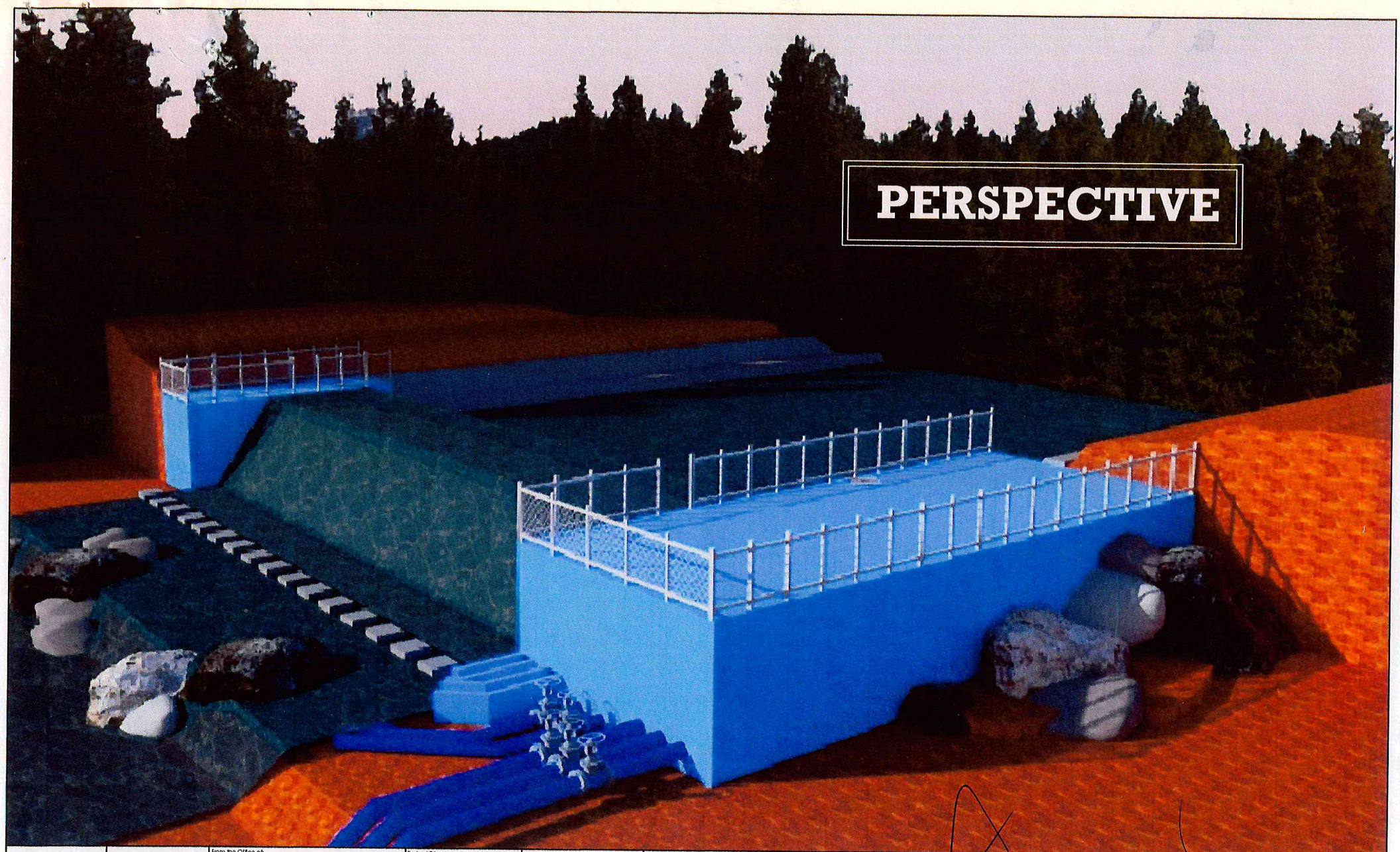
PACKAGE 3

CONSTRUCTION OF WATER SOURCE

PACKAGE 3: TECHNICAL DETAILS AND SPECIFICATIONS

NOTONGON AND MATIBOGGO SPRING SOURCE DEVELOPMENT



ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title: NOTONGON - MATIBOGGO SOURCE DEVELOPMENT

Location: Makilala, North Cotabato

Sheet Content: PERSPECTIVE

Drawn By: RSUM MJCT

Date: AUGUST 2020

Prepared by:
ENGR. MARY JOSELLE C. TABASA
ASA A - PDD

Checked by:
ENGR. CANUTO A. CODILLA, JR.
Division Manager A - PDD

Reviewed by:
ENGR. RAMIL A. CONDEZ, RMP/MBA
Department Manager A - ECD

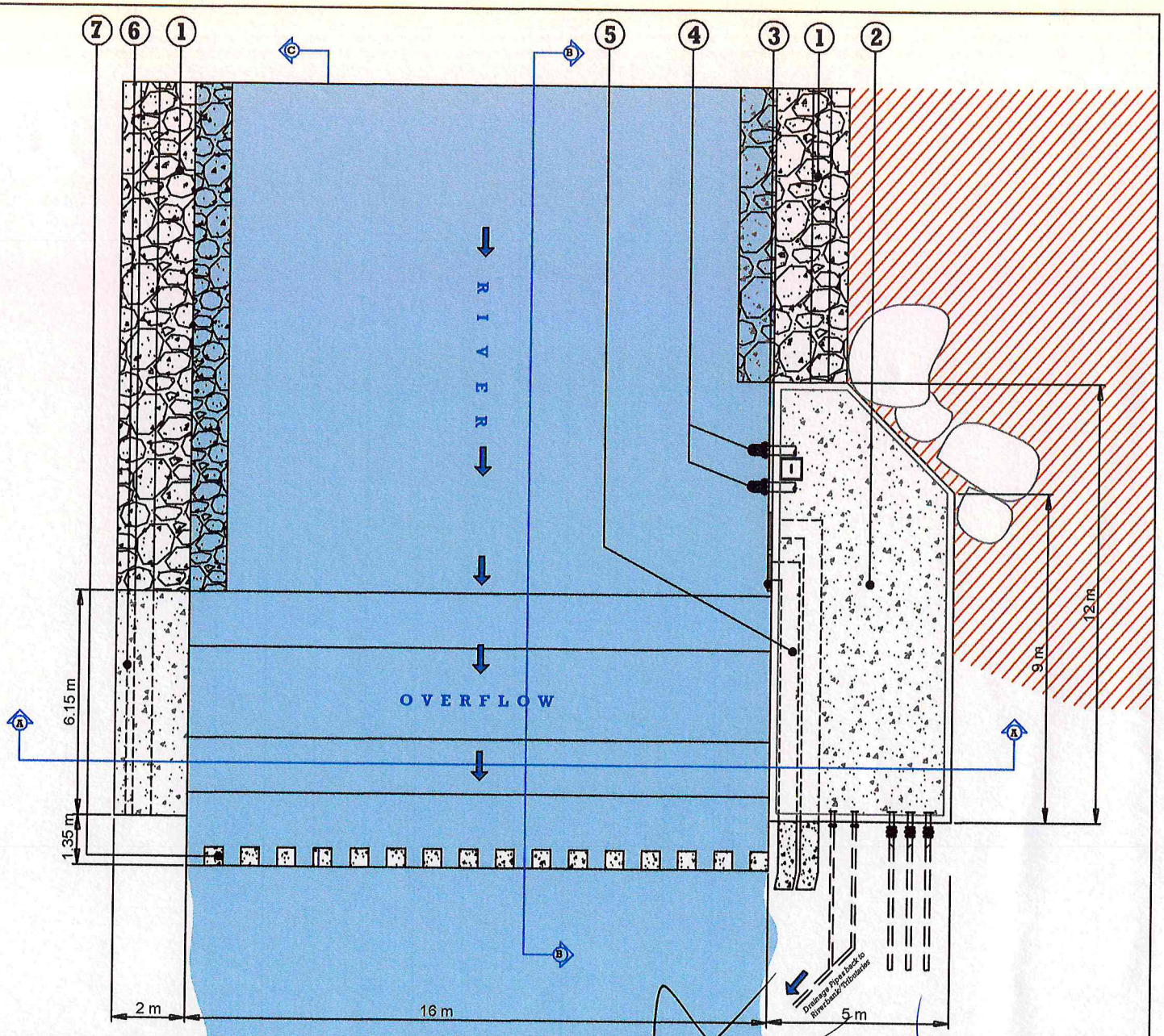
Recommending Approval:
ENGR. WILLSHER LISANDRO M. ALQUEZA, RMP/MBA
AGM for Operations

Approved by:
STELLA M. GONZALES, MPS
General Manager

Sheet No.
N / 01

INDEX

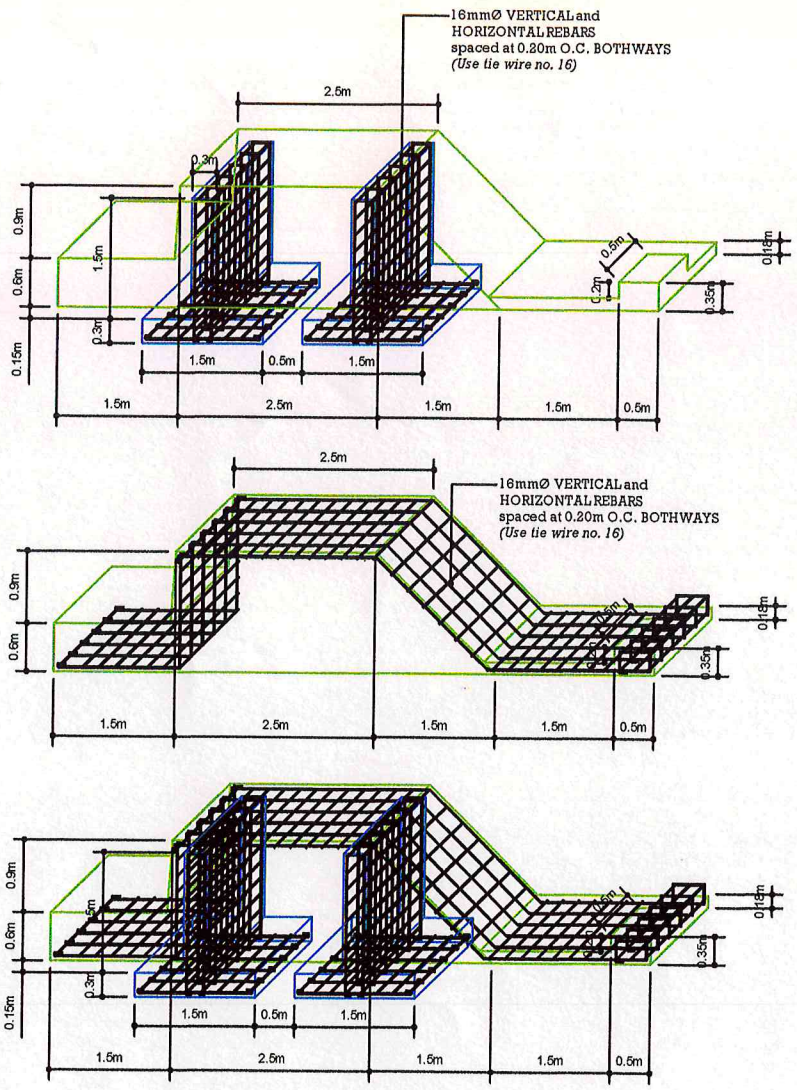
SYMBOL	DESCRIPTION
①	20METER CEMENT PLASTERED RIPRAP *(PLEASE REFER TO SHEET N/04)*
②	COLLECTION BOX W/ MANHOLE (133.20 CU.M CAPACITY) *PLEASE SEE SHEET N/05*
③	STAINLESS STEEL PENSTOCK GATE *(PLEASE SEE SHEET N/06)*
④	250MMØ SPOOL WITH STRAINER *(PLEASE SEE SHEET N/06)*
⑤	500MM CONCRETE REC. CANAL DRAINS *(PLEASE SEE SHEET N/04)*
⑥	6.15M X 2.0M X 2.40M CONCRETE WALL *(CONCRETED PHASE OF RIPRAP WALL)*
⑦	0.5M X 0.5M X 0.35M CONCRETE BLOCKS SPACED AT EVERY 0.10M O.C.



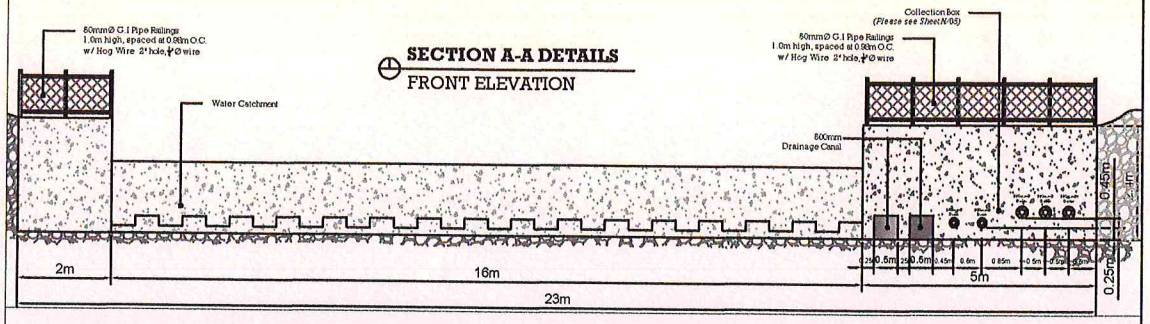
ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidappawan_ws@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

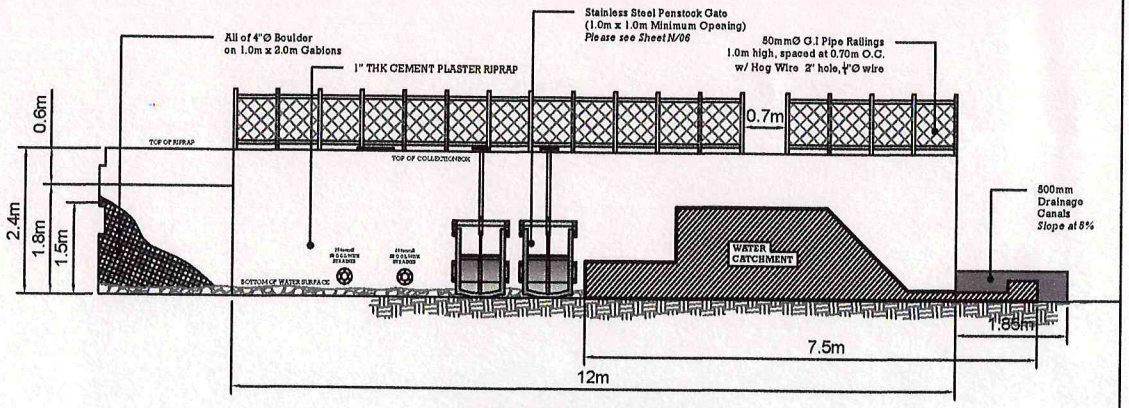
Project Title: NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Location: Makilala, North Cotabato		Prepared by: ENGR. MARY JOSELLE C. TABASA, ASA A - PDD	Reviewed by: ENGR. RAMIL A. CONDEZ, RMP/MBA, Department Manager A - ECD	Approved by: STELLA M. GONZALES, MPS, General Manager	Sheet No. N / 02
Sheet Content: NOTONGON CATCHMENT DETAILS	Drawn By: MJCT	Date: AUGUST 2020	Checked by: ENGR. CANUTO A. CODILLA, JR., Division Manager A - PDD	Recommending Approval: ENGR. WILFREDO ISANDRO M. ESQUEZA, RMP/MBA, AGM for Operations		



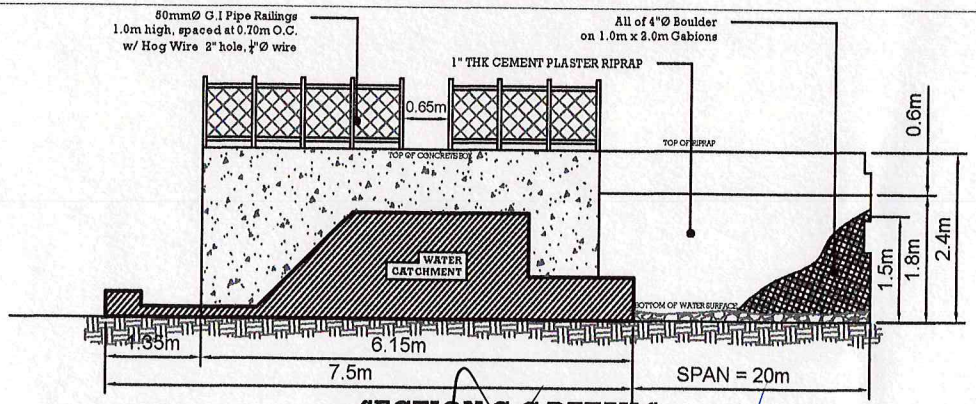
COLUMN & FOOTING DETAILS
w/ Rebar Matting Details



SECTION A-A DETAILS
FRONT ELEVATION

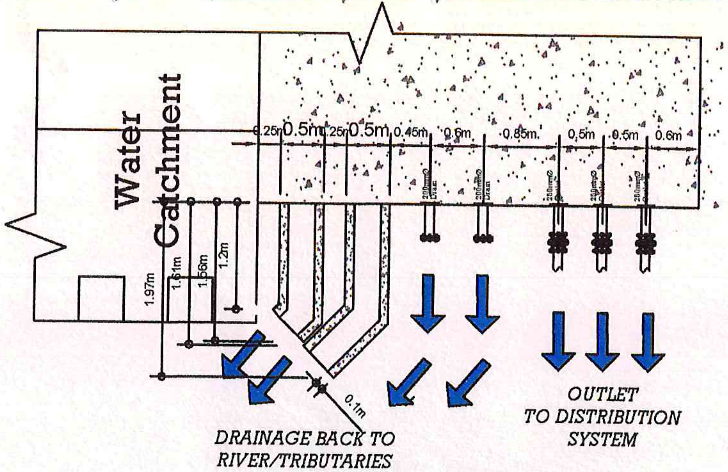


SECTION B-B DETAILS
RIGHT ELEVATION

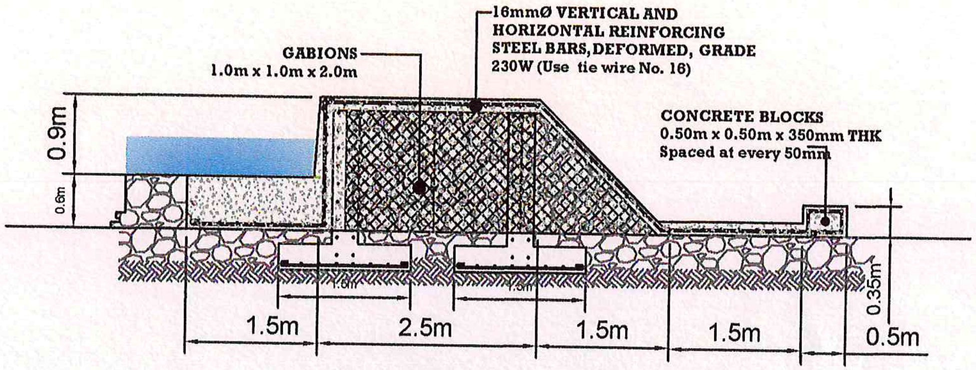


SECTION C-C DETAILS
LEFT ELEVATION

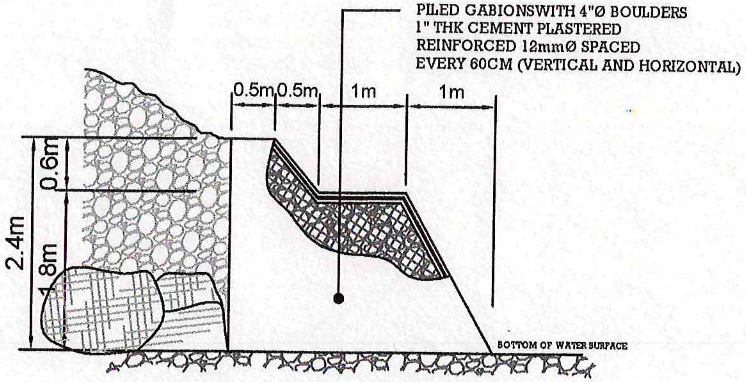
ISO 9001:2015 CERTIFIED Certificate No. 66478	From the Office of: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Brgy. Lanao, Kidapawan City Tel Nos. (064)577-1533, 577-1865 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawandistrict.gov.ph *"Committed to Service, Development and Self-Reliance"*	Project Title: NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Location: Makilala, North Cotabato	Prepared by: **ENGR. MARY JOSELLE C. TABASA** ASA A - PDD	Reviewed by: **ENGR. RAMIL A. CONDEZ, RMP/MBA** Department Manager A - ECD	Approved by: **STELLA M. GONZALES, MPS** General Manager	Sheet No. **N / 03**
		Sheet Content: NOTONGON CATCHMENT REBAR DETAILS AND CUT SECTIONS	Drawn by: MJCT	Date: AUGUST 2020	Checked by: **ENGR. CANUTO A. CODILLA, JR.** Division Manager A - PDD	Recommending Approval: **ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA** AGM for Operations	



