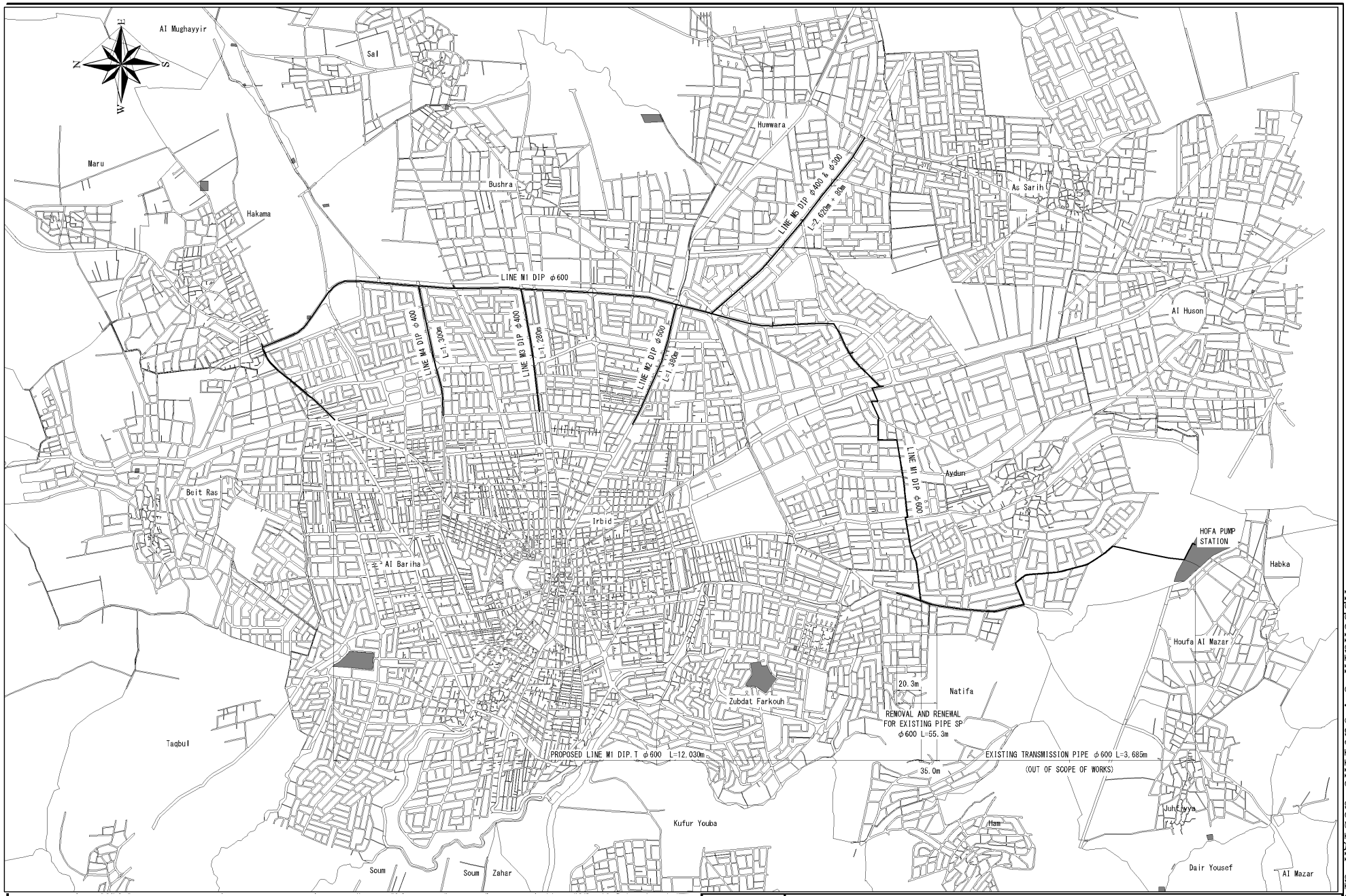
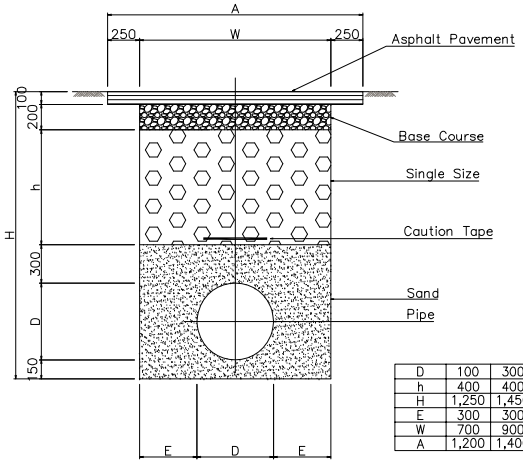
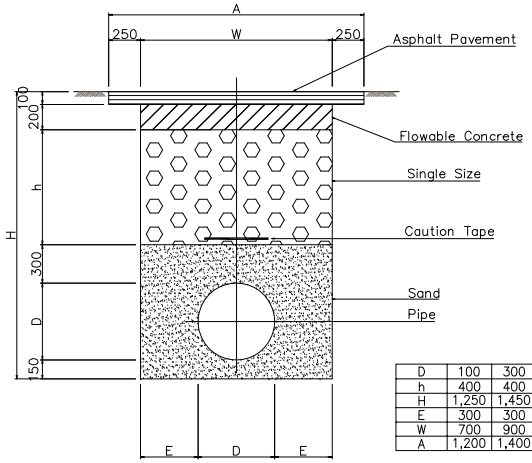


No.1	GENERAL SITE PLAN



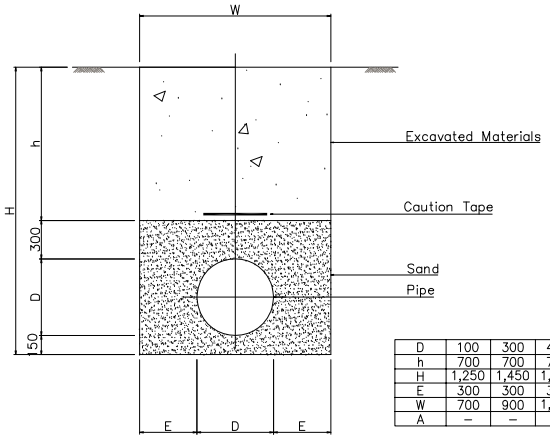
D	100	300	400	500	600
h	400	400	400	900	900
H	1,250	1,450	1,550	2,150	2,250
E	300	300	300	450	450
W	700	900	1,000	1,400	1,500
A	1,200	1,400	1,500	1,900	2,000

TYPE:1 ALONG ASPHALT STREET
FOR MUNICIPALITY MAIN ROAD S=1/20



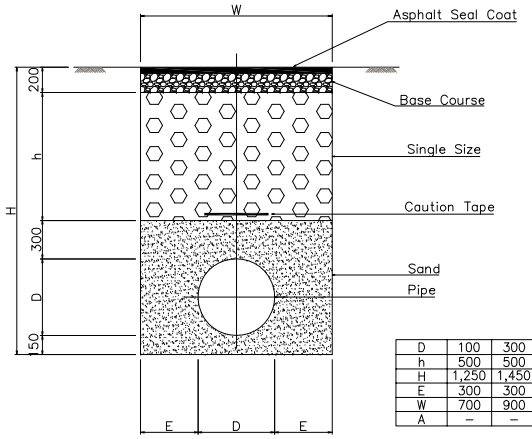
D	100	300	400	500	600
h	400	400	400	900	900
H	1,250	1,450	1,550	2,150	2,250
E	300	300	300	450	450
W	700	900	1,000	1,400	1,500
A	1,200	1,400	1,500	1,900	2,000

TYPE:2 CROSS SECTION
FOR MUNICIPALITY MAIN ROAD S=1/20



D	100	300	400	500	600
h	700	700	700	1,200	1,200
H	1,250	1,450	1,550	2,150	2,250
E	300	300	300	450	450
W	700	900	1,000	1,400	1,500
A	–	–	–	–	–

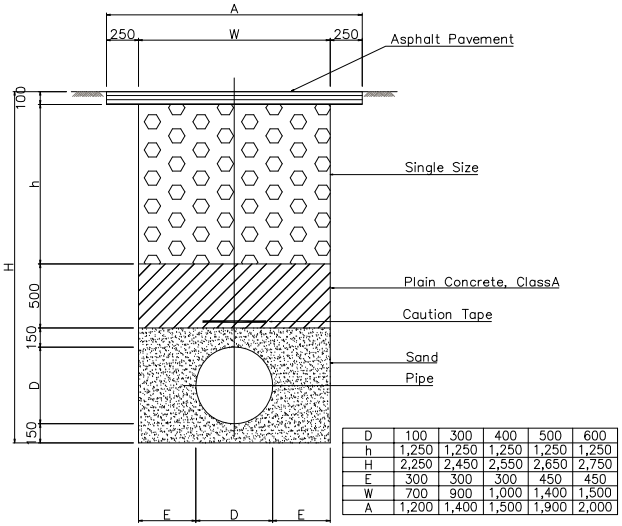
TYPE:3 NON PAVEMENT
FOR MUNICIPALITY ROAD S=1/20



D	100	300	400	500	600
h	500	500	500	1,000	1,000
H	1,250	1,450	1,550	2,150	2,250
E	300	300	300	450	450
W	700	900	1,000	1,400	1,500
A	–	–	–	–	–

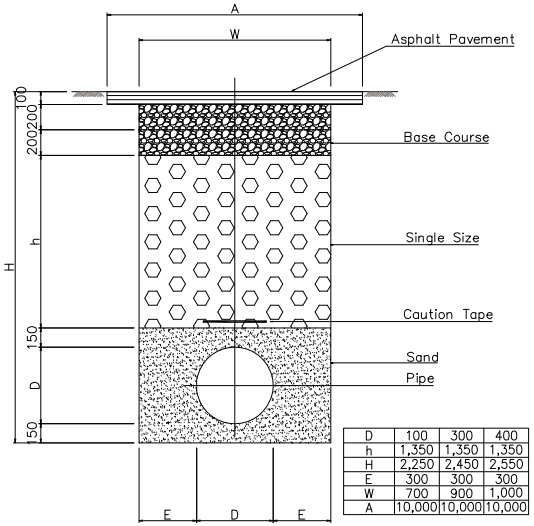
TYPE:4 AGRICULTURAL ROAD
FOR MUNICIPALITY ROAD S=1/20

No.2	TYPICAL TRENCH CROSS SECTION FOR PIPELINE IN THE ROAD UNDER MUNCIPALITY



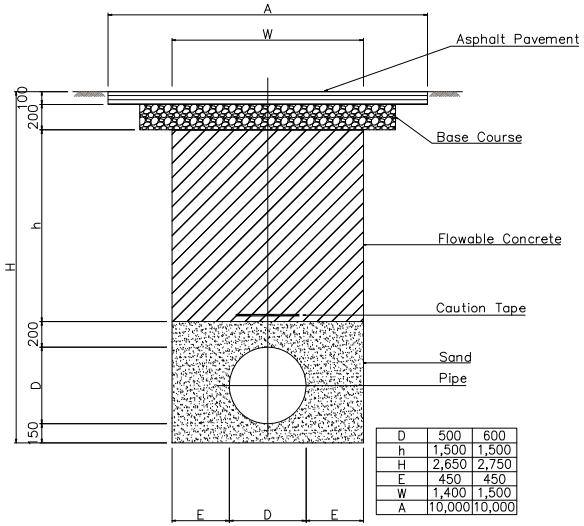
D	100	300	400	500	600
h	1,250	1,250	1,250	1,250	1,250
H	2,250	2,450	2,550	2,650	2,750
E	300	300	300	450	450
W	700	900	1,000	1,400	1,500
A	1,200	1,400	1,500	1,900	2,000

TYPE:5 ALONG ASPHALT STREET FOR MAIN & SECONDARY ROAD S=1/20



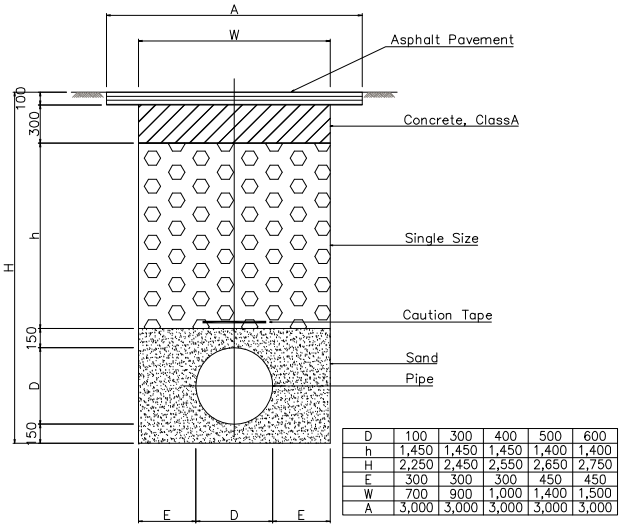
D	100	300	400
h	1,350	1,350	1,350
H	2,250	2,450	2,550
E	300	300	300
W	700	900	1,000
A	10,000	10,000	10,000

TYPE:6 CROSS SECTION OF MAIN ROAD S=1/20



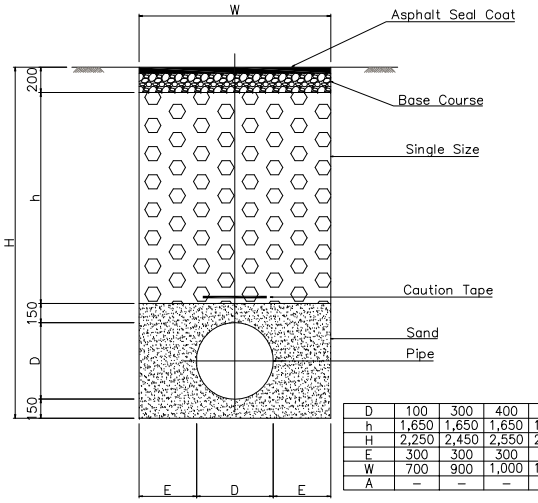
D	500	600
h	1,500	1,500
H	2,650	2,750
E	450	450
W	1,400	1,500
A	10,000	10,000

TYPE:7 CROSS SECTION OF MAIN ROAD S=1/20



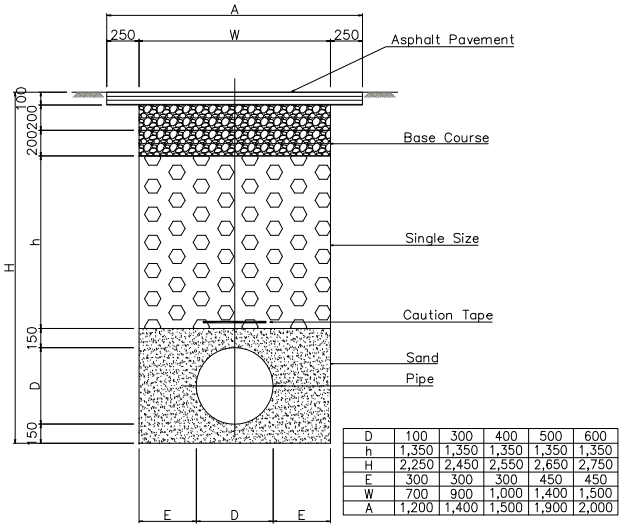
D	100	300	400	500	600
h	1,450	1,450	1,450	1,400	1,400
H	2,250	2,450	2,550	2,650	2,750
E	300	300	300	450	450
W	700	900	1,000	1,400	1,500
A	3,000	3,000	3,000	3,000	3,000

TYPE:8 CROSS SECTION OF SECONDARY ROAD S=1/20



D	100	300	400	500	600
h	1,650	1,650	1,650	1,650	1,650
H	2,250	2,450	2,550	2,650	2,750
E	300	300	300	450	450
W	700	900	1,000	1,400	1,500
A	–	–	–	–	–

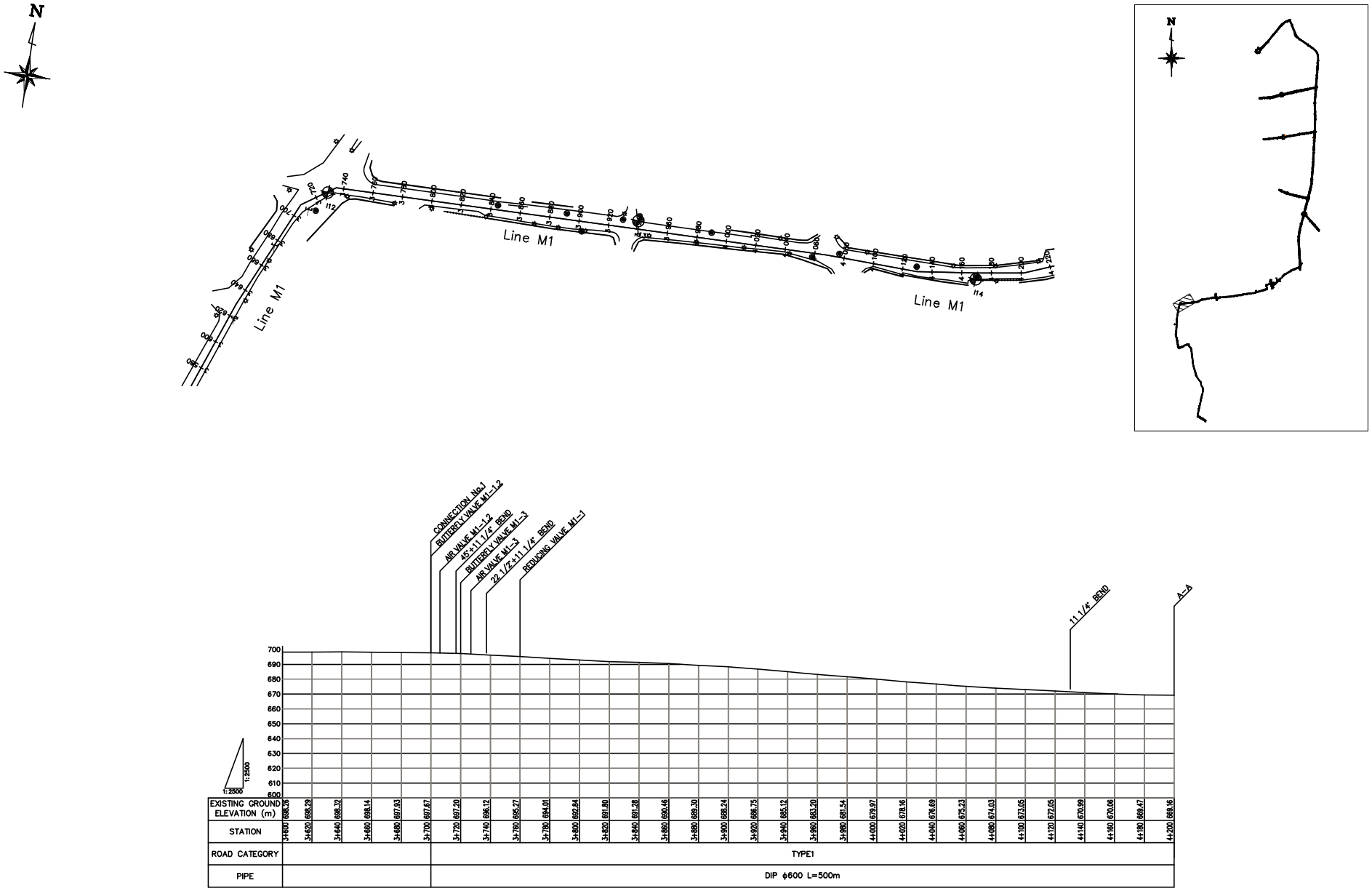
TYPE:9 LONG AND CROSS SECTION OF AGRICULTURAL ROAD S=1/20



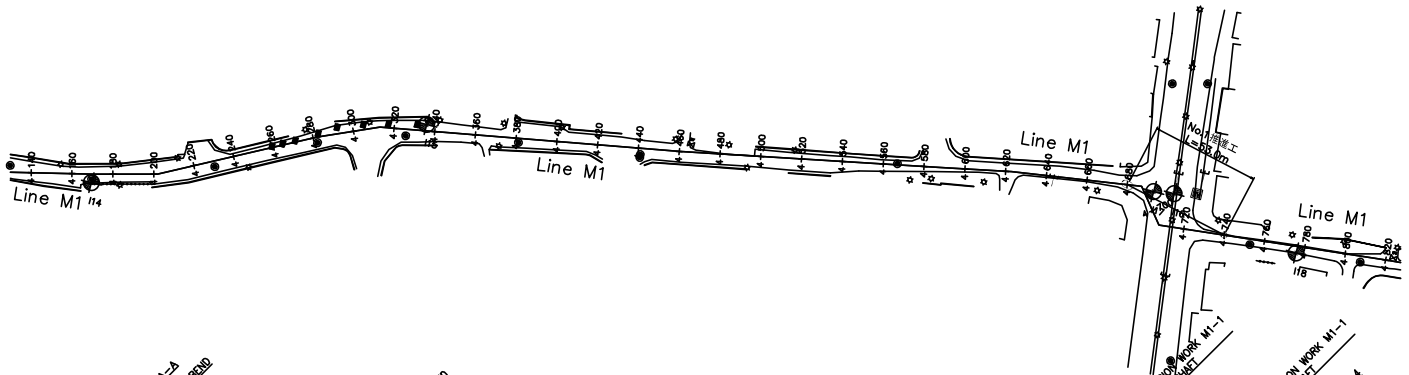
D	100	300	400	500	600
h	1,350	1,350	1,350	1,350	1,350
H	2,250	2,450	2,550	2,650	2,750
E	300	300	300	450	450
W	700	900	1,000	1,400	1,500
A	1,200	1,400	1,500	1,900	2,000

