

8.3-8-1 Equipment List of Existing Mohara Water Treatment Plant

Sl. No.	Name of the Equipment	Q'ty	Year of purchase	Country of origin	Manufacturer's Name	Operating Condition/Remarks
1	Generator No-1, 1000kVA, 3.3kV	1	1987	England	Engine-GEC Dorman Diesels Stafford, Alternator-Newage Engineering Ltd. England	A
2	Generator No 2 (Out of Order), 1000kVA, 3.3kV	1	1987	England	Same as above	C -Engine Block Damaged
3	Rapid Mixers, 5 HP	2	1987	U.S.A.	Motor-Reliance Electric Company Mixer M/C- Philadelphia Mixers Division Philadelphia Gear Cooperation, U.S.A.	A
4	Lime Mixers, 10 HP	2	1987	U.S.A.	Same as above	A
5	Submersible Waste W. Pump (Sludge Tank) 30 HP	4	1987	U.S.A.	Flygt Corporation, U.S.A.	A
6	Level Control System for Sludge Tank	4	1987	U.S.A.	Healy-Ruff Company	C-as float damaged
7	Solution Metering Pump for Alum Dosing, Max. Cap. 104.1GPH, Simplex Head, ¼ HP	2	1987	U.S.A.	Wallace & Tiernan, Pennwalt Corporation, U.S.A.	B
8	Slurry Metering Pump for Lime Dosing, Max. Cap. 204.2GPH, Duplex Head, ¼ HP	2	1987	U.S.A.	Same as above	B
9	Alum Circulation Pump (For Alum Mixing), 200GPM, 11.2ft, 2HP	2	1987	U.S.A.	Ladish Corporation, Tri-Clover Division, U.S.A.	B
10	Sump Pump (Duplex) for Chemical Building 38GPM, 20ft., 1HP	2	1987	U.S.A.	Yeomans chicago corp. (Formerly Clow Corp., Pump Division), U.S.A.	B
11	2 ton Overhead Bridge Crane (for chemical Bldg.)	1	1987	U.S.A.	Mannesmann Demag corporation, U.S.A.	A

Sl. No.	Name of the Equipment	Q'ty	Year of purchase	Country of origin	Manufacturer's Name	Operating Condition/Remarks
12	Raw water pump No. 1 DC operated for speed contrl 8800GPM, 41.5ft. 132kW, 750rpm Raw water pump No. 2 AC operated -same- Raw water pump No. 3 AC operated -same- Raw water pump No. 4 AC / Inverter control 2400m ³ /hr., 13.65m, 200kW, 988rpm	4	1987 1987 1987 1998	Korea Korea Korea India	Bong Myung, Korea Bong Myung, Korea Bong Myung, Korea Kirlosker/Siemens, India	C - Motor out of order A A B - Inverter out of order
13	High Lift Pumps 400x300-CDVM, 3475GPM, 271ft., 350 kW, 3.3 kV	5	1987	Japan	Torishima Pump Mfg. Ltd., Japan. Motor Maker: Shinko, Japan	A
14	Air Compressor, 45 kW	1	1987	Japan	Tanabe pneumatic Machinery co Ltd., Japan	A
15	Sump Pump (for High Lift Pump Station), 0.75 kW	1	1987	Japan	Torsihima Pump Mfg. Co. Ltd., Japan	A
16	Electrical Panels & Control Desk for High Lift Pump	6	1987	Japan	Togami Electric Mfg. Co. Ltd., Japan	B
17	Level Sensing Instruments (for Clear Well)	2	1987	Japan	Chino Works Ltd., Japan.	B
18	Pressure Sensing Instruments (for Trunk Main)	1	1987	Japan	Chino Works Ltd., Japan	A
19	Clear Well Level Recorder	1	1987	Japan	Hitachi, Japan	C
20	Clear Well Under Drainage Submersible Pump No.1 Clear Well Under Drainage Submersible Pump No.2 3.1 kW each	2	1987	Sweden	FLYGT PUMPS LTD.	A C
21	Sump Pump for Raw Water Pump Station	1	1987	Korea	Bong Myung, Korea	B
22	5.5 ton Overhead Bridge Crane (for Raw Water Pump Station)	1	1987	Korea	Bando Machinery co. Ltd., Seoul, Korea.	A

Sl. No.	Name of the Equipment	Q'ty	Year of purchase	Country of origin	Manufacturer's Name	Operating Condition/Remarks
23	<u>Chlorination System (2 units)</u> V-notch Chlorimeter with Injector - 2000 lbs/24hr. Vacuum Regulator Check Unit - 3000 lbs/24hr. Solution Distributors Chlorine gas leak detector Emergency kit "B" Flow Monitor Chlor Scale Pressure Demand Air Mask Eye Wash & Shower	2	1987	U.S.A	Wallace & Tiernan Wallace & Tiernan Wallace & Tiernan Wallace & Tiernan Indian Springs mfg. Co. Universal flow Monitors Inc. Force flow Equipment Mine Safety Appliances co. Speakman Company	A A A A A A B A B
24	<u>Electrical System</u> 2500kVA Main Transformer, 33 / 3.3 kV 500kVA Distribution Transformer, 3300 / 400 V 300kVA Dry type Transformer, 3300 / 400 V Load Interrupter Switchgear Air Circuit Breaker, 1200 A , 3.3 kV Neutral Grounding Register	1 1 1 1 5 1	1987	U.S.A	Westinghouse Electric Corp. U.S.A Westinghouse Electric Corp. U.S.A Westinghouse Electric Corp. U.S.A Westinghouse Electric Corp. U.S.A Westinghouse Electric Corp. U.S.A Westinghouse Electric Corp. U.S.A Westinghouse Electric Corp. U.S.A.	A A A A A A A
25	7.5 ton Overhead Bridge Crane for High Lift Pump Station	1	1987	U.S.A	Mannesmann Demag Corpn. U.S.A	A
26	<u>Control Room Equipment</u> Venturi Flow Meter Differential Pressure Transmitter Integrator Differential Pressure Regulator Flow Purgemaster Meter Indicator Digital Counter Totalizer Field Signal Indicator Annunciator Plant Monitor Panel Power One's River Level Sensor & Transmitter	2 2 2 2 2 2 2 2 2 1 1 1 1	1987	U.S.A U.S.A U.S.A U.S.A U.S.A U.S.A U.S.A U.S.A U.S.A U.S.A U.S.A U.K	Fischer & Porter , U.S.A Fischer & Porter, U.S.A. AGM Electronics, Inc. 85733 , U.S.A. Fischer & Porter, U.S.A. Fischer & Porter, U.S.A. Crompton Kessler McHANEY Engg. Inc. Transmation Inc. RONAN Engg. Company Sierra Controls Power One Linear Transamerica Instruments, England	One set pertially Operable Other set not Operable as Venturie Flow Meas.not Suitable for high turbid Raw water A A A B A A A C-sensor damaged

Sl. No.	Name of the Equipment	Q'ty	Year of purchase	Country of origin	Manufacturer's Name	Operating Condition/Remarks
26	Recorder for River Level	1	1987	U.S.A	FOXBORO	C-as sensor damaged
cnt	Plant Interphone & Paging System	1		U.S.A	Soundolier	A
27	<u>Laboratory Equipment</u>					
	Water Distilling		1987	U.S.A	Fisons Ltd. U.S.A.	B
	Oven,		1987	U.S.A	Fisons Ltd. U.S.A.	A
	Muffle Furnace		1987	U.S.A	Fisons Ltd. U.S.A.	A
	Steaming Water Bath		1987	U.S.A	Fisher Ltd. U.S.A.	C- Heating coil damaged
	Balance		1987	U.S.A	Fisons Ltd. U.S.A.	A
	Balance weigh		1987	U.S.A	Precision Scientific Group. U.S.A.	A
	Balance analytical		1987	U.S.A	Mettler, U.S.A.	A
	Centrifuge		1987	U.S.A	Clay Adams, U.S.A.	A
	Chlorine Titrimeter		1987	U.S.A	Fisher Scientific, U.S.A.	A
	Chlorine color comparator		1987	U.S.A	Fisher Sc. U.S.A.	A
	Hot plate		1987	U.S.A	Fisher Sc. U.S.A.	A
	Hot Plate Magnetic stirrer		1987	U.S.A	Fisher Sc. U.S.A.	A
	Filter Holder		1987	U.S.A	Gel Man Sciences, U.S.A.	A
	pH/ION Meter		1987	U.S.A	Fisher Sc. U.S.A.	A
	Jar test Apparatus		1987	U.S.A	Phipps & Bird Inc., U.S.A.	A
	Turbidimeter		1987	U.S.A	Hf Scientific U.S.A.	A
	Vacuum Manifold		1987	U.S.A	Fisher Sc. U.S.A.	A
	Vacuum Pump		1987	U.S.A	Fisher Sc. U.S.A.	A
	Titration Cabinet		1987	U.S.A	Fisher Sc. U.S.A.	A
	Desicator cabinet		1987	U.S.A	Fisher Sc. U.S.A.	A
	Refrigerator -5CFT		1987	Italy	INDESIT Italy	A
	Incubator		1987	U.S.A	Precision Sc. U.S.A.	A
	Autoclave		1987	Japan	ALP Co., Ltd., Tokyo, Japan	A
	Spectrophotometer DR-2000		1998	U.S.A	HACH U.S.A	A
	Reflux condenser with 500ml round bottom flask		1998	U.K	Borosil, England.	A
	BOD Bottle		1998	U.K	Borosil, England.	A
28	<u>Maintenance Accessories</u>					
	Universal Tester	1	1987	U.S.A	Simpson	B
	Universal Signal Generator	1	1987	U.S.A	Transmation Inc. U.S.A	B
29	Pressure Reducing Valve, 10" & 4" dia.	2	1987	U.S.A	Chas. M. Bailey	B

8.3-8-2 Power Requirement of Equipment in Existing Mohara Water Treatment Plant

Equipment	Number	Power (kW)	Voltage (V)
Raw Water Pump	3 (4)	396	380
Sludge & Backwash Water Pump	4	89.6	380
Alum Recirculation Pump	2	3.0	380
Alum Feeding (Metering) Pump	2	0.4	380
Lime Feeding (Metering) Pump	2	0.4	380
Sump Pump			
for Raw Water Pump Room	3	3.0	380
for Chemical Building	2	1.5	380
for Transmission Pump Room	2	2.0	380
Compressor	1	45	380
Transmission Pump	5	1,750	3,300
Clear Well Drainage Pump	2	6.2	380
Over Head Crane			
for High Lift Pump Room	1	8.7	380
for Chemical Building	1	4.7	380
for Raw Water Pump Station	1	5.2	380
Ventilator			
for Chlorination Room	5	2.2	230
for Sub-Station	3	1.2	230
for Chemical Room	2	2.0	230
for Transmission Pump Room	2	2.0	230
Lime Mixer	2	3.0	380
Rapid Mixer	2	7.4	380
Panel, Lighting, Instrument, etc.		200	230/100
Total		2,540	

8.3-8-3 (1) Summary of Power Failures at Mohara W.T.P (1998)

Mo. Date	March			April			May			June			July			August			September			October			November			December		
	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G
1										15						15												13		
2				2	25	Op					Trip											30								
3		50						45								40									25					
4		15														Trip														
5		5						50	Op	Trip																				
6																					Trip									
7											Trip																			
8		25											5	Op								3	Op				25			
9																			20			2	Op				10			
10		25												50											10					
11		10												Trip		8	25	Op												
12		40														4	5	Op										15		
13		10														4	5	Op						10						
14										20			10										20		1	55	Op			
15		20													Trip				Trip			4	20	Op						
16	1	6			45			20																						
17																												30		
18					20											Trip														
19							3	55	Op																					
20							9	35	Op	3	40	Op	Trip									3	Op		55					
21				1	5			15			10														35					
22	1			1	45	Op								Trip									5							
23	1	8		1			1	45	Op	Trip																20				
24		30						15		Trip						30														
25											35																			
26					10																									
27								10																			6	40	Op	
28								25			10			55	Op					30	Op									
29					10			15																						
30	10	35	Op													Trip							10							
31																Trip														

Legend: H: Hours
M: Minutes
G: Generator
Op: Operation
Trip: Supplied power down in a moment

8.3-8-6

8.3-8-3 (2) Summary of Power Failures at Mohara W.T.P (1999)

Mo.	January			February			March			April			May			June			July			August			September			October			November			December								
Date	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G	H	M	G									
1				3		Op		20		1	15	Op																														
2								5								2	13																									
3															3					1					1	45	Op									10						
4				Trip													10																									
5								20									10				10															15						
6																	15																				5					
7	Trip					25	Op		5						2	45	Op								10			20														
8																	15				10				6	30	Op										20					
9											1	5	Op								20					10		1	25	Op							10					
10																									1	15	Op					1	15	Op				5				
11									45	Op											3	38																				
12																												6		Op								10				
13	5		5	Op							1		Op								5			5														5				
14			10			1	55	Op									30				5																					
15													5				10																		5		1	35	Op			
16				45	Op																																	10				
17																																						9	10	Op		15
18				12																																						
19									6	35	Op		15																												5	
20	Trip																				4		Op																10	10		
21																	15																									
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Legend: H: Hours
M: Minutes
G: Generator
Op: Operation
Trip: Supplied power down in a moment

8.3-8-7

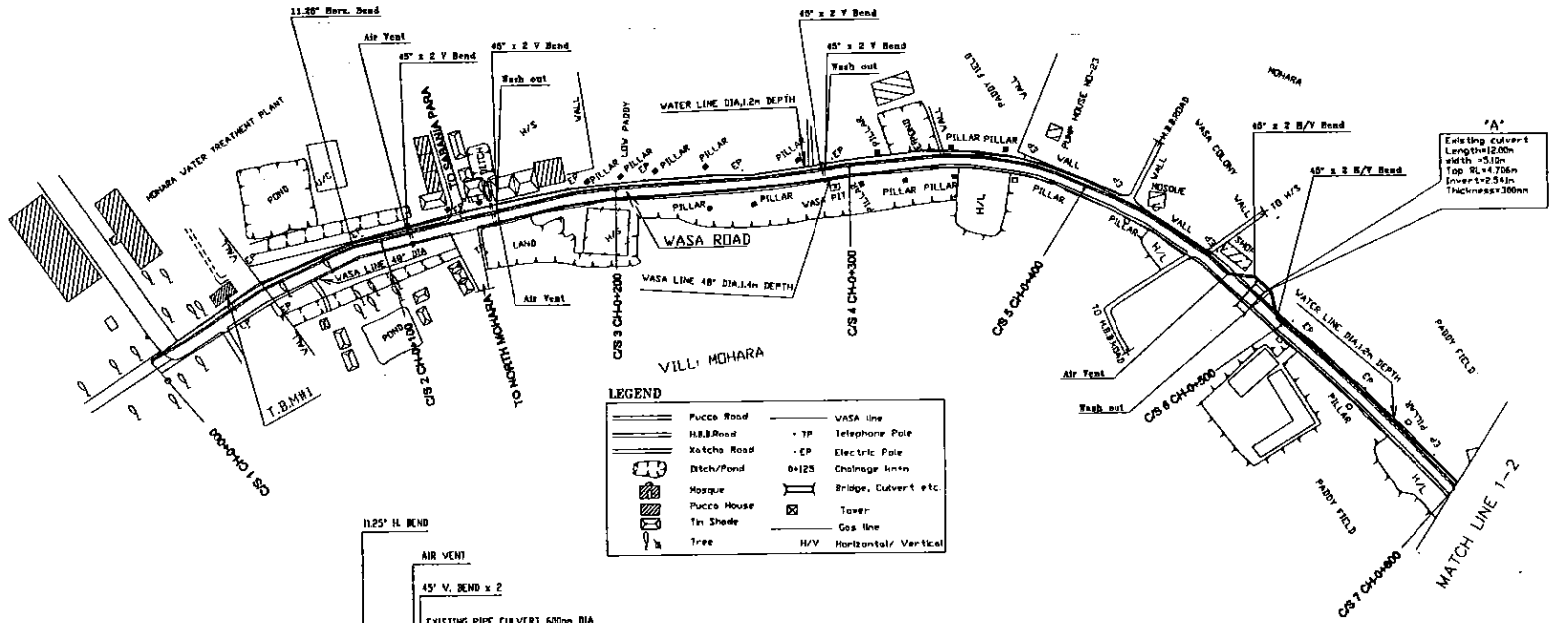
8.3-8-8

8.3-8-3 (3) Summary of Power Failures at Mohara W.T.P (2000)

Mo.	January			February		
Date	H	M	G	H	M	G
1						
2				1		Op
3						
4						
5						
6						
7						
8					15	
9						
10		35				
11					40	
12						
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29					13	
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31		10				

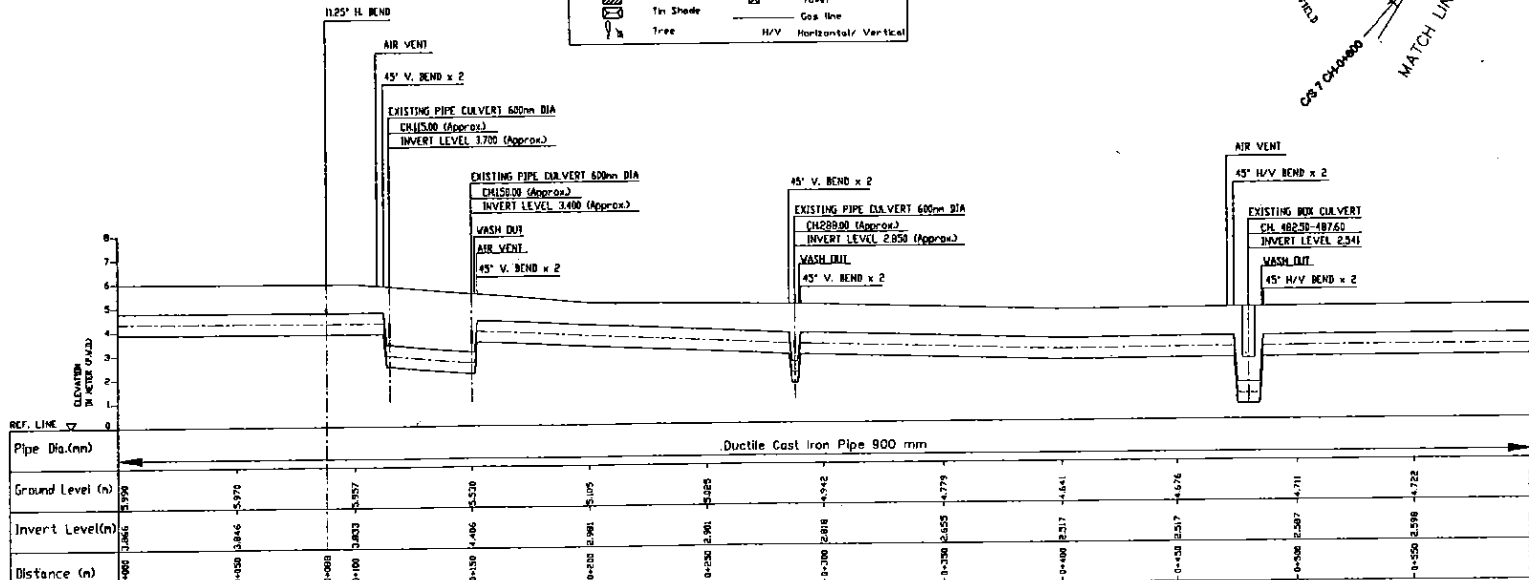
Legend: H: Hours
M: Minutes
G: Generator
Op: Operation
Trip: Supplied power down in a moment

Figure 8.3-9-1 Proposed Transmission Pipeline Plan and Longitudinal Profile



LEGEND

	Pucca Road		WASA line
	H.B.B Road		7P Electric Pole
	Xatcha Road		EP Electric Pole
	Ditch/Pond		0+12S Chainage mark
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		H/V Horizontal Vertical



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

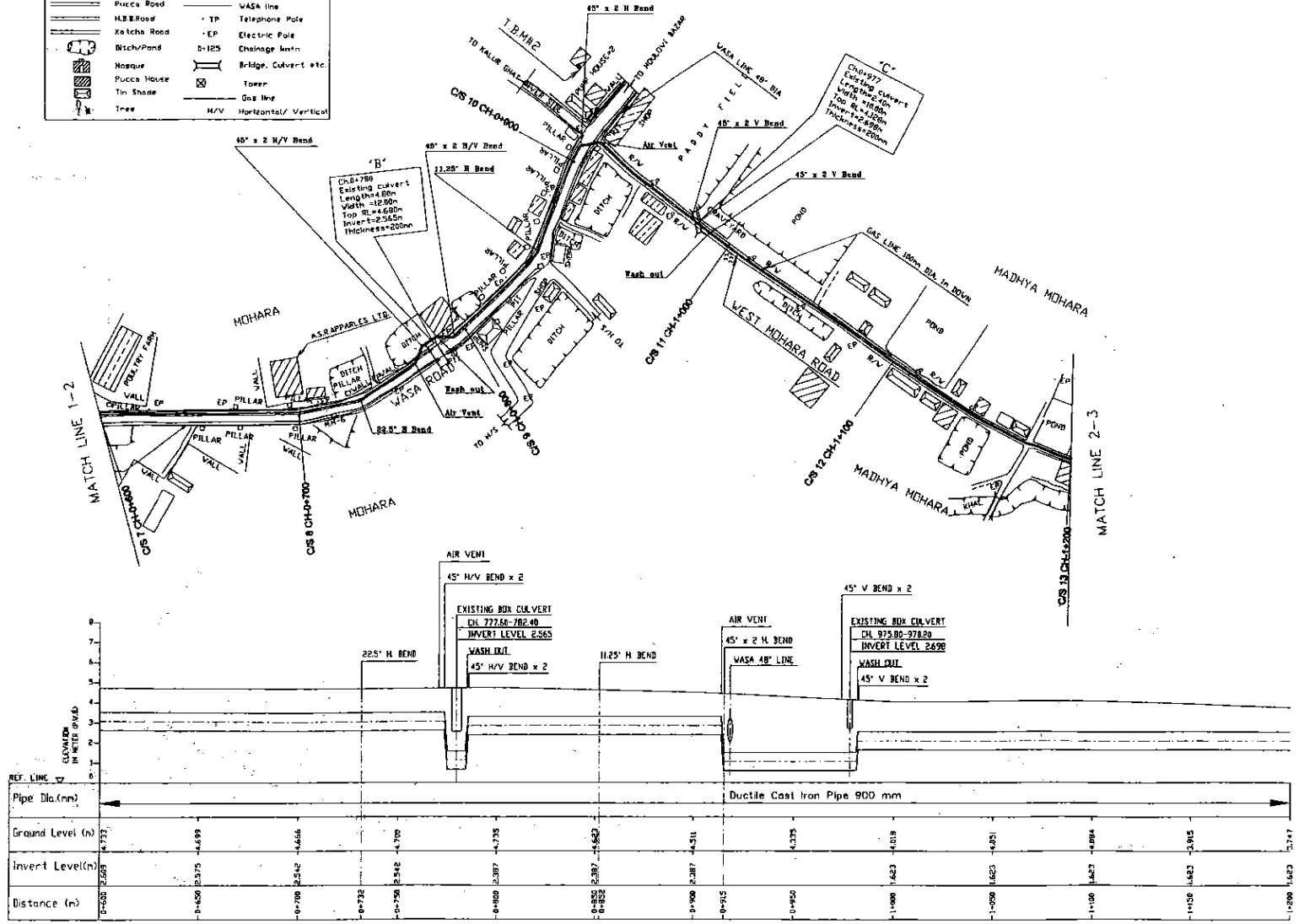
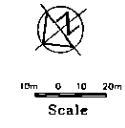
8.3-9-1

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8.3-9-2

LEGEND

	Pucca Road		WASA line
	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Chainage Mark
	Nasque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shant		Gas line
	Tree		H/V Horizontal/ Vertical



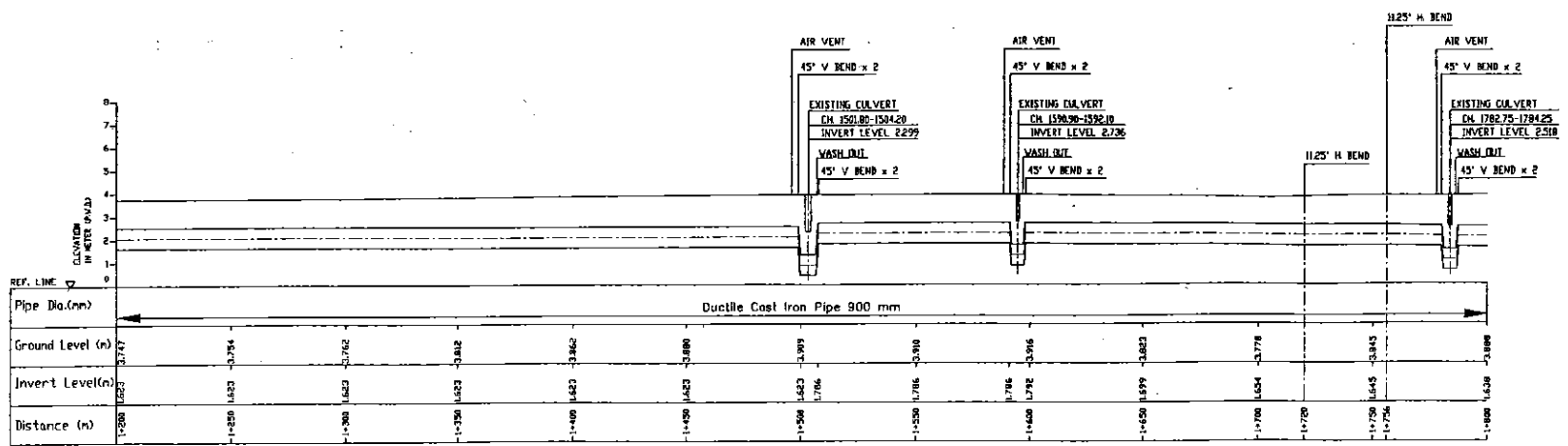
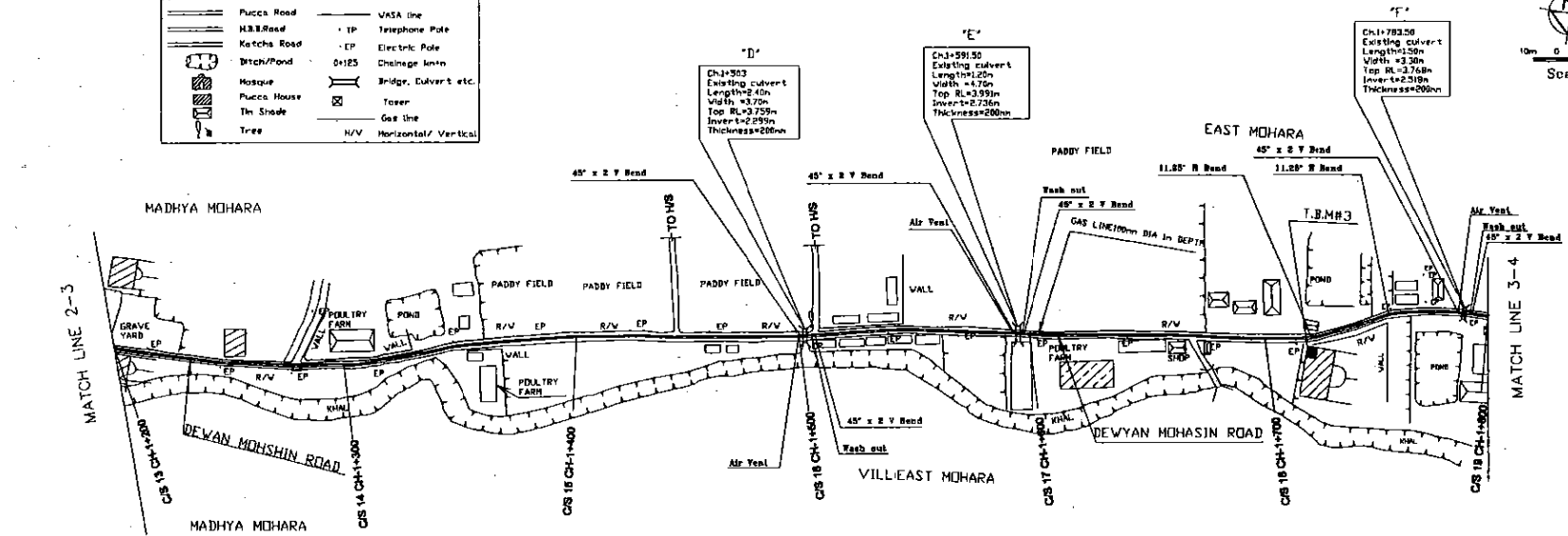
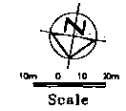
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Chittagong WASA-JICA NJS Consultants Co. Ltd.	FEASIBILITY STUDY ON EXTENSION AND EXPANSION OF MOHARA WATER TREATMENT PLANT	MOHARA-KHULSHI Ch. 0+600 to Ch. 1+200	MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE PLAN & LONGITUDINAL PROFILE	2/31
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8.3-9.3

LEGEND

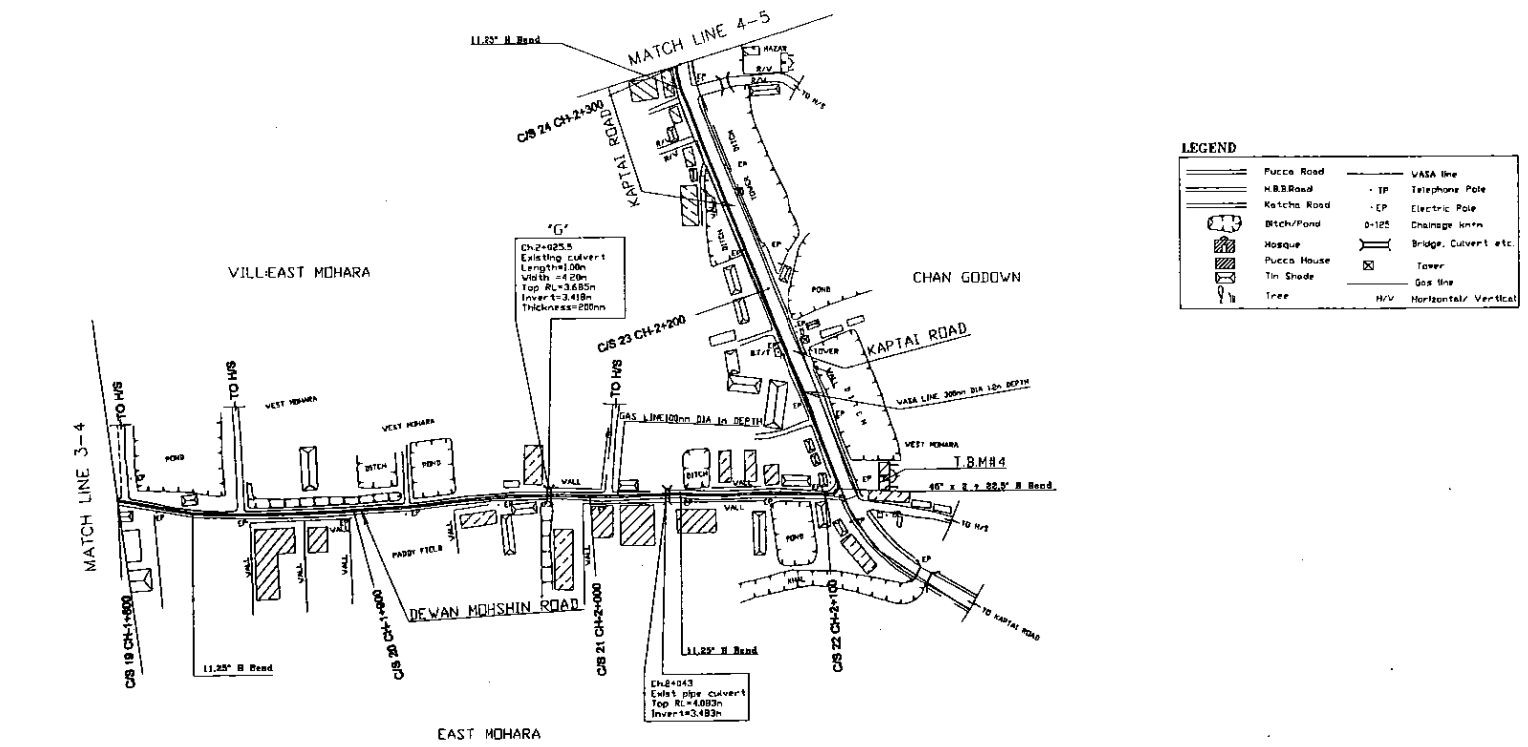
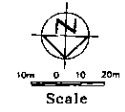
	Pucca Road		V.A.S.A. line
	H.B.B. Road		Telephone Pole
	Katcha Road		Electric Pole
	Witch/Pond		Chainage km/m
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tim Shade		Gas line
	Tree		N/V Horizontal/ Vertical



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

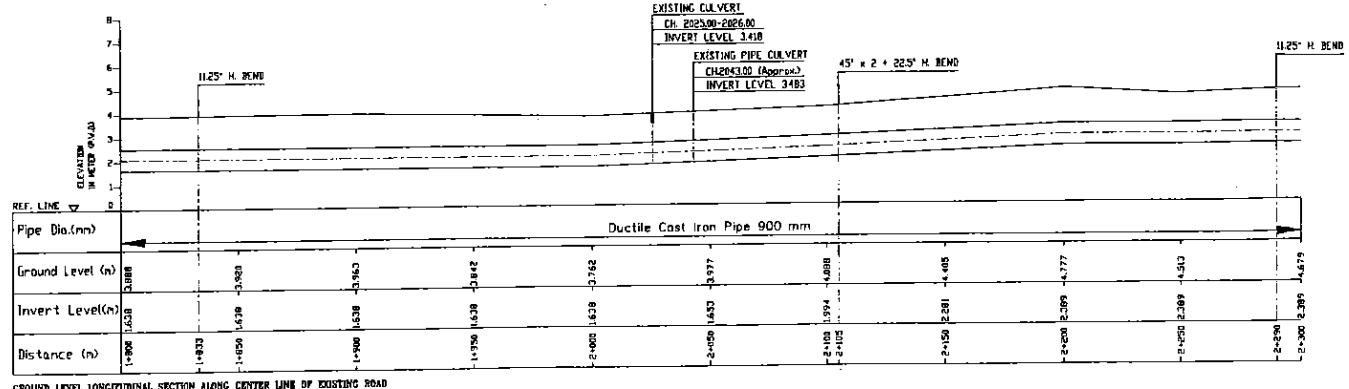
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8.3-9-4