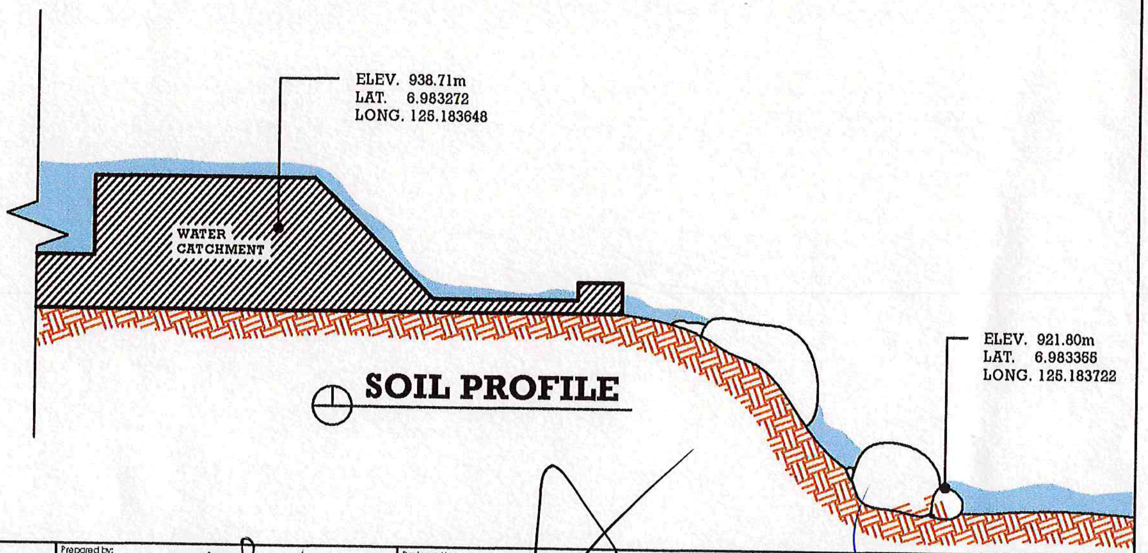
DRAINAGE CANAL
Top Elevation



OVERFLOW DETAILS

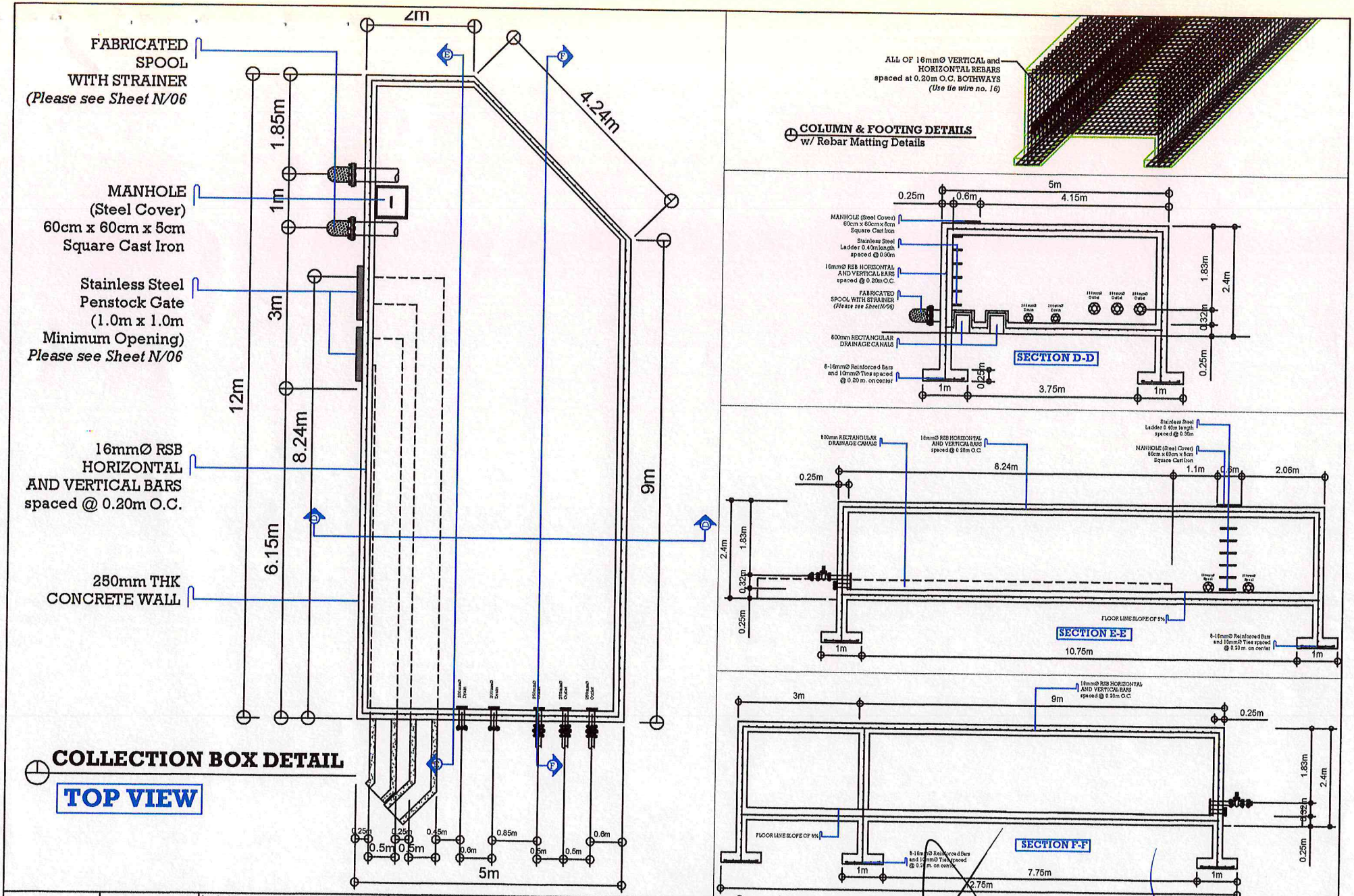


RIPRAP DETAILS
Front Elevation



SOIL PROFILE

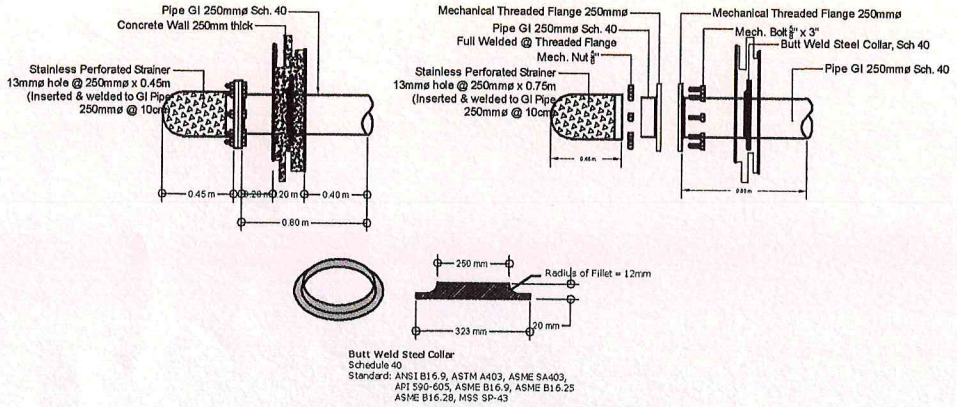
ISO 9001:2015 CERTIFIED Certificate No. 66478	From the Office of: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Brgy. Lanao, Kidapawan City Tel Nos. (064)577-1503, 577-1865 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawanwd.gov.ph *"Committed to Service, Development and Self-Reliance"*	Project Title: NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Location: Makilala, North Cotabato	Prepared by: ENGR. MARY JOSELLE C. TABASA ASA A-PDD	Reviewed by: ENGR. RAMIL A. CONDEZ, RMP/MBA Department Manager A - ECD	Approved by: STELLA M. GONZALES, MPS General Manager
		Sheet Content: DRAINAGE CANAL, OVERFLOW, RIPRAP AND SOIL PROFILE DETAILS	Drawn By: MJCT / Date: AUGUST 2020	Checked by: ENGR. CANUTO A. CODILLA, JR. Division Manager A - PDD	Recommending Approval: ENGR. WILESPH LISANDRO M. ALQUEZA, RMP/MBA AGM for Operations	Sheet No. N / 04



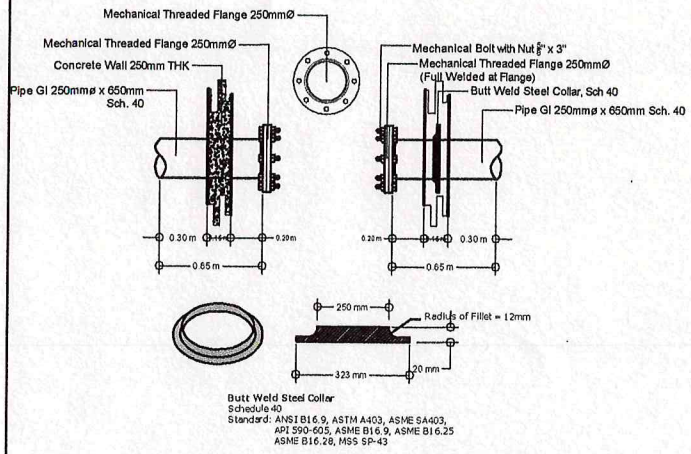
COLLECTION BOX DETAIL

TOP VIEW

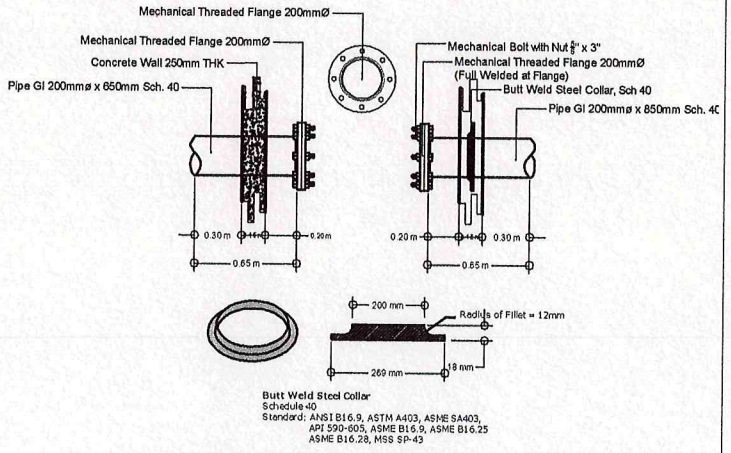
ISO 9001:2015 CERTIFIED Certificate No. 66478	From the Office of: Republic of the Philippines METRO KIDAPAWAN WATER DISTRICT Brgy. Lanao, Kidapawan City Tel Nos. (064)577-1533, 577-1865 E-mail Address: metrokid@pacom.weblyahoo.com Website: www.metrokidapawanwd.gov.ph "Committed to Service, Development and Self-Reliance"	Project Title: NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Location: Makilala, North Cotabato	Prepared by: ENGR. MARY JOSELLE C. TABASA ASA A - PDD	Reviewed by: ENGR. RAMIL A. CONDEZ, RMP/MBA Department Manager A - ECD	Approved by: STELLA M. GONZALES, MPS General Manager	Sheet No. N / 05
		Sheet Content: NOTONGON COLLECTION BOX DETAILS	Drawn By: RSUM MJCT	Date: AUGUST 2020	Checked by: ENGR. CANUTO A. COMILLA, JR. Division Manager A - PDD	Recommending Approval: ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA AGM for Operations	



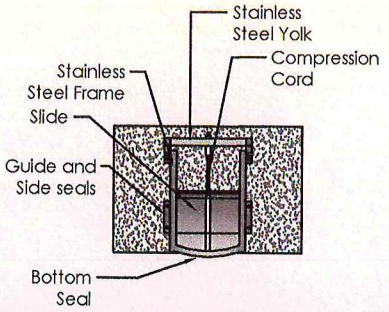
SPOOL WITH STRAINER SECTION DETAIL
COLLECTION BOX SPOOL



OUTLET SPOOL SECTION DETAIL (250MMØ)



DRAIN SPOOL SECTION DETAIL (200MMØ)



STAINLESS STEEL PENSTOCK GATE DETAIL

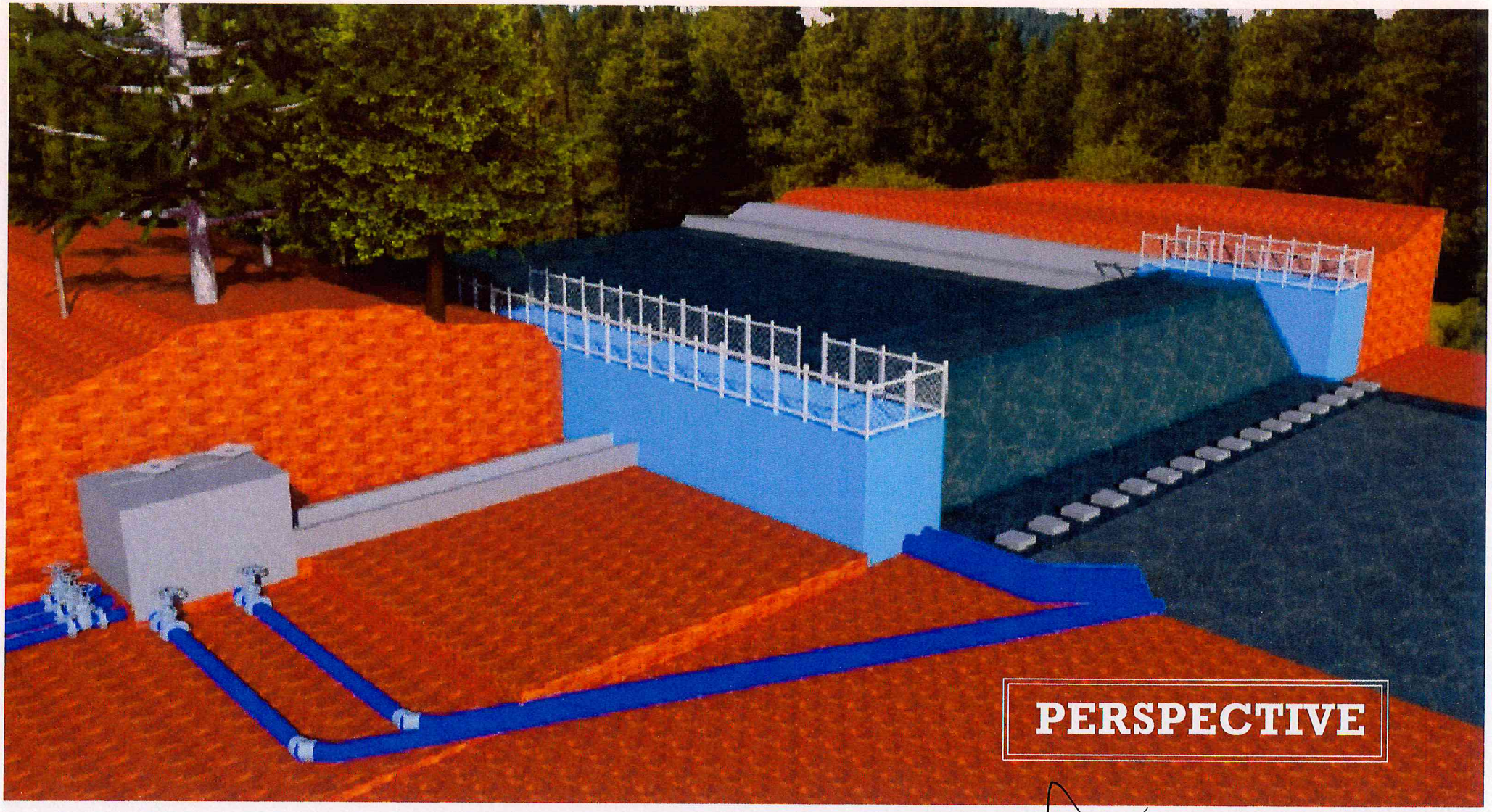
Specification of Material:

- Stainless Steel Garde 316
- High A-class penstock design based on DIN 19569-4/AWWA C560/BS 775
- Sealing made from waste water resistant neoprene
- Sealing Faces in bolted design
- Sliding Design with adjoining sealing
- Standard head 6m water column for on-seating and off-seating
- Door guided by rollers for bigger sizes
- All steel component of stainless grade 316

ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_ed@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title:	Location:	Prepared by:	Reviewed by:	Approved by:	Sheet No.
NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Makilala, North Cotabato	ENGR. MARY JOSELLE C. TABASA ASA A - PDD	ENGR. RAMIL A. CONDEZ, RMP/MBA Department Manager A - ECD	STELLA M. GONZALES, MPS General Manager	N / 06
Sheet Content:	Drawn By: / Date:	Checked by:	Recommending Approval:		
NOTONGON SPOOL AND PENSTOCK GATE DETAILS	RSUM / MJCT — AUGUST 2020	ENGR. CANUTO A. CODILLA, JR. Division Manager A - PDD	ENGR. WILESTER LISANDRO M. ALQUEZA, RMP/MBA AGM for Operations		



