







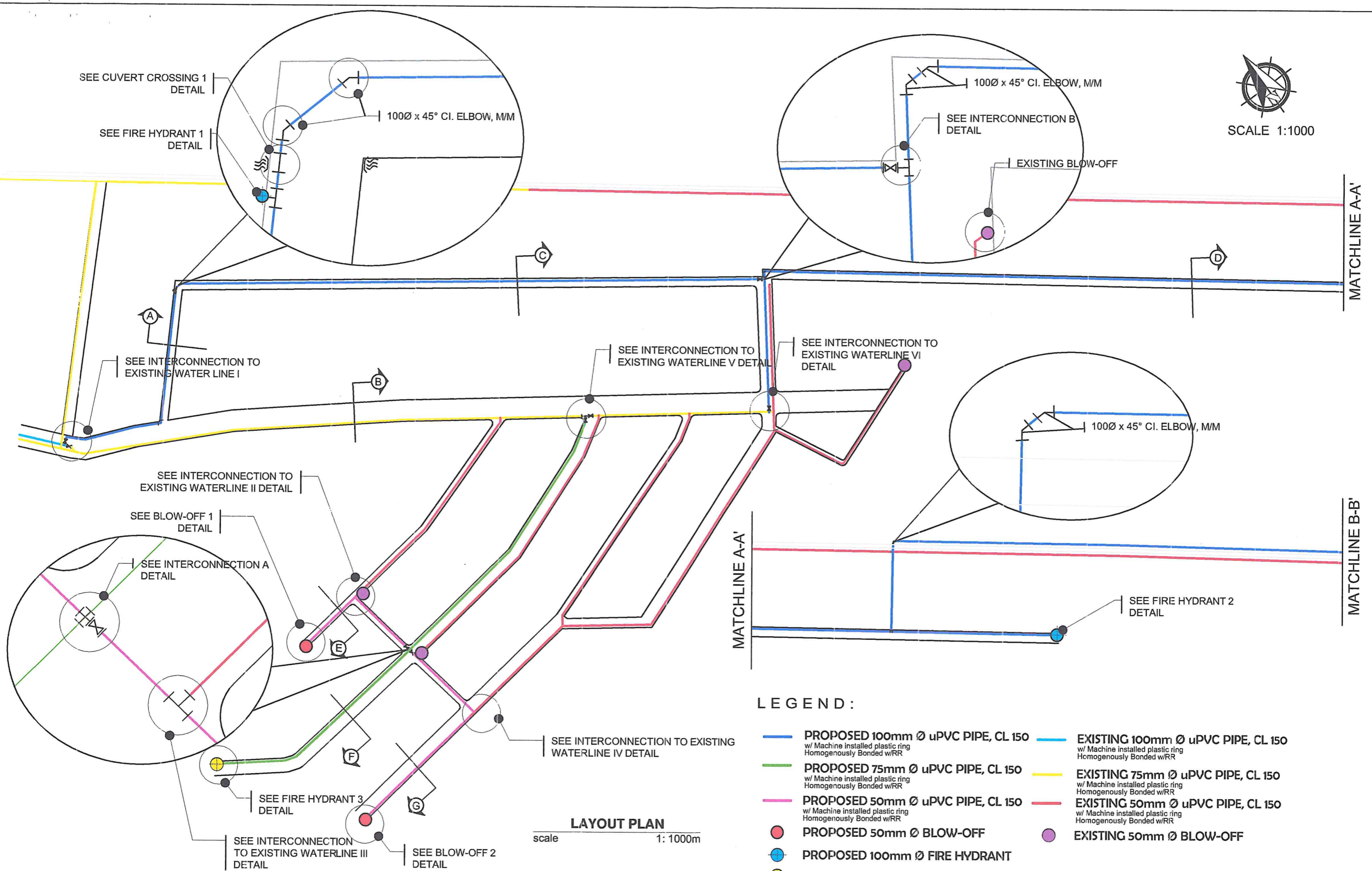
SCALE 1:4650

VICINITY MAP
SCALE : 1:4650

 <p>Republic of the Philippines METROPOLITAN NAGA WATER DISTRICT 40 J. Miranda Avenue, Naga City</p>	PREPARED BY:  SHARMAINE E. BRACIA <small>OIC - DMA, PDCD</small>	CHECKED BY:  SONJUN O. MILLARES <small>OIC - DEPT. MGR., EED</small>	 NOEL A. MARTINEZ JR. <small>OIC - DEPT. MGR., PAMD</small>	 ROGUE S. FRANCISCO <small>AGM, O & TS</small>	 FLORENCIO T. MONGOSO JR. <small>General Manager A</small>	PROJECT TITLE/LOCATION: PROPOSED WATERLINE EXTENSION PROJECT ZONE 4A, ST. CLARE SUBDIVISION (URBAN POOR), CONCEPCION PEQUEÑA, NAGA CITY Total Length = 1373 Lm	SHEET CONTENTS : Vicinity Map	SHEET NO.: 1 / 11 <small>10 - 2024</small>
	CAD BY: JL PEÑAS							



SCALE 1:1000



LEGEND :

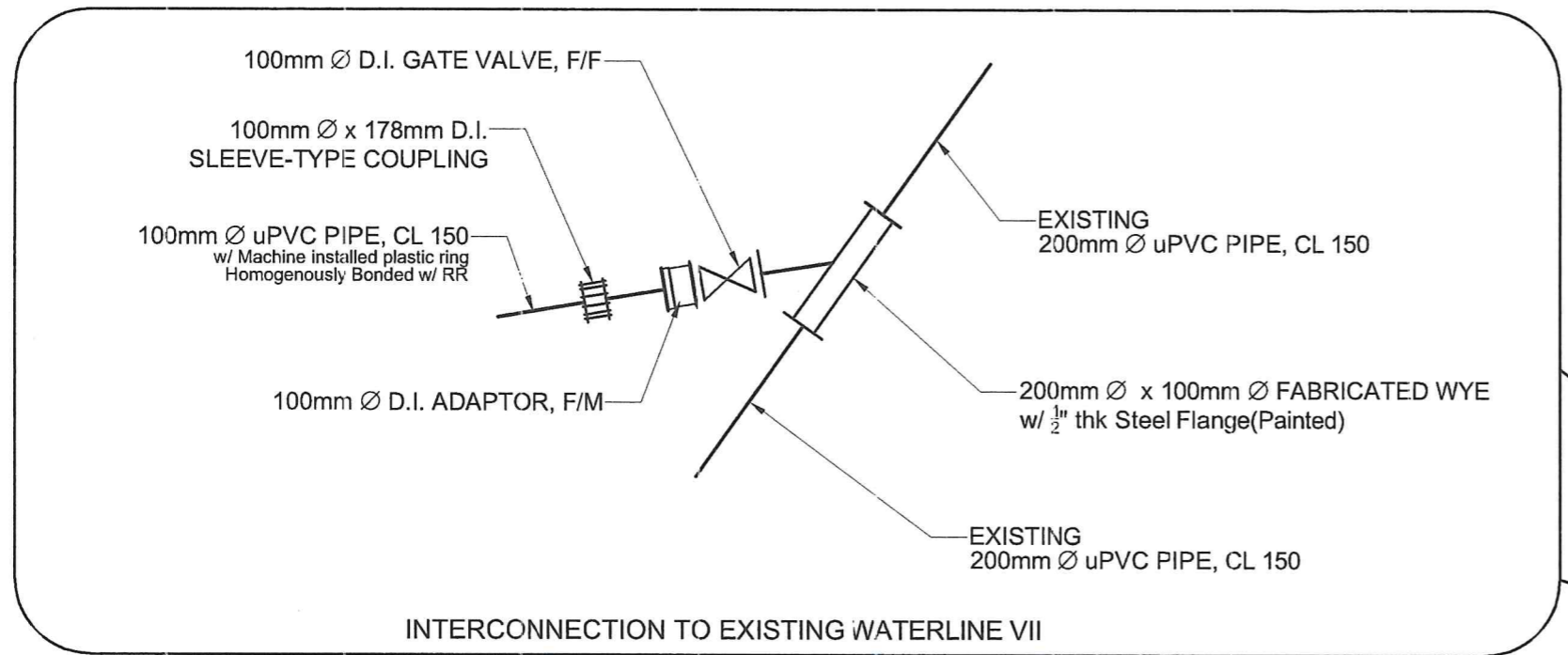
- PROPOSED 100mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogenously Bonded w/RR
- PROPOSED 75mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogenously Bonded w/RR
- PROPOSED 50mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogenously Bonded w/RR
- EXISTING 100mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogenously Bonded w/RR
- EXISTING 75mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogenously Bonded w/RR
- EXISTING 50mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogenously Bonded w/RR
- PROPOSED 50mm Ø BLOW-OFF
- PROPOSED 100mm Ø FIRE HYDRANT
- PROPOSED 75mm Ø FIRE HYDRANT
- EXISTING 50mm Ø BLOW-OFF

LAYOUT PLAN
scale 1: 1000m

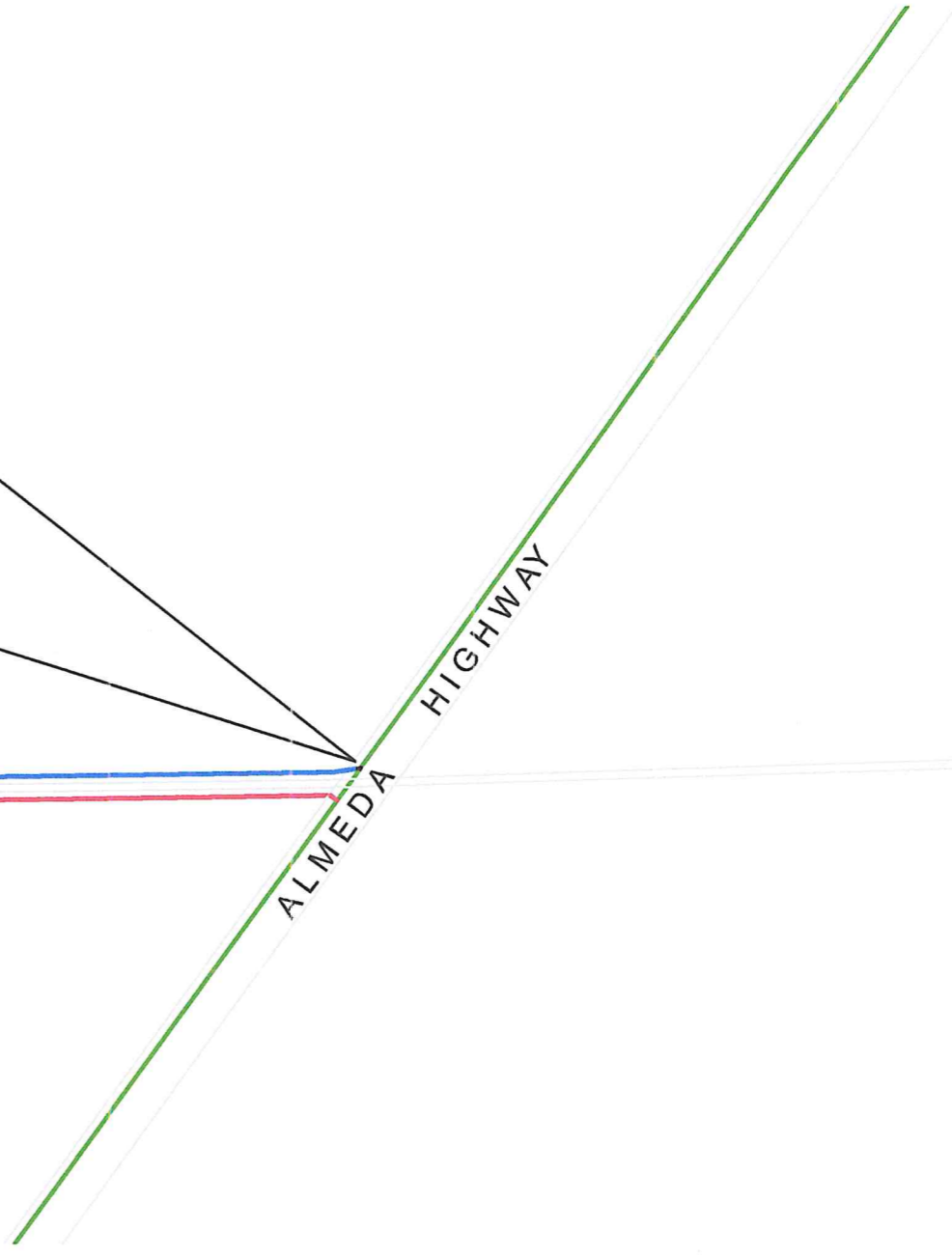
<p>Republic of the Philippines METROPOLITAN NAGA WATER DISTRICT 40 J. Miranda Avenue, Naga City</p>	PREPARED BY:	CHECKED BY:	RECOMMENDING APPROVAL:	APPROVED BY :	PROJECT TITLE/LOCATION:	SHEET CONTENTS :	SHEET NO.:
	 SHARMAINE B. BRACIA OIC - DMA, PDCD	 SONJUN O. MILLARES OIC - DEPT. MGR., EED	 NOEL A. MARTINEZ JR. OIC - DEPT. MGR., PAMD	 ROQUE S. FRANCISCO AGM, O & TS	 FLORENCIO T. MONGOSO JR. General Manager A	PROPOSED WATERLINE EXTENSION PROJECT ZONE 4A, ST. CLAIRE SUBDIVISION (URBAN POOR), CONCEPCION PEQUEÑA, NAGA CITY Total Length = 1373Lm	Layout
						CAD BY: JL PEÑAS	10 - 2024