LEGEND

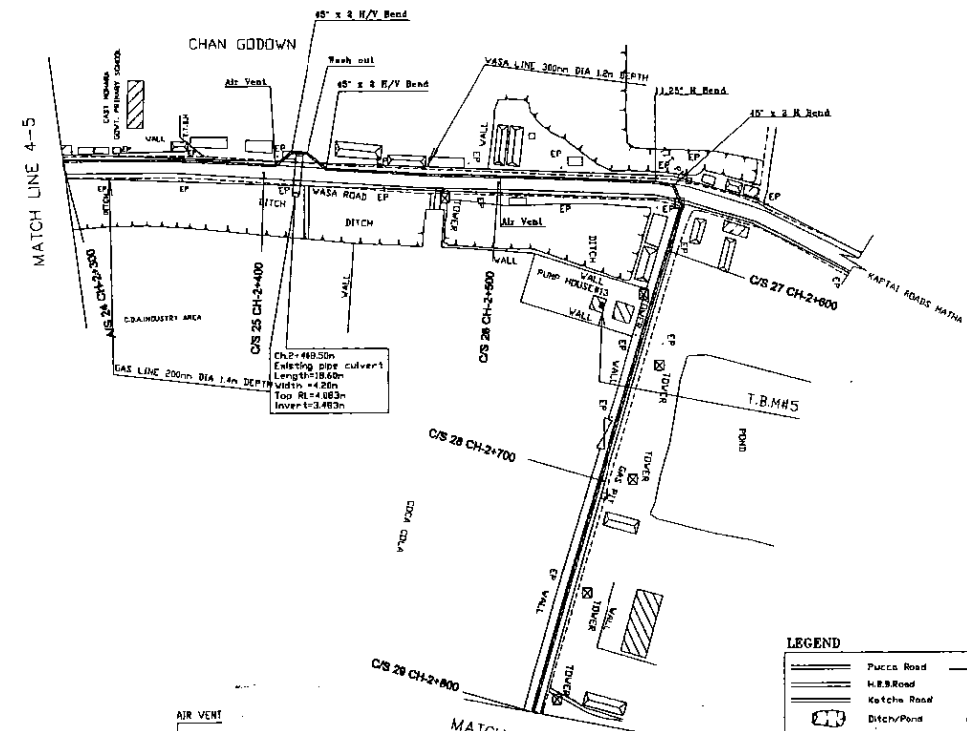
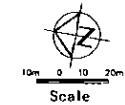
	Pucca Road		VASA line
	M.B.S Road		IP Telephone Pole
	Katcha Road		EP Electric Pole
	Bitch/Pond		Drainage Ann
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		H/V Horizontal/ Vertical



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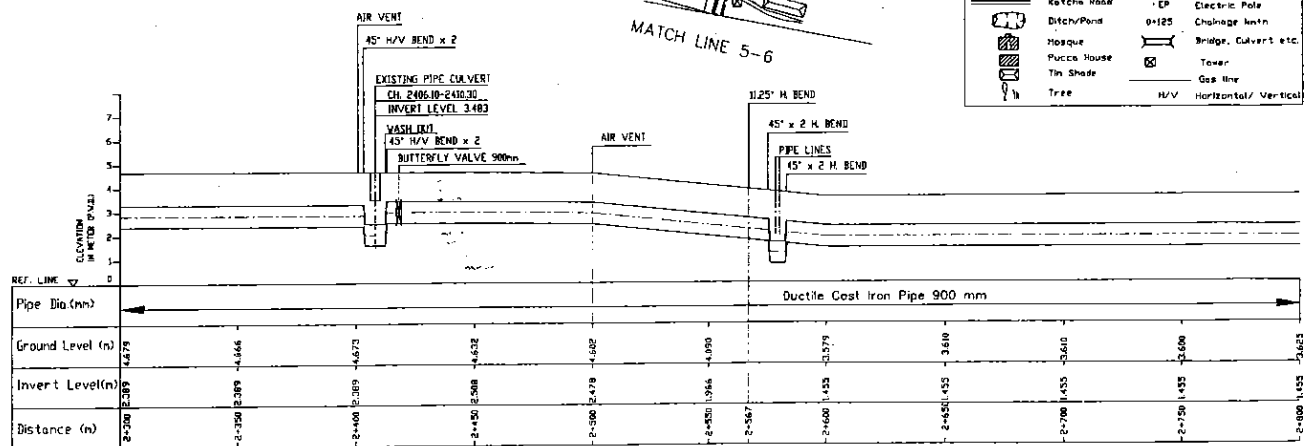
Chittagong WSA-JICA NJS Consultants Co. Ltd.	FEASIBILITY STUDY ON EXTENSION AND EXPANSION OF MOHARA WATER TREATMENT PLANT	MOHARA-KHULSHI Ch. 1+800 to Ch. 2+300	MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE PLAN & LONGITUDINAL PROFILE	4/31
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8.3-9-5



LEGEND

	Pucca Road		WASA line
	M.E.R. Road		Telephone Pole
	Match Road		Electric Pole
	Ditch/Pond		Chainage Mark
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		H/V Horizontal/ Vertical



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

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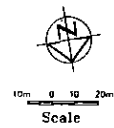
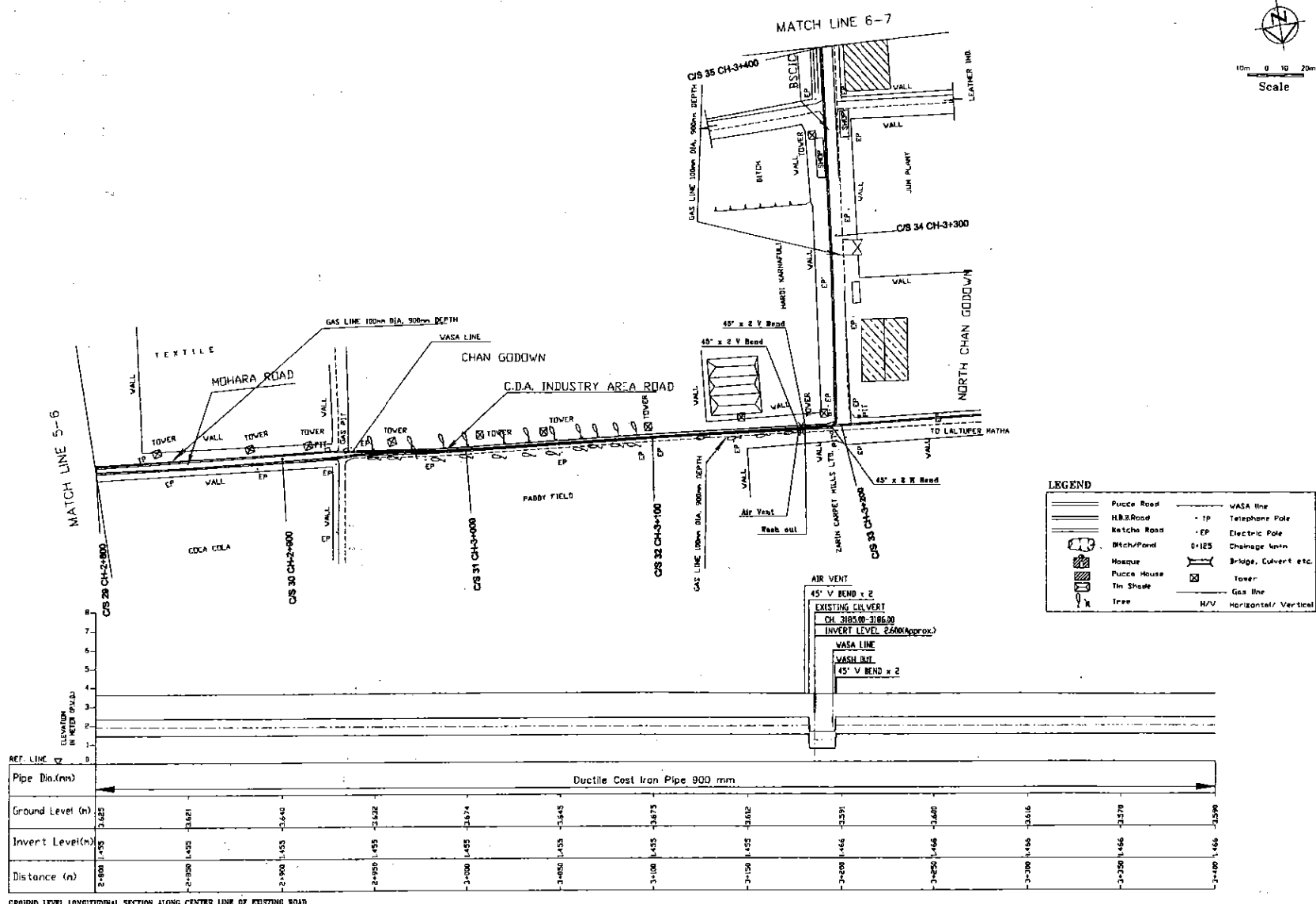
Chittagong WASA-JICA
NJS Consultants Co. Ltd.

FEASIBILITY STUDY ON
EXTENSION AND EXPANSION OF
MOHARA WATER TREATMENT PLANT

MOHARA-KHULSHI
Ch. 2+300 to Ch. 2+800

MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE
PLAN & LONGITUDINAL PROFILE

8.3-9-6



LEGEND

	Pucca Road		VASA Line
	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Mith/Pond		Chainage Linn
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		H/V Horizontal/ Vertical

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Chittagong WASA-JICA
NJS Consultants Co. Ltd.

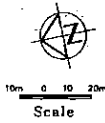
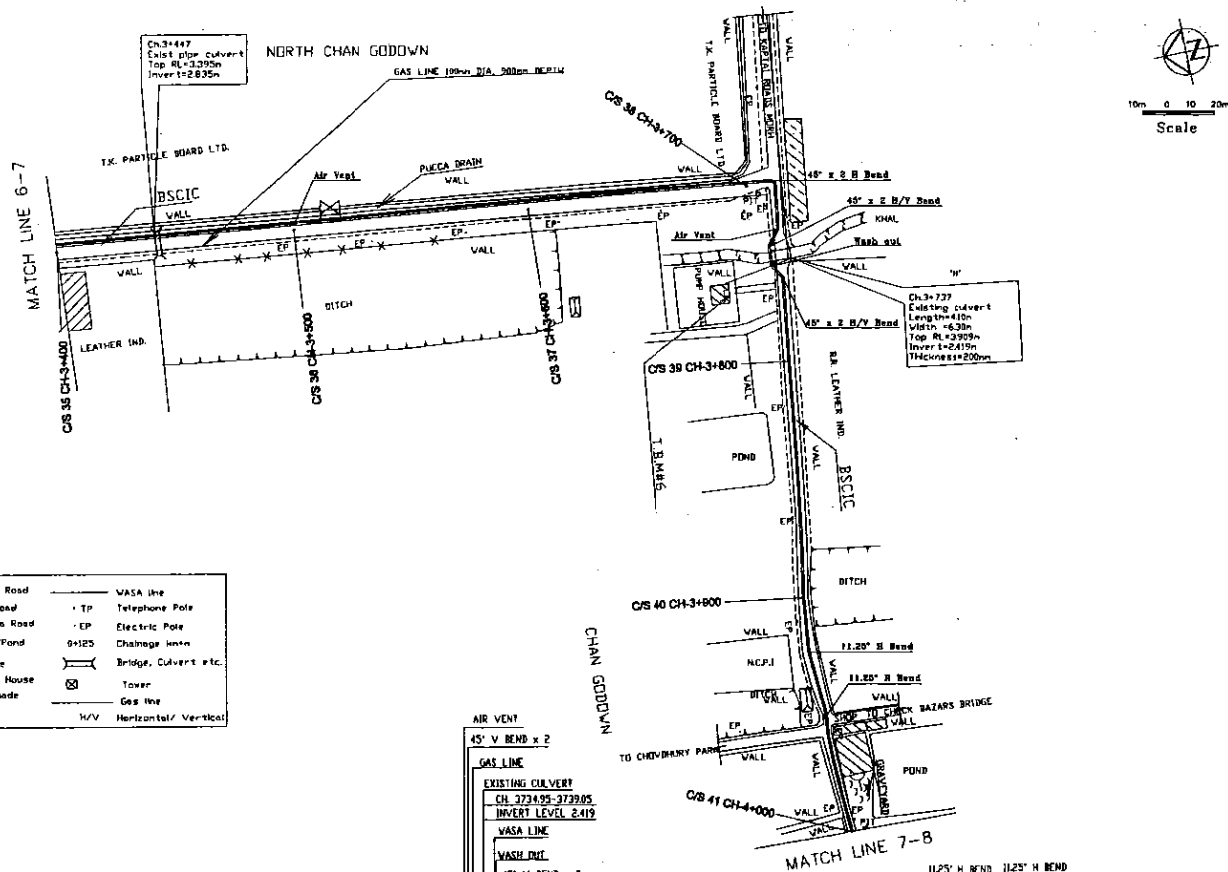
FEASIBILITY STUDY ON
EXTENSION AND EXPANSION OF
MOHARA WATER TREATMENT PLANT

MOHARA-KHULSHI
Ch. 2+800 to Ch. 3+400

MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE
PLAN & LONGITUDINAL PROFILE

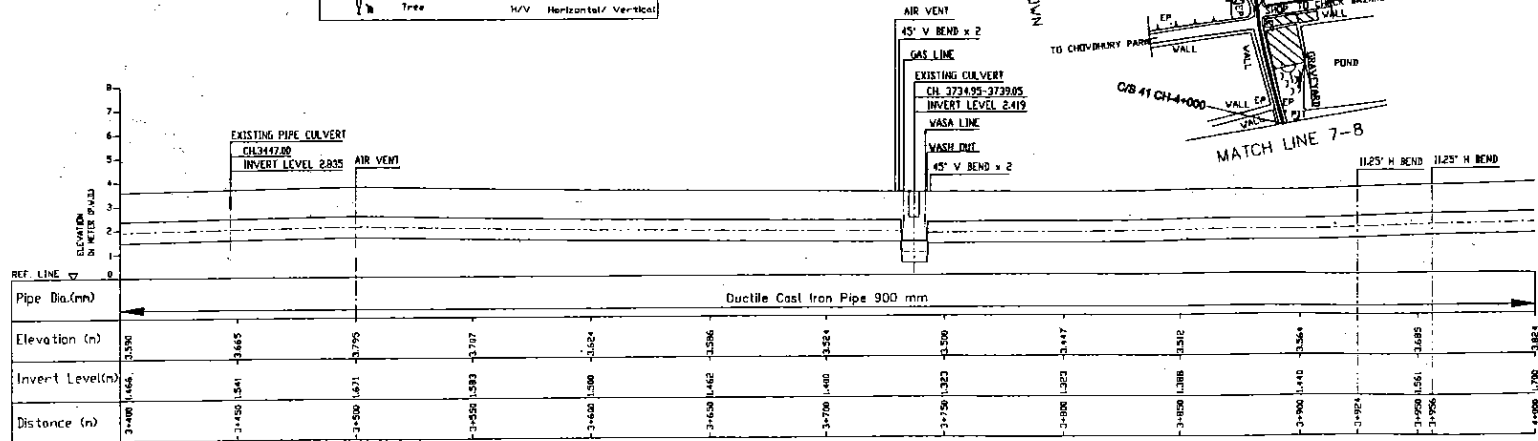
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8.3-9-7



LEGEND

	Pucca Road		WASA line
	H.B.B. Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Drainage Inlet
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		Horizontal/ Vertical



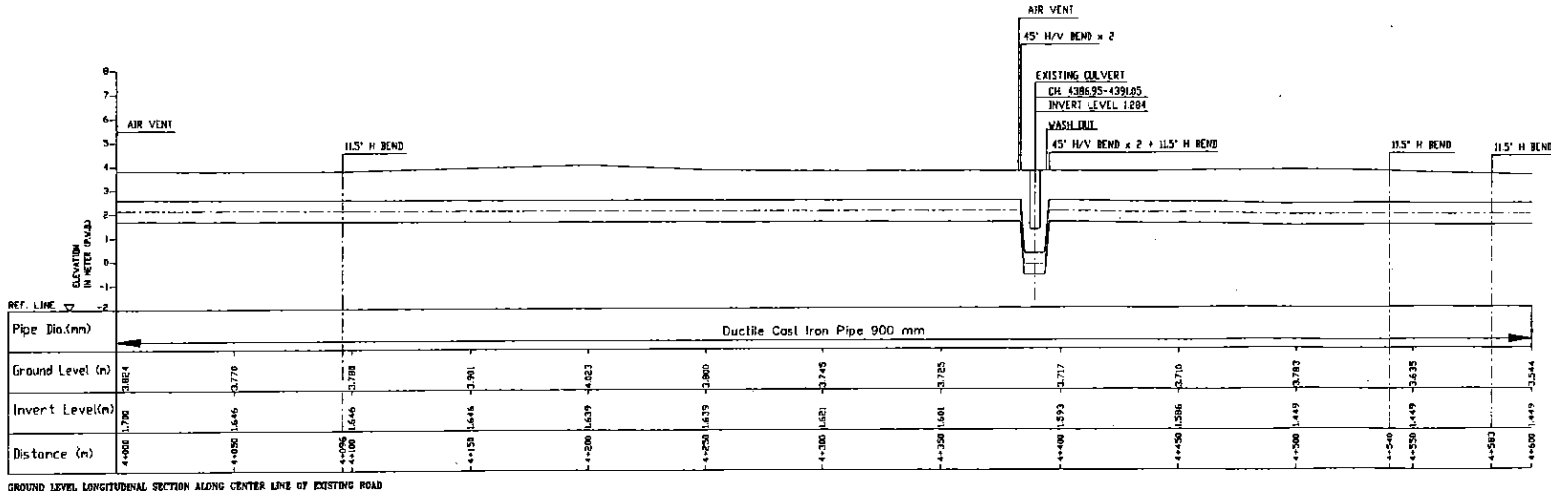
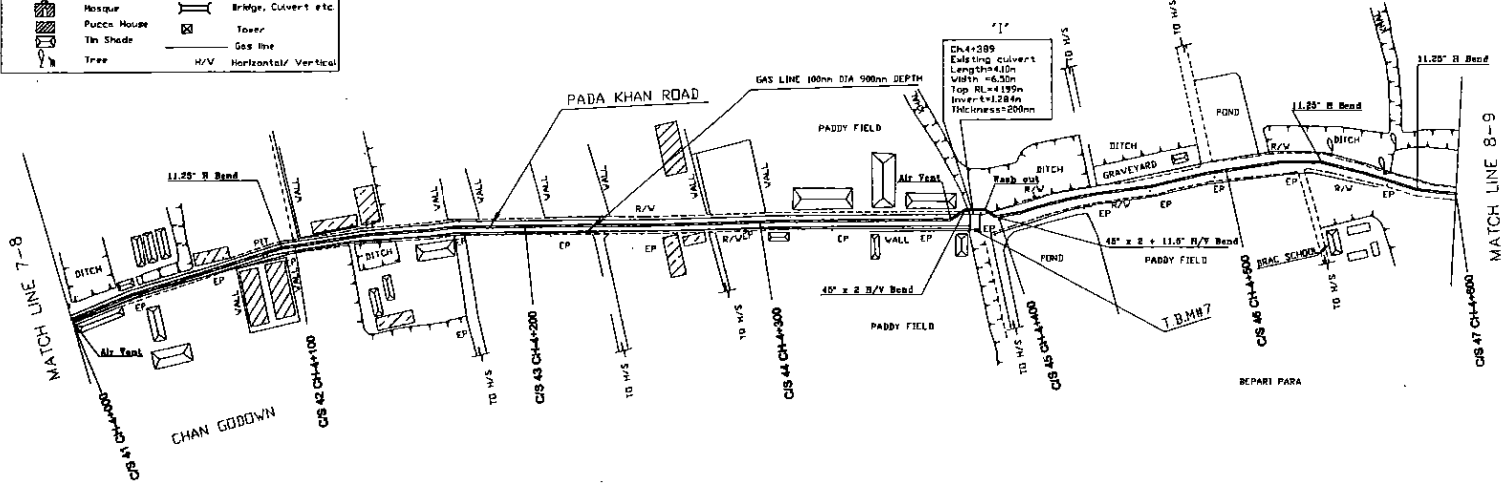
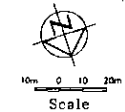
GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

SEPT. 2000

8.3-9-8

LEGEND

	Pucca Road		VISA line
	H.B. Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Diameter 25mm
	House		Bridge, Culvert etc
	Pucca House		Tower
	Tree		Gas line
			H/V Horizontal/ Vertical



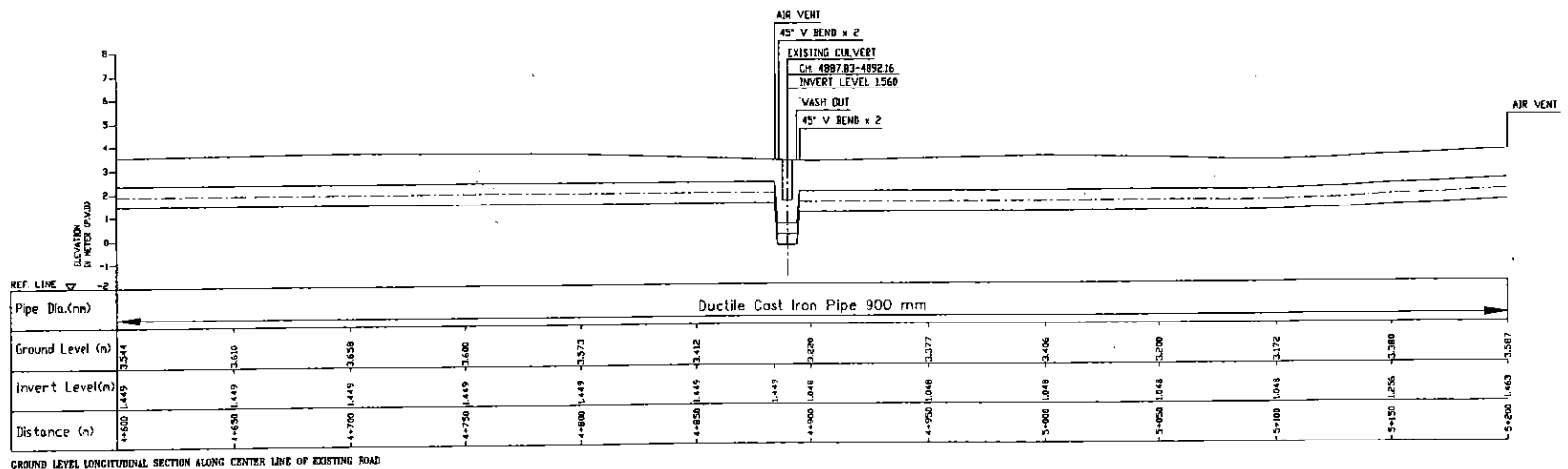
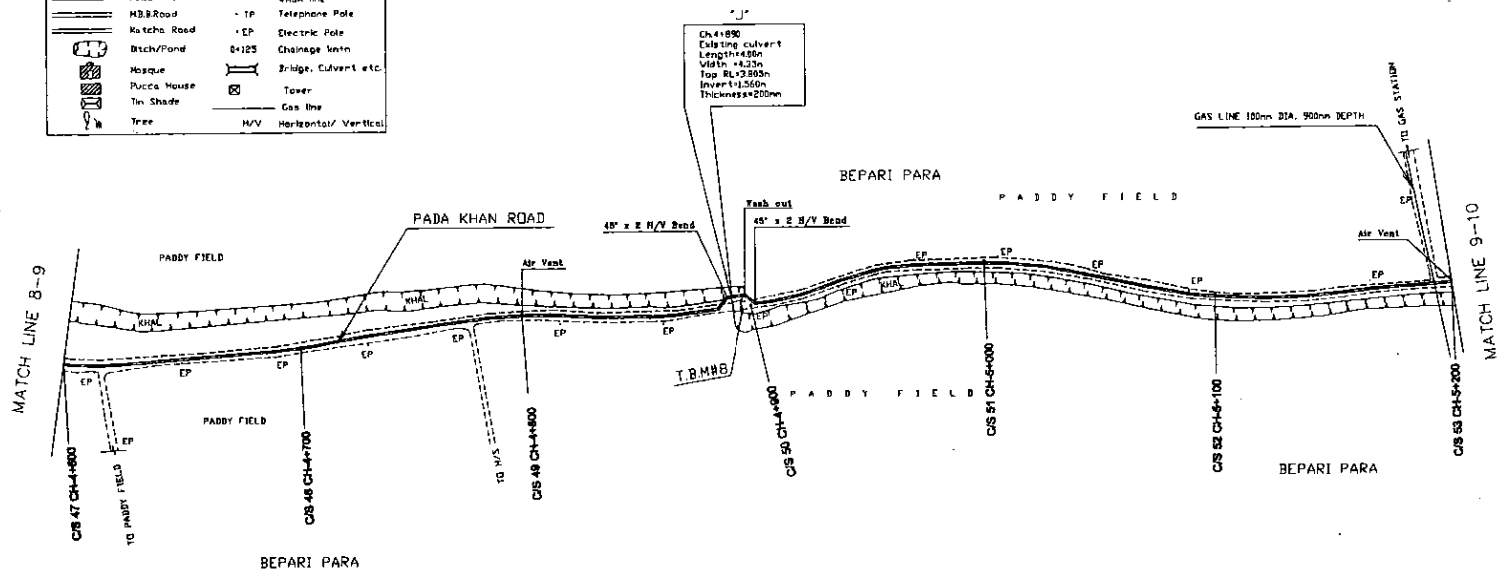
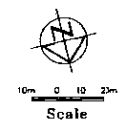
SEPT. 2000

Chittagong WASA-JICA NJS Consultants Co. Ltd.	FEASIBILITY STUDY ON EXTENSION AND EXPANSION OF MOHARA WATER TREATMENT PLANT	MOHARA-KHULSHI Ch. 4+000 to Ch. 4+600	MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE PLAN & LONGITUDINAL PROFILE	8/31
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8.3-9-9

LEGEND

	Pucca Road		WASA line
	M.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Bitch/Pond		Chainage Mark
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		Horizontal/ Vertical



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

SEPT. 2000

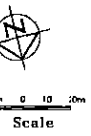
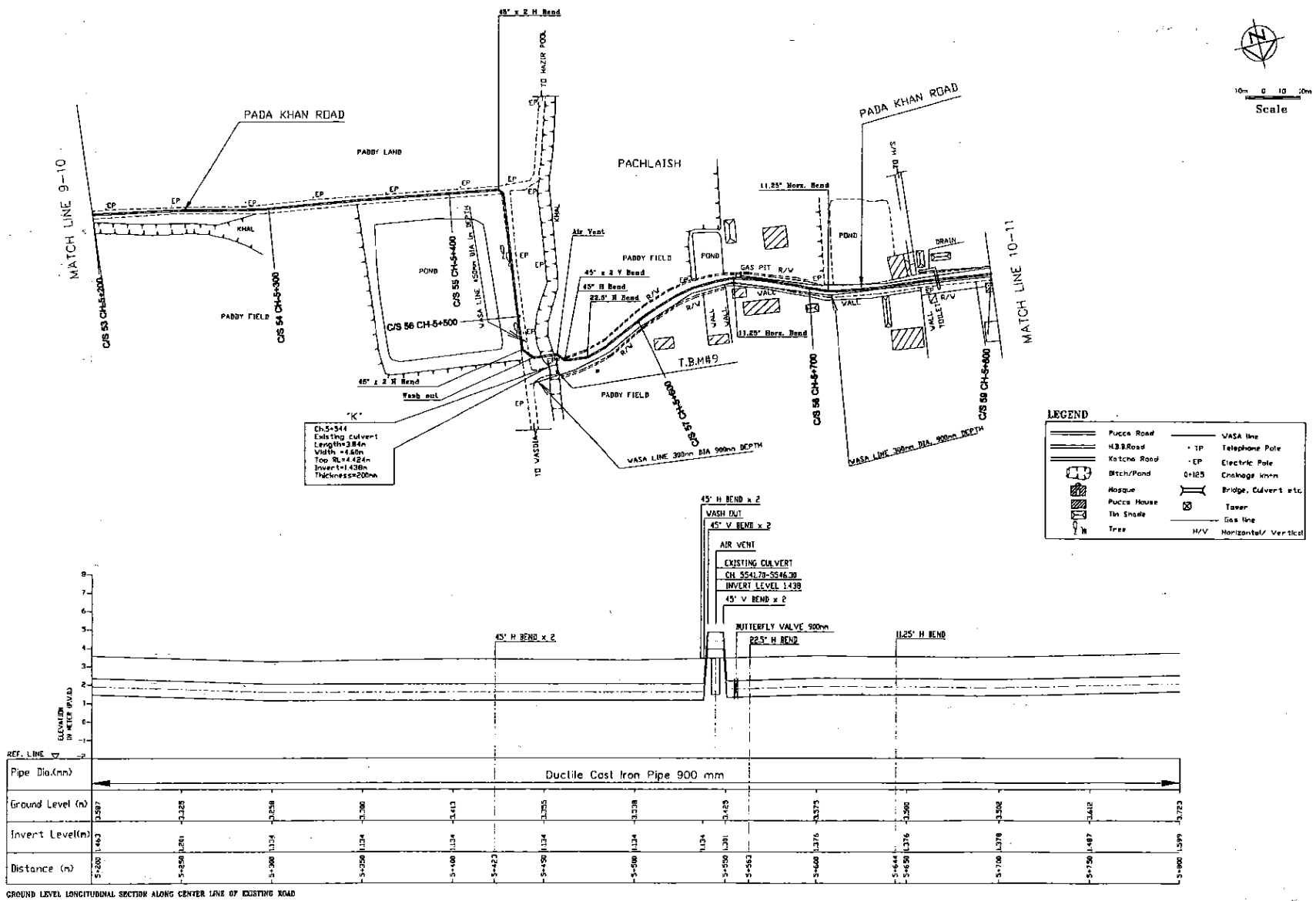
Chittagong WASA-JICA
NJS Consultants Co. Ltd.

FEASIBILITY STUDY ON
EXTENSION AND EXPANSION OF
MOHARA WATER TREATMENT PLANT

MOHARA-KHULSHI
Ch. 4+600 to Ch. 5+200

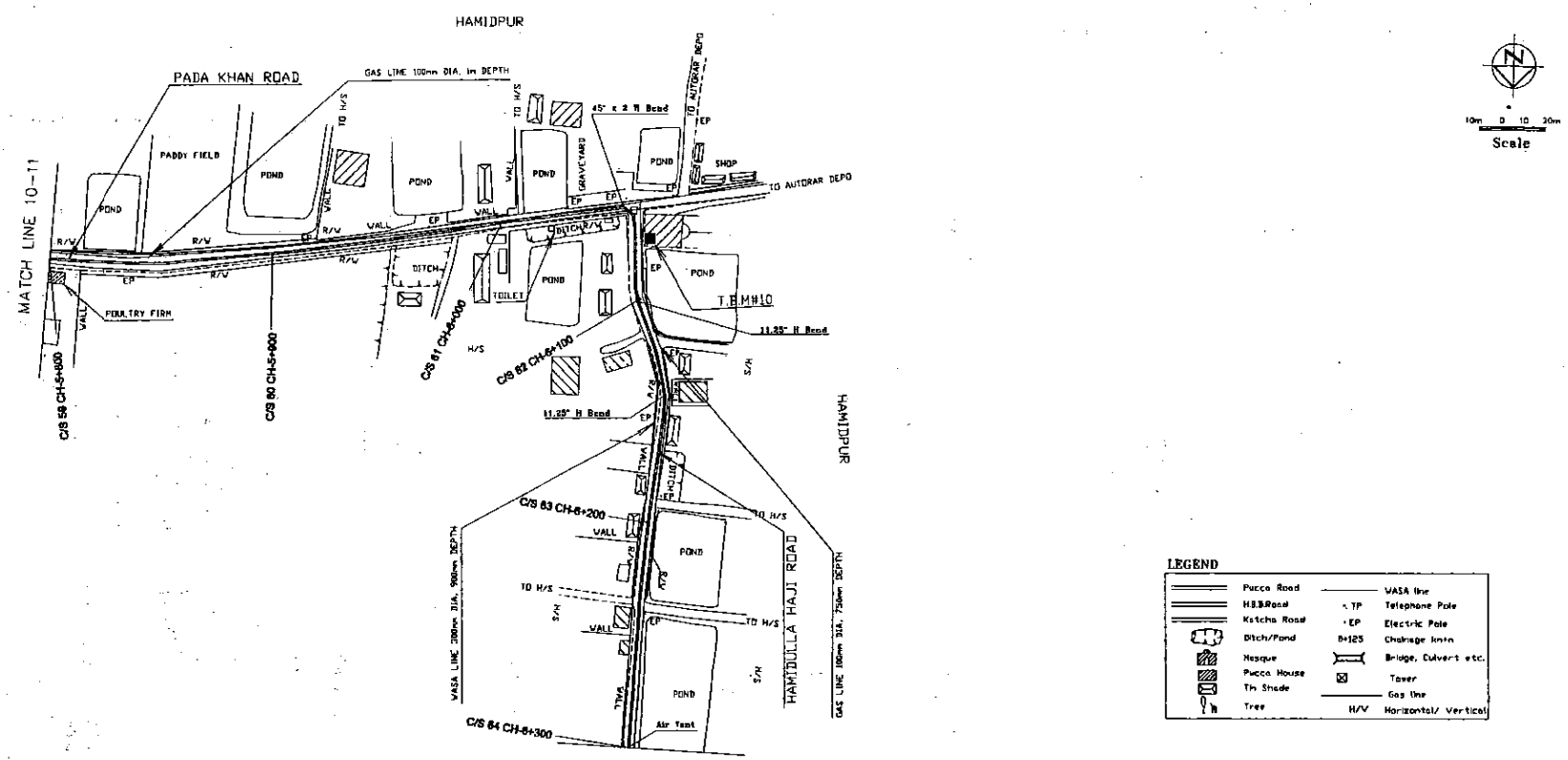
MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE
PLAN & LONGITUDINAL PROFILE