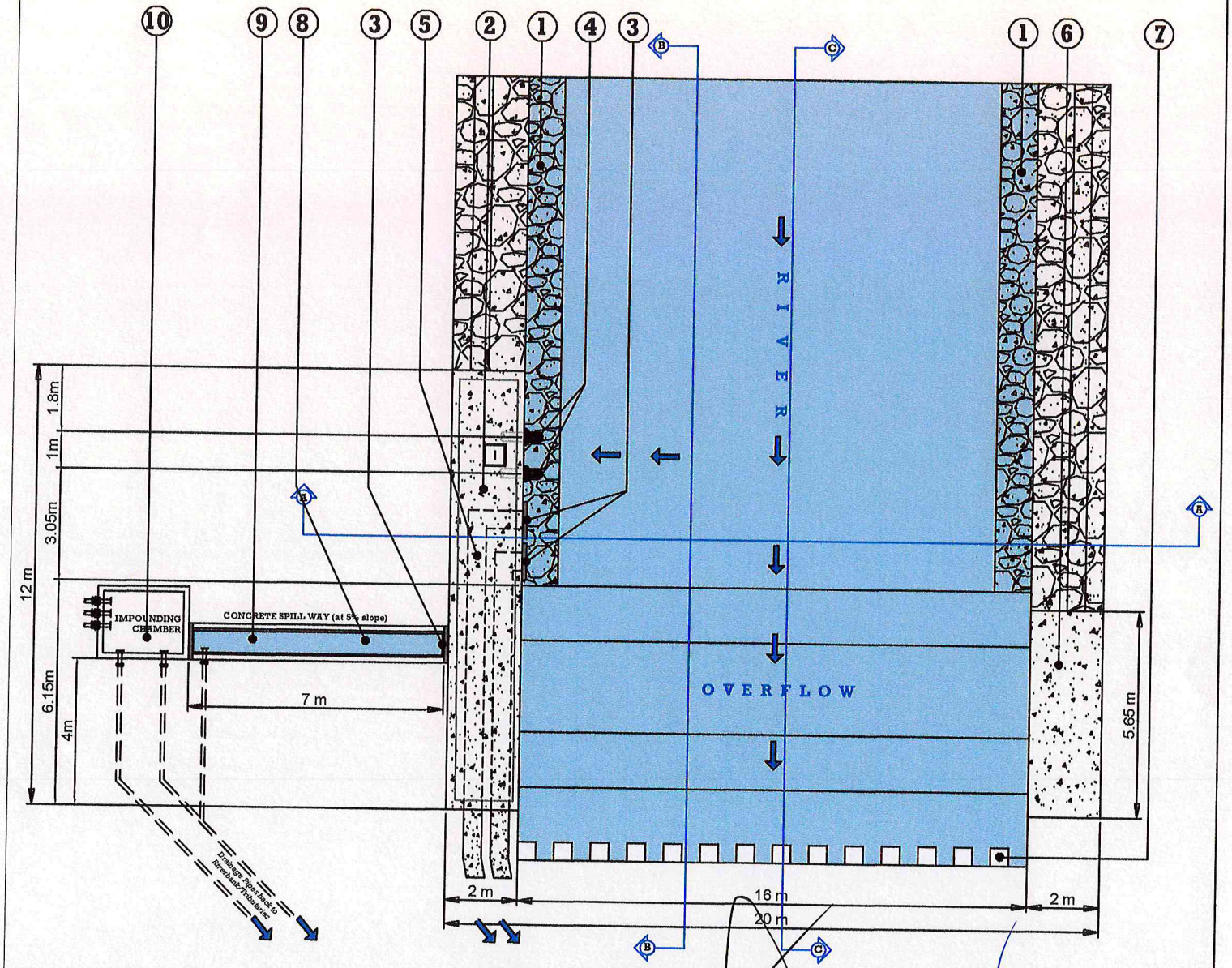
ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title: NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Location: Makilala, North Cotabato		Prepared by: ENGR. MARY JOSELLE C. TABASA, ASA A - PDD	Reviewed by: ENGR. RAMIL A. CONDEZ, RMP/MBA, Department Manager A - ECD	Approved by: STELLA M. GONZALES, MPS, General Manager	Sheet No. M / 01
Sheet Content: PERSPECTIVE (MATIBOGGO SOURCE)	Drawn By: RSUM MJCT	Date: AUGUST 2020	Checked by: ENGR. GANUTO A. CODILLA, JR., Division Manager A - PDD	Recommending Approval: ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA, AGM for Operations		

INDEX

SYMBOL	DESCRIPTION
①	20METER CEMENT PLASTERED RIPRAP *(PLEASE REFER TO SHEET M/04)*
②	COLLECTION BOX w/ MANHOLE (50.4 CU.M CAPACITY) *PLEASE SEE SHEET M/05*
③	STAINLESS STEEL PENSTOCK GATE *(PLEASE SEE SHEET M/08)*
④	250MMØ SPOOL WITH STRAINER *(PLEASE SEE SHEET M/08)*
⑤	500MM CONCRETE REC. CANAL DRAINS *(PLEASE SEE SHEET M/04)*
⑥	5.65M x 2.0M x 2.40M CONCRETE WALL *(CONCRETED PHASE OF RIPRAP WALL)*
⑦	0.5M x 0.5M x 0.35M CONCRETE BLOCKS SPACED AT EVERY 0.10M O.C.
⑧	SCREEN COVERS HOG WIRE, 2" HOLE, ¼"Ø WIRE X 1.0M WIDTH
⑨	CONCRETE SPILL WAY W/ SCREEN COVER
⑩	10 M^3 IMPOUNDING CHAMBER *(PLEASE SEE SHEET M/07)*

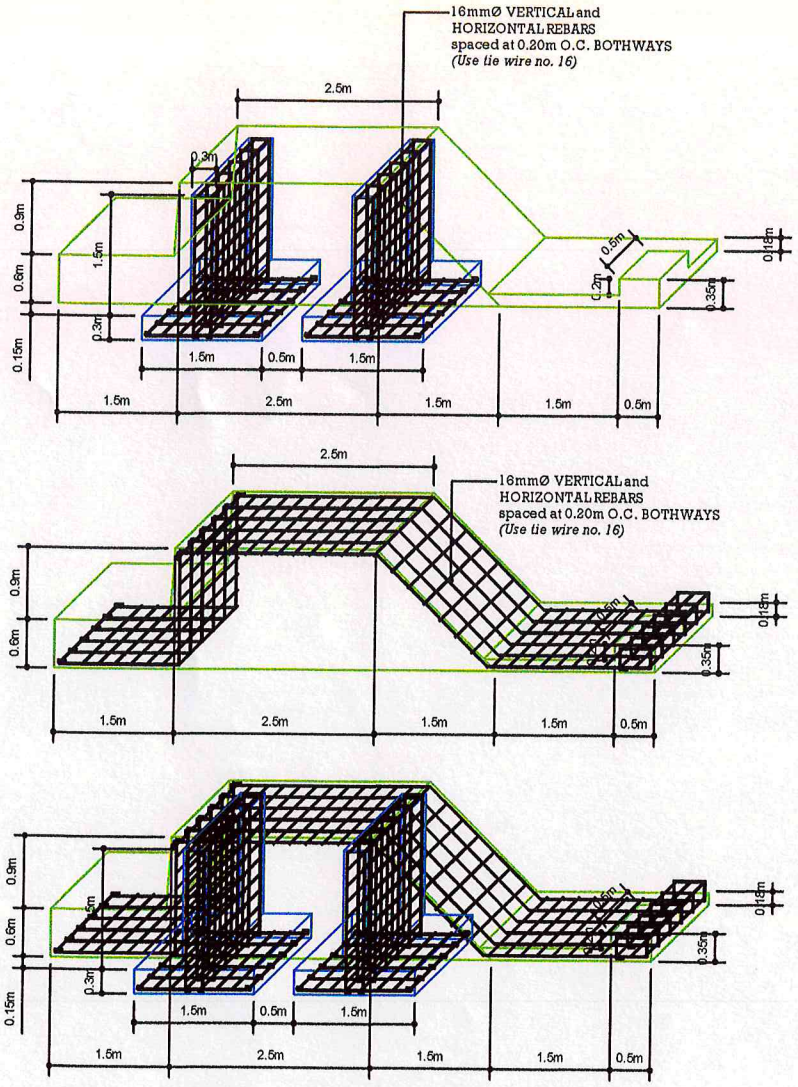


ISO 9001:2015 CERTIFIED
Certificate No. 66478

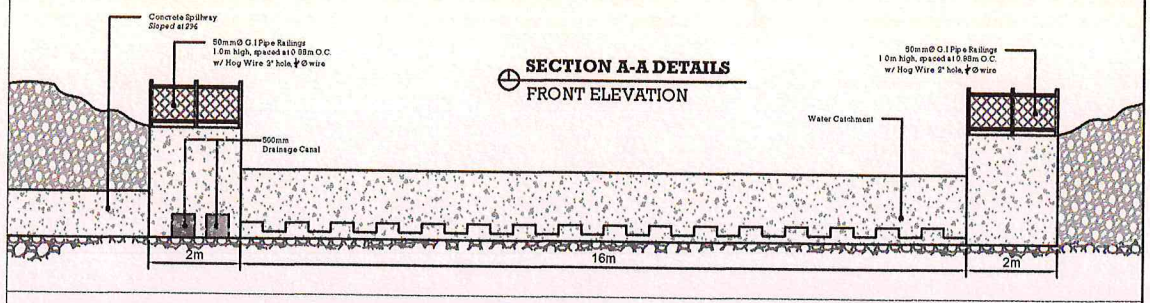
From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title: NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Location: Makilala, North Cotabato	Prepared by: ENGR. MARY JOSELLE C. TABASA, ASA A - PDD	Reviewed by: ENGR. RAMIL A. CONDEZ, RMP/MBA, Department Manager A - ECD
Sheet Content: MATIBOGGO CATCHMENT DETAILS	Drawn By: MJCT / Date: AUGUST 2020	Checked by: ENGR. CANUTO A. CODILLA, JR., Division Manager A - PDD	Recommending Approval: ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA, AGM for Operations
			Approved by: STELLA M. GONZALES, MPS, General Manager

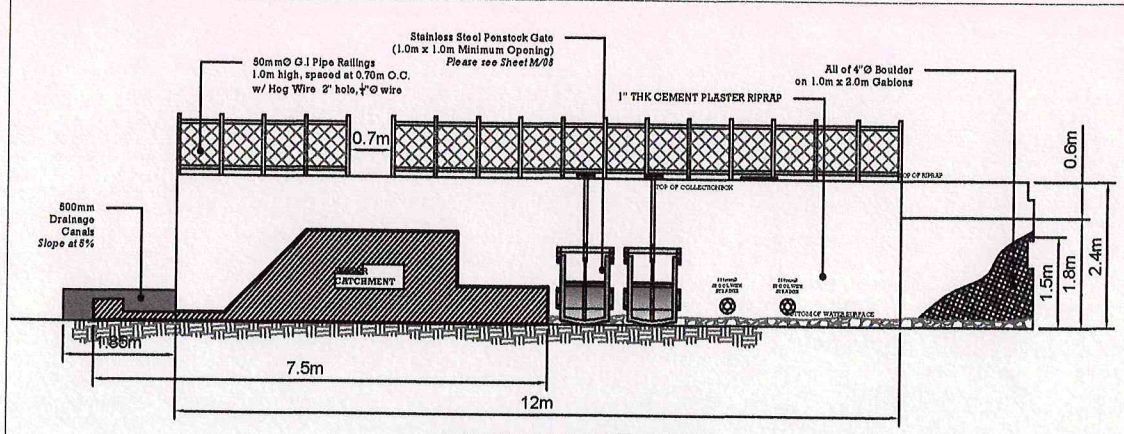
Sheet No. **M / 02**



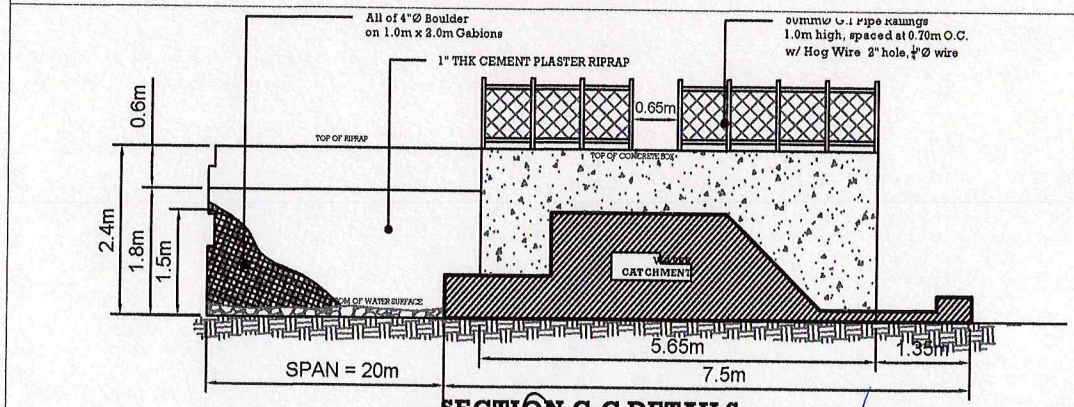
COLUMN & FOOTING DETAILS
w/ Rebar Matting Details



SECTION A-A DETAILS
FRONT ELEVATION



SECTION B-B DETAILS
LEFT ELEVATION



SECTION C-C DETAILS
RIGHT ELEVATION

ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: mwd.kidapawan_wd@yahoo.com
Website: www.mwdkidapawancity.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title:	NOTONGON - MATIBOGGO SOURCE DEVELOPMENT
Location:	Makilala, North Cotabato
Sheet Content:	MATIBOGGO CATCHMENT REBAR DETAILS AND CUT SECTIONS
Drawn By:	MJCT
Date:	AUGUST 2020

Prepared by:
ENGR. MARY JOSELLE C. TABASA
ASA A - PDD

Checked by:
ENGR. CANUTO A. CODILLA, JR.
Division Manager A - PDD

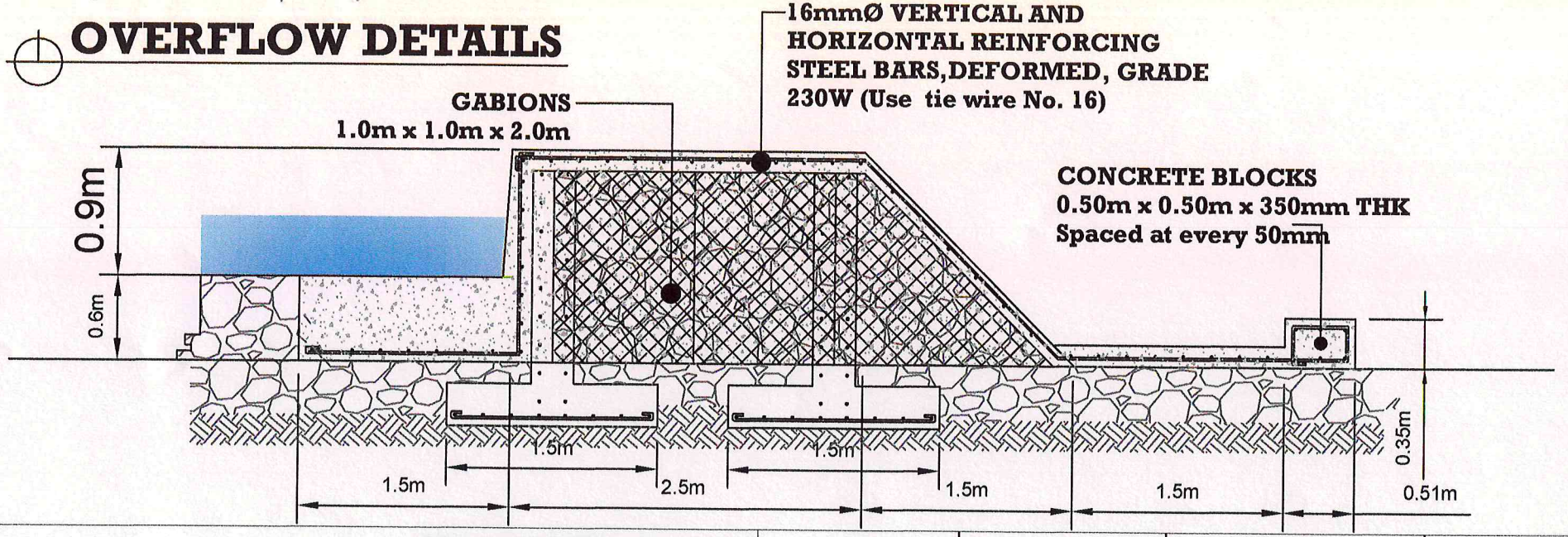
Reviewed by:
ENGR. RAMIL A. CONDEZ, RMP/MBA
Department Manager A - ECD

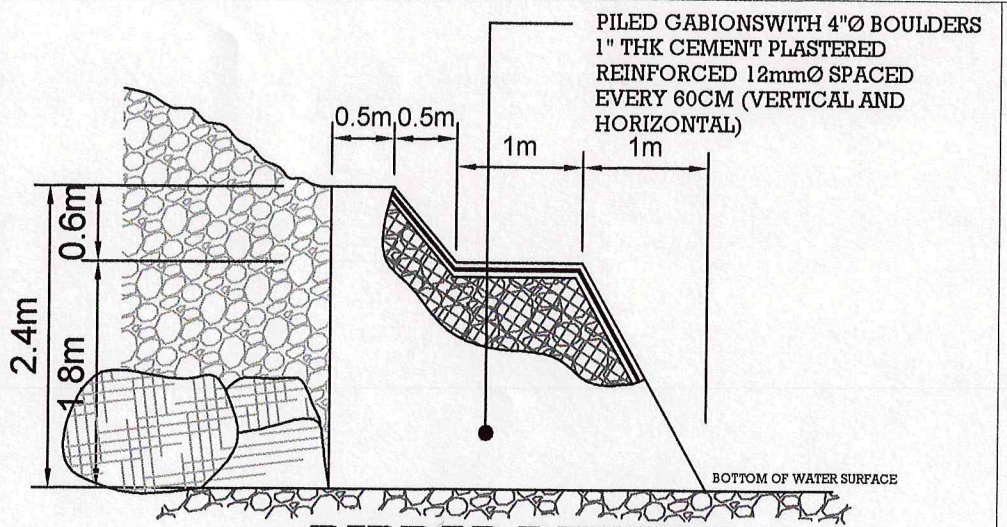
Recommending Approval:
ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA
AGM for Operations