MATCHLINE B-B' MATCHLINE C-C'



MATCHLINE C-C'



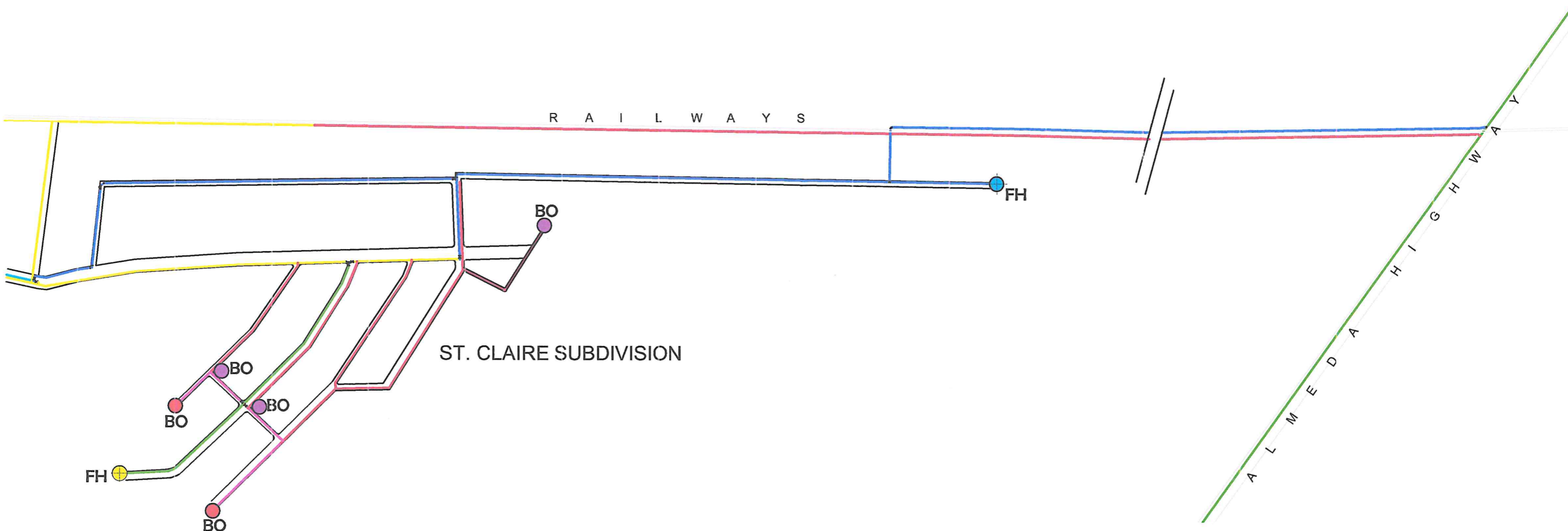
LEGEND :

- PROPOSED 100mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogeneously Bonded w/RR
- PROPOSED 75mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogeneously Bonded w/RR
- PROPOSED 50mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogeneously Bonded w/RR
- PROPOSED 50mm Ø BLOW-OFF
- PROPOSED 100mm Ø FIRE HYDRANT
- PROPOSED 75mm Ø FIRE HYDRANT
- EXISTING 200mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogeneously Bonded w/RR
- EXISTING 100mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogeneously Bonded w/RR
- EXISTING 75mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogeneously Bonded w/RR
- EXISTING 50mm Ø uPVC PIPE, CL 150
w/ Machine installed plastic ring
Homogeneously Bonded w/RR
- EXISTING 50mm Ø BLOW-OFF

LAYOUT PLAN

scale 1:1000m

<p>Republic of the Philippines METROPOLITAN NAGA WATER DISTRICT 40 J. Miranda Avenue, Naga City</p>	PREPARED BY:	CHECKED BY:	RECOMMENDING APPROVAL:	APPROVED BY:	PROJECT TITLE/LOCATION:	SHEET CONTENTS :	SHEET NO.:	
	 SHARMAINE BRACIA <small>OIC - DMA, PDCD</small>	 SONJUN O. MILLARES <small>OIC - DEPT. MGR., EED</small>	 NOEL A. MARTINEZ JR. <small>OIC - DEPT. MGR., PAMD</small>	 ROQUE S. FRANCISCO <small>AGM, O & TS</small>	 FLORENCIO T. MONGOSO JR. <small>General Manager A</small>	PROPOSED WATERLINE EXTENSION PROJECT ZONE 4A, ST. CLAIRE SUBDIVISION (URBAN POOR), CONCEPCION PEQUEÑA, NAGA CITY Total Length = 1373Lm	Layout	3 11
						CAD BY: JL PEÑAS	10 - 2024	









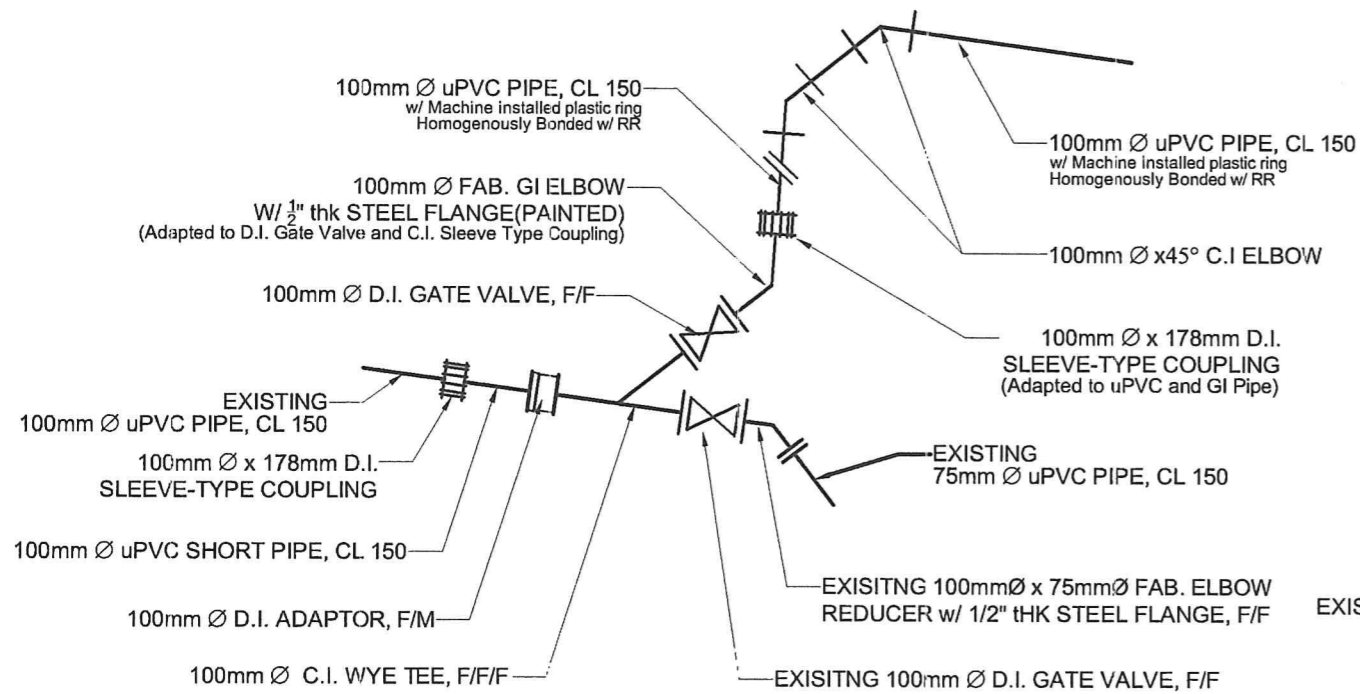
LEGEND :

- PROPOSED 100mm Ø uPVC PIPE, CL 150
w/ Machine installed pastic ring
Homogenously Bonded w/RR
 - PROPOSED 75mm Ø uPVC PIPE, CL 150
w/ Machine installed pastic ring
Homogenously Bonded w/RR
 - PROPOSED 50mm Ø uPVC PIPE, CL 150
w/ Machine installed pastic ring
Homogenously Bonded w/RR
 - PROPOSED 50mm Ø BLOW-OFF
 - PROPOSED 100mm Ø FIRE HYDRANT
 - PROPOSED 75mm Ø FIRE HYDRANT
- EXISTING 100mm Ø uPVC PIPE, CL 150
w/ Machine installed pastic ring
Homogenously Bonded w/RR
 - EXISTING 75mm Ø uPVC PIPE, CL 150
w/ Machine installed pastic ring
Homogenously Bonded w/RR
 - EXISTING 50mm Ø uPVC PIPE, CL 150
w/ Machine installed pastic ring
Homogenously Bonded w/RR
 - EXISTING 50mm Ø BLOW-OFF

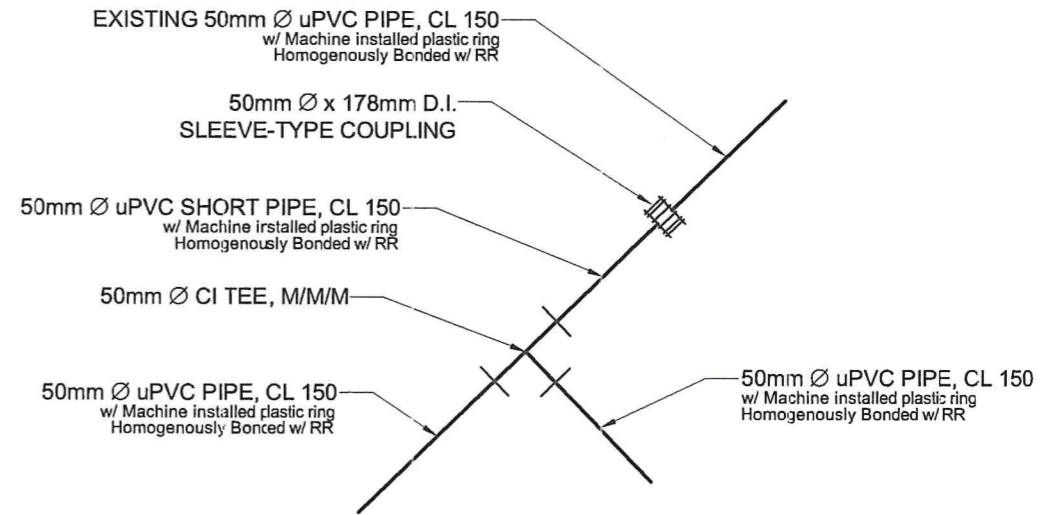
LAYOUT PLAN

scale 1: 7,500m

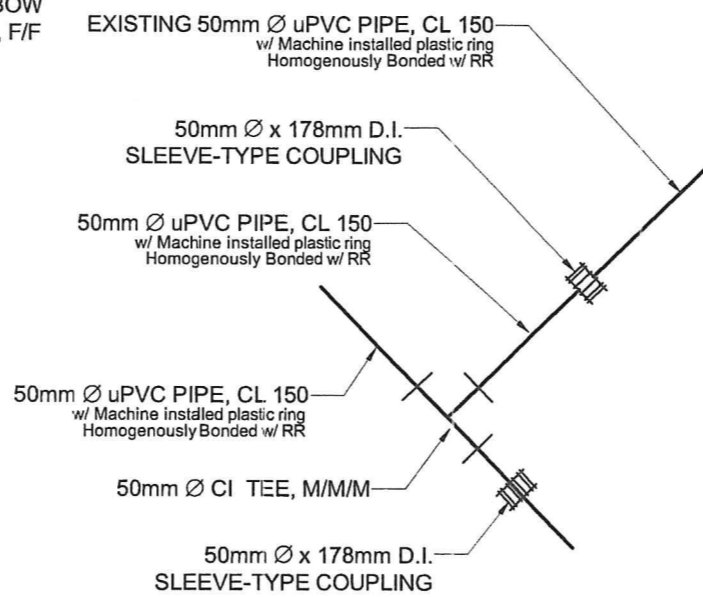
 Republic of the Philippines METROPOLITAN NAGA WATER DISTRICT 40 J. Miranda Avenue, Naga City	PREPARED BY:	CHECKED BY :	RECOMMENDING APPROVAL:	APPROVED BY :	PROJECT TITLE/LOCATION:	SHEET CONTENTS :	SHEET NO.:
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						CAD BY: JL PEÑAS	10 - 2024



