Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

HAM VILLAGE

DETAILED DESIGN DRAWINGS

Consultant:

engicon

Client:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

January 2021

DRAWING NO	DRAWING TITLE
G-000	LIST OF DRAWINGS
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W-PL-103	HAM PROPOSED NETWORK LAYOUT PLAN (SHEET 3 OF 4)
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Purpose Of Issue	Rev.	Date	Approved

Consultant:

engicon

Client:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

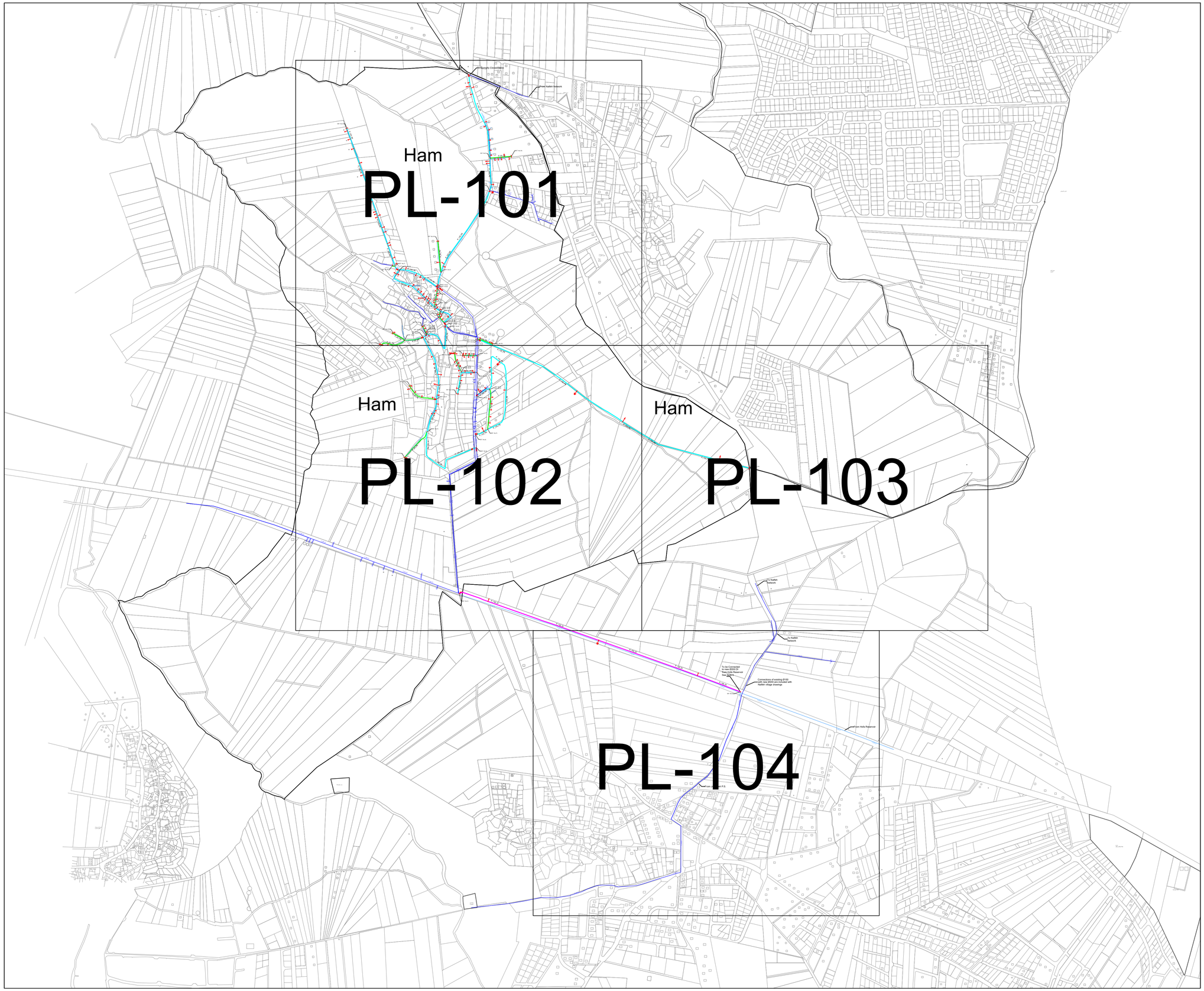
Title:

LIST OF DRAWINGS

Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: N.T.S.	Date: JAN. 2021	Approved: W.Z.

METERS

Drawing Number:	Rev.:
G-000	0



NOTES:

1. Crossings with other pipes and utilities to be verified by Contractor on site.
2. For node connection details, refer to typical details drawings W-TD-14 to W-TD-16.
3. Invert levels of connection points between existing & new pipes to be verified by Contractor on site.
4. For 150mm DI Pipe profile, refer to drawings W-PR-201 to W-PR-203.
5. The network rehabilitation design is based on replacing old GI and Steel pipes with HDPE pipes, if during the work any of the pipes selected for replacement was found to be HDPE, it shall remain as is and not to be replaced.
6. If the New Pipe Ø150mm supplying Ham was constructed before new Ø200mm pipe within Natfeh village works, connect the new Ø150 pipe to the existing 400 ST pipe from Hofa temporarily.

LEGEND:

- Ham Village Border
- P_50_G — Canceled Existing Pipes and Fittings with Text
- P_63_PE — Existing Network and Fittings with Text
- Proposed Pipe 63 HDPE
- Proposed Pipe 125 HDPE
- Proposed Pipe 150 DI
- Proposed House Connections
- Proposed Pressure Reducing Valve
- Proposed Gate Valve
- FCV — Proposed Flow Control Valve
- Proposed End Cap
- Proposed Single Air Release Valve
- Proposed Washout
- DET. No.(2) — Proposed Node Connection with Detail No.

Purpose Of Issue	Rev.	Date	Approved

Consultant: engicon

Client: giz — Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

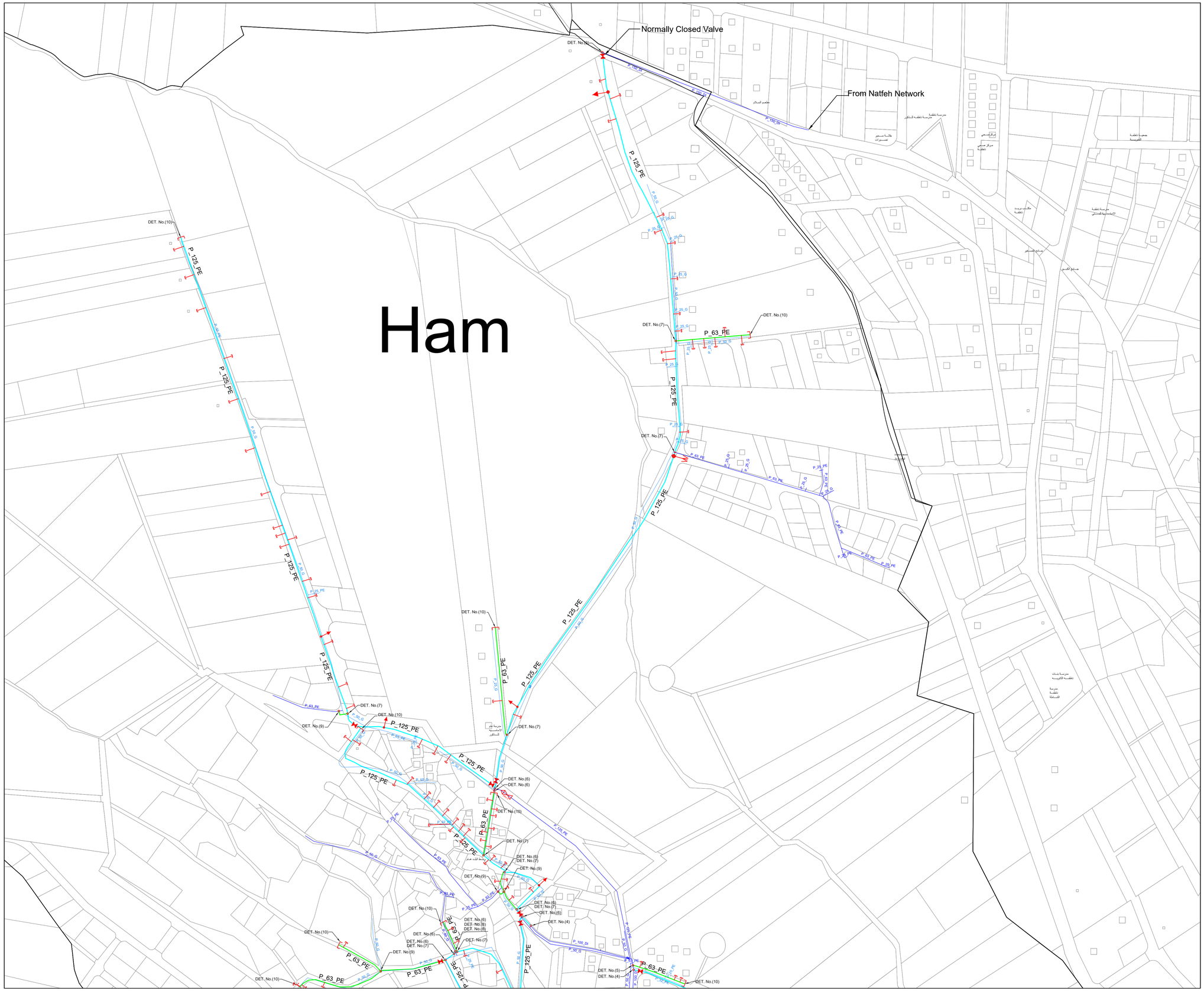
Title:

HAM PROPOSED NETWORK
KEY PLAN

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	**Date:**	**Approved:**
N.T.S.	JAN. 2021	W.Z.

METERS

Drawing Number:	Rev.:
W-PL-100	0



NOTES:

1. Crossings with other pipes and utilities to be verified by Contractor on site.
2. For node connection details, refer to typical details drawings W-TD-14 to W-TD-16.
3. Invert levels of connection points between existing & new pipes to be verified by Contractor on site.
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- Proposed Pipe 150 DI
- Proposed House Connections
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- Proposed Gate Valve
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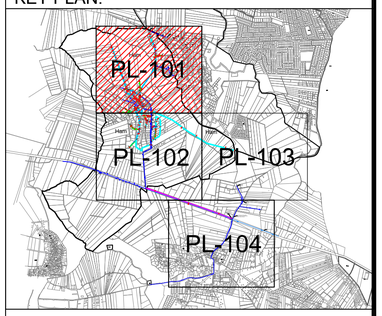
- Proposed End Cap
- Proposed Single Air Release Valve
- Proposed Washout
- DET. No.(2) — Proposed Node Connection with Detail No.

KEY PLAN:



Purpose Of Issue	Rev.	Date	Approved

Consultant: engicon

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Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

HAM PROPOSED NETWORK
SHEET (1 OF 4)

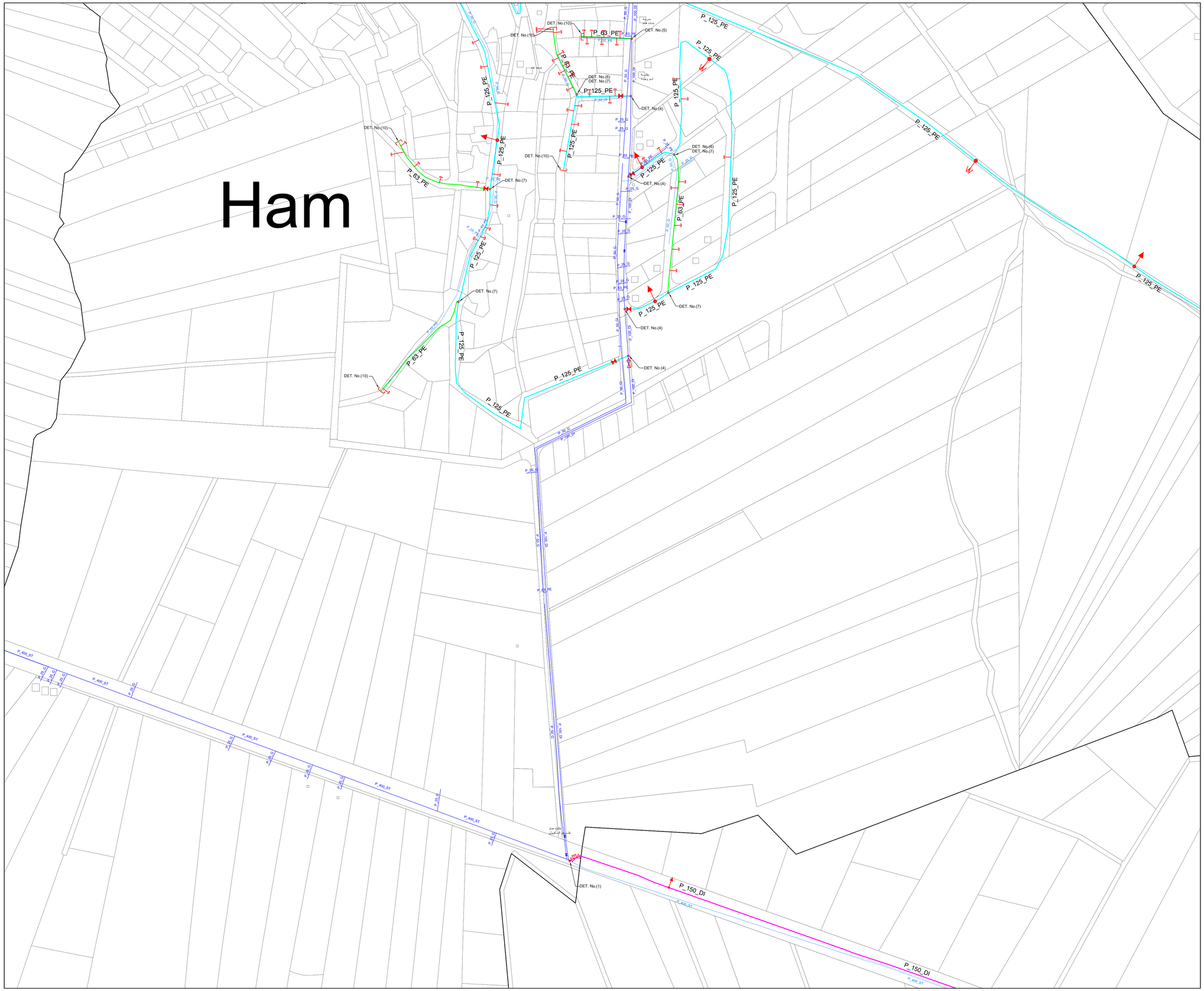
Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	**Date:**	**Approved:**
1:2500	JAN. 2021	W.Z.

0 50 100 150 200 250
METERS

Drawing Number: W-PL-101

Rev.: 0

MATCH LINE (SEE SHEET W-PL-101)



MATCH LINE (SEE SHEET W-PL-103)

NOTES:

1. Crossings with other pipes and utilities to be verified by Contractor on site.
2. For node connection details, refer to typical details drawings W-TD-14 to W-TD-16.
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- Proposed House Connections
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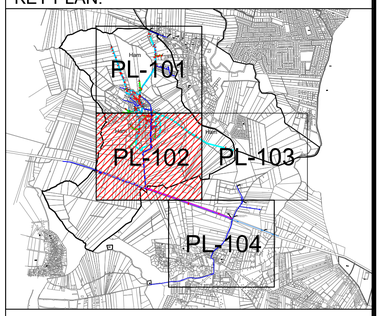
- FCV — Proposed Flow Control Valve
- Proposed End Cap
- Proposed Single Air Release Valve
- Proposed Washout
- DET. No.(2) — Proposed Node Connection with Detail No.