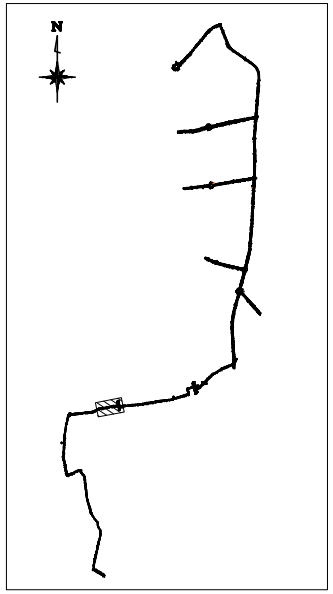
TYPE:10 ALONG ASPHALT STREET OF RURAL ROAD S=1/20

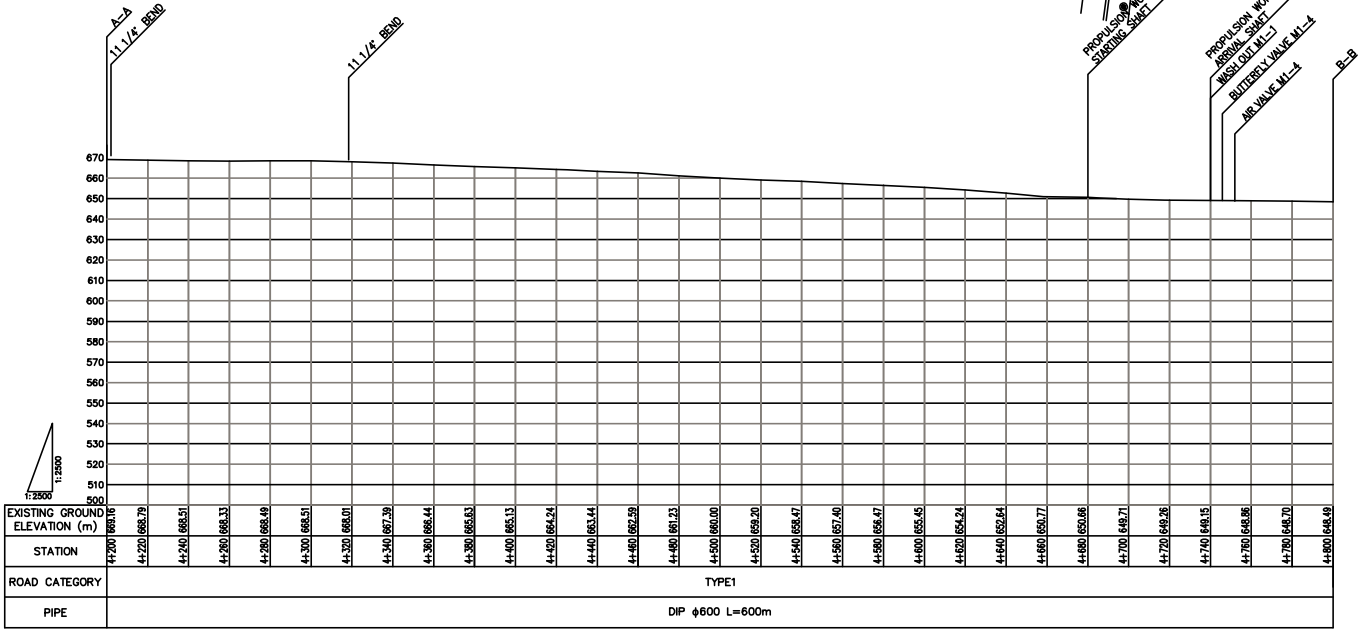
No.3	TYPICAL TRENCH CROSS SECTION FOR PIPELINE IN THE ROAD UNDER MP WH



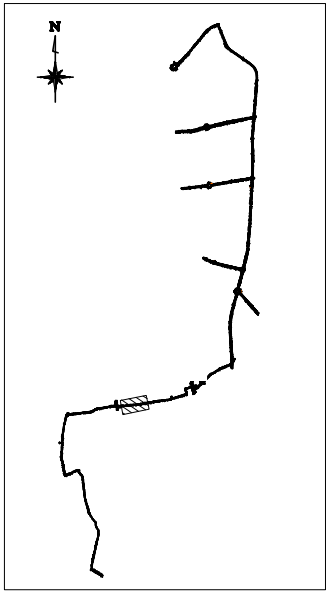
No.4	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (7/26)

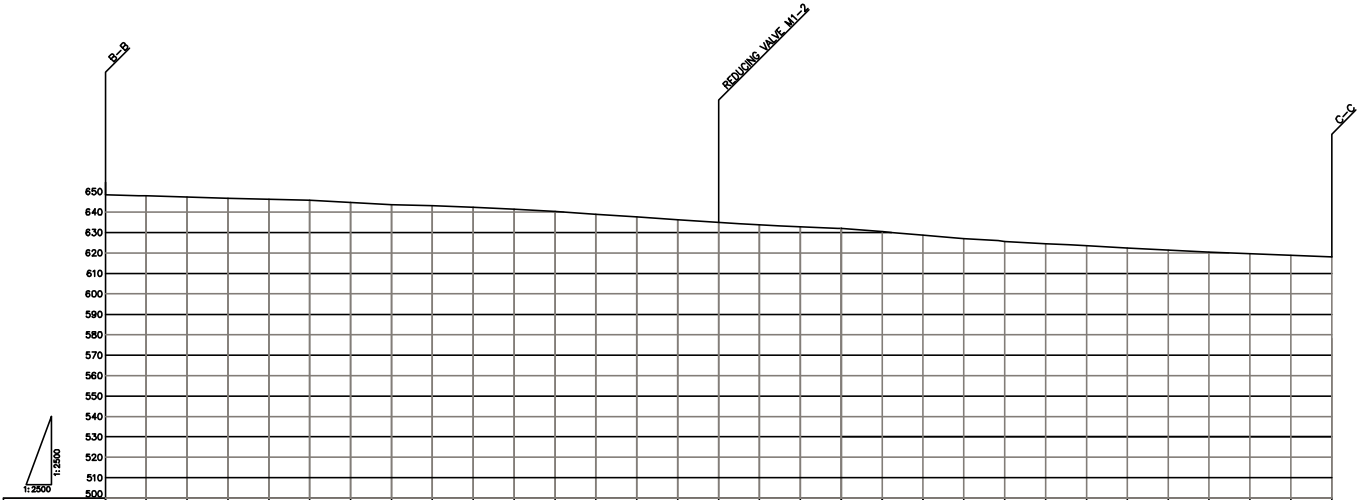






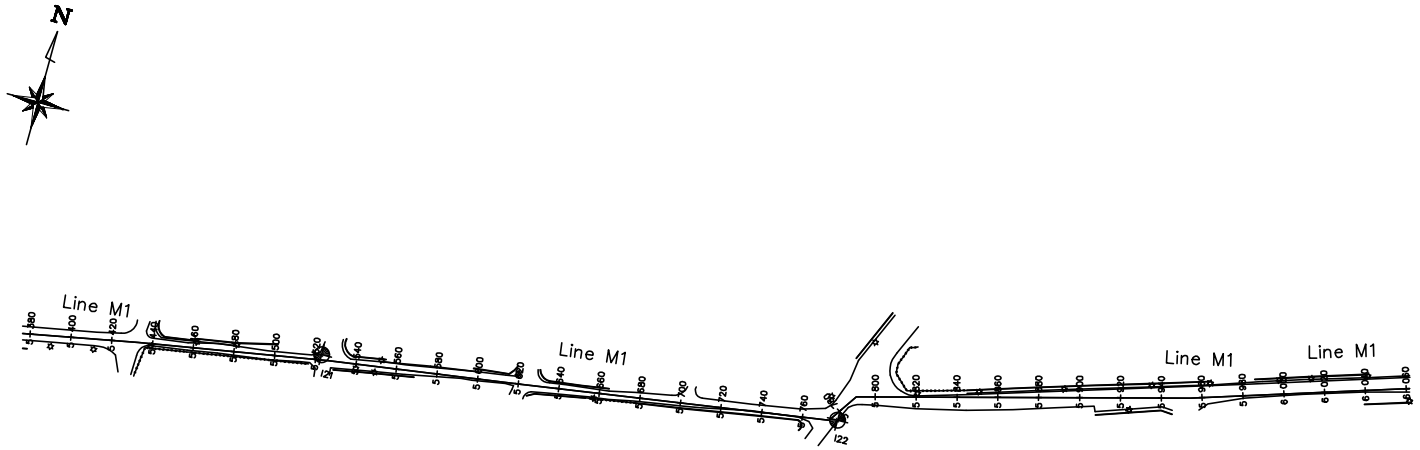
No.5	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (8/26)

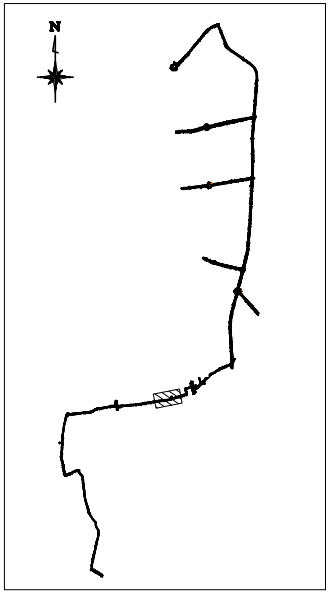


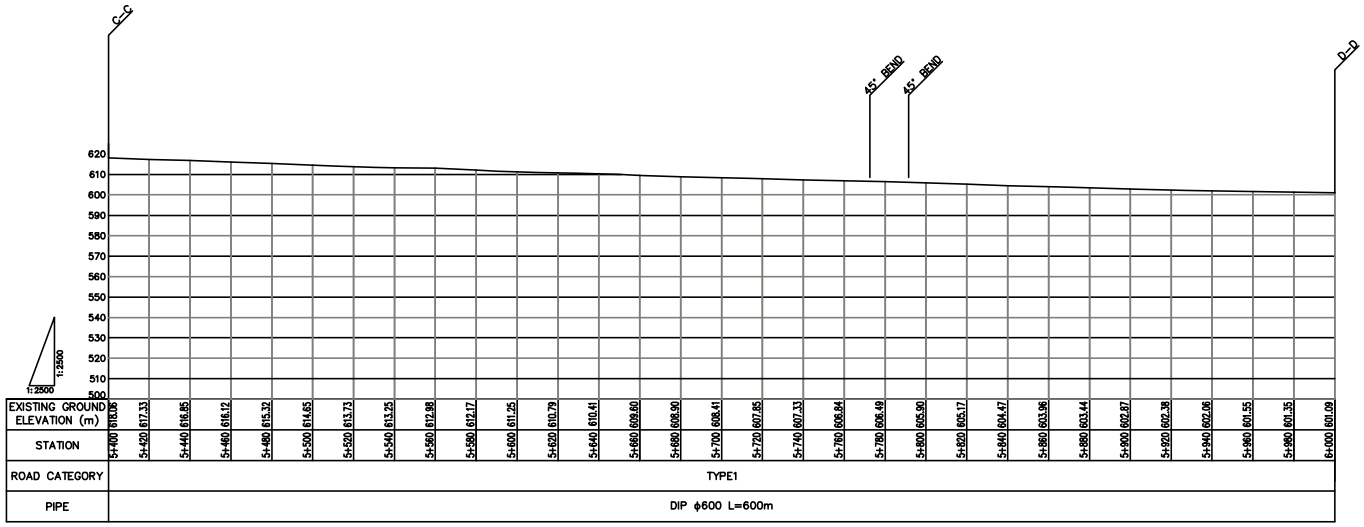


EXISTING GROUND ELEVATION (m)	648.49	647.90	647.30	646.73	646.26	645.78	644.88	643.82	643.10	642.39	641.43	640.26	638.97	637.67	636.21	634.88	633.74	632.79	631.83	630.47	628.69	627.02	625.59	624.61	623.50	622.42	621.33	620.41	619.58	618.87	618.06
STATION	4+800	4+820	4+840	4+860	4+880	4+900	4+920	4+940	4+960	4+980	5+000	5+020	5+040	5+060	5+080	5+100	5+120	5+140	5+160	5+180	5+200	5+220	5+240	5+260	5+280	5+300	5+320	5+340	5+360	5+380	5+400
ROAD CATEGORY	TYPE1																														
PIPE	DIP ϕ600 L=600m																														

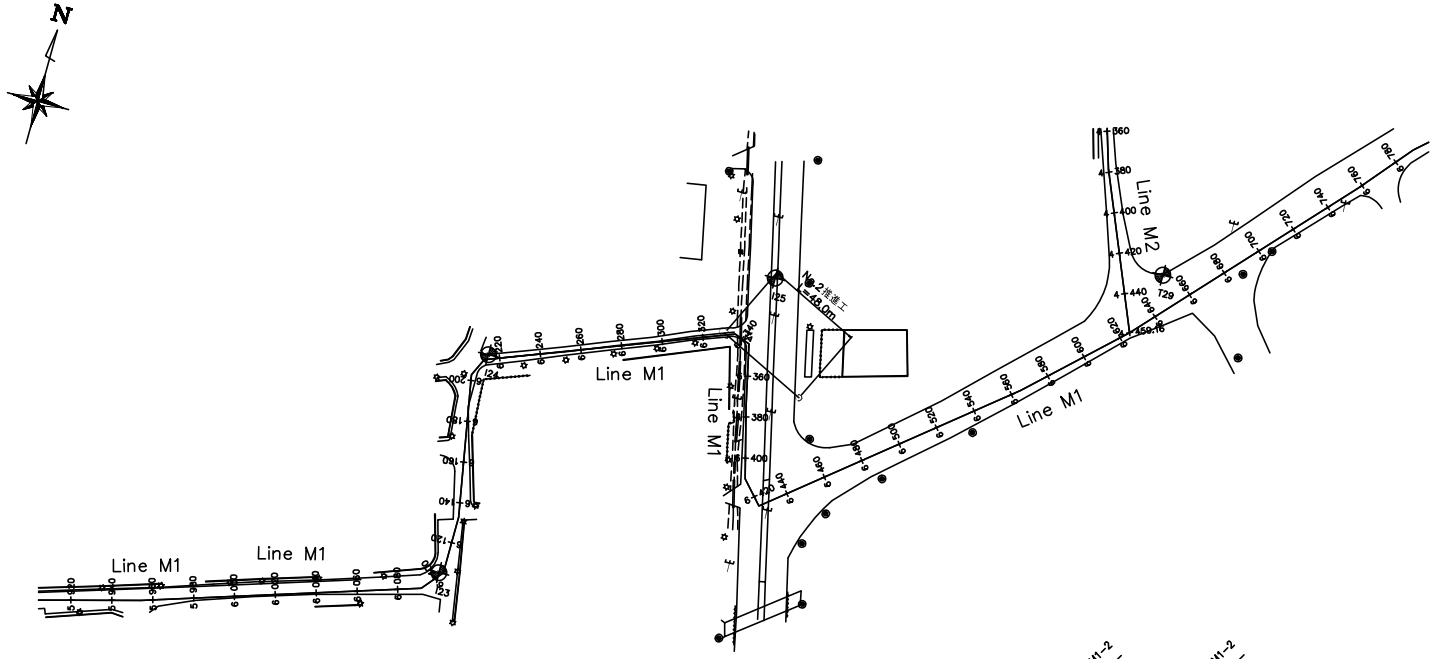
No.6	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (9/26)

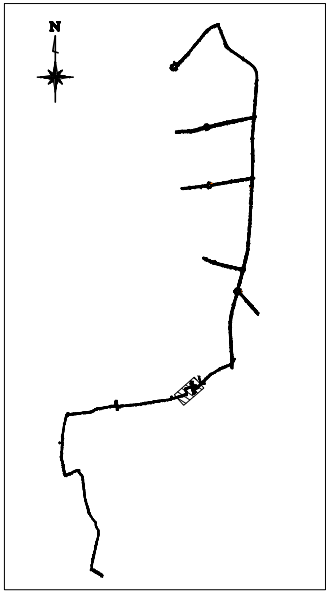


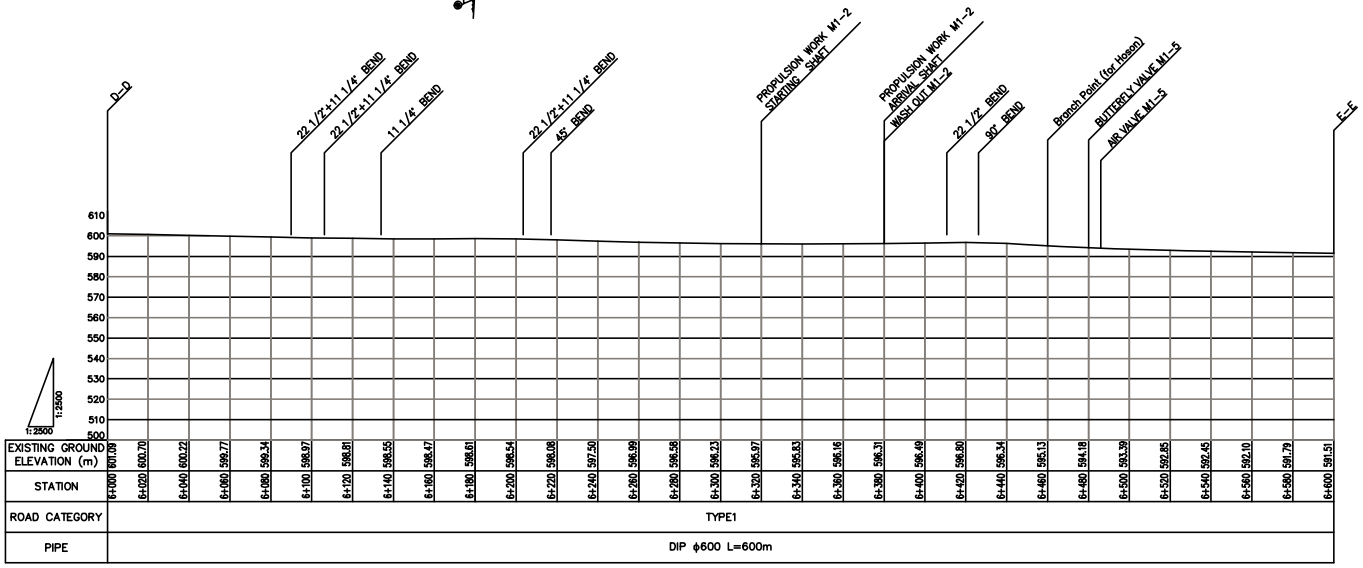




No.7	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (10/26)