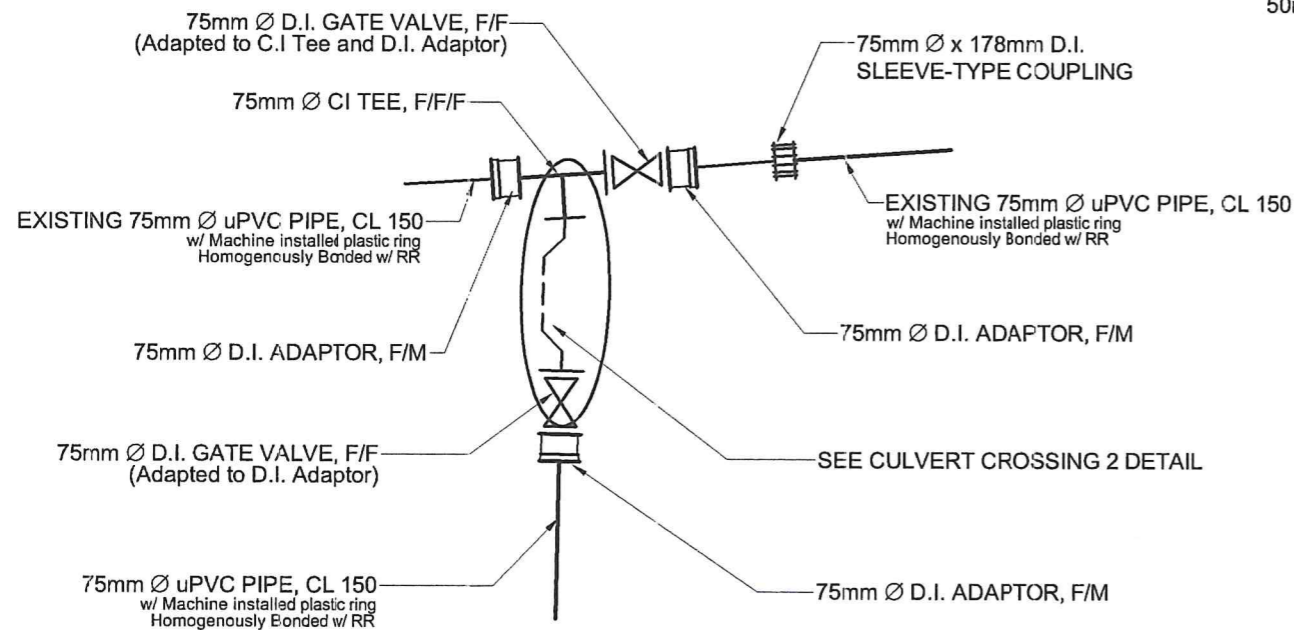
INTERCONNECTION I



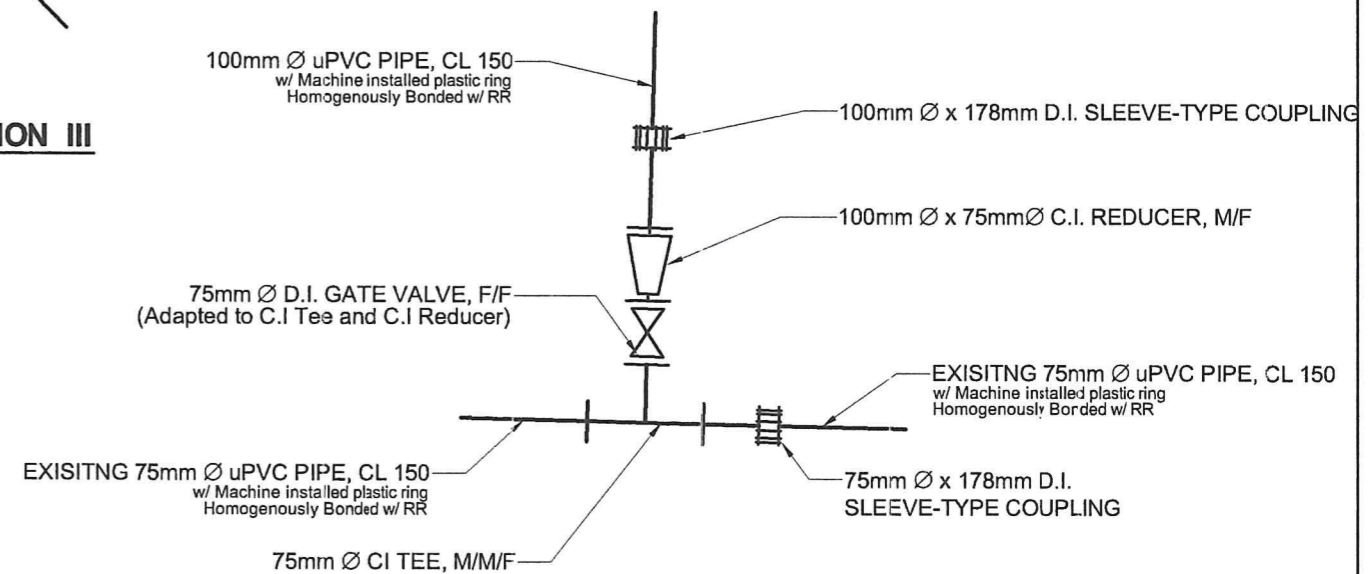
INTERCONNECTION II & IV



INTERCONNECTION III



INTERCONNECTION V



INTERCONNECTION VI

INTERCONNECTION TO EXISTING WATER LINE DETAIL

N T S



Republic of the Philippines
METROPOLITAN NAGA WATER DISTRICT
 40 J. Miranda Avenue, Naga City

PREPARED BY:
 SHARMAINE E. BRACIA
 OIC - DMA, PDCD

CHECKED BY:
 SONJUNO MILLARES
 OIC - DEPT. MGR., EED

NOEL A. MARTINEZ JR.
 OIC - DEPT. MGR., PAMD

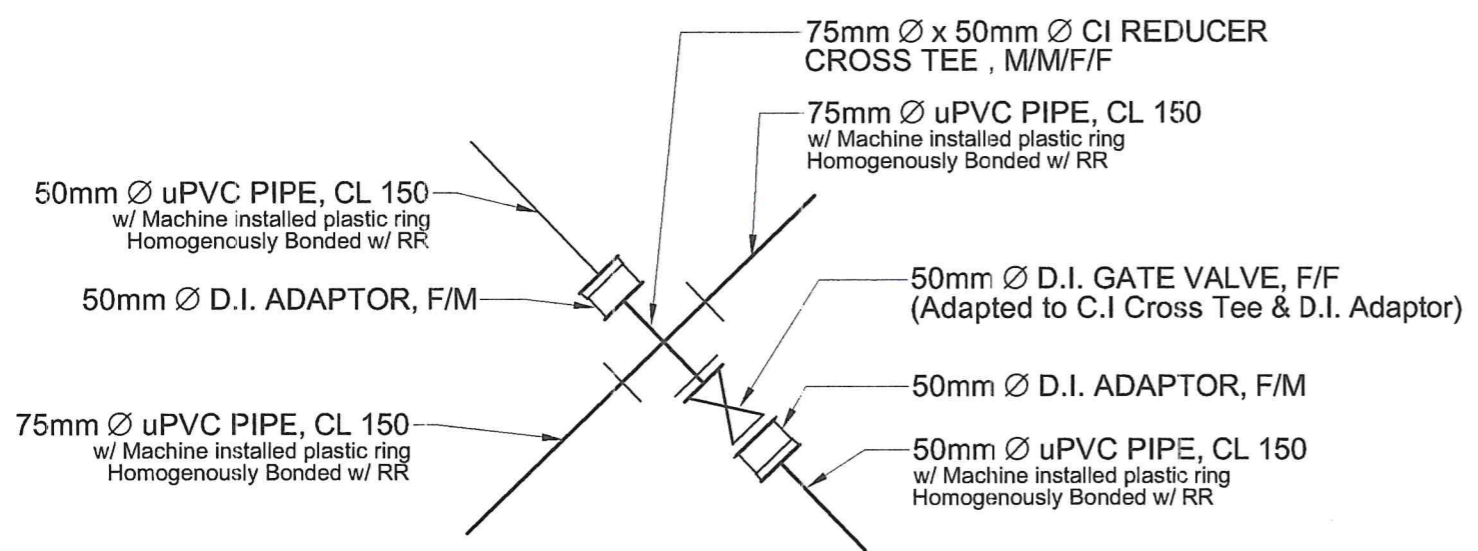
RECOMMENDING APPROVAL:
 ROQUE S. FRANCISCO
 AGM, O & TS

APPROVED BY:
 FLORENCIO T. MONGOSO JR.
 General Manager A

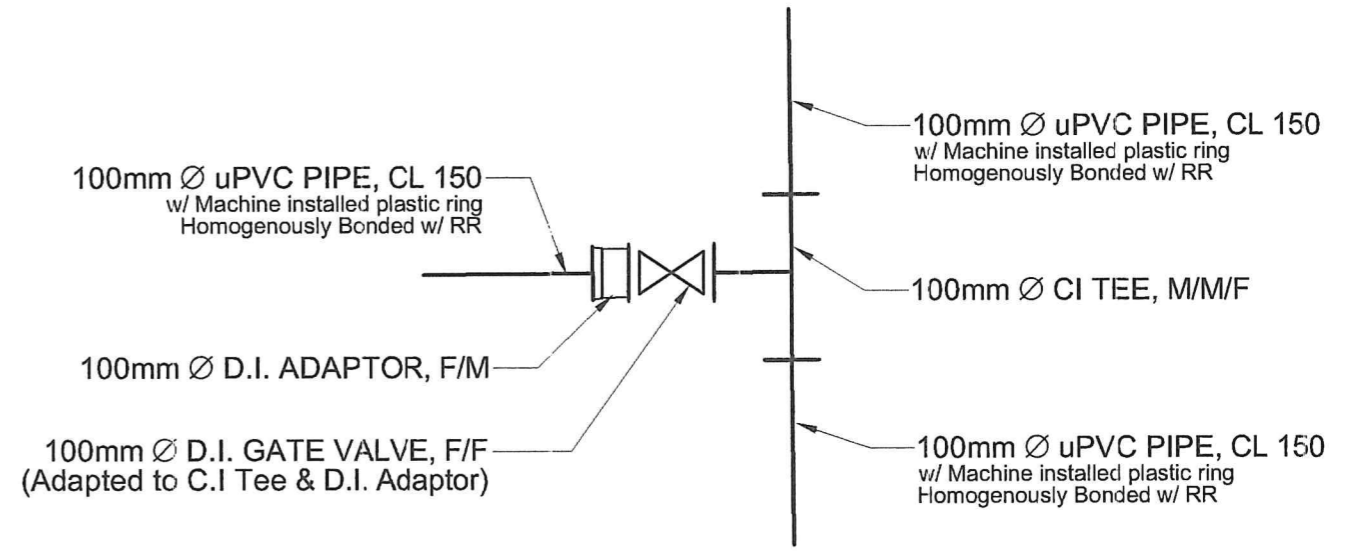
PROJECT TITLE/LOCATION:
PROPOSED WATERLINE EXTENSION PROJECT
 ZONE 4A, ST. CLAIRE SUBDIVISION (URBAN POOR),
 CONCEPCION PEQUEÑA, NAGA CITY
 Total Length = 1373Lm