KEY PLAN:



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Consultant: engicon

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Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

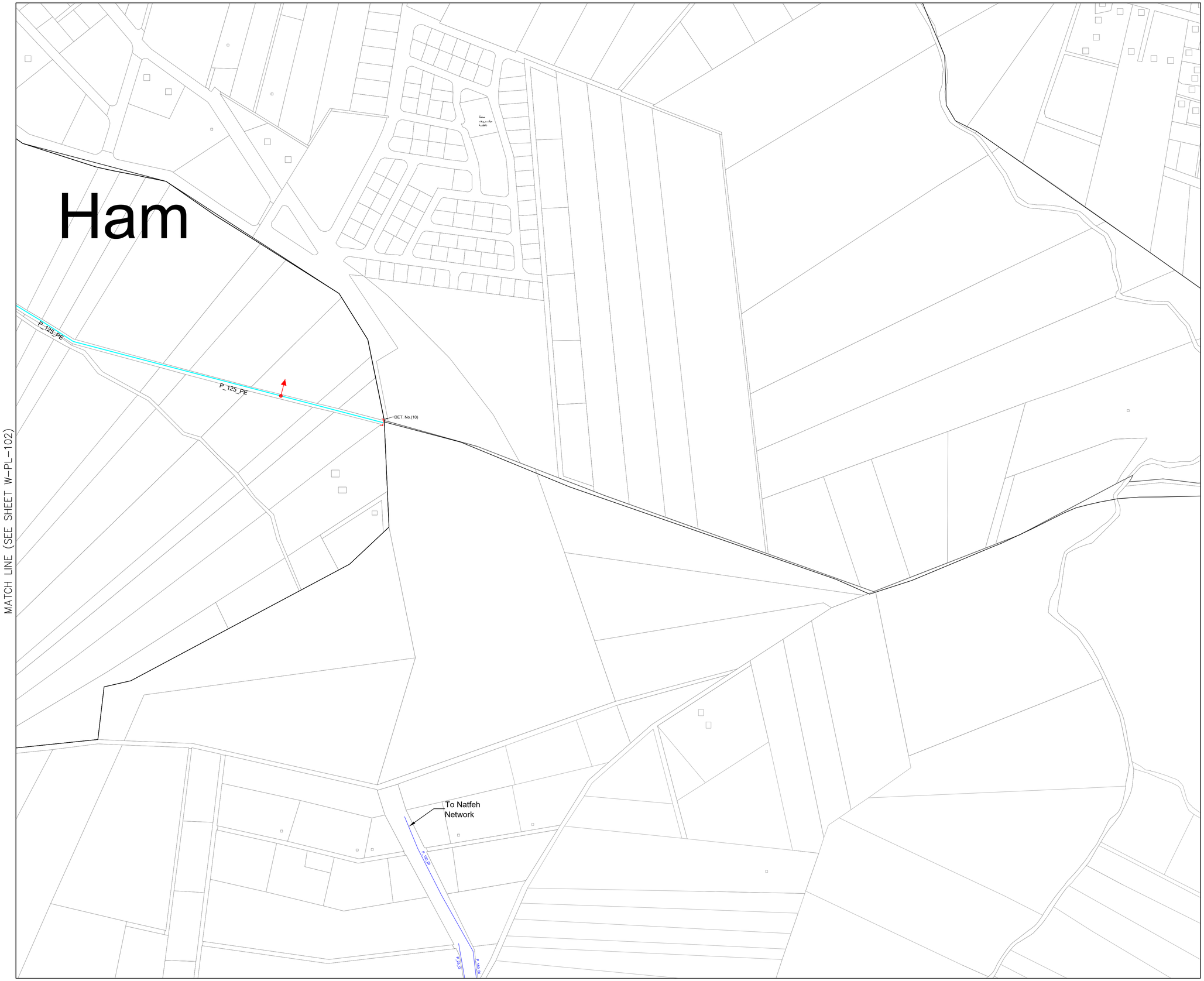
Title:

HAM PROPOSED NETWORK
SHEET (2 OF 4)

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	Date:	Approved:
1:2500	JAN. 2021	W.Z.

0 50 100 150 200 250
METERS

Drawing Number:	Rev.:
W-PL-102	0



NOTES:

1. Crossings with other pipes and utilities to be verified by Contractor on site.
2. For node connection details, refer to typical details drawings W-TD-14 to W-TD-16.
3. Invert levels of connection points between existing & new pipes to be verified by Contractor on site.
4. For 150mm DI Pipe profile, refer to drawings W-PR-201 to W-PR-203.
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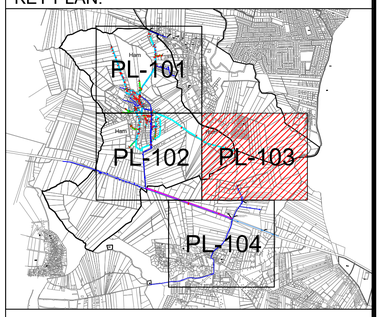
- Proposed Pipe 150 DI
- Proposed House Connections
- Proposed Pressure Reducing Valve
- Proposed Gate Valve
- FCV — Proposed Flow Control Valve
- Proposed End Cap
- Proposed Single Air Release Valve
- Proposed Washout
- DET. No.(2) — Proposed Node Connection with Detail No.

KEY PLAN:



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Client: giz — Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

HAM PROPOSED NETWORK
SHEET (3 OF 4)

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	**Date:**	**Approved:**
1:2500	JAN. 2021	W.Z.

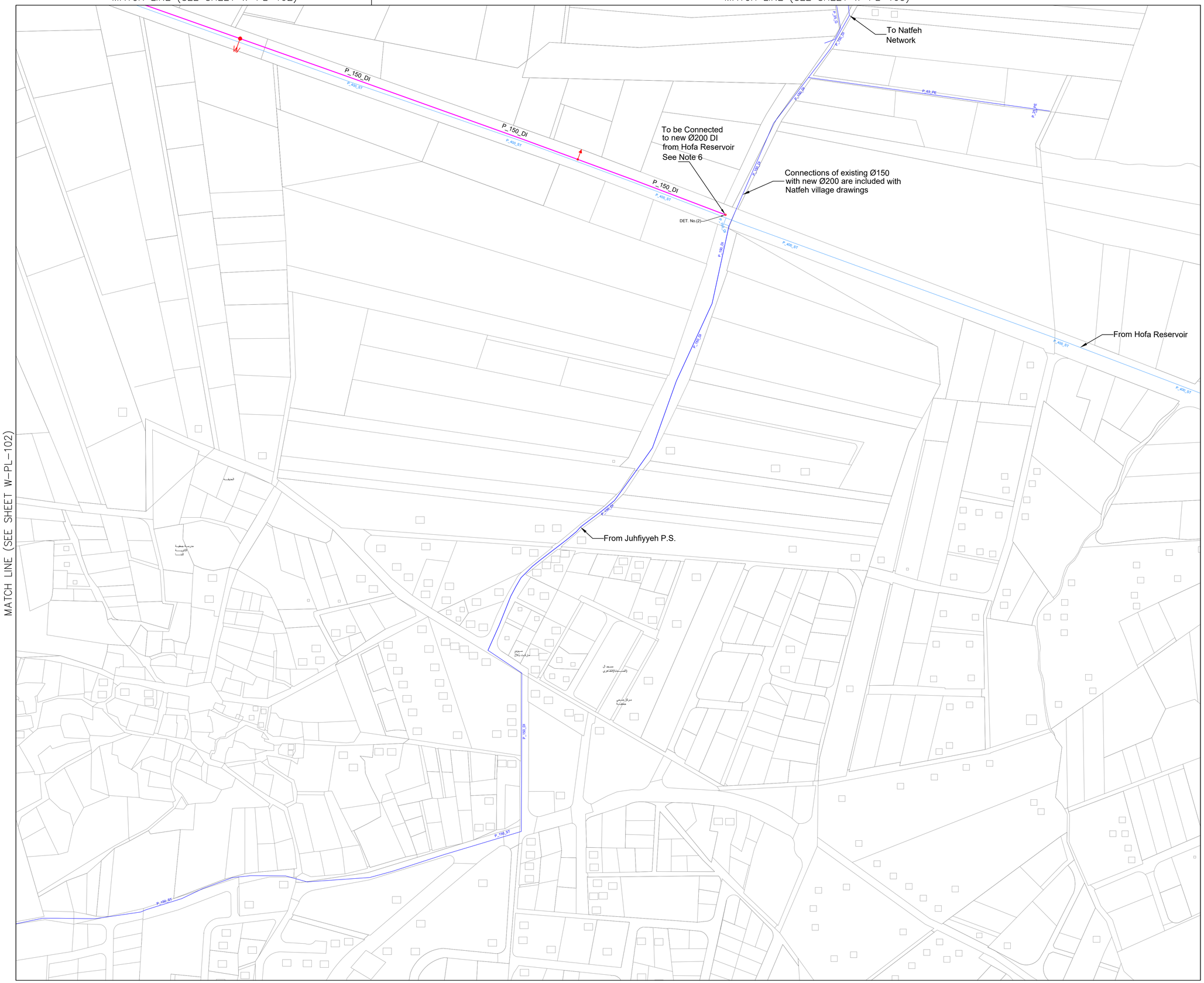
0 50 100 150 200 250
METERS

Drawing Number:	Rev.:
W-PL-103	0

MATCH LINE (SEE SHEET W-PL-102)

MATCH LINE (SEE SHEET W-PL-103)

MATCH LINE (SEE SHEET W-PL-102)



NOTES:

1. Crossings with other pipes and utilities to be verified by Contractor on site.
2. For node connection details, refer to typical details drawings W-TD-14 to W-TD-16.
3. Invert levels of connection points between existing & new pipes to be verified by Contractor on site.
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- P_63_PE — Existing Network and Fittings with Text
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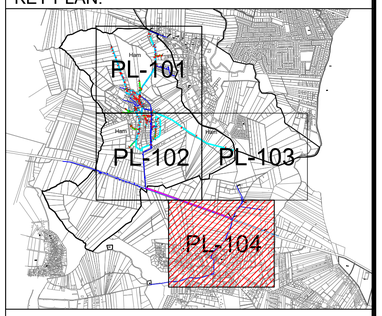
- Proposed Pipe 125 HDPE
- Proposed Pipe 150 DI
- Proposed House Connections
- Proposed Pressure Reducing Valve
- Proposed Gate Valve
- FCV — Proposed Flow Control Valve
- Proposed End Cap
- Proposed Single Air Release Valve
- Proposed Washout
- DET. No.(2) — Proposed Node Connection with Detail No.

KEY PLAN:



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Consultant: engicon

Client: giz — Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

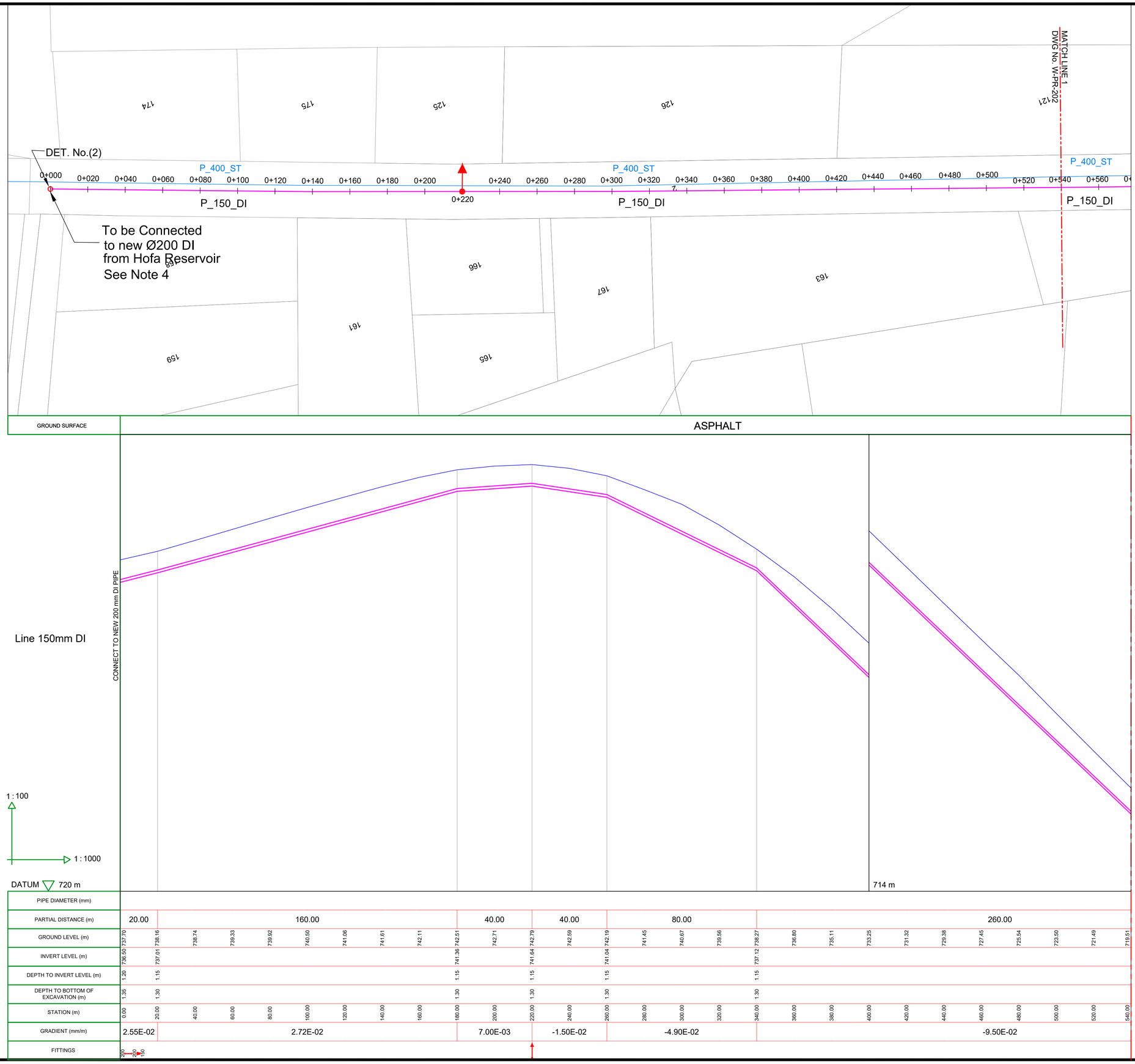
Title:

HAM PROPOSED NETWORK
SHEET (4 OF 4)

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	**Date:**	**Approved:**
1:2500	JAN. 2021	W.Z.

0 50 100 150 200 250
METERS

Drawing Number:	Rev.:
W-PL-104	0



NOTES:

1. For node connection details, refer to typical details drawings W-TD-14 to W-TD-16.
2. Crossings with other pipes and utilities to be verified by Contractor on site.
3. Invert levels of connection points between existing & new pipes to be verified by Contractor on site.
4. If the New Pipe Ø150mm supplying Ham was constructed before new Ø200mm pipe within Natfeh village works, connect the new Ø150 pipe to the existing 400 ST pipe from Hofa temporarily.

LAYOUT LEGEND:

- Ham Village Border
- P_50_G — Canceled Existing Pipes and Fittings with Text
- P_63_PE — Existing Network and Fittings with Text
- Proposed Pipe 150 DI
- 0+060 0+080 0+100 — Profile Stationing
- DET. No.(2) — Proposed Node Connection with Detail No.

PROFILE LEGEND:

- Finish Road Level
- Proposed Pipe

FITTINGS LEGEND:

- FCV — Proposed Flow Control Valve
- Proposed Single Air Release Valve
- W — Proposed Washout
- 45° 90° — Horizontal Bends
- 150 / 400 / 400 — Node Connection
- Reducer

Purpose Of Issue	Rev.	Date	Approved

Consultant: engicon

Client: giz — Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

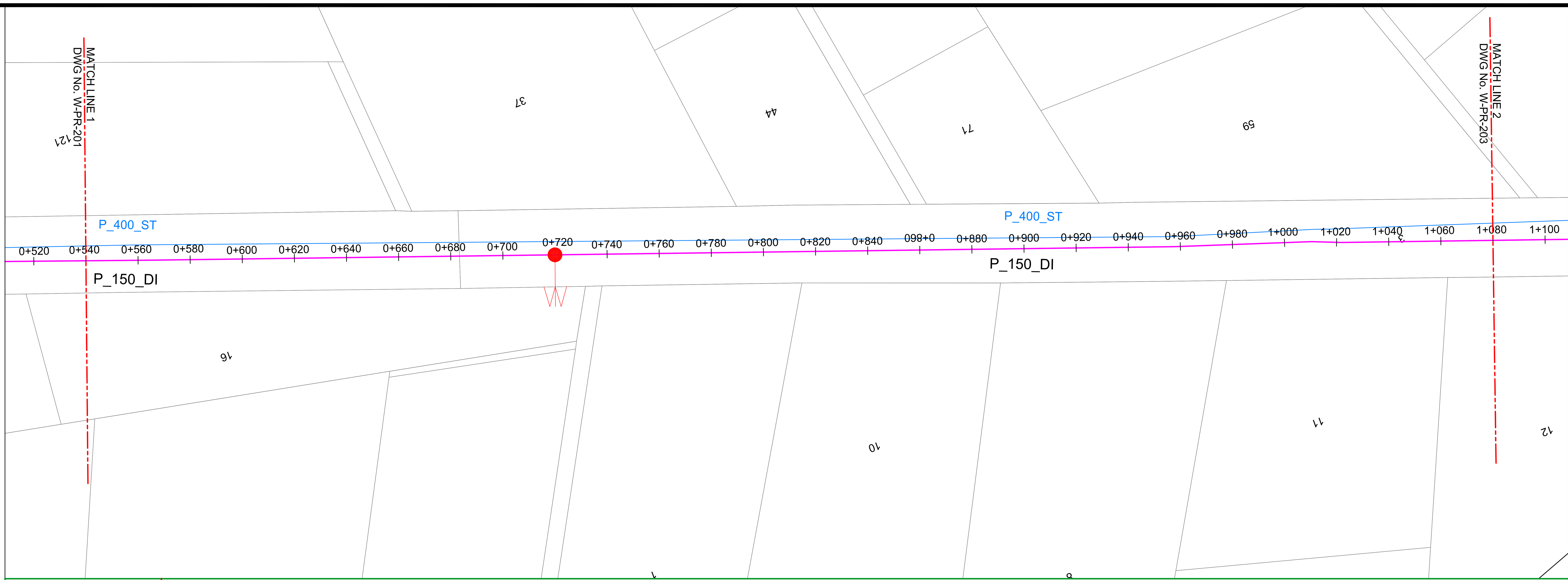
HAM Ø 150 DI PROFILE
SHEET (1 OF 3)

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale: V:1/100 H:1/1000	Date: JAN. 2021	Approved: W.Z.