Approved by:
STELLA M. GONZALES, MPS
General Manager

Sheet No.
M / 03

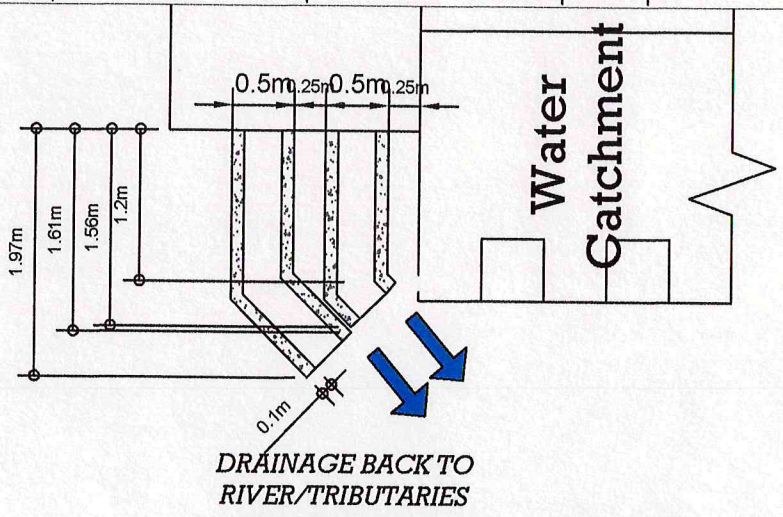
OVERFLOW DETAILS





RIPRAP DETAILS

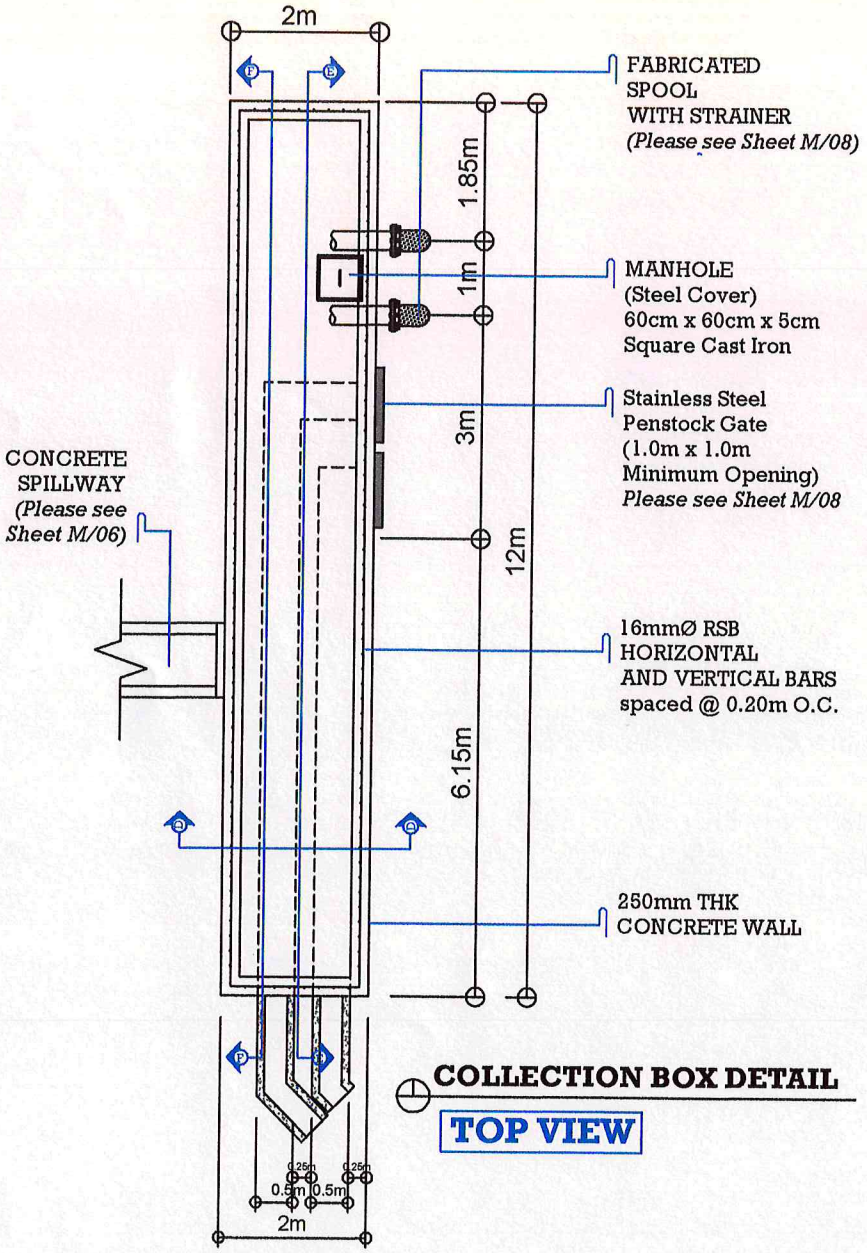
Front Elevation



DRAINAGE CANAL

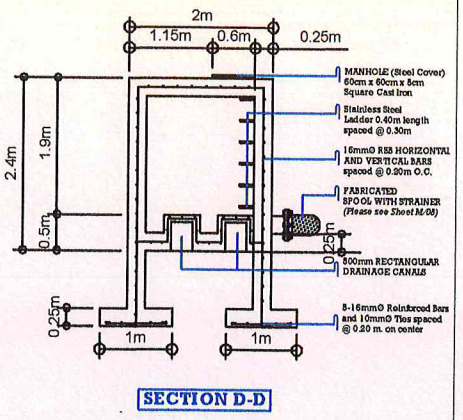
Top Elevation

From the Office of: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Brgy. Lanao, Kidapawan City Tel Nos. (064)577-1183, 577-1865 E-mail Address: metrokidapawan_cwd@yahoo.com Website: www.metrokidapawancwd.gov.ph *"Committed to Service, Development and Self-Reliance"*	Project Title: NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Location: Makilala, North Cotabato	Prepared by: **ENGR. MARY JOELLE C. TABASA** ASA A - PDD	Reviewed by: **ENGR. RAMIL A. CONDEZ, RMP/MBA** Department Manager A - ECD	Approved by: **STELLA M. GONZALES, MPS** General Manager	Sheet No. **M / 04**
ISO 9001:2015 CERTIFIED Certificate No. 66478	Sheet Content: DRAINAGE CANAL, OVERFLOW AND RIPRAP DETAILS	Drawn By: MJCT / Date: AUGUST 2020	Checked by: **ENGR. GANUTO A. CODILLA, JR.** Division Manager A - PDD	Recommending Approval: **ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA** AGM for Operations		

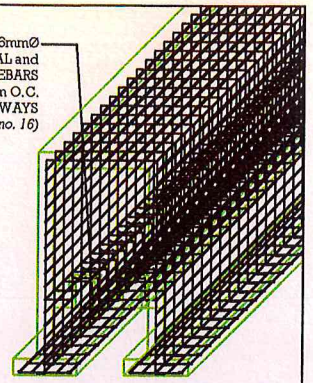


COLLECTION BOX DETAIL

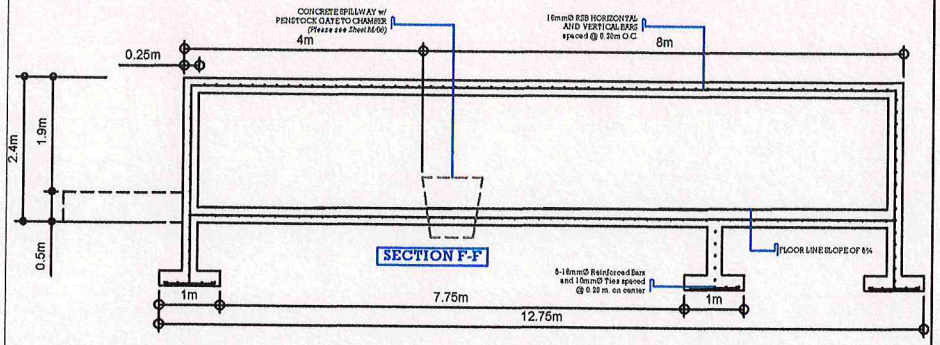
TOP VIEW



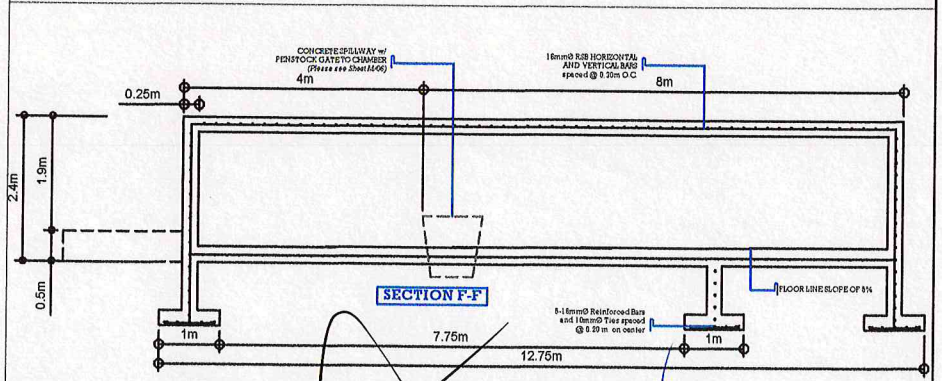
SECTION D-D



COLUMN & FOOTING DETAILS
w/ Rebar Matting Details



SECTION F-F

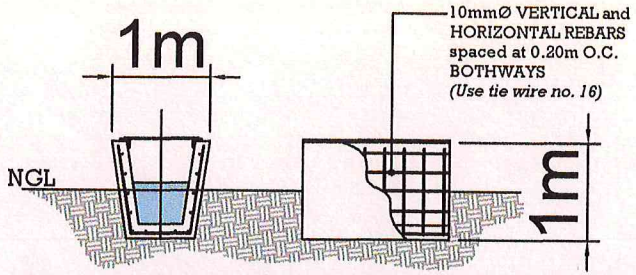


SECTION F-F

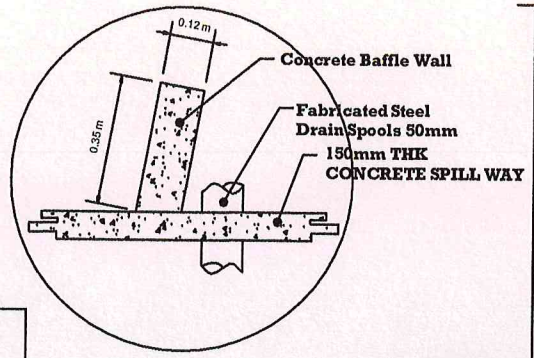
ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title:	Location:	Prepared by:	Reviewed by:	Approved by:	Sheet No.
NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Makilala, North Cotabato	ENGR. MARY JOSELLE C. TABASA ASA A - PDD	ENGR. RAUL A. CONDEZ, RMP/MBA Department Manager A - ECD	STELLA M. GONZALES, MPS General Manager	M / 05
Sheet Content:	Drawn By: / Date:	Checked by:	Recommending Approval:		
MATIBOGGO COLLECTION BOX DETAILS	RSUM MJCT / AUGUST 2020	ENGR. CANUTO A. CODILLA, JR. Division Manager A - PDD	ENGR. WILESPER LEGANDRO M. ALQUEZA, RMP/MBA AGM for Operations		



CONCRETE SPILL WAY



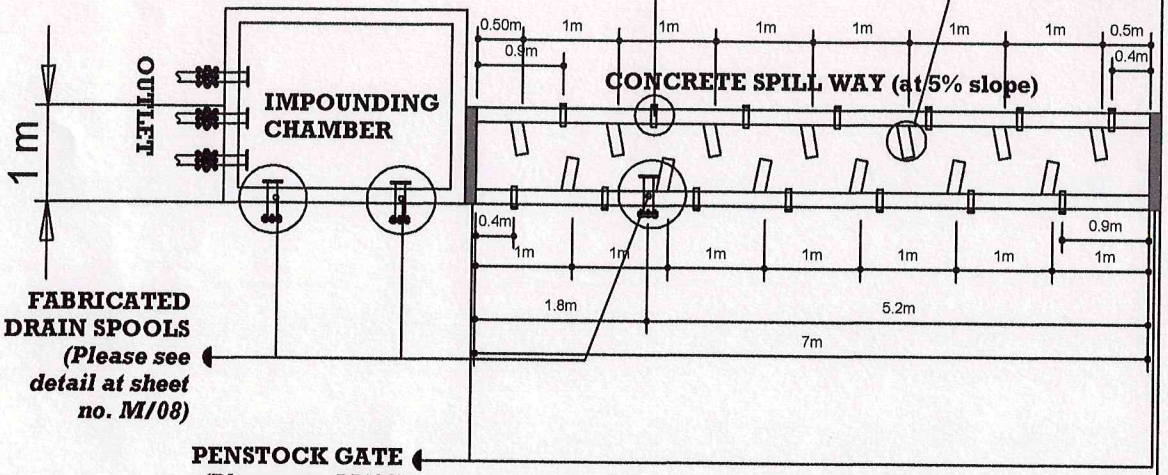
FABRICATED STEEL DRAIN GI SPOOLS spaced at 0.95m O.C.
(Please see detail at sheet no. M/08)

CONCRETE BAFFLE WALLS

MANHOLE (STEEL COVER) 60cm x 60cm x 5cm Square Cast Iron

FABRICATED SPOOL WITH STRAINER ***(Please see detail at sheet no. M/08)***

CATCHMENT WITH STAINLESS STEEL PENSTOCK GATE



FABRICATED DRAIN SPOOLS ***(Please see detail at sheet no. M/08)***

PENSTOCK GATE ***(Please see M/08)***

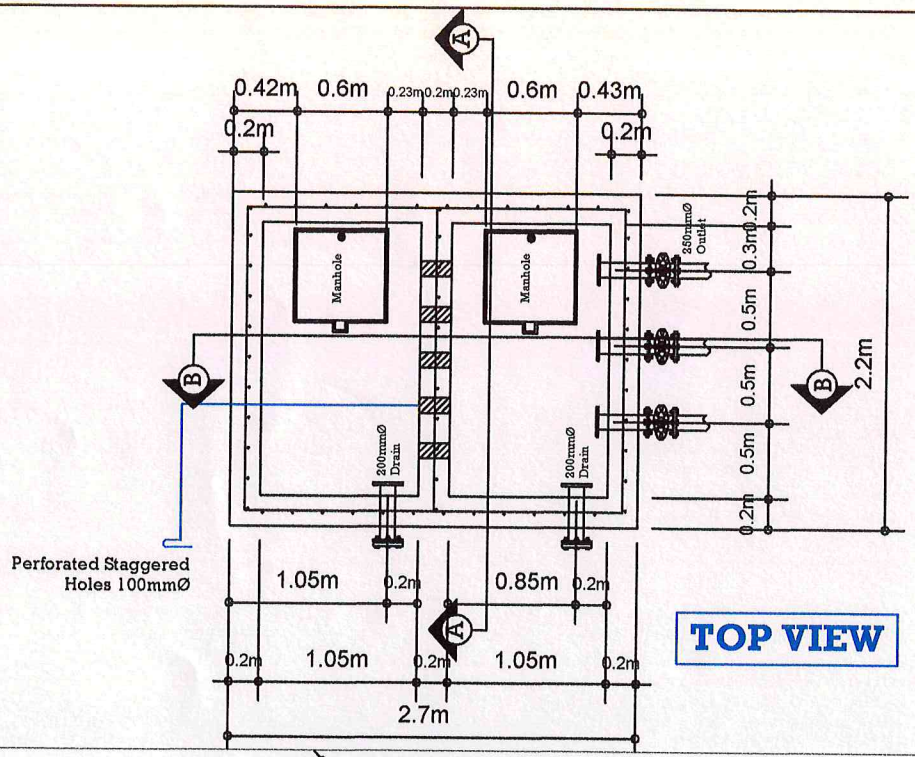
CATCHMENT TO CHAMBER DETAILS

ISO 9001:2015 CERTIFIED
Certificate No. 66478

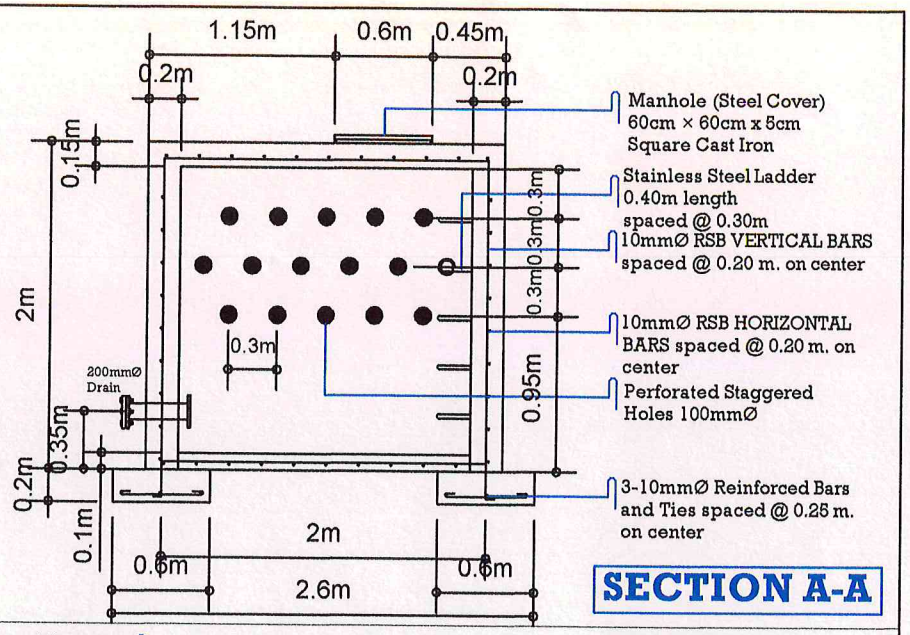
From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title: NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Location: Makilala, North Cotabato	Prepared by: ENGR. MARY JOSELLE C. TABASA, ASA A - PDD	Reviewed by: ENGR. RAMIL A. CONDEZ, RMP/MBA, Department Manager A - ECD
Sheet Content: MATIBOGGO CATCHMENT TO CHAMBER DETAILS	Drawn By: MJCT; Date: AUGUST 2020	Checked by: ENGR. CANUTO A. CODILLA, JR., Division Manager A - PDD	Recommending Approval: ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA, ADM for Operations
			Approved by: STELLA M. GONZALES, MPS, General Manager

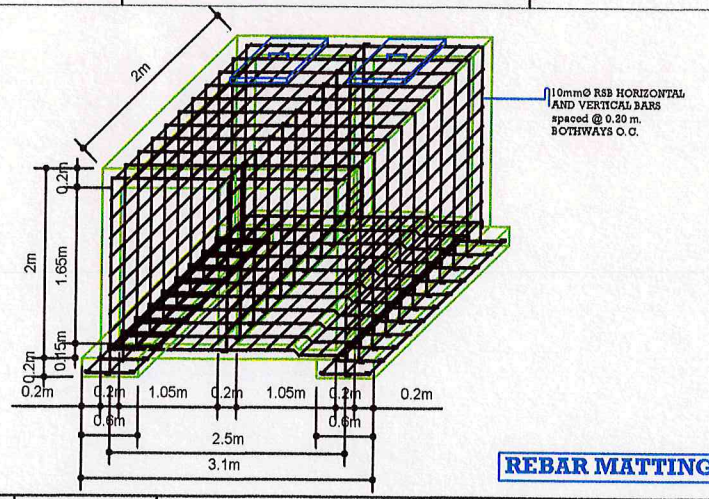
Sheet No. M / 06



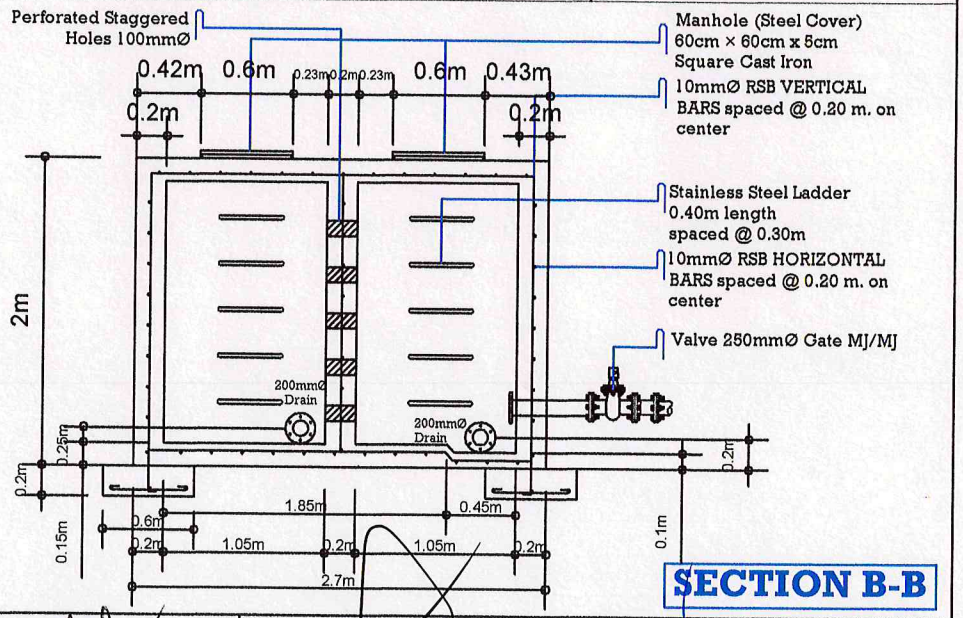
TOP VIEW



SECTION A-A



REBAR MATTING DETAILS

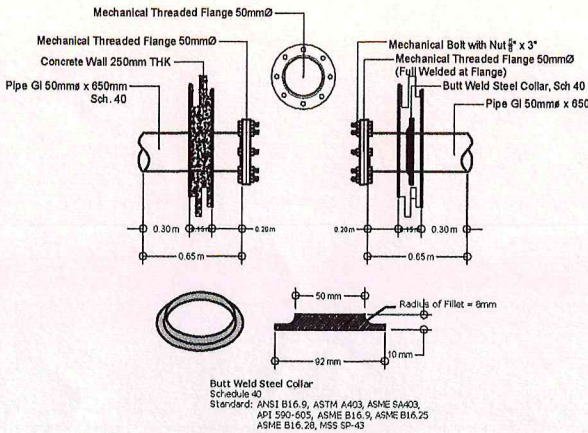


SECTION B-B

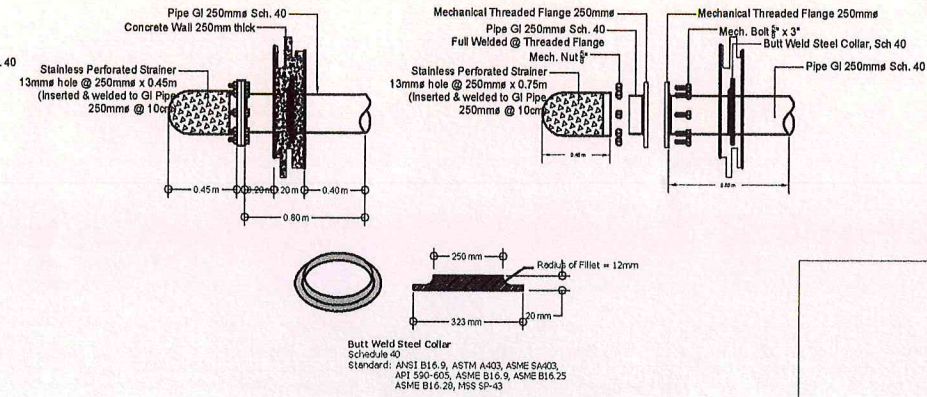
ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1645
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