SHEET CONTENTS :
 Interconnection Detail
 CAD BY: JL PEÑAS

SHEET NO.:
 4 / 11
 10 - 2024

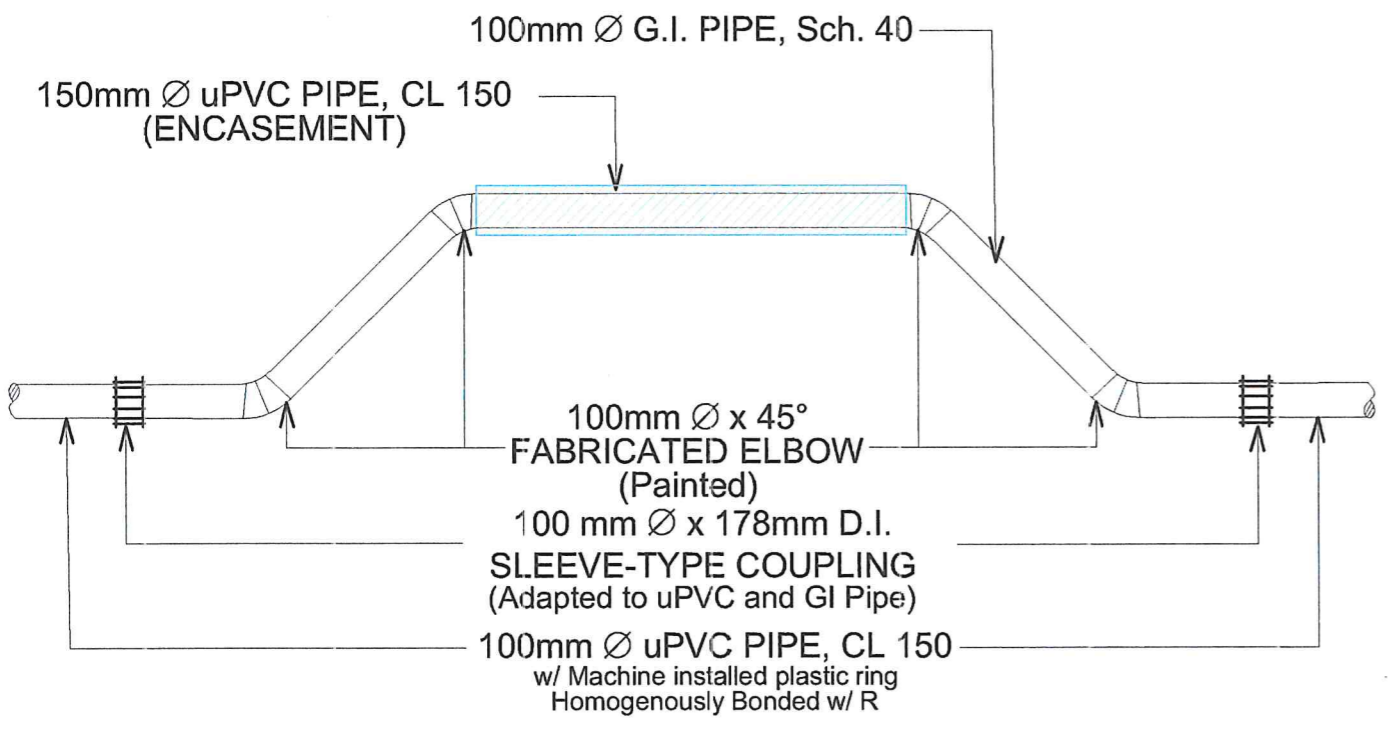


INTERCONNECTION A

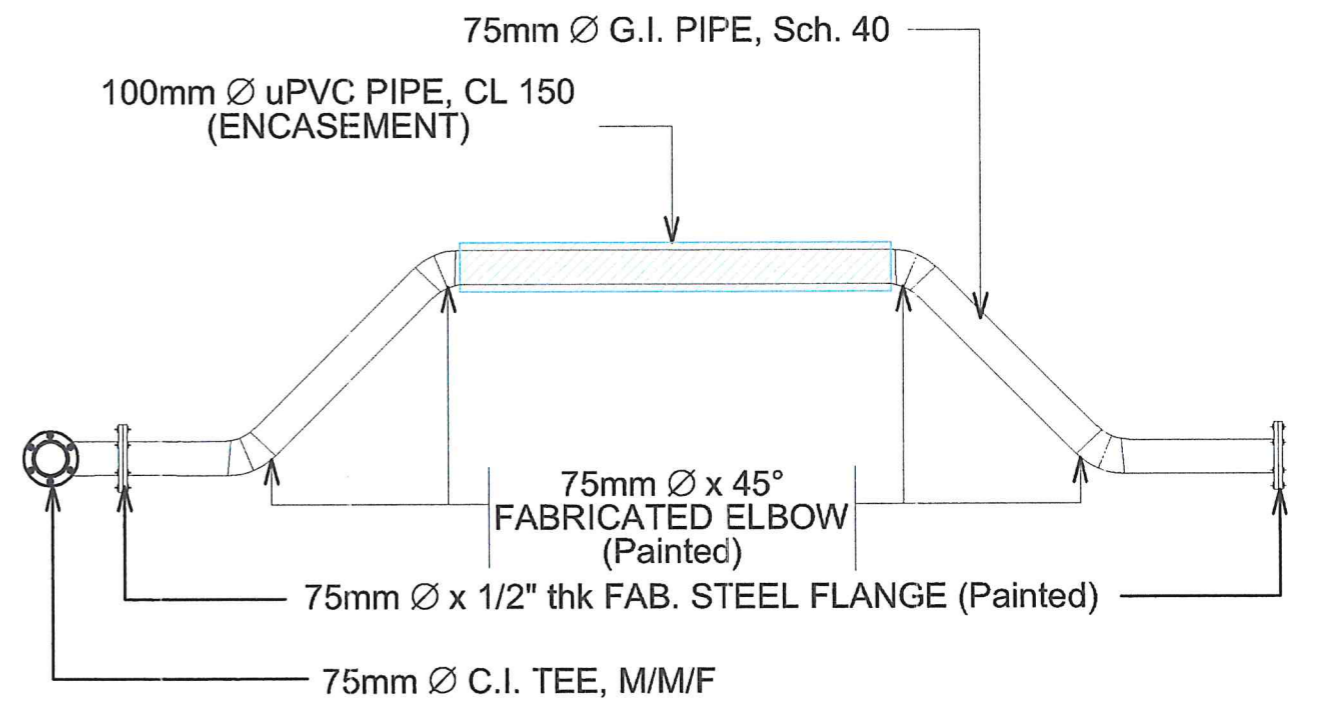


INTERCONNECTION B

INTERCONNECTION DETAIL
N T S



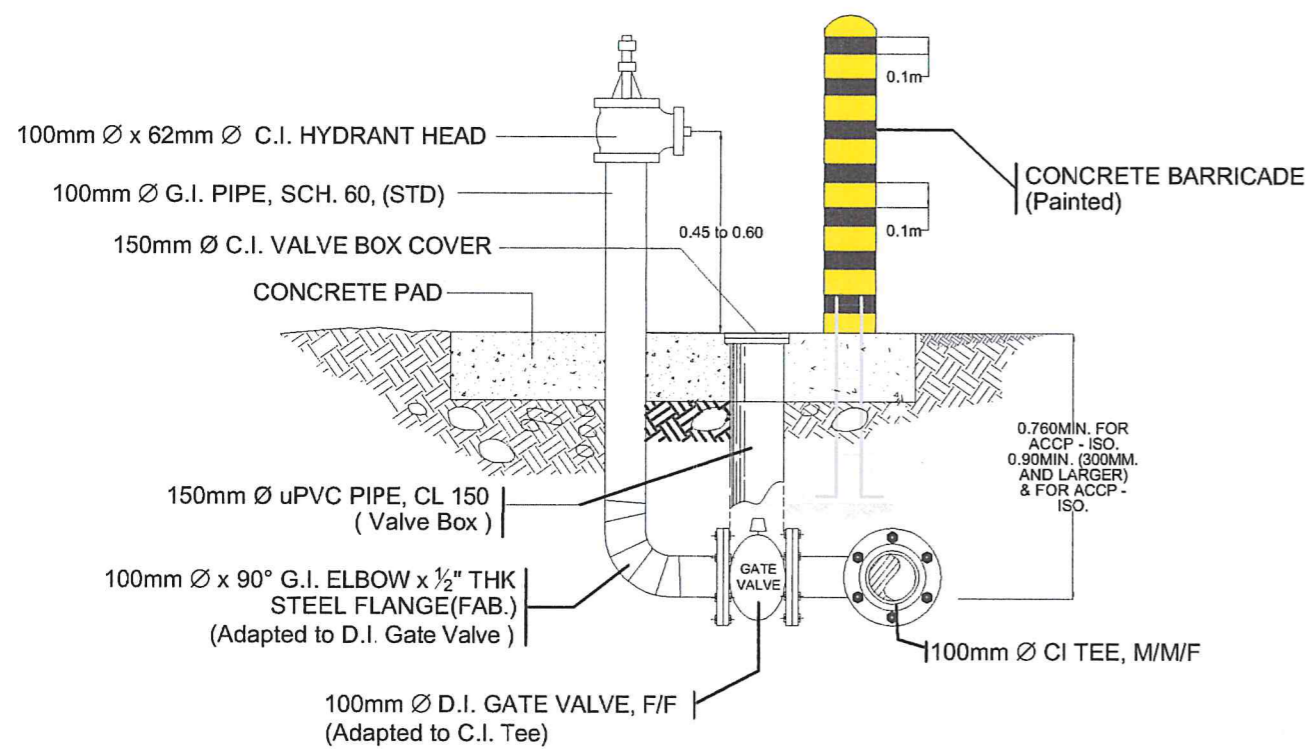
CULVERT CROSSING 1



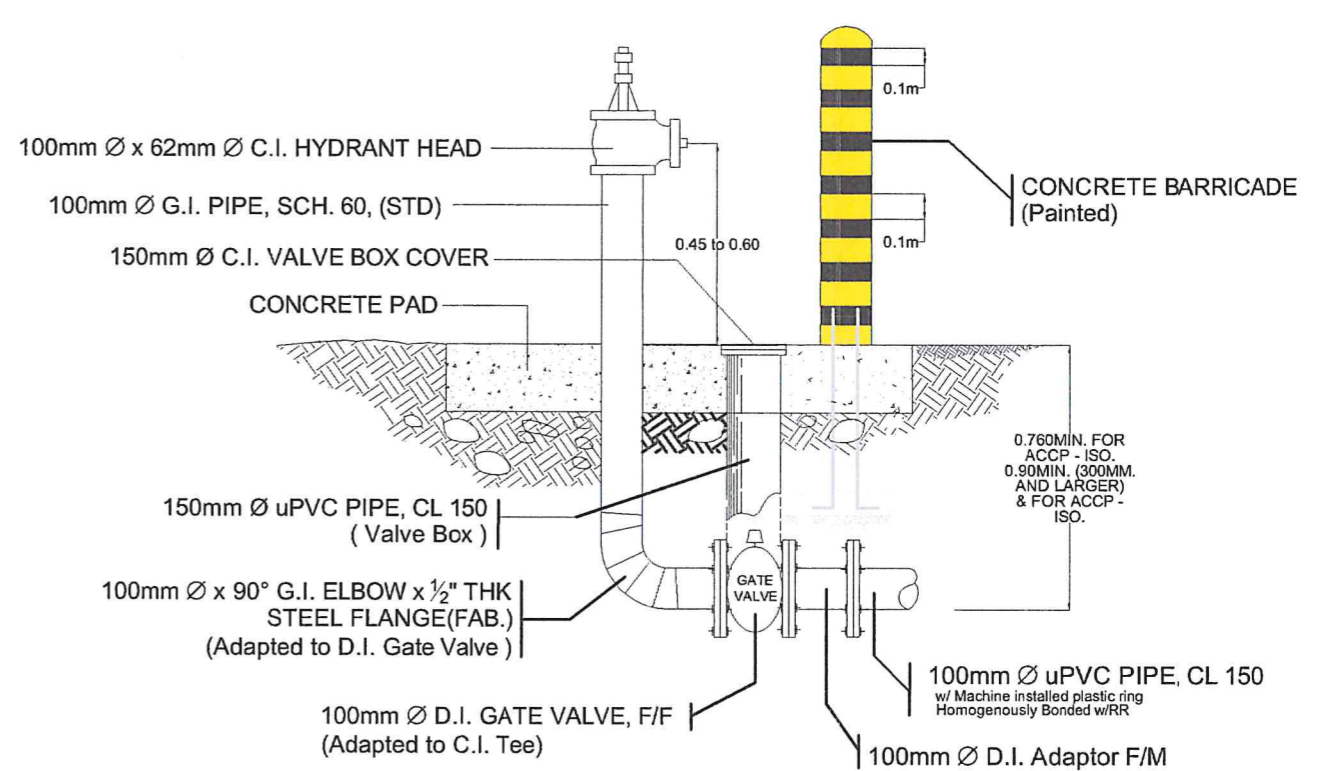
CULVERT CROSSING 3

CULVERT CROSSING DETAIL
N T S

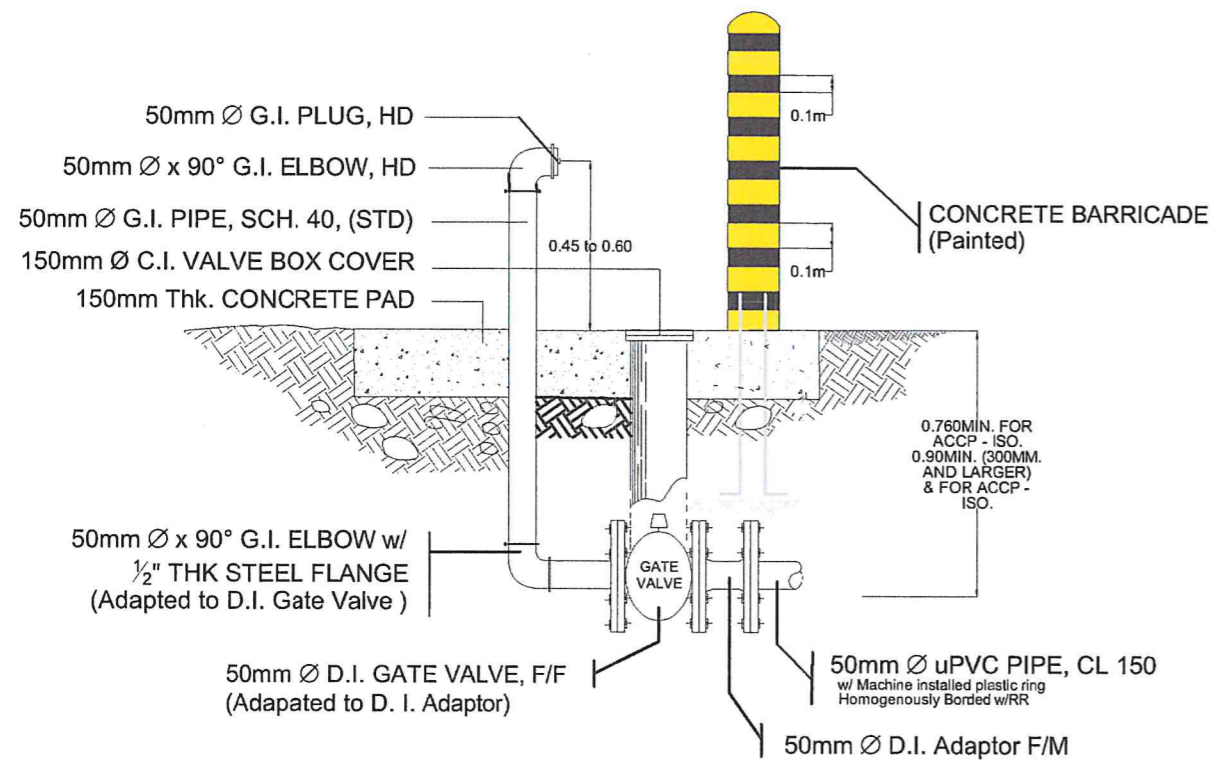
<p>Republic of the Philippines METROPOLITAN NAGA WATER DISTRICT 40 J. Miranda Avenue, Naga City</p>	PREPARED BY:	CHECKED BY:	RECOMMENDING APPROVAL:	APPROVED BY:	PROJECT TITLE/LOCATION:	SHEET CONTENTS:	SHEET NO.:
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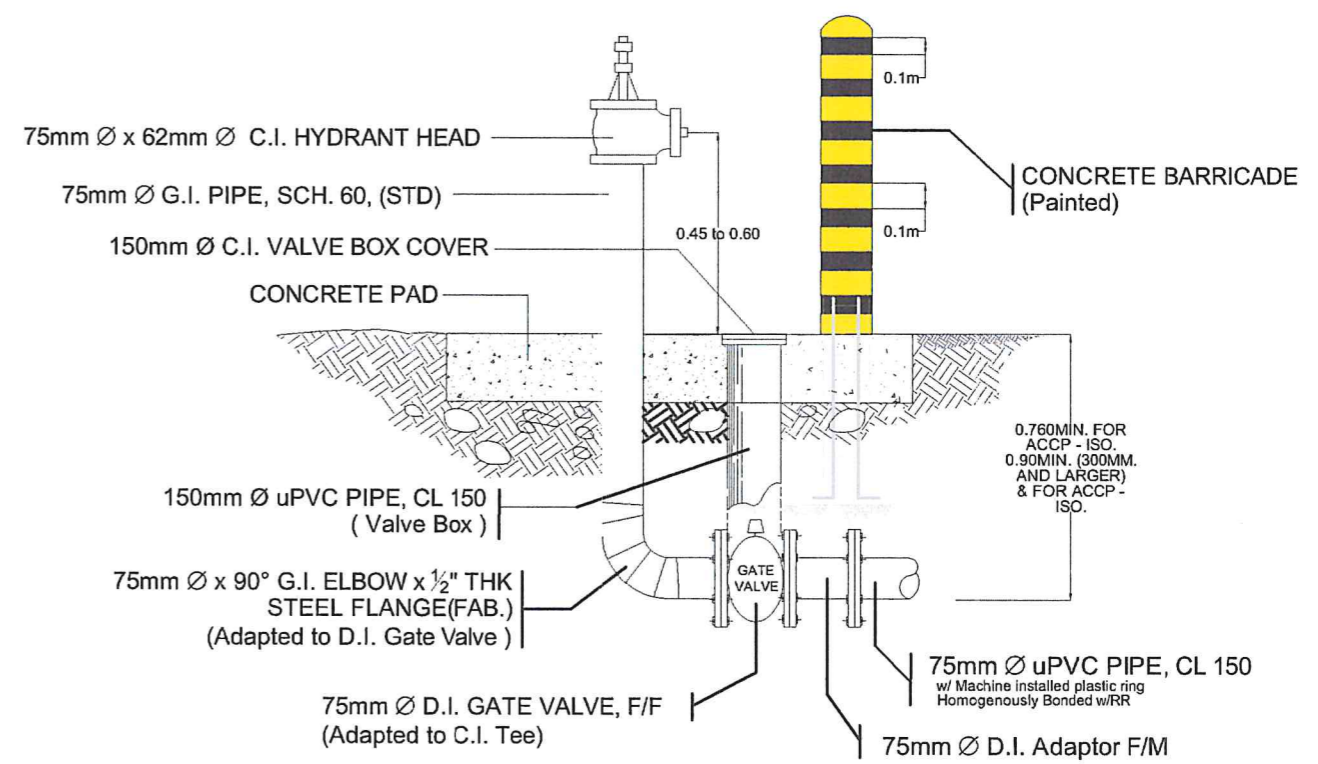
FIRE HYDRANT 1 DETAIL
not to scale



