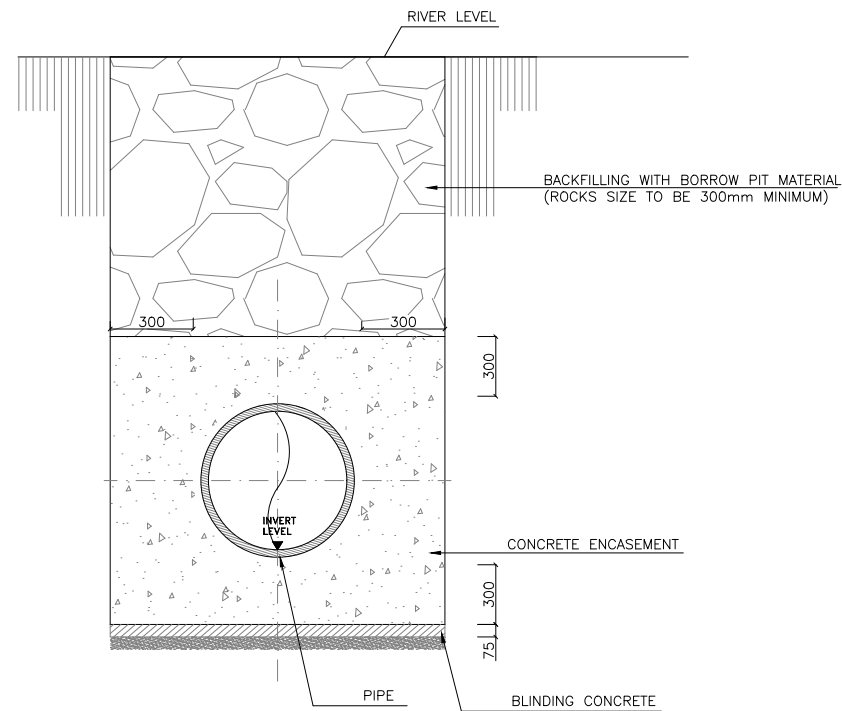
TRENCH IN NATURAL TERRAIN
CROSS SECTION
SCALE 1/10



CONCRETE ENCASEMENT IN ROAD TRENCH
N.T.S.



TYPICAL DETAIL FOR TRENCHES HOUSING
POTABLE WATER PIPE LINE & SEWER PIPE LINE



TYPICAL DETAIL FOR PIPE PROTECTION
LAID ALONG THE RIVER
N.T.S.

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- 3-CONCRETE IS AS PER STRUCTURAL CONCRETE AND REINFORCING SPECIFICATION.
- 4-HIGH TENSILE REINFORCEMENT (INDICATED ON DRAWINGS BY T) MUST HAVE A MINIMUM GUARANTEED YIELD STRENGTH OF 400MPa.
- 5-ALL UNDERGROUND CONCRETE IN CONTACT WITH THE GROUND AND SEWAGE TO BE SULPHATE RESISTING.
- 6-OVERLAPPING LENGTH OF REINFORCEMENT ARE THESE SHOWN ON THE DRAWINGS BUT NOT LESS THAN 50 TIMES DIAMETER OF THE BAR.
- 7-MINIMUM COVER OF REINFORCEMENT TO INSIDE & OUTSIDE FACES SHALL NOT BE LESS THAN 20MM AND MAXIMUM COVER SHALL NOT BE MORE THAN ONE THIRD OF THE WALL THICKNESS.
- 8-A FLEXIBLE PIPE JOINT SHALL BE PROVIDED AS CLOSE AS IS PRACTICABLE TO THE OUTSIDE FACE OF THE MANHOLE. IN ANY CASE THE DISTANCE FROM THE MANHOLE SHALL NOT EXCEED HALF THE NOMINAL DIAMETER OF THE PIPE. THE LENGTH OF THE NEXT PIPE (ROCKER PIPE) SHALL BE 2 TO 3 TIMES THE DIAMETER OF THE PIPE.
- 9-BACKFILL PIPES AFTER INSTALLATION TO A MINIMUM COVER OF 900MM IN ROADS AND ELSEWHERE.
- 10-ENCASEMENT IS REQUIRED ON PIPE WHICH HAS A COVER FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE. OF LESS THAN 900MM OR MORE THAN 900MM.
- 11-MANHOLE SHALL BE PROVIDED WITH 20MM DIAMETER HOT GALVANIZED STEEL RUNGS SPACED AT 300MM C/C FOR ACCESS AT THE INDICATED LOCATIONS IN THE REINFORCED CONCRETE WALLS.
- 12-RUNGS AND LADDERS SHALL BE PLASTIC COATED OR MADE FROM AN APPROVED CORROSION RESISTANT MATERIAL.
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N.T.S. : NOT TO SCALE
D.I. : DUCTILE IRON
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CLIENT:



COUNCIL FOR DEVELOPMENT AND
RECONSTRUCTION

CONSULTANT:



Project Name: P-2111D

COMPLEMENTARY WORKS FOR THE
EXPANSION OF THE SEWAGE COLLECTION
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WASTEWATER TREATMENT PLANT AND
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(GC2W2C)

Drawing Title:

WASTEWATER NETWORK
TRENCHES TYPICAL DETAILS

Dwg No.: P-2111D-P1-WW-DET-308			Rev No.: 00
Date: SEPTEMBER-2026			Scale: A.S.
Drawn	Designed	Checked	Approved
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