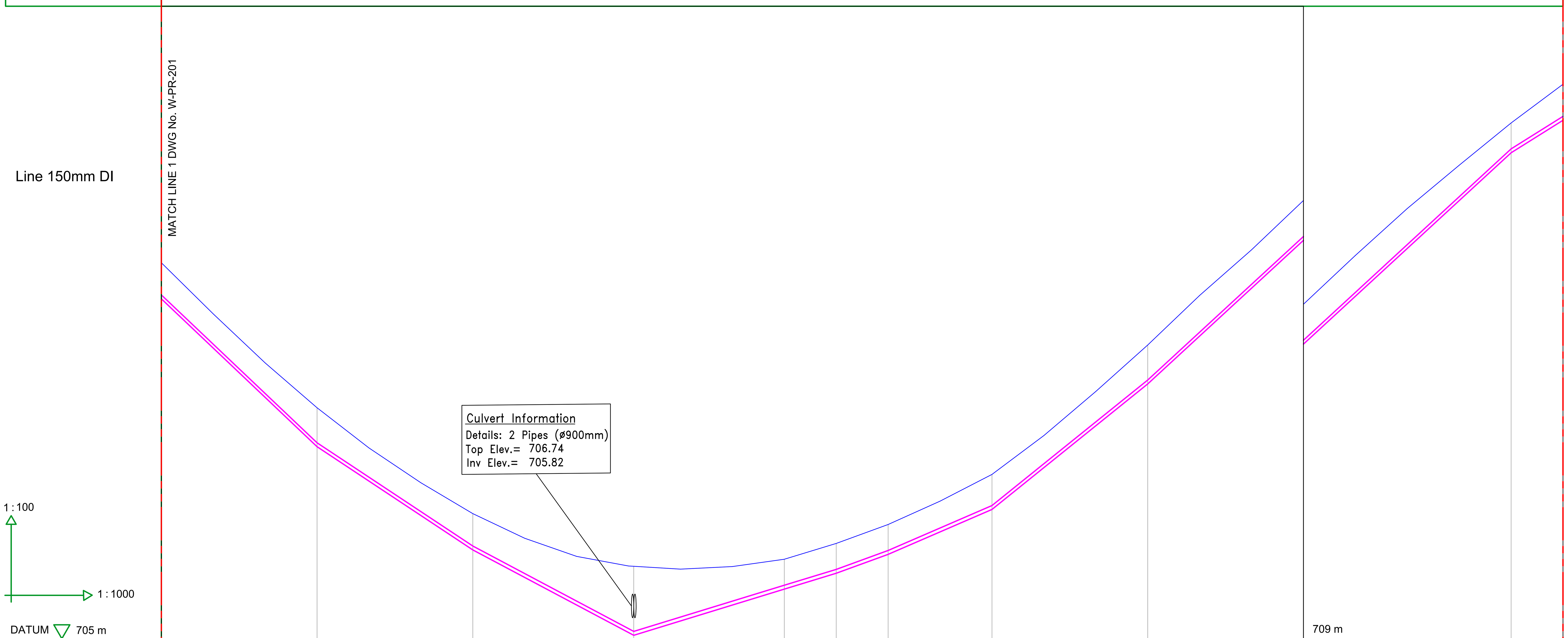
METERS

Drawing Number: W-PR-201

Rev.: 0



GROUND SURFACE	ASPHALT



PIPE DIAMETER (mm): 150 mm DI

STATION (m)	GROUND LEVEL (m)	INVERT LEVEL (m)	DEPTH TO INVERT LEVEL (m)	DEPTH TO BOTTOM OF EXCAVATION (m)	FITTINGS
540.00	719.51				
560.00	717.54				
580.00	715.65				
600.00	713.92	712.42	1.50	1.65	
620.00	712.37				
640.00	711.03				
660.00	709.84	708.44	1.40	1.55	
680.00	708.89				
700.00	708.19				
720.00	707.82				
722.00	707.81	705.15	2.66	2.81	Washout
740.00	707.70				
760.00	707.80				
780.00	708.08	706.93	1.15	1.30	
800.00	708.69	707.54	1.15	1.30	
820.00	709.42	708.27	1.15	1.30	
840.00	710.32				
860.00	711.35	710.00	1.35	1.50	
880.00	712.85				
900.00	714.55				
920.00	716.34	714.84	1.50	1.65	
940.00	718.25				
960.00	720.01				
980.00	721.91				
1000.00	723.79				
1020.00	725.60				
1040.00	727.27				
1060.00	728.90	727.75	1.15	1.30	
1080.00	730.39				

Segment (m)	PARTIAL DISTANCE (m)	GRADIENT (mm/m)
600–660	60.00	-6.63E-02
660–722	62.00	-5.31E-02
722–780	58.00	3.07E-02
780–800	20.00	3.05E-02
800–820	20.00	3.65E-02
820–860	40.00	4.33E-02
860–920	60.00	8.07E-02
920–1060	140.00	9.22E-02

NOTES:

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- Ham Village Border
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- P_63_PE — Existing Network and Fittings with Text
- Proposed Pipe 150 DI
- 0+060 0+080 0+100 — Profile Stationing
- DET. No.(2) — Proposed Node Connection with Detail No.

PROFILE LEGEND:

- Finish Road Level
- Proposed Pipe

FITTINGS LEGEND:

- FCV — Proposed Flow Control Valve
- Proposed Single Air Release Valve
- Proposed Washout
- 45° 22.1/2° — Horizontal Bends
- 150 400 400 — Node Connection
- Reducer

Purpose Of Issue	Rev.	Date	Approved

Consultant: engicon

Client: giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

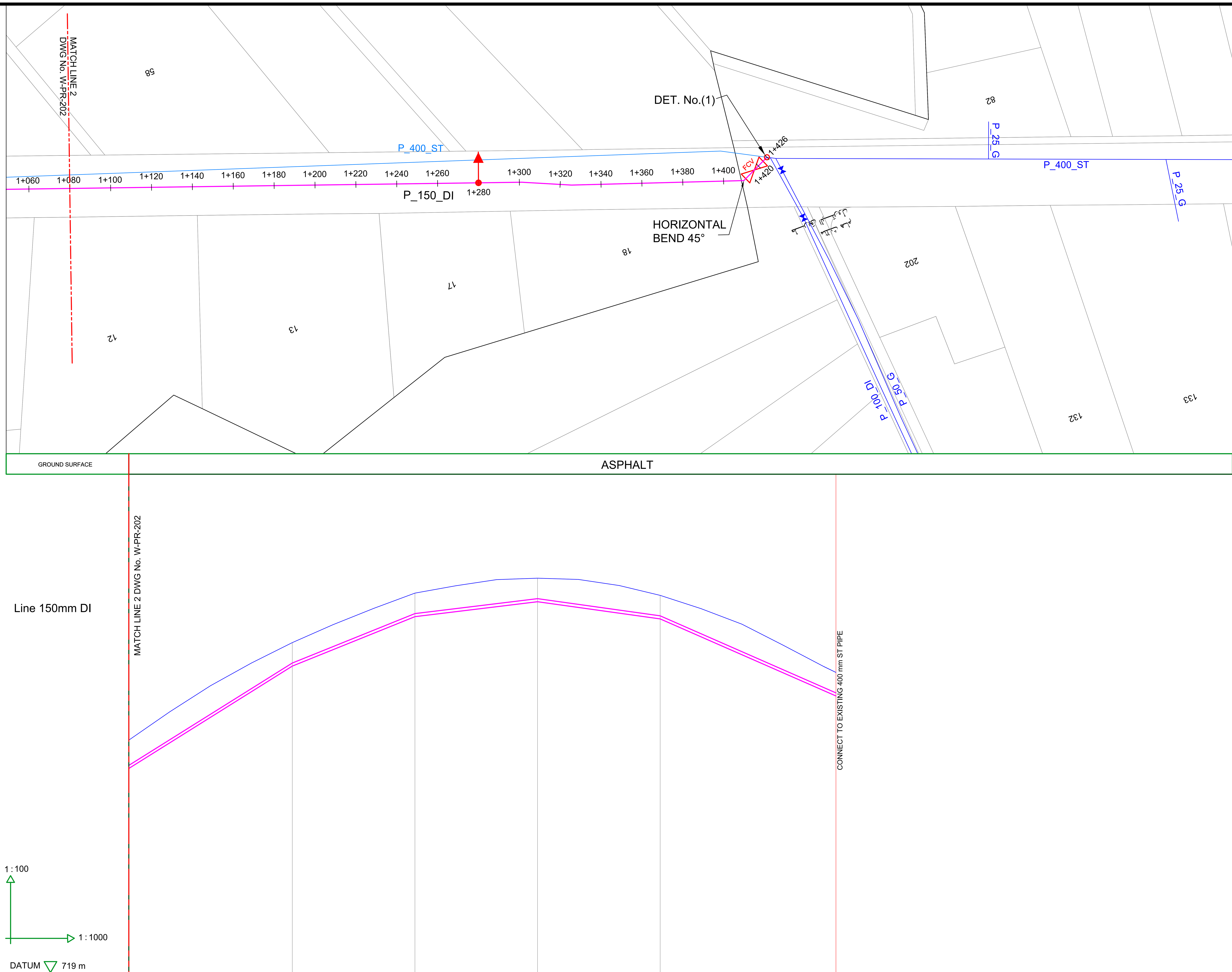
Title:

HAM Ø 150 DI PROFILE
SHEET (2 OF 3)

Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: V:1/100 H:1/1000	Date: JAN. 2021	Approved: W.Z.

METERS

Drawing Number: W-PR-202 | Rev.: 0



	1080	1100	1120	1140	1160	1180	1200	1220	1240	1260	1280	1300	1320	1340	1360	1380	1400	1420	1426
PIPE DIAMETER (mm)																			
PARTIAL DISTANCE (m)		100.00				60.00			60.00			60.00				86.00			
GROUND LEVEL (m)	730.39	731.77	733.05	734.16	735.16	736.04	736.84	737.58	737.94	738.24	738.31	738.25	737.95	737.47	736.82	736.06	735.04	733.99	733.70
INVERT LEVEL (m)					734.01			736.43			737.16			736.32					732.55
DEPTH TO INVERT LEVEL (m)					1.15			1.15			1.15			1.15					1.15
DEPTH TO BOTTOM OF EXCAVATION (m)					1.30			1.30			1.30			1.30					1.30
STATION (m)	1080.00	1100.00	1120.00	1140.00	1160.00	1180.00	1200.00	1220.00	1240.00	1260.00	1280.00	1300.00	1320.00	1340.00	1360.00	1380.00	1400.00	1420.00	1426.00
GRADIENT (mm/m)		6.26E-02				4.03E-02			1.22E-02			-1.40E-02				-4.38E-02			
FITTINGS											(air release valve)							(bend, FCV)	150 / 400 / 400

NOTES:

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LAYOUT LEGEND:

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- P_63_PE — Existing Network and Fittings with Text
- Proposed Pipe 150 DI
- 0+060 0+080 0+100 — Profile Stationing
- DET. No.(2) — Proposed Node Connection with Detail No.

PROFILE LEGEND:

- Finish Road Level
- Proposed Pipe

FITTINGS LEGEND:

- FCV — Proposed Flow Control Valve
- Proposed Single Air Release Valve
- Proposed Washout
- 45° 22.1/2° — Horizontal Bends
- 150 400 400 — Node Connection
- Reducer

Purpose Of Issue	Rev.	Date	Approved

Consultant: engicon

Client: giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

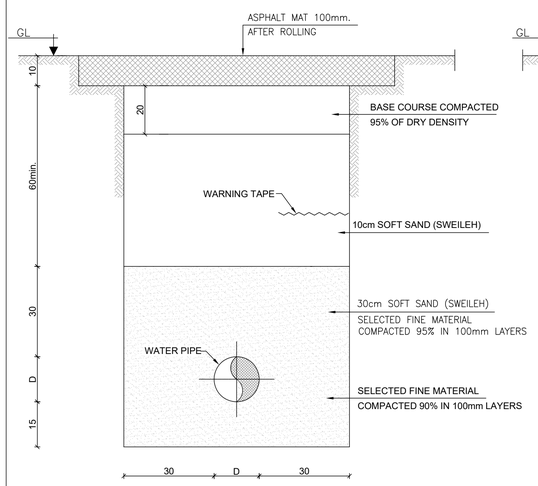
Project: Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title: HAM Ø 150 DI PROFILE
SHEET (3 OF 3)

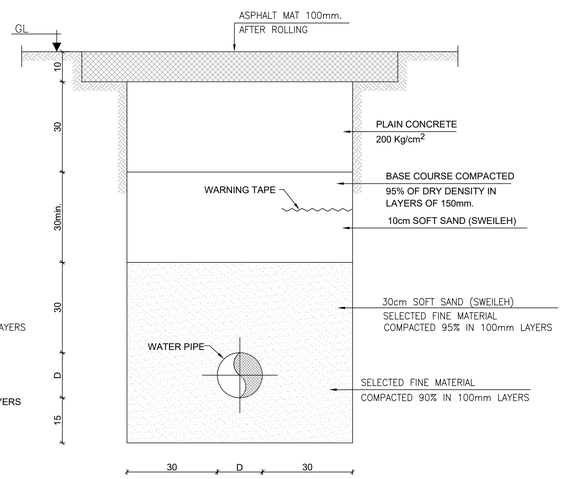
Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: V:1/100 H:1/1000	Date: JAN. 2021	Approved: W.Z.

METERS

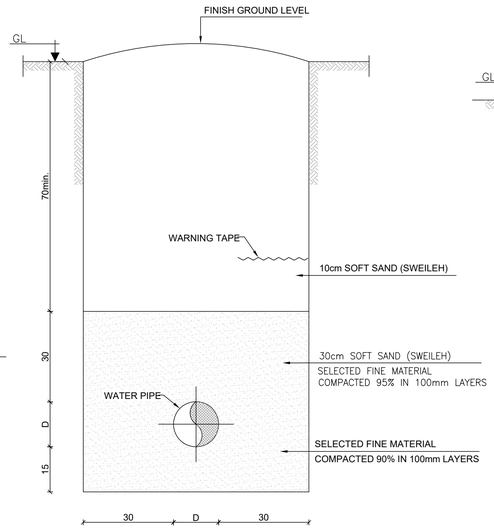
Drawing Number: W-PR-203
Rev.: 0



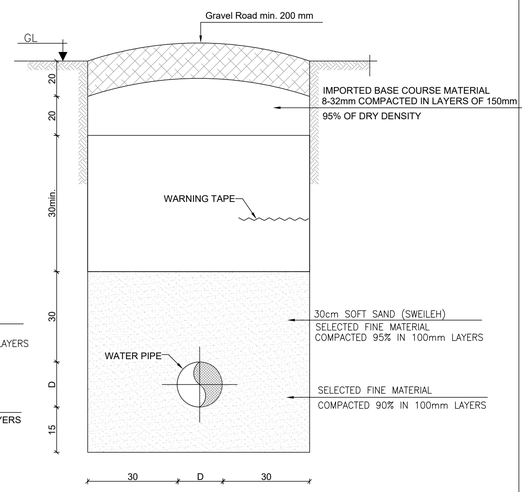
A) TYPICAL TRENCH CROSS SECTION
ALONG SERVICE ROAD ASPHALT SURFACE



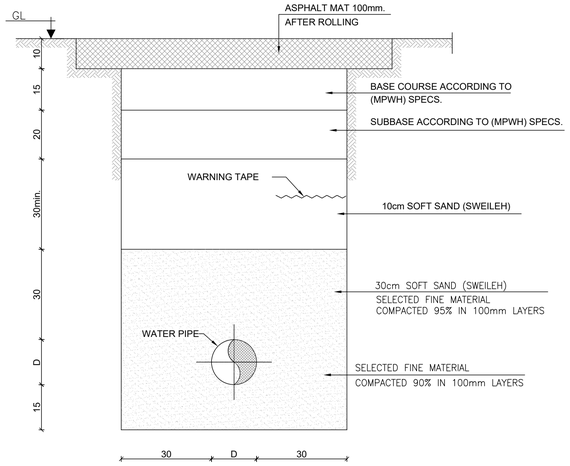
B) TYPICAL CROSS SECTION FOR PIPES CROSSING
THE MAIN STREET AT SKEW OR RIGHT ANGLES



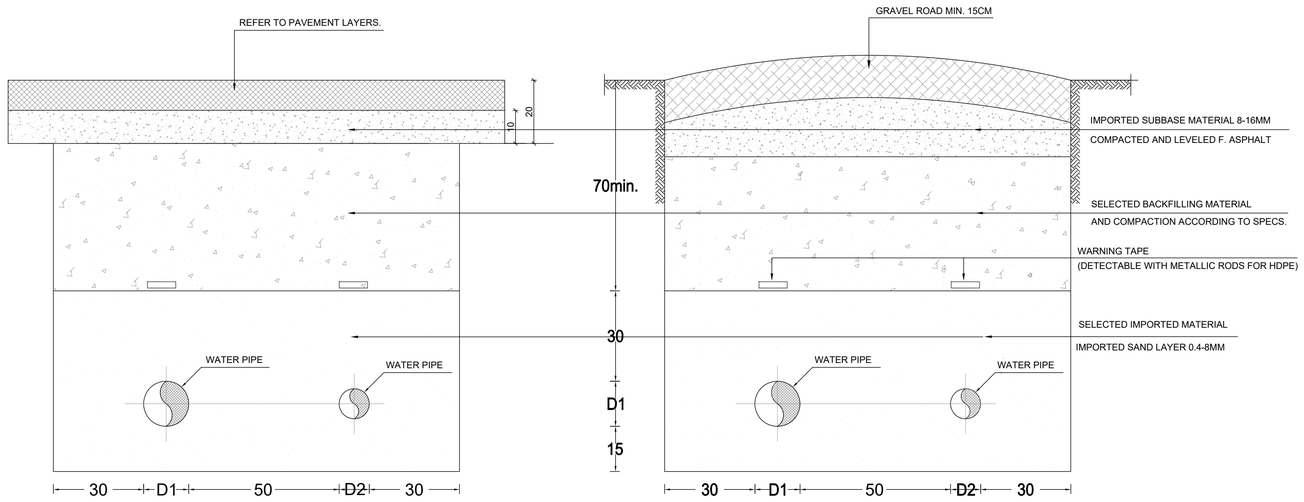
C) TYPICAL TRENCH CROSS SECTION FOR PIPE
ALONG NATURAL GROUND



D) TYPICAL TRENCH CROSS SECTION FOR PIPE
ALONG GRAVEL ROAD



E) TYPICAL TRENCH CROSS SECTION FOR PIPE
ALONG HIGHWAY ROAD ASPHALT SURFACE



F) TYPICAL CROSS SECTIONS FOR TWO PIPES
BOTH IN ONE TRENCH

TYPICAL DETAILS OF TRENCH CROSS SECTIONS FOR PIPES

NOTE:-

ALL DIMENSIONS ARE IN CM UNLESS OTHERWISE INDICATED.