FIRE HYDRANT 2 DETAIL
not to scale



BLOW-OFF 1 and 2 DETAIL
not to scale

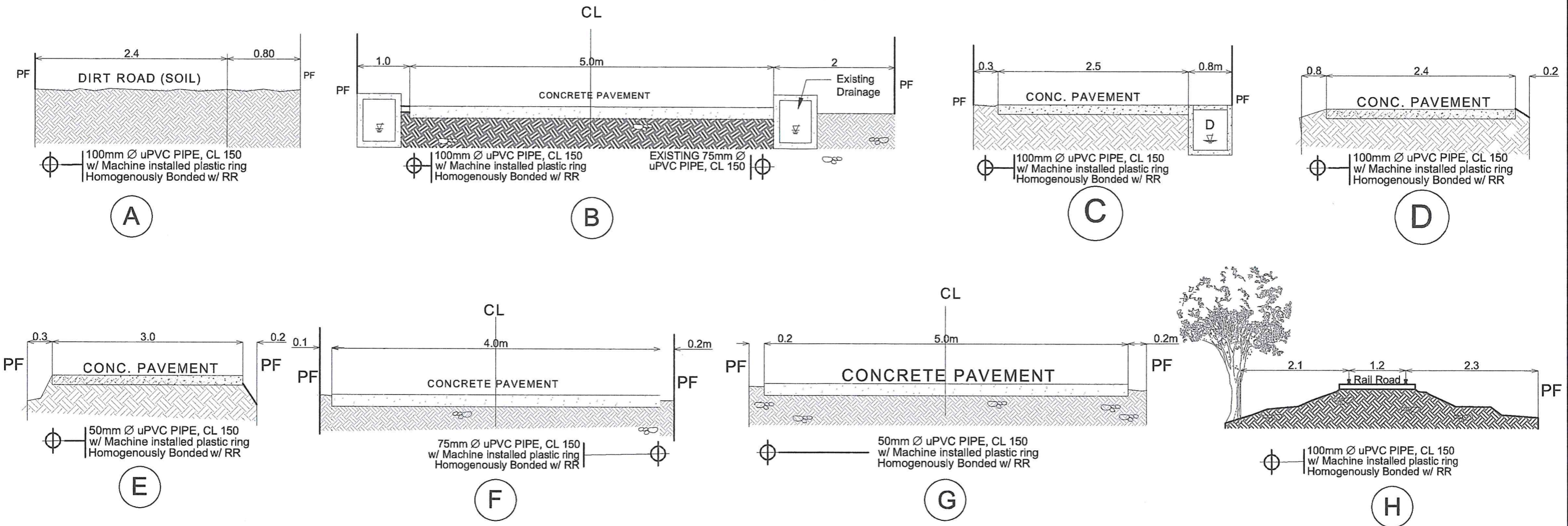


FIRE HYDRANT 3 DETAIL
not to scale

PREPARED BY: SHARMAINE E. BRACIA OIC - OMA, PDCD	CHECKED BY: SONJUN O. MILLARES OIC - DEPT. MGR., EED	RECOMMENDING APPROVAL: NOEL A. MARTINEZ JR. OIC - DEPT. MGR., PAMD	APPROVED BY: ROQUE S. FRANCISCO AGM, O & TS	APPROVED BY: FLORENCIO T. MONGOSO JR. General Manager A
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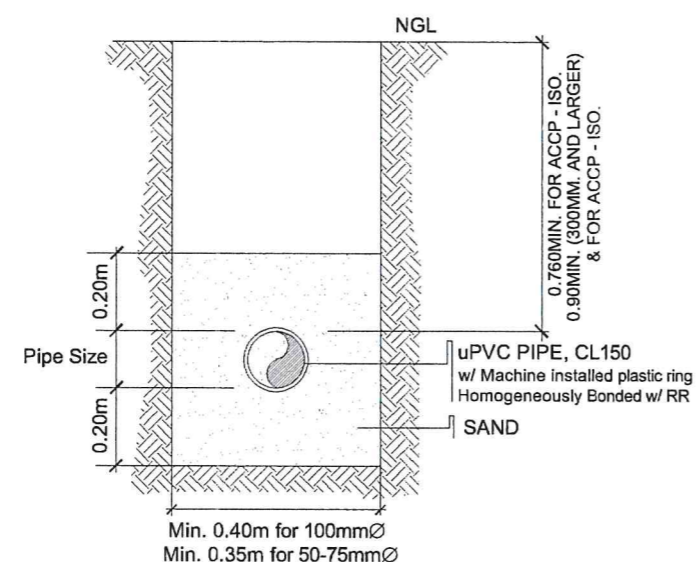
PROJECT TITLE/LOCATION: PROPOSED WATERLINE EXTENSION PROJECT ZONE 4A, ST. CLAIRE SUBDIVISION (URBAN POOR), CONCEPCION PEQUEÑA, NAGA CITY Total Length = 1373Lm

SHEET CONTENTS : Fire Hydrant Detail Blow-Off Detail	SHEET NO.: 6 11
CAD BY: JL PEÑAS	10 - 2024