8.3-9-10



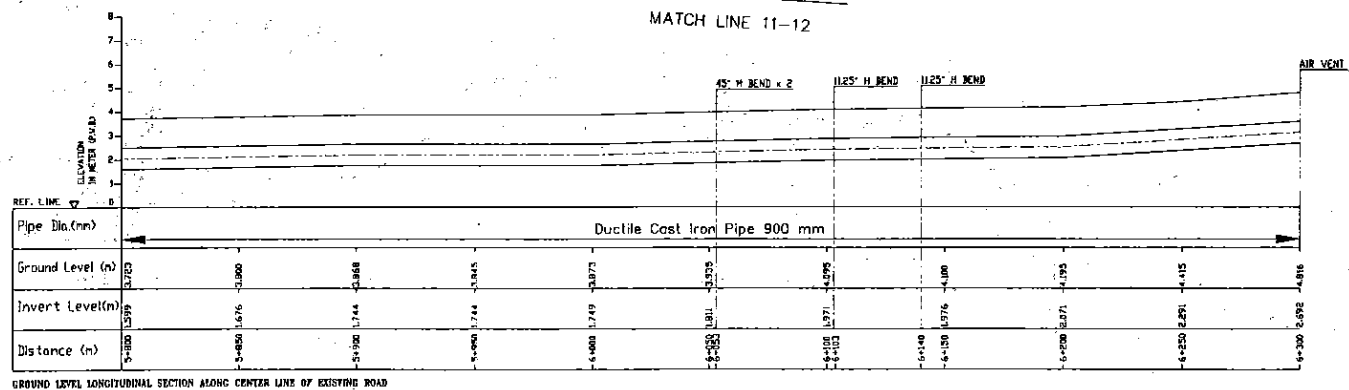
SEPT. 2000

8.3-9-11

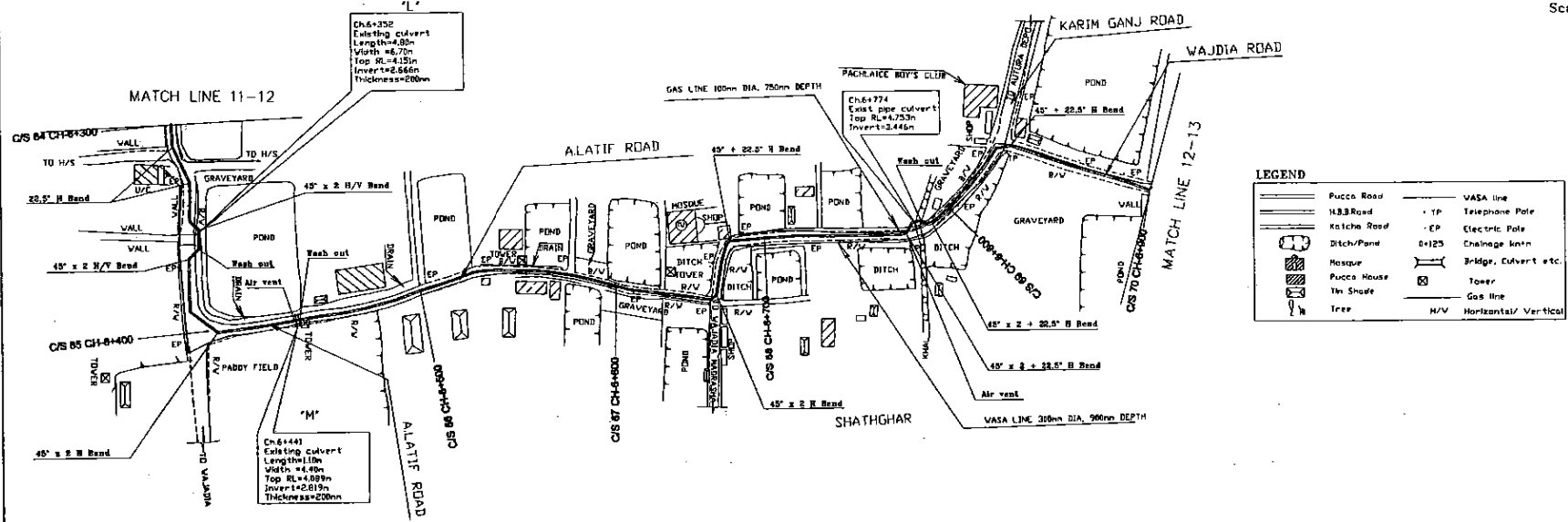
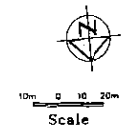


LEGEND

	Pucco Road		WASA line
	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Chabutra khatra
	Masque		Bridge, Culvert etc.
	Pucco House		Tower
	Th Shade		Gas line
	Tree		Horizontal/ Vertical

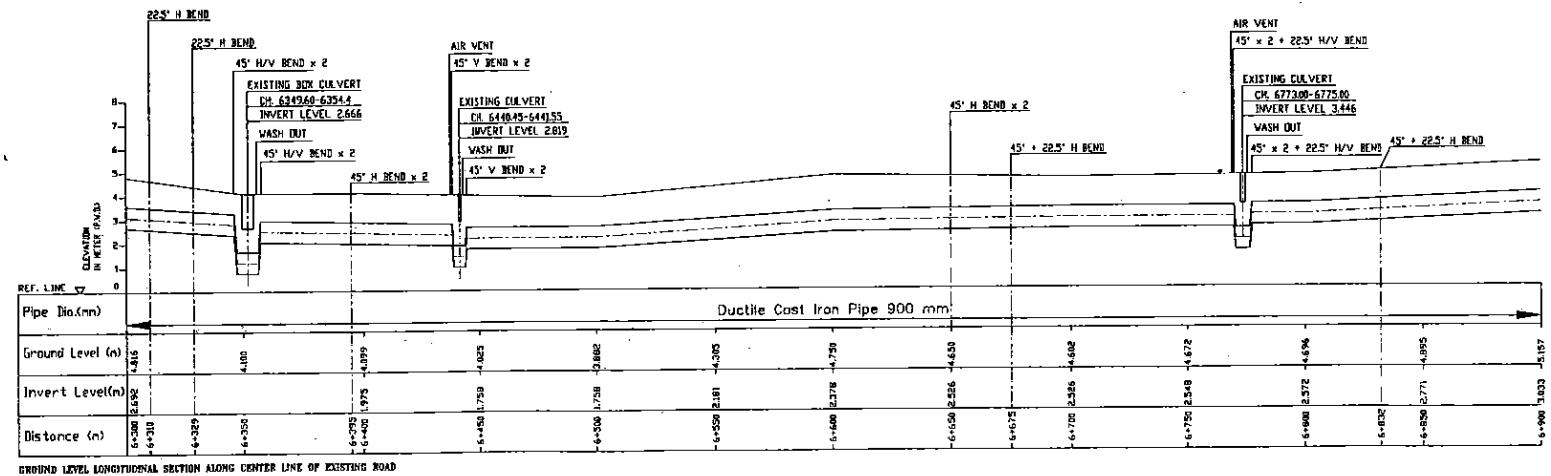


SEPT. 2000



LEGEND

	Pucca Road		VASA line
	Katcha Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Ch.125
	Masque		Bridge, Culvert etc.
	Pucca House		Tower
	Tree		Gas line
			H/V Horizontal/ Vertical



8.3-9-12

SEPT. 2000

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FEASIBILITY STUDY ON
EXTENSION AND EXPANSION OF
MOHARA WATER TREATMENT PLANT

MOHARA-KHULSHI
Ch. 6+300 to Ch. 6+900

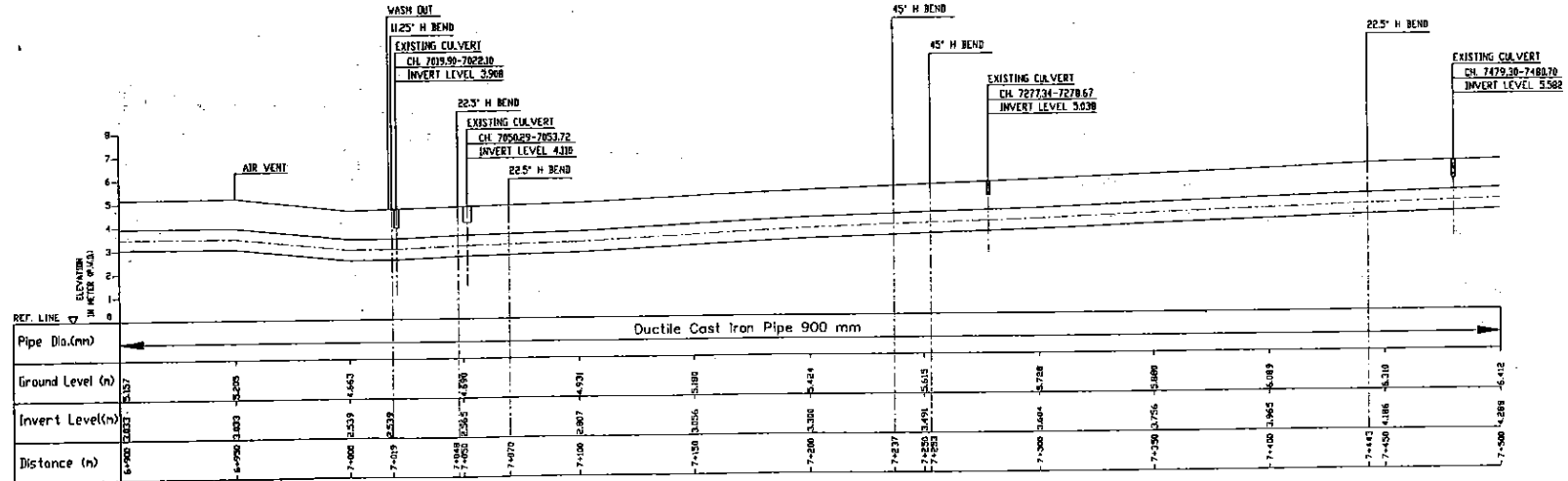
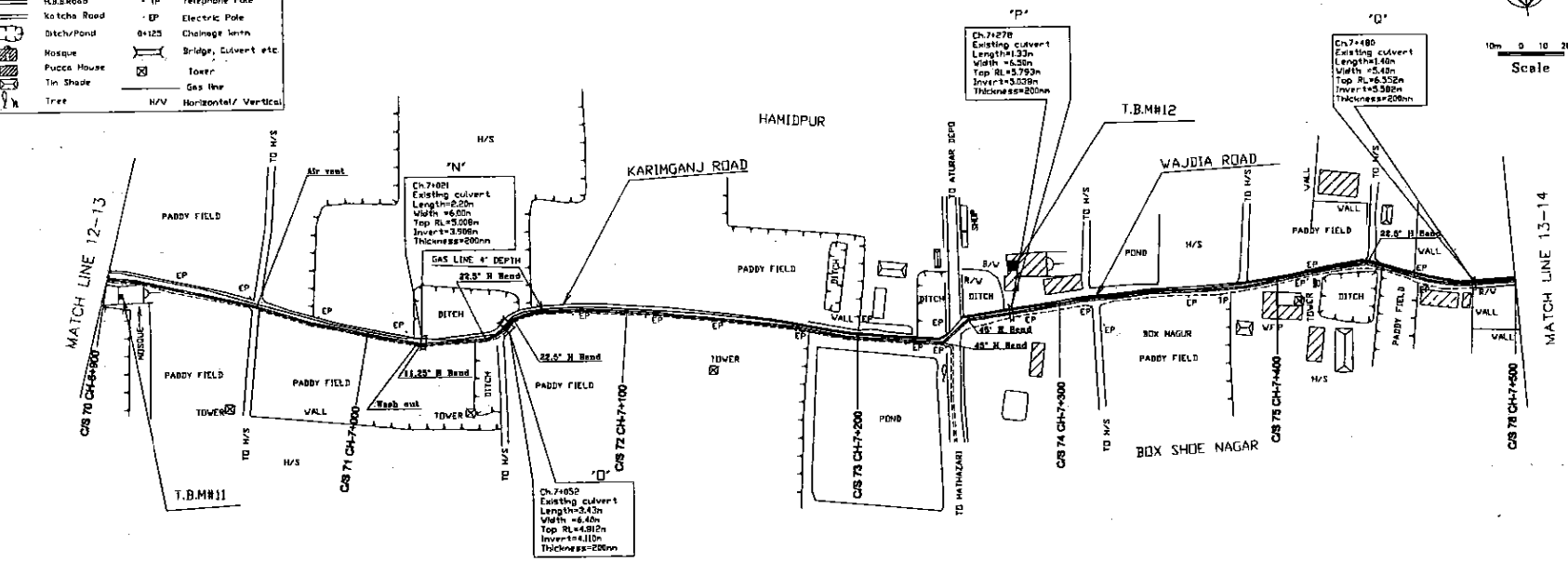
MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE
PLAN & LONGITUDINAL PROFILE

12/31

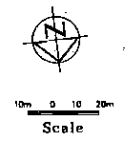
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LEGEND

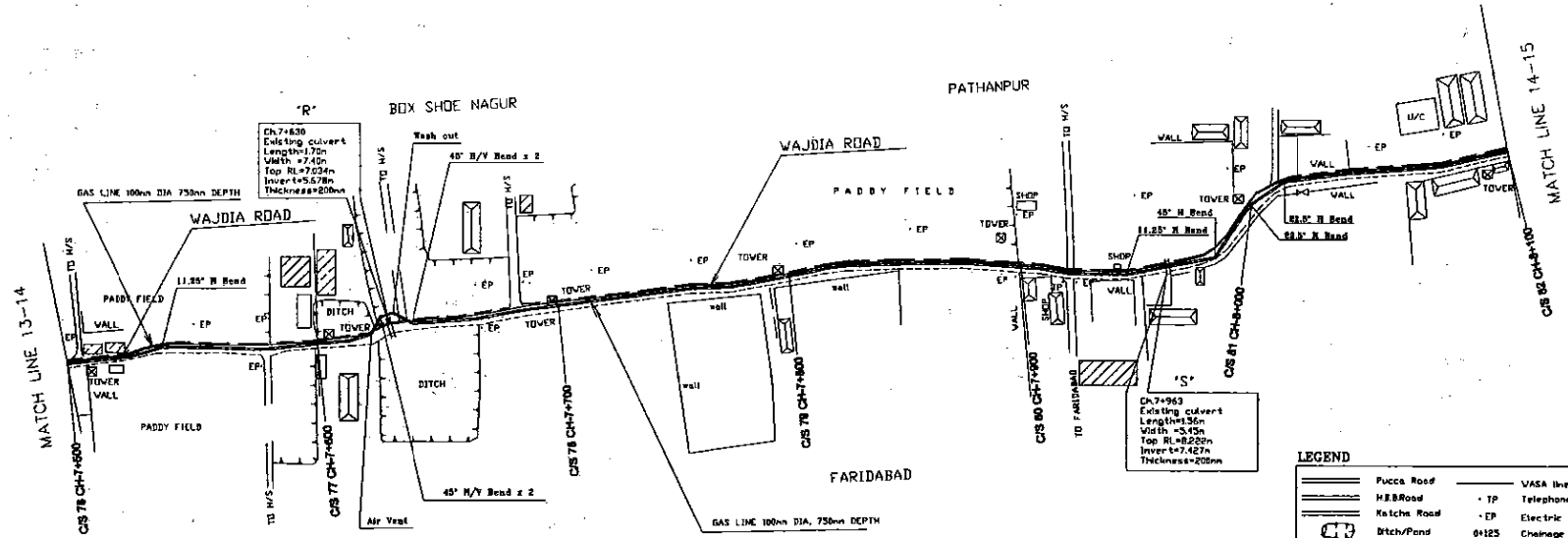
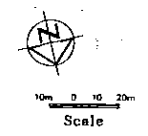
	Pucca Road		VASA line
	H.B.R. Road		1P Telephone Pole
	Kotcha Road		EP Electric Pole
	Ditch/Pond		0+125 Chainage mark
	Nasque		Bridge, Culvert etc
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		H/V Horizontal/ Vertical



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

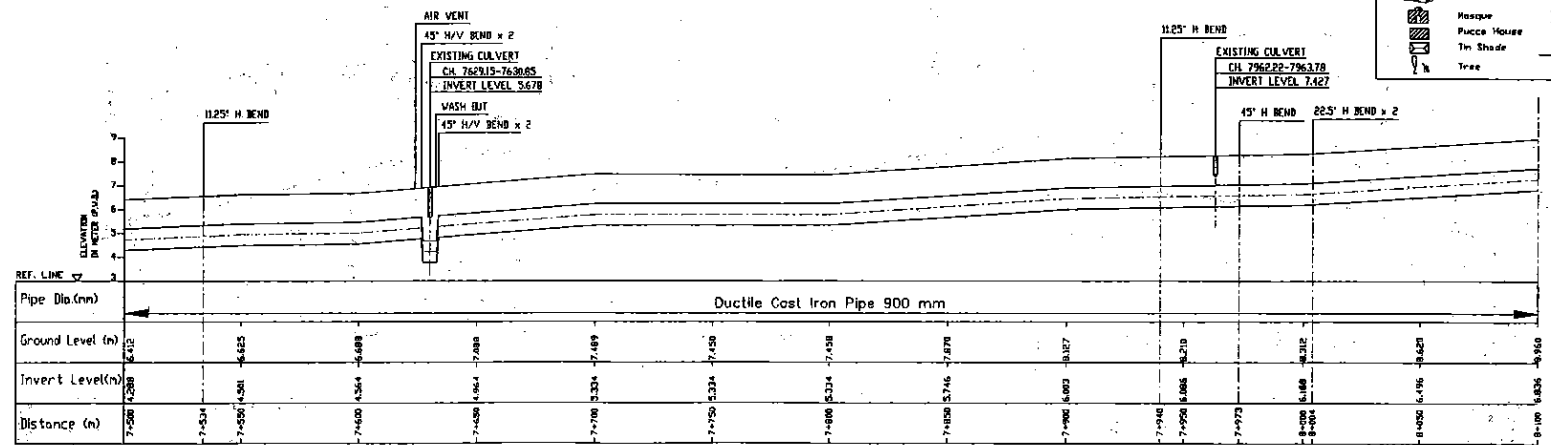


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LEGEND

	Pucca Road		VASA line
	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Chainage knot
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tree		Gas line
			Horizontal/Vertical



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

8.3.9-14

SEPT. 2000

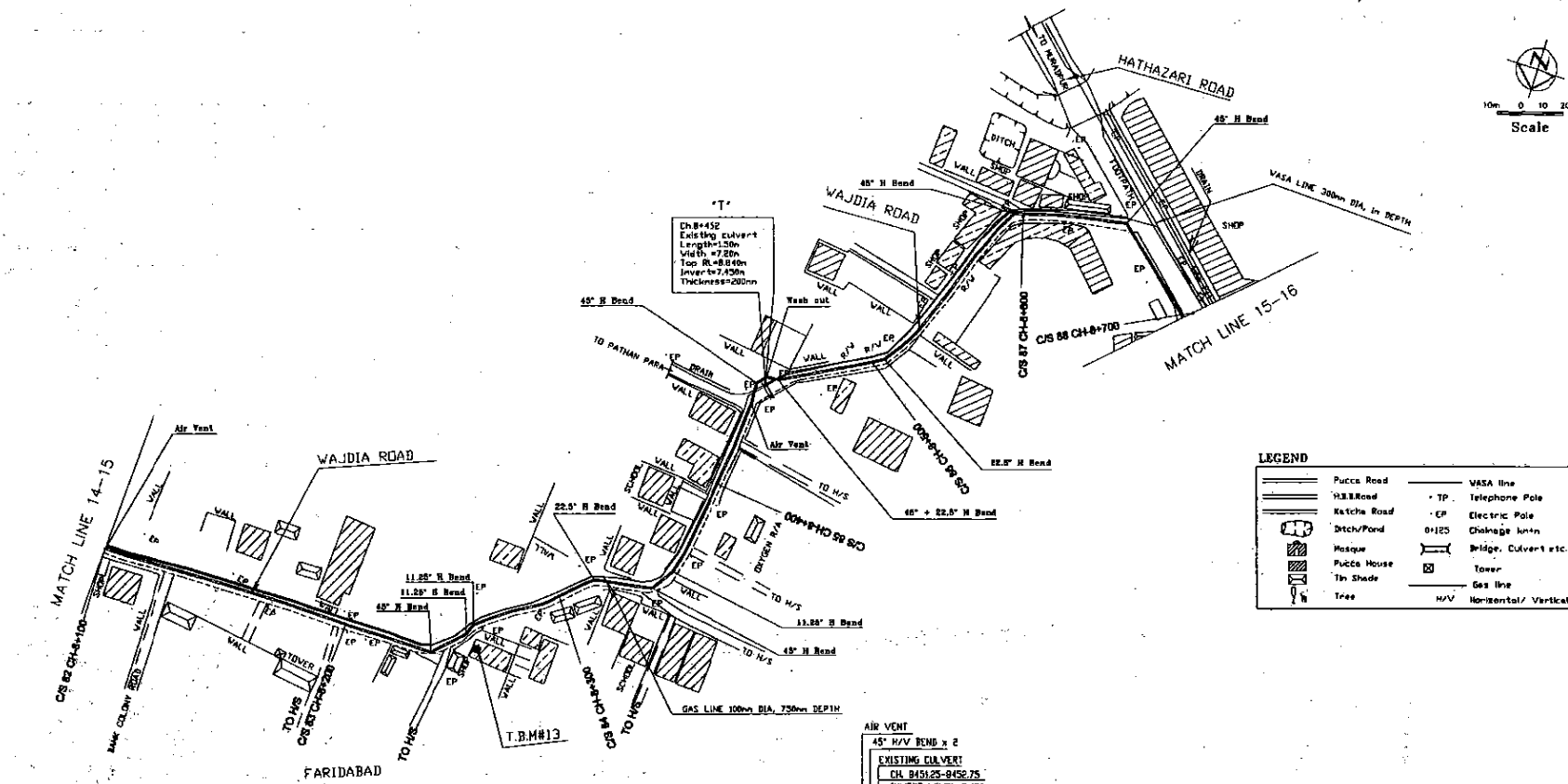
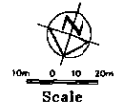
Chittagong WASA-JICA
NJS Consultants Co. Ltd.

FEASIBILITY STUDY ON
EXTENSION AND EXPANSION OF
MOHARA WATER TREATMENT PLANT

MOHARA-KHULSHI
Ch. 7+500 to Ch. 8+100

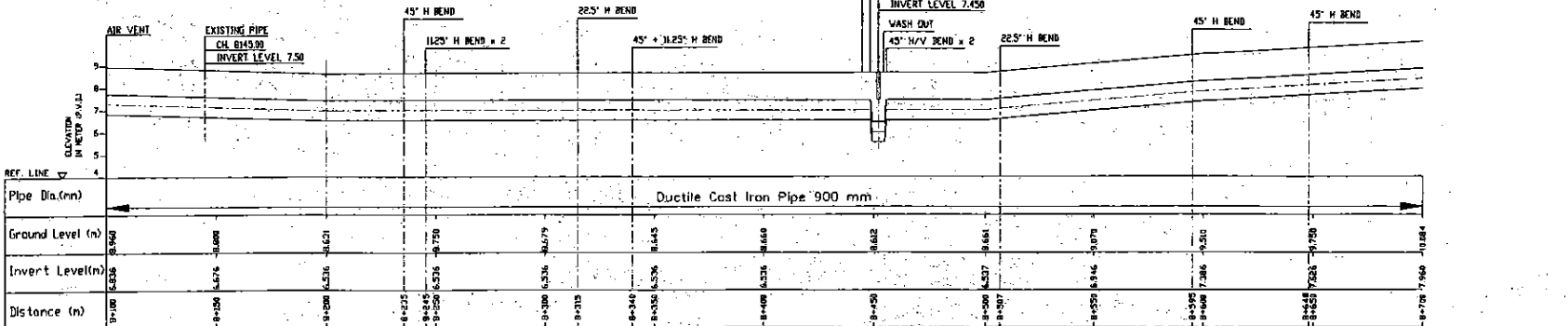
MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE
PLAN & LONGITUDINAL PROFILE

8.3-9-15



LEGEND

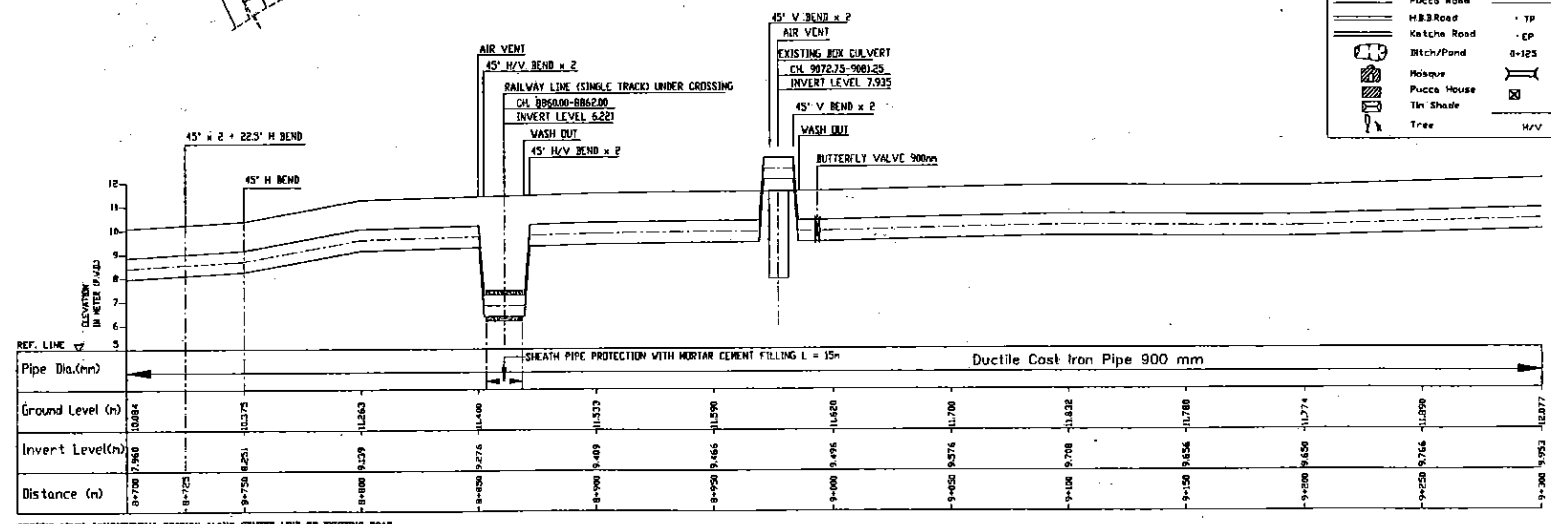
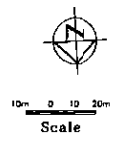
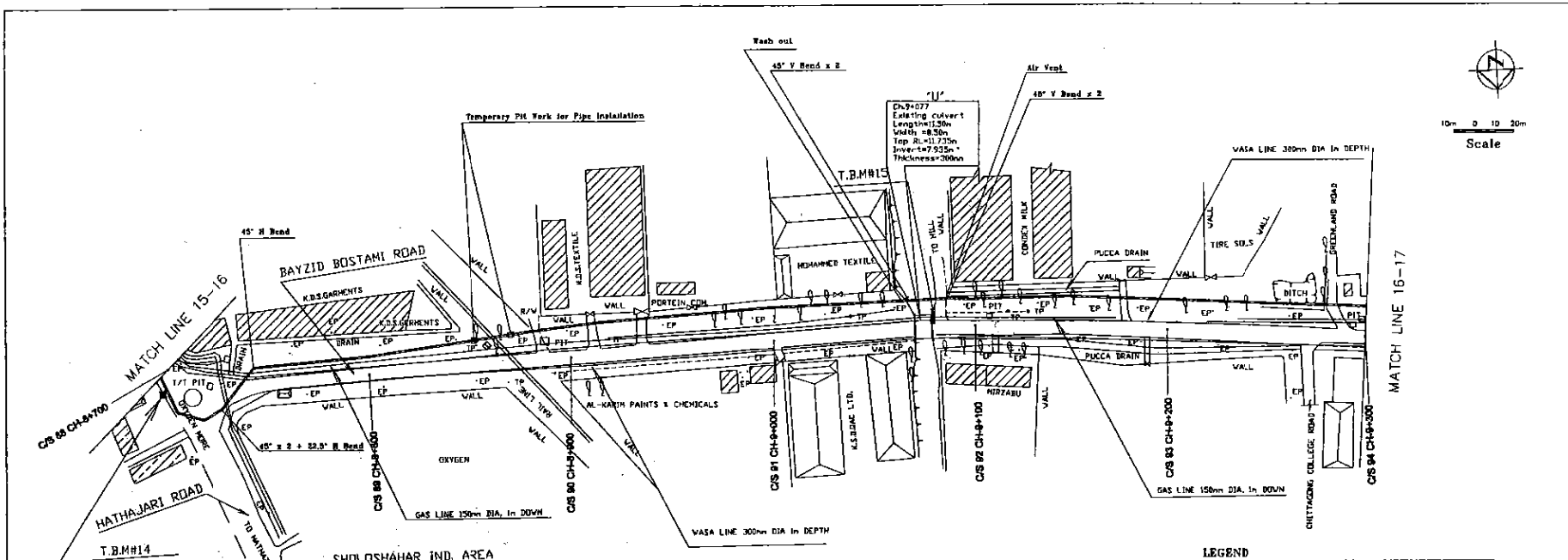
	Pucca Road		VASA line
	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Chainage mark
	Mosque		Bridge/Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		H/V Horizontal/ Vertical



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

SEPT. 2000

8.3-9-16



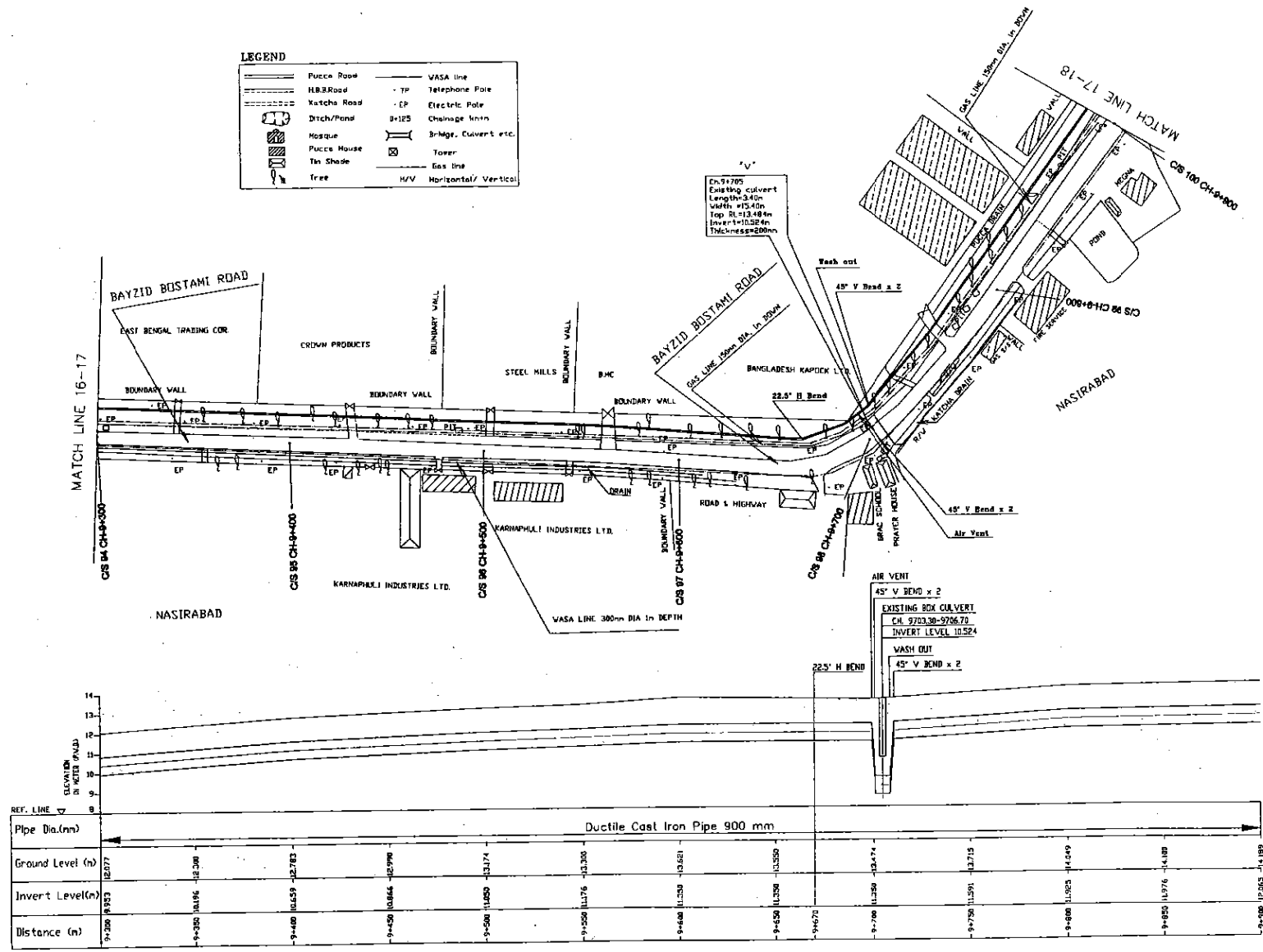
LEGEND

	Pucca Road		VASA line
	H.B.B. Road		Telephone Pole
	Katcha Road		Electric Pole
	Bitch/Pond		Change Junction
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		H/V Horizontal/ Vertical

GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

SEPT. 2000

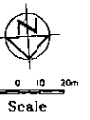
8.3-9-17



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

REF. LINE	ELEVATION IN METERS (A.M.S.L.)
9+300	12.077
9+350	12.300
9+400	12.783
9+450	12.796
9+500	13.174
9+550	13.200
9+600	13.261
9+650	13.350
9+700	13.474
9+750	13.715
9+800	14.049
9+850	14.100
9+900	14.189

Distance (m)	Ground Level (m)	Invert Level (m)	Pipe Dia. (mm)
9+300	12.077	11.953	900
9+350	12.300	12.176	900
9+400	12.783	12.659	900
9+450	12.796	12.672	900
9+500	13.174	13.050	900
9+550	13.200	13.076	900
9+600	13.261	13.137	900
9+650	13.350	13.226	900
9+700	13.474	13.350	900
9+750	13.715	13.591	900
9+800	14.049	13.925	900
9+850	14.100	14.076	900
9+900	14.189	14.165	900

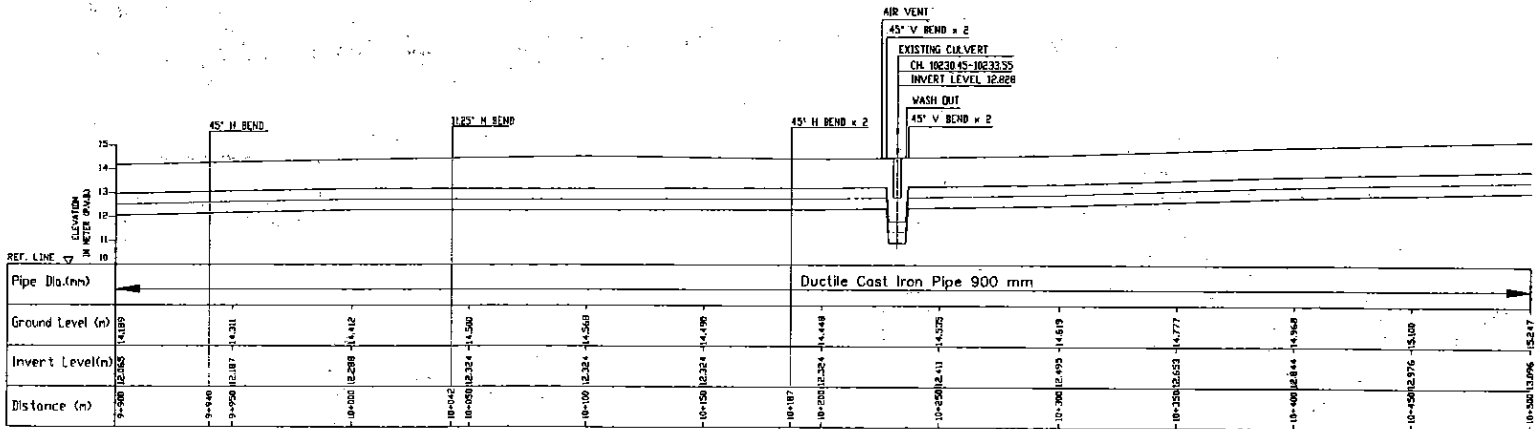
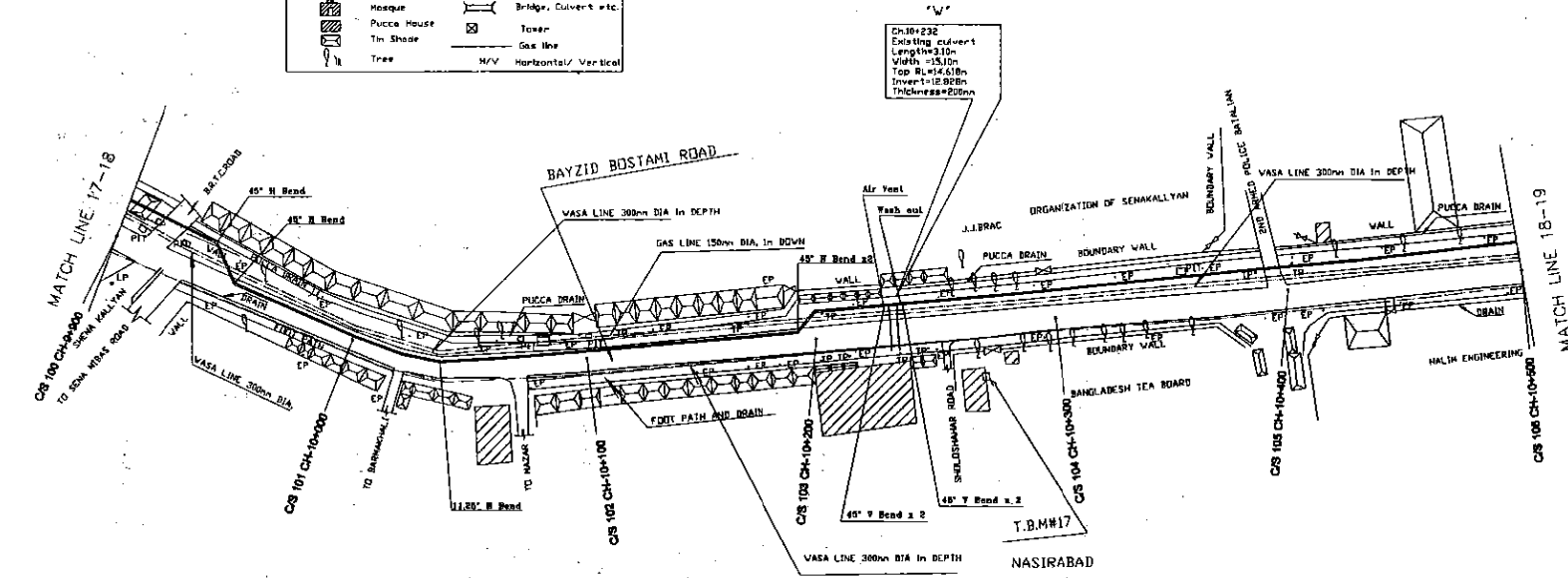
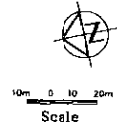