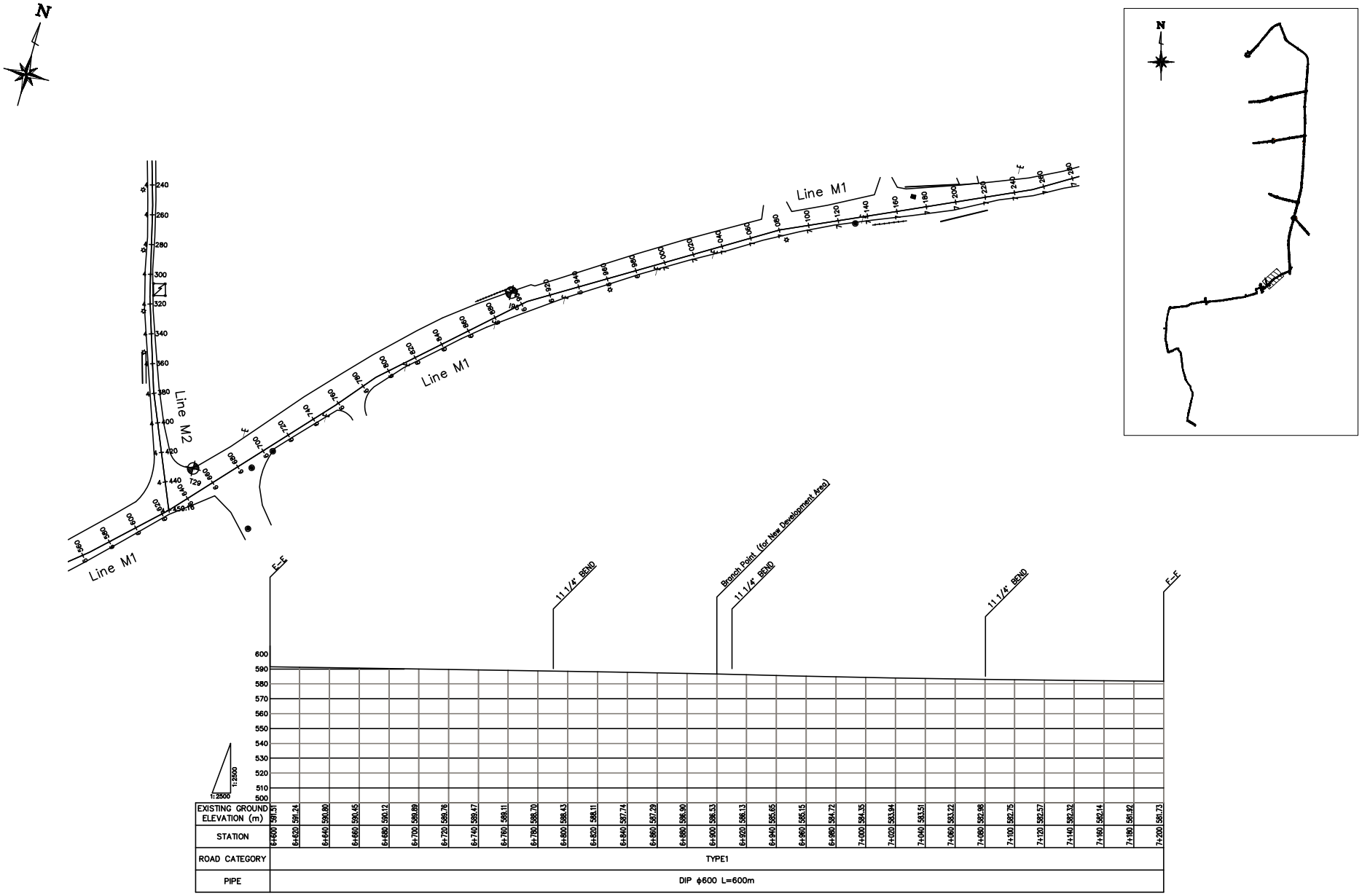






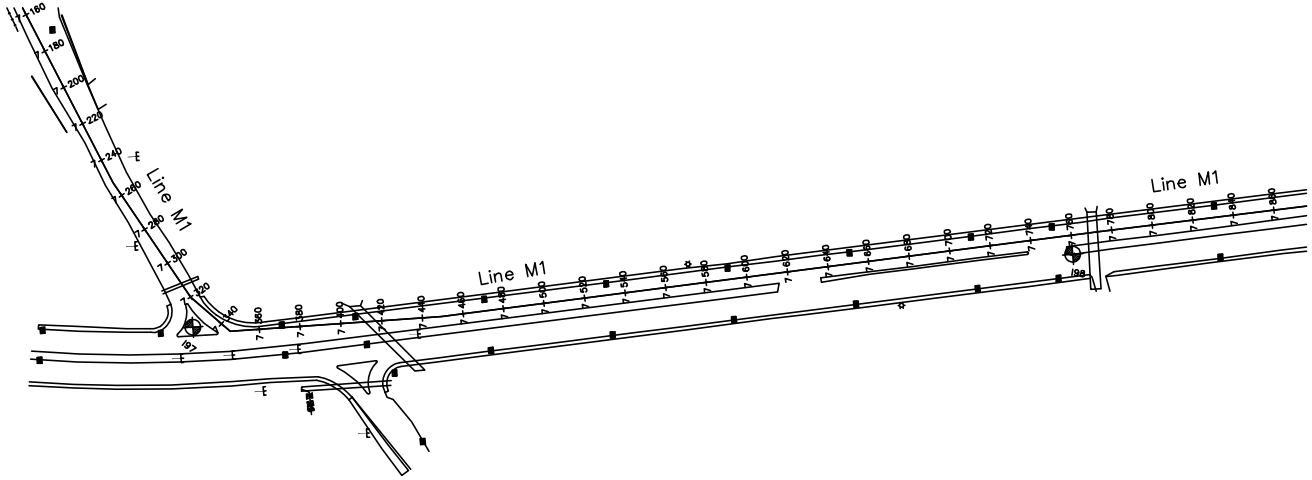
EXISTING GROUND ELEVATION (m)	601.09	600.70	600.22	599.77	599.34	598.97	598.81	598.55	598.47	598.61	598.61	598.54	598.06	597.50	596.99	596.58	596.23	595.97	595.83	596.16	596.31	596.49	596.60	596.34	595.13	594.18	593.39	592.85	592.45	592.10	591.79	591.51
STATION	6+000	6+020	6+040	6+060	6+080	6+100	6+120	6+140	6+160	6+180	6+200	6+220	6+240	6+260	6+280	6+300	6+320	6+340	6+360	6+380	6+400	6+420	6+440	6+460	6+480	6+500	6+520	6+540	6+560	6+580	6+600					
ROAD CATEGORY	TYPE1																																			
PIPE	DIP φ600 L=600m																																			

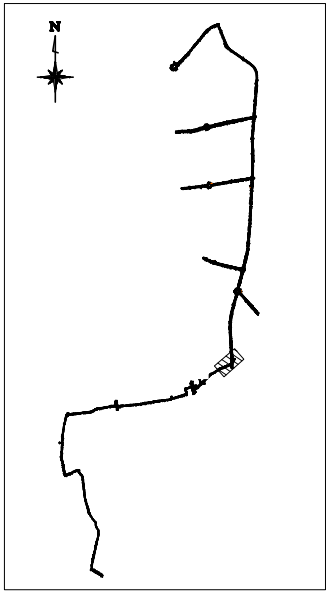
No.8	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (11/26)

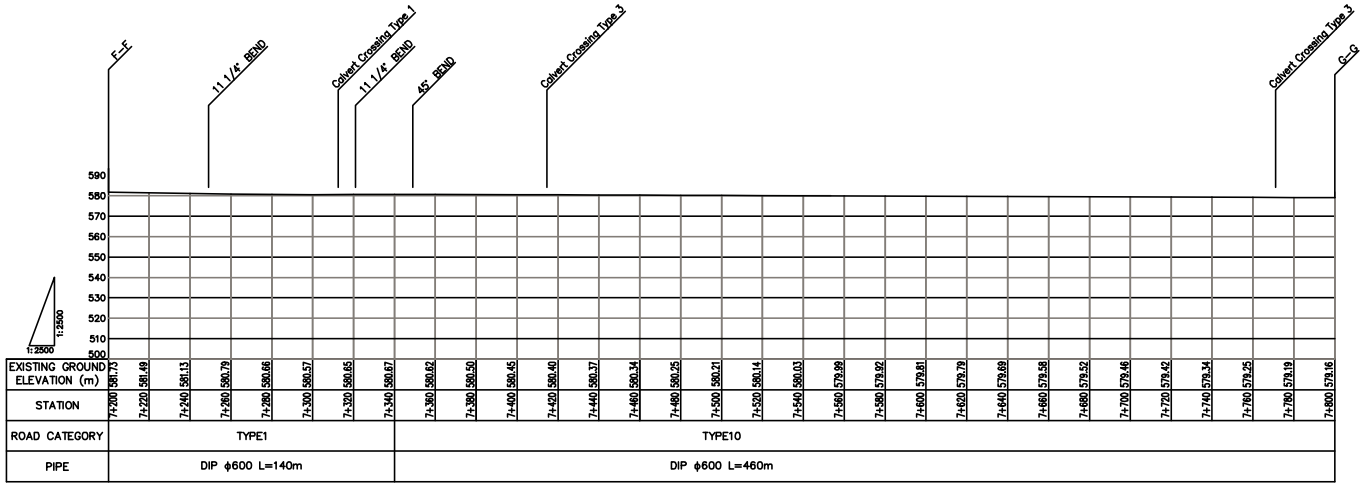


EXISTING GROUND ELEVATION (m)	591.51	591.24	590.80	590.45	590.12	589.89	589.76	589.47	589.11	588.70	588.43	588.11	587.74	587.29	586.90	586.53	586.13	585.65	585.15	584.72	584.35	583.94	583.51	583.22	582.98	582.75	582.57	582.32	582.14	581.92	581.73
STATION	6+600	6+620	6+640	6+660	6+680	6+700	6+720	6+740	6+760	6+780	6+800	6+820	6+840	6+860	6+880	6+900	6+920	6+940	6+960	6+980	7+000	7+020	7+040	7+060	7+080	7+100	7+120	7+140	7+160	7+180	7+200
ROAD CATEGORY	TYPE1																														
PIPE	DIP φ600 L=600m																														

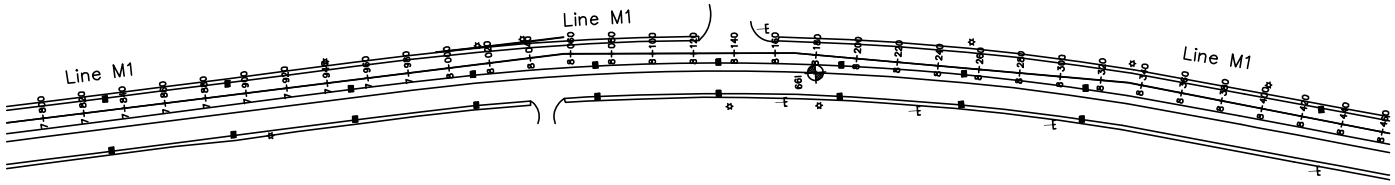
No.9	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (12/26)

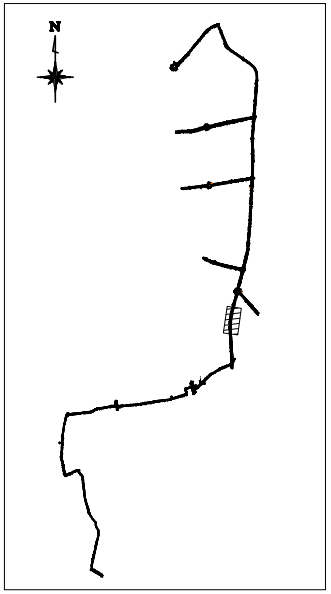


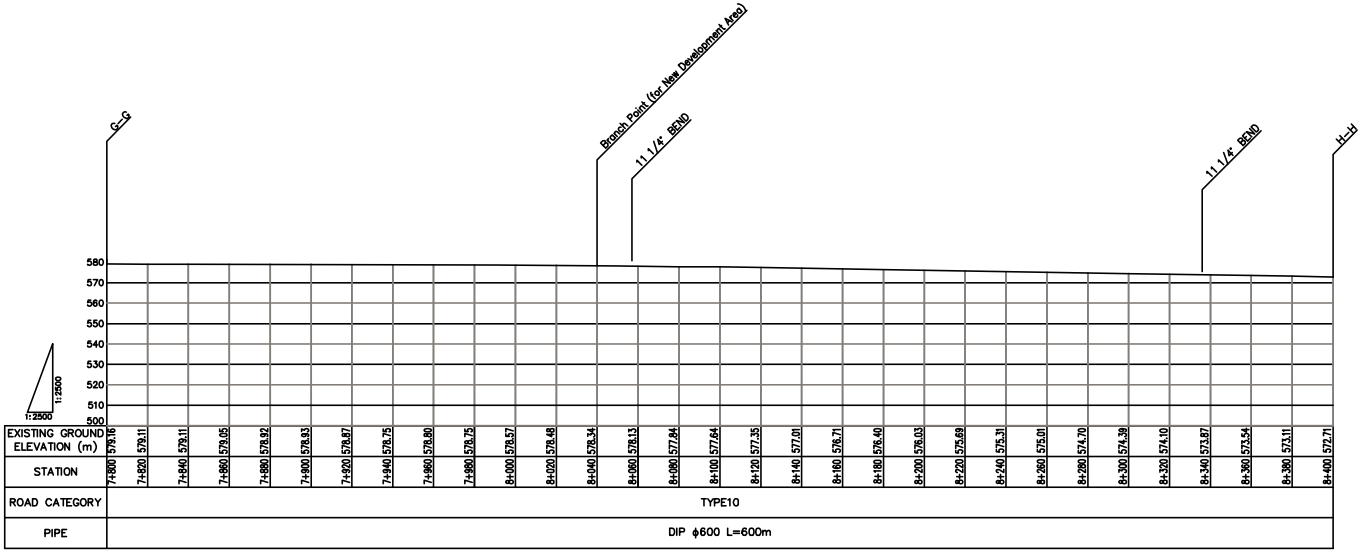




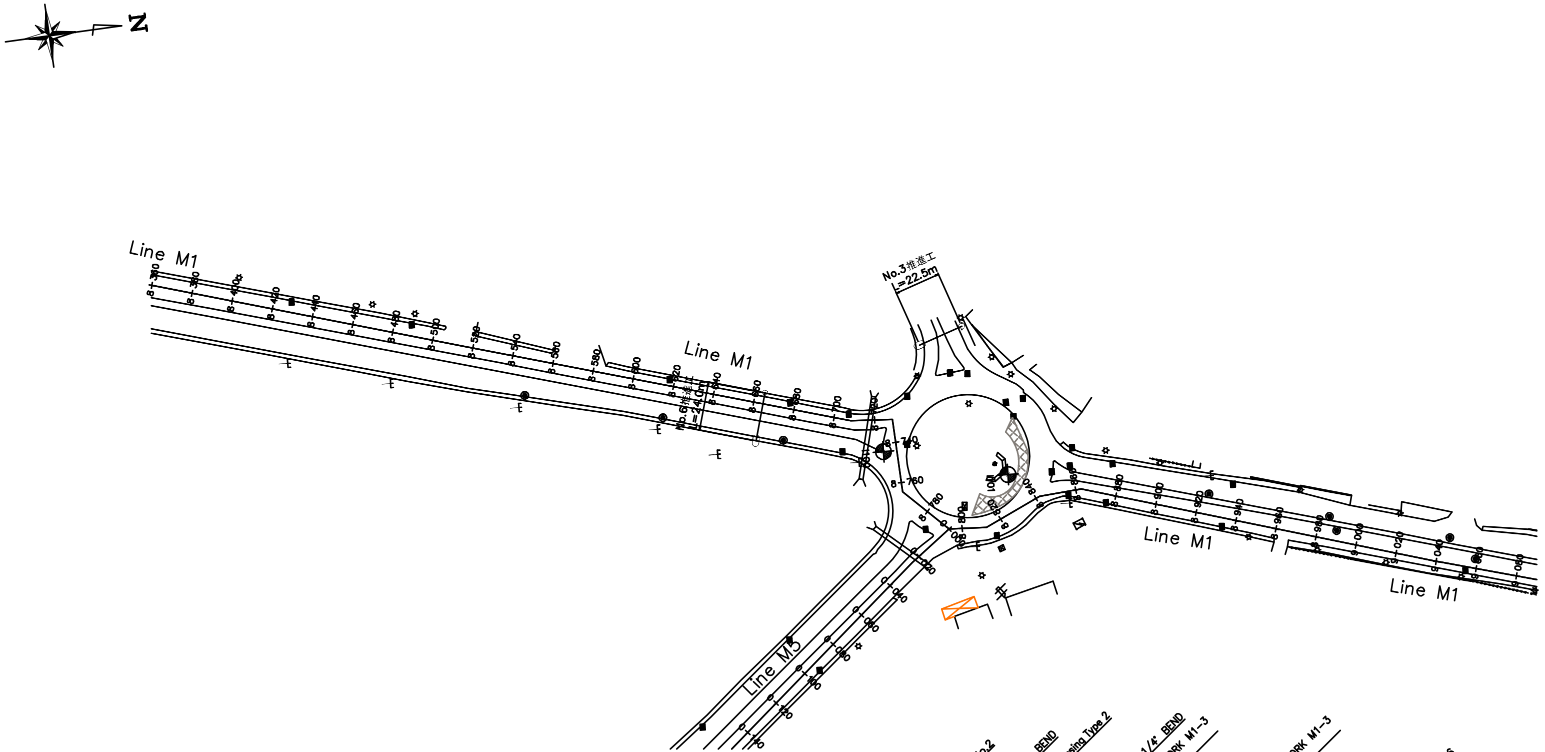
No.10	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (13/26)

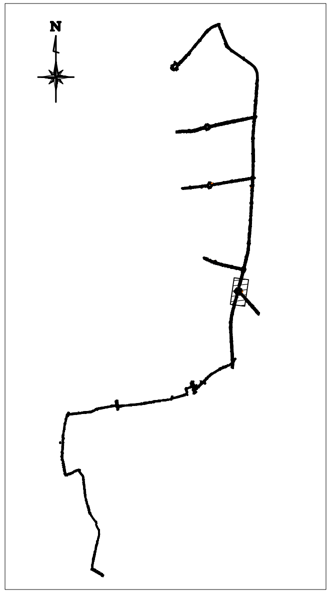


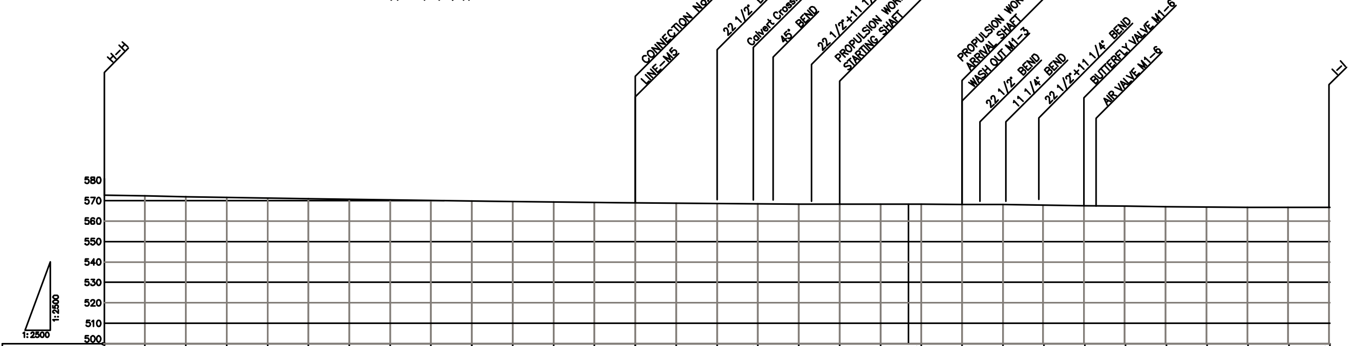




No.11	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (14/26)





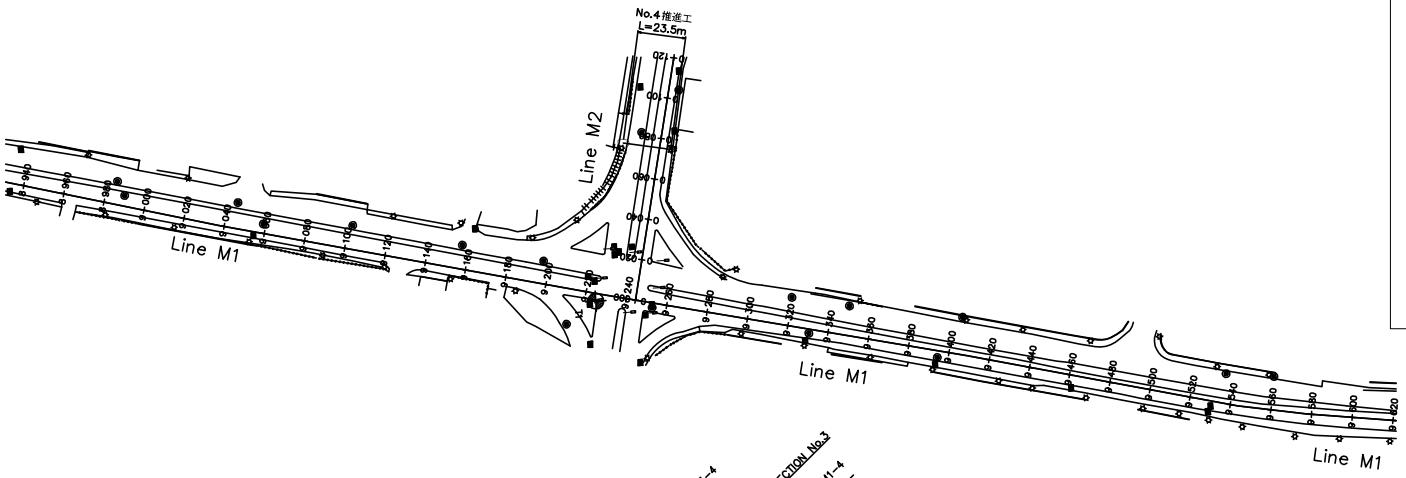


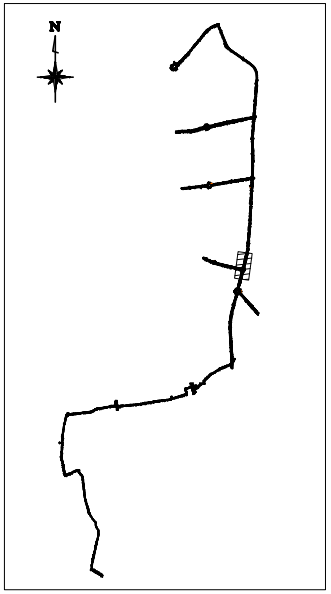
EXISTING GROUND ELEVATION (m)	STATION
572.71	8+400
572.37	8+420
572.03	8+440
571.69	8+460
571.31	8+480
570.96	8+500
570.68	8+520
570.37	8+540
570.09	8+560
569.81	8+580
569.57	8+600
569.31	8+620
569.15	8+640
568.97	8+660
568.77	8+680
568.62	8+700
568.44	8+720
568.39	8+740
568.35	8+760
568.31	8+780
568.24	8+800
568.15	8+820
568.17	8+840
567.85	8+860
567.57	8+880
567.36	8+900
567.10	8+920
566.90	8+940
566.81	8+960
566.79	8+980
566.64	9+000