Purpose Of Issue	Rev.	Date	Approved

Consultant:

engicon

Client:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

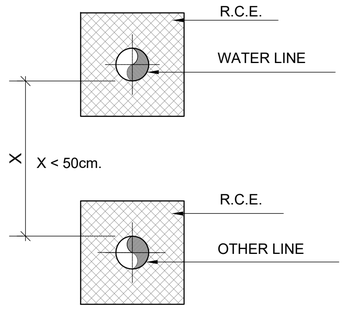
Title:

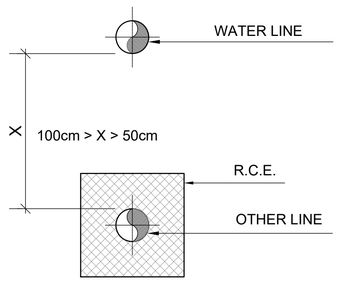
TRENCH DETAILS

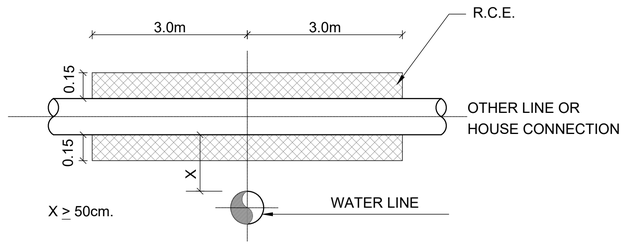
Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: N.T.S	Date: JAN. 2021	Approved: W.Z.

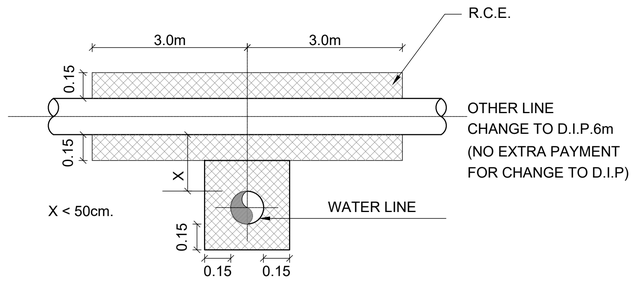
METERS

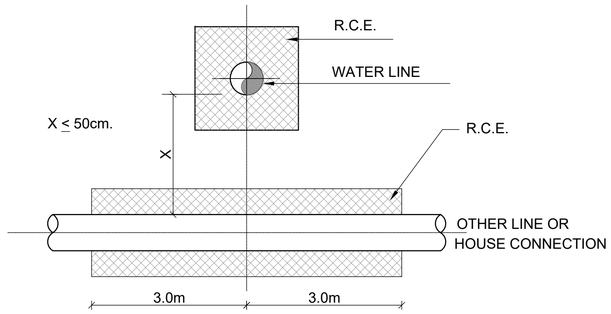
Drawing Number:	Rev.:
W-TD-01	0

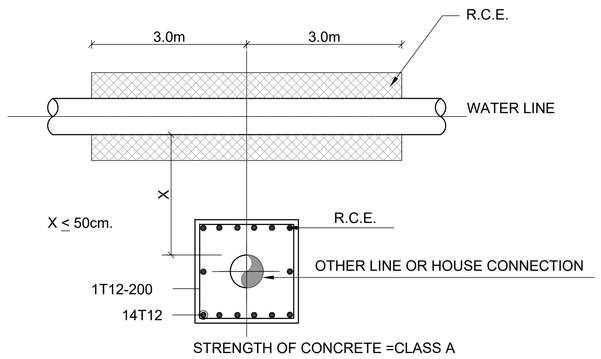






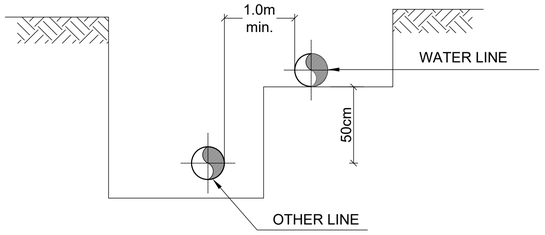




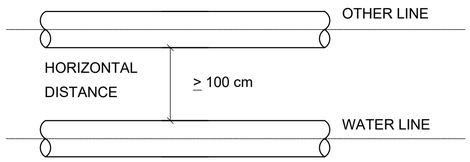


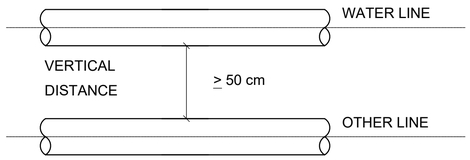
WATER LINE CROSSING BELOW OTHER LINE

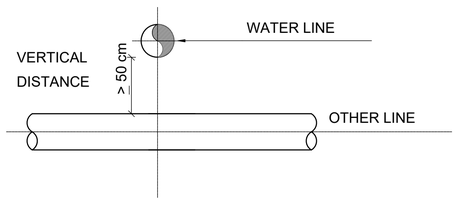
WATER LINE CROSSING OVER OTHER LINES



WATER LINES RUNNING PARALLEL WITH OTHER LINES







GENERAL LAYOUT REQUIREMENTS

NOTE:

Strength of encasement concrete = CLASS A

Purpose Of Issue	Rev.	Date	Approved

Consultant: engicon

Client: giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project: Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

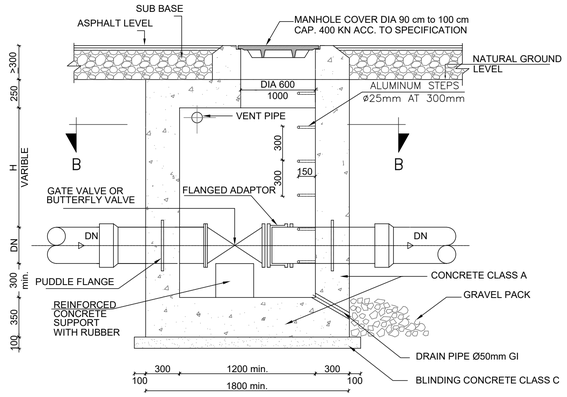
Title: WATER & OTHER PIPES CROSSING DETAILS

Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: N.T.S	Date: JAN. 2021	Approved: W.Z.

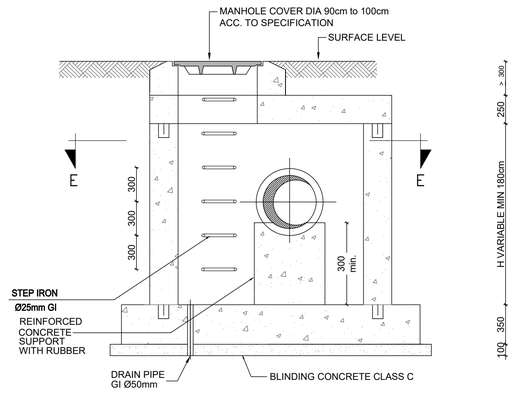
METERS

Drawing Number: W-TD-02

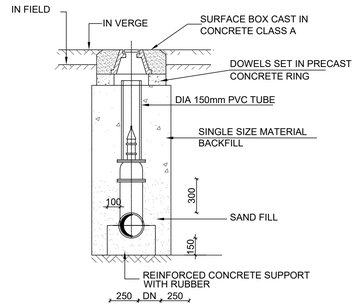
Rev.: 0

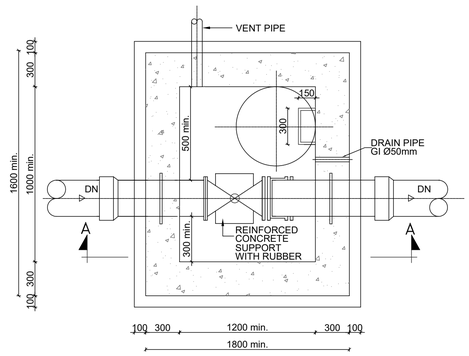


SECTION A-A

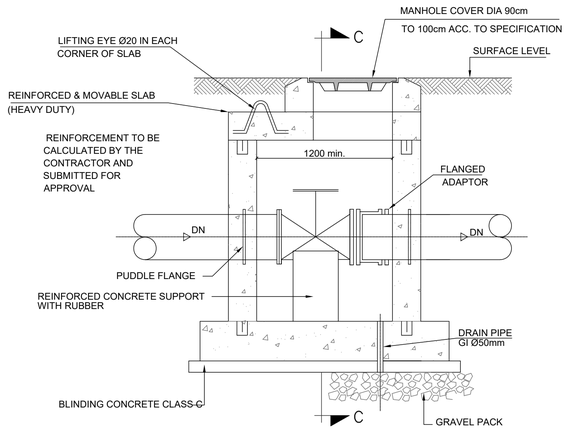


SECTION C-C

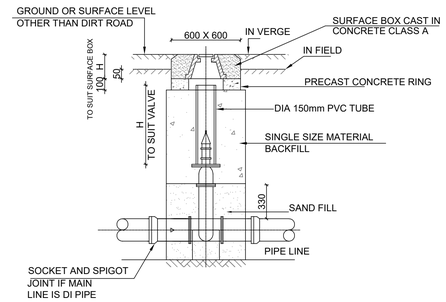




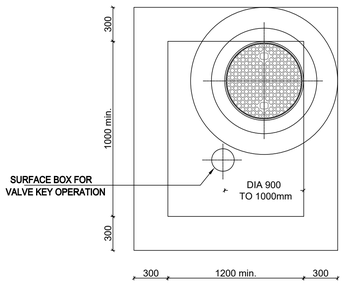
SECTION B-B



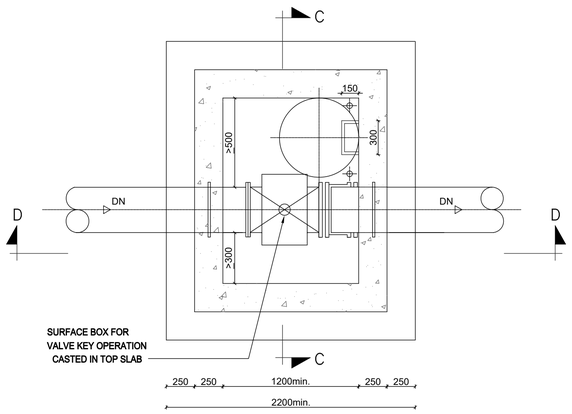
SECTION D-D



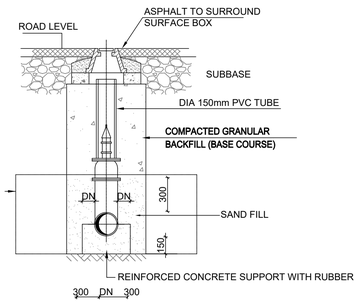
GATE VALVE IN FIELD OR VERGE
FOR DN < 200 mm

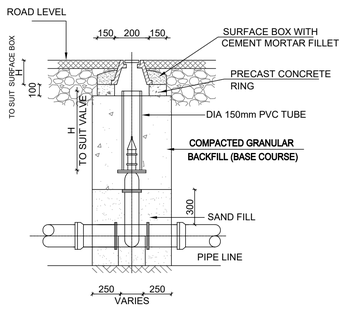


TOP VIEW
CONCRETE CHAMBER
FOR VALVES OF DN > 200



SECTION (E-E) CONCRETE CHAMBER
FOR ISOLATION VALVES OF DN > 200
(ALTERNATIVE PRECAST CONCRETE)





GATE VALVE IN ROAD
FOR DN≤200 mm

NOTE:-

ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE INDICATED.

Purpose Of Issue	Rev.	Date	Approved

Consultant:

engicon

Client:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

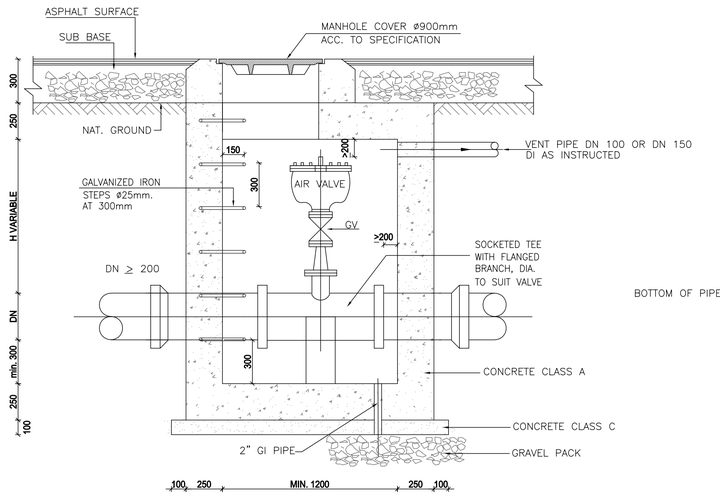
ISOLATION VALVE DETAILS

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	**Date:**	**Approved:**
N.T.S	JAN. 2021	W.Z.

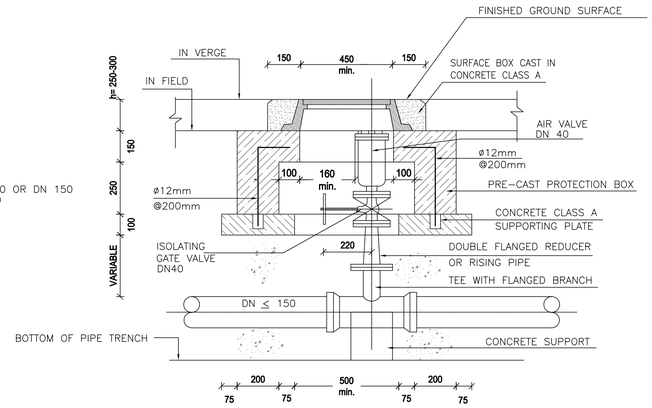
METERS

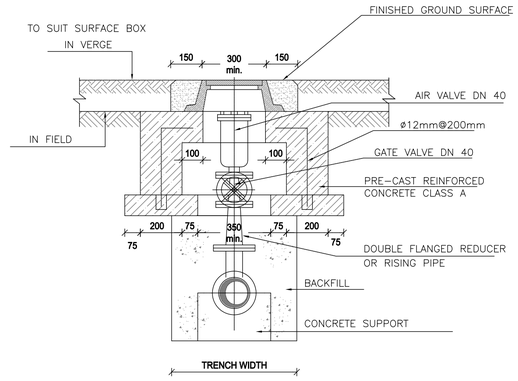
Drawing Number: W-TD-03

Rev.: 0

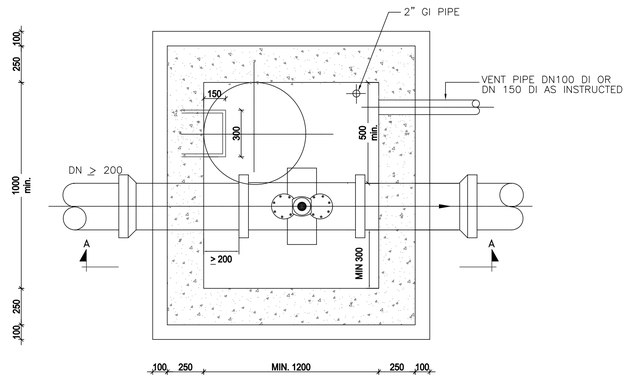


SECTION A-A

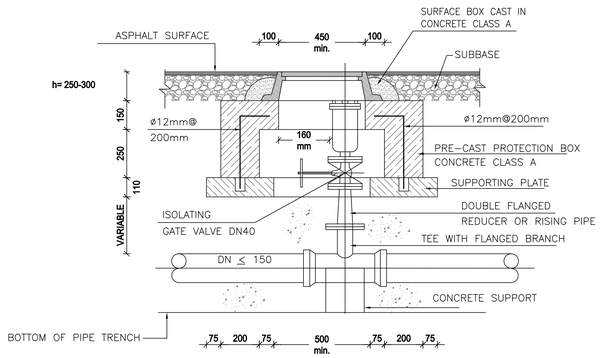


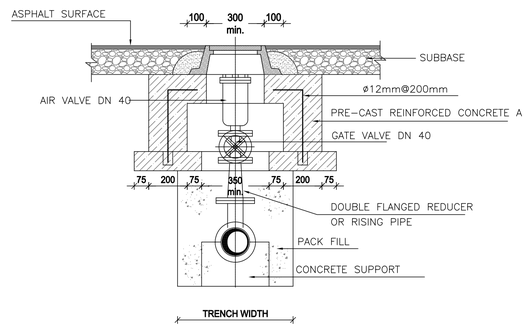


AIR RELEASE VALVE IN FIELD OR VERGE FOR DI MAINS DN ≤150mm

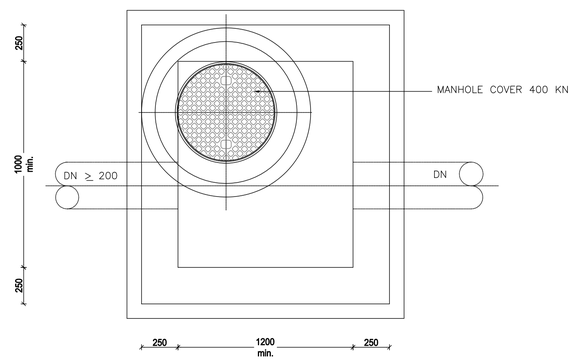


PLAN





AIR RELEASE VALVES IN ROADS FOR DI MAINS DN ≤150mm



TOP VIEW

TYPICAL AIR RELEASE VALVE CHAMBER

FOR MAINS DN ≥200mm

AIR RELEASE VALVE SCHEDULE

MAIN LINE D (mm.)	AIR RELEASE VALVES	
	D (mm)	TYPE
DN 100	DN 50	SINGLE , LARGE ORIFICE
DN 150	DN 50	SINGLE , LARGE ORIFICE
DN 200	DN 100	DOUBLE , LARGE ORIFICE
DN 300	DN 100	DOUBLE , LARGE ORIFICE
DN 400	DN 100	DOUBLE , LARGE ORIFICE
DN 500	DN 100	DOUBLE , LARGE ORIFICE
DN 600	DN 100	DOUBLE , LARGE ORIFICE