SEPT. 2000

8.3-9-18

LEGEND

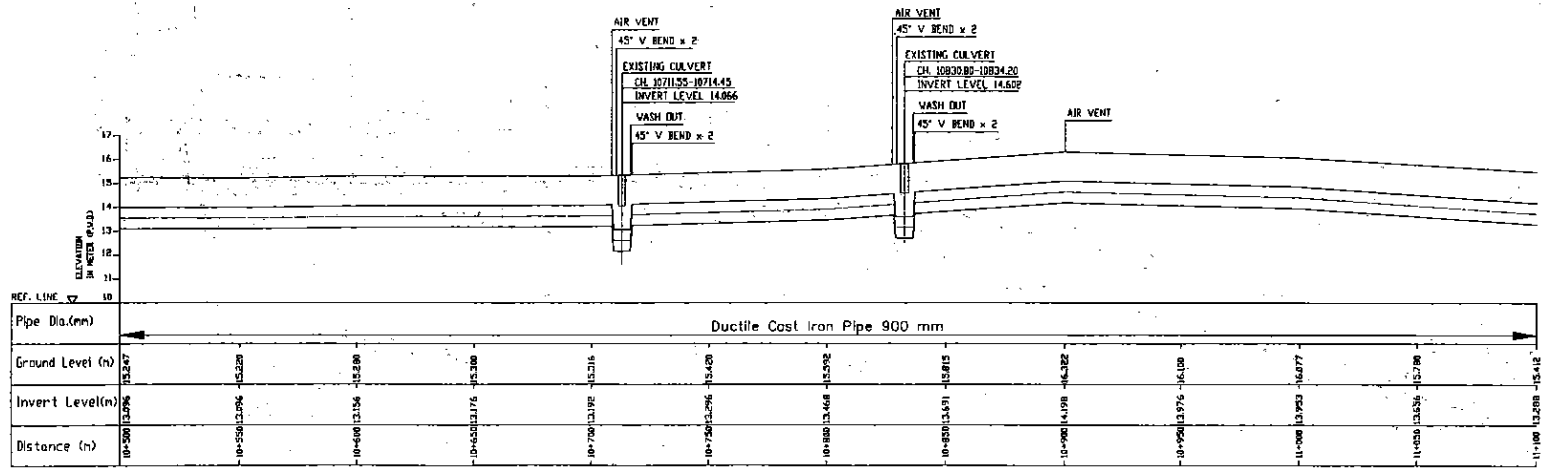
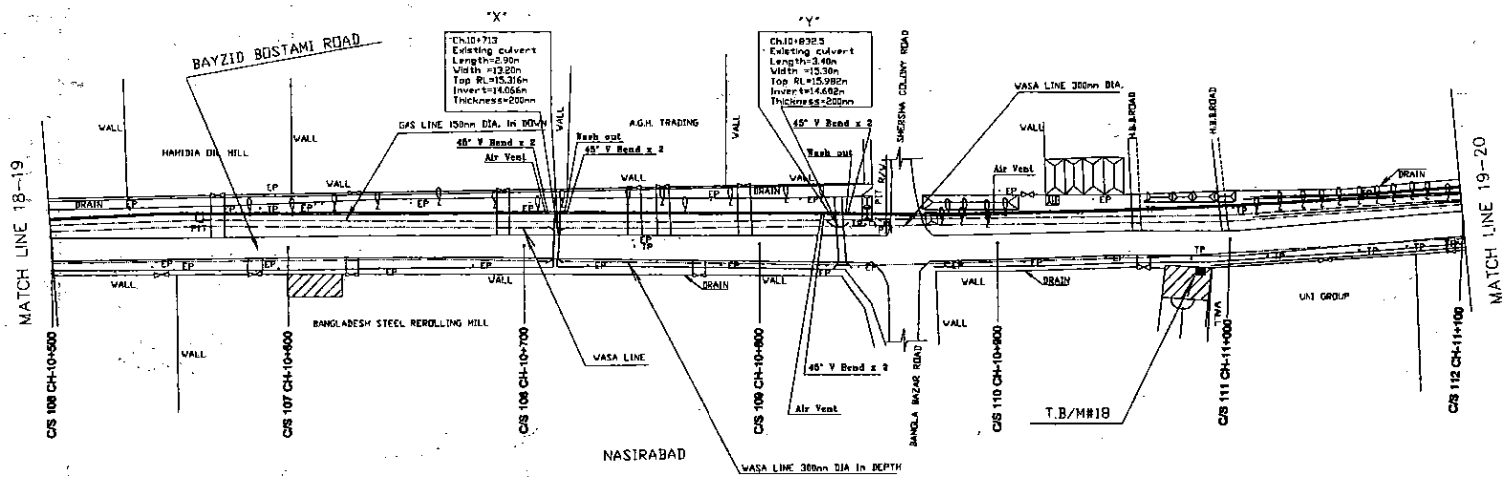
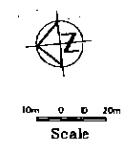
	Pucca Road		VASA line
	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Choke
	House		Bridge, Culvert, etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		M/V Horizontal/ Vertical



8.3.6.16

LEGEND

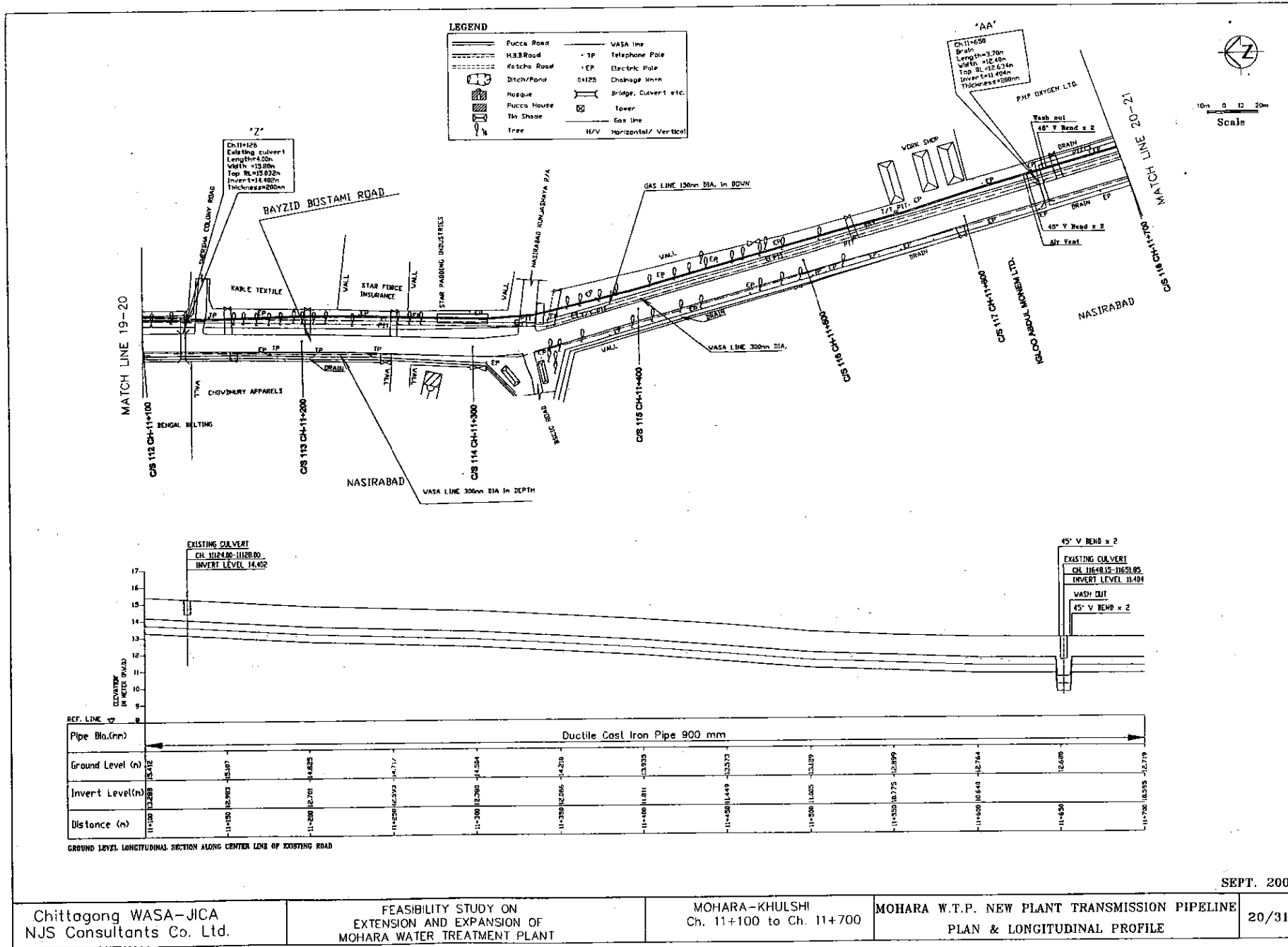
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	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Chalange line
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	In Shade		Gas line
	Tree		H/V Horizontal/ Vertical



CROSSING LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

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8-3-9-20



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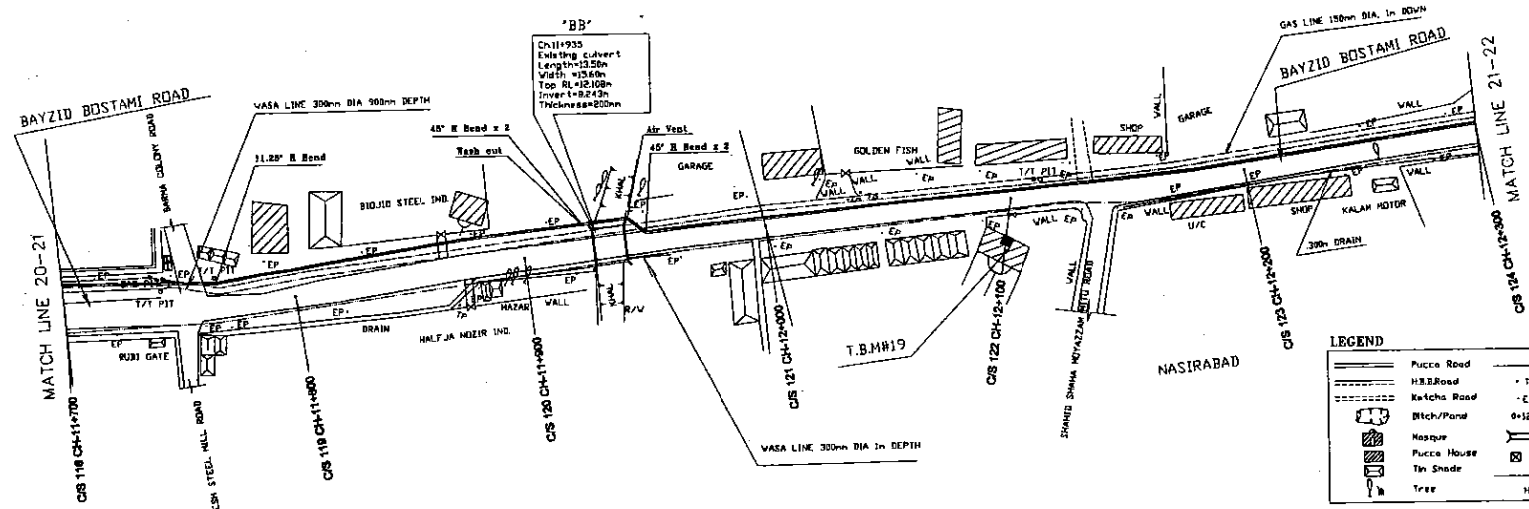
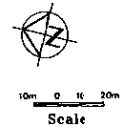
FEASIBILITY STUDY ON
 EXTENSION AND EXPANSION OF
 MOHARA WATER TREATMENT PLANT

MOHARA-KHULSHI
 Ch. 11+100 to Ch. 11+700

MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE
 PLAN & LONGITUDINAL PROFILE

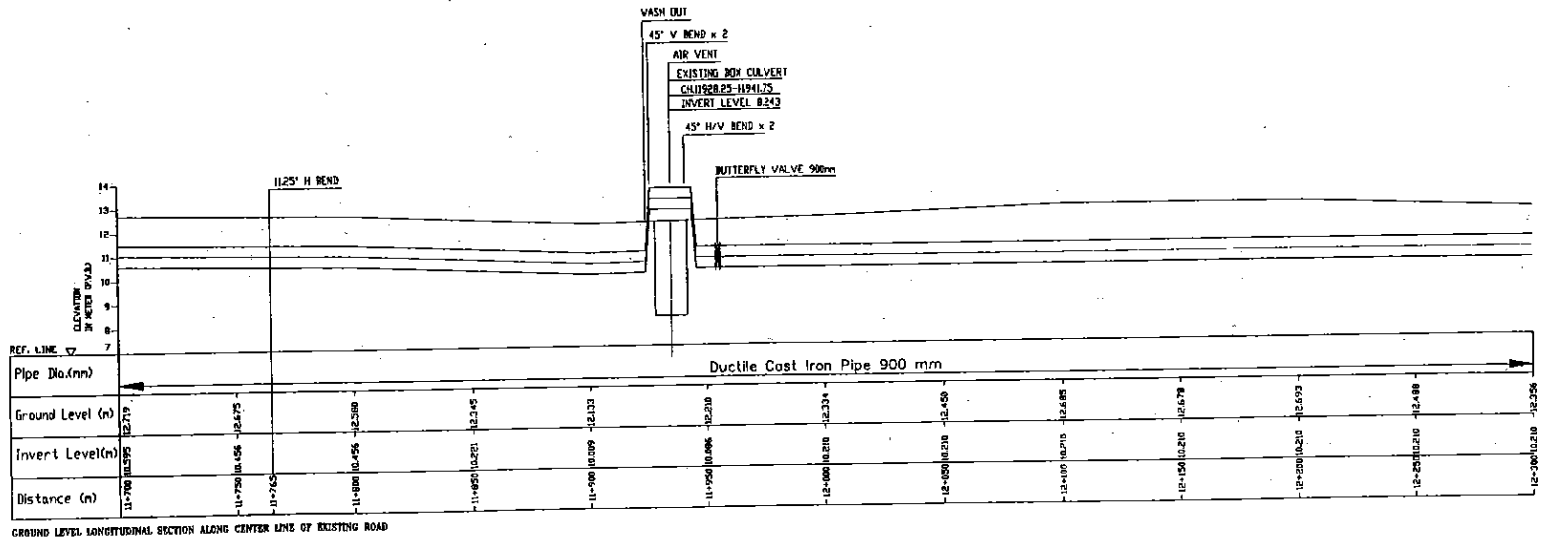
20/31

8.3-9-21



LEGEND

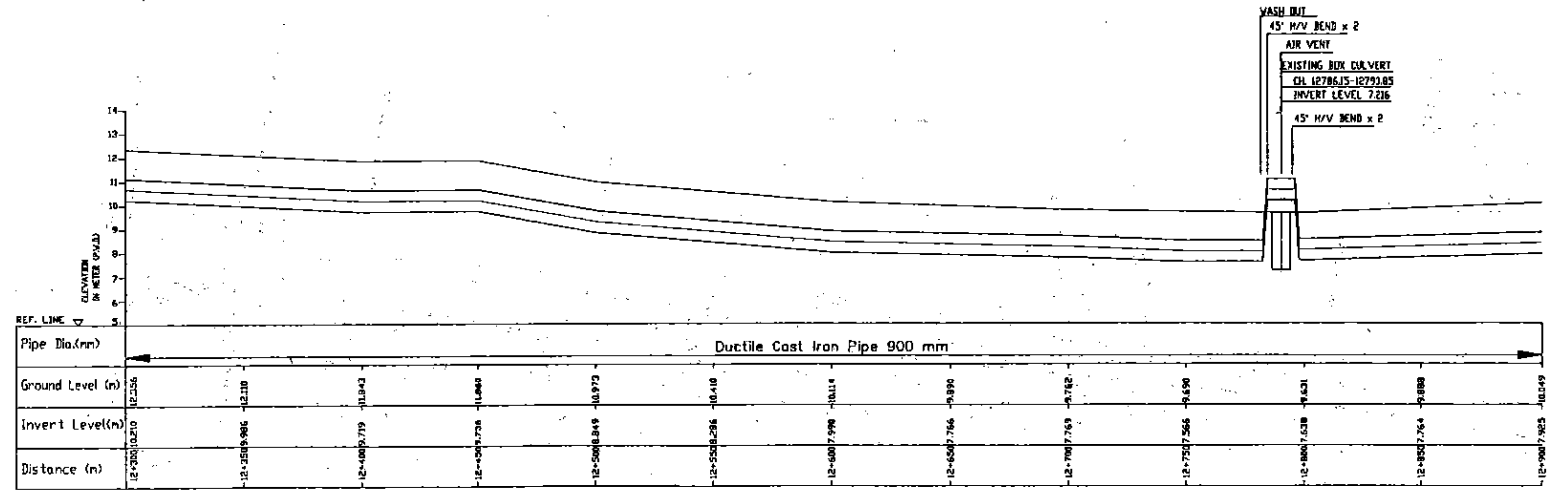
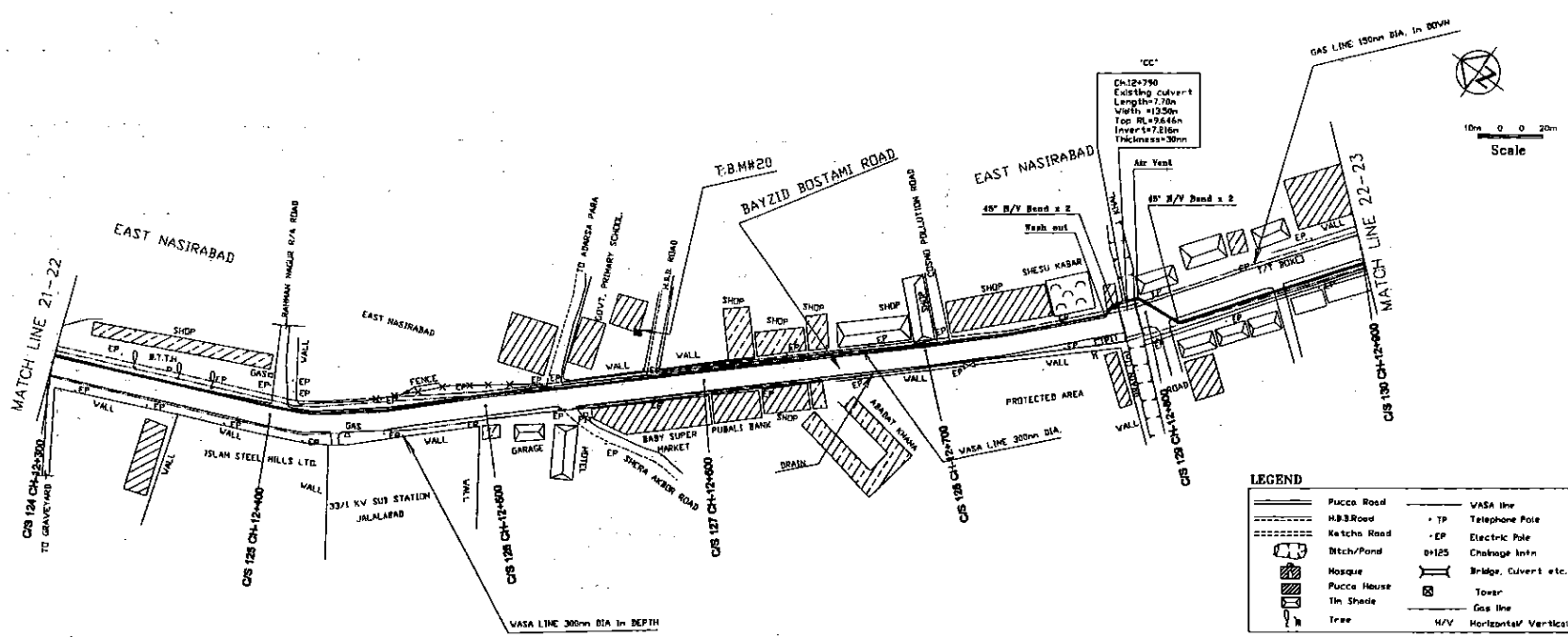
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	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Bridge/Panel		Charge term
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		H/V Horizontal/ Vertical



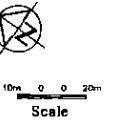
GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

SEPT. 2000

8.3-9-22



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD



LEGEND

	Pucca Road		VASA line
	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Nitch/Pond		Choke Intn
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		Horizontal/ Vertical

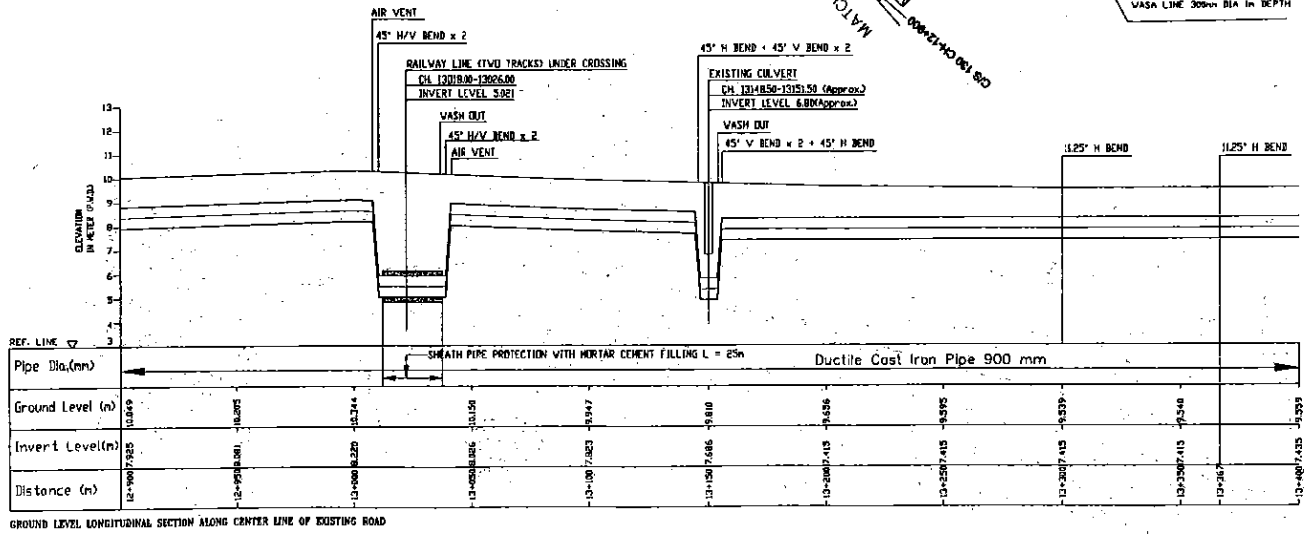
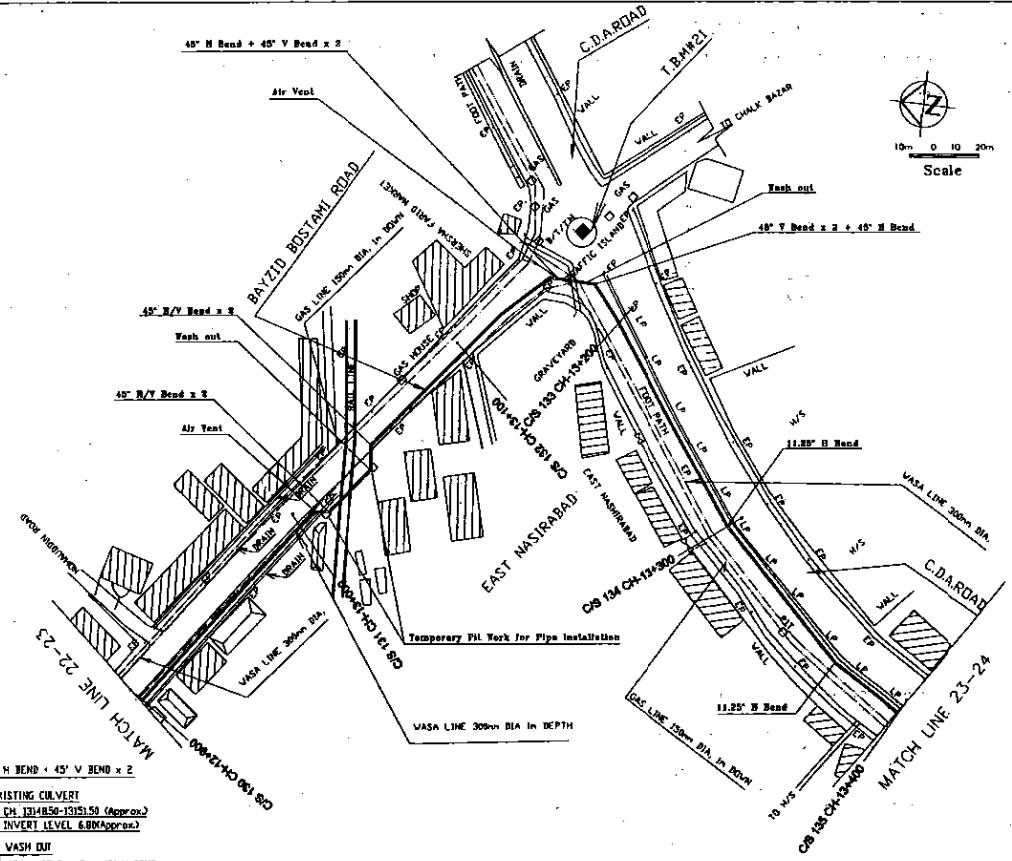
SEPT. 2000

Chittagong WSA-JICA NJS Consultants Co. Ltd.	FEASIBILITY STUDY ON EXTENSION AND EXPANSION OF MOHARA WATER TREATMENT PLANT	MOHARA-KHULSHI Ch. 12+300 to Ch. 12+900	MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE PLAN & LONGITUDINAL PROFILE	22/31
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8.3-9-23

LEGEND

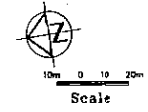
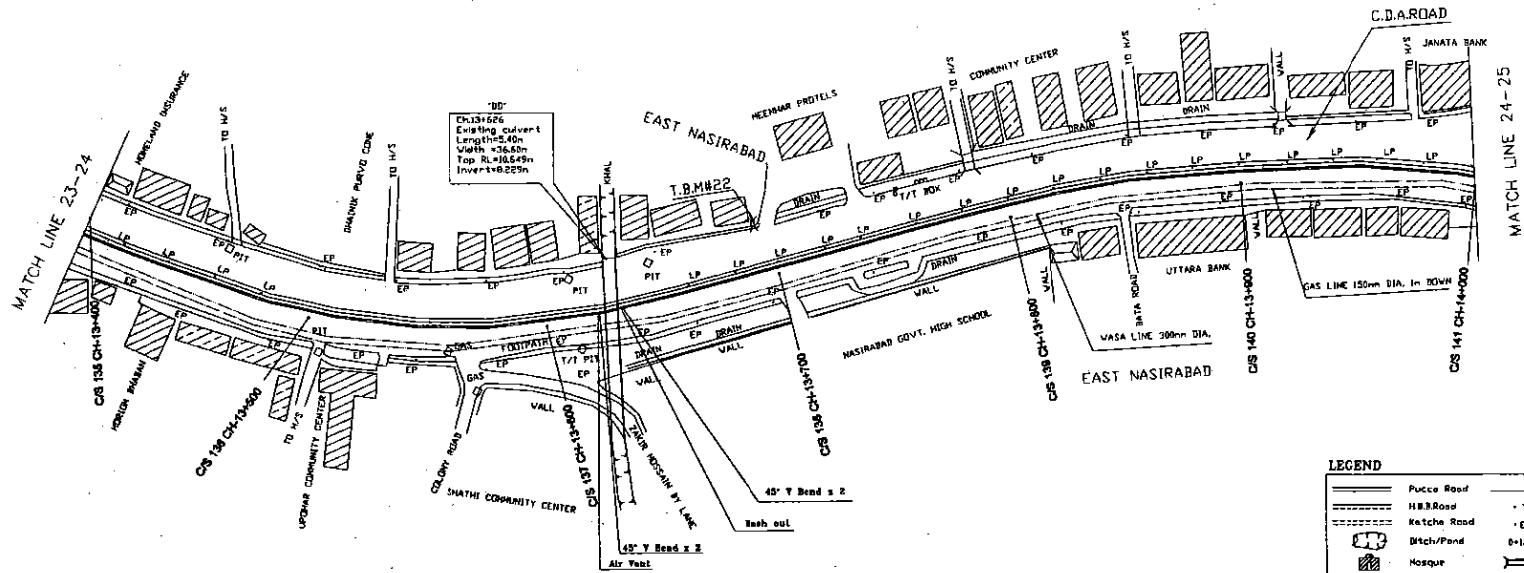
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	H.B.R. Road		TP Telephone Pole
	Katcha Road		EP Electric Pole
	Ditch/Pond		0+125 Chabge Invert
	Mosque		Bridge, Culvert etc.
	Pucca House		Tower
	Tin Shade		Gas line
	Tree		H/V Horizontal/ Vertical



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

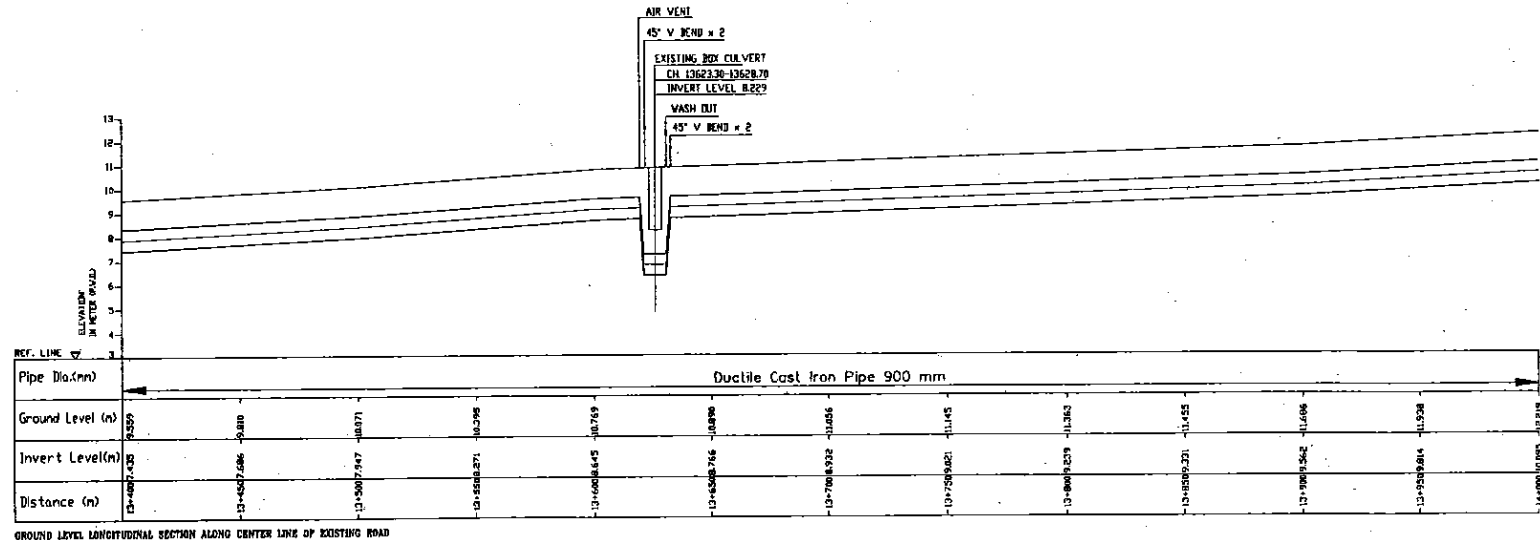
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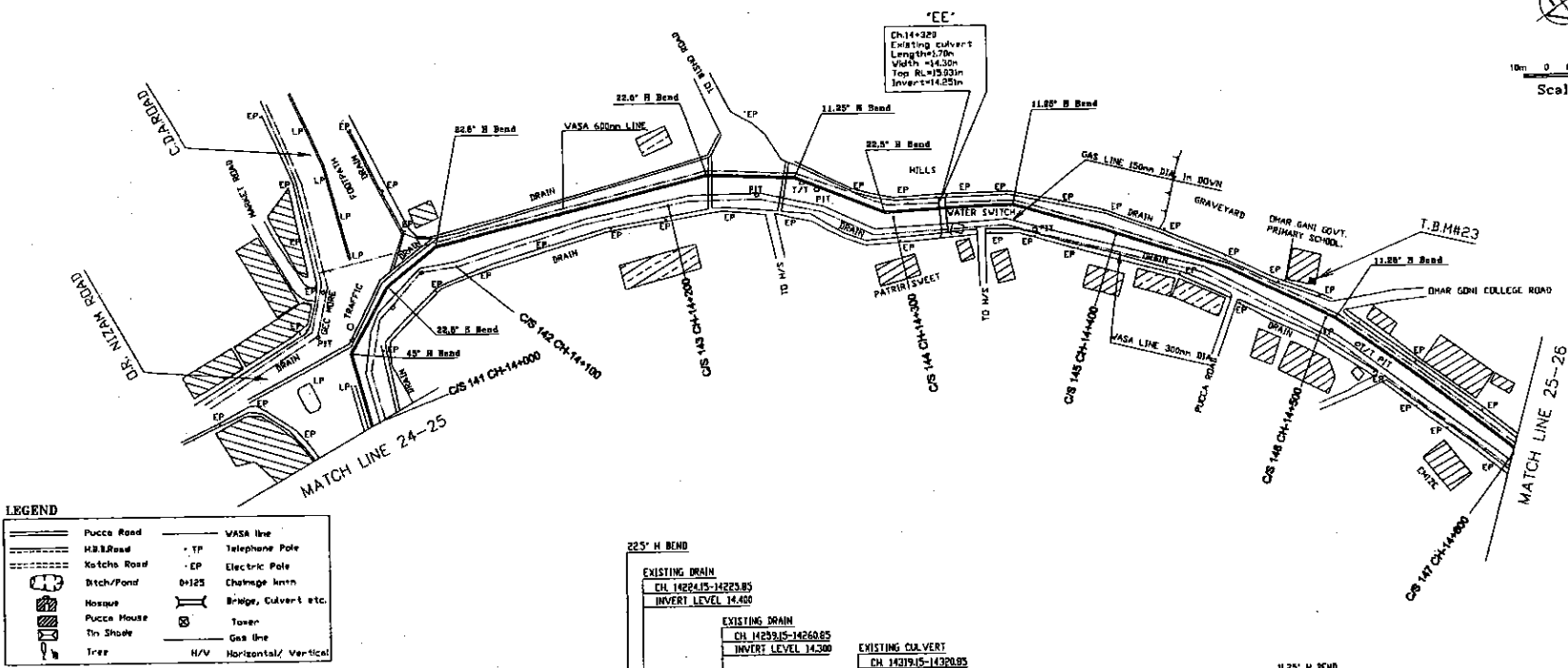
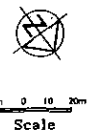
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	Pucca Road		VASA line
	H.B.R. Road		Telephone Pole
	Katcha Road		Electric Pole
	Ditch/Pond		Drainage Inlet
	Mosque		Bridge, Culvert etc.
	Pucca House		Taper
	Tin Shade		Gas Line
	Tree		Horizontal/ Vertical