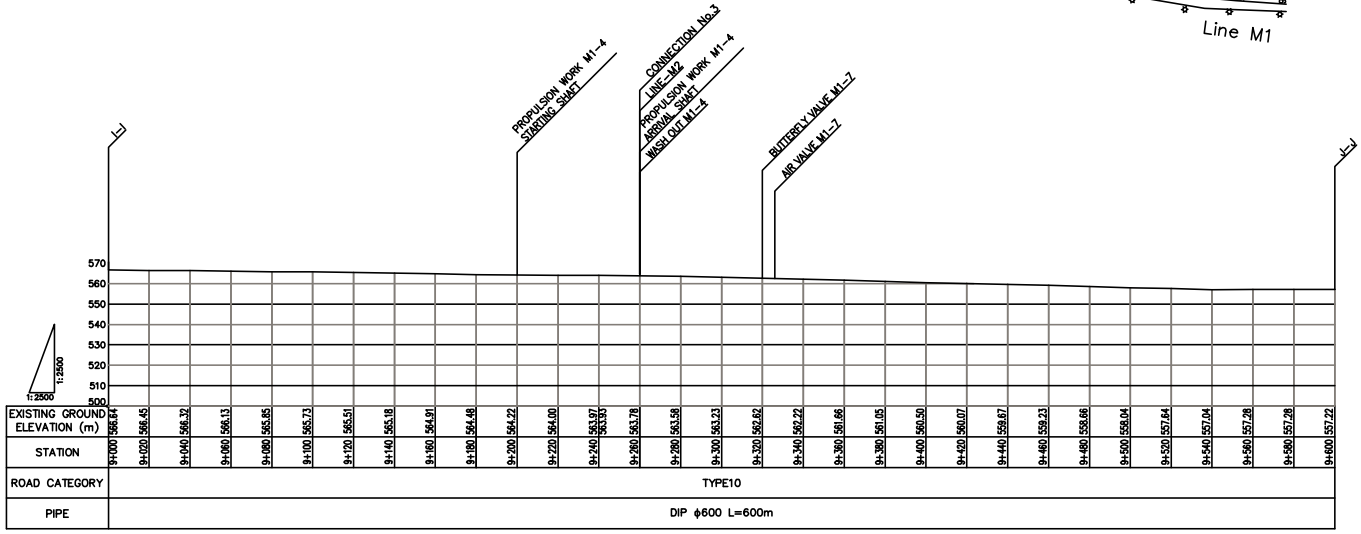
ROAD CATEGORY: TYPE10

PIPE: DIP ϕ600 L=600m

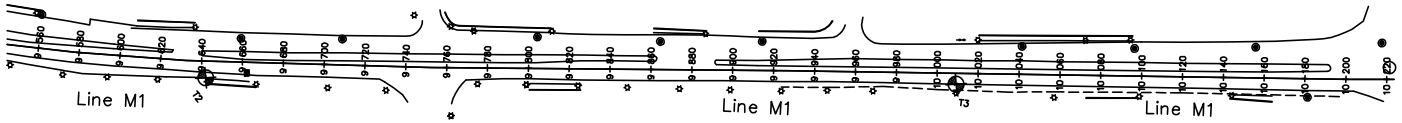
No.12	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (15/26)

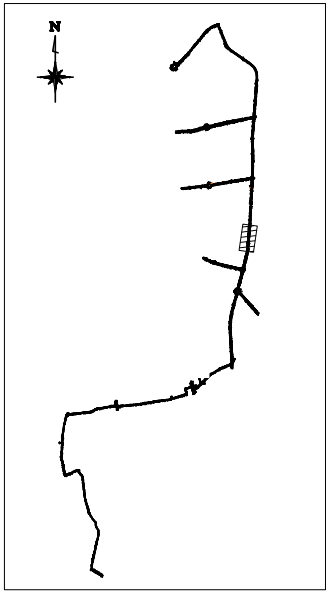


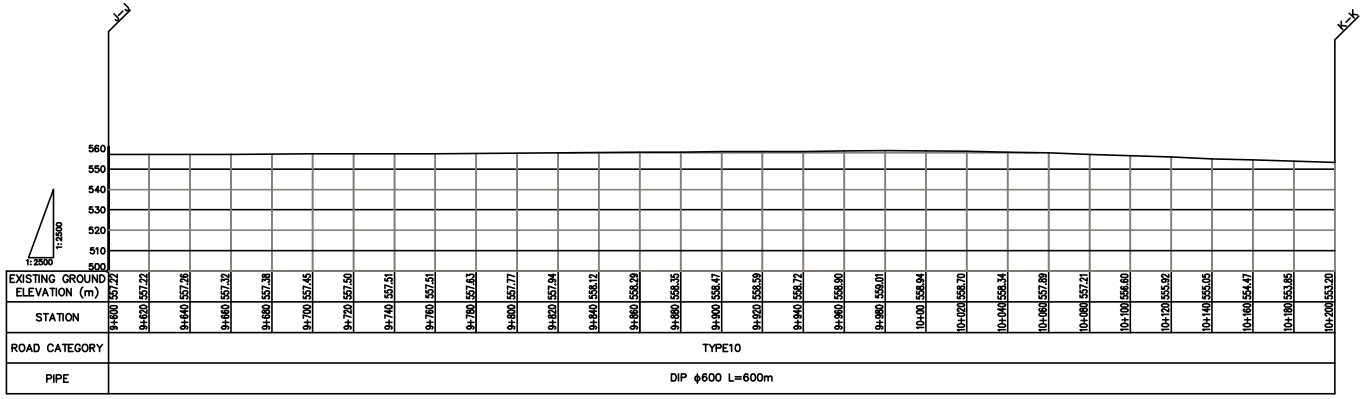




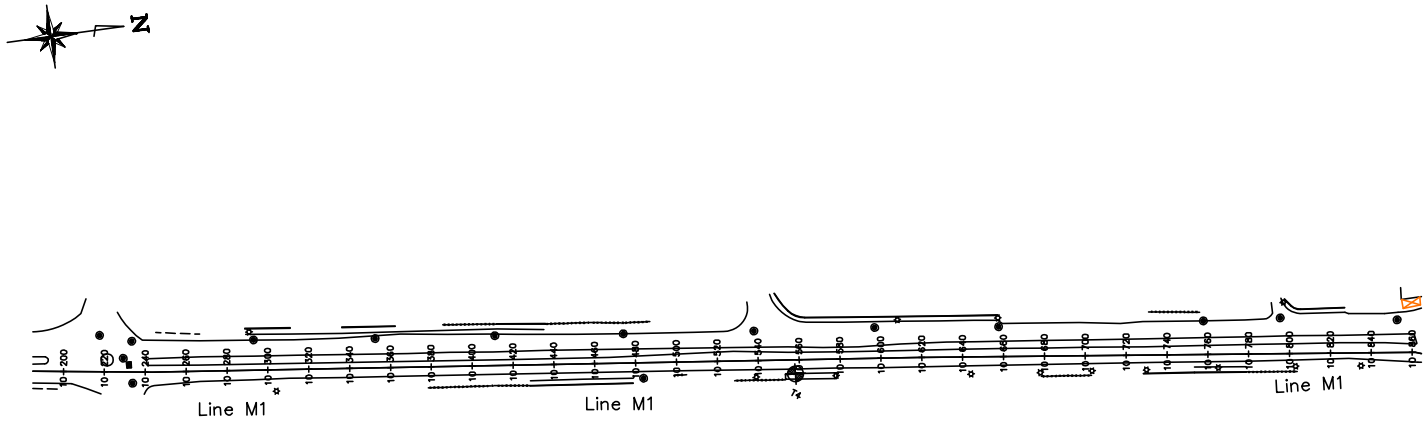
No.13	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (16/26)

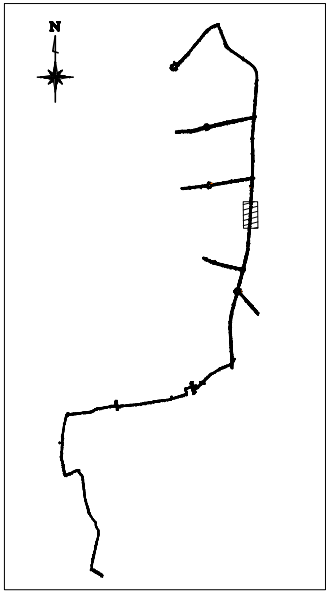


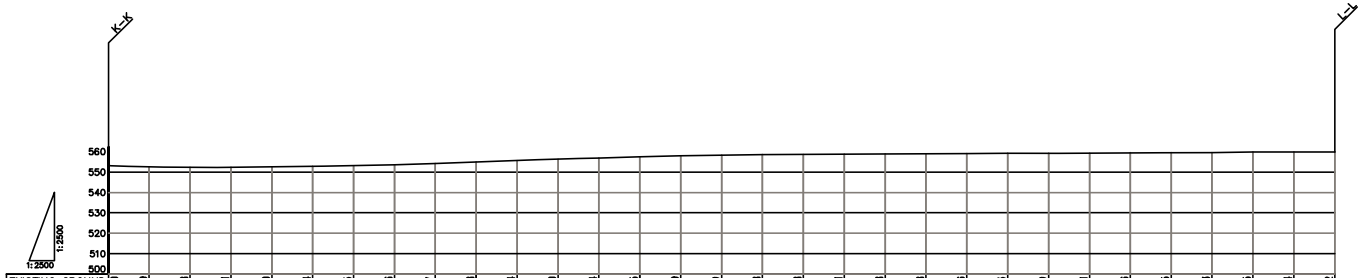




No.14	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (17/26)



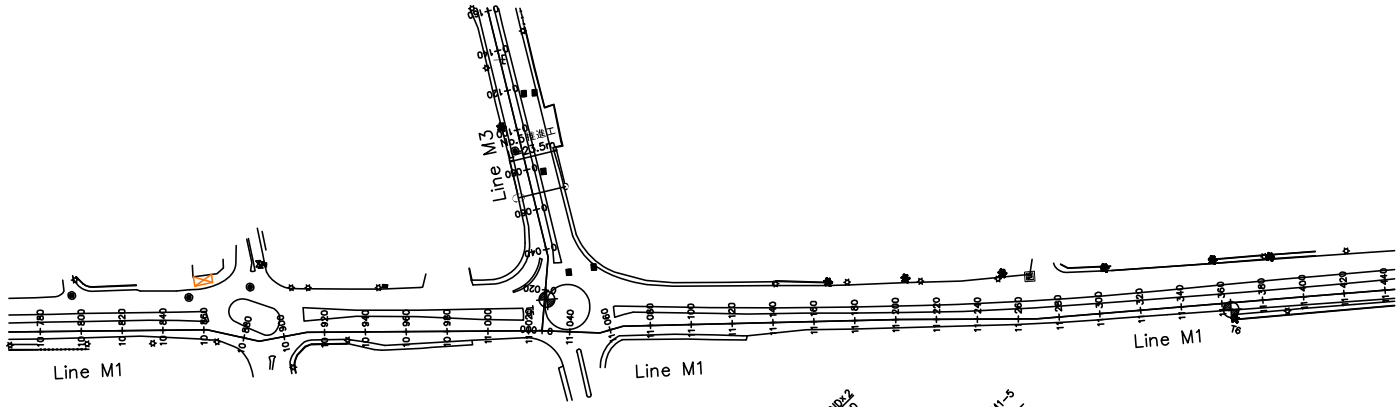


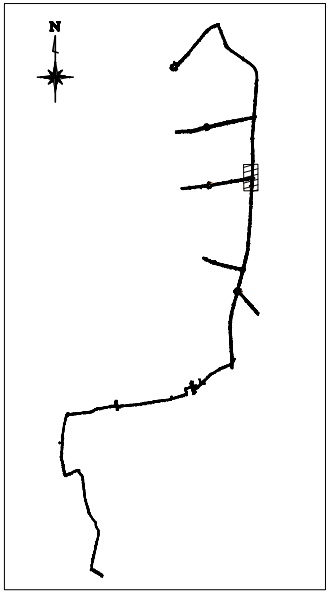


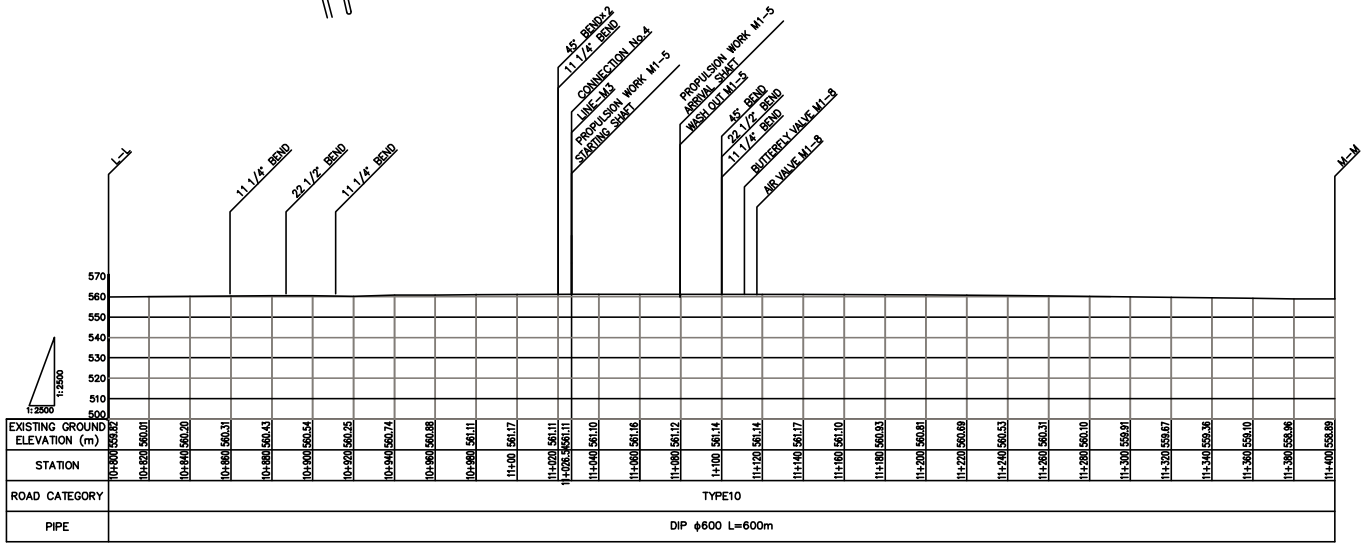
EXISTING GROUND ELEVATION (m)	553.20	552.49	552.28	552.41	552.60	552.84	553.15	553.56	554.17	554.88	555.64	556.30	556.84	557.45	557.89	558.19
STATION	10+200	10+220	10+240	10+260	10+280	10+300	10+320	10+340	10+360	10+380	10+400	10+420	10+440	10+460	10+480	10+500
ROAD CATEGORY	TYPE10															
PIPE	DIP ϕ600 L=600m															

EXISTING GROUND ELEVATION (m)	558.48	558.58	558.71	558.88	558.98	559.06	559.13	559.19	559.31	559.46	559.45	559.63	559.75	559.84	559.82
STATION	10+520	10+540	10+560	10+580	10+600	10+620	10+640	10+660	10+680	10+700	10+720	10+740	10+760	10+780	10+800
ROAD CATEGORY															
PIPE															

No.15	PLAN AND PROFILE OF DISTRIBUTION MAIN FOR LINE M1 (18/26)







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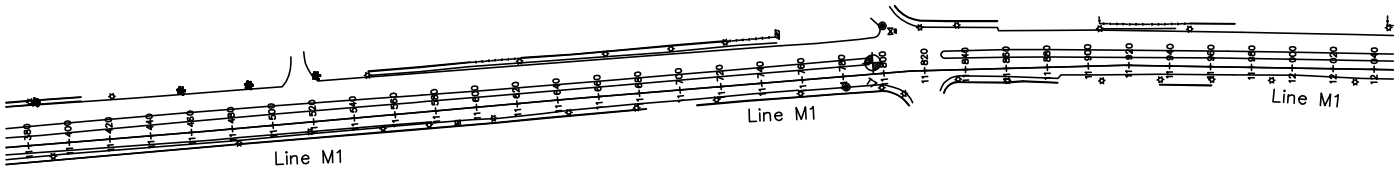

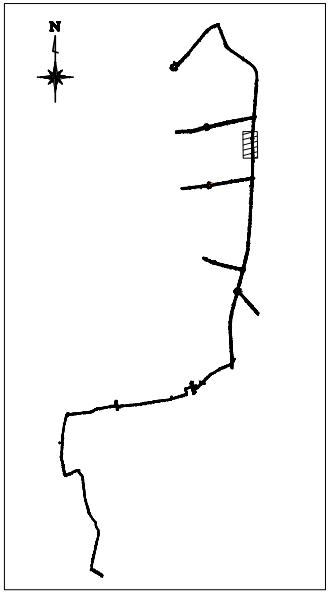

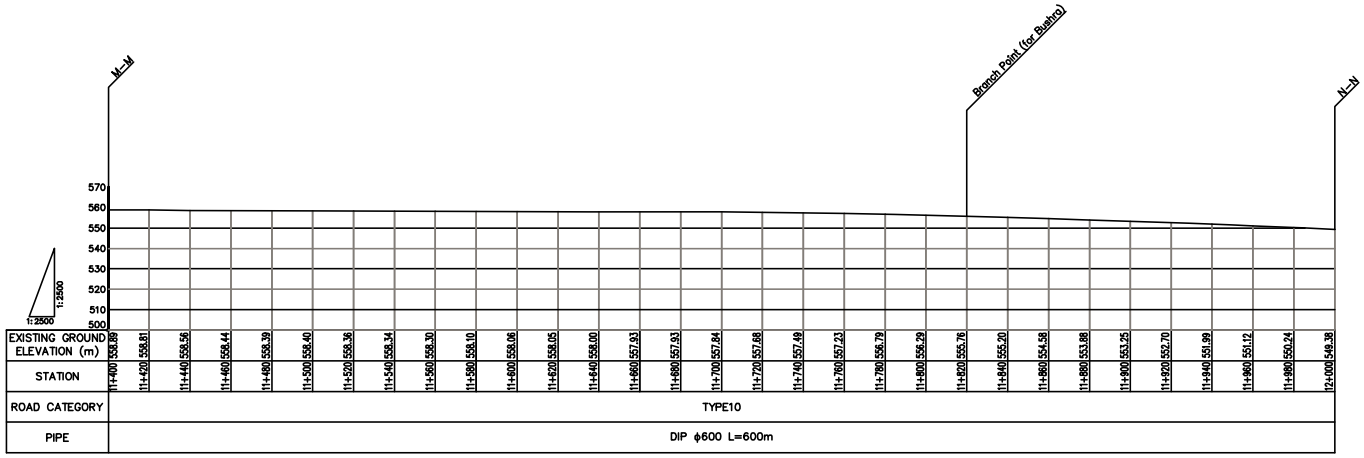

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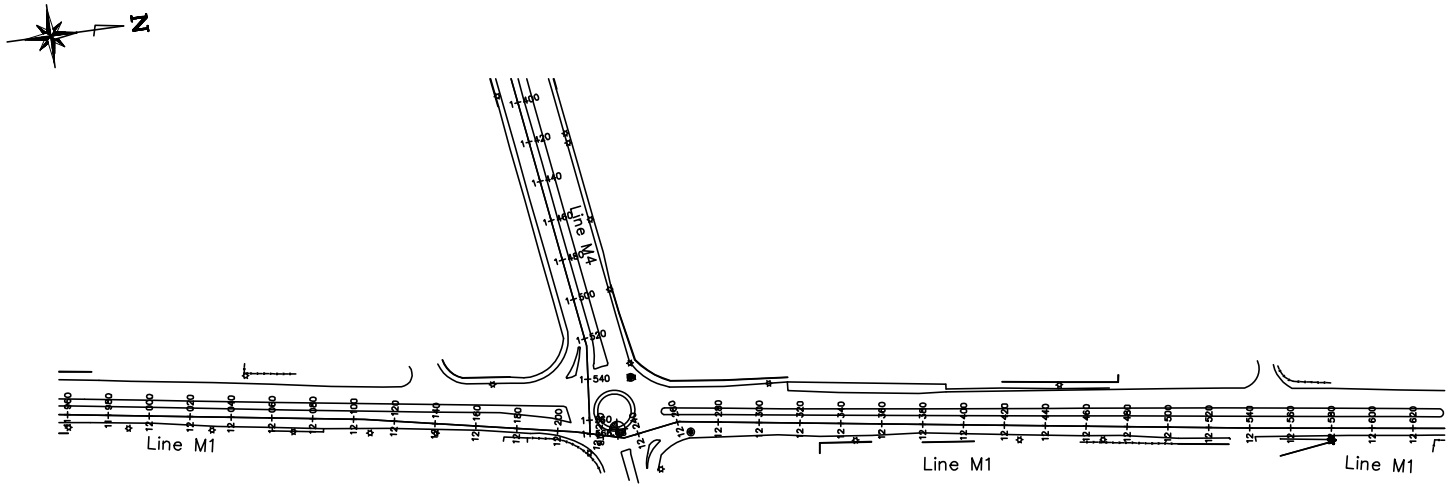