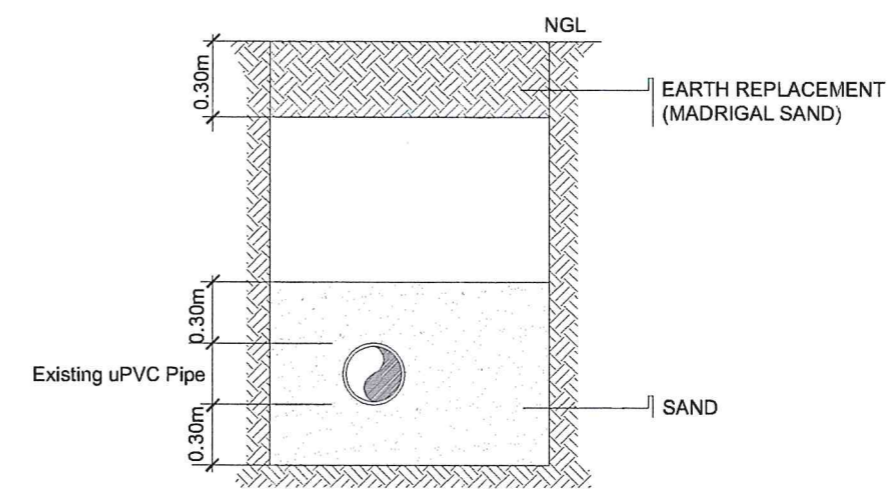
ROAD CROSS SECTION DETAIL

N T S



TRENCH DETAIL

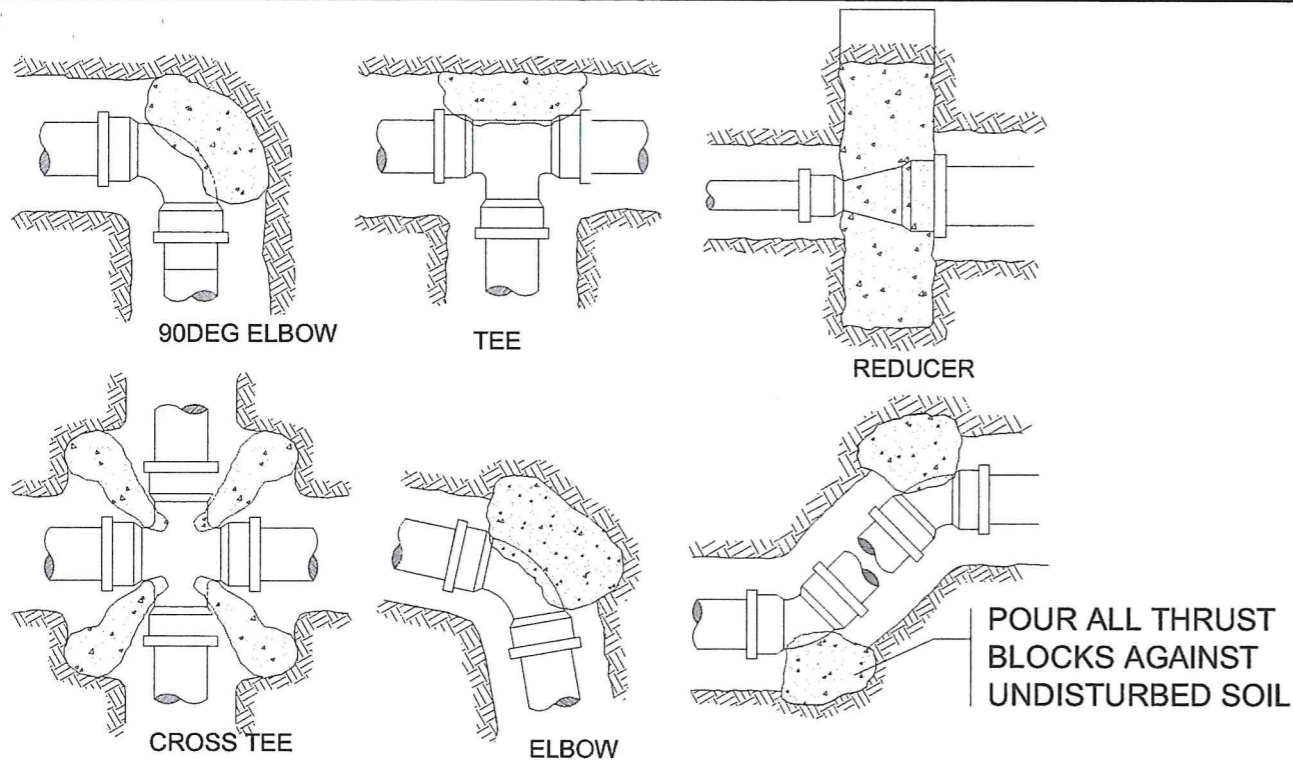
N T S



BELLHOLE DETAIL

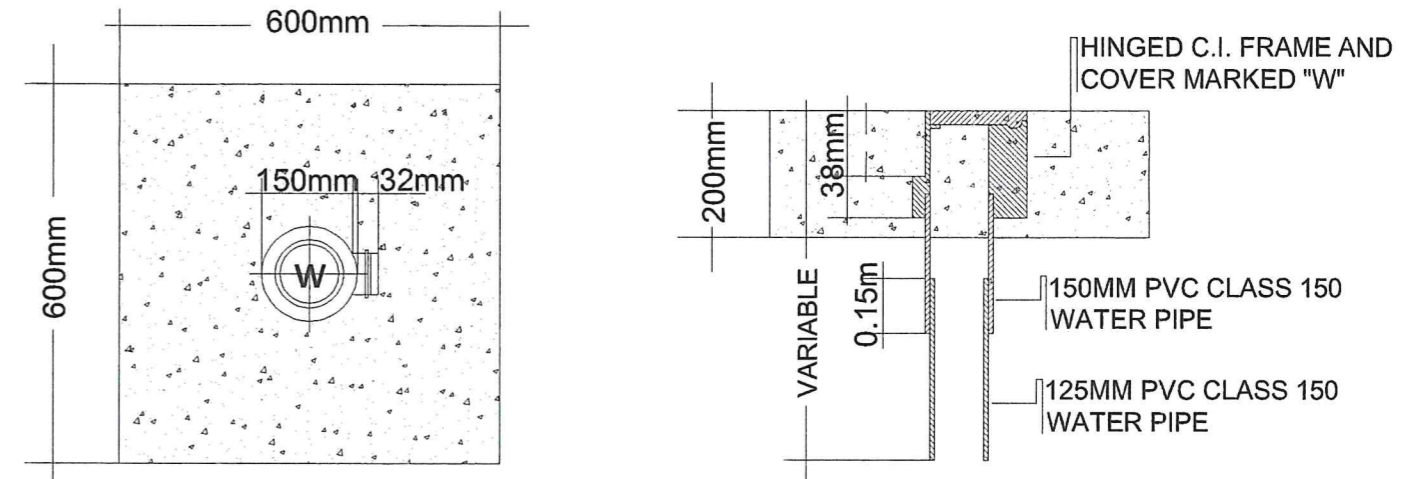
N T S

<p>Republic of the Philippines METROPOLITAN NAGA WATER DISTRICT 40 J. Miranda Avenue, Naga City</p>	PREPARED BY:	CHECKED BY:	RECOMMENDING APPROVAL:	APPROVED BY:	PROJECT TITLE/LOCATION:	SHEET CONTENTS :	SHEET NO.:	
	 SHARMAINE E. BRACIA OIC - DMA, PDCD	 SONJUN O. MILLARES OIC - DEPT. MGR., EED	 NOEL A. MARTINEZ JR. OIC - DEPT. MGR., PAMD	 ROQUE S. FRANCISCO AGM, O & TS	 FLORENCIO T. MONGOSO JR. General Manager A	PROPOSED WATERLINE EXTENSION PROJECT ZONE 4A, ST. CLAIRE SUBDIVISION (URBAN POOR), CONCEPCION PEQUEÑA, NAGA CITY Total Length = 1373Lm	Road Cross Section Detail Trench Detail Bellhole Detail	7 11
						CAD BY: JL PEÑAS	10 - 2024	