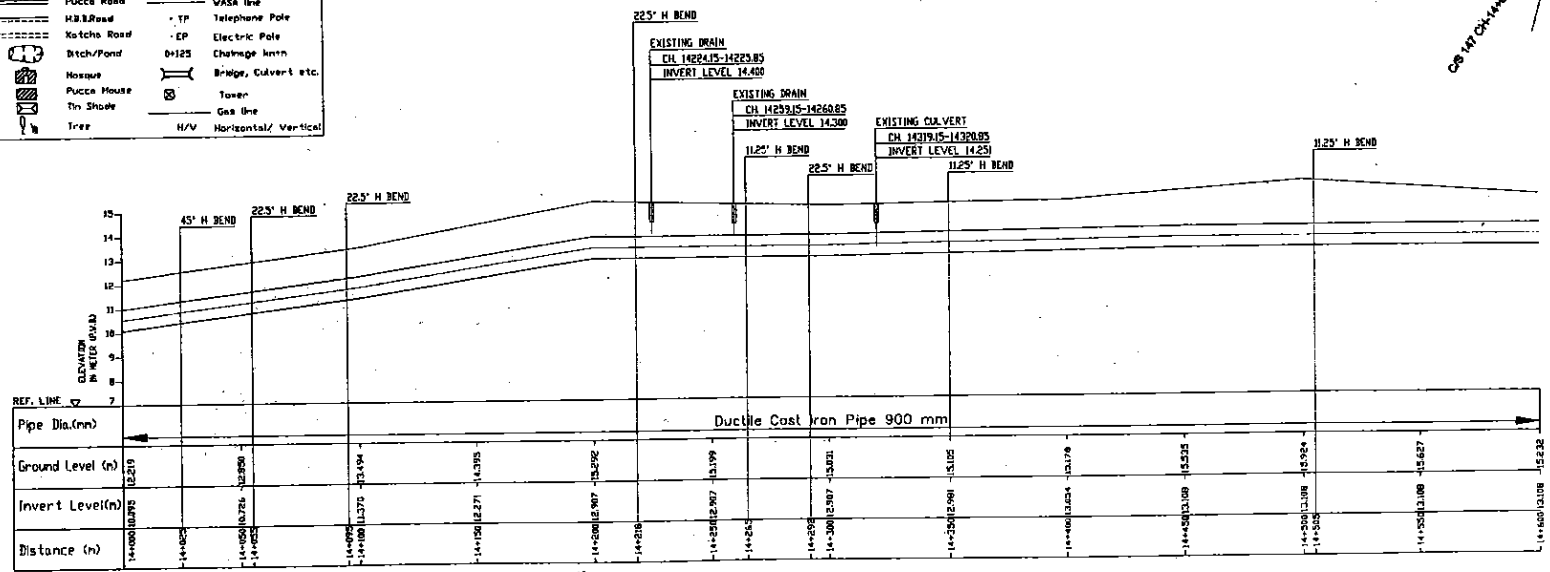
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8-3-9-25



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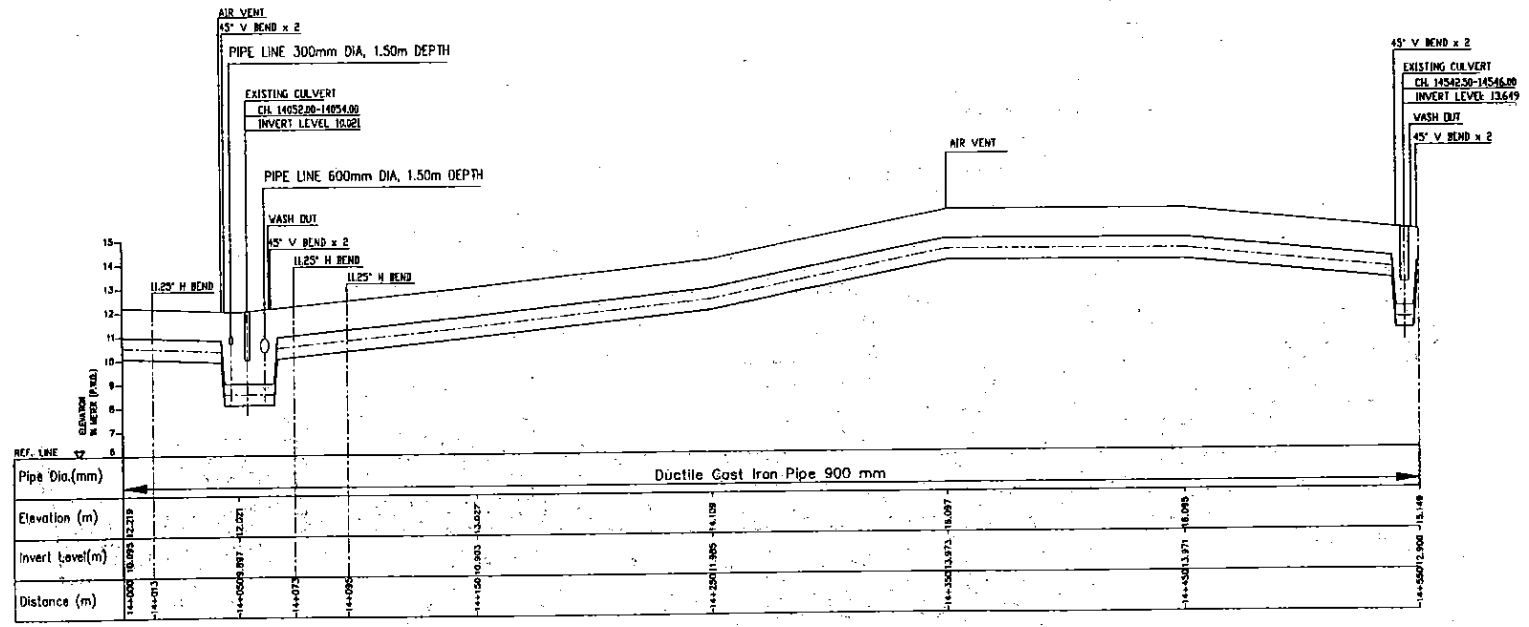
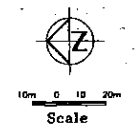
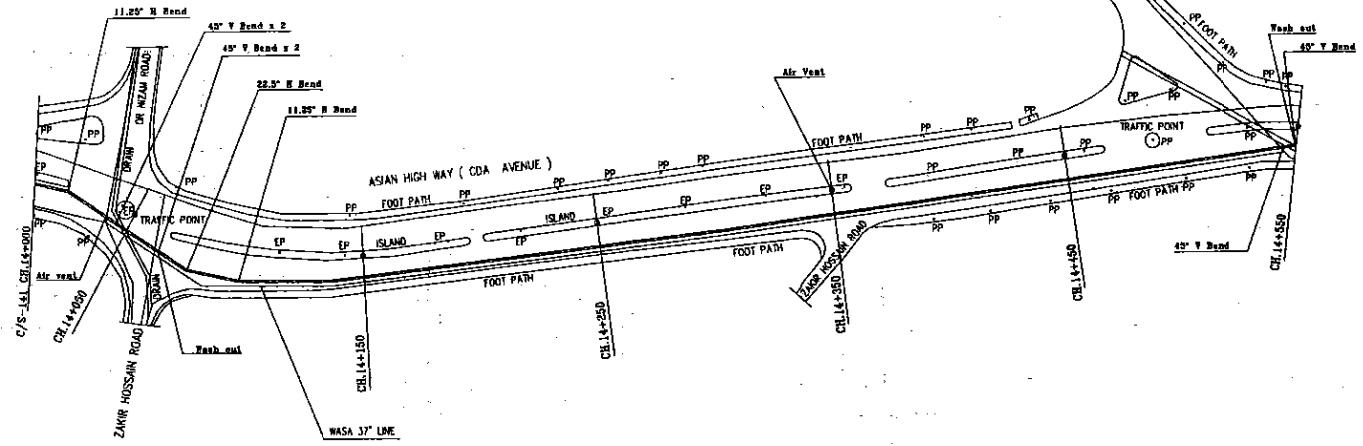
	Pucca Road		VASA line
	H.B. Road		TP Telephone Pole
	Katcha Road		EP Electric Pole
	Ditch/Pond		D+125 Charge Meter
	House		Bridge, Culvert etc.
	Pucca House		Towers
	Tree Shade		Gas line
	Tree		H/V Horizontal/ Vertical



GROUND LEVEL LONGITUDINAL SECTION ALONG CENTER LINE OF EXISTING ROAD

SEPT. 2000

8:3-9-27



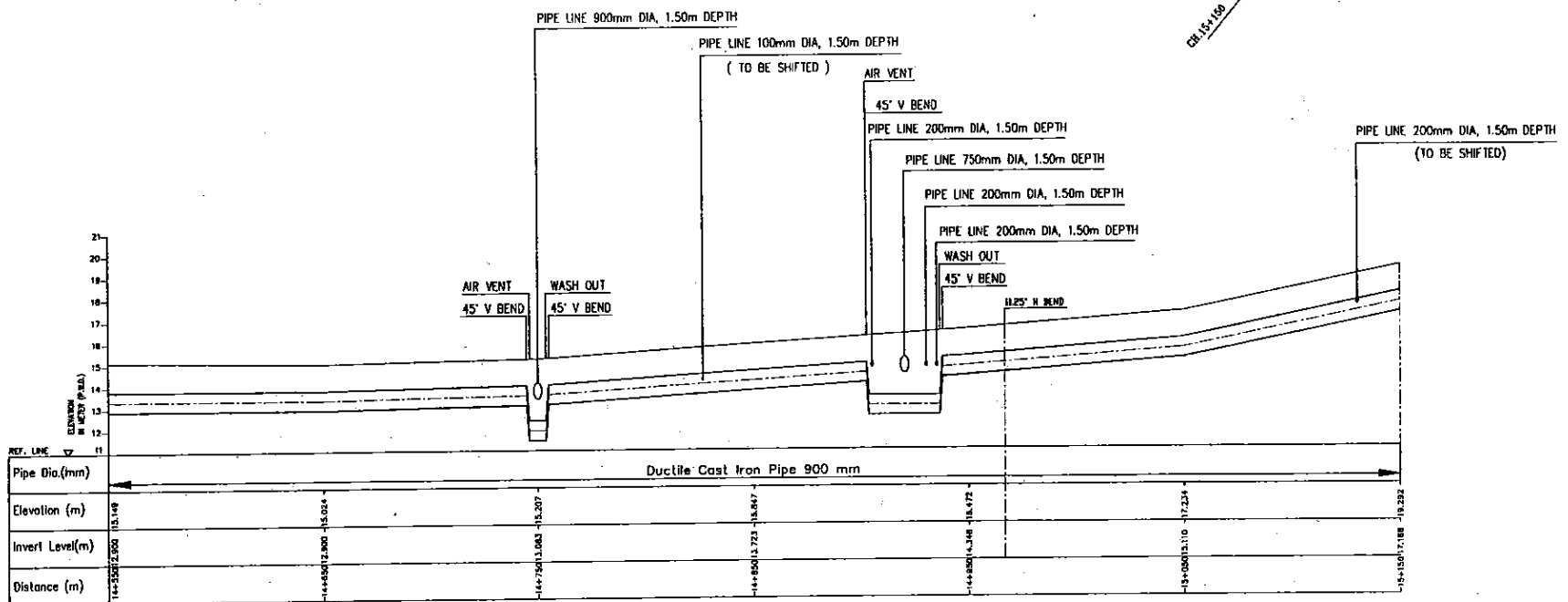
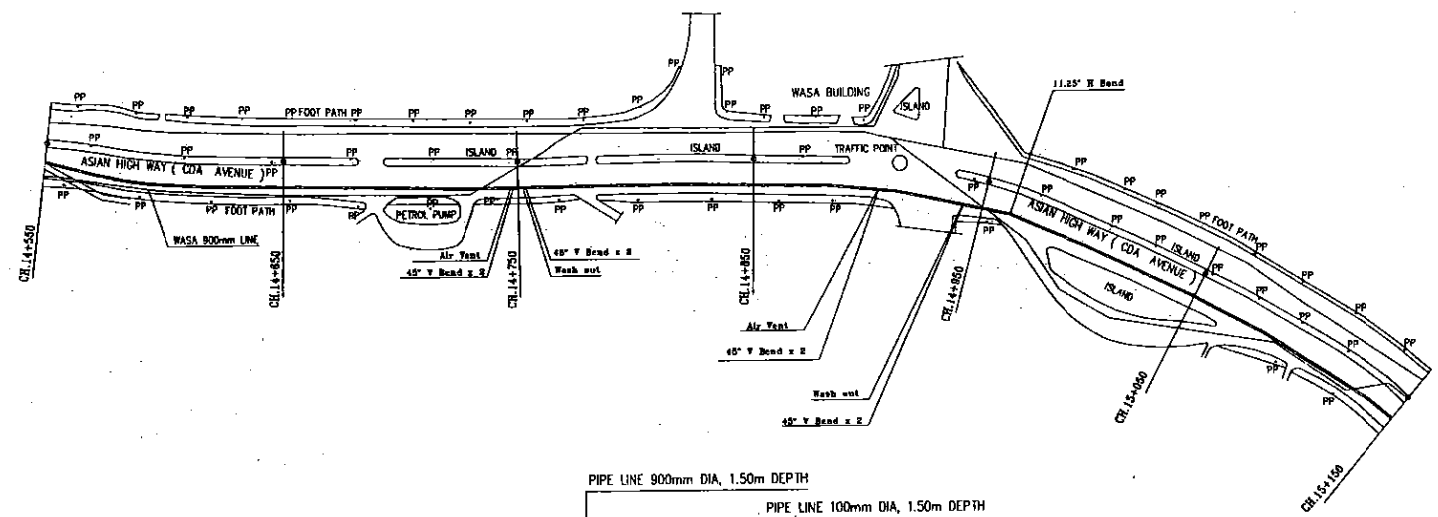
PLAN AND LONGITUDINAL SECTION ARE REFERRED TO DRAWINGS OF SECOND CHITTAGONG WATER SUPPLY PROJECT (JULY, 1988)

SEPT. 2000

Chittagong WASA-JICA NJS Consultants Co. Ltd.	FEASIBILITY STUDY ON EXTENSION AND EXPANSION OF MOHARA WATER TREATMENT PLANT	REFERENCE GEC-BATTALI HILL Ch. 14+000 to Ch. 14+550	MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE PLAN & LONGITUDINAL PROFILE (ALT. FOR BATTALI)	27/31
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SCALE : - 1 : 3000
 10m 0 10 20m
 Scale



PLAN AND LONGITUDINAL SECTION ARE REFERRED TO DRAWINGS OF SECOND CHITTAGONG WATER SUPPLY PROJECT (JULY, 1988)

8.3-9-28

SEPT. 2000

Chittagong WASA-JICA
 NJS Consultants Co. Ltd.

FEASIBILITY STUDY ON
 EXTENSION AND EXPANSION OF
 MOHARA WATER TREATMENT PLANT

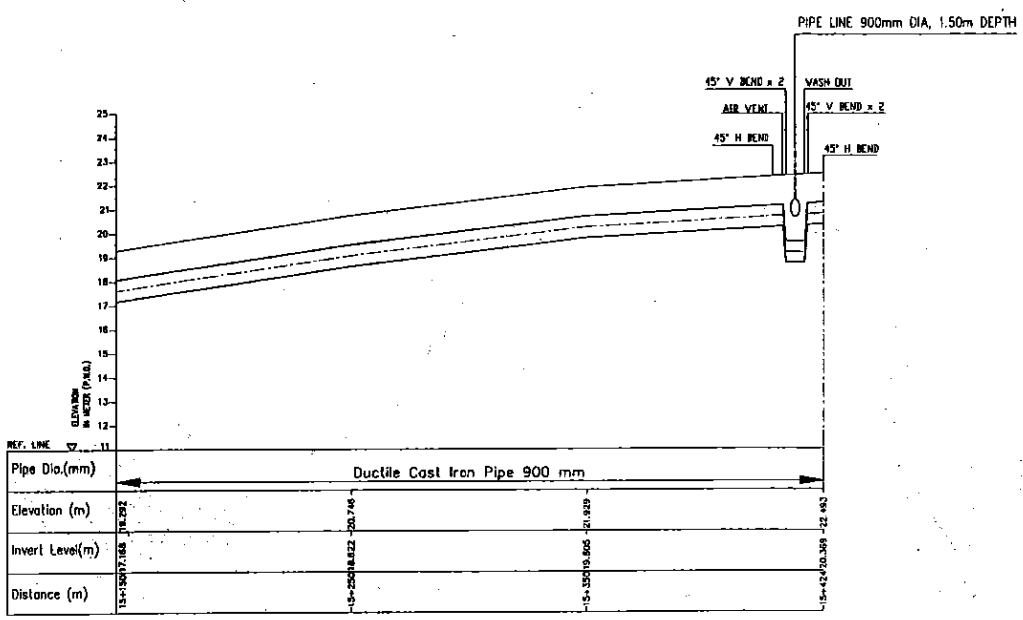
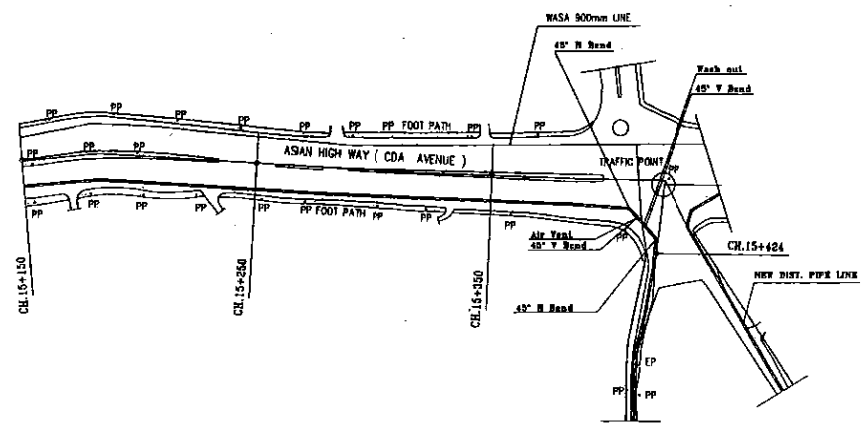
REFERENCE
 GEC-BATTALI HILL
 Ch. 14+550 to Ch. 15+150

MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE
 PLAN & LONGITUDINAL PROFILE (ALT. FOR BATTALI)

28/31



10m 0 10 20m
Scale



PLAN AND LONGITUDINAL SECTION ARE REFERRED TO DRAWINGS OF SECOND CHITTAGONG WATER SUPPLY PROJECT (JULY, 1988)

SEPT. 2000

Chittagong WASA-JICA
NJS Consultants Co. Ltd.

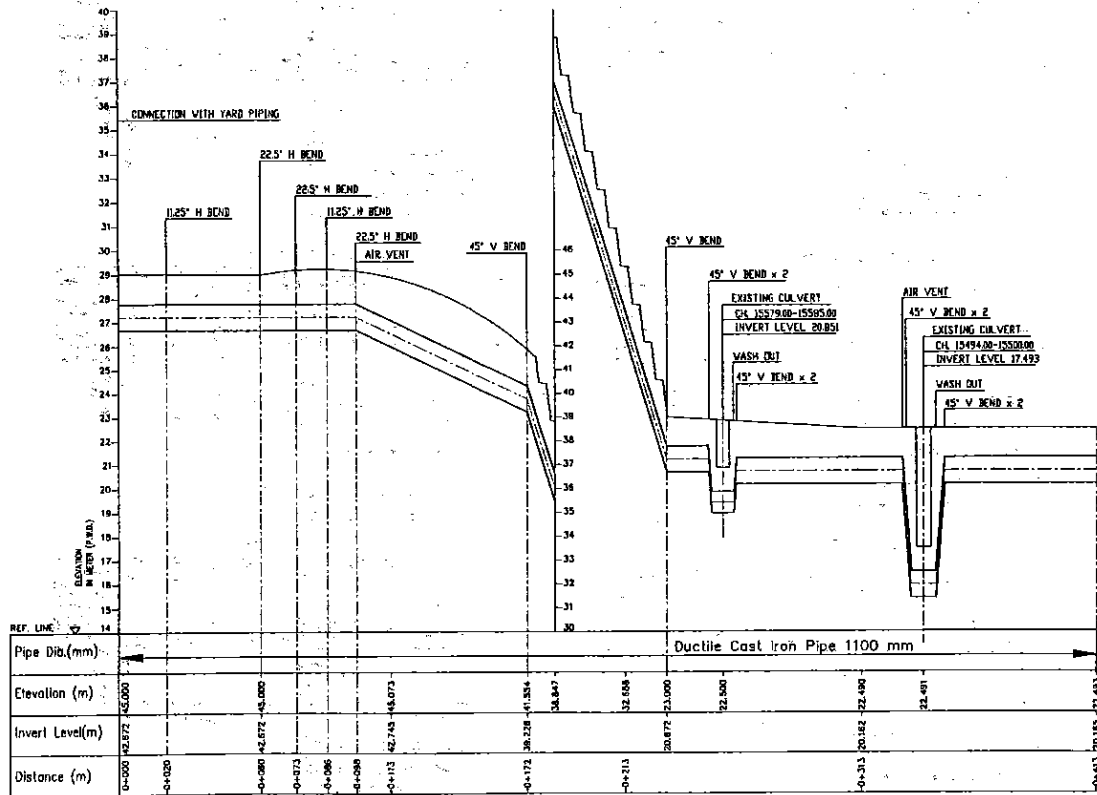
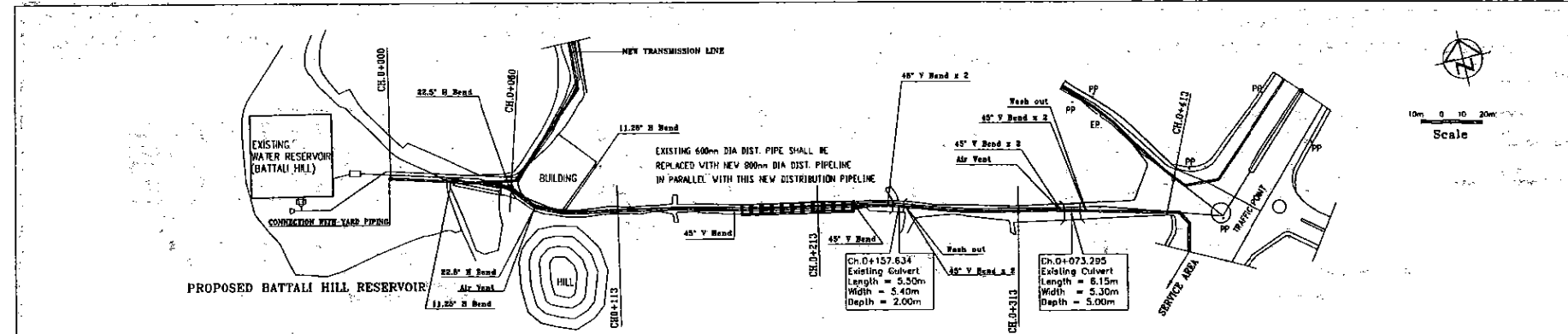
FEASIBILITY STUDY ON
EXTENSION AND EXPANSION OF
MOHARA WATER TREATMENT PLANT

REFERENCE
GEC-BATTALI HILL
Ch. 15+150 to Ch. 15+424

MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE
PLAN & LONGITUDINAL PROFILE (ALT. FOR BATTALI)

29/31

8.3-9-29



LONGITUDINAL SECTION IS ASSUMPTION BASED OF FIELD OBSERVATION PLAN IS REFERRED TO CEASA TOPO. SURVEY DRAWING

8.3-9-31

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Chittagong WSA-JICA
NJS Consultants Co. Ltd.

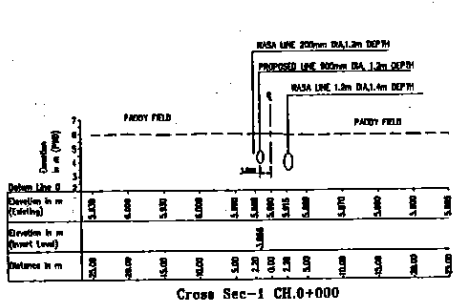
FEASIBILITY STUDY ON
EXTENSION AND EXPANSION OF
MOHARA WATER TREATMENT PLANT

REFERENCE
NEW DISTRIBUTION PIPELINE
BATTALI HILL-ISPAHANI

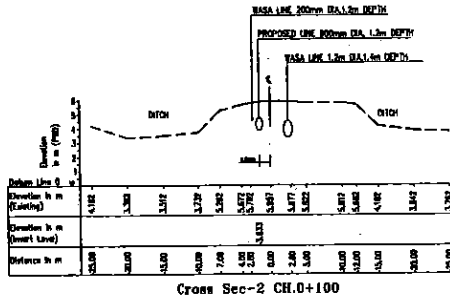
MOHARA W.T.P. NEW PLANT TRANSMISSION PIPELINE
PLAN & LONGITUDINAL PROFILE (ALT. FOR BATTALI)

31/31

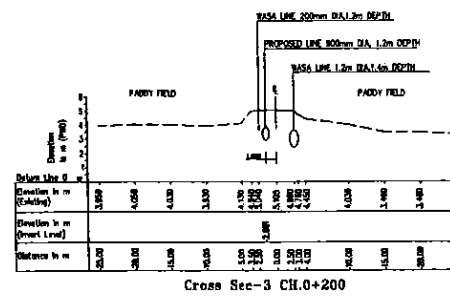
Figure 8.3-9-2 Proposed Transmission Pipeline Cross Section



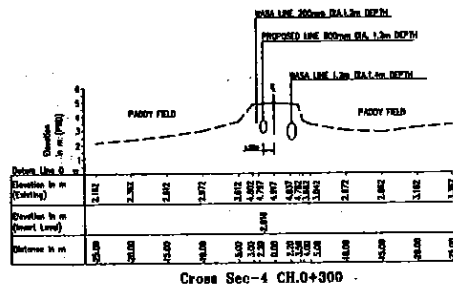
Cross Sec-1 CH.0+000



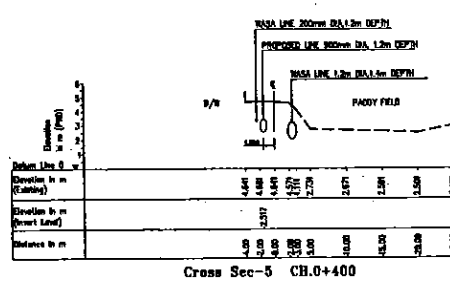
Cross Sec-2 CH.0+100



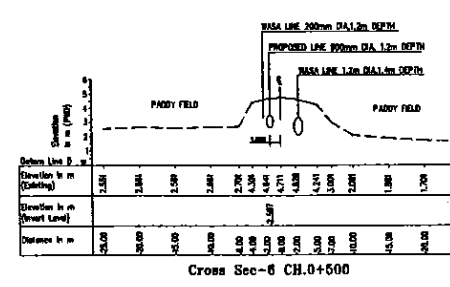
Cross Sec-3 CH.0+200



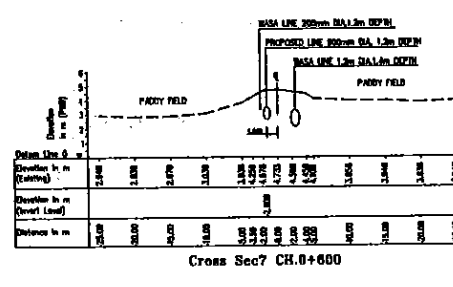
Cross Sec-4 CH.0+300



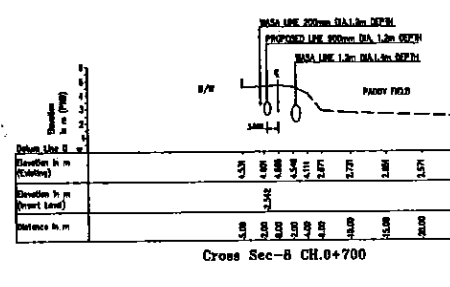
Cross Sec-5 CH.0+400



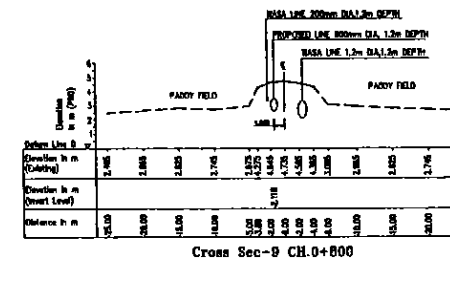
Cross Sec-6 CH.0+500



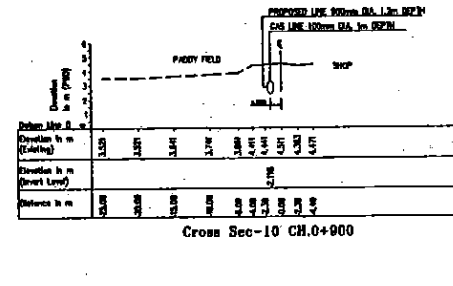
Cross Sec-7 CH.0+600



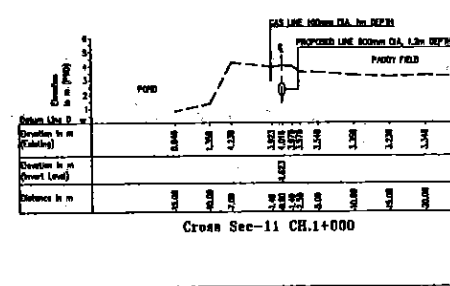
Cross Sec-8 CH.0+700



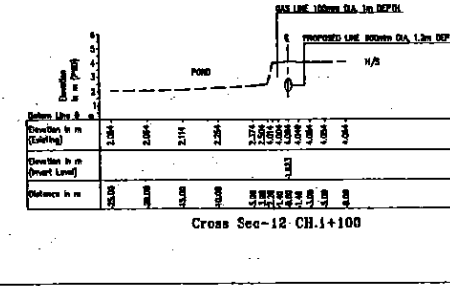
Cross Sec-9 CH.0+800



Cross Sec-10 CH.0+900



Cross Sec-11 CH.1+000



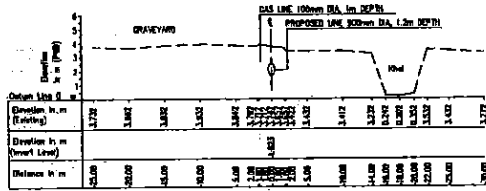
Cross Sec-12 CH.1+100



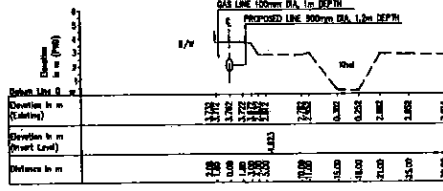
8.3-9-32

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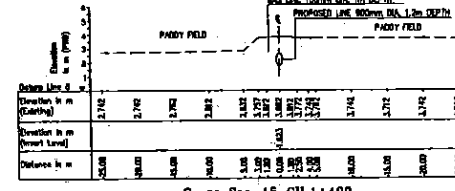
8.3-9-33