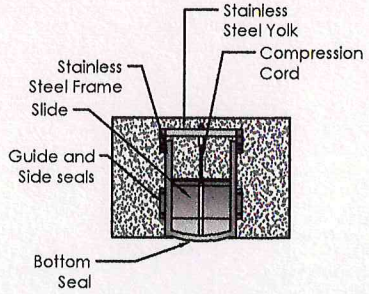
Project Title:	Location:	Prepared by:	Reviewed by:	Approved by:	Sheet No.
NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Makilala, North Cotabato	ENGR. MARY JOSELLE C. TABASA, ASA - PDD	ENGR. KAMIL A. CONDEZ, RMP/MBA, Department Manager A - ECD	STELLA M. GONZALES, MPS, General Manager	M / 07
Sheet Content: MATIBOGGO IMPOUNDING CHAMBER DETAILS	Drawn By: RSUM MJCT; Date: AUGUST 2020	Checked by: ENGR. CANUTO A. CODILLA, JR., Division Manager A - PDD	Recommending Approval: ENGR. WILESPER LEGANDRO M. ALQUEZA, RMP/MBA, AOM for Operations		



DRAIN SPOOL SECTION DETAIL (50MMØ)



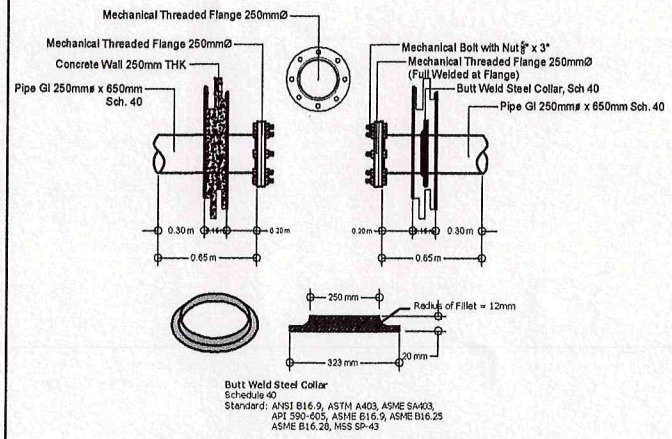
SPOOL WITH STRAINER SECTION DETAIL
COLLECTION BOX SPOOL



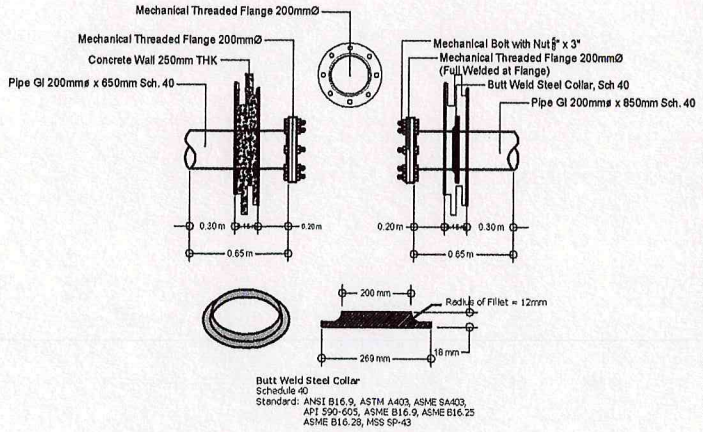
STAINLESS STEEL PENSTOCK GATE DETAIL

Specification of Material:

- Stainless Steel Garde 316
- High A-class penstock design based on DIN 19569-4/AWWA C560/BS 775
- Sealing made from waste water resistant neoprene
- Sealing Faces in bolted design
- Sliding Design with adjoining sealing
- Standard head 6m water column for on-seating and off-seating
- Door guided by rollers for bigger sizes
- All steel component of stainless grade 316



OUTLET SPOOL SECTION DETAIL (250MMØ)



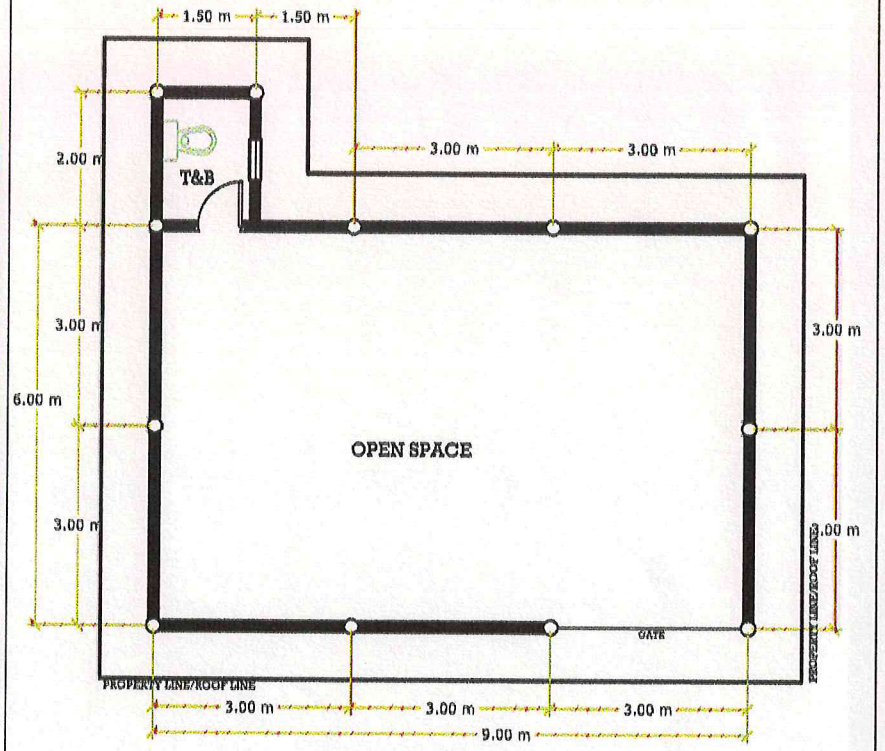
DRAIN SPOOL SECTION DETAIL (200MMØ)

ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title:	Location:		Prepared by:	Reviewed by:	Approved by:	Sheet No.
NOTONGON - MATIBOGGO SOURCE DEVELOPMENT	Makilala, North Cotabato		ENGR. MARY JOSELLE C. TABASA ASA A - PDD	ENGR. RAMIL A. CONDEZ, RMP/MBA Department Manager A - ECD	STELLA M. GONZALES, MPS General Manager	M / 08
Sheet Content:	Drawn By:	Date:	Checked by:	Recommending Approval:		
MATIBOGGO SPOOL AND PENSTOCK GATE DETAILS	RSUM MJCT	AUGUST 2020	ENGR. CANUTO A. CODILLA, JR. Division Manager A - PDD	ENGR. WILESTER LISANDRO M. ALQUEZA, RMP/MBA AGM for Operations		

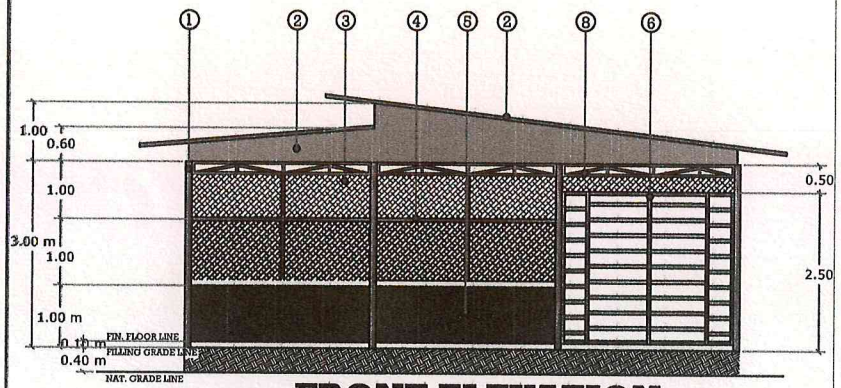
PERSPECTIVE



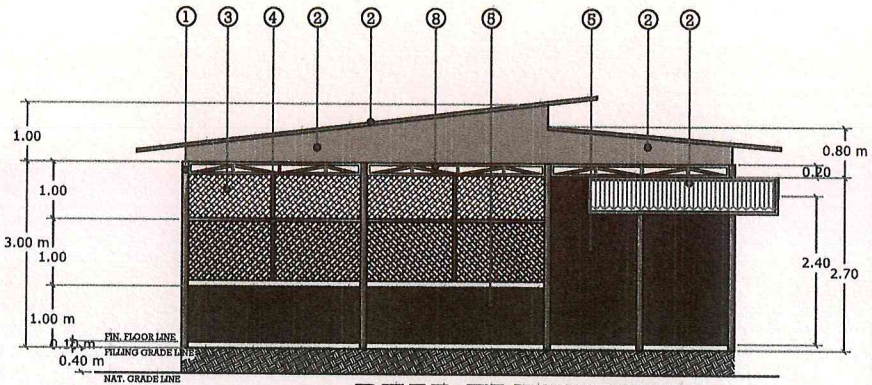
FLOOR PLAN

PROPOSED NOTONGON BUNKHOUSE/ FACILITY

	ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATION DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: JOpilas DATE: OCTOBER 2019	PROJECT TITLE: PROPOSED NOTONGON BUNKHOUSE/ FACILITY	PREPARED BY: JOEAN R. OPILAS, JO/PDO; CHECKED BY: GANUTO A. CODILLA JR., CE, DIVISION MANAGER A, EOD	REVIEWED BY: RAHIL A. CONDEZ, CE,MBA,RMP, DEPARTMENT MANAGER A, EOD; RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA, ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER	Sheet No.: A/08



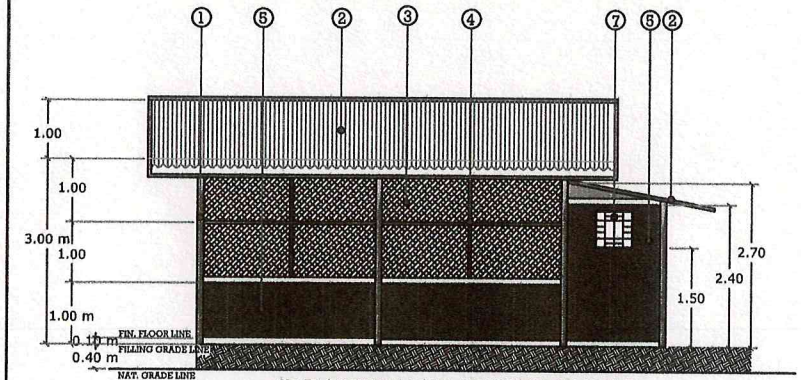
FRONT ELEVATION



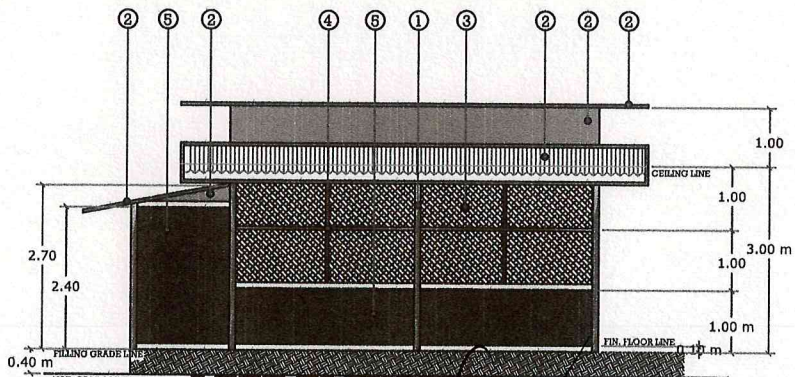
REAR ELEVATION

INDEX

SYMBOL	MATERIAL
1	GI STEEL PIPE 4"
2	COLOR ROOF
3	WIRE MESH
4	TUBULAR 1" X 1"
5	CONC.CEMENT FINISH
6	FABRICATED STEEL GATE
7	FABRICATED STEEL WINDOW
8	SEE GIRT DETAIL



RIGHT ELEVATION

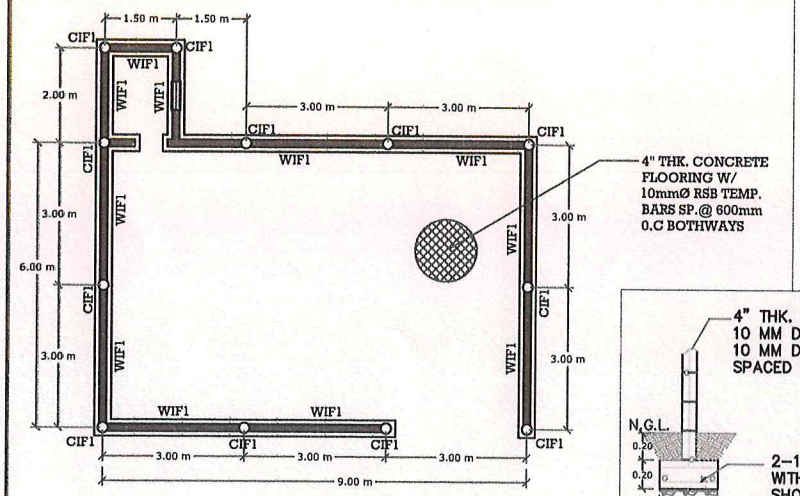


LEFT ELEVATION

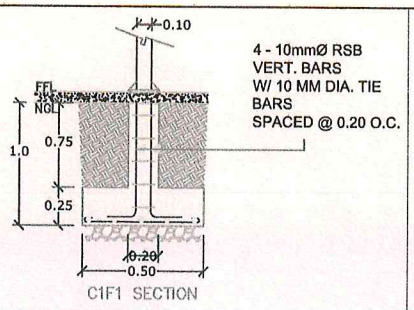
PROPOSED NOTONGON BUNKHOUSE/ FACILITY

	ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATION DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: JOplas DATE: OCTOBER 2019	PROJECT TITLE: PROPOSED NOTONGON BUNKHOUSE/ FACILITY	PREPARED BY: JOEAN R. OPILAS JO/PDO CHECKED BY: CANUTO A. CODILLA JR., CE DIVISION MANAGER A ECD	REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP DEPARTMENT MANAGER A ECD RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS GENERAL MANAGER	SHEET NO. A/09

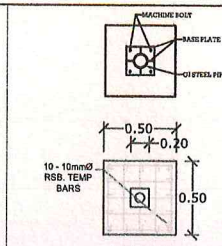
FM-PDD-04 00 12-08-2016



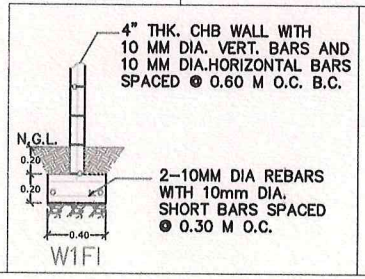
FOUNDATION PLAN



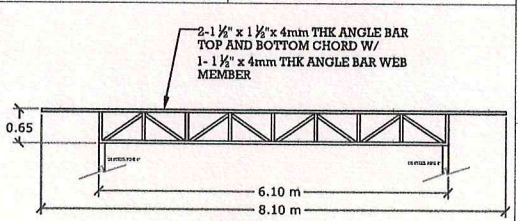
C1F1 SECTION



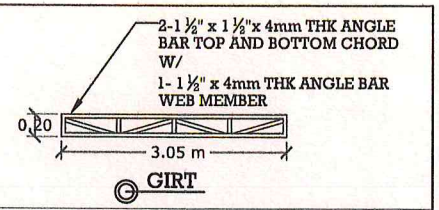
PLAN



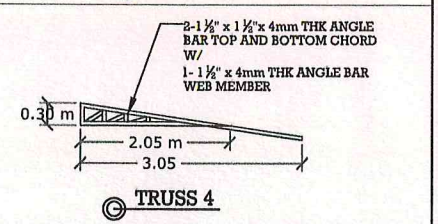
W1F1



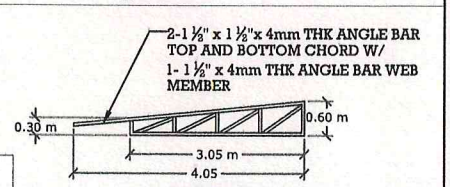
TRUSS 5



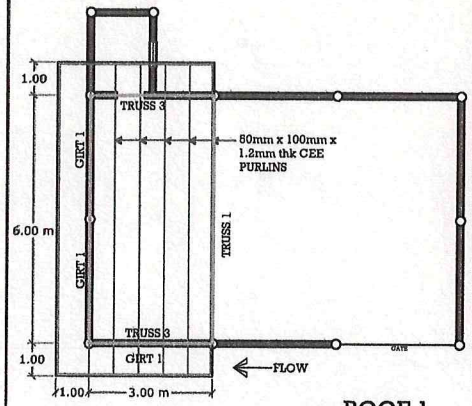
GIRT



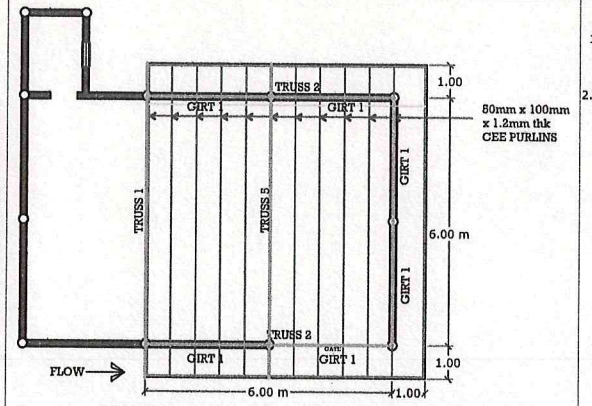
TRUSS 4



TRUSS 3

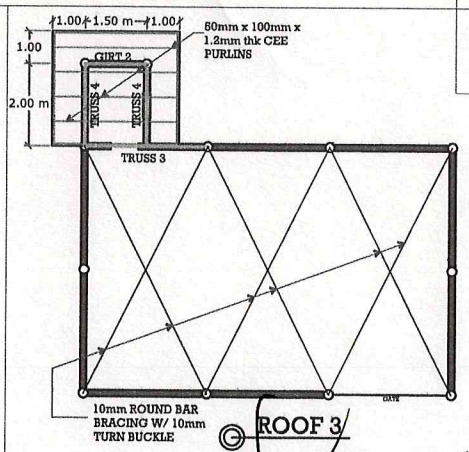


ROOF 1

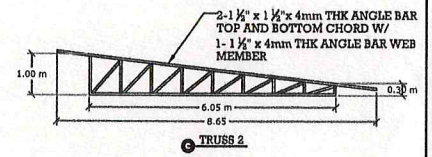


ROOF 2

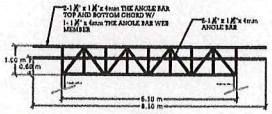
NOTE: USE DOUBLE FOIL/DOUBLE SIDED INSULATION FOAM ON ROOF PANELS AS PROTECTION FROM EXTREME HEAT DURING DRY SEASON