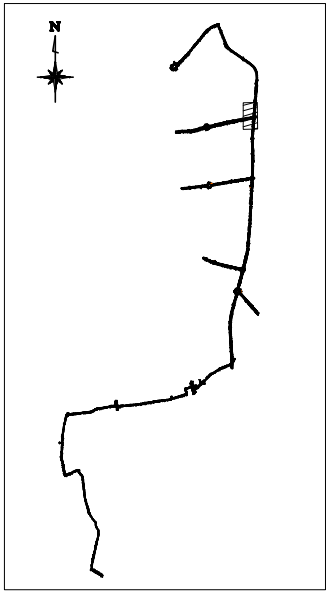

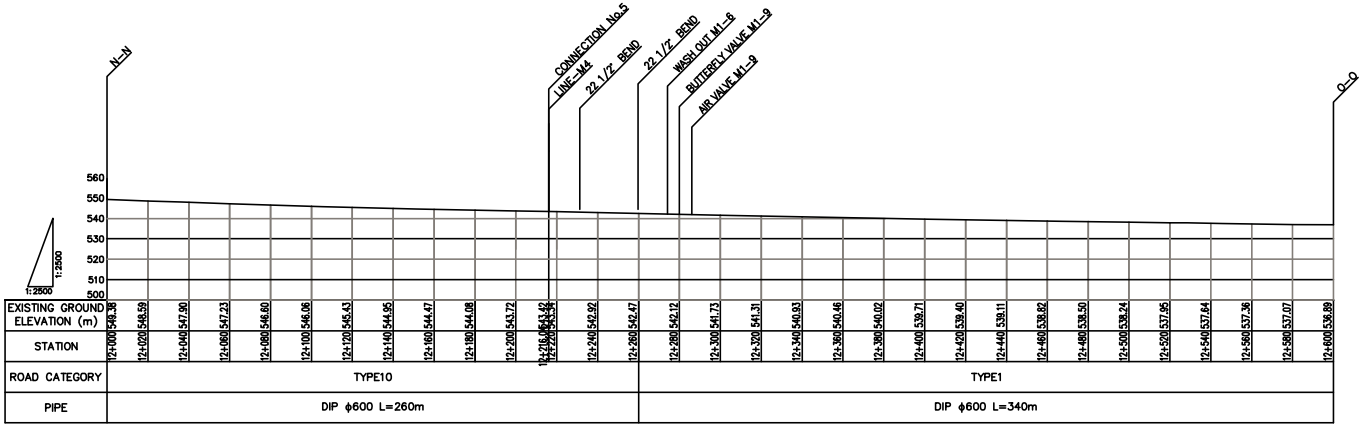

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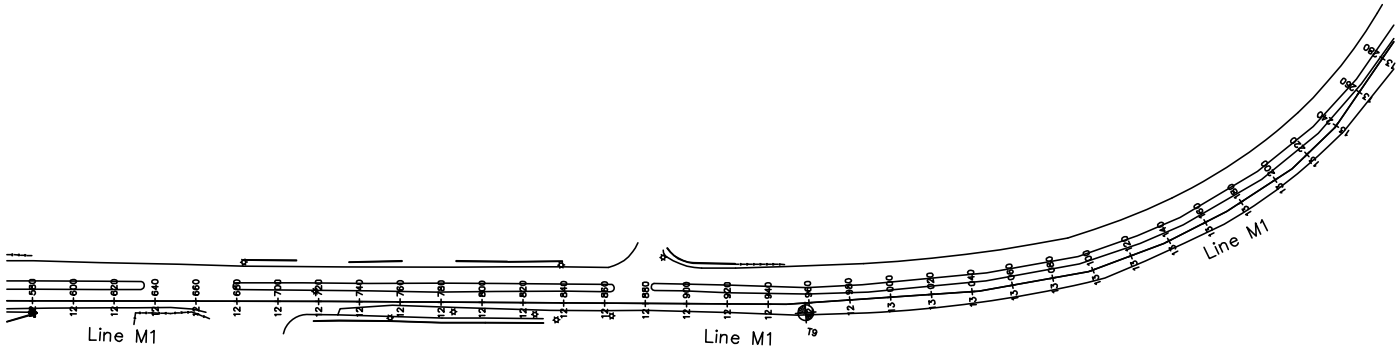

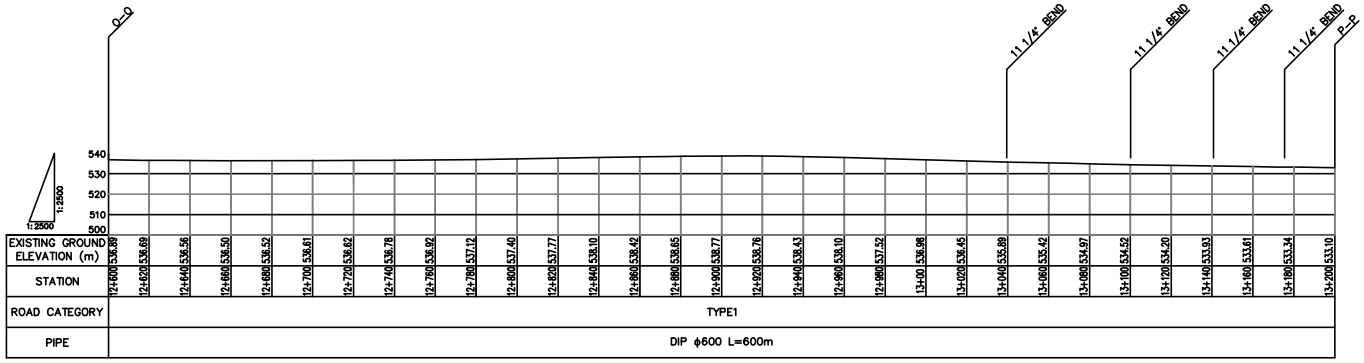

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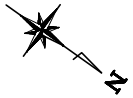

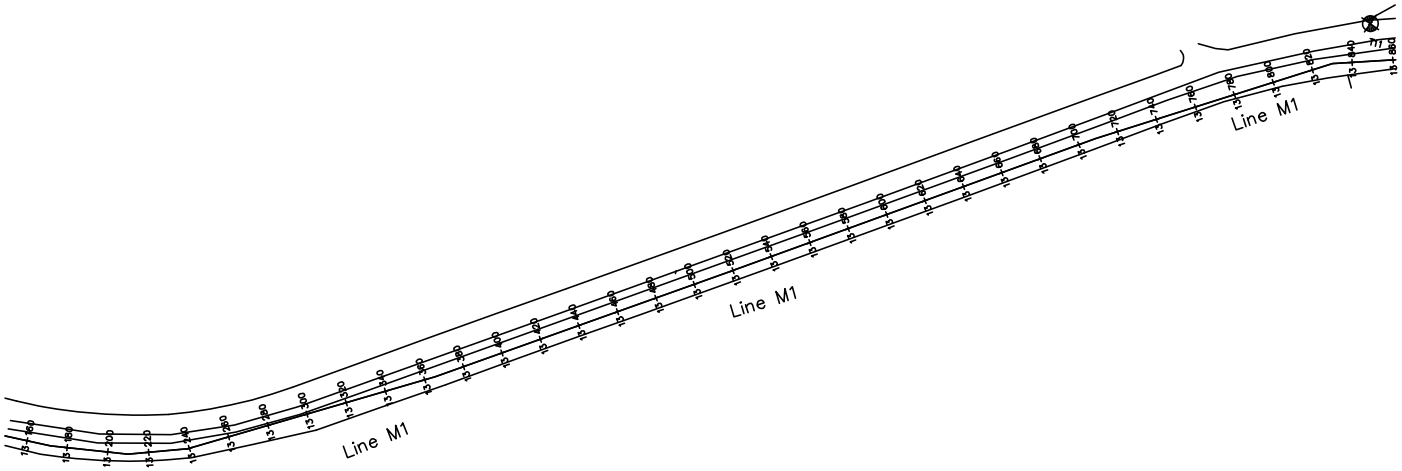

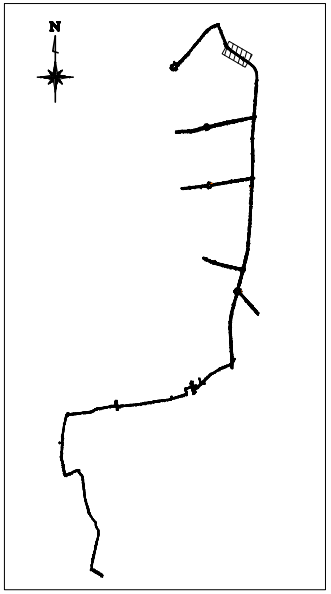

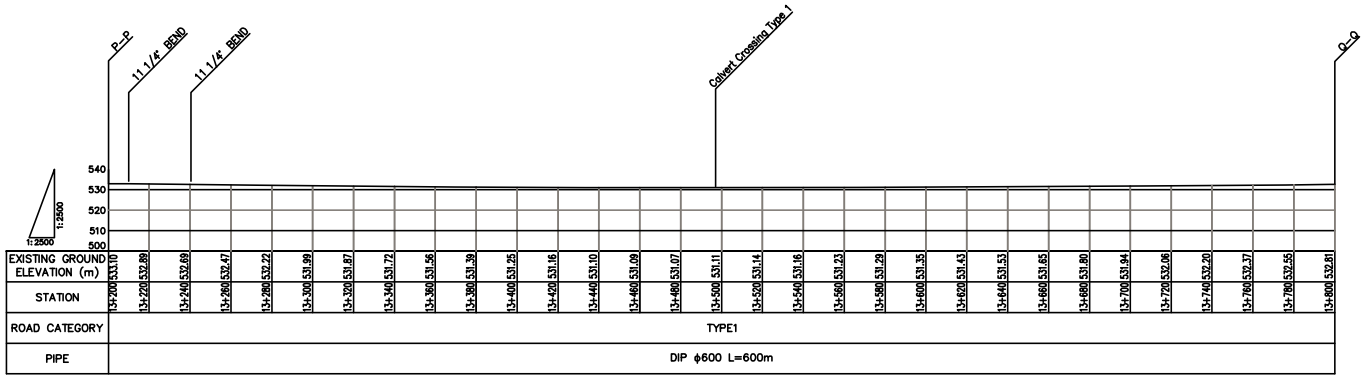

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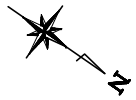

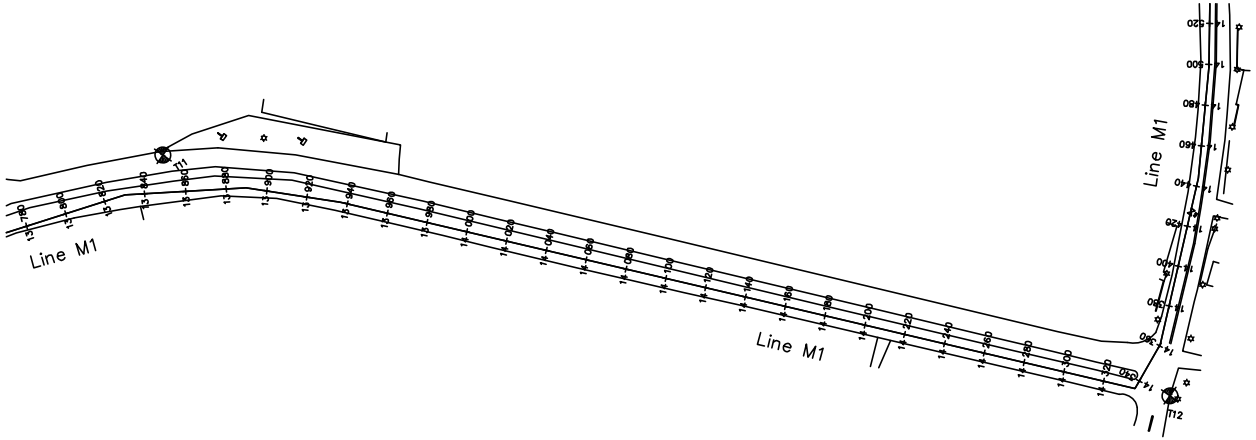

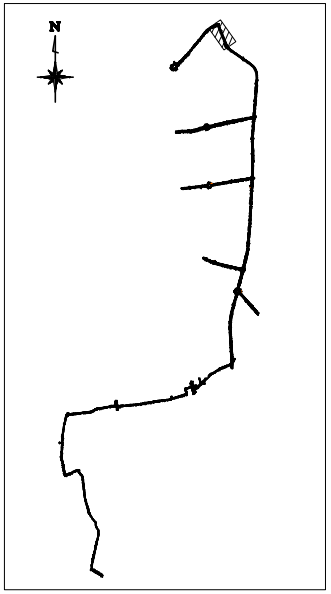

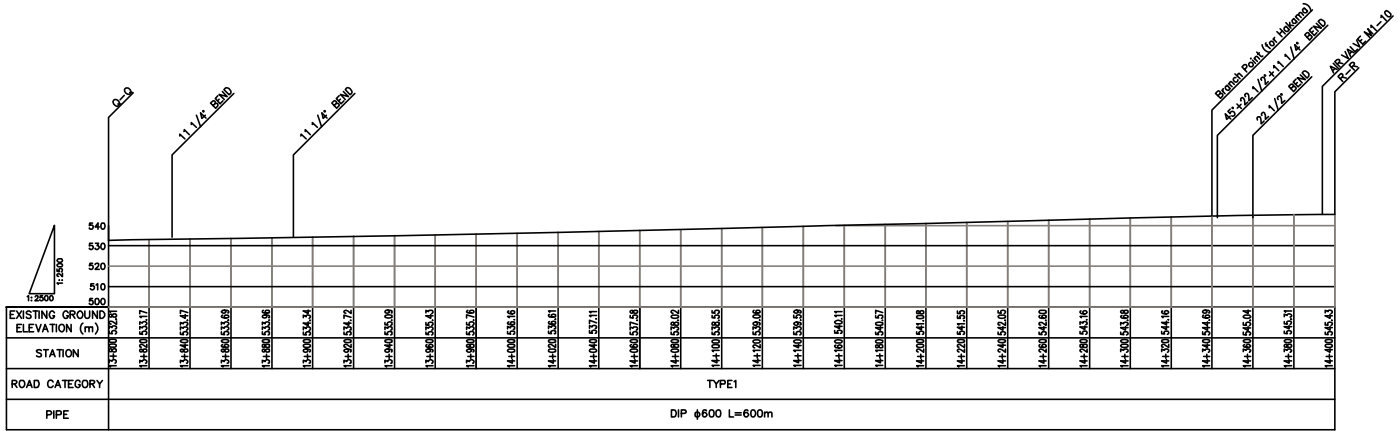

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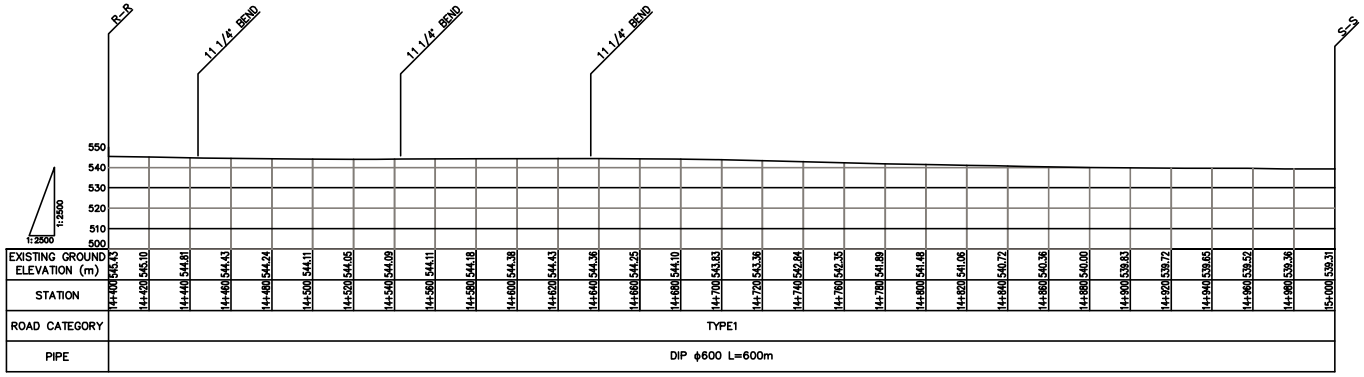

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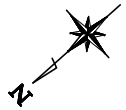