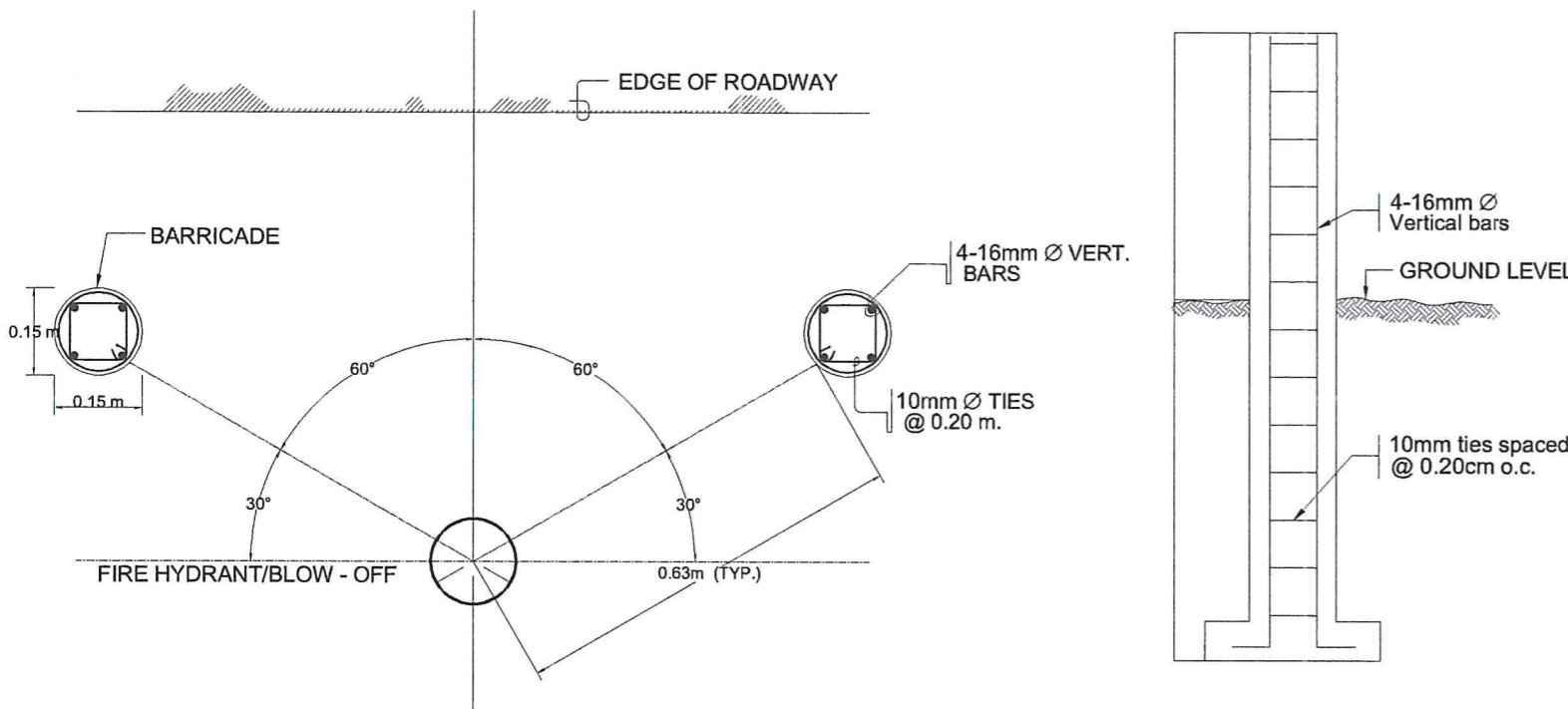
CONCRETE THRUST BLOCK DETAIL

not to scale



VALVE BOX & COVER DETAIL

not to scale

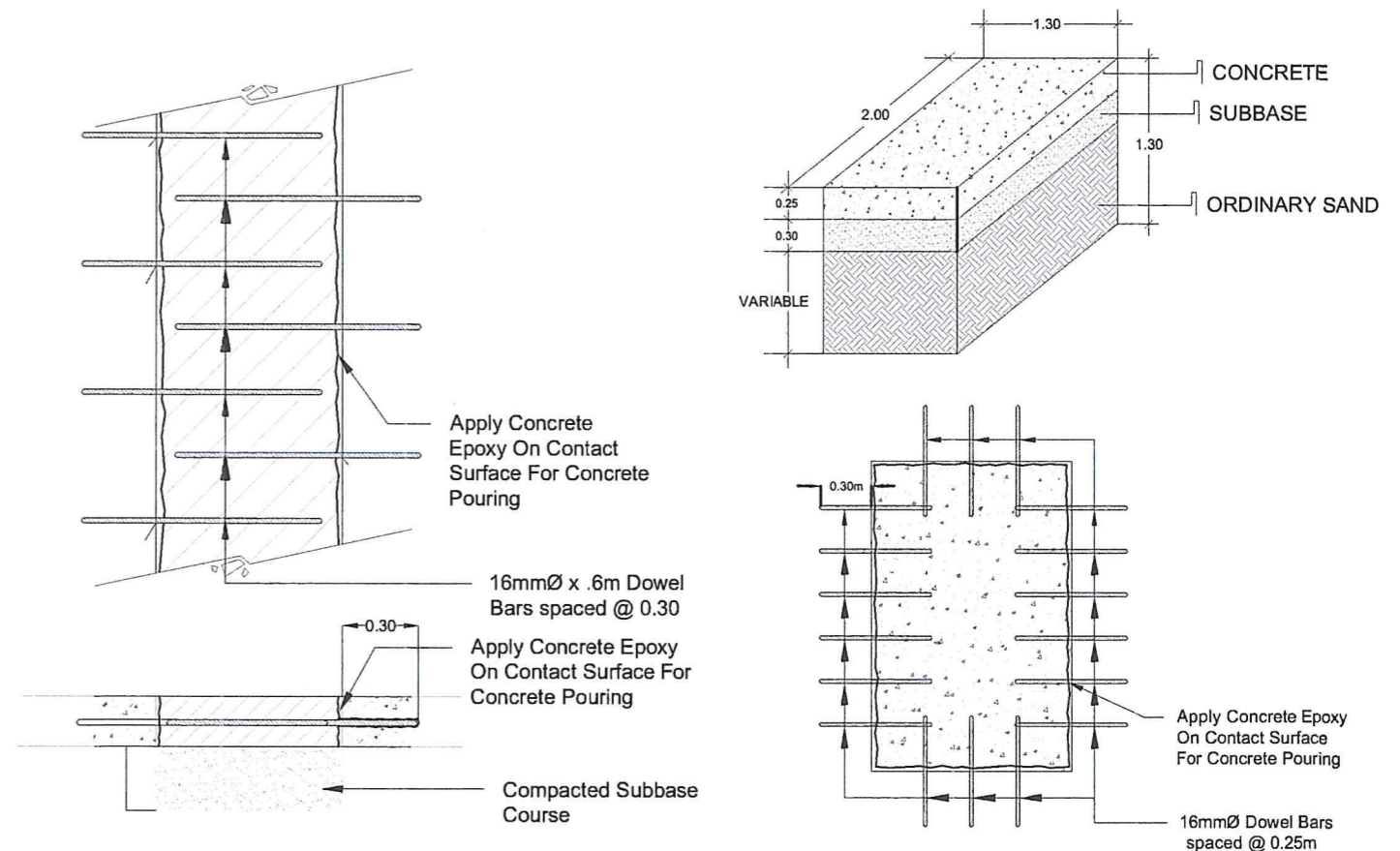


PLAN FOR SETTING BARRICADE

NOT TO SCALE

ELEV. OF CONC. BARRICADE

NOT TO SCALE



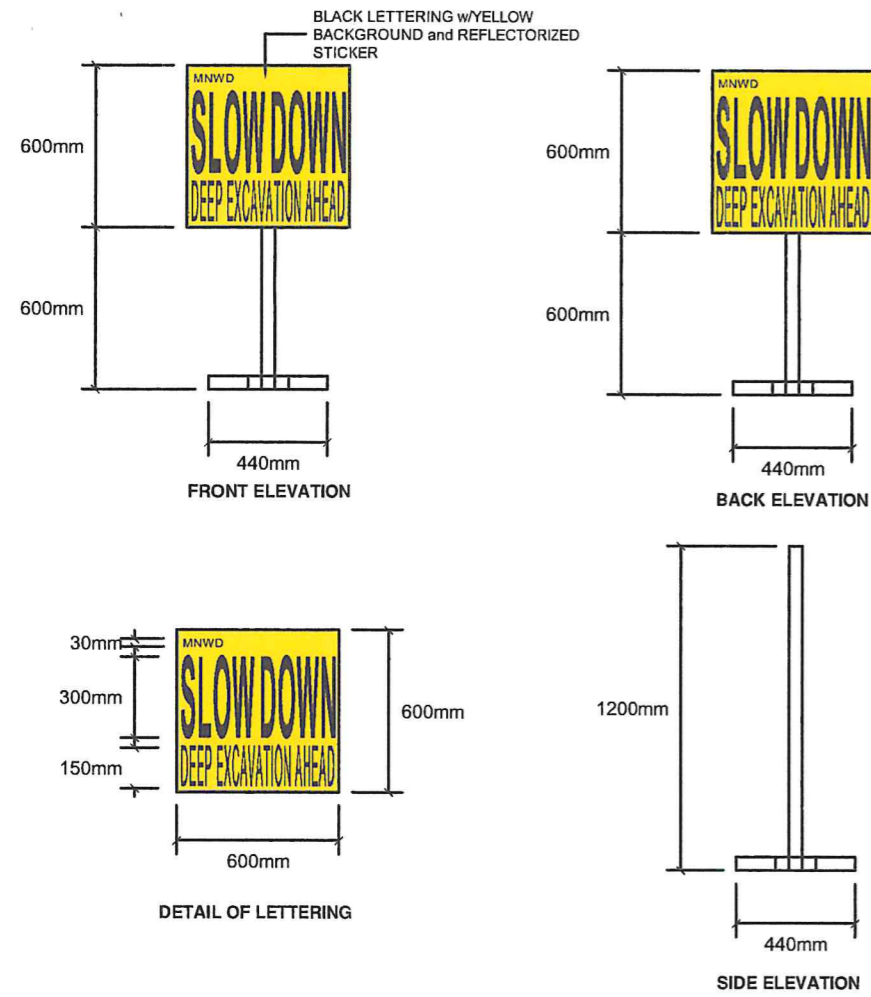
TRENCH

CONCRETE RESTORATION WITH DOWELS DETAILS

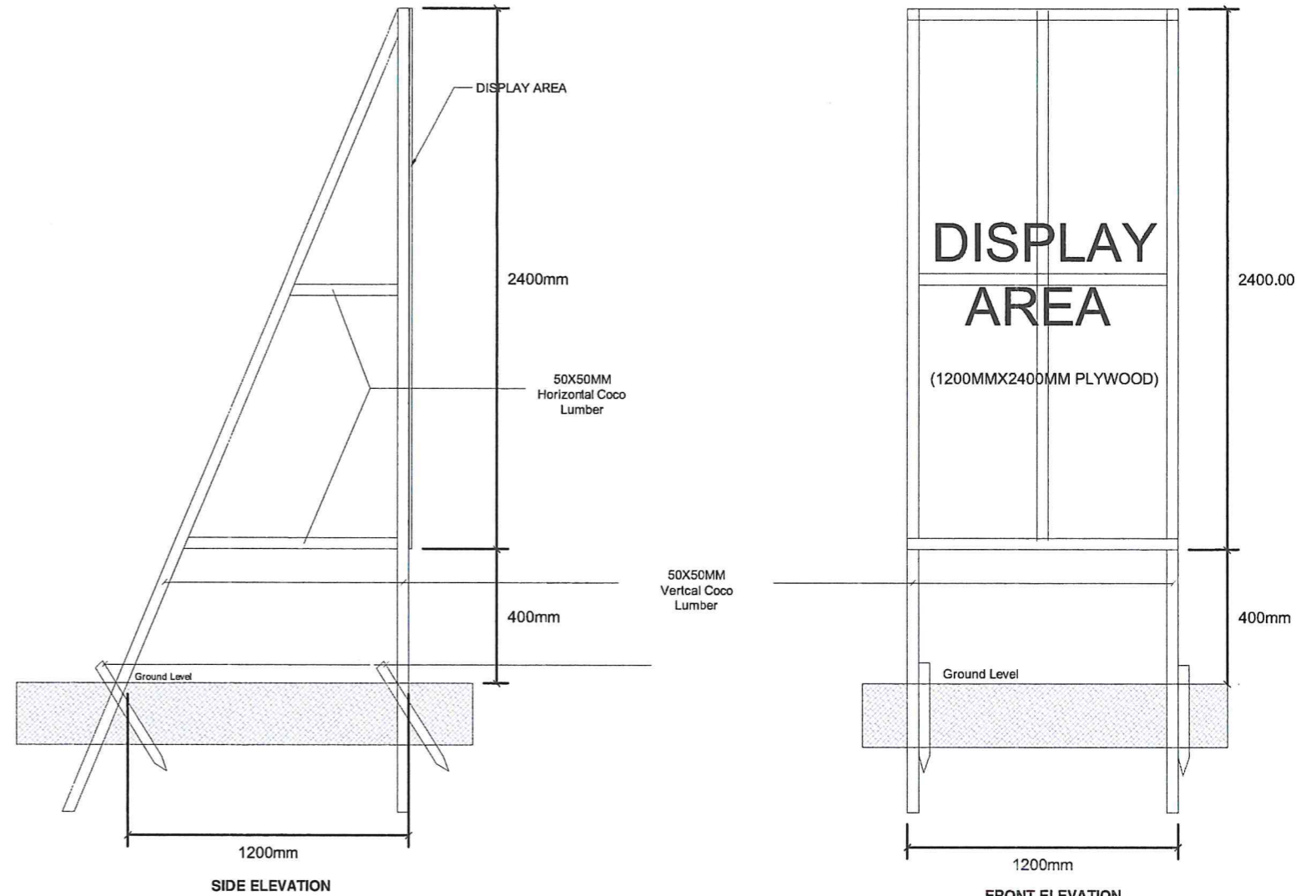
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BELLHOLE

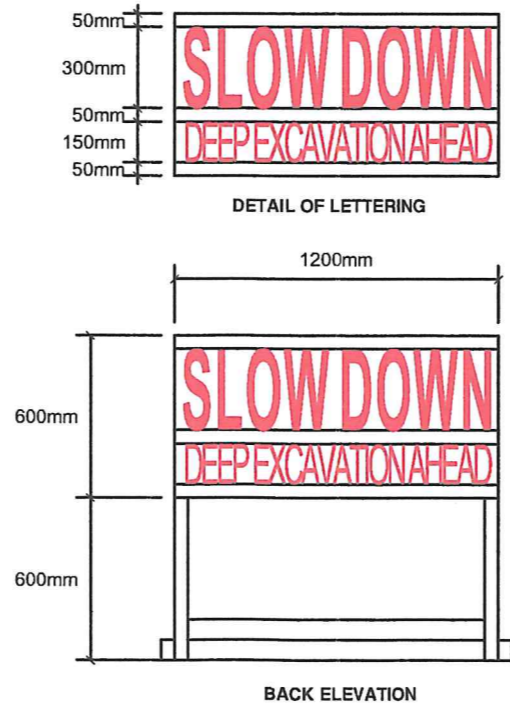
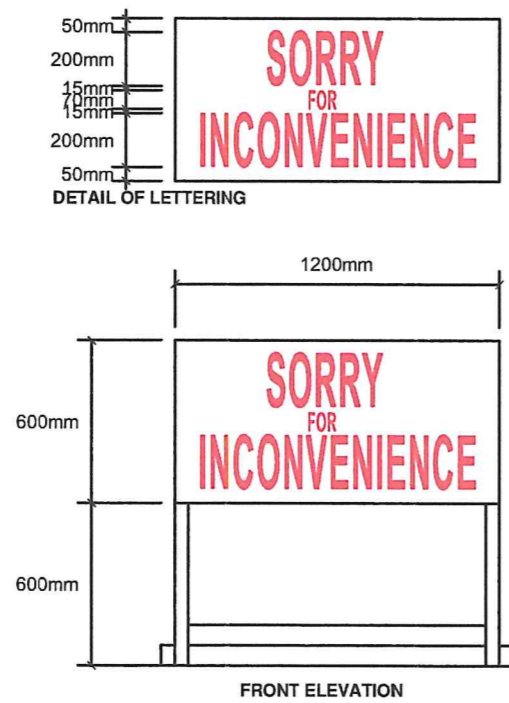
SCALE



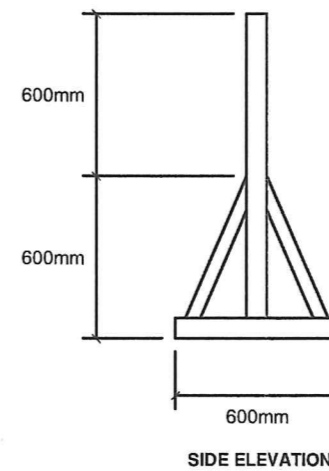
WARNING SIGN DETAIL (WS1)
not to scale



PROJECT BILLBOARD DETAILS
not to scale



WARNING SIGN DETAIL (WS2)
not to scale



<p>Republic of the Philippines METROPOLITAN NAGA WATER DISTRICT 40 J. Miranda Avenue, Naga City</p>	PREPARED BY:	CHECKED BY:	RECOMMENDING APPROVAL:	APPROVED BY:	PROJECT TITLE/LOCATION:	SHEET CONTENTS:	SHEET NO.:	
	 SHARMAINE E. BRACIA OIC - DMA, PDCC	 SONJUN O. MILLARES OIC - DEPT. MGR., EED	 NOEL A. MARTINEZ JR. OIC - DEPT. MGR., PAMD	 ROQUE S. FRANCISCO AGM, O & TS	 FLORENCIO T. MONGOSO JR. General Manager A	PROPOSED WATERLINE EXTENSION PROJECT ZONE 4A, ST. CLAIRE SUBDIVISION (URBAN POOR), CONCEPCION PEQUEÑA, NAGA CITY Total Length = 1373Lm	Project Billboard Detail Warning Sign Detail	9
						CAD BY: JL PEÑAS	11	
							10 - 2024	

SPECIFICATIONS:

1. WARNING SIGNS

a. National and Main Streets :

The Contractor shall provide the following signs :

- a.1 Slow down signs (WS-1) at 50 meters before and after the project. (See WS-1 details)
- a.2 Slow down signs (WS-1) at 25 meters before and after the project. (See WS-1 details)
- a.3 Road signs (WS-2) at every 10 meters along the entire length of the excavation with warning tape stretch on top of the road signs. (See WS-2 details)

b. Secondary or Interior Streets

The Contractor shall provide the following signs :

- b.1 Road signs (WS-2) at 25 meters and 10 meters before and after the project. (See WS-2 details)
- b.2 Road signs (WS-2) at every 10 meters along the entire length of the excavation with warning tape stretch on top of the road signs. (See WS-2 details)

c. Pathways/Footwalks :

The Contractor shall provide the following signs :

- c.1 Road signs (WS-2) at 5 meters before and after the project. (See WS-2 details)
- c.2 Road signs (WS-2) at every 10 meters along the entire length of the excavation with warning tape stretch on top of the road signs. (See WS-2 details)

2. EXCAVATION WORKS

- a. The contractor shall furnish labor, tools, materials and other facilities for the satisfactory performance to complete the excavation works. The contractor shall make all necessary excavation to grade as indicated on the plans and provided in these specifications.
- b. Trenches for water pipelines shall be made wide enough to allow good workmanship. A table shown on the drawing gives the recommended widths and depths for various pipe sizes.
- c. Whenever the methods used for the dewatering trenches and the other pits are found ineffective and inadequate, the contractor shall construct dewatering trenches or wells in order to rapidly collect the water as the case may be.