ROOF 3

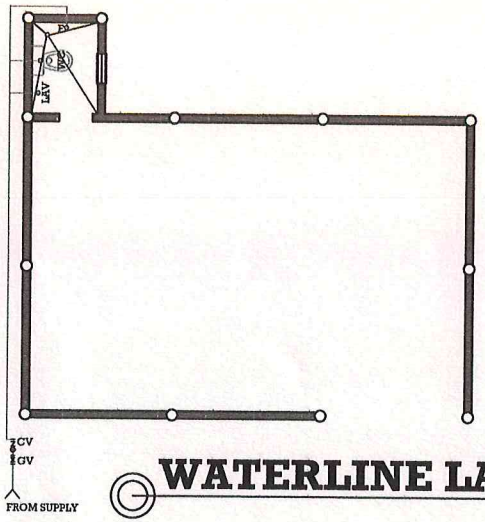


TRUSS 2

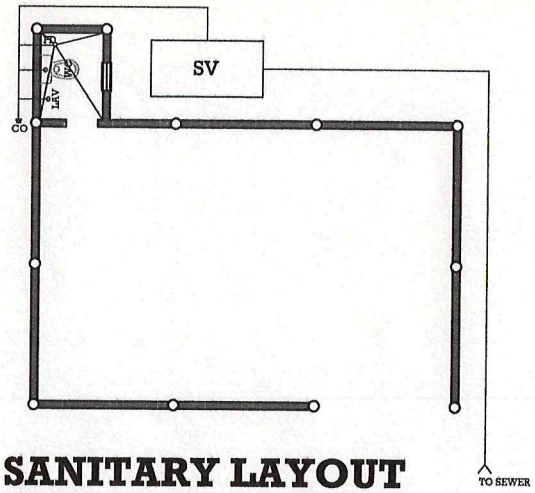


PROPOSED NOTONGON BUNKHOUSE/ FACILITY

ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATION DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: JOpilas DATE: OCTOBER 2019	PROJECT TITLE: PROPOSED NOTONGON BUNKHOUSE/ FACILITY	PREPARED BY: JOEAN R. OPILAS JO/PDD CHECKED BY: CANUTO A. CODILLA JR., CE DIVISION MANAGER A ECD	REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP DEPARTMENT MANAGER A ECD RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS GENERAL MANAGER	SHEET NO. S/02



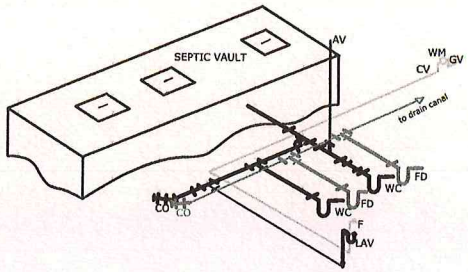
WATERLINE LAYOUT



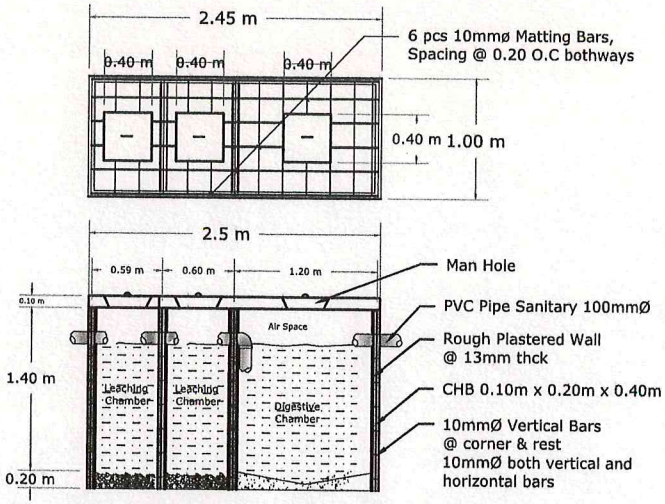
SANITARY LAYOUT

Legend:

AV	Air Vent
WC	Water Closet
FD	Floor Drain
LAV	Lavatory
CO	Clean out Plug
CV	Check Valve
WM	Water Meter
GV	Gate Valve
F	Faucet
SH	Shower Head
U	Urinal



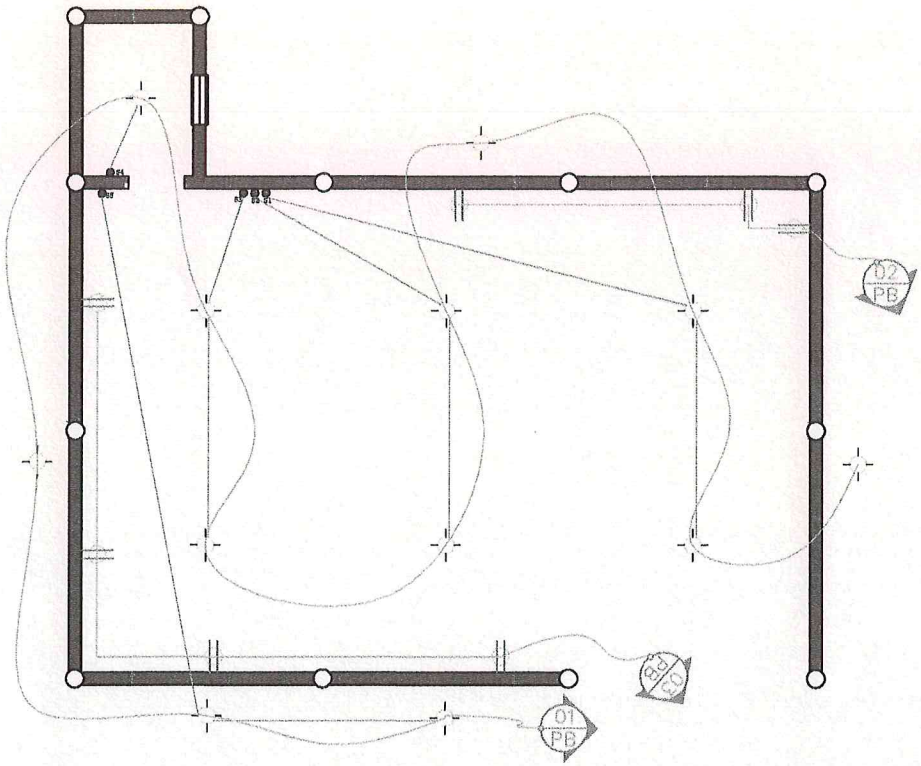
SCHEMATIC DIAGRAM



SEPTIC VAULT DETAILS

PROPOSED NOTONGON BUNKHOUSE/ FACILITY

ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATION DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: JOpilas DATE: OCTOBER 2019	PROJECT TITLE: PROPOSED NOTONGON BUNKHOUSE/ FACILITY	PREPARED BY: JOEAN R. OPILAS JO/FOD CHECKED BY: CANUTO A. CODILLA JR., CE DIVISION MANAGER A ECD	REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP DEPARTMENT MANAGER A ECD RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS GENERAL MANAGER	SHEET NO. P/01



LEGEND:

⊹	LIGHTING OUTLET
═	CONVENIENCE OUTLET
S	SWITCH

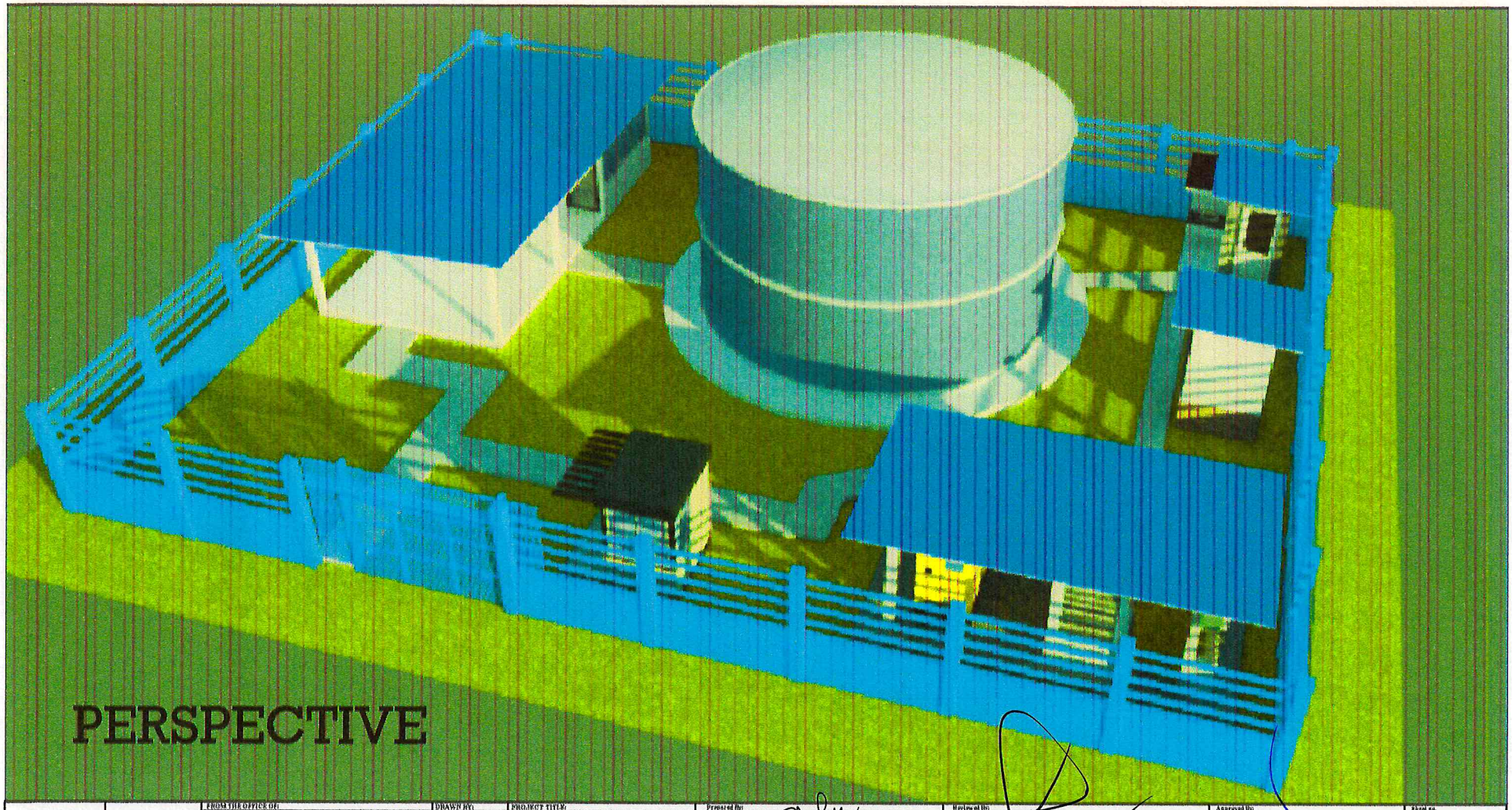
ELECTRICAL LAYOUT PLAN

PROPOSED NOTONGON BUNKHOUSE/ FACILITY

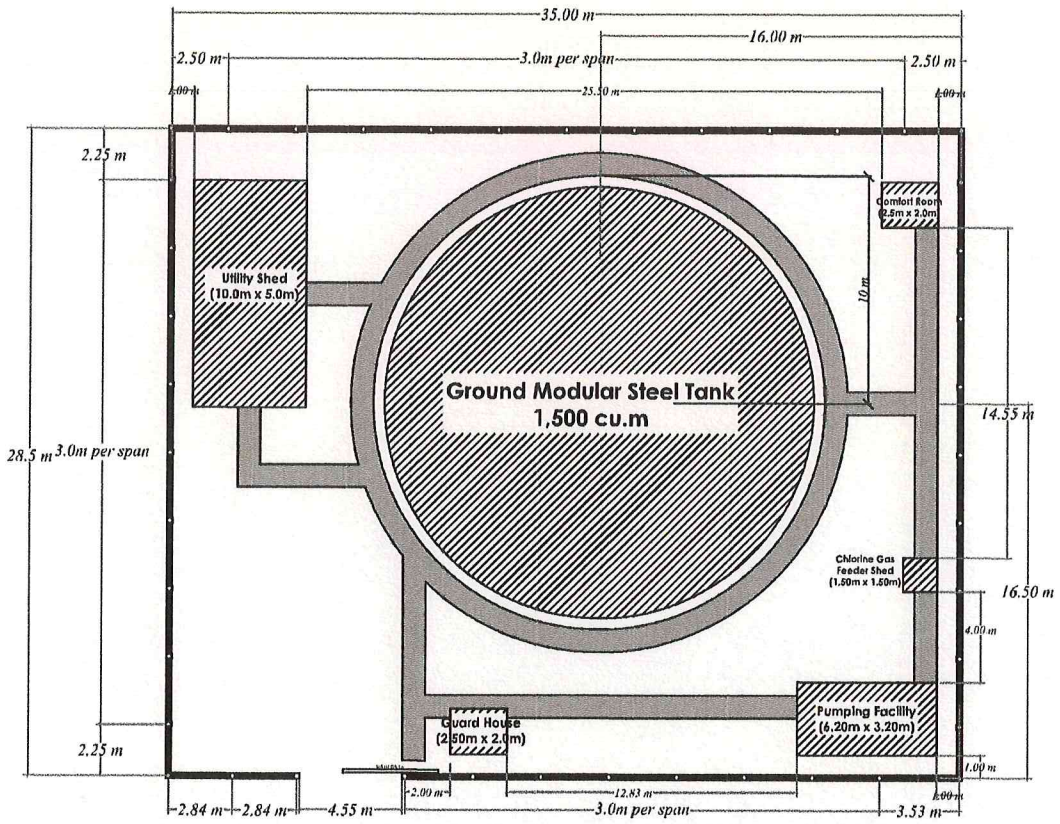
	ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATION DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: JOpilas DATE: OCTOBER 2019	PROJECT TITLE: PROPOSED NOTONGON BUNKHOUSE/ FACILITY	PREPARED BY: JOEAN B. OPILAS, CESPO CHECKED BY: CANUTO A. CODILLA JR., CE, DIVISION MANAGER A EDD	REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP, DEPARTMENT MANAGER EDD RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA, ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER	SHEET NO. E/01

PACKAGE 3: TECHNICAL DETAILS AND SPECIFICATIONS

BUENAVIDA WATER IMPOUNDING STRUCTURE

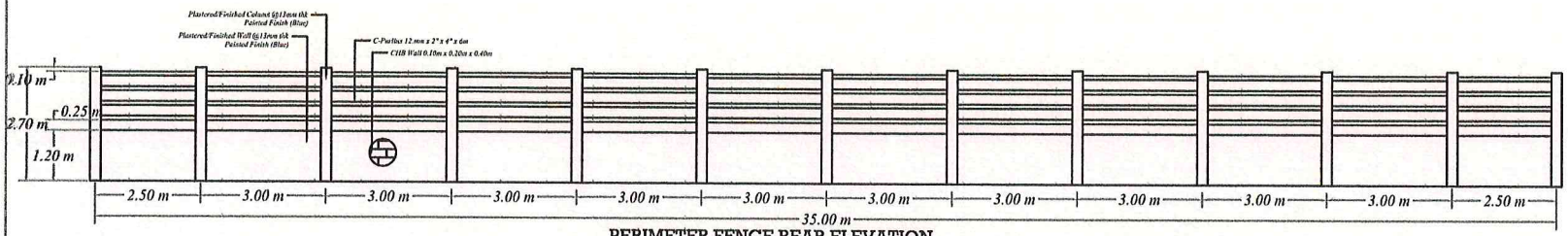


	ISO 9001:2015 CERTIFIED Certificate No. 61478	FROM THE OFFICE OF: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Lanao, Kidapawan City Tel nos. (064)577-1833, 577-1865, Fax no. (064) 572-6555 Email Address: mwdkidapawan@yahoo.com Website: www.mwdkidapawan.gov.ph *"Committed to Service, Development and Self-Reliance"*	DRAWN BY: MJCTABASA DATE: OCTOBER 2019	PROJECT TITLE: **WATER IMPOUNDING STRUCTURE** *(Perspective)*	Prepared by: **MARY JOSELLE O. TABASA, CE** CASUAL - POS Checked by: **CAMILO K. GODILLA JR., CE** DIVISION MANAGER A (OIC)	Reviewed by: **RAMIL A. GONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A (OIC) Recommending Approval: **WILESPER LISANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	Approved by: **STELLA M. GONZALES, MPS** GENERAL MANAGER	Sheet no. **A / 36**

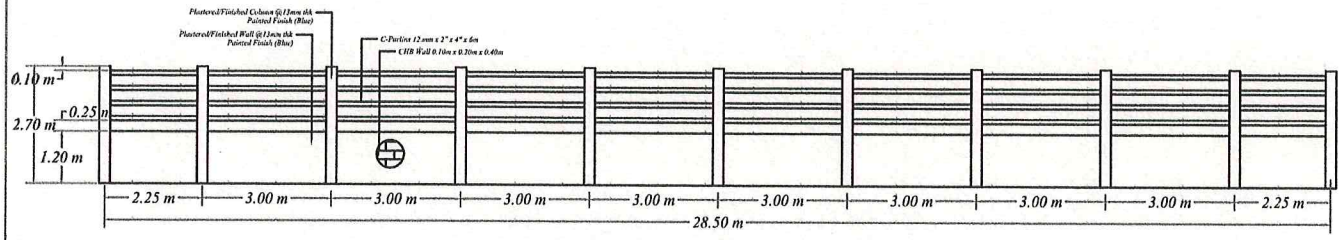


SITE DEVELOPMENT PLAN

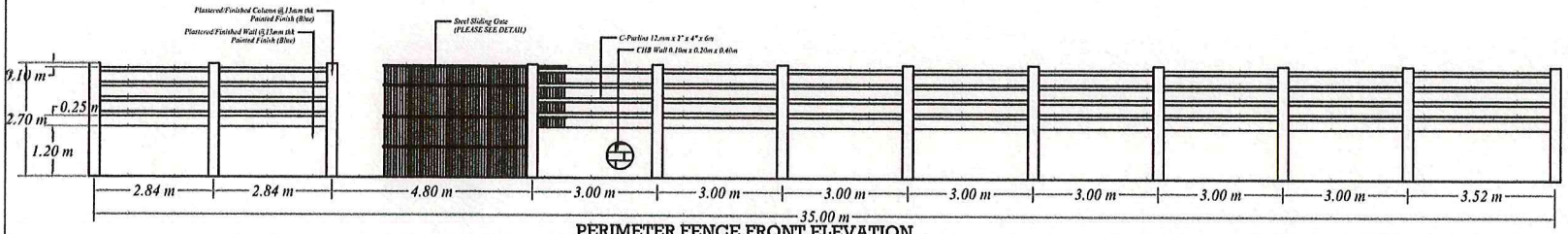
	ISO 9001:2015 CERTIFIED Certificate No. 11478	FROM THE OFFICE OF: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Lanao, Kidapawan City Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawan.com.ph *"Committed to Service, Development and Self-Reliance"*	DRAWN BY: MICTABASA DATE: OCTOBER 2019	PROJECT TITLE: **1,500 CUBIC METER WATER IMPOUNDING STRUCTURE** *(Site Development Plan)*	Prepared By: **MARY JOSELLE C. TABASA, CE** CASUAL - PDD Checked By: **CANUTO A. CODILLA JR., CE** DIVISION MANAGER A PDD	Reviewed By: **RAMIL A. GONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD Recommending Approval: **WILESPER EISANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	Approved By: **STELLA M. GONZALES, MPS** GENERAL MANAGER	Sheet no. **A / 37**