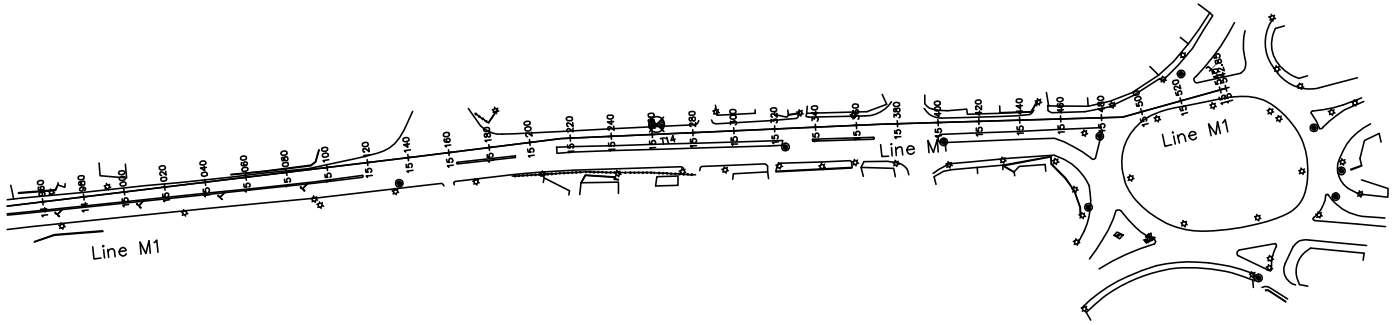

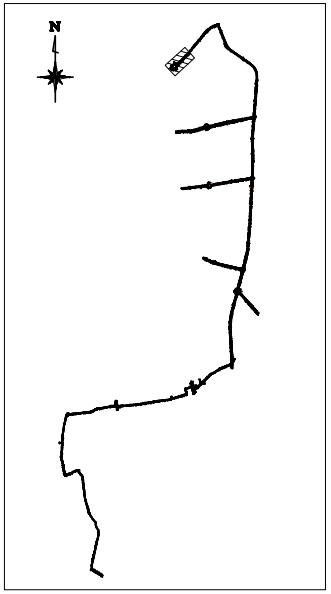

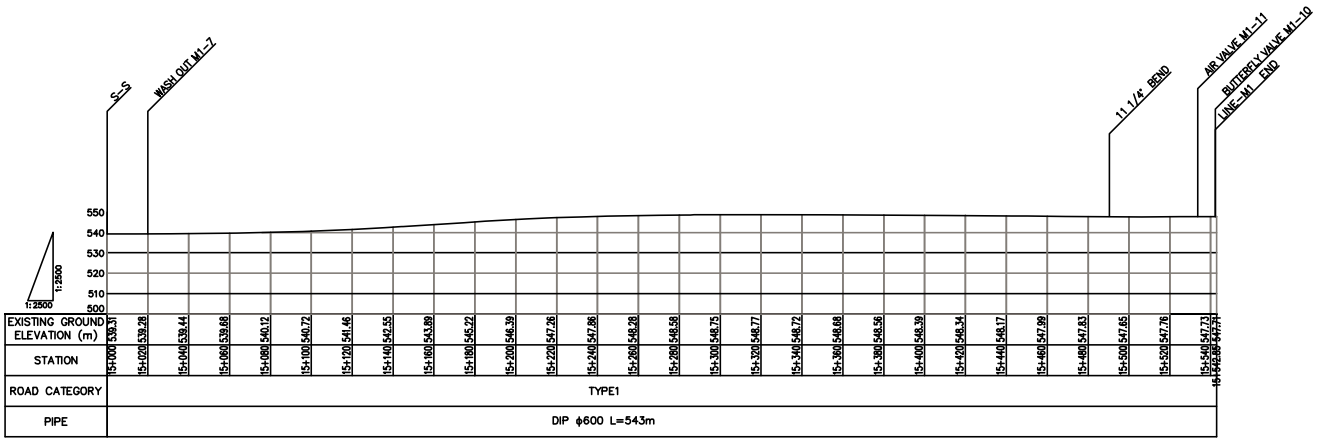

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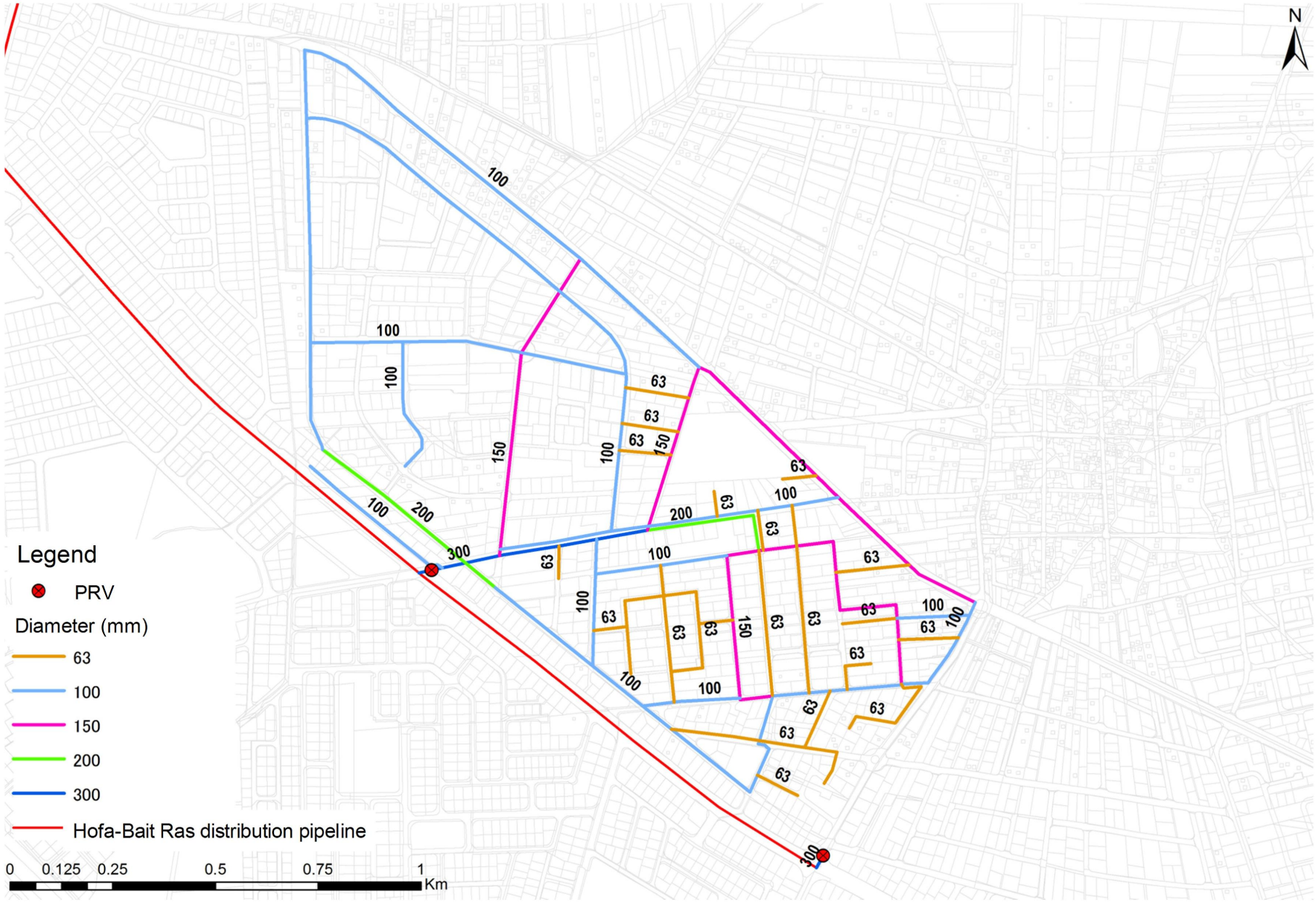
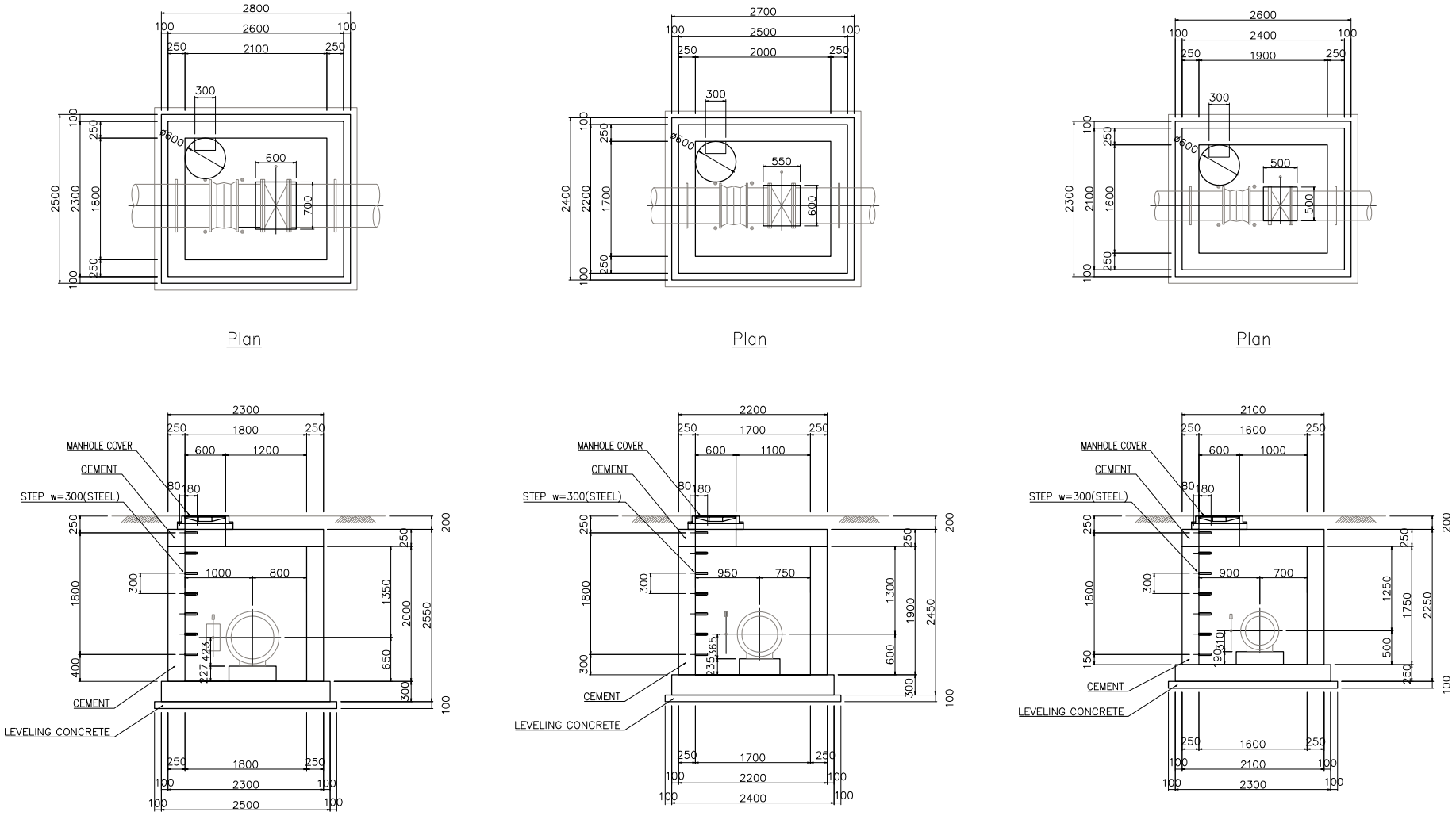


No.24	Site Plan of pipeline in Hawwara



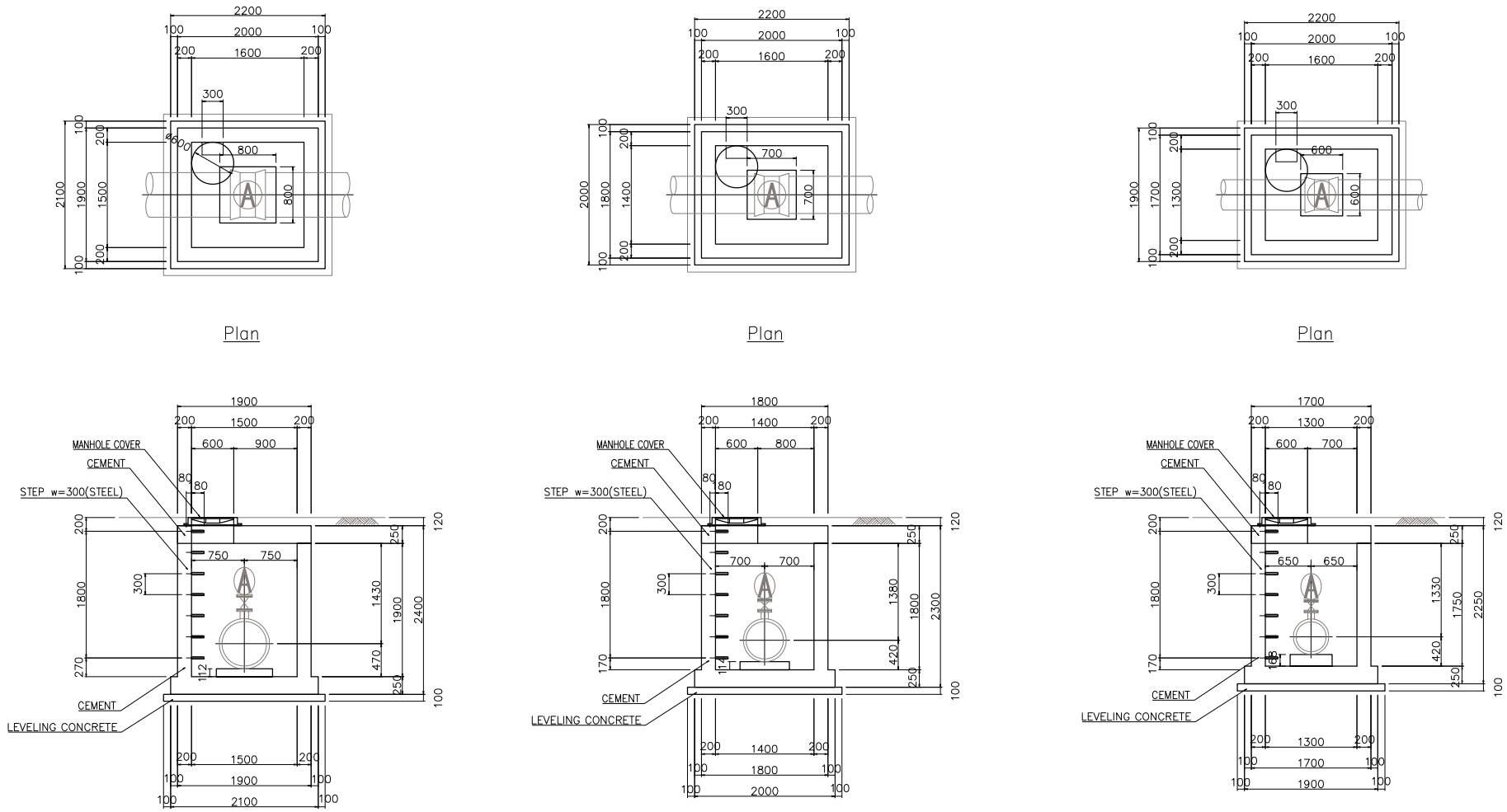
φ600 DP1.50m

φ500 DP1.50m

φ400 DP1.50m

Butterfly Valve Chamber S=1/30

No.25	STRUCTURAL DRAWING OF CHAMBER 1



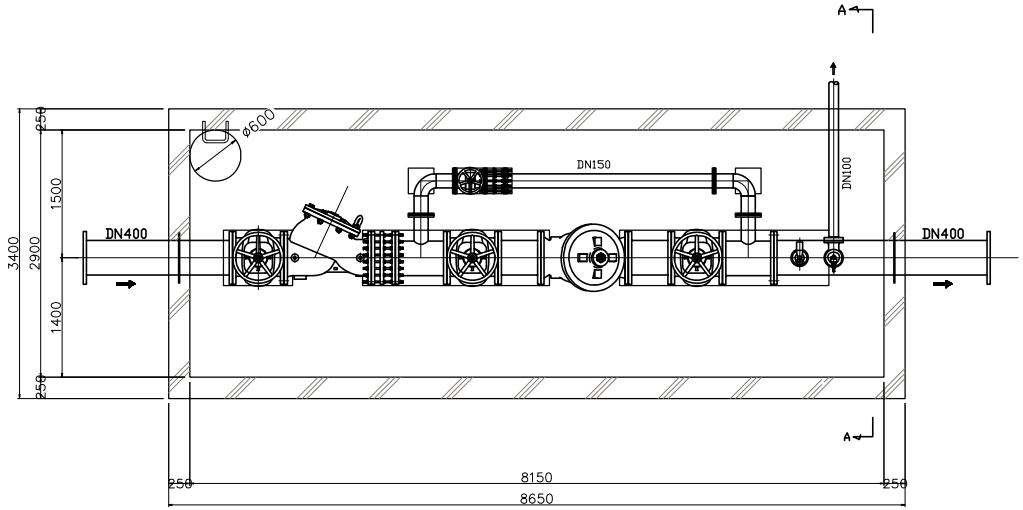
φ600× 100 DP1.50m

φ500× 80 DP1.50m

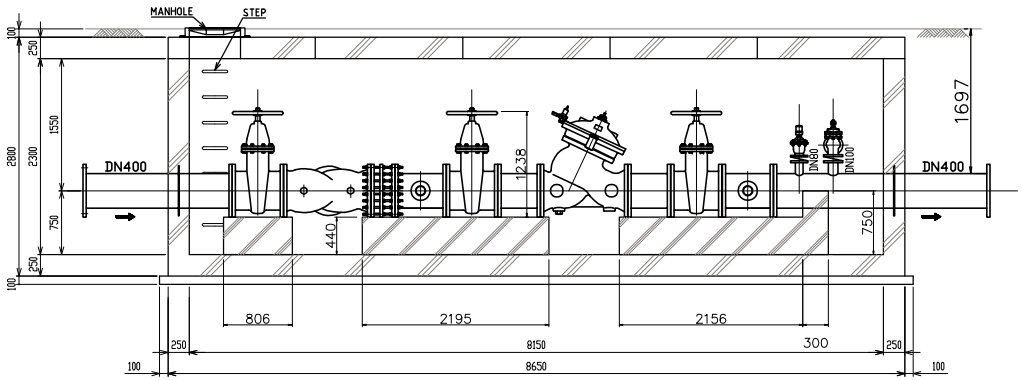
φ400× 80 DP1.50m

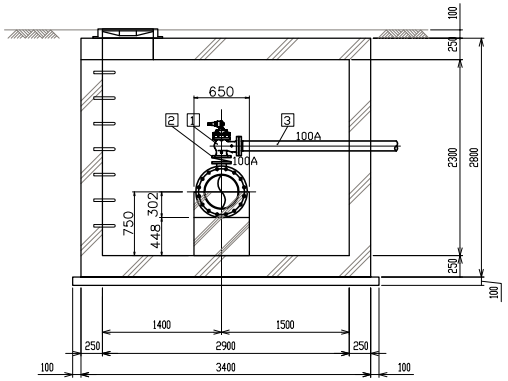
Air Valve Chamber S=1/30

No.26	STRUCTURAL DRAWING OF CHAMBER 2



Plan





Section A–A

Pressure reducing valve S=1/30

No.27	STRUCTURAL DRAWING OF CHAMBER 3

Inflow to Hofa reservoir

To plan the distribution pipeline between Hofa reservoir and Bait Ras district, water balance in the northern governorates are considered. first, namely water demand and internal (local) water sources amount in each locality is estimated. Then, based on the total water availability in the northern governorates, demand is reduced in each locality to balance reduced demand and water sources availability. With this study, water availability to Hofa reservoir is estimated.

i. The precondition of the water allocation is listed below:

- Estimates of demand and water availability are for year 2017.
- Total amount of water from the existing sources is 72MCM/year in 2013.
- Additional 9MCM/year of water is expected through rehabilitation of eastern wells.
- Upon completion of the water transmission mains which is planned to supply Disi water to the northern governorates, additional 10MCM/year will be available.
- The increased water will be supplied to Hofa reservoir through the eastern water transmission mains.
- The water transmission operation from Zebdat pumping station to Hofa reservoir will be stopped.

ii. Allocation of water in the northern governorates

To estimate the water allocation to study area, water balance is studied in the northern governorates. For this purpose, entire northern governorate is divided into sub-transmission zones. In each sub-transmission zone, water balance is estimated considering the demand of all localities and water sources available in respective localities. Based on these water balances, flow along transmission mains and sub-transmission mains are estimated. Figure-7.1 shows the amount of water demand and water source in each sub-transmission zones and also available water transmission flow in each transmission mains and sub-transmission mains.

iii. Water supply and demand balance around Irbid city and distribution flow from Hofa reservoir to target areas in the project

Water supply and demand balance around Irbid city is shown in Figure-7.2. Total 21.36MCM/year of water can be supplied to Hofa reservoir from the eastern water sources. Bushra, Sal, Mghayyer, Hakama, Maro and Al'al localities, which are located in eastern and northeast part of Irbid city, are not in this project area and water demand of these localities is 2.27MCM/year. Water in these localities is to be supplied from the internal water sources. Also, 4.01 MCM/year of water is to be supplied to other areas (in Ajloun) located in the southern part of Hofa reservoir. Further, water from Hofa reservoir is distributed through existing distribution pipes to Hoson, Sarieh, Aidoon, Aliah, and Mukhayyam Shahed Azmi localities which are not in this project area and their total water demand is 4.09 MCM/year. Therefore, the amount of water available from Hofa reservoir for the target area in this Project (eastern Irbid city and Hawwara) is 11.00MCM/year.

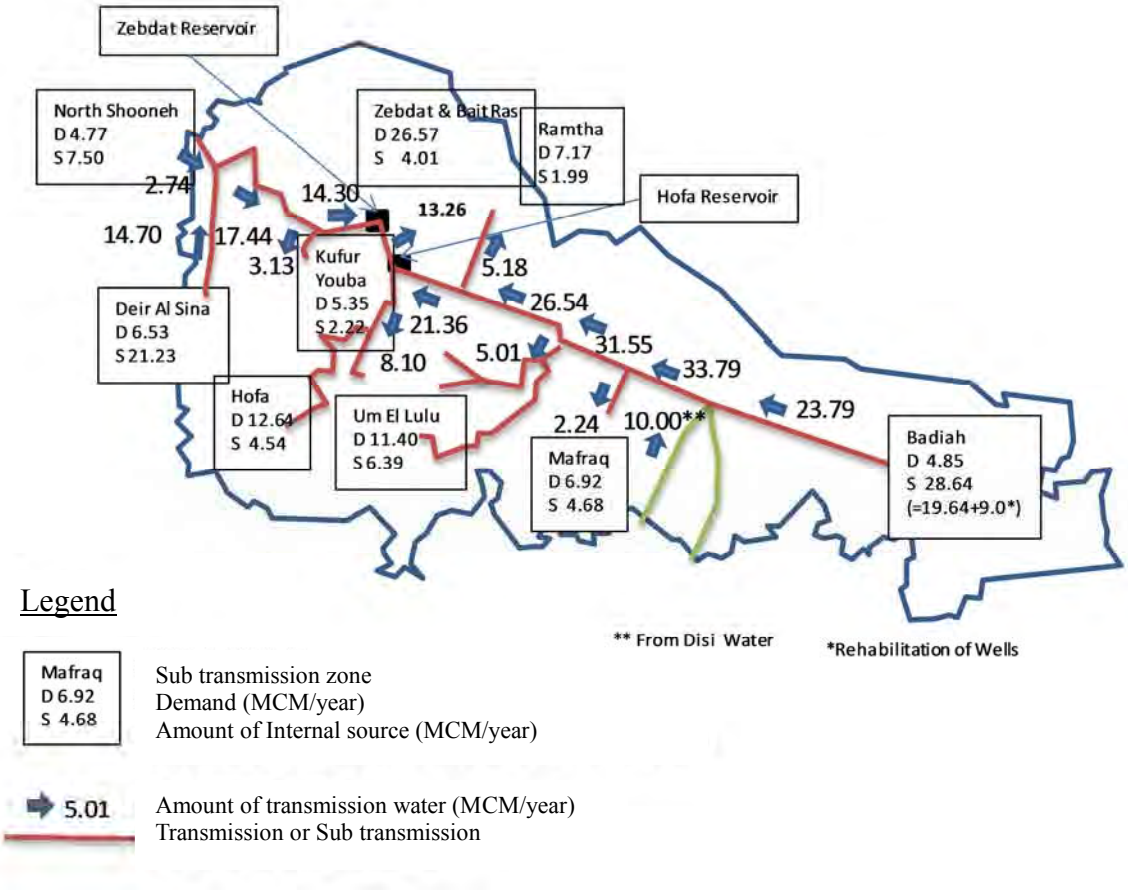


Fig. 7.1 Allocation of water in 4 Northern Governorates (2017)

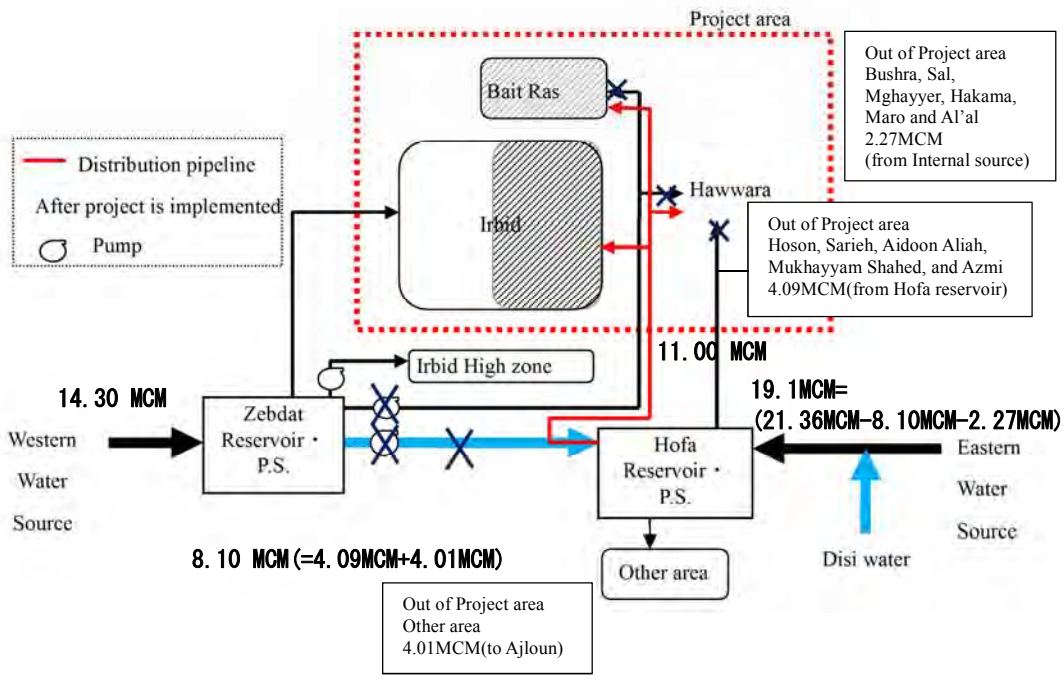


Fig. 7.2 Water balance near Irbid City (2017 average base, MCM/y)

1-1 Environmental and Social Considerations

1-1-1 Environmental and Social Considerations

1. Outline of the project

The Project for which Environmental and Social Considerations are carried out are a) Hofa－Bait Ras distribution pipeline and b) Hawwara network rehabilitation and restructuring.
Outline of the Project is shown in Table 1.

Table 1 Outline of Project

Priority	Sub Project	Outline	Remarks
1	Hofa－Bait Ras distribution pipeline	Hofa-Bait Ras distribution pipeline, 600 mm DCIP: 12.0 km, 500 mm DCIP: 1.3 km, 400 mm DCIP: 5.2 km	To distribute the increased volume of expected water to eastern Irbid, Bait Ras, and Hawwara brought from the eastern transmission pipeline
2	Hawwara distribution network	Hawwara distribution network： 300 mm DCIP: 0.6 km, 200 mm DCIP: 0.7 km, 150 mm DCIP: 3.2km, 100 mm DCIP: 8.7 km and House connection	Hawwara population: 16,000 (2012), water network installed in 1970's

2. Basic Environment and Social situation

(1) Land use

Project area is shown in satellite picture, google map (Figure 1). Land use of each sub project is described below.