Purpose Of Issue	Rev.	Date	Approved

Consultant:

engicon

Client:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

AIR RELEASE VALVE DETAILS

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T.H.	CAD	S.G.
Scale:	Date:	Approved:
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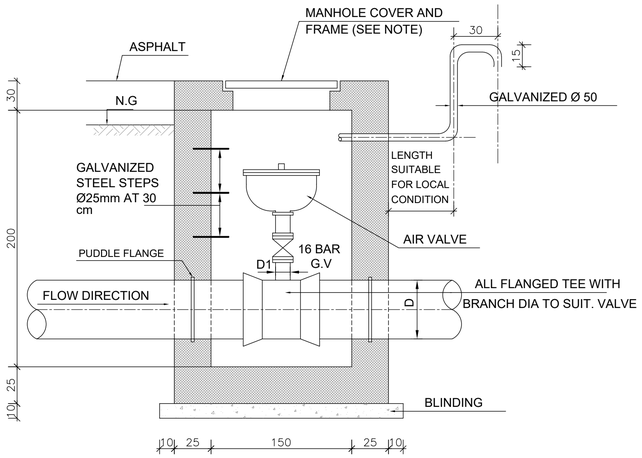
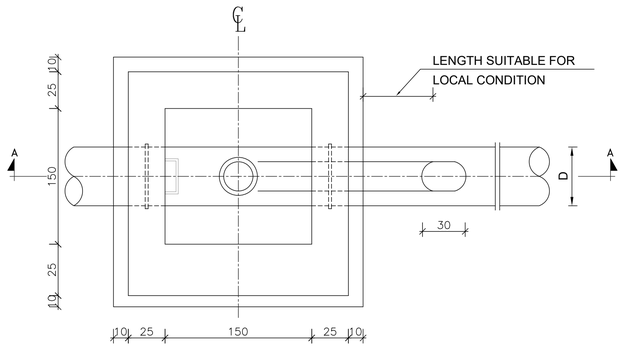
METERS

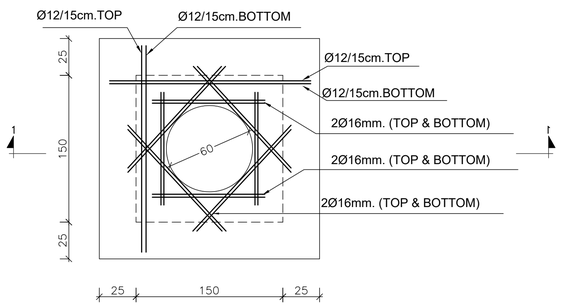
Drawing Number:	Rev.:
W-TD-04	0



SECTION A–A
N.T.S.

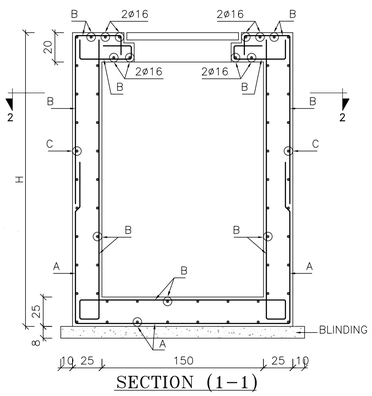


PLAN
N.T.S.

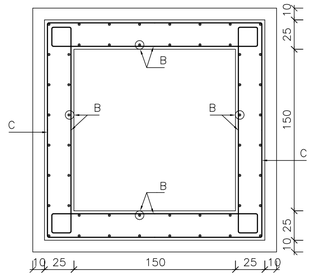


SLAB REINFORCEMENT
N.T.S.

TYPICAL AIR RELEASE VALVE CHAMBER



SECTION (1–1)



SECTION (2–2)

TYPICAL REINFORCEMENT DETAILS OF CHAMBERS
N.T.S.

TABLE OF DIMENSIONS & REINFORCEMENT (mm)

CHAMBER TYPE	DEPTH H (m)	BARS "A"		BARS "B"		BARS "C"	
		DIA.	SPAC.	DIA.	SPAC.	DIA.	SPAC.
TYPE 1	UP TO 2.5	ø12	150	ø12	150	ø12	150

NOTE:-

ALL DIMENSIONS ARE IN cm UNLESS OTHERWISE INDICATED.

Purpose Of Issue	Rev.	Date	Approved

Consultant:
engicon

Client:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

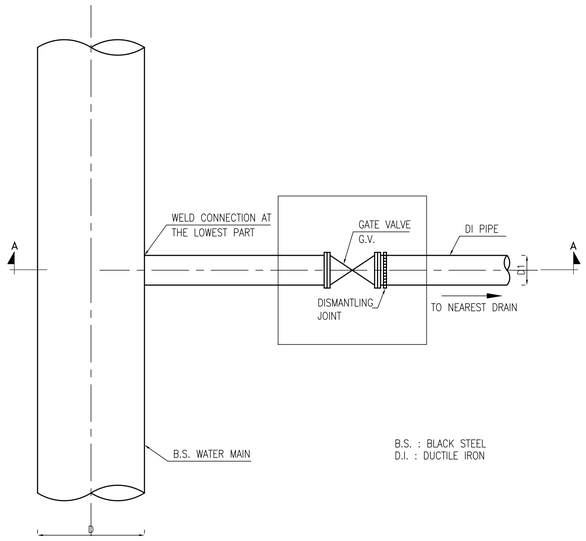
Project:
Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:
AIR RELEASE VALVE CHAMBER STRUCTURAL DETAILS

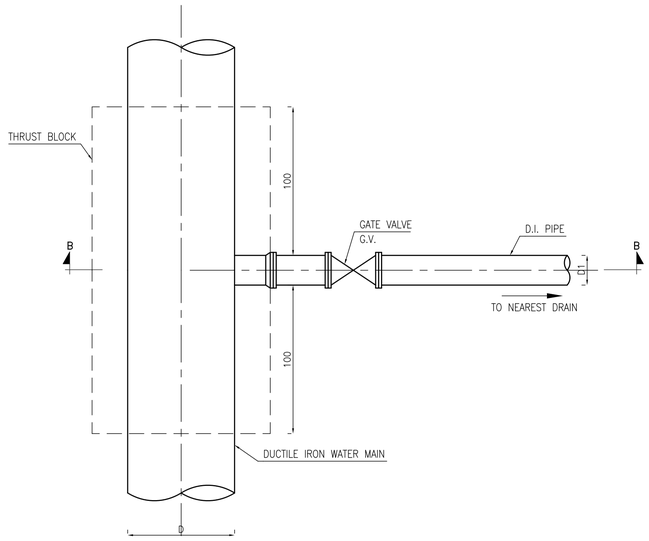
Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	Date:	Approved:
N.T.S	JAN. 2021	W.Z.

METERS

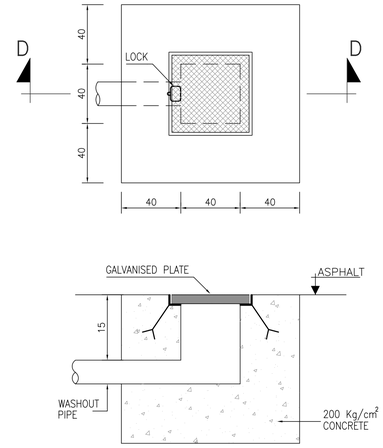
Drawing Number:	Rev.:
W-TD-05	0



PLAN

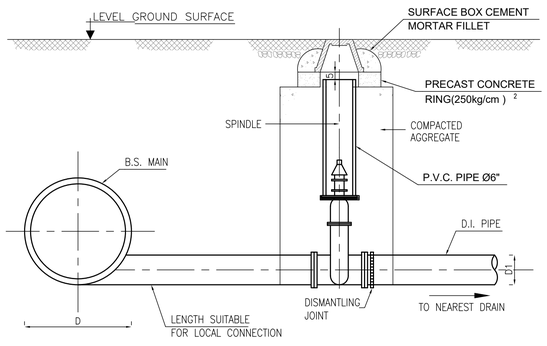


PLAN



SECTION D–D

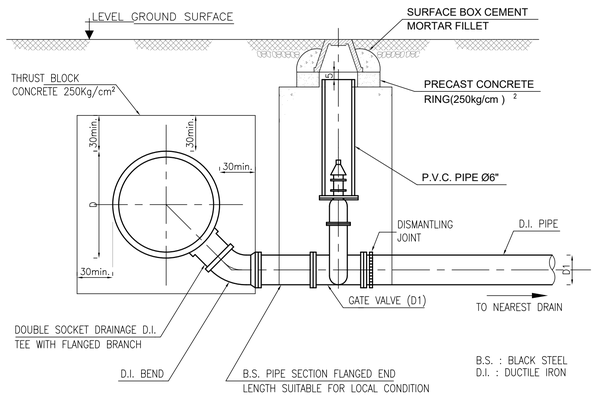
TYPICAL WASHOUT–OUTLET IN ASPHALTED AREAS



SECTION A–A

TYPICAL WASHOUT DETAIL ON BLACK STEEL WATER MAIN

1/20



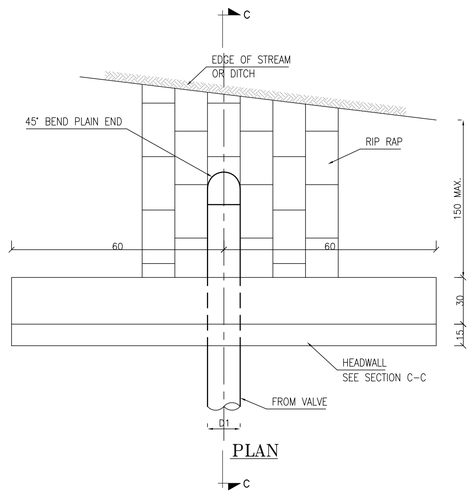
SECTION B–B

TYPICAL WASHOUT DETAIL ON DI WATER MAIN

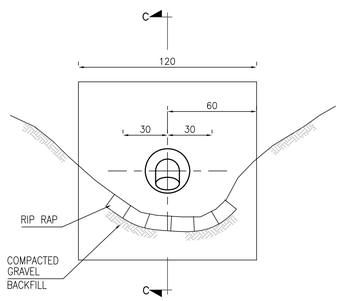
1/20

D (mm.)	D1 (mm.)	NOTE
500–600	200 DI	A=1300mm. B=1200mm. CHAMBER
300–400	150 DI	SURFACE BOX
150–250	100 DI	SURFACE BOX
⩽ 100	100 DI	SURFACE BOX

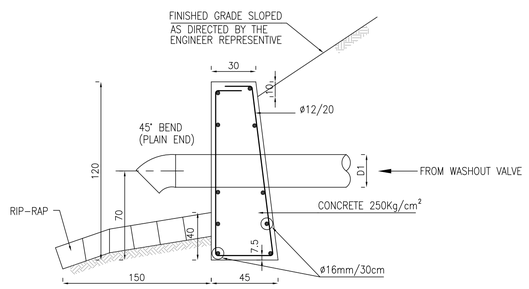
* FOR CHAMBER AND SURFACE BOX DETAILS OF WASHOUT VALVES SEE TYPICAL DETAILS OF GATE VALVES



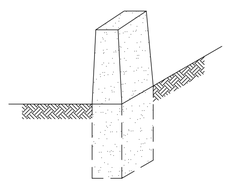
PLAN



ELEVATION



SECTION C–C



TYPICAL HEADWALL DETAIL FOR WASHOUT AND/OR AS DIRECTED BY THE ENGINEER FOR PROPER DRAINING

N.T.S.

NOTE:-

- ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE INDICATED.

Purpose Of Issue	Rev.	Date	Approved

Consultant:

engicon

Client:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

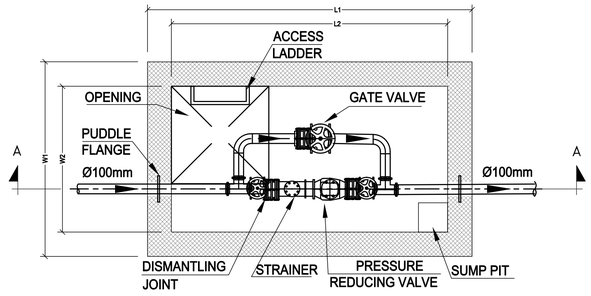
WASHOUT DETAILS

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	Date:	Approved:
N.T.S	JAN. 2021	W.Z.

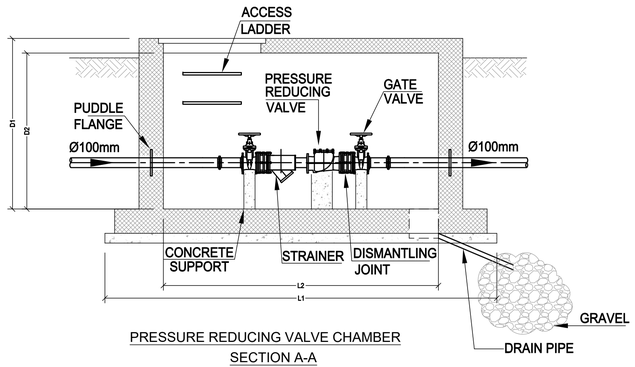
METERS

Drawing Number:	Rev.:
W-TD-06	0

CHAMBER ARRANGEMENT DETAILS
FOR DIAMETERS Ø100 mm



PRESSURE REDUCING VALVE CHAMBER
PLAN



PRESSURE REDUCING VALVE CHAMBER
SECTION A-A

FOR DIAMETERS Ø100 mm

NOTES:
1. Chamber details in this drawing are for guidance purposes only
2. The structural design of chambers is the responsibility of the Contractor
3. PRV includes all equipment needed according to PRV manufacturer recommendations (i.e. pressure loggers....etc)

Purpose Of Issue	Rev.	Date	Approved

Consultant:
engicon

Client:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

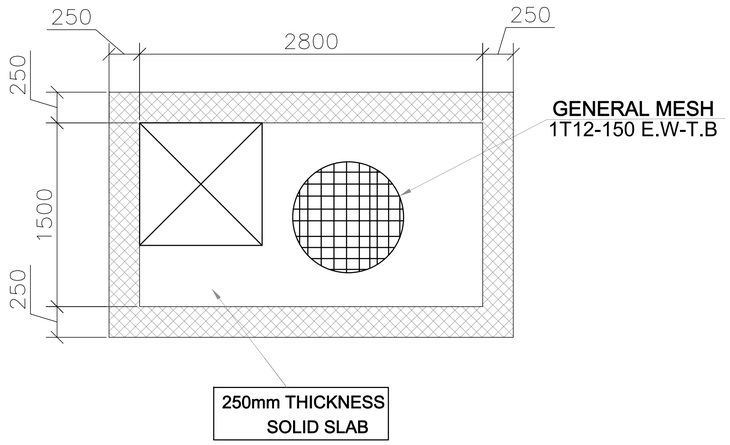
Project:
Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:
PRESSURE REDUCING VALVE DETAILS

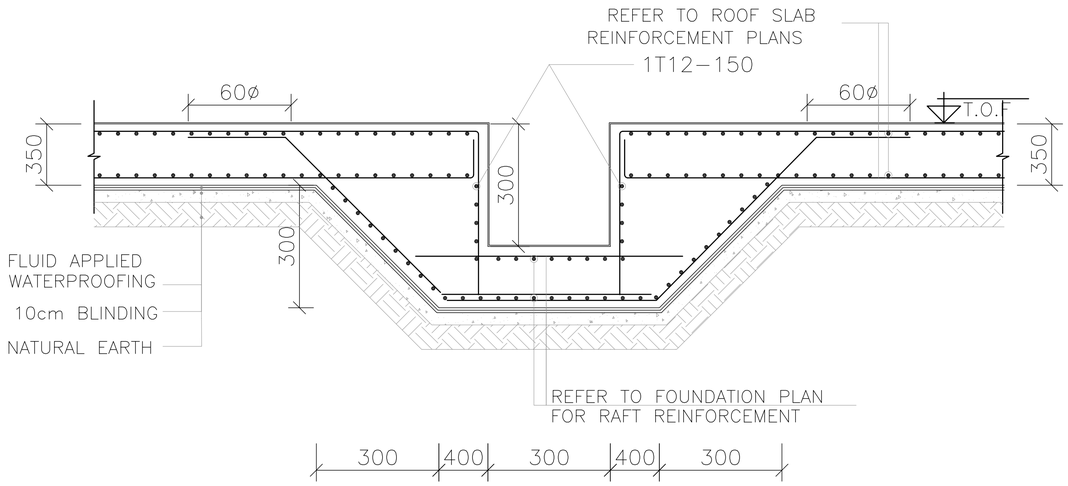
Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale: N.T.S.	Date: JAN. 2021	Approved: W.Z.