PERIMETER FENCE REAR ELEVATION

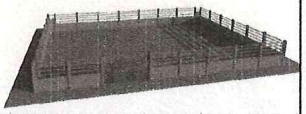


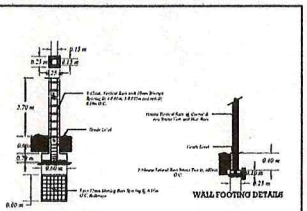
PERIMETER FENCE RIGHT & LEFT ELEVATION



PERIMETER FENCE FRONT ELEVATION

PERSPECTIVE VIEW

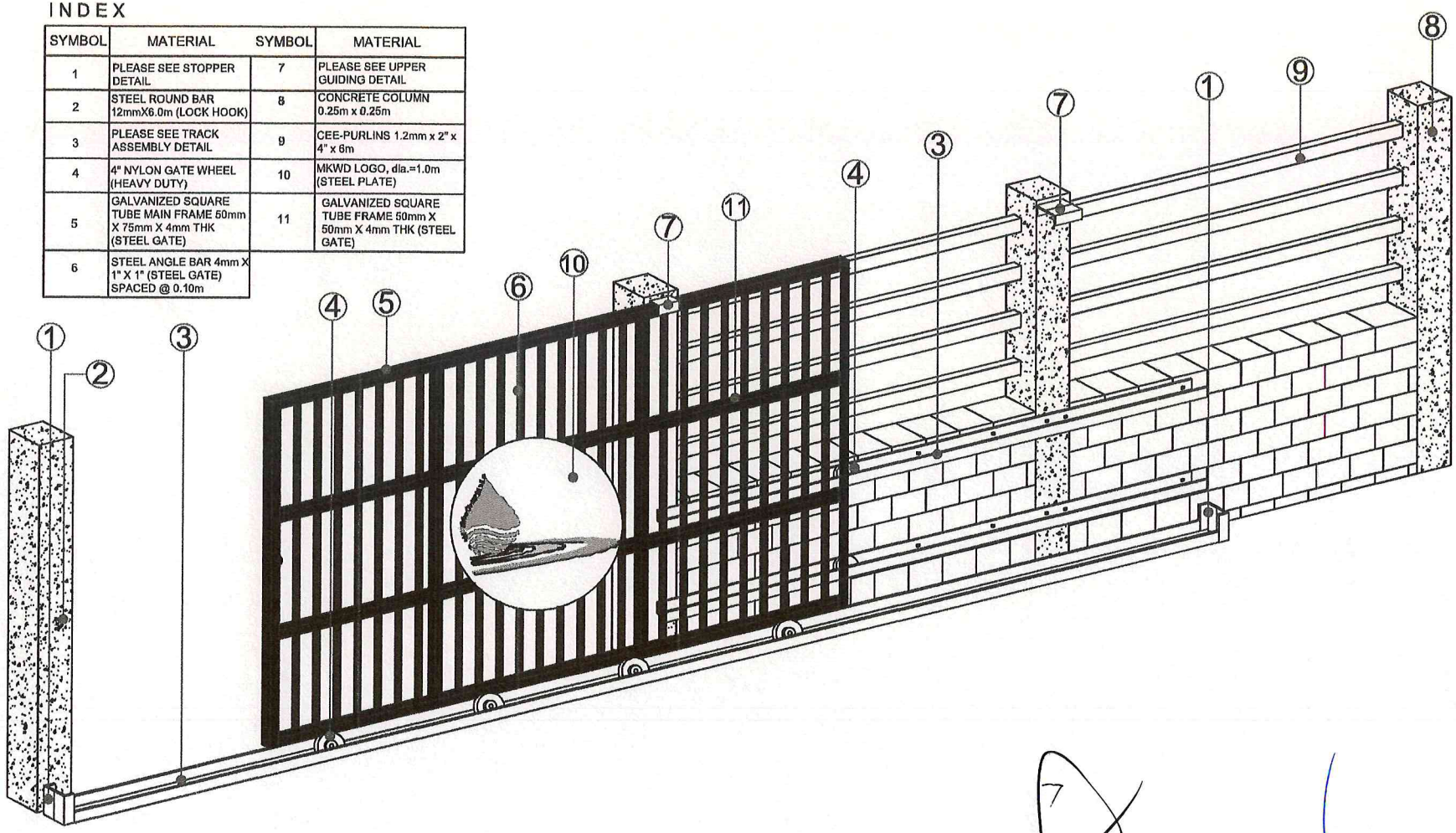




ISO 9001:2018 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Lanao, Kidapawan City Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawandistrict.ph *"Committed to Service, Development and Self-Reliance"*	DRAWN BY: MJCTABASA DATE: OCTOBER 2019	PROJECT TITLE: *Perimeter Fence Details*	Prepared By: **MARY JOSELLE C. TABASA, CE** CASUAL - PDD Checked By: **CANUTO A. CODILLA JR., CE** DIVISION MANAGER A PDD	Reviewed By: **HAMIR A. CONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD Recommending Approval: **WILESPER NSANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	Approved By: **STELLA M. GONZALES, MPS** GENERAL MANAGER	Sheet no. **A/39**

INDEX

SYMBOL	MATERIAL	SYMBOL	MATERIAL
1	PLEASE SEE STOPPER DETAIL	7	PLEASE SEE UPPER GUIDING DETAIL
2	STEEL ROUND BAR 12mmX6.0m (LOCK HOOK)	8	CONCRETE COLUMN 0.25m x 0.25m
3	PLEASE SEE TRACK ASSEMBLY DETAIL	9	CEE-PURLINS 1.2mm x 2" x 4" x 6m
4	4" NYLON GATE WHEEL (HEAVY DUTY)	10	MKWD LOGO, dia.=1.0m (STEEL PLATE)
5	GALVANIZED SQUARE TUBE MAIN FRAME 50mm X 75mm X 4mm THK (STEEL GATE)	11	GALVANIZED SQUARE TUBE FRAME 50mm X 50mm X 4mm THK (STEEL GATE)
6	STEEL ANGLE BAR 4mm X 1" X 1" (STEEL GATE) SPACED @ 0.10m		



ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Lanao, Kidapawan City
Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

DRAWN BY: JR Opilas
DATE: MAY 2020

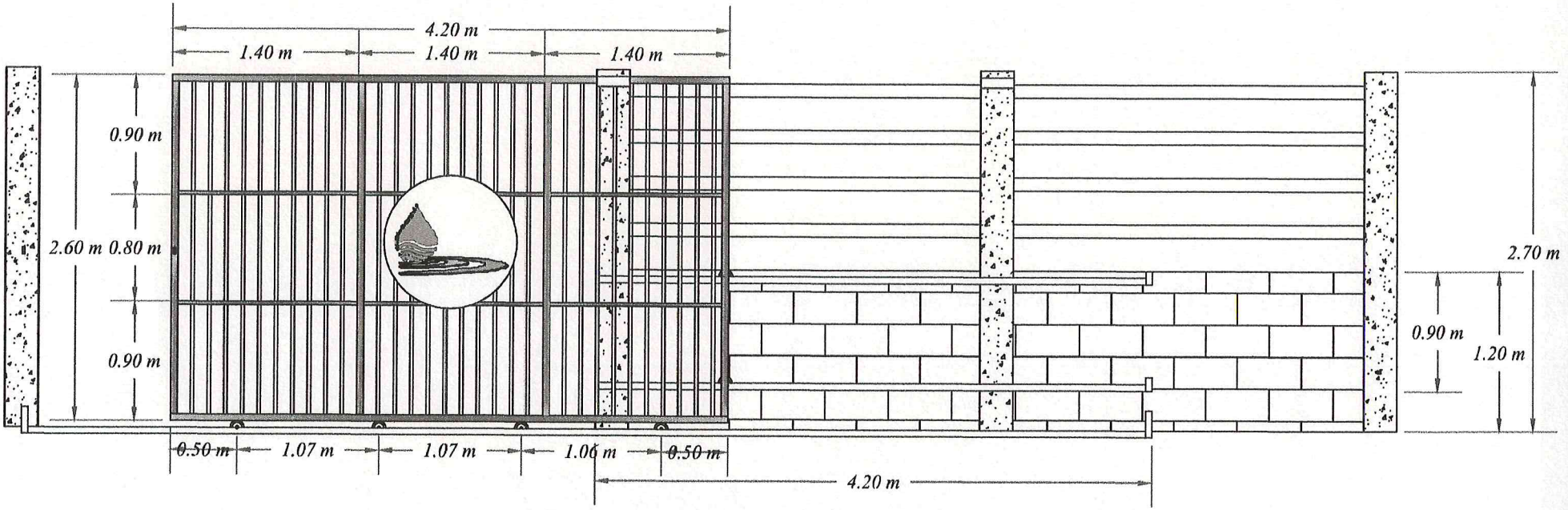
PROJECT TITLE: ***Sliding Gate Details***

PREPARED BY: **JOEAN R. OPILAS** JO - PDD
CHECKED BY: **CANUTO A. CODILLA JR., CE** DIVISION MANAGER A ECD

REVIEWED BY: **RAMIL A. CONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD
RECOMMENDED BY: **WILESPER LISANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION

APPROVED BY: **STELLA M. GONZALES, MPS** GENERAL MANAGER

SHEET NO. **S/56**

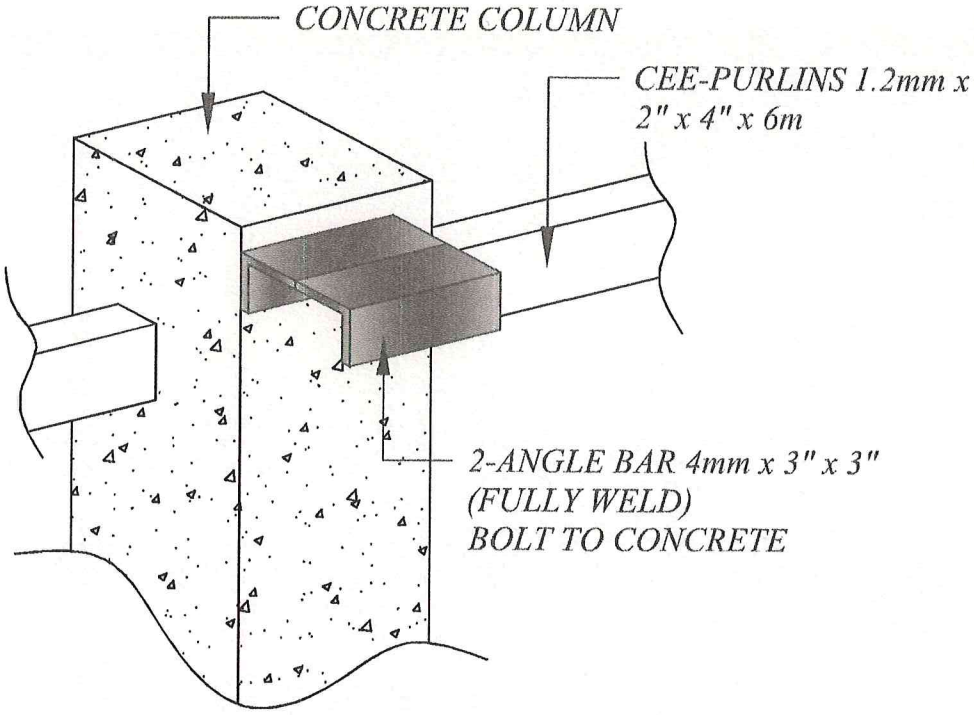


SLIDING GATE ELEVATION

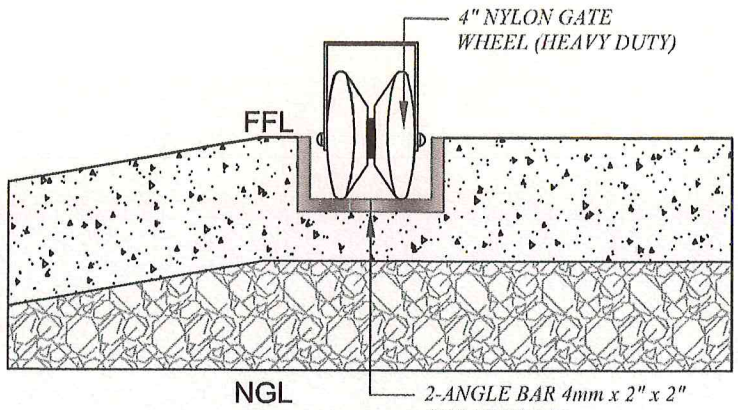
ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Lanao, Kidapawan City
Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

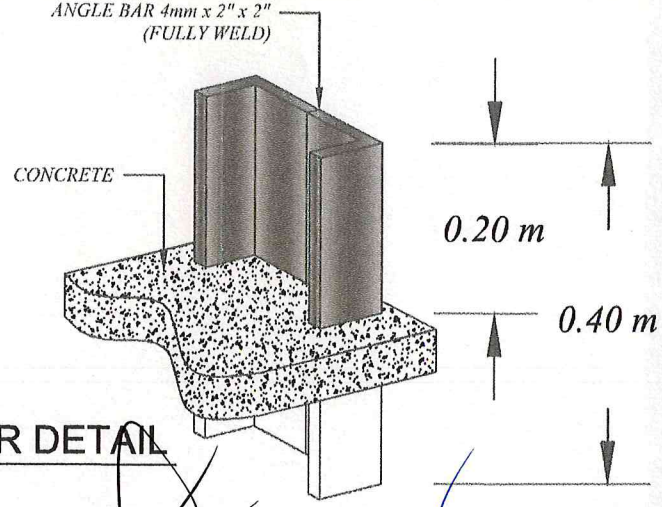
DRAWN BY:	PROJECT TITLE:	PREPARED BY:	REVIEWED BY:	APPROVED BY:	SHEET NO.
JROpilas	*Sliding Gate Details*	**JOEAN R. OPILAS**	**RAMIL A. CONDEZ, CE, RMP, MBA**	**STELLA M. GONZALES, MPS**	**S/57**
DATE: MAY 2020		CHECKED BY: **CANUTO A. CODILLA JR., CE** DIVISION MANAGER A ECD	RECOMMENDED BY: **WILESPER LISANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	GENERAL MANAGER	



UPPER GUIDING DETAIL



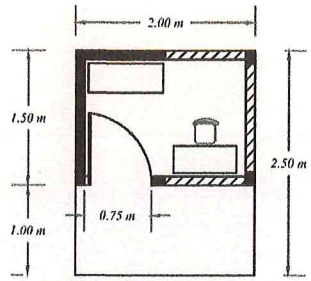
TRACK ASSEMBLY DETAIL



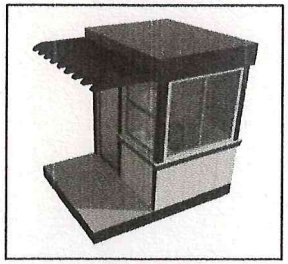
STOPPER DETAIL

	ISO 9001:2016 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Lanao, Kidapawan City Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawanwd.gov.ph *"Committed to Service, Development and Self-Reliance"*	DRAWN BY: JROpias DATE: MAY 2020	PROJECT TITLE: ***Sliding Gate Details***	PREPARED BY: **JOEAN R. OPILAS** JO - PDD CHECKED BY: **CANUTO A. CODILLA, JR., CE** DIVISION MANAGER A-ECD	REVIEWED BY: **RAMIL A. CONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD RECOMMENDED BY: **WILESPER LISANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: **STELLA M. GONZALES, MPS** GENERAL MANAGER	SHEET NO. **S/58**

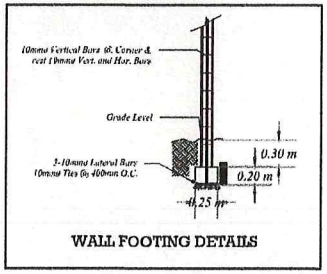
FM-PDD-04 09 12-08-2016



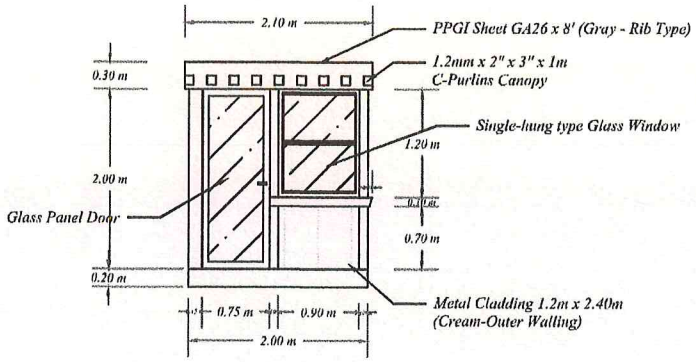
FLOOR PLAN



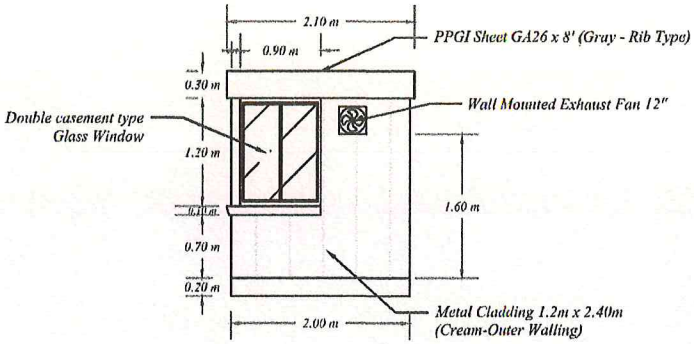
PERSPECTIVE



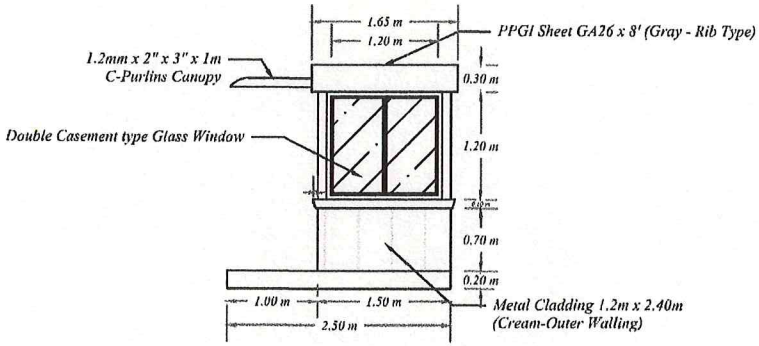
WALL FOOTING DETAILS



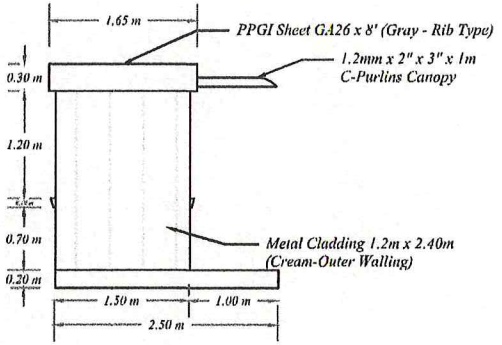
FRONT ELEVATION



REAR SIDE ELEVATION

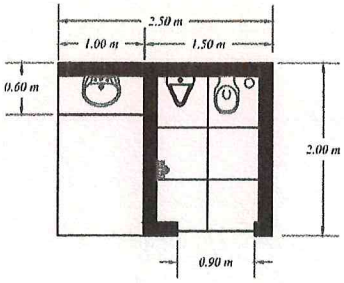


RIGHT SIDE ELEVATION

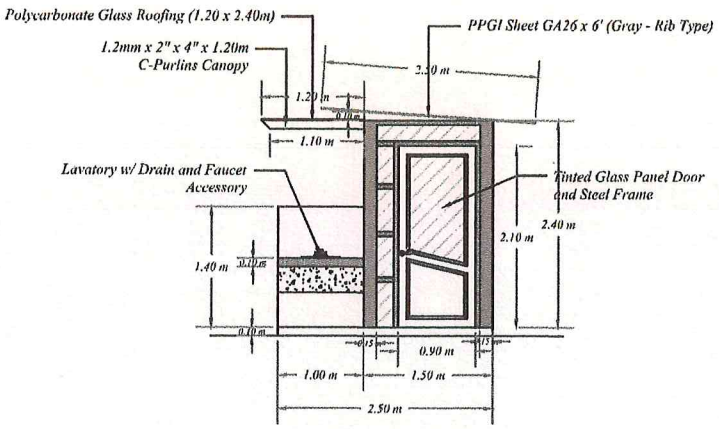


LEFT SIDE ELEVATION

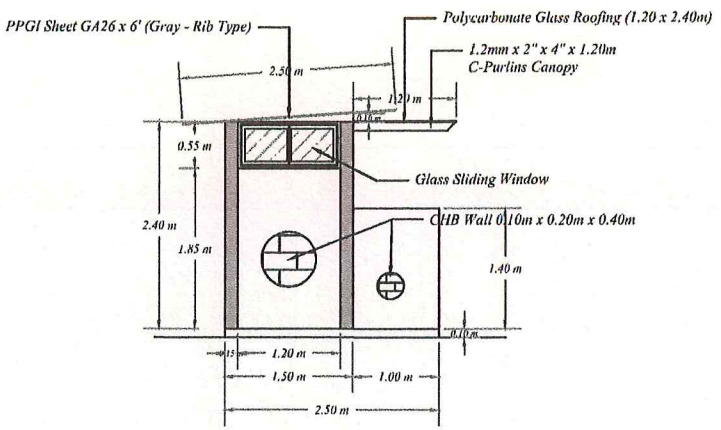
	ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: Republic of the Philippines METRO KIDAPAWAN WATER DISTRICT Lanao, Kidapawan City Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawanwater.ph "Committed to Service, Development and Self-Reliance"	DRAWN BY: MJCTABASA DATE: OCTOBER 2019	PROJECT TITLE: *Guard House Details*	Prepared By: **MARY JOSELLE C. TABASA, CE** CASUAL - PDO Checked By: **CANUTO A. CUDILLA JR., CE** DIVISION MANAGER A PDO	Reviewed By: **RAMIL A. CONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD Recommending Approval: **WILESPER LEANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	Approved By: **STELLA M. GONZALES, MPS** GENERAL MANAGER	Sheet no. **A / 38**