1) Hofa－Bait Ras distribution pipeline

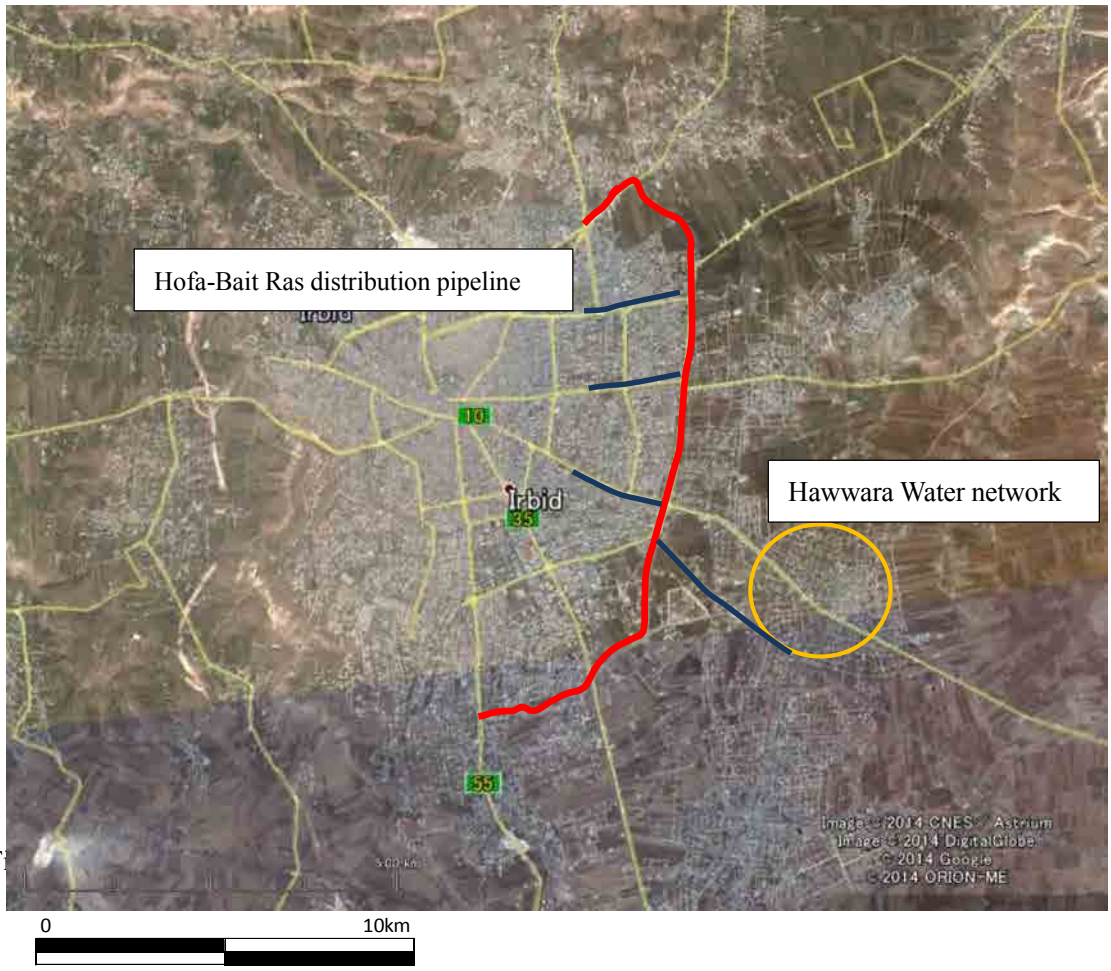
Distribution main pipeline is located along the road in the southern and eastern part of Irbid. The west side is main city area in which houses are densely populated. The eastern side is slightly sparse with extended residential area. The cultivated land is distributed between the sparsely populated residential area in the northeast, southwest and eastern side.

Distribution branch pipelines to west area enter the city center. There are commercial facilities along the road. Distribution branch pipeline to southeast area passes through the sparse residential area and cultivated land.

2) Hawwara distribution network

Hawwara is mainly residential area surrounded by vast agricultural land in the neighborhood of Irbid. There exists small commercial area in the center. Distribution network are mainly to be rehabilitated in

these residential areas.



F use)

Figure 1 Location of Project (Existing Land use)

(2) Natural environment

1) Reserve Area

Nature Reserve Areas in Northern 4 governorates are shown in Table 2 and Figure 2. Nature reserves are located very far from the Project Areas at a distance of more than 10 km. Hence, the implementation of Project is not expected to have any impact on these nature reserves.

Table 2 Natural Conservation Area in Northern 4 governorates

Name of Nature Reserve	Ajloun Forest Reserve	Yarmouk Nature Reserve
Year of the establishment	1988	2010
Management organization	RSCN	RSCN
Purpose of Establishment	Forest Conservation, evergreen oak forest	Natural Conservation
Relevant laws	National Parks Regulation No.29, 2005	Proposed by RSCN, unspecified
Relevant Ministry	MOE (Ministry of Environment)	—
Area	13 km^2	20 km^2
Distance from Project Area	12 km	13 km

Note) RSCN： Royal Society for the Conservation of Nature

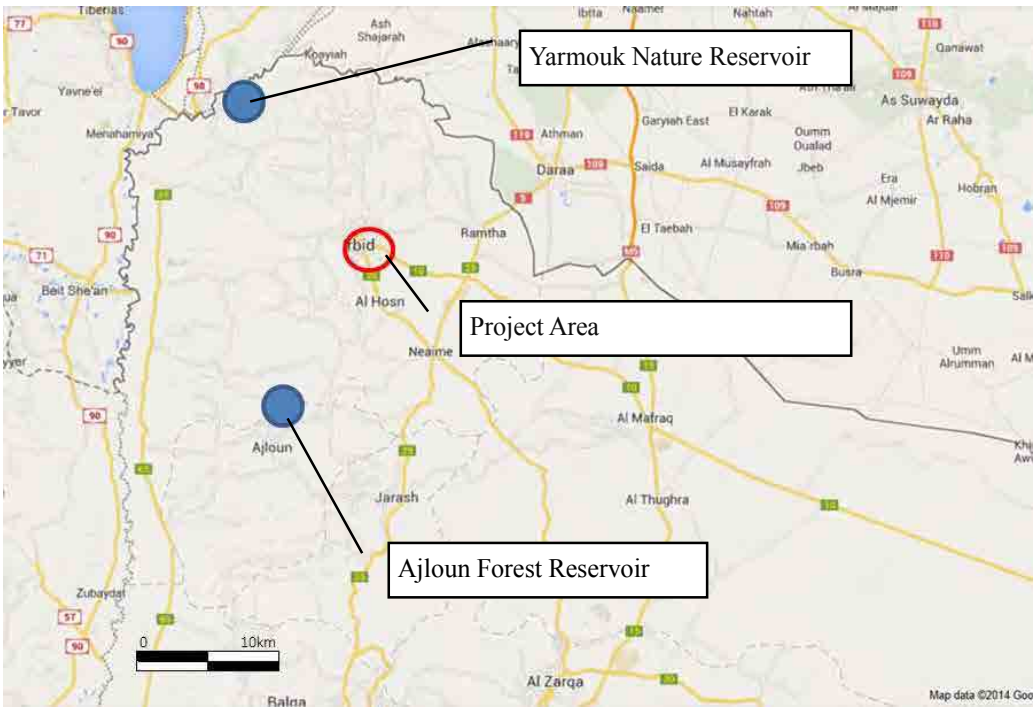


Figure 2 Site map of Project and Nature Reserve Area

2) Conservation of River Basin

There exist watersheds in east and west side of the Irbid center. On the western side, Wadi Al Arab Basin is located and on the eastern side is Wadi Shallalah Basin with Yarmouk river. Wadi arab basin with well-field area is not designated as Conserve Area.

(3) Historical and cultural heritage area

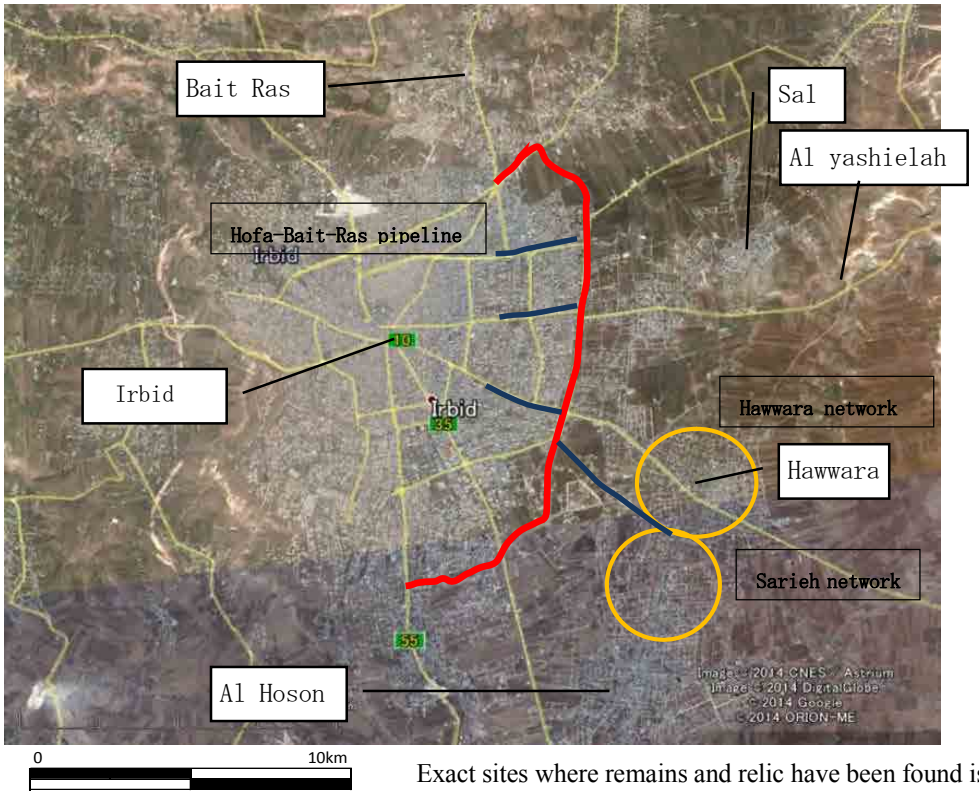
The sites around the Project area where remains and relic have been found are shown in Table 3 and Figure 3. According to Antiquities Law No. 23, 2004 (Antiquities Law No.12, 1987 revised), Department of Antiquities in Ministry of Tourism and Antiquities is responsible for excavation and investigation of remains and relic. Remains and relic is excavated following the Old Stone Age around the project area. The sites where remains are relics have been found are located along the old highway from Palestine to Damascus and Baghdad.

The sites of remains and relic related to project area is mainly in Irbid, surrounding Bait Ras and Hawwara. In Hawwara, the site of remains is Ayyubid/Mamluk as listed in Table 3. In past, Roman grave and ceramics were found and investigated during the installation of pipeline in Hawwara. (Ismael Melhem and other, Three Buriaks from Roman era at Hawwara/Irbid, ANNUAL OF THE DEPARTMENT OF ANTIQUITIES OF JORDAN, Volume 55, 2011)

Table 3 Sites around the project area where remains have been found in past

Era	Al Hoson	Irbid	Bait Ras	Sal	Al-yasielah	Hawwara
Umayyad	○	○	○	○	○	○
Abbasid	○	-	○	○	○	○
Ayyubid/Mamluk	○	○	○	○	○	○
Ottoman	○	○	○	○	○	-
Hellenistic	○	-	-	-	-	-
Roman	○	○	○	○	-	-
Late Byzantine	○	○	○	-	-	-
Middle Byzantine	○	○	-	○	-	-
Early Byzantine	○	○	-	○	-	-
Iron Age	○	○	-	○	-	-
Late Bronze	-	-	-	-	-	-
Middle Bronze	-	-	-	-	-	-
Early Bronze	-	-	-	-	-	-
Chalcolithic	-	-	-	-	-	-
Neolithic	-	-	-	-	-	-
Epi-Paleolithic	-	-	-	-	-	-
Paleolithic	-	-	-	-	-	-

○ Sites where Remains and relic have been found in past (Source: Dar As-Saraya Museum Guide, 2007, Department of Antiquities)



Exact sites where remains and relic have been found is unclear

Figure 3 Antique Sites in and around the Project Area

3. Project area and Sites of remains and relic

(1) Laws or Regulation related to Environmental and Social Considerations

The Environmental Impact Assessment (EIA) is mainly enforced by the following Laws and Regulation in Jordan.

- Environmental Impact Assessment Regulations No. 37 of 2005,
- Environmental Protection Law No. 52 of 2006,

EIA is enforced by the following procedures in Jordan.

i) Project implementation organization submits the project overview document for examination to Directorate of Licensing & Guidance in MOE.

ii) MOE calls the meeting of central license committee. If necessary the committee will examine to confirm the construction site. Based on the review by the committee, it will decide to implement the Comprehensive EIA (Holding of Public Hearings), Preliminary EIA (No Holding of Public Hearings)or not to implement. The result is notified by the MOE to the Project implementation organization within 45 days of submission of document.

iii) Based on the result of decision from committee, if needed, Project implementation organization implements EIA and submits the result to MOE. The committee meeting is held and the authorization or modified instructions is given as applicable.

iv) After approval of EIA (for the Projects that require EIA), construction or project is permitted.

v) MOE implements the monitoring for checking the parameters included in EIA during the construction period

Flow of EIA procedures is shown in Figure 4

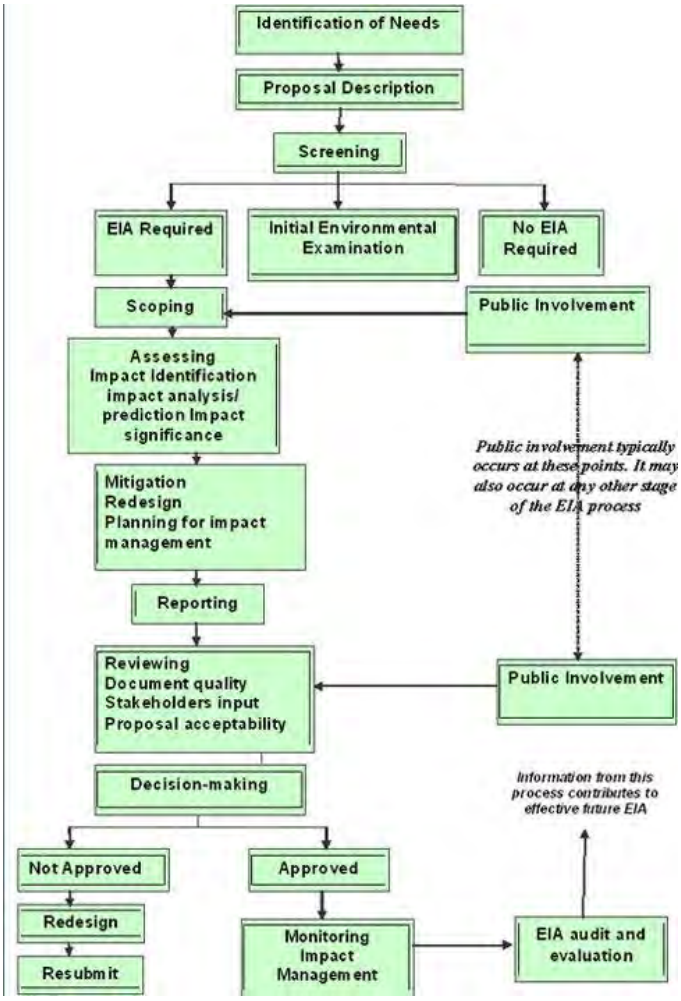


Figure 4 Flow of EIA procedures

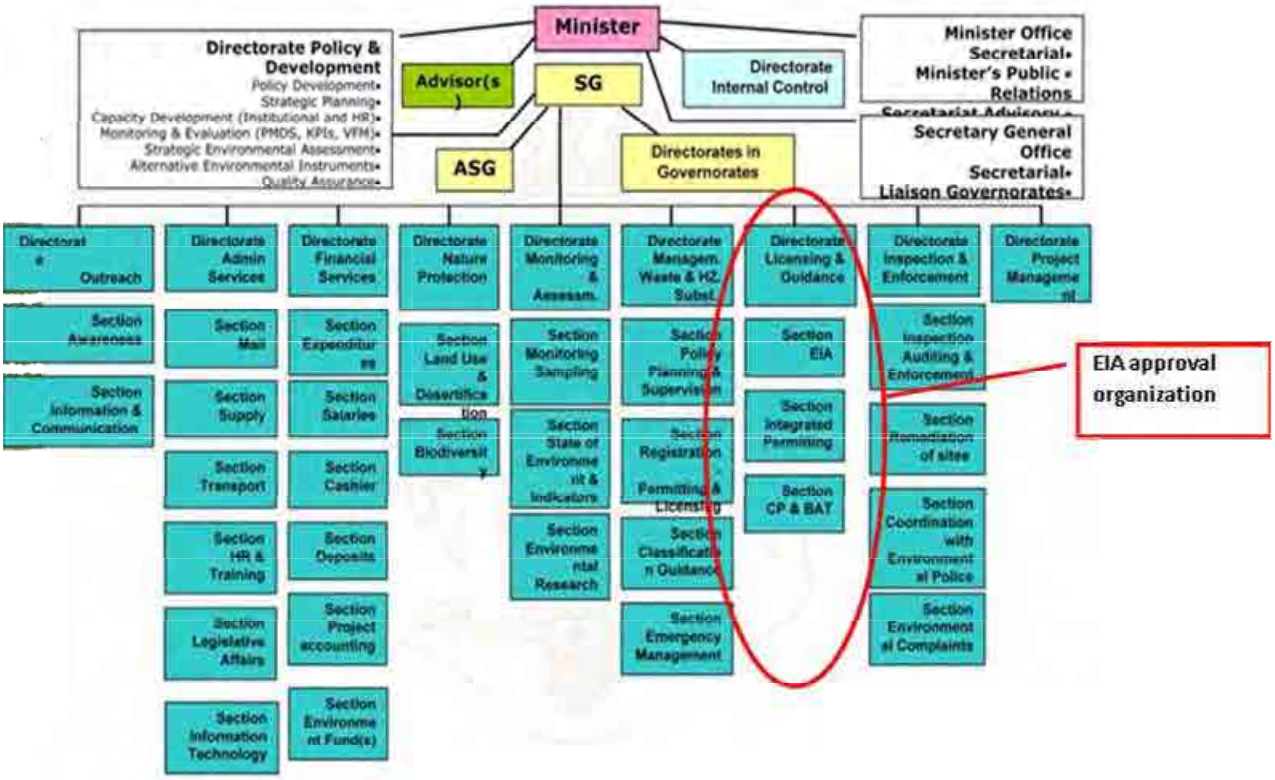
Regarding the contents of Project documents to be submitted for the examination, Directorate Licensing & Guidance in MOE and WAJ (Water Authority of Jordan) in charge of environment explained that there is no standard form and explained to submit project outline, planning and drawing for confirmation of project site, specifications and catalog of main installation equipment, document for Environmental evaluation.

For the Component A of Project, Project document for examination will be prepared and submitted to MOE through WAJ after the confirmation of Hawwara distribution network. Based on the review of submitted Project document, MOE will decide and instruct the EIA type.

(2) Relevant organization

1) MOE

Organization chart of MOE is shown in Figure 5. The department responsible for supervision and EIA approval is Directorate of Licensing & Guidance under MOE.

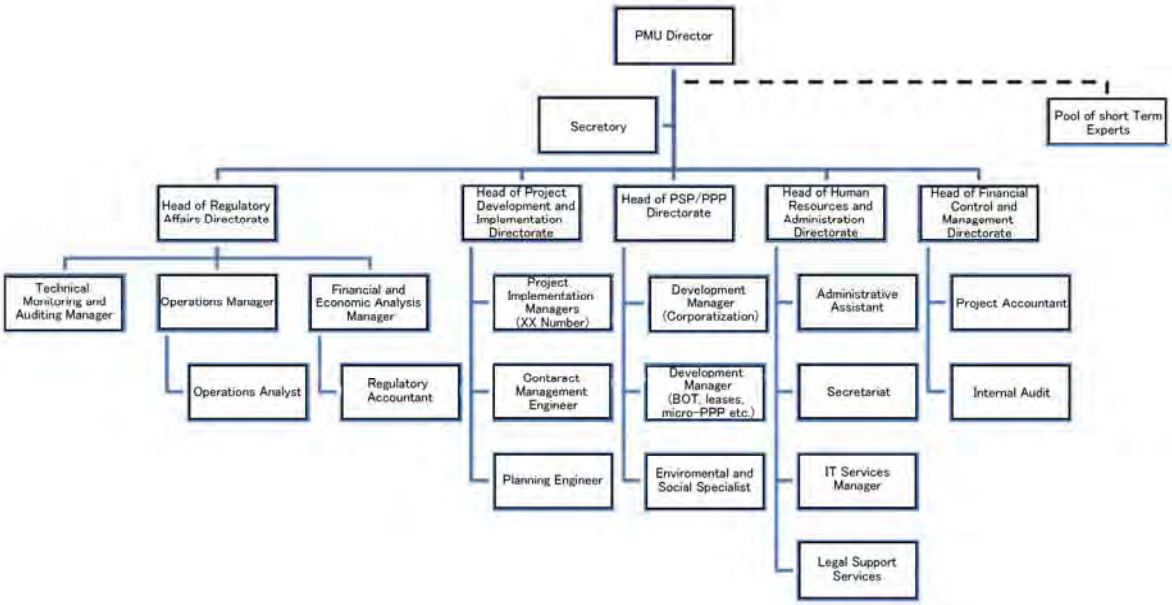


(Source: MOE document)

Figure 5 Organization of MOE and EIA approval organization

2) WAJ

The division responsible for EIA management in WAJ is PMU: Project Management Unit. For this purpose, in PMU there is technical monitoring, Department of inspection, and Environmental and Social expert. Organization chart of WAJ PMU is shown in Figure 6.