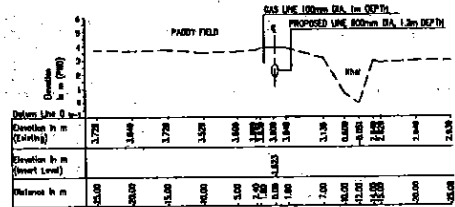
Cross Sec-13 CH.1+300



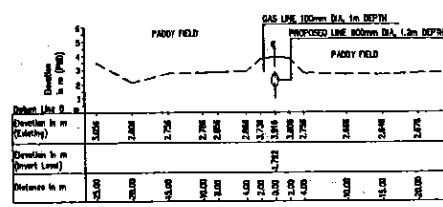
Cross Sec-14 CH.1+300



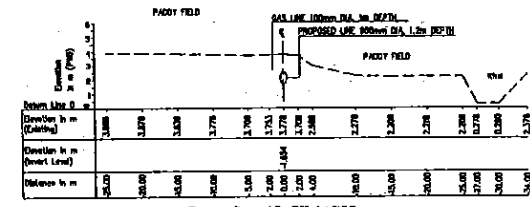
Cross Sec-15 CH.1+400



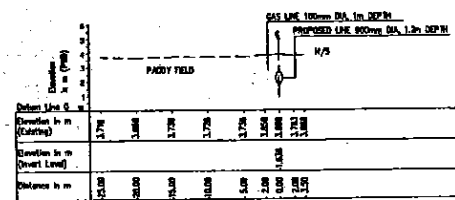
Cross Sec-16 CH.1+500



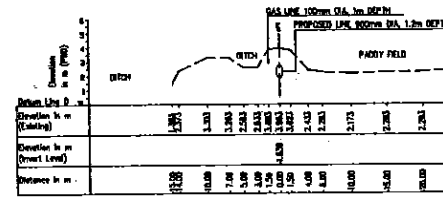
Cross Sec-17 CH.1+600



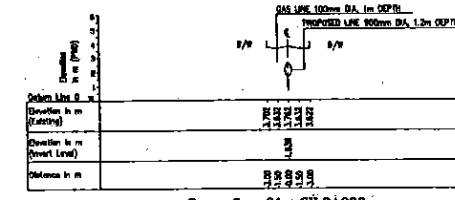
Cross Sec-18 CH.1+700



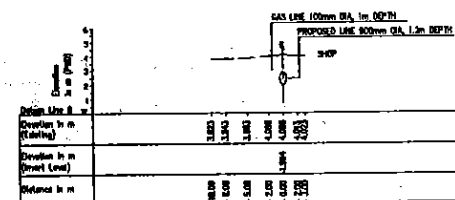
Cross Sec-19 CH.1+800



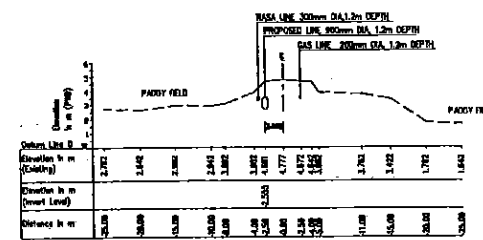
Cross Sec-20 CH.1+800



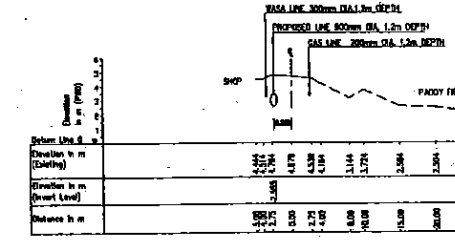
Cross Sec-21 CH.2+000



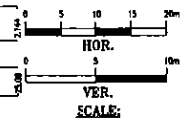
Cross Sec-22 CH.2+100



Cross Sec-23 CH.2+200

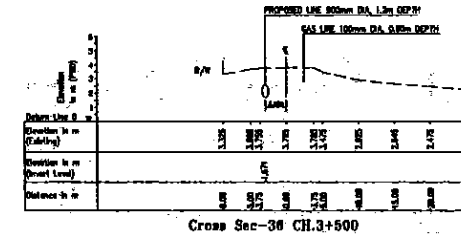
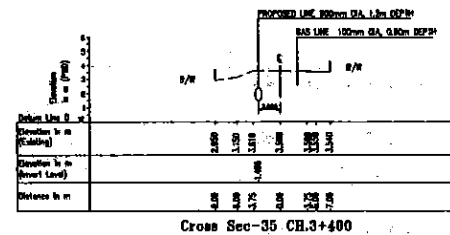
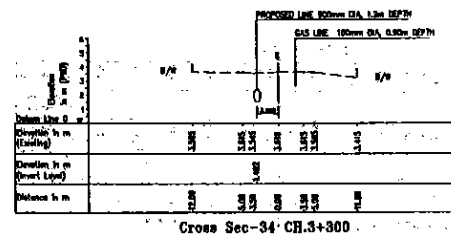
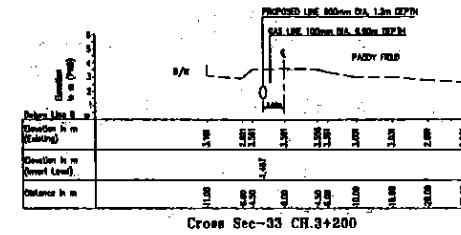
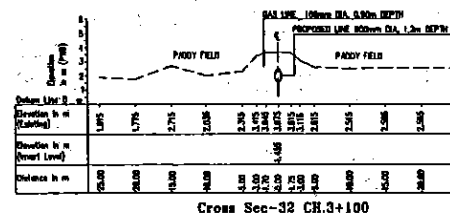
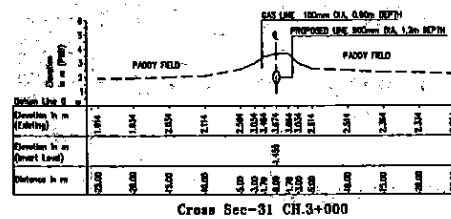
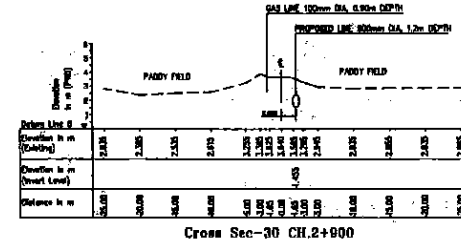
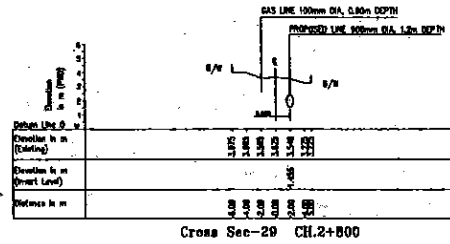
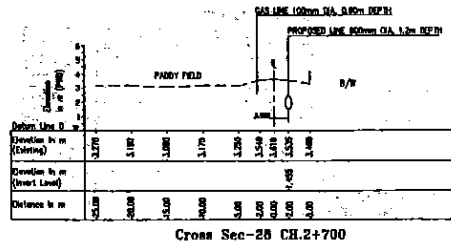
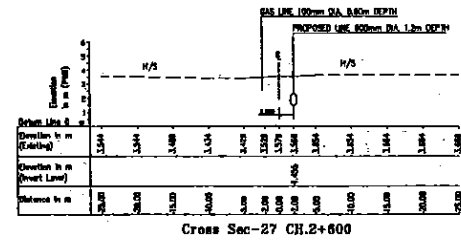
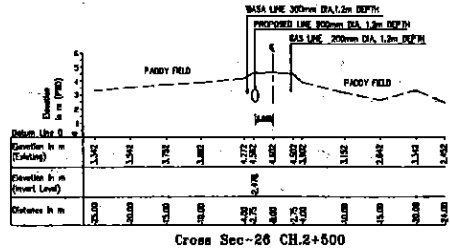
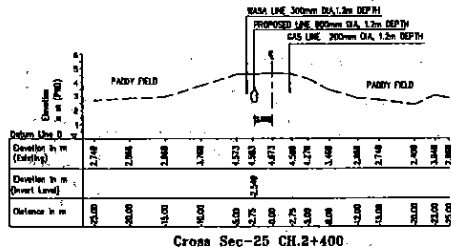


Cross Sec-24 CH.2+300



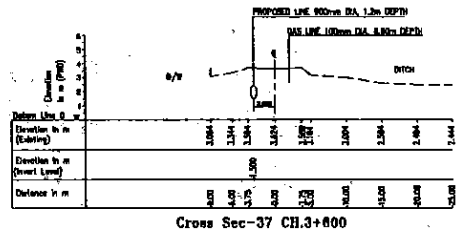
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8.3-9-34

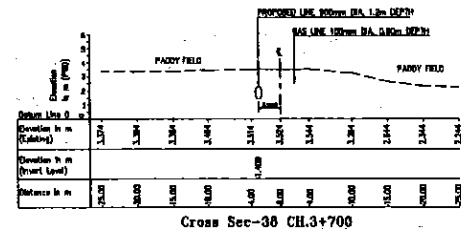


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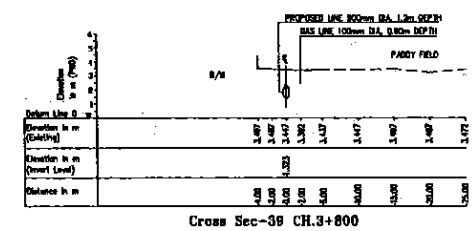
8.3-9-35



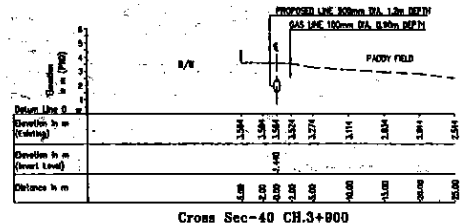
Cross Sec-37 CH.3+800



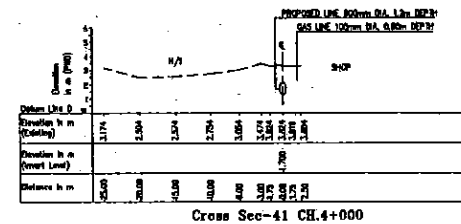
Cross Sec-38 CH.3+700



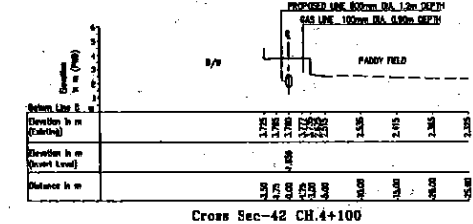
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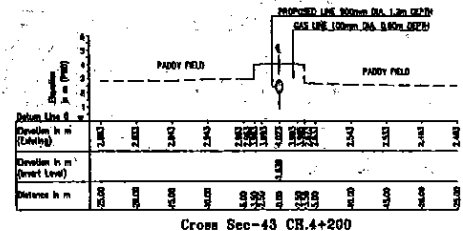
Cross Sec-40 CH.3+800



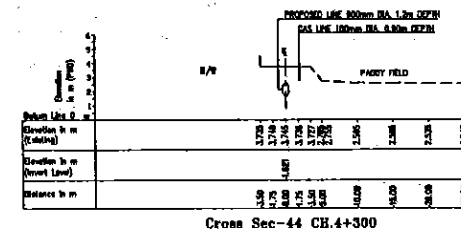
Cross Sec-41 CH.4+000



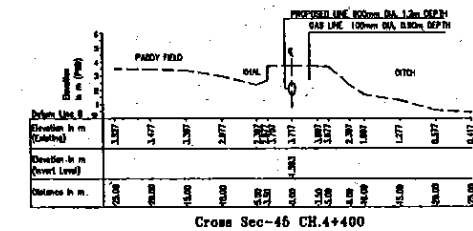
Cross Sec-42 CH.4+100



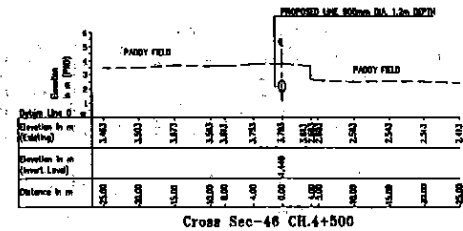
Cross Sec-43 CH.4+200



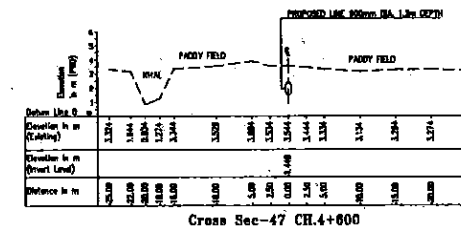
Cross Sec-44 CH.4+300



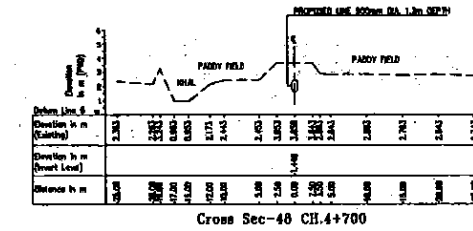
Cross Sec-45 CH.4+400



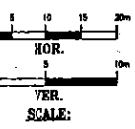
Cross Sec-46 CH.4+500



Cross Sec-47 CH.4+800

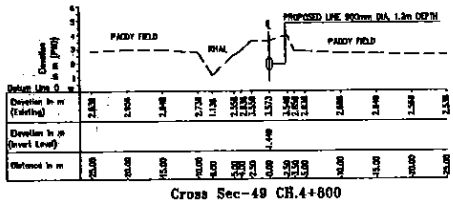


Cross Sec-48 CH.4+700

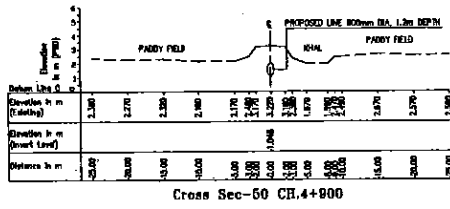


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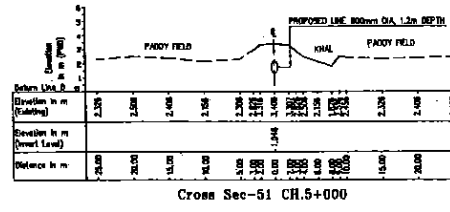
8.3-9-36



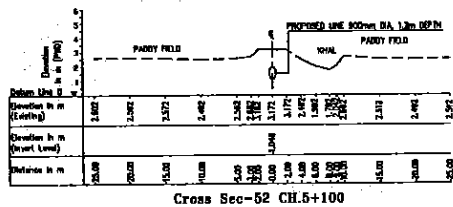
Cross Sec-49 CH.4+800



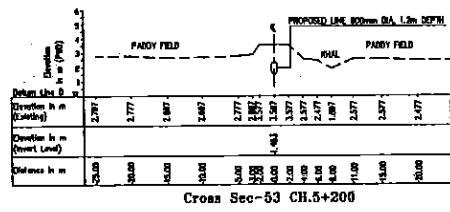
Cross Sec-50 CH.4+900



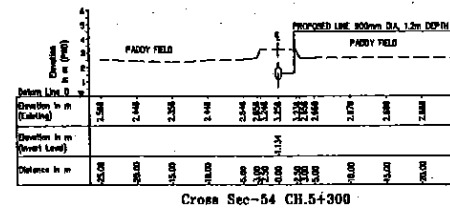
Cross Sec-51 CH.5+000



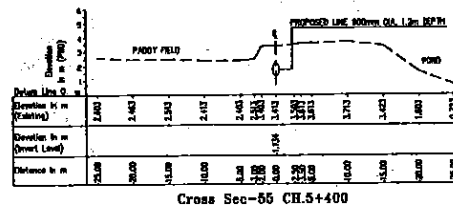
Cross Sec-52 CH.5+100



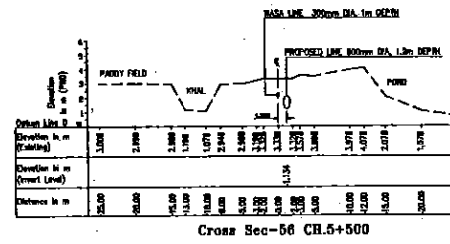
Cross Sec-53 CH.5+200



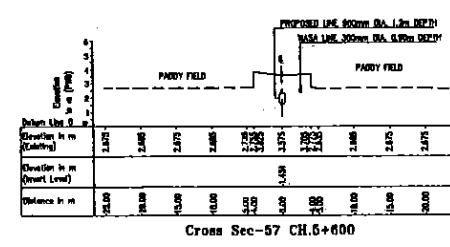
Cross Sec-54 CH.5+300



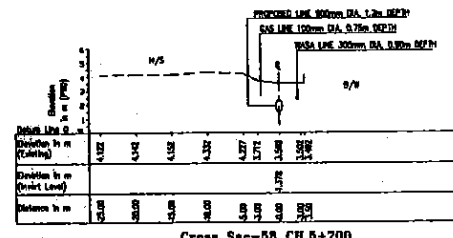
Cross Sec-55 CH.5+400



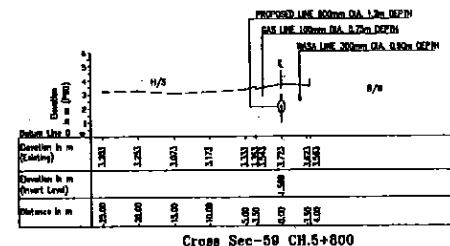
Cross Sec-56 CH.5+500



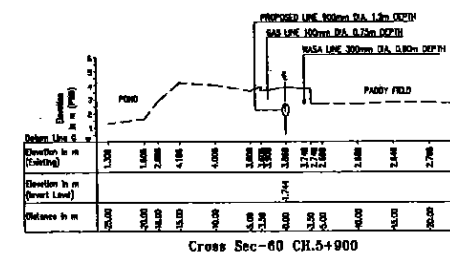
Cross Sec-57 CH.5+600



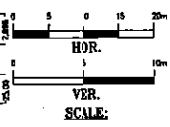
Cross Sec-58 CH.5+700



Cross Sec-59 CH.5+800

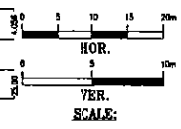
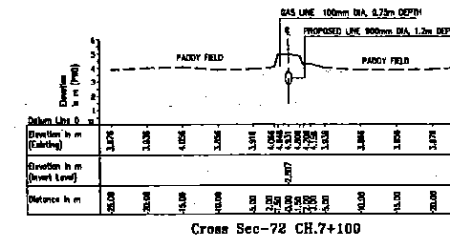
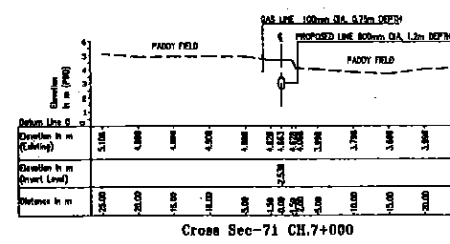
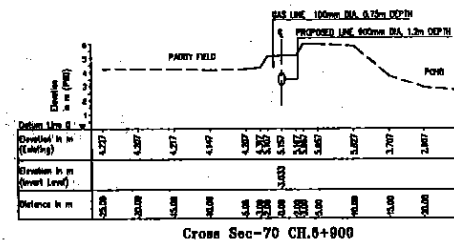
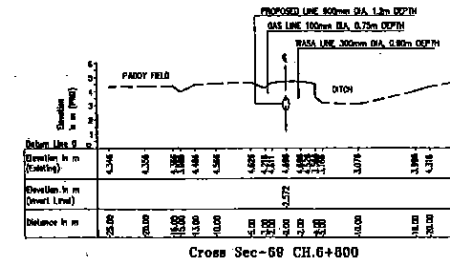
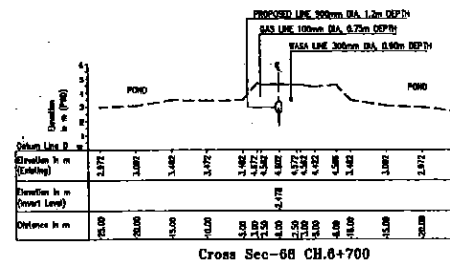
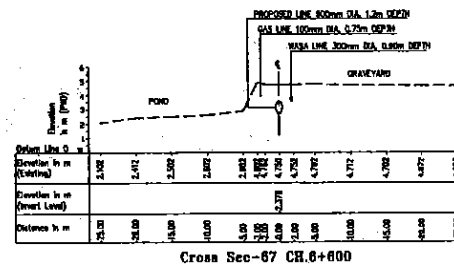
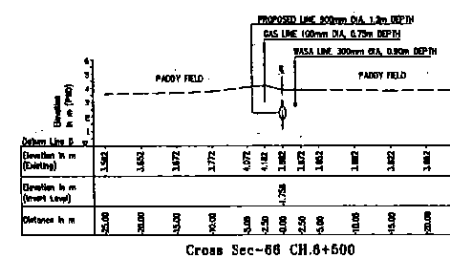
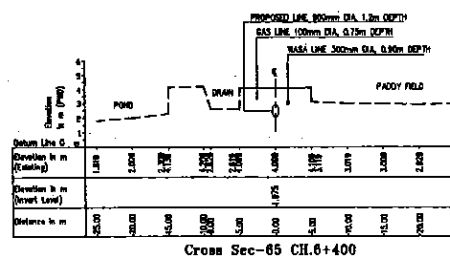
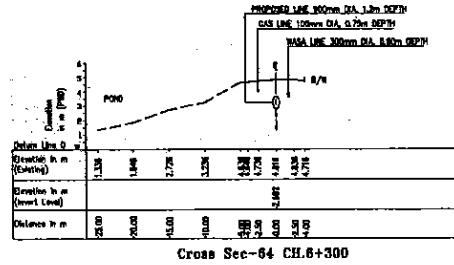
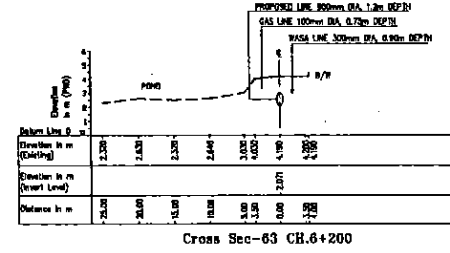
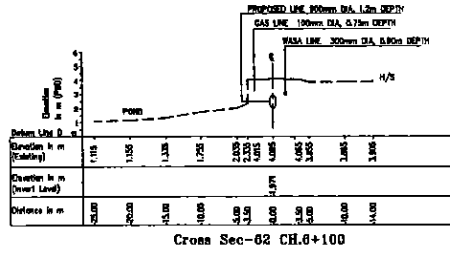
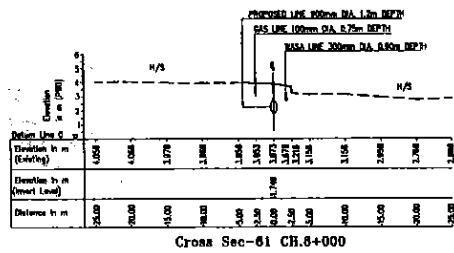


Cross Sec-60 CH.5+900



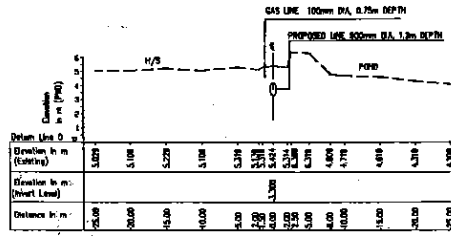
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8.3-9-37

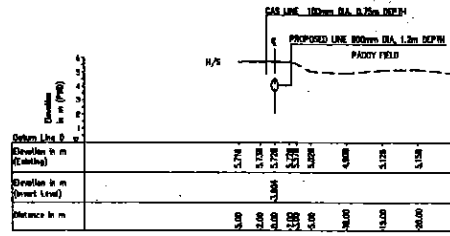


SEPT. 2000

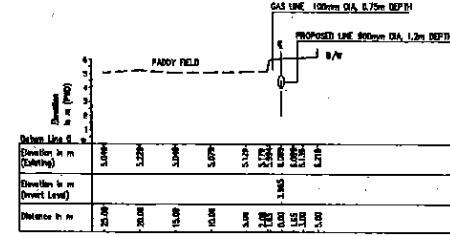
8.3-9-38



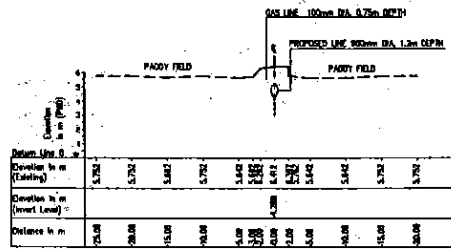
Cross Sec-73 CH.7+200



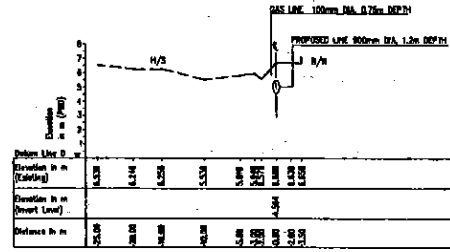
Cross Sec-74 CH.7+300



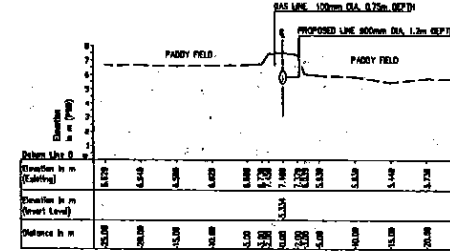
Cross Sec-75 CH.7+400



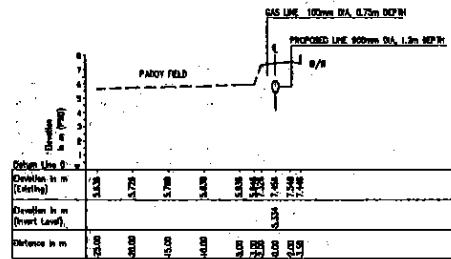
Cross Sec-76 CH.7+500



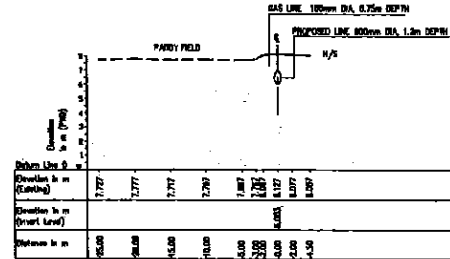
Cross Sec-77 CH.7+600



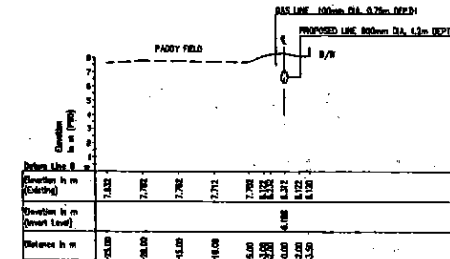
Cross Sec-78 CH.7+700



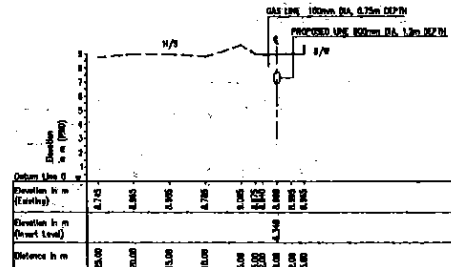
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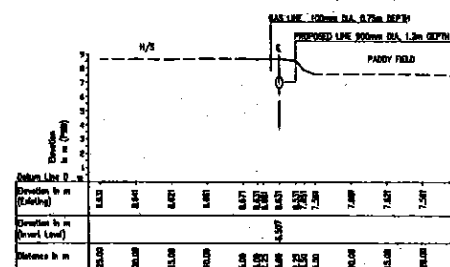
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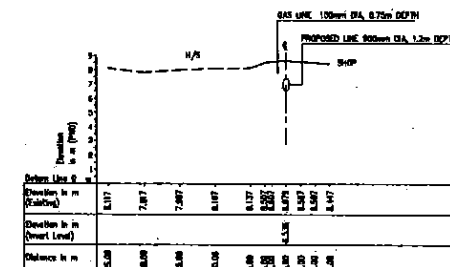
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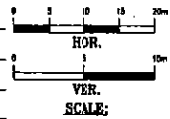
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Cross Sec-83 CH.8+200

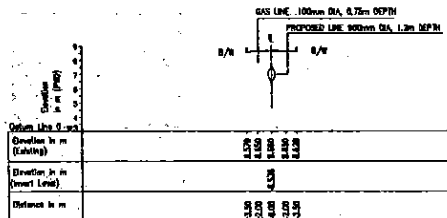


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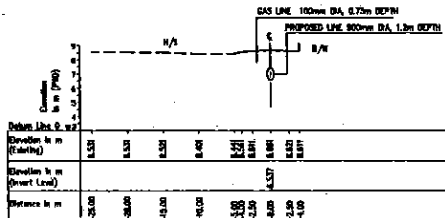


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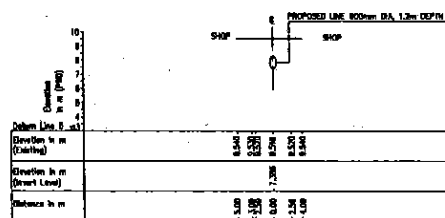
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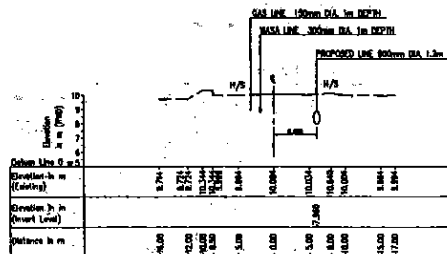
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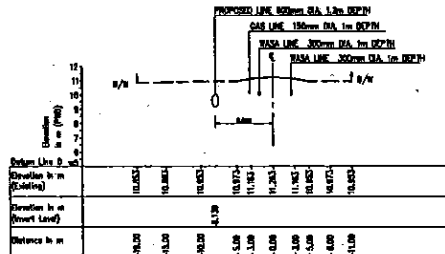
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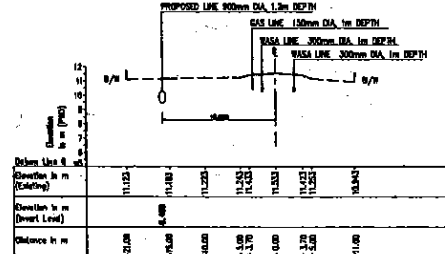
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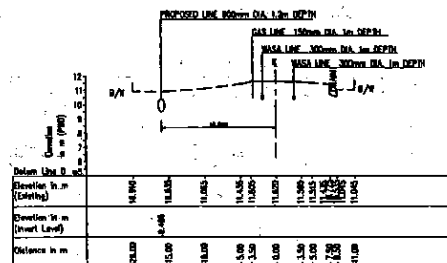
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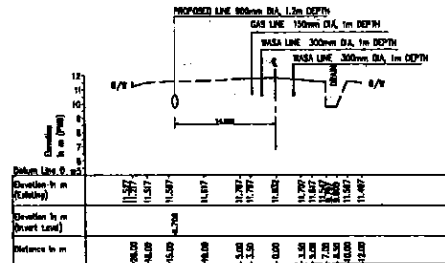
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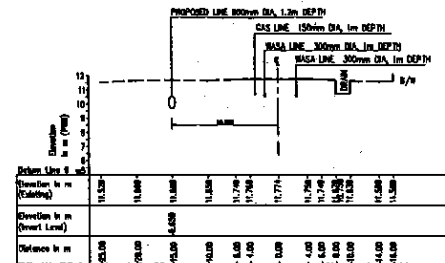
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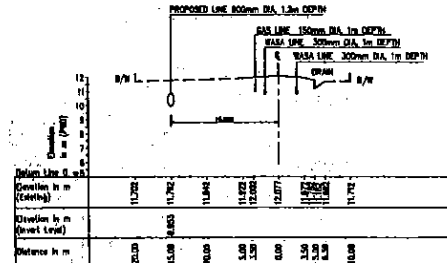
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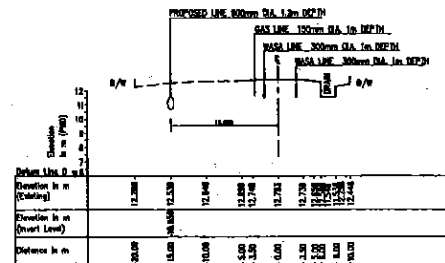
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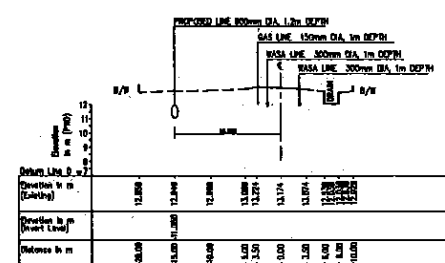
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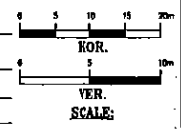
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Cross Sec-95 CH.9+400

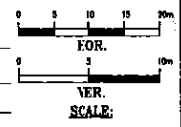
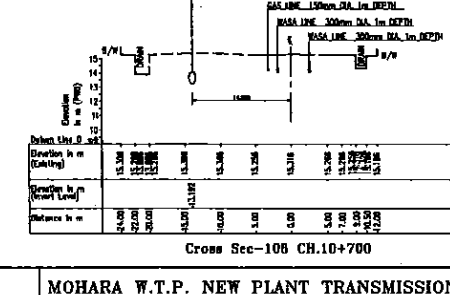
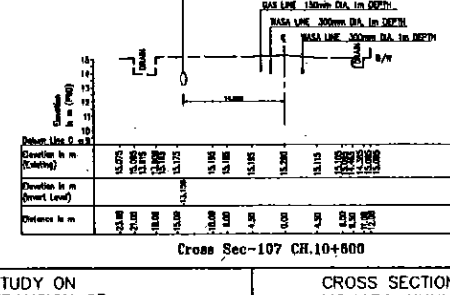
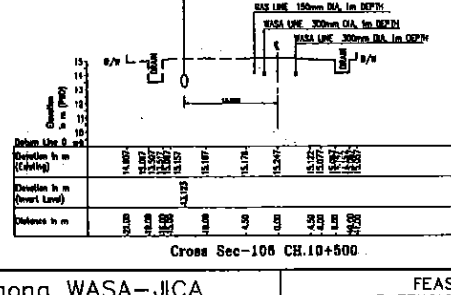
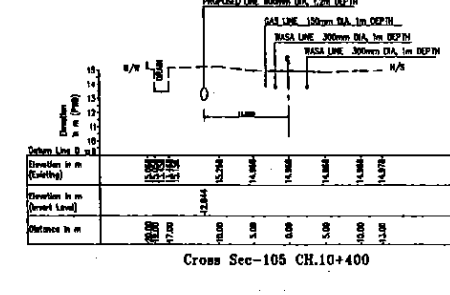
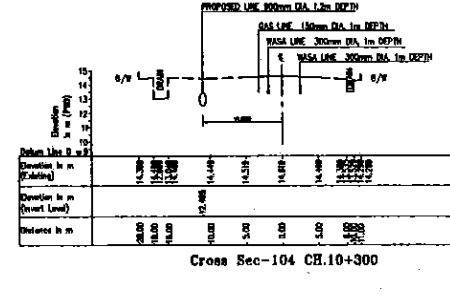
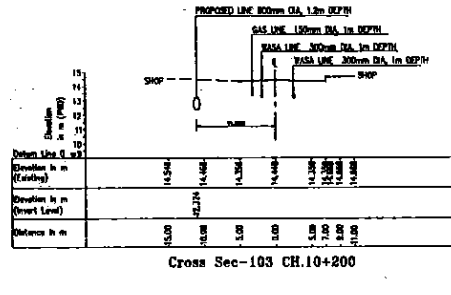
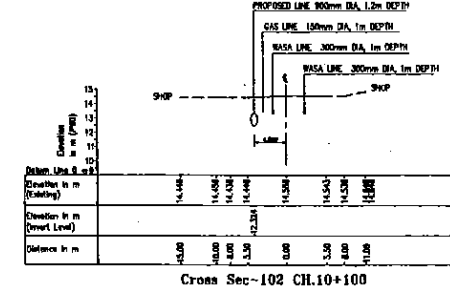
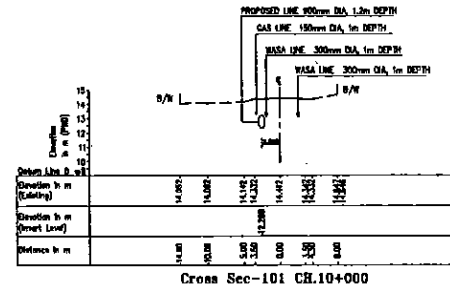
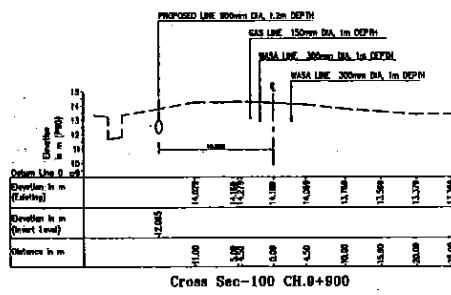
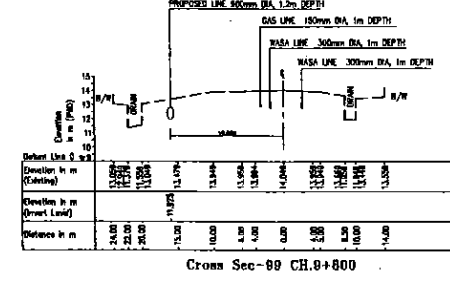
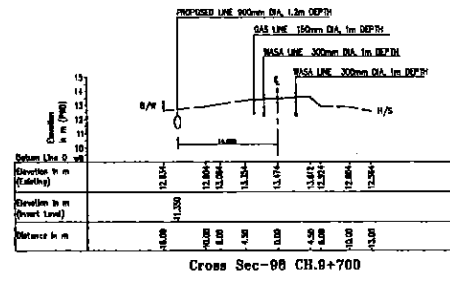
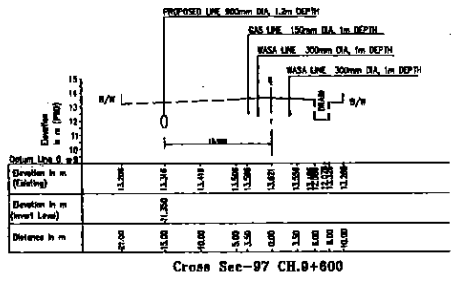