METERS

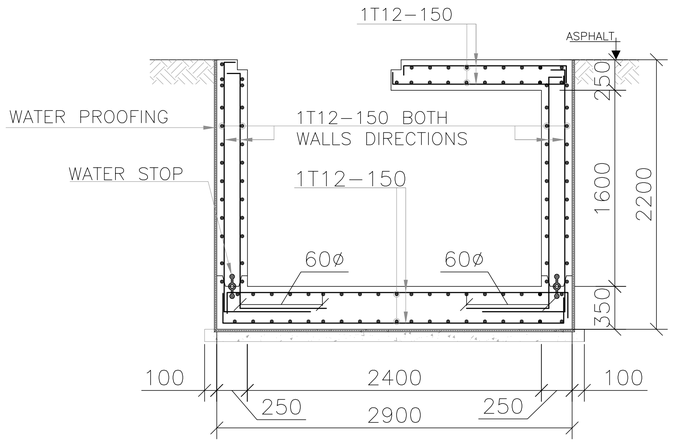
Drawing Number:	Rev.:
W-TD-07	0



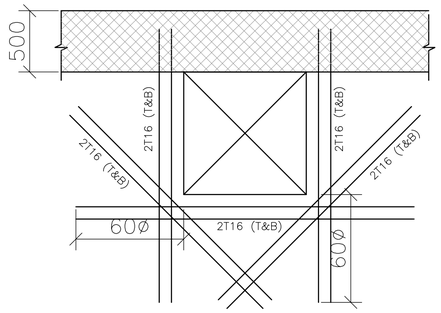
P.R.V. ø150 & ø100 PIPES REINFORCEMENT PLAN
1:50



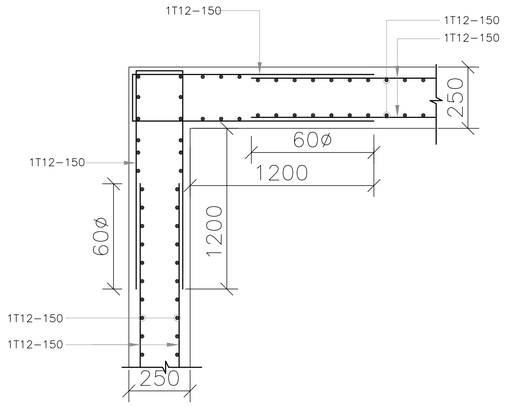
SUMP PIT TYPLICAL
REINFORCEMENT DETAIL
1:25



P.R.V. ø150 & ø100 PIPES REINFORCEMENT DETAILS
1:50



TYPICAL DETAIL FOR RECTANGULAR SLAB OPENINGS
1:25



REINFORCEMENT DETAIL (B) AT CORNER OF WALLS
AT MID-HEIGHT OF TANK
1:25

Cover

Clear concrete cover to reinforcement shall be:
75 mm for foundation in contact with soil or blinding.
50 mm for foundation in contact with water.
75 mm for walls in contact with soil.
50 mm for walls.
40 mm for slabs.

Reinforced Concrete

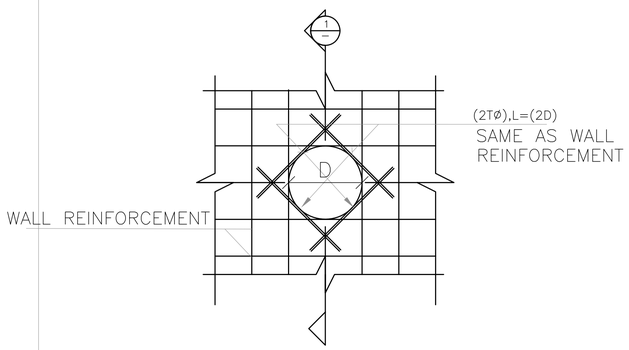
Compressive strength of concrete, Fcu, as defined by a standard 150mm cube at 28 days shall be:
– 35 MPa: for all reinforced concrete.
– 20 MPa: for plain concrete (blinding, screed,...)

Reinforcement

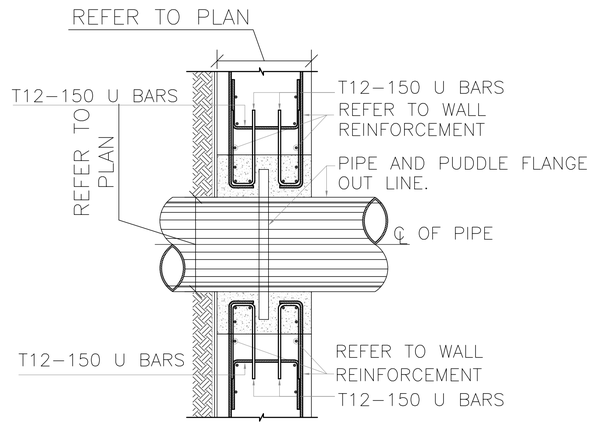
steel bars of Characteristic Strength equal to fy=420 MPa

Foundation

–The chambers raft foundation was designed on Bearing Capacity equal to 150 kPa.
–The Contractor shall ensure that the foundation layer possesses this allowable capacity before construction.



OPENINGS IN WALLS
REINFORCEMENT DETAIL
1:25



SECTION 1 REINFORCEMENT
AT PIPE INLET&OUTLET
1:25

Purpose Of Issue	Rev.	Date	Approved

Consultant:
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Client:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:
Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:
PRESSURE REDUCING VALVE CHAMBER STRUCTURAL DETAILS

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	**Date:**	**Approved:**
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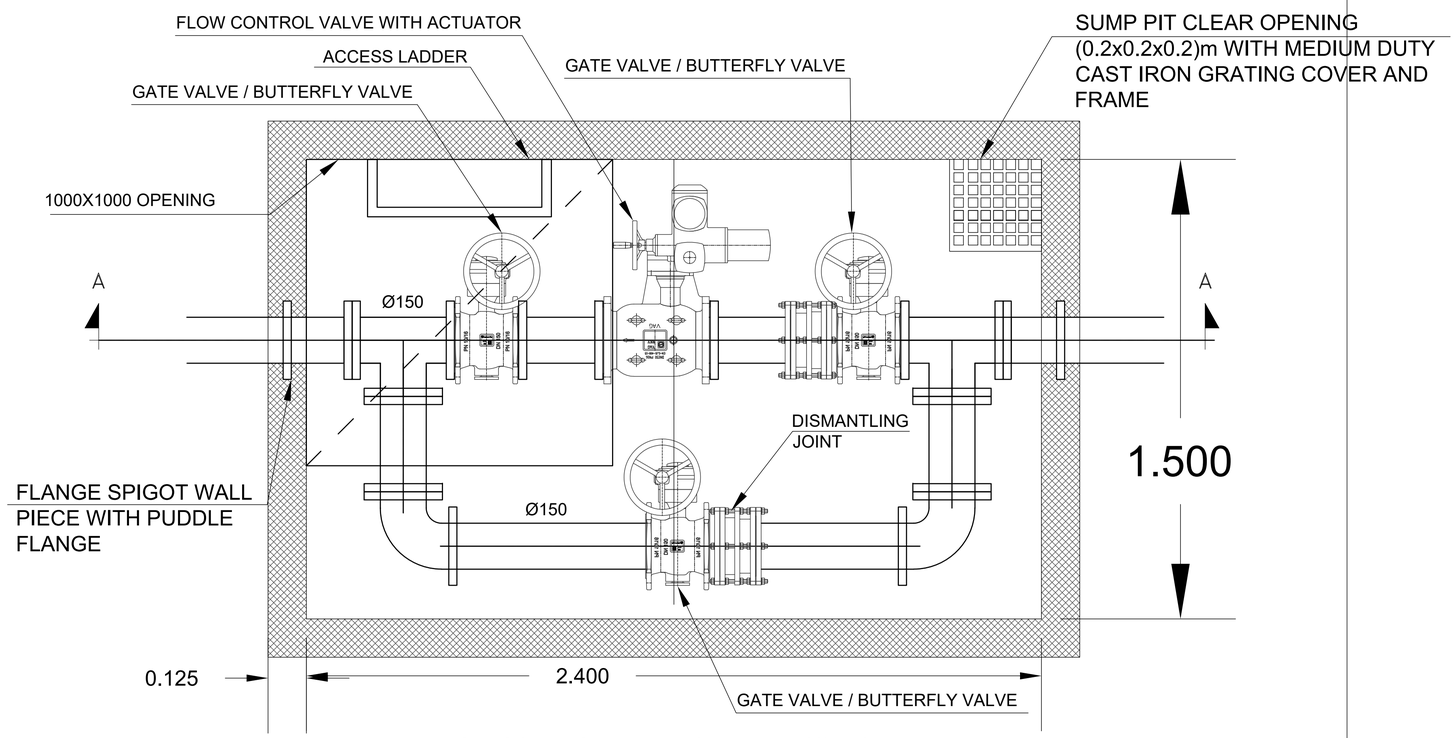
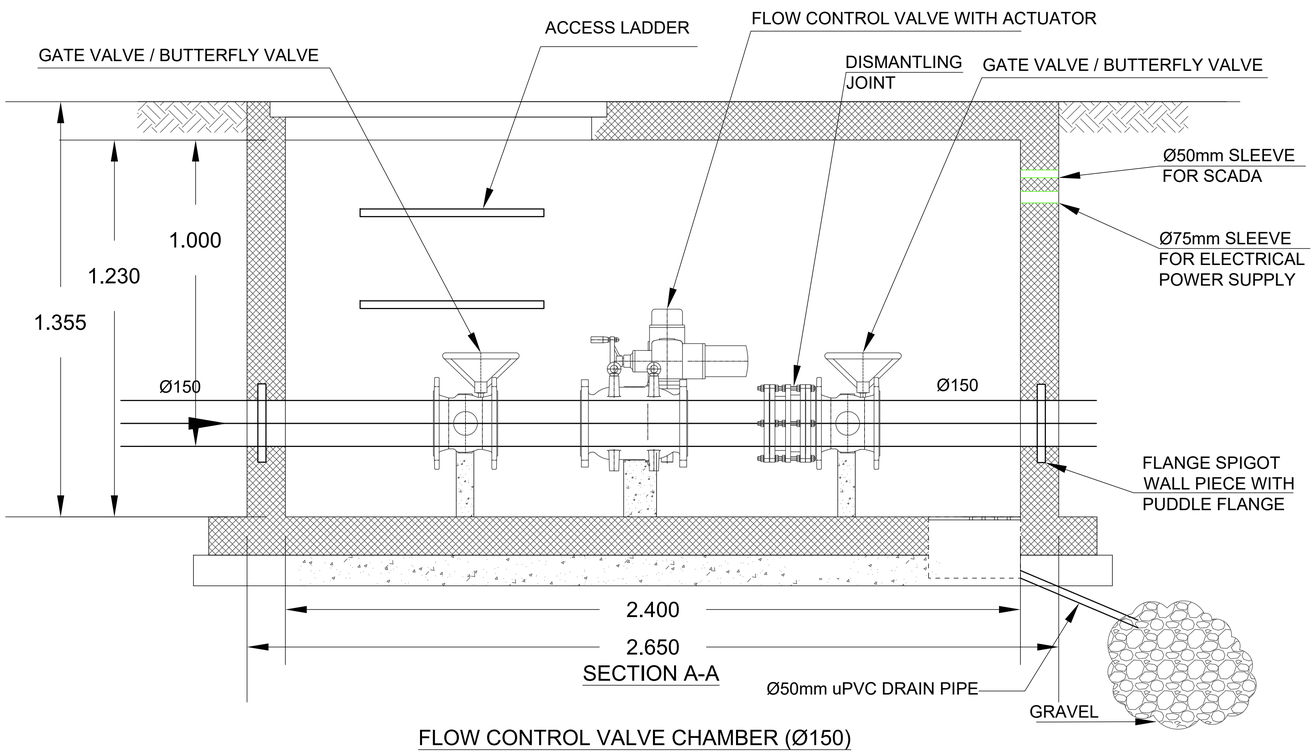


FLOW CONTROL VALVE CHAMBER (Ø150)
PLAN



FLOW CONTROL VALVE CHAMBER (Ø150)

Purpose Of Issue	Rev.	Date	Approved

Consultant:

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Client:

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Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

FLOW CONTROL VALVE DETAILS

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	**Date:**	**Approved:**
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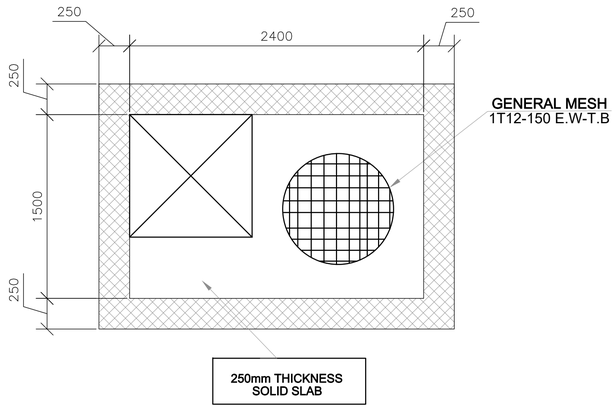
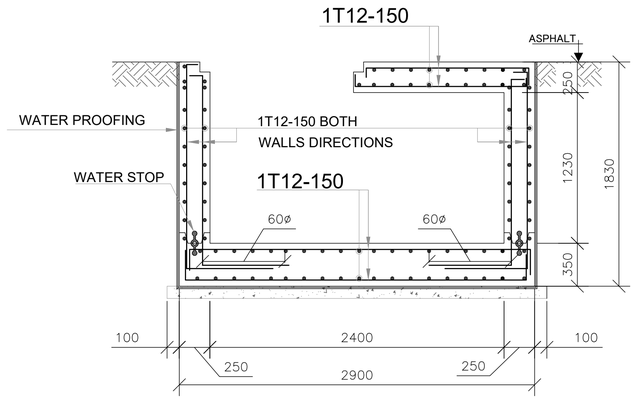
METERS

Drawing Number:	Rev.:
W-TD-09	0



F.C.V. Ø150 PIPES REINFORCEMENT PLAN

1:50



F.C.V. Ø150 PIPES REINFORCEMENT DETAILS

1:50

Cover

Clear concrete cover to reinforcement shall be:

75 mm for foundation in contact with soil or blinding.

50 mm for foundation in contact with water.

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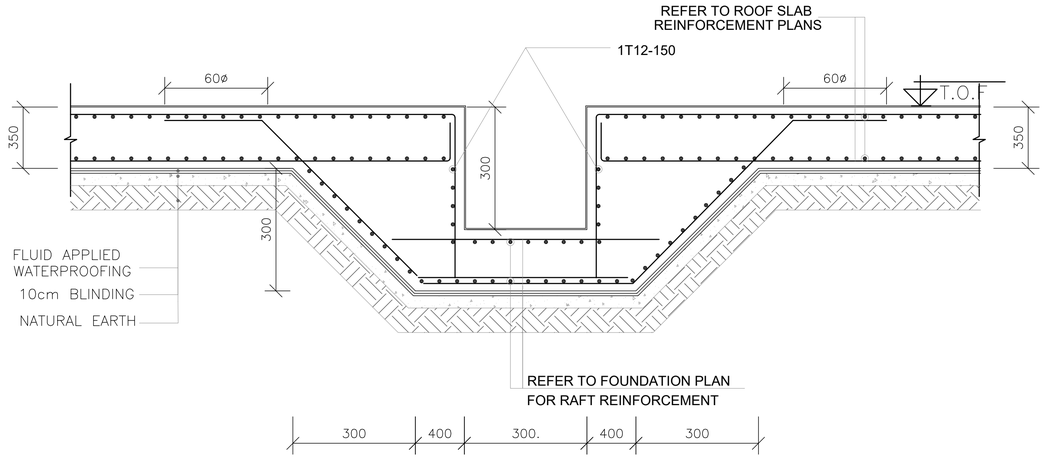
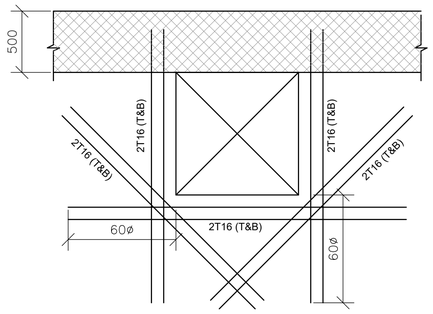


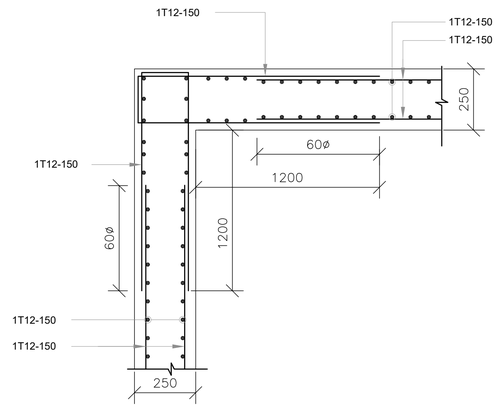
SUMP PIT TYPLICAL REINFORCEMENT DETAIL

1:25



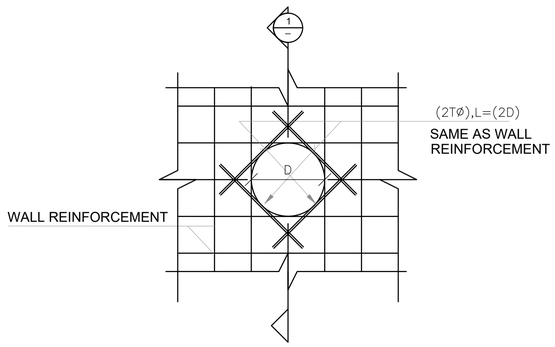
TYPICAL DETAIL FOR RECTANGULAR SLAB OPENINGS

1:25



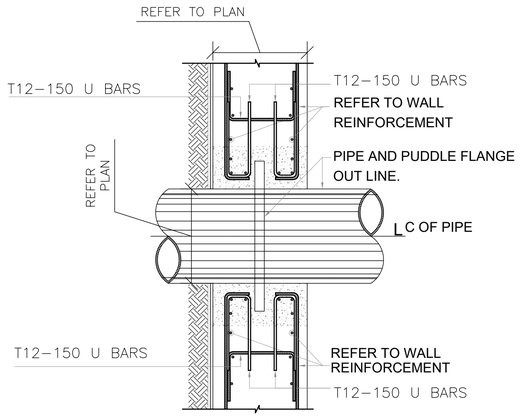
REINFORCEMENT DETAIL (B) AT CORNER OF WALLS AT MID-HEIGHT OF TANK

1:25



OPENINGS IN WALLS REINFORCEMENT DETAIL

1:25



SECTION 1 REINFORCEMENT AT PIPE INLET&OUTLET

1:25

Purpose Of Issue	Rev.	Date	Approved

Consultant:

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Client:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

FLOW CONTROL VALVE CHAMBER STRUCTURAL DETAILS

Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: N.T.S.	Date: JAN. 2021	Approved: W.Z.