(Source: WAJ)

Figure 6 Organization of WAJ PMU

4. Consideration of alternative solution

As alternative solutions, cases of the installation of main distribution pipeline are shown in Figure 7. Other options are difficult to implement.

1) Case of the installation of main distribution pipeline in the west side

If proposed main distribution pipeline is aligned in west side, the pipeline becomes shorter but there is existing pipeline in the same route. Therefore during construction of the new pipeline, it would be difficult to stop the water supply through the existing pipes. Also, along the same route, construction of two lines would be very complicated and construction is difficult. In addition, occurrence of remarkable traffic jam is possible due to complicated installation in the city center.

2) Current proposal

It is easy to install the pipe in this case because there is few existing pipeline along this proposed alignment. There is less possibility of occurrence of traffic jam. Also, land acquisition is not required in this case. In addition, with this option it would be easier to respond to water supply needs for expansion towards east side in future.

3) Case of the installation of main distribution pipeline in the east side

In the eastern side, available road for pipe alignment is limited, and pipeline construction will require purchase of farming land. Consequently, this option would be substantially difficult to implement.

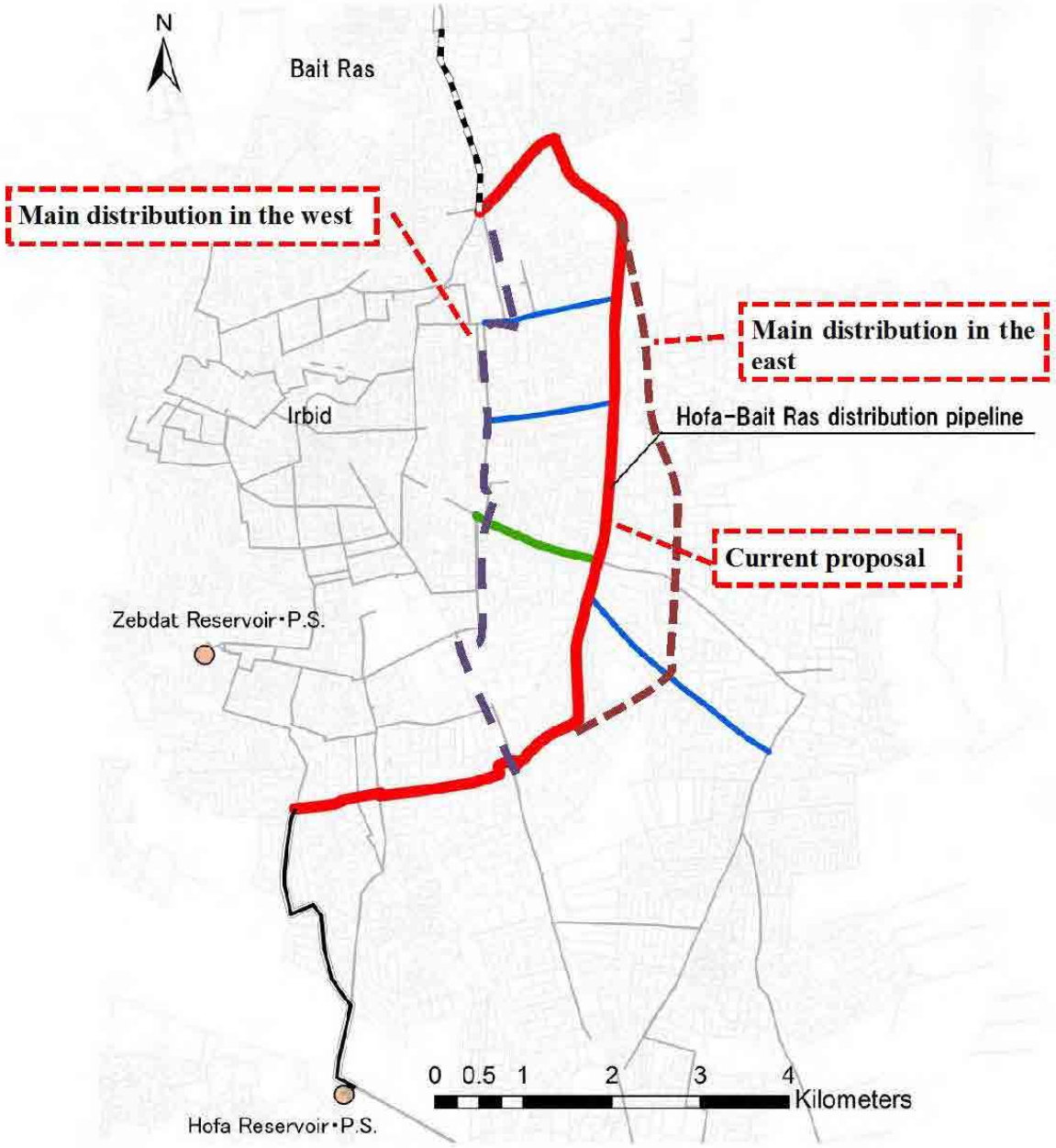


Figure 7 Outline of alternative routes

5. Scoping and TOR of examination of Environmental and Social Considerations

Scoping of Environmental Item and Reason of evaluation in this Project (Component A) is shown in Table 4.

Table 4 Scoping (Component A)

Category	No.	Environmental Item	Evaluation		Reason of evaluation
			Before and during construction	Operation	
Pollution Control	1	Air Quality	B-	D	Construction Stage : Temporary deterioration in air Quality is expected by construction machine. Operation Stage : Deterioration in air Quality is not expected because distribution main, distribution network is under the ground.
	2	Water Quality	B-	D	Construction Stage : Water pollution by discharge from construction site, construction equipment, vehicles, is expected. Operation Stage : Water pollution is not expected due to use of distribution main, distribution network.
	3	Wastes	D	D	Waste is not expected to generate from distribution main, and distribution network.
	4	Soil pollution	B-	D	Construction Stage : Possibility of the soil pollution by oil from construction equipment. Operation Stage : Soil pollution is not expected during operation.
	5	Noise and Vibration	B-	D	Construction Stage : Noise is expected from construction equipment, vehicles. Operation Stage : Noise and Vibration is not expected from distribution main, distribution network.
	6	Subsidence	D	D	Development of water source and construction or rehabilitation of water treatment plant is not included. Subsidence is not expected.
	7	Offensive odor	D	D	Offensive odor is not expected from distribution main, distribution network.
	8	Substratum	D	D	The work that has an influence on Substratum is not included.
Natural Environment	9	Reserve Area	D	D	Reserve Area does not exist in and around the project site.
	10	Ecosystem	D	D	Project area is urban and its suburbs where people are living. The area does not include any protected animals and plants. No negative influence on ecosystem is expected.
	11	Hydrology	D	D	Alteration of Hydrology is not expected from distribution main, distribution network.
	12	Topography, geological feature	D	D	Alteration of Topography, geological feature is not expected from distribution

Category	No.	Environmental Item	Evaluation		Reason of evaluation
			Before and during construction	Operation	
					main, distribution network.
Social Environment	13	Resettlement	D	D	Resettlement does not occur from distribution main, distribution network.
	14	Poor classes	D	D	No negative impact on poor class is expected.
	15	Ethnic Minorities and Indigenous Peoples	D	D	Ethnic Minorities and Indigenous Peoples do not inhabit in the project area.
	16	Refugee	D	B+	It is assumed that the residence of Refugee is included in the project area, but there is no discrimination in water supply, and project is expected to improve water supply for all inhabitants.
	17	Livelihood	B-	D	Construction Stage : Traffic regulation, some interruption may occur, and the approach to commercial facilities may be limited during construction. Operation Stage : Negative impact on livelihood is not expected.
	18	Cultural heritage	B-	D	Construction Stage : There is possibility to find remains and relic during the excavation work in and surrounding Hawwara. Operation Stage : Negative impact on remains and relic is not expected.
	19	Landscape	D	D	Negative impact on landscape in project area is not expected because piping is under the ground.
	20	Gender	D	D	No negative impact on Gender is expected due to Project.
	21	Work Environment	B-	D	Construction Stage : Working environment of Labor is expected to deteriorate temporarily by aggravation of the air quality, noise, vibration. Operation Stage : Negative impact on work Environment is not expected.
Others	22	accident	B-	D	Construction Stage : The consideration for the accidents such as traffic accidents is necessary. Operation Stage : The accidents such as traffic accidents is not expected because piping is under the ground.

Note) Evaluation A+/-: Significant positive / negative impact is expected.
Evaluation B+/-: Positive / negative impact is expected to some extent.
Evaluation C+/-: Positive / Negative impact is not clear. (Further examination is necessary, and level of impact becomes clear by the progress of the examination.)
Evaluation D : No impact is expected

TOR of examination of Environmental and Social Considerations based on above Scoping is shown in Table 5.

Table 5 TOR of Examination of Environmental and Social Considerations

Environmental Item	Item of Examination	Means of Examination
Air Quality	1) Confirmation of Environmental standard (Jordan Environmental standard) 2) Impact during construction	1)Past Examination report 4) Contents of construction: Method, Period, Site, area Type of Construction machine, Working site, Working period, Confirmation of number of construction vehicles, Period, route
Water Quality	1) Confirmation of Environmental standard (Jordan Environmental standard) 2) Confirmation of well source 3) Influence of construction	1) Past Examination report 2) Past Examination report 3) Water use during construction period, Water distribution plan, Type of Construction machine with discharges, working site, period, number, discharge amount
Soil pollution	1) Preventive measures against oil leaks under construction	1) Confirmation of type of construction machine and vehicles, working area, Period
Livelihood	1) The situation such as presence of commercial facilities in the project site (Influence and avoidance in Traffic regulation and blocking)	1) Site investigation for confirmation
Cultural Heritage	1) Existence of remains and relic in the project site 2) Correspondence method before and during construction	1) Past Examination report 2) Inquiry with the related organization
Work Environment	1) Labor safety measures	1) Examination of similar cases (Confirmation of approach in the Similar example)
Accident	1) Traffic safety measures during construction stage	1) Examination of similar cases, Site investigation for confirmation

6. Examination of Environmental and Social Considerations

Result of examination of Environmental and Social Considerations based on Scoping is shown in Table 6.

Table 6 Result of Examination of Environmental and Social Considerations

Environmental Item	Result of examination
Air Quality	According to Environmental standard of Air Quality in Jordan, the maximum emission levels are SO_2: 0.135 ppm (1 hour), 0.130 ppm (24 hours), 0.03 ppm (1 year), CO : 26 ppm (1 hour), 9 ppm (8 hours), NO_2: 0.21 ppm (1 hour), 0.08 ppm (24 hours), 0.05 ppm (1 year), Total suspended particulate TSP: 260 μg/m^3 (24 hours), 75 mg/m^3(1 year). (The Jordan Standard No. 1140 for ambient air quality, 1996) Air pollution is caused by exhaust gas from Construction machine and transportation vehicles, Air dust is caused by machine digging the road for distribution pipe laying. (Type, operation duration of Construction machine, and vehicles after confirmation of Basic design.)
Water Quality	Drinking Water Quality standard in Jordan is provided in Standard for Drinking Water No. 286, 2001 (Revised 2008). The quality of the water source is analyzed regularly by YWC and WAJ, and water quality management is carried out.

Environmental Item	Result of examination
	Well fields near the project site are Hakama Well field and Bushra Well field. They are at a distance of more than 1 km from Hofa-Bait Ras distribution main area and more than 2 km from Hawwara network area. The aquifer is the deep part of B2/A7. Depth of Hakama Well field is 510～540 m and water table is 480～620 m. Depth of Bushra Well field is 530 m and water table is 610 m. The discharges from sprinkling to suppress air dust and washing of equipment and vehicles are not in high amount. It is thus expected that the influence on water source will be small.
Noise and Vibration	According to standard in Jordan, the maximum level of Noise is: City township (daytime: 60 dB, night: 50dB), commercial area (daytime: 65 dB, night: 55 dB), education, hospital, mosque (daytime: 45 dB, night: 35 dB). (MOE, 1997) Limitation of Load Vibration is: residential area (daytime: 65 dB, night: 60 dB), commercial, industrial area (daytime: 70 dB, night: 65 dB) (General rule of the Japanese local government) Noise and Vibration occur due to transportation vehicles and machine digging of the road for distribution pipe laying. (Type, the operation duration of Construction machine and vehicles after confirmation of Basic design.)
Soil pollution	During construction period, leakage of small amount of oil may occur from Construction machine and vehicles that causes soil pollution. (Type, operation duration of Construction machine and vehicles after confirmation of Basic design.)
Livelihood	Distribution pipelines to west area enter the city center. Along the proposed alignment roads, there are commercial facilities. During construction, traffic may be regulated, and some interruption may occur, and the approach to commercial facilities may be limited. There is possibility of disturbance in access to Sameh mall which is located near the junction of Hawwara pipe and proposed Hofa-Bait Ras pipe.
Cultural Heritage	If the remains and relic related to cultural heritage are located on ground, it can be avoided. However, it is difficult to check if these are buried underground. In Hawwara there is possibility of occurrence of Roman remains and relic and attention is necessary during construction. During construction, care should be taken during digging and if any such remains or relics are observed, information should be sent to Department of Antiquities in Ministry of Tourism and Antiquities (MOTA) to get relevant expert assigned for further instruction about handling of such relics in order to continue digging.
Work Environment	During machine excavation, air pollution may occur due to exhaust gas and mine dust, and Noise and Vibration may occur. These factors may pose risk on workers' health. The impact can be mitigated through use of the dust protective mask and noise reduction appliance.
Accident	There is possibility of traffic jam and traffic accident due to regulated traffic and temporary interruption of traffic during construction. In the similar project, use of sign boards indicating construction works at sites and instruction by the traffic man are implemented.

7. Evaluation of Impacts

Based on Result of examination of Environmental and Social Considerations, Result of Evaluation of impacts is shown in Table 7 Scoping plan and result of examination.

Component A of the Project includes Hofa － Bait Ras distribution main and rehabilitation/restructuring of Hawwara water network. Environmental impact of the project activities is expected only during construction works as described below. During operation of project components, negative impacts are not expected.

1) Development of water source and construction or rehabilitation of water treatment plant is not included in this Project.

2) There is no negative environmental impact during operation of facilities because distribution main and distribution network are located under the ground.

3) Resettlement and land acquisition is not expected because pipelines are to be laid under the ground.

Table 7 Scoping plan and result of examination

Category	No.	Environmental Item	Scoping Evaluation of Impact in Scoping		Evaluation of Impact based on examination result		Reason of evaluation
			Before and under construction	Operation	Before and under construction	Operation	
Pollution Control	1	Air Quality	B-	D	B-	N/A	Air pollution occurs by dust from digging, and due to exhaust gas from construction machines and vehicles during construction.
	2	Water Quality	B-	D	N/A	N/A	Water source in this Project is mainly deep aquifer, and groundwater pollution is not expected due to drainage resulting from sprinkling, or car washing during construction.
	3	Wastes	D	D	N/A	N/A	Wastes do not occur.
	4	Soil pollution	B-	D	B-	N/A	Soil pollution is expected due to leakage of small amount of oil from construction machines, vehicles during construction.
	5	Noise and Vibration	B-	D	B-	N/A	Noise and Vibration is expected to occur from construction machine and vehicles during construction.
	6	Subsidence	D	D	N/A	N/A	Subsidence is not expected.
	7	Offensive odor	D	D	N/A	N/A	Occurrence of offensive odor is not expected.
	8	Substratum	D	D	N/A	N/A	Project activity is not expected to have any impact on Substratum.
Natural Environment	9	Reserve Area	D	D	N/A	N/A	Natural Reserve Area is located far from Project areas (about 10 km or more). Therefore, ne negative impact is expected.
	10	Ecosystem	D	D	N/A	N/A	Project area does not include any protected animals and plants.
	11	Hydrology	D	D	N/A	N/A	Alteration of Hydrology is not expected due to project.
	12	Topography, geological feature	D	D	N/A	N/A	Alteration of Topography, geological feature is not expected.
Social Environment	13	Resettlement	D	D	N/A	N/A	Resettlement is not expected to occur due to Project.
	14	Poor classes	D	D	N/A	N/A	Project activities are not expected to cause any negative impact on Poor classes.
	15	Ethnic Minorities and Indigenous Peoples	D	D	N/A	N/A	Project area does not include Ethnic Minorities and Indigenous Peoples.
	16	Refugee	D	B+	N/A	B+	Project activities will not have any discrimination against Refugee; rather water supply is expected to improve for all.
	17	Livelihood	B-	D	B-	N/A	During construction, Traffic may be regulated and traffic interruption may be caused, and approach to commercial

Category	No.	Environmental Item	Scoping Evaluation of Impact in Scoping		Evaluation of Impact based on examination result		Reason of evaluation
			Before and under construction	Operation	Before and under construction	Operation	
							facilities is expected to be limited.
	18	Cultural Heritage	B-	D	B-	N/A	There is possibility to find remains and relic during excavation work.
	19	Landscape	D	D	N/A	N/A	No negative impact on Landscape is expected to occur.
	29	Gender	D	D	N/A	N/A	Negative impact on Gender is not expected due to Project activities.
	21	Work Environment	B-	D	B-	N/A	Construction activities are expected to have some negative impact on working environment of Labor in terms of air quality, noise, and vibration due to operation of construction machines.
Others	22	Accident	B-	D	B-	N/A	During construction, there is possibility of occurrence of traffic jam and traffic accident due to regulated and interrupted traffic.
	23	Influence of the border violation, climate change	D	D	N/A	N/A	No influence on the border violation, climate change is expected.

Note: N/A: Not applicable

8. Mitigation Measures and Cost

Mitigation measures and related cost on Environmental Items which is expected to have negative impact in this Project is shown in Table 8. The Project activities are only expected to have negative impacts during construction, and not during operation.

Table 8 Mitigation and Cost

No.	Environmental Item	Proposed Environmental management plan	Implementing Agency	Responsible Agency	Cost (thousand Japanese yen)
1	Air Quality	To suppress the scattering of mine dust occurring during construction, regular sprinkling of water is needed.	Contractor	YWC, WAJ	4,440
4	Soil pollution	Construction machines and vehicles need to be checked regularly for any oil leakage and carry out repair if required. If leakage occurs, the soil containing leaked oil should be collected and disposed off appropriately.	Contractor	YWC, WAJ	618
5	Noise and Vibration	The construction section moves by week to 10 days, so the noise emitting period in each section is short and the influence in the daytime is small. Construction is planned such that noise during construction does not occur night.	Contractor	YWC, WAJ	758

No.	Environmental Item	Proposed Environmental management plan	Implementing Agency	Responsible Agency	Cost (thousand Japanese yen)
6	Livelihood	During construction, to mitigate the impact on traffic and people daily life, approach side walk needs to be appropriately set and a traffic regulating person is needed to provide direction on site for safe and smooth traffic during construction works.	Contractor	YWC, WAJ	
7	Cultural Heritage	Construction plans should be submitted to MOTA in advance requesting assignment of a monitoring person for occurrence of any remains or relics. If relics or remains are found during excavation, the instruction from monitoring person should be followed for continuing the excavation work.	MOTA	MOTA	(Cost from MOTA)
8	Work Environment	Public and workers safety and sanitation measures should be taken during the construction period. Safety management rules should be prepared and implemented on site. Construction area indicator, protection fence, and provision of watchmen at construction sites should be provided to avoid occurrence of any accident. For the workers, provision of mask against dust, and earmuffs or plugs against noise should be made.	Contractor	YWC, WAJ	650#
9	Accident	During construction period, it is necessary to isolate the construction sites, and implement traffic restriction. For this purpose, it is important to install construction plan at site, indicate construction area, provide protection fence, watchmen, and especially at night provide lighting arrangements at construction site with appropriate traffic indicators in order to avoid accident.	Contractor	YWC, WAJ	27,458

Protection against dust sound proofing appliance, Safety measures costs for inhabitants are included in traffic safety measures costs.

9. Monitoring plan

Monitoring plan, which is mainly required for construction stage, is shown in Table 9.

Table 9 Monitoring plan

Environmental Item	Item	Place	Frequency	Responsible institution
Air Quality	TSP, CO, NO_2, SO_2	Neighborhood of Construction site	1 time /month	Contractor YWC, WAJ
Soil pollution	Checking of oil leakage from construction machines and vehicles, and status of repairing Situation of locations where soil is affected by oil leakage	Construction site, construction machinery, Vehicle storage place	1 time /month	Contractor YWC, WAJ
Noise and Vibration	Noise and Vibration	Neighborhood of Construction site	1 time /month	Contractor YWC, WAJ

Livelihood	Condition of blocking, limited approach of commercial facilities	Surrounding Construction site	1 time /week	Contractor YWC, WAJ
Cultural Heritage	Existence of remains and relic	Construction site	MOTA coordination	Contractor MOTA
Work Environment	Situation of wearing working clothes, safe shoes, masks, and other safety related accessories of Workers. Enforcement situation of the safety measures of neighboring inhabitants	Construction site Surrounding Construction site	1 time /week	Contractor YWC, WAJ
Accident	Enforcement situation of traffic safety measures. Traffic man work situation	Surrounding Construction site	1 time /week	Contractor YWC, WAJ

10. Stakeholder Consultation

For Component A of the Project, document on Project outline will be prepared and submitted to MOE through WAJ after the confirmation of Hawwara distribution network. Based on review of submitted document, MOE will decide the EIA type required for requested project and instruct WAJ accordingly. Based on instruction from MOE, if necessary, stakeholder Consultation for Component A of the Project shall be organized.

1-1-2 Land Acquisition and Resettlement

Land acquisition and resettlement is not expected to occur in implementation of Component A of the Project.

1-1-3 Others

5) Monitoring Form (Draft)

Monitoring Form (Draft) is shown in Appendix 1.

2. Environmental check list

Environmental check list is shown in Appendix 2.