3. SHEETING AND BRACING

- a. The contractor shall provide all shoring, sheeting and bracing necessary or required to perform and protect the excavation work and to safeguard the workmen and the public.
- b. The contractor shall provide a steel plate covering with a minimum thickness of 1" for all excavation works on national and main streets; and a minimum thickness of ¾" for all excavation works on the secondary and interior streets to ensure safety of the pedestrians.
- c. All sheeting and bracing works shall be provided at the expense of the contractor.

4. PIPE AND FITTING LAYING

- a. uPVC(unplasticized polyvinyl chloride) Pipes/Bends, Class 150 with machine installed plastic ring, homogeneously bonded with rubber ring and should conform with ISO standard.
- b. G.I.(Galvanized Iron) Pipe/Elbows, Heavy Duty, schedule 40 and should conform with ISO standard.
- c. D.I.(Ductile Iron) FITTINGS

Relevant characteristics and performance requirements for gate valves, ductile iron body, bonnet guard flange and wrench nut, electronically applied fusion bonded epoxy resin coating, stainless stem, ductile iron encapsulated with EPDM-rubber compound wedge, bronze wedge nut, stainless steel 304 hexagon gland bolts, ASTM D2000 buna "N" nitrile rubber bonnet gasket, open O-ring stem seals, O-ring gland seal with 2 major components (Body and Bonnet).

Relevant characteristics and performance requirements for universal flange adaptor with complete bolts, nuts and gaskets - ductile iron body with epoxy resin coating with stainless steel 304 hexagon bolts.

Should conform with ISO standard.

d. C.I.(Cast Iron) FITTINGS

Relevant characteristics and performance requirements for universal various fittings with complete bolts, nuts and gasket.

Gasket should be 2 ply neoprene or equivalent.

Should conform with ISO standard

- e. No fabricated fitting/material shall be used/installed unless it has been approved by the Engineer-in-Charged.
- f. The pipe shall be located/installed within road right-of-way
- g. Any pipe having its grade, alignment or joint disturbed after laying shall be taken up and relaid. No pipe shall be laid after in water or when trench or weather conditions are unsuitable for work. Water shall be kept out of trench until the jointing is completed. When work is not in progress, open ends of pipe and fittings shall be plugged or closed so that no trench water, earth or foreign substance will enter the pipes or fittings.
- h. Pipe under drainage structures and/or culverts shall have reinforced concrete encasement unless otherwise specified by Engineer-in-Charge.
- i. Proper equipment, tools, instruments and facilities satisfactory to the engineer-in-charge shall be provided and used by the contractor for the safe and efficient execution of the work. All pipes, fittings, valves and accessories shall be carefully lowered into the trench by means of suitable equipment and in such manner as to prevent damage to them. Under no circumstances shall pipes or accessories be dropped or dump into the trench, all foreign matter or dirt shall be thoroughly removed from the interior of the pipes and accessories, before lowering into the trench, any defective, damaged or unsound pipe shall not be lowered into the trench.
- j. Deflection from a straight line or grade, as required by horizontal curves, vertical curves or effect shall be made with proper bends and elbows.
- k. Install caution/warning tap: 30 cm below the natural grade line.
- l. No installation of pipes/fittings shall be done unless excavation has been approved by the Engineer-in-Charge.

5. CONCRETE THRUST BLOCK

- a. Concrete thrust blocks, anchor blocks or welded joints shall be provided at all junctions, changes in direction exceeding 11 ½ degrees or where otherwise shown.


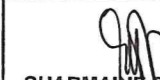




TABLE OF MINIMUM THRUST BLOCK BEARING AREAS IN SQUARE METERS FOR PIPE SIZES 50mm TO 600mm Ø				
PIPE SIZE mm (in.)	TEE & DEAD END	90 DEG. BEND	45 DEG. BEND	22.5 DEG. BEND
50 (2")				
75 (3")	0.0500	0.0700	0.0400	0.0200
100 (4")	0.0900	0.1200	0.0700	0.0400
150 (6")	0.2000	0.2800	0.1500	0.0800
200 (8")	0.3500	0.5000	0.2700	0.1400
250 (10")	0.5500	0.7700	0.4200	0.2100
300 (12")	0.7900	1.1100	0.6000	0.3100
350 (14")	1.0700	1.5200	0.8200	0.4200
400 (16")	1.4000	1.9800	1.0700	0.5500
450 (18")	1.7700	2.5100	1.3600	0.6900
500 (20")	2.1900	3.1000	1.6800	0.8500
600 (24")	3.1500	4.4600	2.4200	1.2300

6. PIPELINE TRENCH BACKFILL

- a. Selected borrow materials having the sand equivalent shall first be brought up to mid diameter of the pipe and compacted, then backfilling at 150mm(6in.) and compaction shall be repeatedly done until fully backfilled.
- b. Blasted rock, broken concrete or broken pavement materials and large boulders, shall not be used as backfill materials.
- c. Backfill shall be brought to a suitable elevation above grade to provide for anticipated settlement and shrinkage.
- d. When backfill material is not enough, it shall be sourced from outside but must conform with the general condition on materials quality.
- e. Prior to backfilling, a backfilling permit shall be secured from the MNWD Engineer-in-Charge.

7. INSTALLATION OF VALVES AND VALVE BOX COVER

- a. Valves and valve box covers shall be installed as shown on the drawings. Valves shall be set plumb center with valve box cover. Valves shall have the interiors cleaned of all foregoing matters before installation.

 <p>Republic of the Philippines METROPOLITAN NAGA WATER DISTRICT 40 J. Miranda Avenue, Naga City</p>	PREPARED BY:  SHARMAINE E. BRACIA OIC - DMA, PDCD	CHECKED BY:  SONJUN O. MIJARES OIC - DEPT. MGR., EED	RECOMMENDING APPROVAL:  NOEL A. MARTINEZ JR. OIC - DEPT. MGR., PAMD	APPROVED BY:  ROQUE S. FRANCISCO AGM, O & TS	APPROVED BY:  FLORENCIO T. MONGOSO JR. General Manager A	PROJECT TITLE/LOCATION: PROPOSED WATERLINE EXTENSION PROJECT ZONE 4A, ST. CLAIRE SUBDIVISION (URBAN POOR), CONCEPCION PEQUEÑA, NAGA CITY Total Length = 1373Lm	SHEET CONTENTS : Specifications	SHEET NO.: 10 / 11 10 - 2024
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8. FIRE HYDRANTS AND BLOW OFFS

- a. Where no curbs exist, the hydrant/blow-off shall be located within 1.50 meters of the road right-of-way or as directed by the Engineer-in-Charge and barricades shall be installed as shown in the drawing

9. BRIDGE AND CULVERT CROSSING

- a. The work shall include furnishing of all materials, labor, tools equipment and other facilities for the satisfactory performance to complete the bridge and culvert crossing as specified herein.
- b. Bridge and culvert crossing shall be installed in accordance with the MNWD approved design.
- c. Steel or G.I. pipes shall be painted blue.

10. CONCRETE CUTTING AND BREAKING

- a. The work shall include furnishing of all labor, tools equipment and other facilities for the satisfactory performance to complete the concrete cutting and breaking works as specified herein.

11. RESTORATION WORKS

- a. Furnish all materials, labor, tools, equipment and perform all works necessary as specified herein.
- b. All damaged roads and driveways, if any, on account of the performance of the work covered by the contract, the same shall be restored into its original condition.
- c. ASTM ISO type 1 for normal Portland cement, unless the Engineer-in-Charge approved as change.
- d. Fine aggregate to be used in the composition of concrete shall consist of sand, stone or other inert materials with similar characteristics or a combination there of having clean, hard, strong, durable, uncoated grains and free from injurious amount of dust, lumps, soft or flaky particles, shale, alkali, organic matter, ham or clay.
- e. Coarse aggregate shall consist of crushed stones, gravel or other approved inert materials with similar characteristics as the fine aggregate and shall well graded as to maximum size of 3/4" in diameter.
- f. Cold mix asphalt with emulsifier, unless the Engineer-in-Charge approved as change.
- g. Class "A" concrete shall consist of one(1) part cement to a total of five(5) parts of fine and coarse aggregates measured separately.
- h. Concrete mixing shall be done using one(1) bagger concrete mixer / transit mixer.
- i. Depositing Concrete
 Before pouring of concrete, debris shall be removed from space to be occupied by the concrete.
 During concrete pouring, it shall be thoroughly spanted and compacted by means of a rod.
 Water shall be removed from excavated portion before concrete is poured.
- j. Depositing of Asphalt
 Before pouring of cold mix asphalt, debris shall be removed from cured concrete.
 Used of vibratory compactor/roller must be observed during compaction of cold mix asphalt.

12. HYDROTESTING

- a. Furnish all materials, labor, tools equipment except pressure gauge to be provided by MNWD and perform all unless necessary or specified herein.
- b. After the pipes have been laid, the joints completed and the trench partially backfilled but with joints exposed for examination, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of 150 psi.
- c. The duration of each pressure test shall be at least two (2) hour unless otherwise specified by the engineer.
- d. Each section of pipeline shall be slowly filled with water and the specified test pressure, measured at the point of lowest elevation, shall be applied by means of a hydrotesting machine connected to the pipe in manner satisfactory to the engineer. During the filling of the pipe and before applying the test pressure, all air shall be expelled from the pipeline. To accomplish this, taps shall be made, if necessary at points of highest elevation, and after completion of the test, the taps shall be tightly plugged unless otherwise specified.
- e. During the test, all exposed pipes, fittings, valves, hydrants, joints and coupling shall be carefully examined. If found to be cracked or defective, they shall be removed and replaced by the contractor. The test shall be repeated until satisfactory results are obtained.
- f. Hydrotesting points are indicated in the plans and it should be strictly followed, no further works are allowed before the start of hydrotesting prior to the mentioned work.

13. DISINFECTION


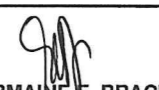

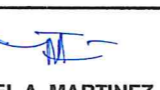
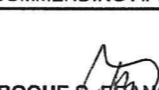
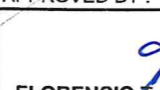
- a. Furnish all materials, labor, tools equipment and perform all unless necessary or specified herein.
- b. Before being placed in service, and before certification of completion by the engineer, all new water mains or extensions to existing system, or valved section of such extension or any replacement in the existing water system shall be disinfected with chlorine.
- c. The preferred point of applications of the chlorinating agent is at the beginning of the pipeline, extensions, or any valved section and through a corporation stop inserted on the top of the newly laid pipe.

14. FLUSHING

- a. Furnish all materials, labor, tools equipment and perform all unless necessary or specified herein.
- b. After chlorination, all treated water shall be thoroughly flushed from newly laid pipeline and replaced with water throughout its entire length. Water sample shall be collected by MNWD for laboratory examination, with cost chargeable to the Contractor until all samples passes the NSDW requirement.

15. AS-BUILT PLAN

- a. After completion of works, the contractor shall submit a preliminary "As-Built Plan" of the project prior to the conduct of the final inspection of MNWD project Engineer-in-Charge.

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