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Drawing Number: W-TD-10

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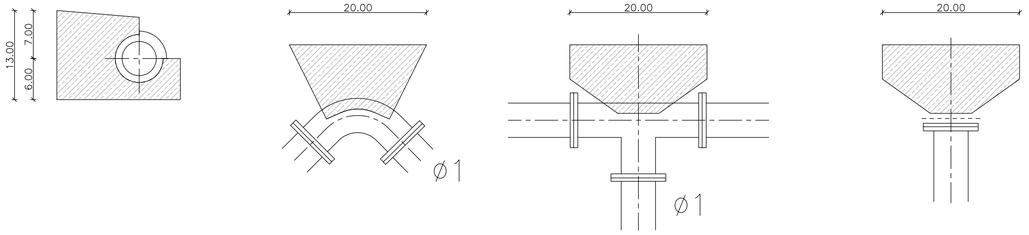
A B C



TAB. II : Adjustment factor of supporting area (a)					
ø1 P2 (bar) \ P1 (bar)	10	15	20	25	30
2	0.5	0.75	1.0	1.25	1.5
1.5	0.67	1.0	1.33	1.67	2.0
1.0	1.0	1.5	2.0	2.5	3.0
0.5	2.0	3.0	4.0	5.0	6.0

Freq = Fn x a

TABLE I : Required supporting area for thrust blocks (Fn)

TEST PRESSURE P1 10 BAR
GROUND PRESSURE P2 1 BAR

	A 1	A 2	A 3	A 4	A 5	A 6	B	C
ø1	90° ø1 F	60° ø1 F	45° ø1 F	30° ø1 F	22° ø1 F	11° ø1 F	ø1 F	ø1 F, ø1 F
mm	m 2	m 2	m 2	m 2	m 2	m 2	m 2	m 2
65	0.07	0.05	0.04	0.03	0.02	0.01	0.05	0.05
80	0.11	0.08	0.06	0.04	0.03	0.02	0.08	0.08
100	0.16	0.11	0.08	0.06	0.04	0.02	0.11	0.11
150	0.35	0.25	0.19	0.13	0.10	0.05	0.25	0.25
200	0.56	0.40	0.31	0.21	0.16	0.08	0.40	0.40
250	0.93	0.66	0.51	0.34	0.26	0.13	0.66	0.66
300	1.33	0.94	0.72	0.49	0.37	0.19	0.94	0.94
400	2.34	1.66	1.28	0.86	0.65	0.33	1.66	1.66
500	3.53	2.50	1.93	1.30	0.98	0.50	2.50	2.50
600	5.09	3.61	2.78	1.88	1.41	0.72	3.61	3.61
700	6.91	4.90	3.77	2.55	1.91	0.98	4.90	4.90
800	9.01	6.39	4.92	3.32	2.49	1.28	6.39	6.39
900	11.42	8.10	6.24	4.21	3.16	1.62	8.10	8.10

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engicon

Client:
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Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:
THRUST BLOCK DETAILS-1

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Scale:	Date:	Approved:
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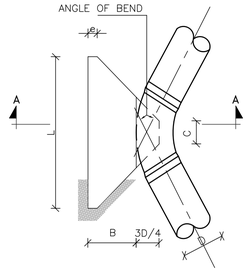
METERS

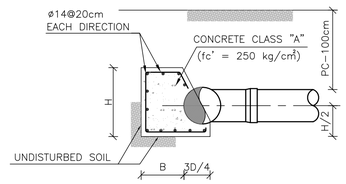
Drawing Number: W-TD-11

Rev.: 0

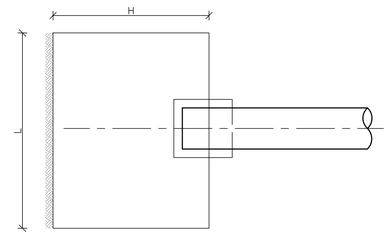
THRUST BLOCK DETAILS



PLAN



SECTION A-A



THRUST BLOCK FOR 11.25° BEND

D (mm)	C (cm)	L (cm)	B (cm)	H (cm)	e (cm)
100	20	50	30	50	15
150	20	60	45	50	15
200	20	75	75	75	20
300	25	120	105	105	20
400	25	140	125	105	20

THRUST BLOCK FOR 22.5° BEND

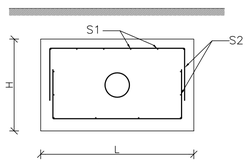
D (mm)	C (cm)	L (cm)	B (cm)	H (cm)	e (cm)
100	20	50	30	50	15
150	20	70	50	50	15
200	30	90	75	75	20
300	40	140	125	110	20
400	40	160	145	140	20

THRUST BLOCK FOR 45° BEND

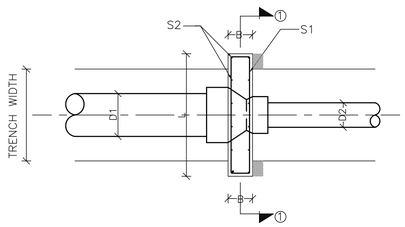
D (mm)	C (cm)	L (cm)	B (cm)	H (cm)	e (cm)
100	20	65	40	60	15
150	20	85	50	75	15
200	30	105	75	85	20
300	40	200	155	145	25
400	40	240	175	165	25

THRUST BLOCK FOR END CAPS AND TEES

D (mm)	H (Tickness) (cm)	B (Width) (cm)	L (Length) (cm)
100	55	55	75
150	60	75	115
200	65	90	145
300	90	145	195
400	95	165	215



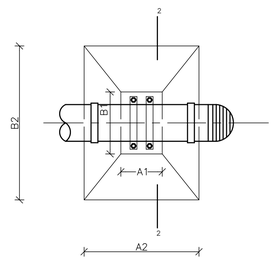
SEC 1-1



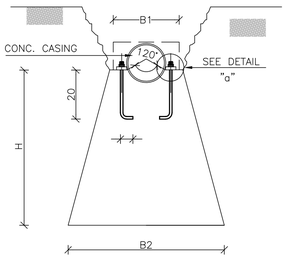
PLAN

THRUST BLOCK FOR REDUCER

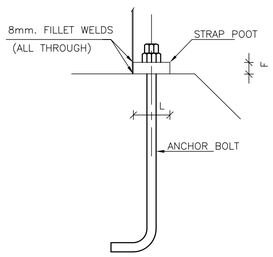
D	D2	H	L	B	S1	S2
150	100	35	75	25	ø12/20	ø12/20
200	150	45	80	30	ø12/20	ø12/20
200	100	65	95	40	ø14/20	ø14/20
300	200	95	110	40	ø14/20	ø14/20
300	150	110	125	50	ø14/20	ø14/20
400	300	100	115	40	ø14/20	ø14/20



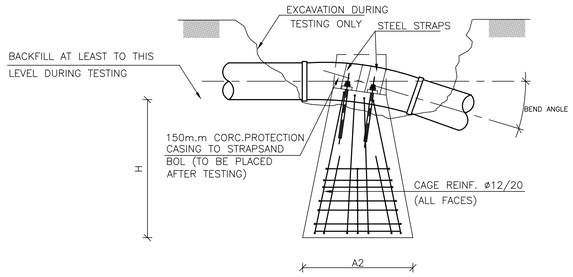
PLAN



SECTION 2-2



DETAIL "a"



SECTION 1-1

THRUST ANCHORS FOR 22.5" VERTICAL BEND.PIPE CLASS 24(P.TEET=18kg/cm2.P.WORKING=12kg/cm2)

DN(mm)	A1(cm)	A2(cm)	B1(cm)	B2(cm)	H(cm)	STRAP(S) NO.XB(m.m)XT(m.m)	STRAPfoot LXBXTI(m.m)	BOLTS
150	20	90	45	115	70	1X100X8	48X100X8	2M12
200	20	105	50	135	85	1X100X8	48X100X8	2M12

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Client:

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Title:

THRUST BLOCK DETAILS-2

Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: N.T.S	Date: JAN. 2021	Approved: W.Z.

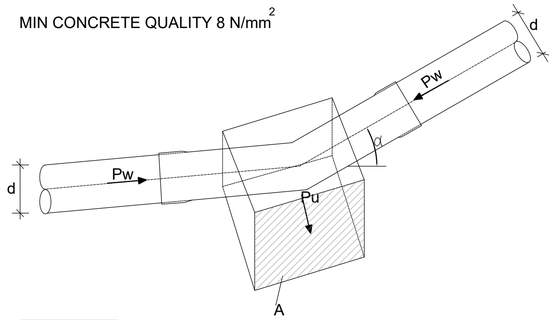
METERS

Drawing Number: W-TD-12

Rev.: 0

Anchor Blocks/ Thrust Blocks

MIN CONCRETE QUALITY 8 N/mm^2



$$Pw = \frac{d^2 \times \pi}{4} \times pi$$

pi.... internal pressure
Pw.. hydrostatical force of pressure

$$Pu = 2 \times Pw \times \sin\frac{\alpha}{2}$$

Pu...reversing force
α .....angle which describes the change of direction

ASSUMED POSSIVE SOIL FORCE $\sigma_{ep} = \frac{50}{1.5} = 35 KN/m^2$ 1.5... safety factor

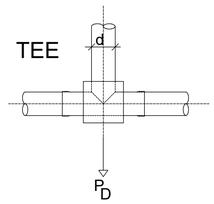
NECESSARY CONCRETE AREA: $A = \frac{Pu}{\sigma_{ep}}$

α = 22°	Pu (KN)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	0.46	1.16	1.80	4.06	7.22
10	0.76	1.92	3.00	6.80	12.04
16	1.20	3.08	4.82	10.84	19.26
25	1.88	4.82	7.52	16.94	30.10

α = 11°	A (cm²)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	1100	1100	1100	1100	1100
10	1100	1100	1100	1100	2800
16	1100	1100	1100	2800	2800
25	1100	1100	1100	2800	4300

α = 90°	A (cm²)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	1100	1300	2050	5100	7950
10	1100	2050	3250	7950	12700
16	1300	3250	5100	11450	20300
25	2050	5100	7950	17850	31700

TEE



$$P_D = \frac{d^2 \times \pi}{2} \times pi$$

α = 30°	Pu (KN)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	0.62	1.56	2.44	5.50	9.80
10	1.01	2.60	4.06	9.14	16.26
16	1.63	4.16	6.50	14.63	26.02
25	2.54	6.50	10.16	22.90	40.65

α = 22°	A (cm²)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	1100	1100	1100	1100	2150
10	1100	1100	1100	2150	3440
16	1100	1100	1400	3440	5500
25	1100	1400	2150	5500	8600

	Pu (KN)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	2.35	6.00	9.42	21.21	37.70
10	3.93	10.00	15.71	35.34	62.83
16	6.28	16.00	25.13	56.55	100.53
25	9.82	25.13	39.27	88.36	157.10

	Pw (KN)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	1.20	3.01	4.71	10.60	18.85
10	1.96	5.02	7.85	17.67	31.42
16	3.14	8.04	12.56	28.27	50.27
25	4.91	12.56	19.63	44.18	78.54

α = 45°	Pu (KN)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	0.92	2.30	3.60	8.11	14.43
10	1.50	3.84	6.00	13.52	24.05
16	2.40	6.15	9.61	21.65	38.50
25	3.76	9.61	15.02	33.81	60.11

α = 30°	A (cm²)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	1100	1100	1100	1900	2900
10	1100	1100	1100	2900	4650
16	1100	1200	1900	4650	7400
25	1100	1900	2900	6550	11600

α = 11°	Pu (KN)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	0.23	0.58	0.90	2.03	3.61
10	0.38	0.96	1.50	3.40	6.02
16	0.60	1.54	2.41	5.42	9.63
25	0.94	2.41	3.76	8.47	15.05

α = 90°	Pu (KN)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	1.70	4.25	6.66	15.00	26.66
10	2.80	7.10	11.10	25.00	44.43
16	4.45	11.37	17.76	40.00	71.09
25	6.94	17.80	27.76	62.50	111.07

α = 45°	A[cm^2]				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	1100	1100	1100	2800	4300
10	1100	1100	1750	4300	6200
16	1100	1750	2800	6200	11000
25	1100	2800	4300	9700	17200

	A (cm²)				
PRESSURE (bar)	DIAMETER (mm)				
	50	80	100	150	200
6	1100	1800	2900	6100	11250
10	1100	2900	4600	10100	17950
16	1800	4600	7200	16200	28750
25	2900	7200	11250	25250	44900

Purpose Of Issue	Rev.	Date	Approved

Consultant:
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Client:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Project:
Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:
THRUST BLOCK DETAILS-3

Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: N.T.S	Date: JAN. 2021	Approved: W.Z.

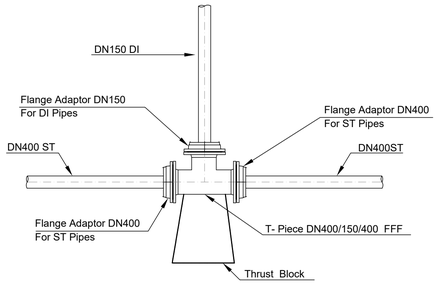
METERS

Drawing Number: W-TD-13

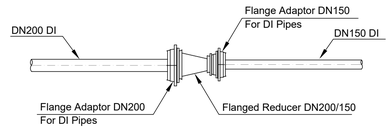
Rev.: 0

HAM PROPOSED WATER NETWORK - TYPICAL NODE CONNECTIONS:

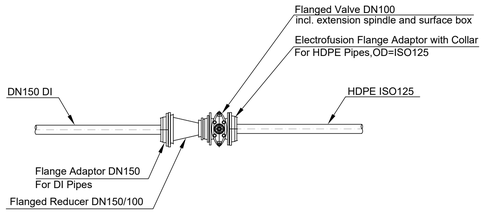
DETAIL (1) :
CONNECTION OF DN400 ST WITH DN150 DI



DETAIL (2) :
CONNECTION OF DN200 DI WITH DN150 DI

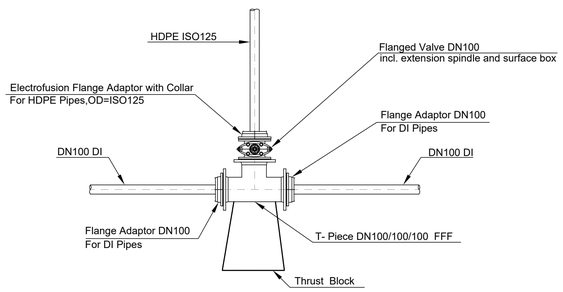


DETAIL (3) :
CONNECTION OF DN150 DI WITH ISO125 HDPE

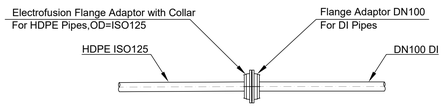


DETAIL (4) :
CONNECTION OF DN100DI WITH ISO125 HDPE

4A:



4B:



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Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

HAM NETWORK
NODE CONNECTIONS DETAILS
SHEET 1 OF 3

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale: N.T.S	Date: JAN. 2021	Approved: W.Z.