Cross Sec-96 CH.9+500



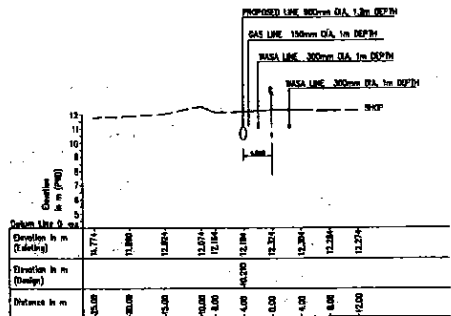
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8.3-9-40

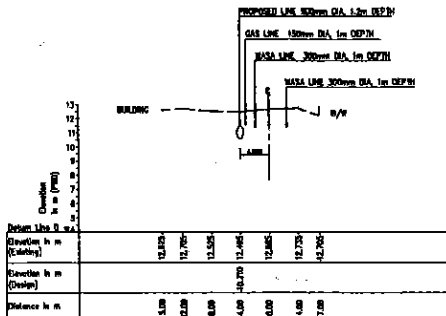


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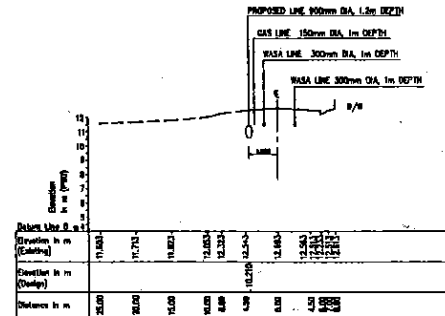
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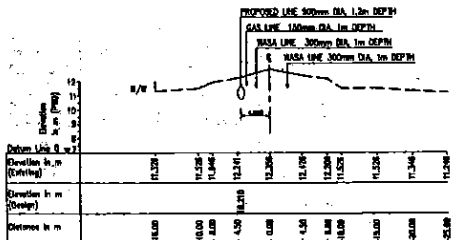
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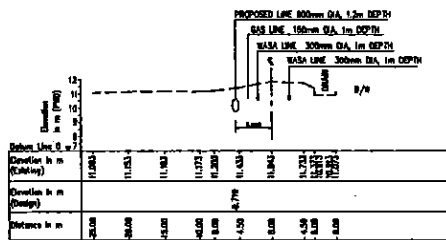
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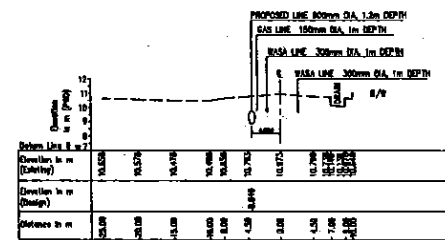
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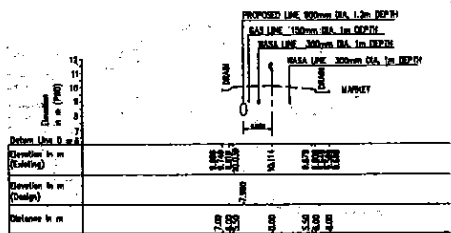
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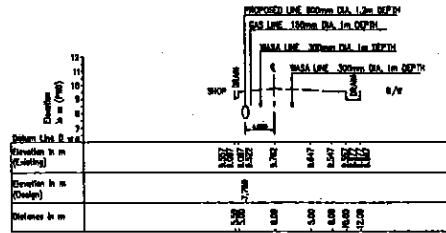
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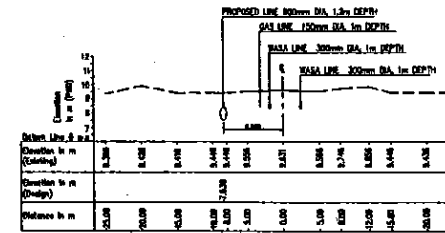
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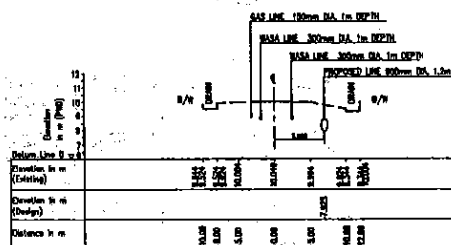
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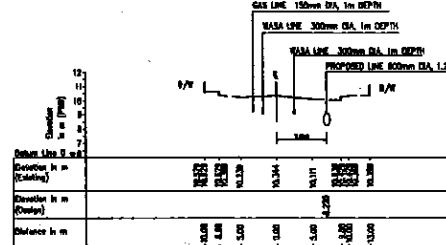
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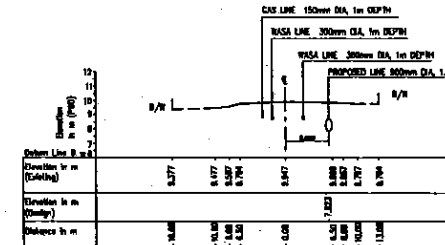
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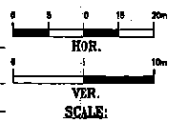
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Cross Sec-131 CH.13+000

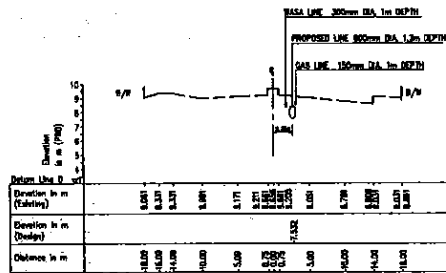


Cross Sec-132 CH.13+100

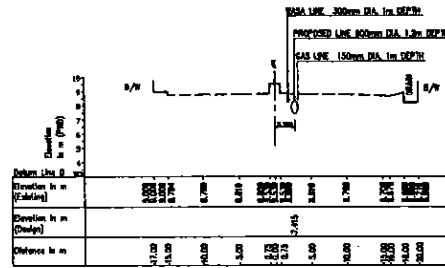


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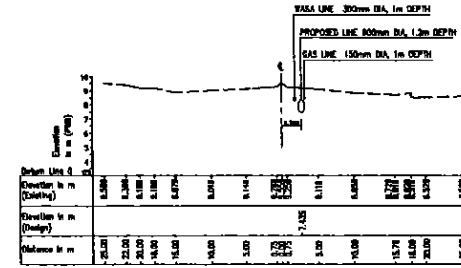
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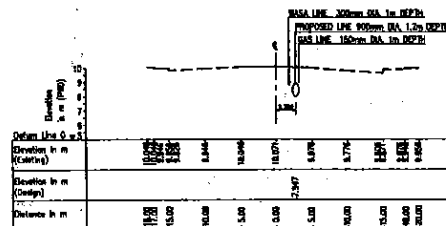
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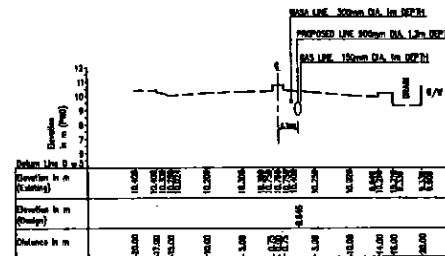
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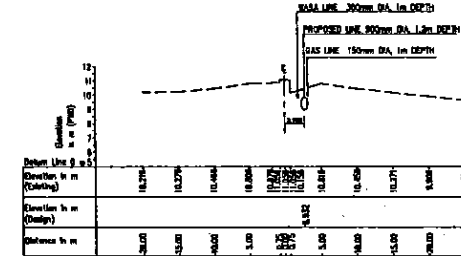
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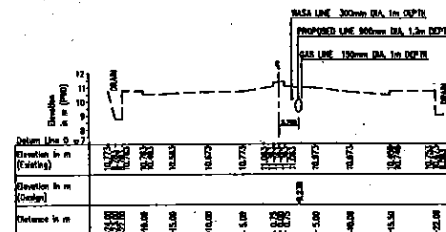
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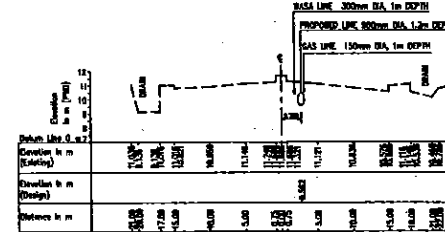
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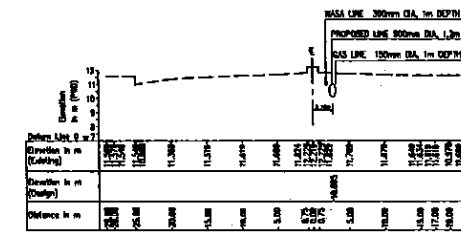
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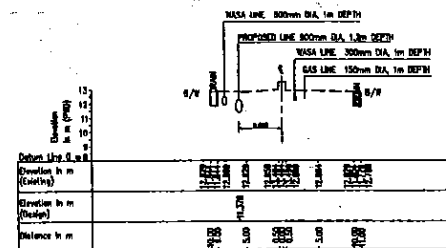
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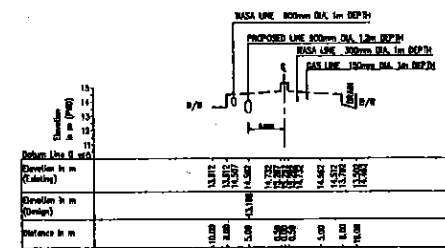
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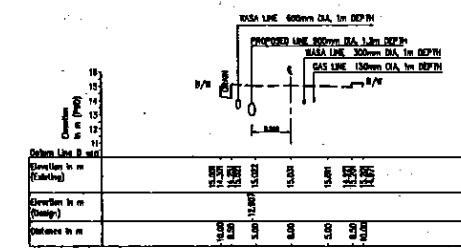
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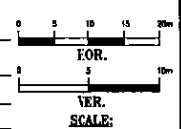
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Cross Sec-143 CH.14+200

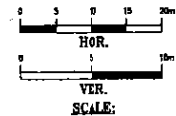
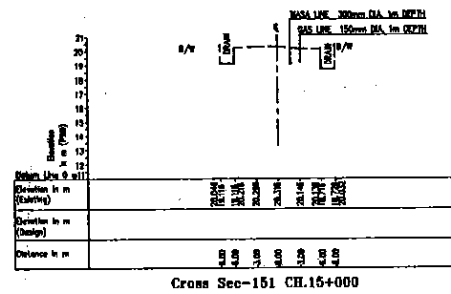
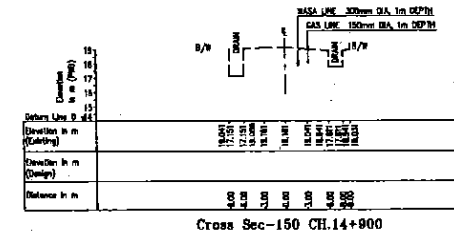
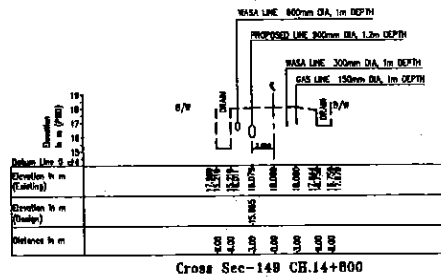
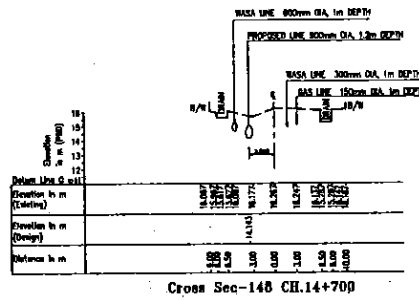
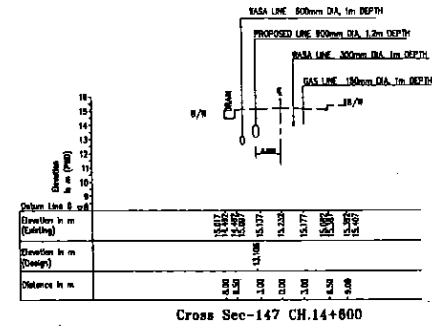
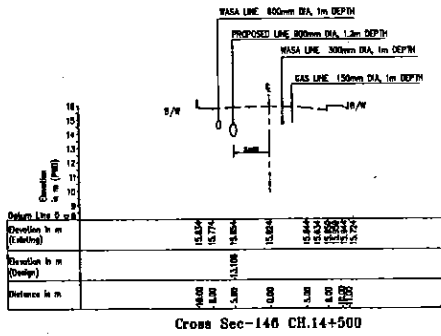
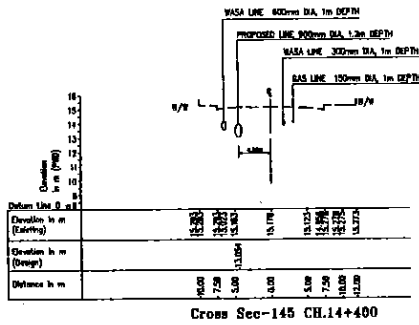


Cross Sec-144 CH.14+300



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8.3-9-44



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CHAPTER 10

FINANCIAL ANALYSIS

Chapter 10 Financial Analysis

10.2 Financial Analysis

10.2-1 Results of calculation

Results of calculation in Chapter 10.2 is shown in the following documents.

A: Revenue by Water Sales

B: Free Cash Flow Analysis

C: Sensitivity Analysis

D: Profit & Loss Statement

E: Net Cash Flow

Each document is presented the following conditions.

Item	Conditions	Attached Table
Case 1	Basic condition described in sub-chapter 10.2.1 (Tariff 6Tk/m ³ , say present condition)	A, B, C, D, E
Case 2	(Tariff: 1.52 times in 2006 and 2020) (Invest cost: 70 % assuming the Grant) (Interest rate from the GOB inc. sublease: 2.5 %)	A, D, E
Case 3	(Tariff: 1.62 times in 2006 and 2020) (Invest cost: 70 % assuming the Grant) (Interest rate from the GOB inc. sublease: 3.0 %)	A, D, E

Table 10.2-1-1 (Case 1, A)

Table 10.2-1-2 (Case 1, B)

Table 10.2-1-3 (Case 1, C)

Table 10.2-1-4 (Case 1, D)

Table 10.2-1-5 (Case 1, E)

Table 10.2-1-6 (Case 2, A)

Table 10.2-1-7 (Case 2, D)

Table 10.2-1-8 (Case 2, E)

Table 10.2-1-9 (Case 3, A)

Table 10.2-1-10 (Case 3, D)

Table 10.2-1-11 (Case 3, E)

Table 10.2-1-1 (A) Revenue by Water Sales (Case 1)

Year	Production Capacity (m ³)	Distribution Progress (%)	Accounted for Water (%)	Collection Efficiency (%)	Water Tariff (US \$ /m ³)	Revenue (US \$)
2001			68%			
2002			69%			
2003			70%			
2004			71%			
2005			72%			
2006	33,215,000	70%	75%	91%	0.11	1,763,163
2007	33,215,000	80%	76%	91%	0.11	2,041,911
2008	33,215,000	90%	77%	91%	0.11	2,327,375
2009	33,215,000	90%	77%	91%	0.11	2,327,375
2010	33,215,000	100%	78%	91%	0.11	2,619,556
2011	33,215,000	100%	78%	91%	0.11	2,619,556
2012	33,215,000	100%	78%	91%	0.11	2,619,556
2013	33,215,000	100%	78%	91%	0.11	2,619,556
2014	33,215,000	100%	79%	91%	0.11	2,653,140
2015	33,215,000	100%	79%	91%	0.11	2,653,140
2016	33,215,000	100%	79%	91%	0.11	2,653,140
2017	33,215,000	100%	79%	91%	0.11	2,653,140
2018	33,215,000	100%	79%	91%	0.11	2,653,140
2019	33,215,000	100%	79%	91%	0.11	2,653,140
2020	33,215,000	100%	79%	91%	0.11	2,653,140
2021	33,215,000	100%	79%	91%	0.11	2,653,140
2022	33,215,000	100%	79%	91%	0.11	2,653,140
2023	33,215,000	100%	79%	91%	0.11	2,653,140
2024	33,215,000	100%	79%	91%	0.11	2,653,140
2025	33,215,000	100%	80%	91%	0.11	2,686,724
2026	33,215,000	100%	80%	91%	0.11	2,686,724
2027	33,215,000	100%	80%	91%	0.11	2,686,724
2028	33,215,000	100%	80%	91%	0.11	2,686,724
2029	33,215,000	100%	80%	91%	0.11	2,686,724
2030	33,215,000	100%	80%	91%	0.11	2,686,724
2031	33,215,000	100%	80%	91%	0.11	2,686,724
2032	33,215,000	100%	80%	91%	0.11	2,686,724
2033	33,215,000	100%	80%	91%	0.11	2,686,724
2034	33,215,000	100%	80%	91%	0.11	2,686,724
2035	33,215,000	100%	80%	91%	0.11	2,686,724
2036	33,215,000	100%	80%	91%	0.11	2,686,724
2037	33,215,000	100%	80%	91%	0.11	2,686,724
2038	33,215,000	100%	80%	91%	0.11	2,686,724
2039	33,215,000	100%	80%	91%	0.11	2,686,724
2040	33,215,000	100%	80%	91%	0.11	2,686,724
2041	33,215,000	100%	80%	91%	0.11	2,686,724
2042	33,215,000	100%	80%	91%	0.11	2,686,724
2043	33,215,000	100%	80%	91%	0.11	2,686,724
2044	33,215,000	100%	80%	91%	0.11	2,686,724
2045	33,215,000	100%	80%	91%	0.11	2,686,724
2046	33,215,000	100%	80%	91%	0.11	2,686,724
2047	33,215,000	100%	80%	91%	0.11	2,686,724
2048	33,215,000	100%	80%	91%	0.11	2,686,724
2049	33,215,000	100%	80%	91%	0.11	2,686,724
2050	33,215,000	100%	80%	91%	0.11	2,686,724

Table 10.2-1-2 (B) Free Cash Flow Analysis (Case 1) (Unit: US\$1000)

Year	Cash In Flow		Cash Out Flow		Free Cash Flow
	Revenue	Investment*	O&M		
2001	0	0	0	0	0
2002	0	0	0	0	0
2003	0	32,000	0	0	(32,000)
2004	0	32,000	0	0	(32,000)
2005	0	32,000	0	0	(32,000)
2006	1,763	0	765	0	998
2007	2,042	0	765	0	1,277
2008	2,327	0	765	0	1,562
2009	2,327	0	765	0	1,562
2010	2,620	0	765	0	1,855
2011	2,620	0	765	0	1,855
2012	2,620	0	765	0	1,855
2013	2,620	0	765	0	1,855
2014	2,653	0	765	0	1,888
2015	2,653	0	765	0	1,888
2016	2,653	0	765	0	1,888
2017	2,653	0	765	0	1,888
2018*	2,653	6,073	765	0	(4,185)
2019*	2,653	6,073	765	0	(4,185)
2020*	2,653	6,073	765	0	(4,185)
2021	2,653	0	765	0	1,888
2022	2,653	0	765	0	1,888
2023	2,653	0	765	0	1,888
2024	2,653	0	765	0	1,888
2025	2,687	0	765	0	1,922
2026	2,687	0	765	0	1,922
2027	2,687	0	765	0	1,922
2028	2,687	0	765	0	1,922
2029	2,687	0	765	0	1,922
2030	2,687	0	765	0	1,922
2031	2,687	0	765	0	1,922
2032	2,687	0	765	0	1,922
2033*	2,687	6,073	765	0	(4,151)
2034*	2,687	6,073	765	0	(4,151)
2035*	2,687	6,073	765	0	(4,151)
2036	2,687	0	765	0	1,922
2037	2,687	0	765	0	1,922
2038	2,687	0	765	0	1,922
2039	2,687	0	765	0	1,922
2040	2,687	0	765	0	1,922
2041	2,687	0	765	0	1,922
2042	2,687	0	765	0	1,922
2043	2,687	0	765	0	1,922
2044	2,687	0	765	0	1,922
2045	2,687	0	765	0	1,922
2046	2,687	0	765	0	1,922
2047	2,687	0	765	0	1,922
2048*	2,687	6,073	765	0	(4,151)
2049*	2,687	6,073	765	0	(4,151)
2050**	2,687	(10,931)	765	0	12,853
IRR					-2.50%
NPV at 7.5%					-US\$62,690
B/C at 7.5%					0.26

*: replacement of equipment

** : salvage value for equipment

Table 10.2-1-3 (C)Sensitivity Analysis (Case 1)

Cost		Revenue	IRR	NPV (at7.5%)	B/C
Capital	O&M		(%)	(US\$)	(at7.5%)
100%	100%	100%	-2.50%	-62,690	0.26
100%	100%	165%	1.02%	-48,129	0.43
100%	100%	190%	2.01%	-42,529	0.50
100%	100%	200%	2.37%	-40,289	0.53
100%	100%	300%	5.46%	-17,888	0.79
100%	100%	380%	7.50%	32	1.00
100%	90%	380%	7.58%	715	1.01
100%	110%	380%	7.43%	-651	0.99
90%	100%	380%	8.42%	7,858	1.10
110%	100%	380%	6.72%	-7,794	0.92

Table 10.2-1-4 (D) Profit & Loss Statement (Case 1) (US\$1000)

Year	Total Revenue	Total O&M Cost	Depreciation	Interest Cost	Profit & Loss
2001	0	0	0	0	0
2002	0	0	0	0	0
2003	0	0	578	2,400	(2,978)
2004	0	0	1,157	4,800	(3,557)
2005	0	0	1,735	7,200	(8,935)
2006	1,763	765	1,735	7,200	(7,937)
2007	2,042	765	1,735	7,200	(7,658)
2008	2,327	765	1,735	7,200	(7,373)
2009	2,327	765	1,735	7,200	(7,373)
2010	2,620	765	1,735	7,200	(7,080)
2011	2,620	765	1,735	7,200	(7,080)
2012	2,620	765	1,735	7,200	(7,080)
2013	2,620	765	1,735	7,200	(7,080)
2014	2,653	765	1,735	7,080	(6,927)
2015	2,653	765	1,735	6,840	(6,687)
2016	2,653	765	1,735	6,480	(6,327)
2017	2,653	765	1,735	6,120	(5,967)
2018	2,653	765	1,735	5,760	(5,607)
2019	2,653	765	1,735	5,400	(5,247)
2020	2,653	765	1,735	5,040	(4,887)
2021	2,653	765	1,735	4,680	(4,527)
2022	2,653	765	1,735	4,320	(4,167)
2023	2,653	765	1,735	3,960	(3,807)
2024	2,653	765	1,735	3,600	(3,447)
2025	2,687	765	1,735	3,240	(3,053)
2026	2,687	765	1,735	2,880	(2,693)
2027	2,687	765	1,735	2,520	(2,333)
2028	2,687	765	1,735	2,160	(1,973)
2029	2,687	765	1,735	1,800	(1,613)
2030	2,687	765	1,735	1,440	(1,253)
2031	2,687	765	1,735	1,080	(893)
2032	2,687	765	1,735	720	(533)
2033	2,687	765	1,735	360	(173)
2034	2,687	765	1,735	120	67
2035	2,687	765	1,735	0	187
2036	2,687	765	1,735	0	187
2037	2,687	765	1,735	0	187
2038	2,687	765	1,735	0	187
2039	2,687	765	1,735	0	187
2040	2,687	765	1,735	0	187
2041	2,687	765	1,735	0	187
2042	2,687	765	1,735	0	187
2043	2,687	765	1,735	0	187
2044	2,687	765	1,735	0	187
2045	2,687	765	1,735	0	187
2046	2,687	765	1,735	0	187
2047	2,687	765	1,735	0	187
2048	2,687	765	1,735	0	187
2049	2,687	765	1,735	0	187
2050	2,687	765	1,735	0	187

Table 10.2-1-5 (E) Net Cash Flow (Case 1)

(US\$1000)

Year	Application						Cash Position from the Previous Year	Source				Net Cash Position
	O & M	Investment	Loan 1		Loan 2			Revenue	Cash provided internally	Loan 1	Loan 2	
			Interest Costs	Loan Repayment	Interest Costs	Loan Repayment						
2001	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	32,000	0	0	0	0	0	0	24,000	8,000	0	0
2004	0	32,000	1,800	0	600	0	0	0	24,000	8,000	(2,400)	(2,400)
2005	0	32,000	3,600	0	1,200	0	(2,400)	0	24,000	8,000	(7,200)	(7,200)
2006	765	0	5,400	0	1,800	0	(7,200)	1,763	0	0	0	(13,402)
2007	765	0	5,400	0	1,800	0	(13,402)	2,042	0	0	0	(19,325)
2008	765	0	5,400	0	1,800	0	(19,325)	2,327	0	0	0	(24,963)
2009	765	0	5,400	0	1,800	0	(24,963)	2,327	0	0	0	(30,601)
2010	765	0	5,400	0	1,800	0	(30,601)	2,620	0	0	0	(35,946)
2011	765	0	5,400	0	1,800	0	(35,946)	2,620	0	0	0	(41,291)
2012	765	0	5,400	0	1,800	0	(41,291)	2,620	0	0	0	(46,636)
2013	765	0	5,400	0	1,800	0	(46,636)	2,620	0	0	0	(51,981)
2014	765	0	5,400	1,200	1,800	400	(51,981)	2,653	0	0	0	(58,893)
2015	765	0	5,310	2,400	1,770	800	(58,893)	2,653	0	0	0	(67,285)
2016	765	0	5,130	3,600	1,710	1,200	(67,285)	2,653	0	0	0	(77,037)
2017	765	0	4,860	3,600	1,620	1,200	(77,037)	2,653	0	0	0	(86,429)
2018	765	6,073	4,590	3,600	1,530	1,200	(86,429)	2,653	6,073	0	0	(95,461)
2019	765	6,073	4,320	3,600	1,440	1,200	(95,461)	2,653	6,073	0	0	(104,133)
2020	765	6,073	4,050	3,600	1,350	1,200	(104,133)	2,653	6,073	0	0	(112,445)
2021	765	0	3,780	3,600	1,260	1,200	(112,445)	2,653	0	0	0	(120,397)
2022	765	0	3,510	3,600	1,170	1,200	(120,397)	2,653	0	0	0	(127,989)
2023	765	0	3,240	3,600	1,080	1,200	(127,989)	2,653	0	0	0	(135,221)
2024	765	0	2,970	3,600	990	1,200	(135,221)	2,653	0	0	0	(142,093)
2025	765	0	2,700	3,600	900	1,200	(142,093)	2,687	0	0	0	(148,571)
2026	765	0	2,430	3,600	810	1,200	(148,571)	2,687	0	0	0	(154,689)
2027	765	0	2,160	3,600	720	1,200	(154,689)	2,687	0	0	0	(160,447)
2028	765	0	1,890	3,600	630	1,200	(160,447)	2,687	0	0	0	(165,845)
2029	765	0	1,620	3,600	540	1,200	(165,845)	2,687	0	0	0	(170,883)
2030	765	0	1,350	3,600	450	1,200	(170,883)	2,687	0	0	0	(175,561)
2031	765	0	1,080	3,600	360	1,200	(175,561)	2,687	0	0	0	(179,879)
2032	765	0	810	3,600	270	1,200	(179,879)	2,687	0	0	0	(183,837)
2033	765	6,073	540	3,600	180	1,200	(183,837)	2,687	6,073	0	0	(187,435)
2034	765	6,073	270	2,400	90	800	(187,435)	2,687	6,073	0	0	(189,073)
2035	765	6,073	90	1,200	30	400	(189,073)	2,687	6,073	0	0	(188,871)
2036	765	0	0	0	0	0	(188,871)	2,687	0	0	0	(186,949)
2037	765	0	0	0	0	0	(186,949)	2,687	0	0	0	(185,027)
2038	765	0	0	0	0	0	(185,027)	2,687	0	0	0	(183,105)
2039	765	0	0	0	0	0	(183,105)	2,687	0	0	0	(181,183)
2040	765	0	0	0	0	0	(181,183)	2,687	0	0	0	(179,261)
2041	765	0	0	0	0	0	(179,261)	2,687	0	0	0	(177,339)
2042	765	0	0	0	0	0	(177,339)	2,687	0	0	0	(175,417)
2043	765	0	0	0	0	0	(175,417)	2,687	0	0	0	(173,495)
2044	765	0	0	0	0	0	(173,495)	2,687	0	0	0	(171,573)
2045	765	0	0	0	0	0	(171,573)	2,687	0	0	0	(169,651)
2046	765	0	0	0	0	0	(169,651)	2,687	0	0	0	(167,729)
2047	765	0	0	0	0	0	(167,729)	2,687	0	0	0	(165,807)
2048	765	6,073	0	0	0	0	(165,807)	2,687	6,073	0	0	(163,885)
2049	765	6,073	0	0	0	0	(163,885)	2,687	6,073	0	0	(161,963)
2050	765	(10,931)	0	0	0	0	(161,963)	2,687	6,073	0	0	(143,037)

Note: Loan 1 is the sublease through GOB. Loan 2 is the direct loan from GOB. Interest rate of both loans is 7.5 percent.

Table 10.2-1-6 (A) Revenue by Water Sales (Case 2)

Year	Production Capacity (m ³)	Distribution Progress Ratio (%)	Accounted for Water (%)	Collection Efficiency (%)	*)Water Tariff (US \$ /m ³)	Revenue (US \$)
2001			68%			
2002			69%			
2003			70%			
2004			71%			
2005			72%			
2006	33,215,000	70%	75%	91%	0.17	2,680,008
2007	33,215,000	80%	76%	91%	0.17	3,103,704
2008	33,215,000	90%	77%	91%	0.17	3,537,610
2009	33,215,000	90%	77%	91%	0.17	3,537,610
2010	33,215,000	100%	78%	91%	0.17	3,981,726
2011	33,215,000	100%	78%	91%	0.17	3,981,726
2012	33,215,000	100%	78%	91%	0.17	3,981,726
2013	33,215,000	100%	78%	91%	0.17	3,981,726
2014	33,215,000	100%	79%	91%	0.17	4,032,773
2015	33,215,000	100%	79%	91%	0.17	4,032,773
2016	33,215,000	100%	79%	91%	0.17	4,032,773
2017	33,215,000	100%	79%	91%	0.17	4,032,773
2018	33,215,000	100%	79%	91%	0.17	4,032,773
2019	33,215,000	100%	79%	91%	0.17	4,032,773
2020	33,215,000	100%	79%	91%	0.21	5,040,967
2021	33,215,000	100%	79%	91%	0.21	5,040,967
2022	33,215,000	100%	79%	91%	0.21	5,040,967
2023	33,215,000	100%	79%	91%	0.21	5,040,967
2024	33,215,000	100%	79%	91%	0.21	5,040,967
2025	33,215,000	100%	80%	91%	0.21	5,104,776
2026	33,215,000	100%	80%	91%	0.21	5,104,776
2027	33,215,000	100%	80%	91%	0.21	5,104,776
2028	33,215,000	100%	80%	91%	0.21	5,104,776
2029	33,215,000	100%	80%	91%	0.21	5,104,776
2030	33,215,000	100%	80%	91%	0.21	5,104,776
2031	33,215,000	100%	80%	91%	0.21	5,104,776
2032	33,215,000	100%	80%	91%	0.21	5,104,776
2033	33,215,000	100%	80%	91%	0.21	5,104,776
2034	33,215,000	100%	80%	91%	0.21	5,104,776
2035	33,215,000	100%	80%	91%	0.21	5,104,776
2036	33,215,000	100%	80%	91%	0.21	5,104,776
2037	33,215,000	100%	80%	91%	0.21	5,104,776
2038	33,215,000	100%	80%	91%	0.21	5,104,776
2039	33,215,000	100%	80%	91%	0.21	5,104,776
2040	33,215,000	100%	80%	91%	0.21	5,104,776
2041	33,215,000	100%	80%	91%	0.21	5,104,776
2042	33,215,000	100%	80%	91%	0.21	5,104,776
2043	33,215,000	100%	80%	91%	0.21	5,104,776
2044	33,215,000	100%	80%	91%	0.21	5,104,776
2045	33,215,000	100%	80%	91%	0.21	5,104,776
2046	33,215,000	100%	80%	91%	0.21	5,104,776
2047	33,215,000	100%	80%	91%	0.21	5,104,776
2048	33,215,000	100%	80%	91%	0.21	5,104,776
2049	33,215,000	100%	80%	91%	0.21	5,104,776
2050	33,215,000	100%	80%	91%	0.21	5,104,776

Note *): Tariff revision is planned 1.52 times of present tariff in 2006, and 1.25 times in 2020, respectively.