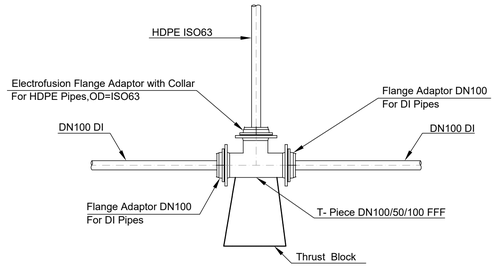
METERS

Drawing Number: W-TD-14

Rev.: 0

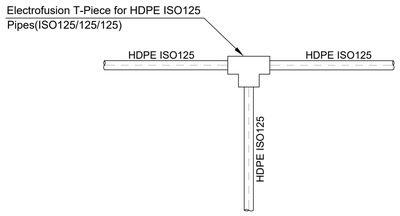
HAM PROPOSED WATER NETWORK - TYPICAL NODE CONNECTIONS:

DETAIL (5) :
CONNECTION OF ISO100 DI WITH ISO63 HDPE

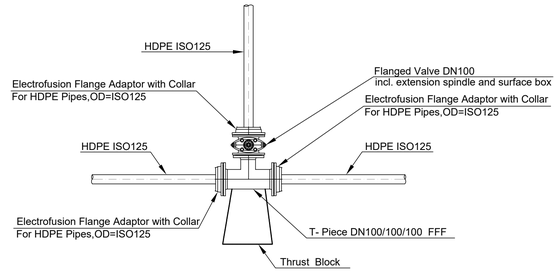


DETAIL (6) :
CONNECTION OF ISO125 HDPE WITH ISO125 HDPE

6A:



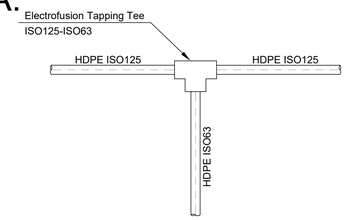
6B:



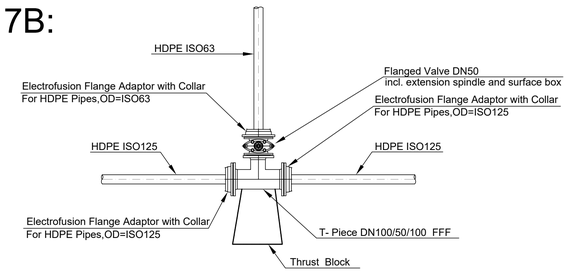
6C:

DETAIL (7) :
CONNECTION OF ISO125 HDPE WITH ISO63 HDPE

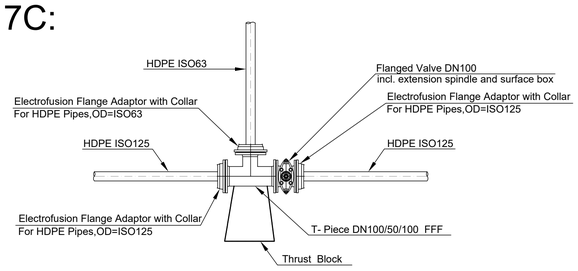
7A:



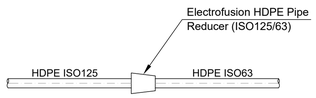
7B:



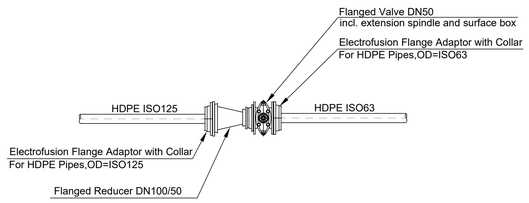
7C:



7D:



7E:



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Client:

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Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

HAM NETWORK
NODE CONNECTIONS DETAILS
SHEET 2 OF 3

Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: N.T.S	Date: JAN. 2021	Approved: W.Z.

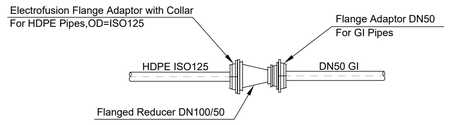
METERS

Drawing Number: W-TD-15

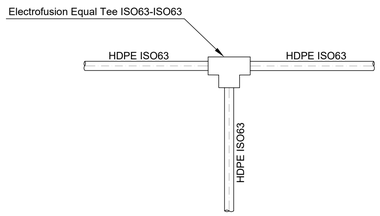
Rev.: 0

HAM PROPOSED WATER NETWORK - TYPICAL NODE CONNECTIONS:

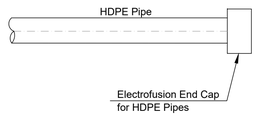
DETAIL (8) :
CONNECTION OF HDPE ISO125 WITH DN50 GI



DETAIL (9) :
CONNECTION OF HDPE ISO63 WITH HDPE ISO63

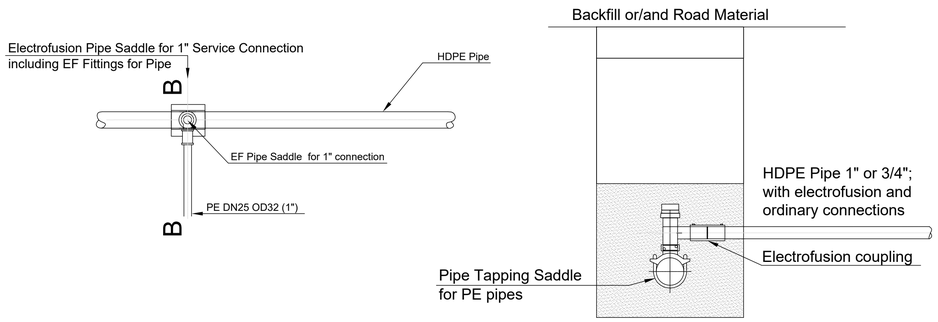


DETAIL (10) :
END CAP FOR HDPE PIPES:



DETAIL (11) :
CONNECTION OF HDPE WITH OD32 HDPE:

Section B-B:



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Project:

Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

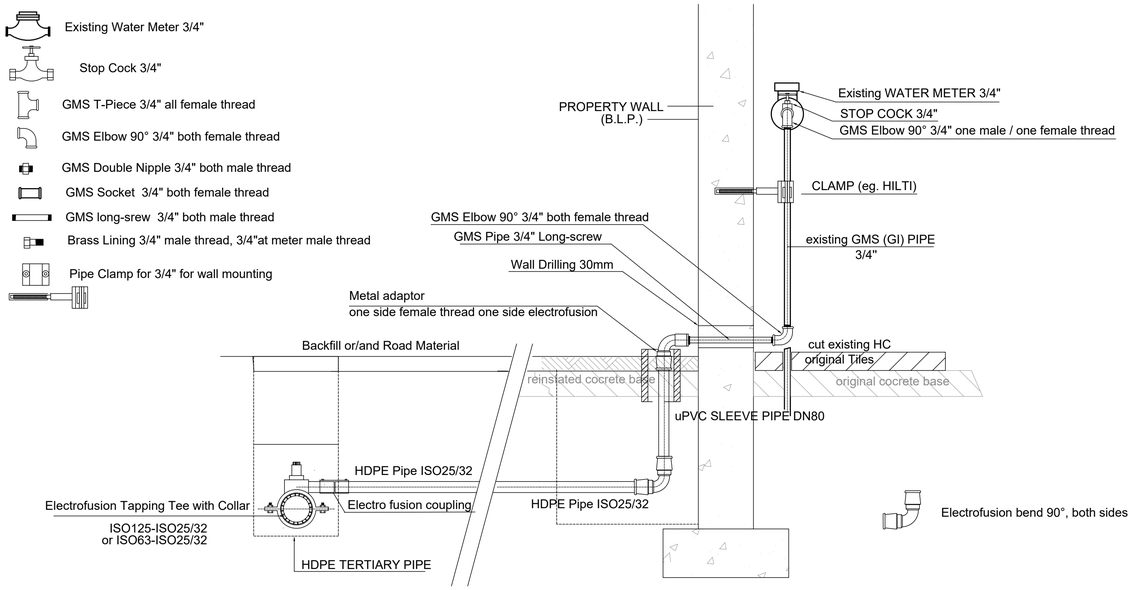
HAM NETWORK
NODE CONNECTIONS DETAILS
SHEET 3 OF 3

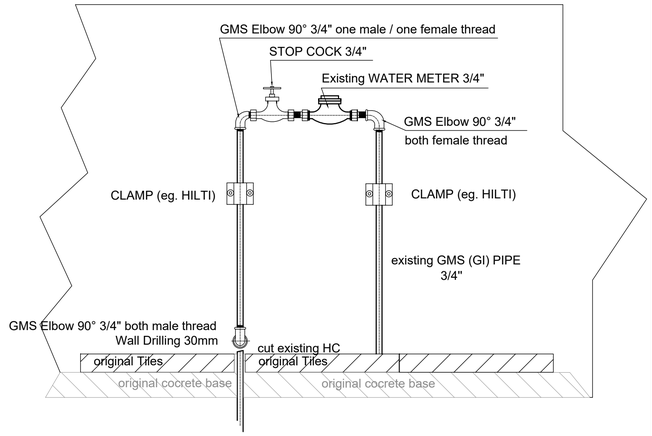
Design: T.H.	Drawn by: CAD	Checked: S.G.
Scale: N.T.S	Date: JAN. 2021	Approved: W.Z.

METERS

Drawing Number:	Rev.:
W-TD-16	0

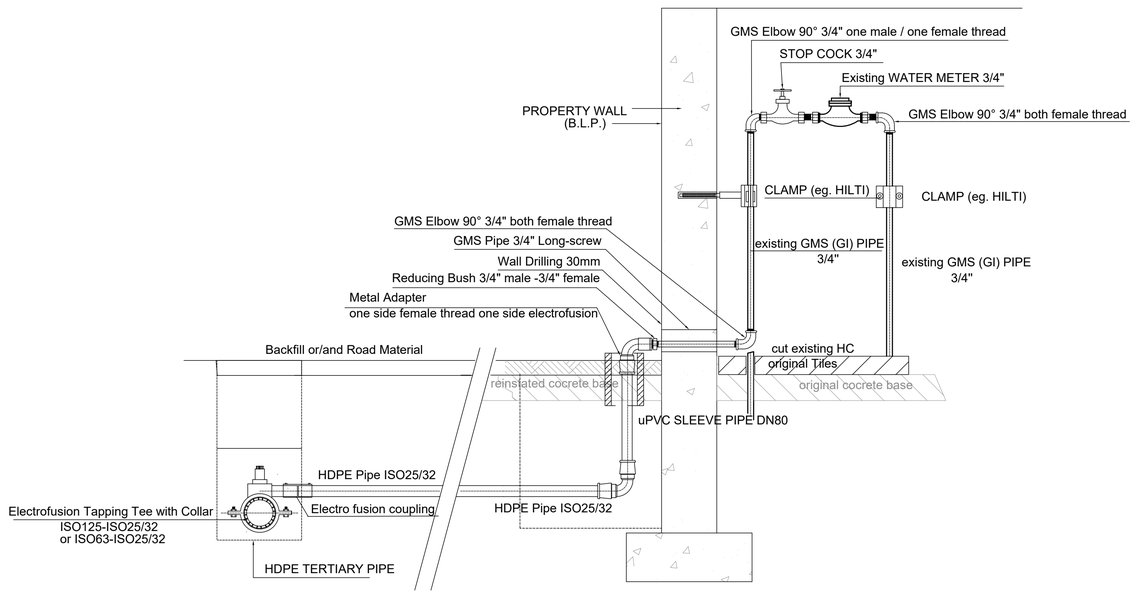
House Connection for single Customer up to four customers reconnected from outside the wall without destroying and reinstatement of compound internal tiling

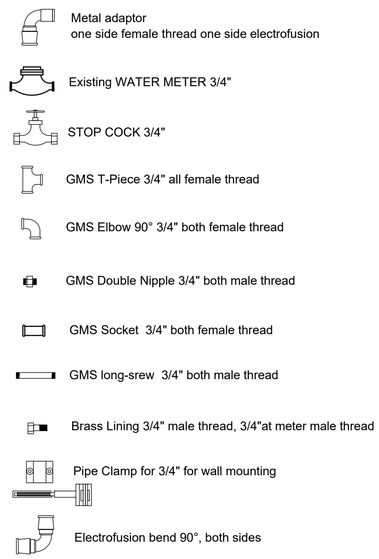




Note:
incase of more than one meter
minimum spacing between meters
should be 25cm to avoid tilting of meters
during reading

House Connection for single cutomer up to four customers reconnected from outside the wall, meter along side wall without destroying and reinstatement of compound internal tiling





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Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

HOUSE CONNECTIONS DETAILS

SHEET 1 OF 2

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	Date:	Approved:
N.T.S	JAN. 2021	W.Z.

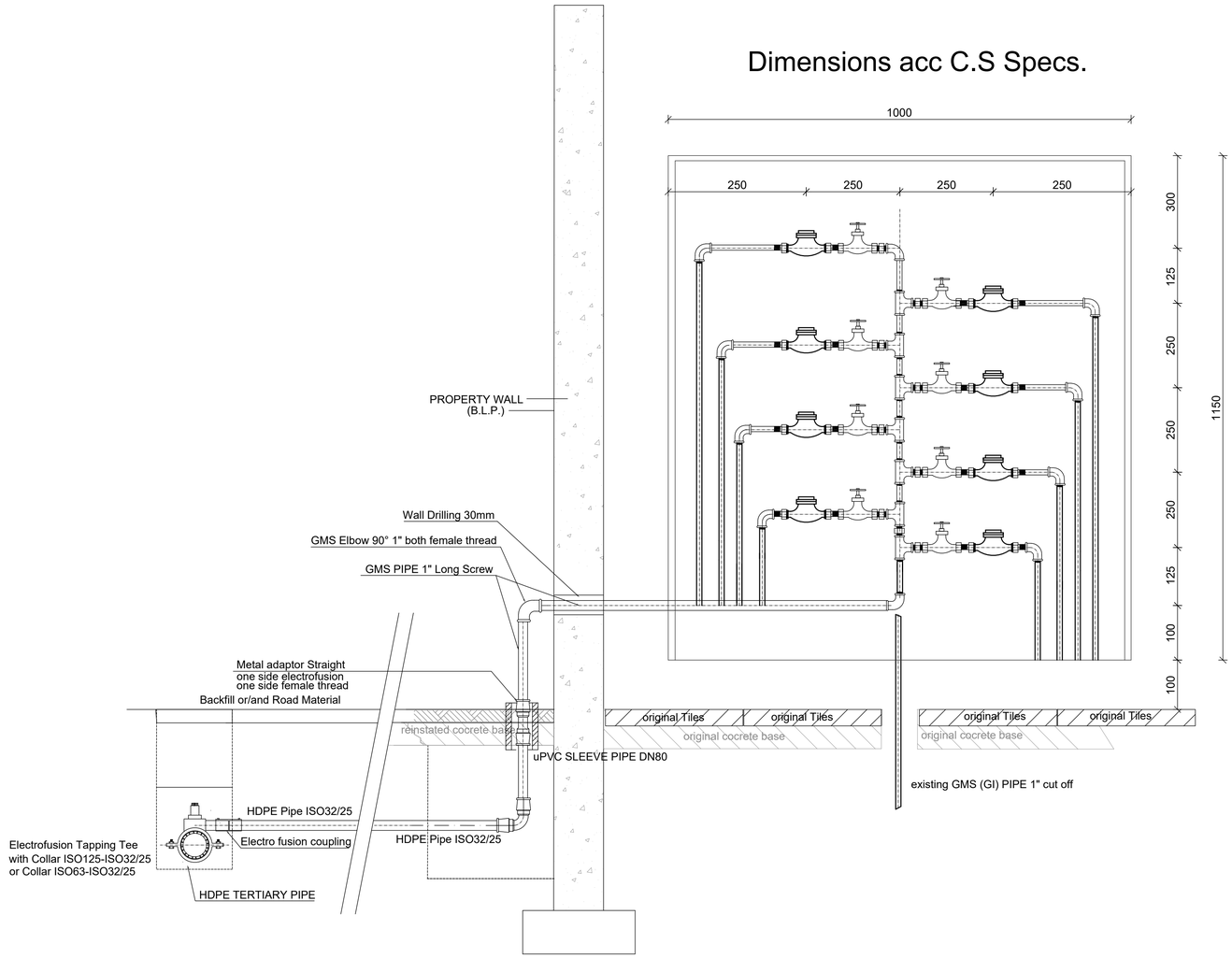
METERS

Drawing Number:	Rev.:
W-TD-17	0

HOUSE CONNECTION FOR MULTIPLE CUSTOMERS

Reconnected from outside the wall, meter along side wall
the limit of work as explained in the drawing below and detailed
in the particular specifications, the connection should be to the meter station

STANDARD DETAIL FOR CONNECTIONS WITH 5 METERS AND ABOVE:



Existing WATER METER 1"

STOP COCK 1"

GMS T-Piece 1" all female thread

GMS Elbow 90° 1" both female thread

GMS Double Nipple 1" both male thread

GMS Socket 1" both female thread

GMS long-srew 1" both male thread

Brass Lining 1" male thread, 3/4"at meter male thread

Electrofusion bend 90°, both sides

Metal adaptor Straight
one side electrofusion
one side female thread

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Technical Designs and Monitoring of Supervision of works for Water Networks in PRM sites Ham, Natfeh and Zoobya

Title:

HOUSE CONNECTIONS DETAILS

SHEET 2 OF 2

Design:	Drawn by:	Checked:
T.H.	CAD	S.G.
Scale:	Date:	Approved:
N.T.S	JAN. 2021	W.Z.

METERS

Drawing Number:	Rev.:
W-TD-18	0