Table 10.2-1-7 (D) Profit & Loss Statement (Case 2) (US\$1000)

Year	Total Revenue	Total O&M Cost	Depreciation	Interest Cost	Profit & Loss
2001	0	0	0	0	0
2002	0	0	0	0	0
2003	0	0	578	560	(1,138)
2004	0	0	1,157	1,120	(1,717)
2005	0	0	1,735	1,680	(3,415)
2006	2,680	765	1,735	1,680	(1,500)
2007	3,104	765	1,735	1,680	(1,076)
2008	3,538	765	1,735	1,680	(642)
2009	3,538	765	1,735	1,680	(642)
2010	3,982	765	1,735	1,680	(198)
2011	3,982	765	1,735	1,680	(198)
2012	3,982	765	1,735	1,680	(198)
2013	3,982	765	1,735	1,680	(198)
2014	4,033	765	1,735	1,652	(119)
2015	4,033	765	1,735	1,596	(63)
2016	4,033	765	1,735	1,512	21
2017	4,033	765	1,735	1,428	105
2018	4,033	765	1,735	1,344	189
2019	4,033	765	1,735	1,260	273
2020	5,041	765	1,735	1,176	1,365
2021	5,041	765	1,735	1,092	1,449
2022	5,041	765	1,735	1,008	1,533
2023	5,041	765	1,735	924	1,617
2024	5,041	765	1,735	840	1,701
2025	5,105	765	1,735	756	1,849
2026	5,105	765	1,735	672	1,933
2027	5,105	765	1,735	588	2,017
2028	5,105	765	1,735	504	2,101
2029	5,105	765	1,735	420	2,185
2030	5,105	765	1,735	336	2,269
2031	5,105	765	1,735	252	2,353
2032	5,105	765	1,735	168	2,437
2033	5,105	765	1,735	84	2,521
2034	5,105	765	1,735	28	2,577
2035	5,105	765	1,735	0	2,605
2036	5,105	765	1,735	0	2,605
2037	5,105	765	1,735	0	2,605
2038	5,105	765	1,735	0	2,605
2039	5,105	765	1,735	0	2,605
2040	5,105	765	1,735	0	2,605
2041	5,105	765	1,735	0	2,605
2042	5,105	765	1,735	0	2,605
2043	5,105	765	1,735	0	2,605
2044	5,105	765	1,735	0	2,605
2045	5,105	765	1,735	0	2,605
2046	5,105	765	1,735	0	2,605
2047	5,105	765	1,735	0	2,605
2048	5,105	765	1,735	0	2,605
2049	5,105	765	1,735	0	2,605
2050	5,105	765	1,735	0	2,605

Table 10.2-1-8 (E) Net Cash Flow (Case 2)

(US\$1000)

Year	Application						Source					Net Cash Position
	O & M	Investment	GOB Loan		Commercial Loan		Cash Position from the Previous Year	Revenue	*)Cash provided internally	GOB Loan	**)Commercial Loan	
			Interest Costs	Loan Repayment	Interest Costs	Loan Repayment						
2001	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	32,000	0	0	0	0	0	9,600	22,400	0	0	0
2004	0	32,000	560	0	0	0	0	9,600	22,400	560	0	0
2005	0	32,000	1,120	0	56	56	0	9,600	22,400	1,232	0	0
2006	765	0	1,680	0	174	174	0	2,680	0	0	113	0
2007	765	0	1,680	0	167	167	0	3,104	0	0	0	325
2008	765	0	1,680	0	148	148	325	3,538	0	0	0	1,122
2009	765	0	1,680	0	129	129	1,122	3,538	0	0	0	1,957
2010	765	0	1,680	0	110	110	1,957	3,982	0	0	0	3,274
2011	765	0	1,680	0	91	91	3,274	3,982	0	0	0	4,629
2012	765	0	1,680	0	72	72	4,629	3,982	0	0	0	6,022
2013	765	0	1,680	0	53	53	6,022	3,982	0	0	0	7,453
2014	765	0	1,680	1,120	34	34	7,453	4,033	0	0	0	7,853
2015	765	0	1,652	2,240	15	15	7,853	4,033	0	0	0	7,199
2016	765	0	1,596	3,360	1	1	7,199	4,033	0	0	0	5,509
2017	765	0	1,512	3,360	0	0	5,509	4,033	0	0	0	3,905
2018	765	6,073	1,428	3,360	0	0	3,905	4,033	6,073	0	0	2,385
2019	765	6,073	1,344	3,360	0	0	2,385	4,033	6,073	0	0	949
2020	765	6,073	1,260	3,360	0	0	949	5,041	6,073	0	0	605
2021	765	0	1,176	3,360	0	0	605	5,041	0	0	0	345
2022	765	0	1,092	3,360	0	0	345	5,041	0	0	0	169
2023	765	0	1,008	3,360	0	0	169	5,041	0	0	0	77
2024	765	0	924	3,360	0	0	77	5,041	0	0	0	69
2025	765	0	840	3,360	0	0	69	5,105	0	0	0	209
2026	765	0	756	3,360	0	0	209	5,105	0	0	0	433
2027	765	0	672	3,360	0	0	433	5,105	0	0	0	741
2028	765	0	588	3,360	0	0	741	5,105	0	0	0	1,133
2029	765	0	504	3,360	0	0	1,133	5,105	0	0	0	1,609
2030	765	0	420	3,360	0	0	1,609	5,105	0	0	0	2,169
2031	765	0	336	3,360	0	0	2,169	5,105	0	0	0	2,813
2032	765	0	252	3,360	0	0	2,813	5,105	0	0	0	3,541
2033	765	6,073	168	3,360	0	0	3,541	5,105	6,073	0	0	4,353
2034	765	6,073	84	2,240	0	0	4,353	5,105	6,073	0	0	6,369
2035	765	6,073	28	1,120	0	0	6,369	5,105	6,073	0	0	9,561
2036	765	0	0	0	0	0	9,561	5,105	0	0	0	13,901
2037	765	0	0	0	0	0	13,901	5,105	0	0	0	18,241
2038	765	0	0	0	0	0	18,241	5,105	0	0	0	22,581
2039	765	0	0	0	0	0	22,581	5,105	0	0	0	26,921
2040	765	0	0	0	0	0	26,921	5,105	0	0	0	31,261
2041	765	0	0	0	0	0	31,261	5,105	0	0	0	35,601
2042	765	0	0	0	0	0	35,601	5,105	0	0	0	39,941
2043	765	0	0	0	0	0	39,941	5,105	0	0	0	44,281
2044	765	0	0	0	0	0	44,281	5,105	0	0	0	48,621
2045	765	0	0	0	0	0	48,621	5,105	0	0	0	52,961
2046	765	0	0	0	0	0	52,961	5,105	0	0	0	57,301
2047	765	0	0	0	0	0	57,301	5,105	0	0	0	61,641
2048	765	6,073	0	0	0	0	61,641	5,105	6,073	0	0	65,981
2049	765	6,073	0	0	0	0	65,981	5,105	6,073	0	0	70,321
2050	765	(10,931)	0	0	0	0	70,321	5,105	6,073	0	0	91,665

Note*): Cash provided internally includes the Grant aid and internal cash position produced by accumulated depreciation and others.

Note**): Early times of the project needs to prepare the cash for interest payment which is provided by commercial loan.

Interest rate of commercial loan is assumed at 10 percent annually, and payment period is 10 years (one grace year).

Table 10.2-1-9 (A) Revenue by Water Sales (Case 3)

Year	Production Capacity (m ³)	Distribution Progress Ratio (%)	Accounted for Water (%)	Collection Efficiency (%)	Water Tariff (US \$ /m ³)	Revenue (US \$)
2001			68%			
2002			69%			
2003			70%			
2004			71%			
2005			72%			
2006	33,215,000	70%	75%	91%	0.18	2,856,324
2007	33,215,000	80%	76%	91%	0.18	3,307,895
2008	33,215,000	90%	77%	91%	0.18	3,770,348
2009	33,215,000	90%	77%	91%	0.18	3,770,348
2010	33,215,000	100%	78%	91%	0.18	4,243,681
2011	33,215,000	100%	78%	91%	0.18	4,243,681
2012	33,215,000	100%	78%	91%	0.18	4,243,681
2013	33,215,000	100%	78%	91%	0.18	4,243,681
2014	33,215,000	100%	79%	91%	0.18	4,298,087
2015	33,215,000	100%	79%	91%	0.18	4,298,087
2016	33,215,000	100%	79%	91%	0.18	4,298,087
2017	33,215,000	100%	79%	91%	0.18	4,298,087
2018	33,215,000	100%	79%	91%	0.23	5,587,514
2019	33,215,000	100%	79%	91%	0.23	5,587,514
2020	33,215,000	100%	79%	91%	0.23	5,587,514
2021	33,215,000	100%	79%	91%	0.23	5,587,514
2022	33,215,000	100%	79%	91%	0.23	5,587,514
2023	33,215,000	100%	79%	91%	0.23	5,587,514
2024	33,215,000	100%	79%	91%	0.23	5,587,514
2025	33,215,000	100%	80%	91%	0.23	5,658,242
2026	33,215,000	100%	80%	91%	0.23	5,658,242
2027	33,215,000	100%	80%	91%	0.23	5,658,242
2028	33,215,000	100%	80%	91%	0.23	5,658,242
2029	33,215,000	100%	80%	91%	0.23	5,658,242
2030	33,215,000	100%	80%	91%	0.23	5,658,242
2031	33,215,000	100%	80%	91%	0.23	5,658,242
2032	33,215,000	100%	80%	91%	0.23	5,658,242
2033	33,215,000	100%	80%	91%	0.23	5,658,242
2034	33,215,000	100%	80%	91%	0.23	5,658,242
2035	33,215,000	100%	80%	91%	0.23	5,658,242
2036	33,215,000	100%	80%	91%	0.23	5,658,242
2037	33,215,000	100%	80%	91%	0.23	5,658,242
2038	33,215,000	100%	80%	91%	0.23	5,658,242
2039	33,215,000	100%	80%	91%	0.23	5,658,242
2040	33,215,000	100%	80%	91%	0.23	5,658,242
2041	33,215,000	100%	80%	91%	0.23	5,658,242
2042	33,215,000	100%	80%	91%	0.23	5,658,242
2043	33,215,000	100%	80%	91%	0.23	5,658,242
2044	33,215,000	100%	80%	91%	0.23	5,658,242
2045	33,215,000	100%	80%	91%	0.23	5,658,242
2046	33,215,000	100%	80%	91%	0.23	5,658,242
2047	33,215,000	100%	80%	91%	0.23	5,658,242
2048	33,215,000	100%	80%	91%	0.23	5,658,242
2049	33,215,000	100%	80%	91%	0.23	5,658,242
2050	33,215,000	100%	80%	91%	0.23	5,658,242

Note*): Tariff revision is planned 1.62 times of present tariff in 2006, and 1.3 times in 2018, respectively.

Table 10.2-1-10 (D) Profit & Loss Statement (Case 3) (US\$1000)

Year	Total Revenue	Total O&M Cost	Depreciation	Interest Cost	Profit & Loss
2001	0	0	0	0	0
2002	0	0	0	0	0
2003	0	0	578	672	(1,250)
2004	0	0	1,157	1,344	(1,829)
2005	0	0	1,735	2,016	(3,751)
2006	2,856	765	1,735	2,016	(1,660)
2007	3,308	765	1,735	2,016	(1,208)
2008	3,770	765	1,735	2,016	(746)
2009	3,770	765	1,735	2,016	(746)
2010	4,244	765	1,735	2,016	(272)
2011	4,244	765	1,735	2,016	(272)
2012	4,244	765	1,735	2,016	(272)
2013	4,244	765	1,735	2,016	(272)
2014	4,298	765	1,735	1,982	(184)
2015	4,298	765	1,735	1,915	(117)
2016	4,298	765	1,735	1,814	(16)
2017	4,298	765	1,735	1,714	84
2018	5,588	765	1,735	1,613	1,475
2019	5,588	765	1,735	1,512	1,576
2020	5,588	765	1,735	1,411	1,677
2021	5,588	765	1,735	1,310	1,778
2022	5,588	765	1,735	1,210	1,878
2023	5,588	765	1,735	1,109	1,979
2024	5,588	765	1,735	1,008	2,080
2025	5,658	765	1,735	921	2,237
2026	5,658	765	1,735	806	2,352
2027	5,658	765	1,735	706	2,452
2028	5,658	765	1,735	605	2,553
2029	5,658	765	1,735	504	2,654
2030	5,658	765	1,735	403	2,755
2031	5,658	765	1,735	302	2,856
2032	5,658	765	1,735	202	2,956
2033	5,658	765	1,735	101	3,057
2034	5,658	765	1,735	34	3,124
2035	5,658	765	1,735	0	3,158
2036	5,658	765	1,735	0	3,158
2037	5,658	765	1,735	0	3,158
2038	5,658	765	1,735	0	3,158
2039	5,658	765	1,735	0	3,158
2040	5,658	765	1,735	0	3,158
2041	5,658	765	1,735	0	3,158
2042	5,658	765	1,735	0	3,158
2043	5,658	765	1,735	0	3,158
2044	5,658	765	1,735	0	3,158
2045	5,658	765	1,735	0	3,158
2046	5,658	765	1,735	0	3,158
2047	5,658	765	1,735	0	3,158
2048	5,658	765	1,735	0	3,158
2049	5,658	765	1,735	0	3,158
2050	5,658	765	1,735	0	3,158

Table 10.2-1-11 (E) Net Cash Flow (Case 3)

(US\$1000)

Year	Application						Cash Position from the Previous Year	Revenue	Source			Net Cash Position
	O & M	Investment	GOB Loan		Commercial Loan				*)Cash provided internally	GOB Loan	**)Commercial Loan	
			Interest Costs	Loan Repayment	Interest Costs	Loan Repayment						
2001	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	32,000	0	0	0	0	0	9,600	22,400	0	0	0
2004	0	32,000	672	0	0	0	0	9,600	22,400	672	0	0
2005	0	32,000	1,344	0	67	67	0	9,600	22,400	1,478	0	0
2006	765	0	2,016	0	208	215	0	2,856	0	348	0	0
2007	765	0	2,016	0	222	250	0	3,308	0	0	0	55
2008	765	0	2,016	0	197	250	55	3,770	0	0	0	597
2009	765	0	2,016	0	172	250	597	3,770	0	0	0	1,164
2010	765	0	2,016	0	147	250	1,164	4,244	0	0	0	2,230
2011	765	0	2,016	0	122	250	2,230	4,244	0	0	0	3,321
2012	765	0	2,016	0	97	250	3,321	4,244	0	0	0	4,437
2013	765	0	2,016	0	72	250	4,437	4,244	0	0	0	5,578
2014	765	0	2,016	1,120	47	250	5,578	4,298	0	0	0	5,678
2015	765	0	1,982	2,240	22	183	5,678	4,298	0	0	0	4,784
2016	765	0	1,915	3,360	3	35	4,784	4,298	0	0	0	3,004
2017	765	0	1,814	3,360	0	0	3,004	4,298	0	0	0	1,363
2018	765	6,073	1,714	3,360	0	0	1,363	5,588	6,073	0	0	1,112
2019	765	6,073	1,613	3,360	0	0	1,112	5,588	6,073	0	0	962
2020	765	6,073	1,512	3,360	0	0	962	5,588	6,073	0	0	913
2021	765	0	1,411	3,360	0	0	913	5,588	0	0	0	965
2022	765	0	1,310	3,360	0	0	965	5,588	0	0	0	1,118
2023	765	0	1,210	3,360	0	0	1,118	5,588	0	0	0	1,371
2024	765	0	1,109	3,360	0	0	1,371	5,588	0	0	0	1,725
2025	765	0	1,008	3,360	0	0	1,725	5,658	0	0	0	2,250
2026	765	0	921	3,360	0	0	2,250	5,658	0	0	0	2,862
2027	765	0	806	3,360	0	0	2,862	5,658	0	0	0	3,589
2028	765	0	706	3,360	0	0	3,589	5,658	0	0	0	4,416
2029	765	0	605	3,360	0	0	4,416	5,658	0	0	0	5,344
2030	765	0	504	3,360	0	0	5,344	5,658	0	0	0	6,373
2031	765	0	403	3,360	0	0	6,373	5,658	0	0	0	7,503
2032	765	0	302	3,360	0	0	7,503	5,658	0	0	0	8,734
2033	765	6,073	202	3,360	0	0	8,734	5,658	6,073	0	0	10,065
2034	765	6,073	101	2,240	0	0	10,065	5,658	6,073	0	0	12,617
2035	765	6,073	34	1,120	0	0	12,617	5,658	6,073	0	0	16,356
2036	765	0	0	0	0	0	16,356	5,658	0	0	0	21,249
2037	765	0	0	0	0	0	21,249	5,658	0	0	0	26,142
2038	765	0	0	0	0	0	26,142	5,658	0	0	0	31,035
2039	765	0	0	0	0	0	31,035	5,658	0	0	0	35,928
2040	765	0	0	0	0	0	35,928	5,658	0	0	0	40,821
2041	765	0	0	0	0	0	40,821	5,658	0	0	0	45,714
2042	765	0	0	0	0	0	45,714	5,658	0	0	0	50,607
2043	765	0	0	0	0	0	50,607	5,658	0	0	0	55,500
2044	765	0	0	0	0	0	55,500	5,658	0	0	0	60,393
2045	765	0	0	0	0	0	60,393	5,658	0	0	0	65,286
2046	765	0	0	0	0	0	65,286	5,658	0	0	0	70,179
2047	765	0	0	0	0	0	70,179	5,658	0	0	0	75,072
2048	765	6,073	0	0	0	0	75,072	5,658	6,073	0	0	79,965
2049	765	6,073	0	0	0	0	79,965	5,658	6,073	0	0	84,858
2050	765	(10,931)	0	0	0	0	84,858	5,658	6,073	0	0	106,755

Note*): Cash provided internally includes the Grant aid and internal cash position produced by accumulated depreciation and others.

Note**): Early times of the project needs to prepare the cash for interest payment which is provided by comarcial loan.

Interest rate of commercial loan is assumed 10 percent, and payment period is 10 years (one grace year).

10.2-2 Financial Plan

For appropriate financial analysis, it is needed that formulation of financial plans should be set up certainly. Generally speaking, financial plans for water works are formulated for the purpose of budgetary arrangement, determination of investment plans and other internal arrangement, external reporting and setting rates. They are classified into several categories according to the purpose.

First, financial plans are categorized by length of period:

- 1) Long-term plan: This type of plan generally covers at least five years. For example, it is drawn up to a project financial situation of the water works 10 years later.
- 2) Medium-term plan: This type covers three years or so. The purpose is to ensure sound financing of the enterprise. In this case, the financial plan is considered as shown the following.
- 3) Short-term plan: This type of plan covers a period of one year or less.

Financial plans can also be classified into two categories according to contents and particulars of the plan:

- 1) General plan: A basic and general plan that comprises all revenue income and expenditure and capital income and expenditure of the works.
- 2) Individual plan: A partial plan, such as a water system extension plan or a specified revenue plan.

Individual plans comprise part of the general plan within the period of the general plan.

In general, a financial plan for revision of water rates is a medium-term and general plan.

Meanwhile, the process of making up a financial plan for revision of water rates involves:

- 1) Examining financial position at the time the plan is started.
- 2) Determining the plan period (rate calculation period)
- 3) Estimating financial position at the end of the plan period
- 4) Calculating the revenue and expenditure of the water works within the plan period

The most important is the fourth step, that is, the estimation of revenue and expenditure. Whether it is accurate or not is a decisive factor greatly affecting the propriety of a financial plan.

According to above-mentioned basic concept, the medium-term financial plan including the New Mohara project is shown in Final Report (refer to Sub-chapter 10.2.3 of Final Report). In this financial plan, the loan payment plan is shown in details from 2001 to 2035 in Table 10.2-2-1 as shown below.

Table 10.2-2-1 Loan Payment Plan (2001 - 2035)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Interest payment(Total)	54.36	52.4	60.21	149.11	216.08	246.87	245.81	244.75	243.68	242.62	242.88	242.88	242.88	215.91	196.26	172.51	163.20	153.88	144.52
Interest(Mohara)	0	0	0	30.24	63.50	100.12	99.74	98.71	97.69	96.66	95.63	94.61	93.58	92.56	90.018	86.24	81.65	77.11	72.58
Interest(Mad. & 3rd In.)	0	0	31.14	62.27	93.41	93.41	93.41	93.41	93.41	93.41	93.41	93.41	93.41	91.85	88.73	84.06	79.39	74.72	70.05
Interest(IDA 1)	0.83	0.76	0.70	0.64	0.57	0.51	0.44	0.38	0.32	0.25	0.19	0.13	0.06	0.02	0	0	0	0	0
Interest(IDA 2)	22.86	20.95	19.04	17.14	15.24	13.33	11.43	9.52	7.62	5.71	3.81	1.90	0.63	0	0	0	0	0	0
Interest(IWSRP)	11.19	10.26	9.33	8.39	7.46	6.53	5.6	4.66	3.73	2.8	1.87	0.93	0.31	0	0	0	0	0	0
Interest(Sub-total)	34.88	31.97	60.21	118.68	180.18	213.90	210.62	206.68	202.77	198.83	194.91	190.98	187.99	184.43	178.75	170.30	161.04	151.83	142.63
Interest balance	19.48	20.43	0.00	30.43	35.90	32.97	35.19	38.07	40.91	43.79	47.97	51.90	54.89	31.49	17.51	0.00	0.00	0.00	0.00

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Principal payment(Total)	41.77	41.77	41.77	41.77	44.79	51.17	50.79	49.76	48.74	47.71	46.68	32.44	41.44	110.93	193.62	253.34	253.29	253.29	253.29
Principal(Mohara)	0	0	0	0	3.02	9.40	9.02	7.99	6.97	5.94	4.91	3.89	2.86	62.32	121.77	181.49	181.44	181.44	181.44
Principal(Mad. & 3rd In.)	0	0	0	0	0	0	0	0	0	0	0	0	23.95	47.9	71.85	71.85	71.85	71.85	71.85
Principal(IDA 1)	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	1.41	0.71	0	0	0	0	0
Principal(IDA 2)	27.21	27.21	27.21	27.21	27.21	27.21	27.21	27.21	27.21	27.21	27.21	18.14	9.07	0	0	0	0	0	0
Principal(IWSRP)	12.44	12.44	12.44	12.44	12.44	12.44	12.44	12.44	12.44	12.44	12.44	8.29	4.15	0	0	0	0	0	0
Principal(Sub-total)	41.77	41.77	41.77	41.77	44.79	51.17	50.79	49.76	48.74	47.71	46.68	32.44	41.44	110.93	193.62	253.34	253.29	253.29	253.29

Note1: Prospection of accrued interest/payment.

IDA 1	Interest, as of 1997	Tk 7.5 million
	Principal, as of 1997	Tk 0 million
IDA 2	Interest, as of 1997	Tk 432.8 million
	Principal, as of 2000	Tk 217.7 million
IWSRP	Interest, as of 1997	Tk 60.6 million
	Principal, as of 2000	Tk 99.5 million
Total	Interest	Tk 500.9 million
	principal	Tk 317.2 million

Note2: 1) Total accrued interest is allotted in interest balance from 2001 to 2015.

2) Total accrued principal is allotted by internal reserve after the year of 2006 (refer to Final Report, Table 10.2-6).

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
135.20	125.89	116.6	107.26	97.95	88.63	79.32	69.95	60.64	51.32	42.01	32.69	23.38	14.07	6.31	1.57
68.04	63.50	58.97	54.43	49.90	45.36	40.82	36.29	31.75	27.22	22.68	18.14	13.61	9.07	4.54	1.51
65.38	60.71	56.04	51.37	46.7	42.03	37.36	32.69	28.02	23.35	18.68	14.01	9.34	4.67	1.56	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133.42	124.21	115.01	105.80	96.60	87.39	78.18	68.98	59.77	50.57	41.36	32.15	22.95	13.74	6.10	1.51
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	229.34	144.91	60.48
181.44	181.44	181.44	181.44	181.44	181.44	181.44	181.44	181.44	181.44	181.44	181.44	181.44	181.44	120.96	60.48
71.85	71.85	71.85	71.85	71.85	71.85	71.85	71.85	71.85	71.85	71.85	71.85	71.85	47.9	23.95	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	253.29	229.34	144.91	60.48

10.2-3 Forecast of Water Tariff Revenue

Forecast of water revenue in 2005 is shown below.

(1) Forecast of accounted for water

		2005		
AFW rate		65%	70%	75%
MOD1	30,000m ³ /day	19,500	21,000	22,500
MOD2(KIRP)	59,000m ³ /day	38,350	41,300	41,250
Mohara	91,000m ³ /day	59,150	63,700	68,250
Madunaghat	45,000m ³ /day	29,250	31,500	33,750
New Mohara	91,000m ³ /day	59,150	63,700	68,250
Total(m ³ /day)		205,400	221,200	234,000
Total(m ³ /year)		74,971,000	80,738,000	85,410,000

(2) Estimate of tariff income

	2005		
Weighted average cost (Tk /m ³)	6	9	12
Tariff income (Tk /year)	449,826,000	726,642,000	1,024,920,000

10.2-4 Supplementary Data of Table 10.2-3 FIRR Related With Tariff Rate, in Final Report.

Table 10.2-4-1 FIRR Related With Tariff Rate

Base Tariff (Tk/m³)	6.0 (100%)	6.6 (110%)	7.2 (120%)	7.8 (130%)	8.4 (140%)	9.0 (150%)	9.6 (160%)	10.2 (170%)	10.8 (180%)	11.4 (190%)	12.0 (200%)	22.8 (380%)
up rate 0	-2.50	-1.81	-1.19	-0.63	-0.12	0.36	0.8	1.23	1.63	2.01	2.37	7.50
(%) 1	-0.76	-0.2	0.37	0.87	1.34	1.77	2.19	2.58	2.95	3.31	3.66	-
2	0.70	1.24	1.74	2.20	2.64	3.05	3.44	3.81	4.17	4.51	4.85	-
3	2.00	2.51	2.98	3.42	3.84	4.24	4.61	4.97	5.32	5.65	5.97	-
4	3.20	3.69	4.14	4.57	4.98	5.36	5.73	6.08	6.42	6.74	7.06	-
5	4.33	4.81	5.25	5.67	6.07	6.44	6.80	7.15	7.48	7.8	8.11	-
6	5.42	5.88	6.32	6.73	7.12	7.49	7.85	8.19	8.52	-	-	-
7	6.47	6.93	7.36	7.77	8.15	8.52	-	-	-	-	-	-
8	7.49	7.95	8.38	-	-	-	-	-	-	-	-	-
9	8.50	-	-	-	-	-	-	-	-	-	-	-

10.4 Consideration of Water Tariff

10.4-1 Proposed water tariff

A progressive block rate system is proposed by JICA study team. This is, as a whole, the tariff structure to ensure low-income people can afford their basic water needs and to encourage free water users to switch to direct connections. The progressive block rate system has several steps. A first step is set a lower water tariff cost for small consumption users while a last step is set a higher tariff cost for much consumption users.

(1) Outline of Water Rates Revision

1) Rate Calculation Period: 2001 - 2005 (for five years)

2) Water Tariff System

Per- object and progressive rate system

3) Blanket Cost and Accounted for water

Blanket cost is assumed as shown below and be shown in Supporting report sub-chapter 10.2-2.

Table 10.4-1-1 Blanket cost and Accounted for water

Item	Amount
Blanket Cost for rate calculation period (thousand Tk)	2,858,250
Accounted-for water for rate calculation period (thousand m ³)	329,102
Average unit cost (Tk / m ³)	8.68

Note: Amount is calculated in accordance with only one assumption.

(2) Requirement for Rate Setting

1) Financial Plan

(a) Premise on Tariff Calculation

Increase of the blanket cost is shown in Supporting report sub-chapter 10.2-2.

(b) Breakdown of Blanket Cost

In forms of elements, blanket cost principally consists of salary, energy, chemicals, repair, depreciation, interest of payment and other expenses, and is multiplied from 2001 to 2005. Blanket cost is classified in basic and commodity charges. Basic charge includes meter cost, meter reading and collection related cost as customer cost.

Otherwise commodity charge includes maintenance, depreciation, interest of payment, chemicals, power cost etc., as fixed and variable cost. Breakdown of blanket cost is illustrated in Figure 10.4-1-1.

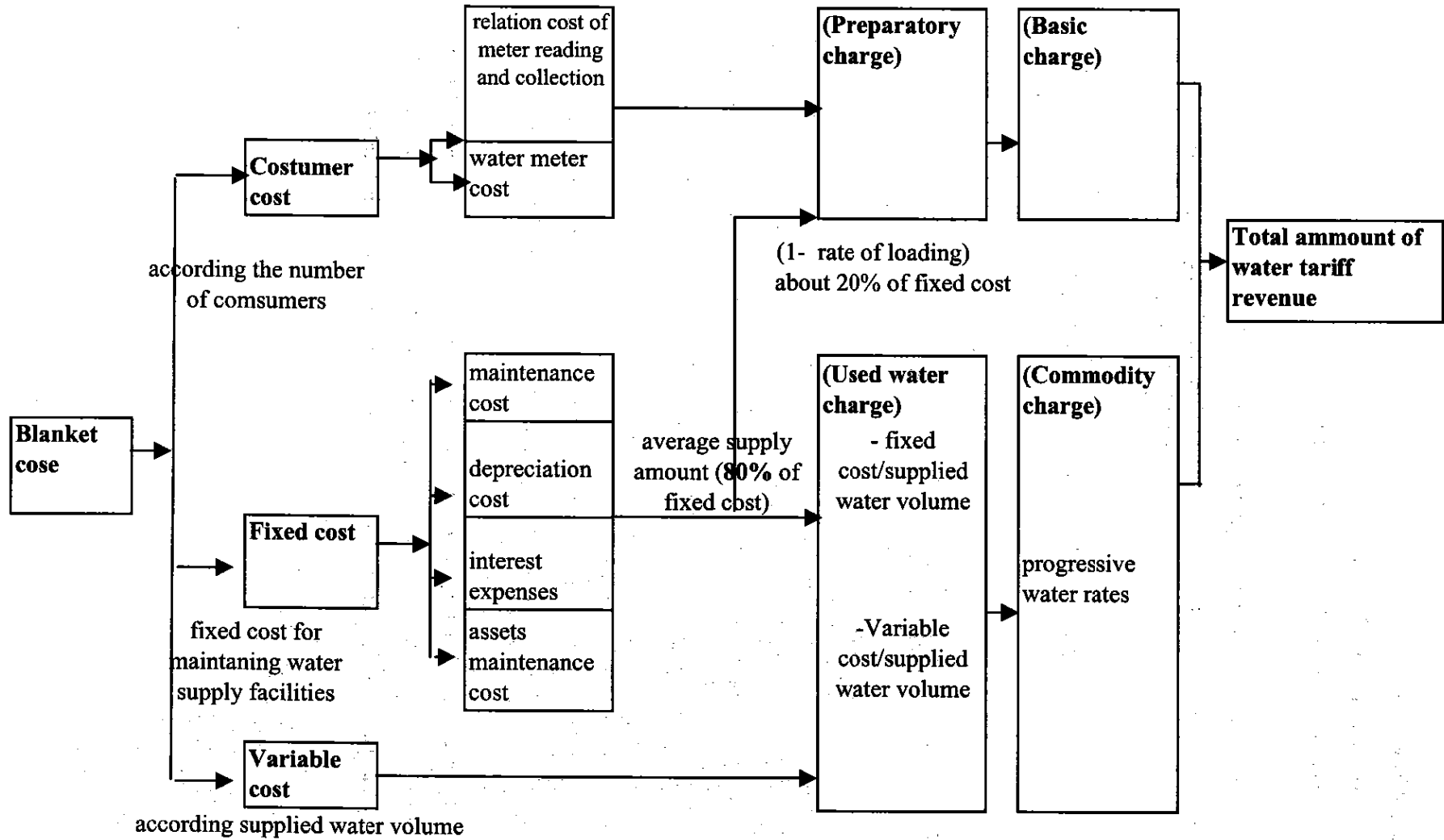


Figure 10.4-1-1 Breakdown of Blanket Cost

(3) Setting of Water Rate

1) New Water Tariff Table Proposed

New Tariff Table proposed is shown in Table 10.4-1-2.

Table 10.4-1-2 A sample of progressive water rate system

Purpose	Basic rate (Tk)	Volumetric charge (per 1 m ³)	
		Volume range: m ³	Tk/m ³
Domestic	100	11 - 70	5.0
		71 - 110	6.0
		111 -	7.0
Non-domestic	100	11 - 70	5.0
		71 - 110	6.0
		111 - 200	7.0
		201 - 300	7.5
		301 -	8.0
Hydrant	100	11 -	1.1

2) Crossed Subsidies on the Tariff Table

The present level of crossed subsidies on the tariff table is 2.8 times the domestic charge. The proposed new tariff will be converted to a charge system so that a difference between domestic and non-domestic use does not exist. However the non-domestic users generally consume more water than domestic users, and therefore are charged high tariff.

3) Reduction and Exemption of Water Tariff

In CWASA, the rate of reduction and exemption for users in some categories is not set. Actually, exemption for social weak people has done through Hydrant and Religious Institution.

The object and rate of water reduction should be set in harmony with the tariff policy of CWASA. As an example, reduction and exemption of the water tariff in Japan, which is adopted in case of per-object and progressive rate system, is presented in Table 10.4-1-3.

Table 10.4-1-3 Reduction and exemption of Water Tariff in Japan (Sample)

Object	Item	Contents
For personal	Family of welfare Family of disabled person Family of week-minded child Family of duplicated lesion-person Family of aged person who can not work Family of heavy dementia aged person Family of needing the aid of medical expenses	Reduction of basic rate
For corporation	Facility of social welfare Medical facility Facility of aged person health School pool	40% reduction of basic rate 12% reduction of basic rate 12% reduction of basic rate Settled price reduction

(4) Evaluation of Tariff Level

1) Social Affordability of New Water Tariff Table

An average household expenditure of drinking water for domestic users is about Tk. 180 per month in assumption. This payment level is equivalent to 26 m³ consumption for domestic user in the proposed tariff table.

(5) Introduction of Tariff Table in other countries

The table shown in Table 10.4-1-4 presents the water tariff schedule of Tokyo, Japan in 1996, which adopts the metered rate system with the “per-diameter charge”.

Table 10.4-1-4 Present Tariff Table of Tokyo, Japan

Diameter (mm)	Basic rate (pipe size) (US \$)	Volumetric charge (per 1 m ³) (Volume range: m ³)	
			(US \$/m ³)
13	8.70	1 - 10	0
		11 - 20	1.23
		21 - 30	1.65
20	11.63	31 - 100	2.03
		101 - 200	2.84
		201 - 1,000	3.54
25	14.37	1,001 -	3.92
30	32.33	1 - 100	2.03
		101 - 200	2.84
		201 - 1,000	3.54
40	64.75	1,001 -	3.92
50	195.67	1 - 1,000	3.54
75	431.04	1,001 -	3.92
100	893.28	1-	3.92
150	1,502.98		
200	3,232.82		
250	4,423.86		
300up	7,543.25		
Public bath	Same as upper till 40 of diameter	1 - 10	0
		11 -	1.04

Note: The rate of exchange to US dollars is TK 50, Peru Soles 3.458, Yen 105.79, respectively.

Average number of domestic contracts in 1996 was 5,422,758. The total supply volume in 1996 was 1,502,473,770 m³. Therefore the average monthly consumption of water per household is estimated at 23 m³ (=1502473770/5422758/12). From this figure, the monthly water charge is computed at US\$ 25.95 (=8.70+1.23x10+1.65x3) for 13mm user. Adding the consumption tax of 5 percent, the monthly water charge is US\$ 27.24.

The table shown in Table 10.4-1-5 presents the water tariff schedule of Yokohama city, Japan in 1996, which adopts the metered rate system with the "per-object charge".

Table 10.4-1-5 Present Tariff Table of Yokohama, Japan

Object	Basic volume (m ³)	Basic rate (US \$)	Volumetric charge (per 1 m ³)	
			(Volume range: m ³)	(US \$/m ³)
Domestic	10	6.99	11 - 20	1.41
			21 - 30	1.89
			31 - 50	2.25
			51 - 100	2.44
			101 -	2.76
Commercial & others	10	6.99	11 - 20	1.41
			21 - 30	1.89
			31 - 50	2.25
			51 - 100	2.44
			101 - 300	2.67
			301 - 1,000	3.05
			1,001 - 10,000	3.38
10,000 -	3.61			
Public bath	10	6.99	11 -	0.38

Note: The rate of exchange to US dollars is TK. 50, Peru Soles 3.458, Yen 105.79, respectively.

Average number of domestic contracts in 1996 was 1,444,837. The total supply volume in 1996 was 409,201,210 m³. Therefore the average monthly consumption of water per household is estimated at 24 m³ (=409201210/1444837/12). From this figure, the monthly water charge is computed at US\$ 28.65(=6.99+1.41x10+1.89x4) for 13mm user. Adding the consumption tax of 5 percent, the monthly water charge is about US\$ 30.08.

The table shown in Table 10.4-1-6 presents the water tariff schedule of Lima, Peru in 1999, which adopts the metered rate system with the "per- object charge".

Table 10.4-1-6 Present Tariff Table of Lima, Peru

User categories	Monthly Consumption (m ³ /month)	Unit cost (US \$/m ³)
Social	0 -	0.23
Domestic	0 - 20	0.23
	21 - 30	0.32
	31 - 50	0.45
	51 - 80	0.62
	81 -	0.87
Commercial	0 -	0.84
Industrial	0 -	0.84
State	0 -	0.42
Base rate	Per connection	0.90 (US \$/month)

Note: The rate of exchange to US dollars is TK. 50, Peru Soles 3.458, Yen 105.79, respectively.

Average monthly consumption per household is estimated at 23 m³. From this figure, the

monthly water charge is computed at US\$ 6.46 ($=0.90+0.23 \times 20+0.32 \times 3$).