FLOOR PLAN

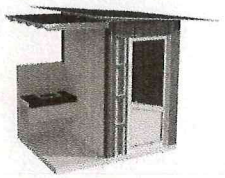


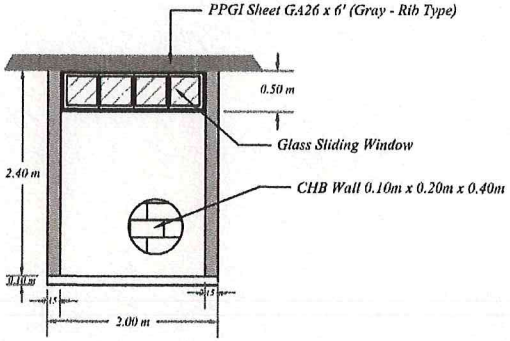
FRONT ELEVATION



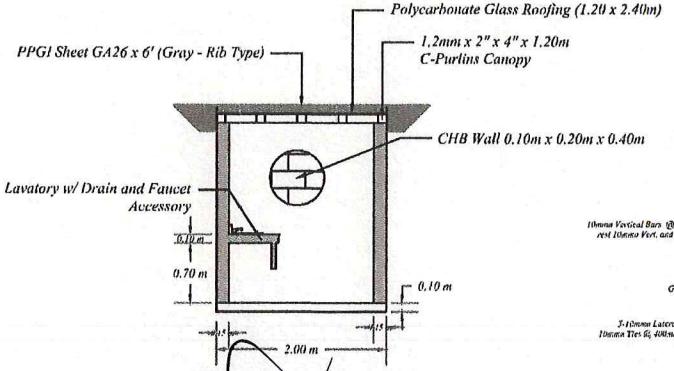
REAR SIDE ELEVATION

PERSPECTIVE

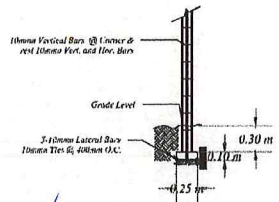




RIGHT SIDE ELEVATION



LEFT SIDE ELEVATION

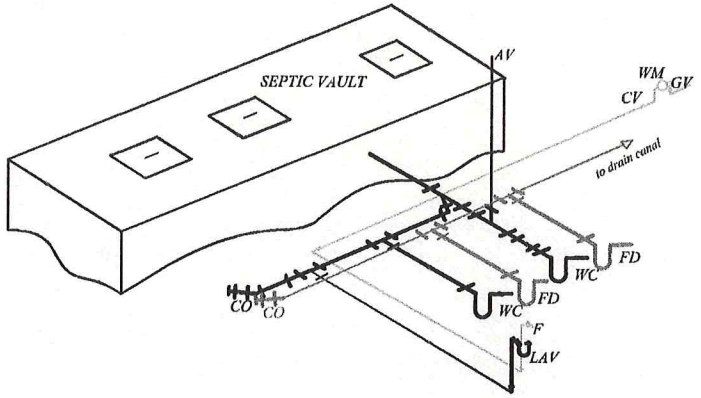


WALL FOOTING DETAILS

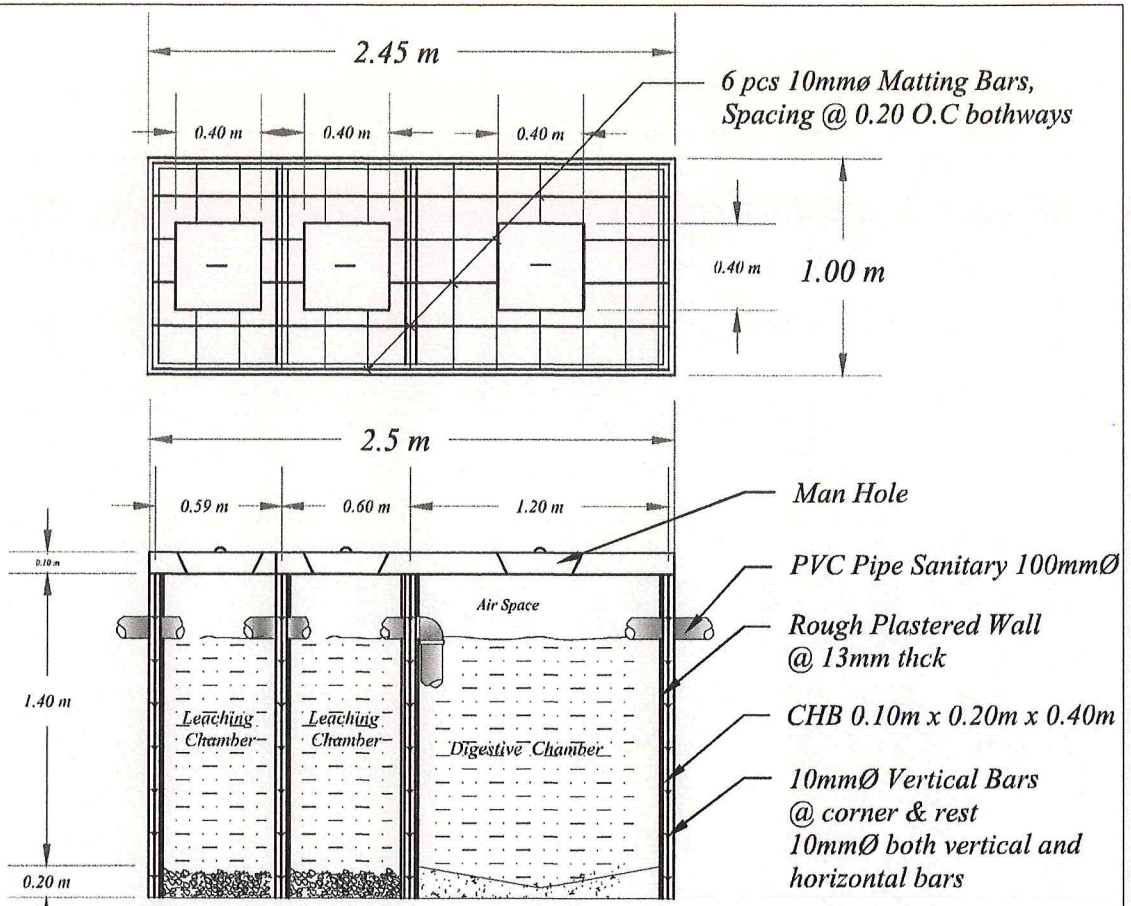
	ISO 9001:2015 CERTIFIED Certificate No. 44478	FROM THE OFFICE OF: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Lanao, Kidapawan City Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawan.gov.ph "Committed to Service, Development and Self-Reliance"	DRAWN BY: MJCTABASA DATE: OCTOBER 2019	PROJECT TITLE: *Comfort Room Details*	Prepared By: **MARY JOSELLE C. TABASA, CE** CASUAL - PDO Checked By: **CANUTO A. CODILLA JR., CE** DIVISION MANAGER A PDO	Reviewed By: **CAMILLA. CONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD Recommending Approval: **WILESPER L. SAMORO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	Approved By: **STELLA M. GONZALES, MPS** GENERAL MANAGER	Sheet no. **A / 40**

Legend:

AV	Air Vent
WC	Water Closet
FD	Floor Drain
LAV	Lavatory
CO	Clean out Plug
CV	Check Valve
WM	Water Meter
GV	Gate Valve
F	Faucet
SH	Shower Head
U	Urinal



SCHEMATIC DIAGRAM



SEPTIC VAULT DETAILS

ISO 9001:2015 CERTIFIED
Certificate No. 61478

FROM THE OFFICE OF:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Lanao, Kidapawan City
Tel nos. (064)577-1533, 577-1865. Fax no. (064) 572-5555
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwaterdistrict.com
"Committed to Service, Development and Self-Reliance"

DRAWN BY: MJCTABASA

DATE: OCTOBER 2019

PROJECT TITLE: *Septic Vault (Three Chamber) Details*

Prepared By: **MARY JOSELLE C. TABASA, CE**, CASUAL - PDO

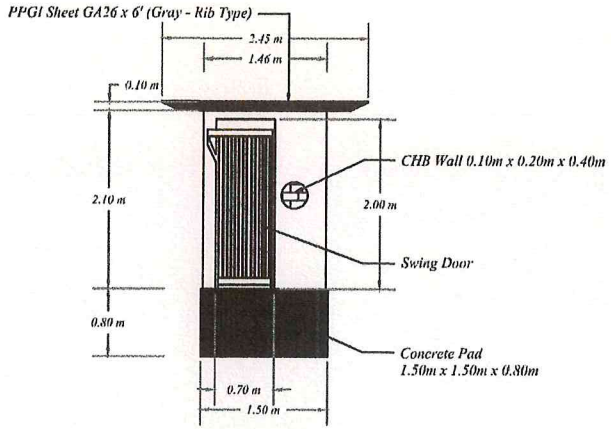
Checked By: **LARUTO A. CODILLA JR., CE**, DIVISION MANAGER A PDO

Reviewed By: **RAMIL A. CONDEZ, CE, RMP, MBA**, DEPARTMENT MANAGER A ECD

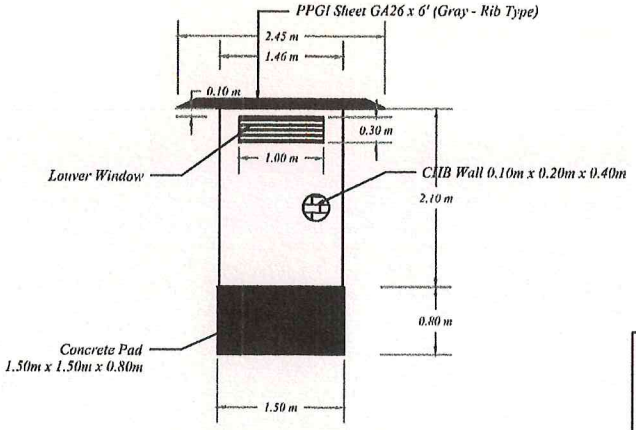
Recommending Approval: **WILESPER LISANDRO M. ALQUEZA, CE, RMP,MBA**, A&S GENERAL MANAGER FOR OPERATION

Approved By: **STELLA M. GONZALES, MPS**, GENERAL MANAGER

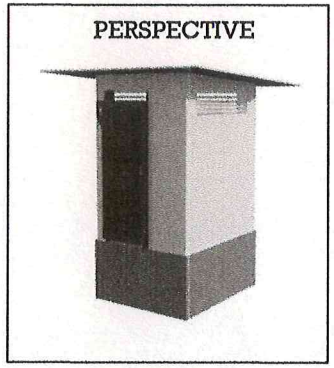
Sheet no. **P / 04**

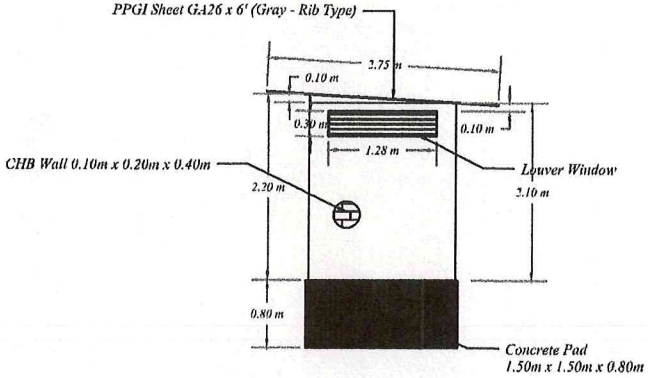


FRONT ELEVATION

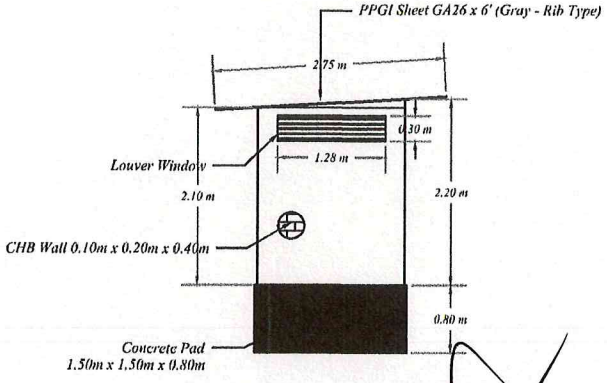


REAR SIDE ELEVATION



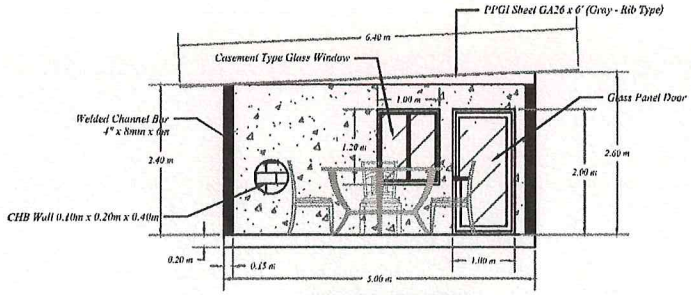


RIGHT SIDE ELEVATION

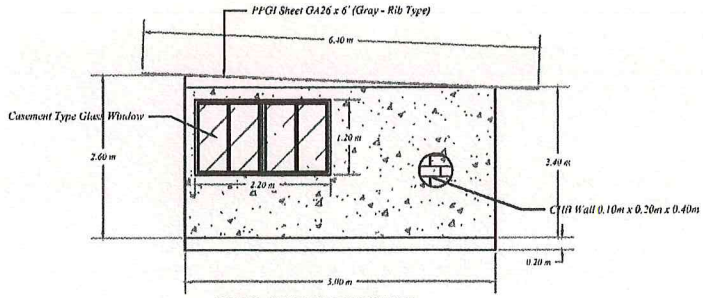


LEFT SIDE ELEVATION

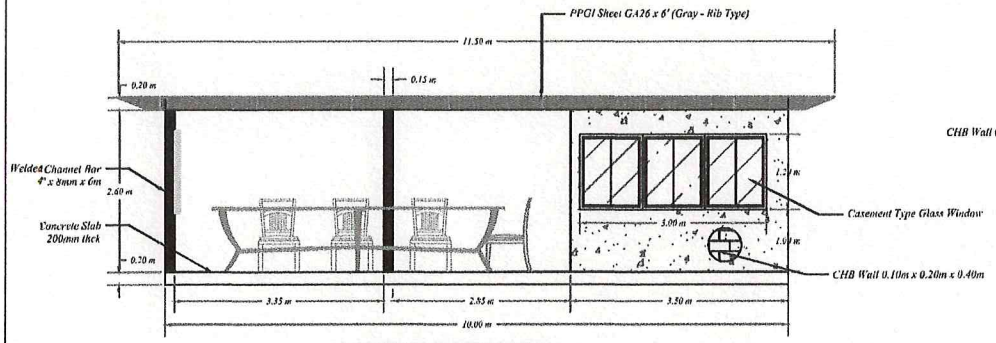
	ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Lanao, Kidapawan City Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-6555 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawan.gov.ph "Committed to Service, Development and Self-Reliance"	DRAWN BY: MJCTABASA DATE: OCTOBER 2019	PROJECT TITLE: ***Chlorine Gas Feeder Details***	Prepared By: **MARY JOSELLE C. TABASA, CE** CASUAL - PDD Checked By: **CANUTO A. CODILLA JR., CE** DIVISION MANAGER A PDD	Reviewed By: **CAMILA. CONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD Recommending Approval: **WILESPER ALEJANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	Approved By: **STELLA M. GONZALES, MPS** GENERAL MANAGER	Sheet no. **A / 43**



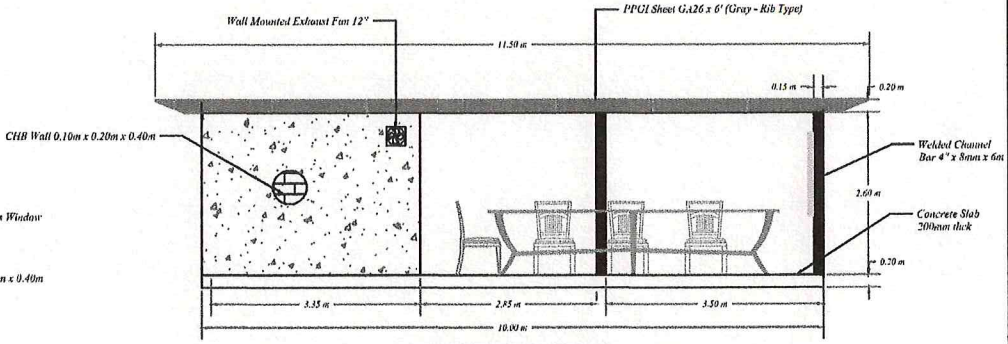
FRONT ELEVATION



REAR SIDE ELEVATION

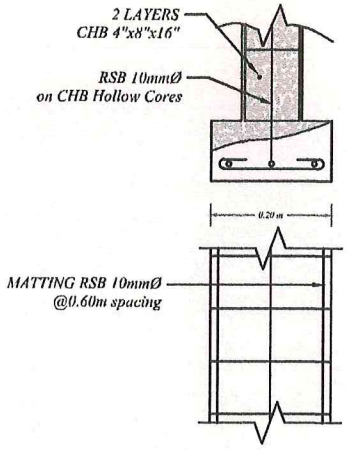


RIGHT SIDE ELEVATION

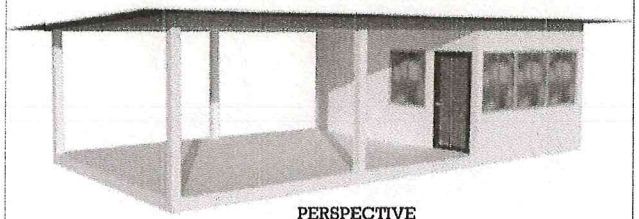


LEFT SIDE ELEVATION

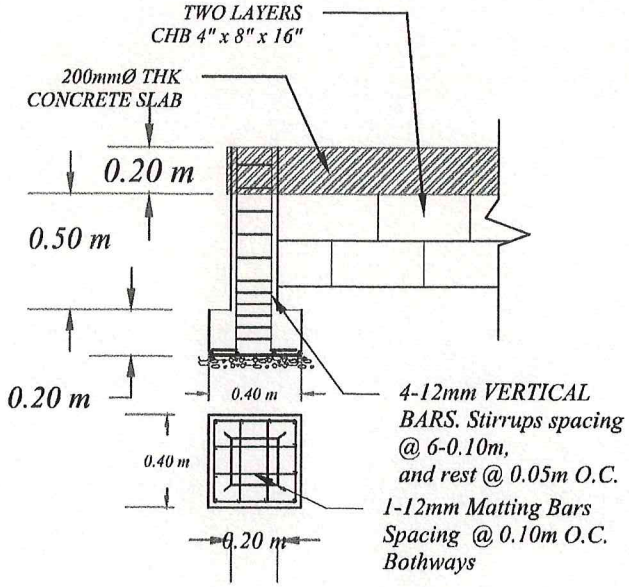
	ISO 9001:2015 CERTIFIED Certificate No. 44478	FROM THE OFFICE OF: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Lanao, Kidapawan City Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555 E-mail Address: metrokidapawan.wd@yahoo.com Website: www.metrokidapawanwd.gov.ph *"Committed to Service, Development and Self-Reliance"*	DRAWN BY: MJCTABASA DATE: OCTOBER 2019	PROJECT TITLE: ***Utility Shed Details (Elevations)***	Prepared By: **MARY JOSELEE C. TABASA, CE** CASUAL - PDO Checked By: **CANUTO A. CODILLA JR., CE** DIVISION MANAGER A PDD	Reviewed By: **RAMIL A. CONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD Recommending Approval: **WILESPER MSANJRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	Approved By: **STELLA M. GONZALES, MPS** GENERAL MANAGER	Sheet no. **A / 42**



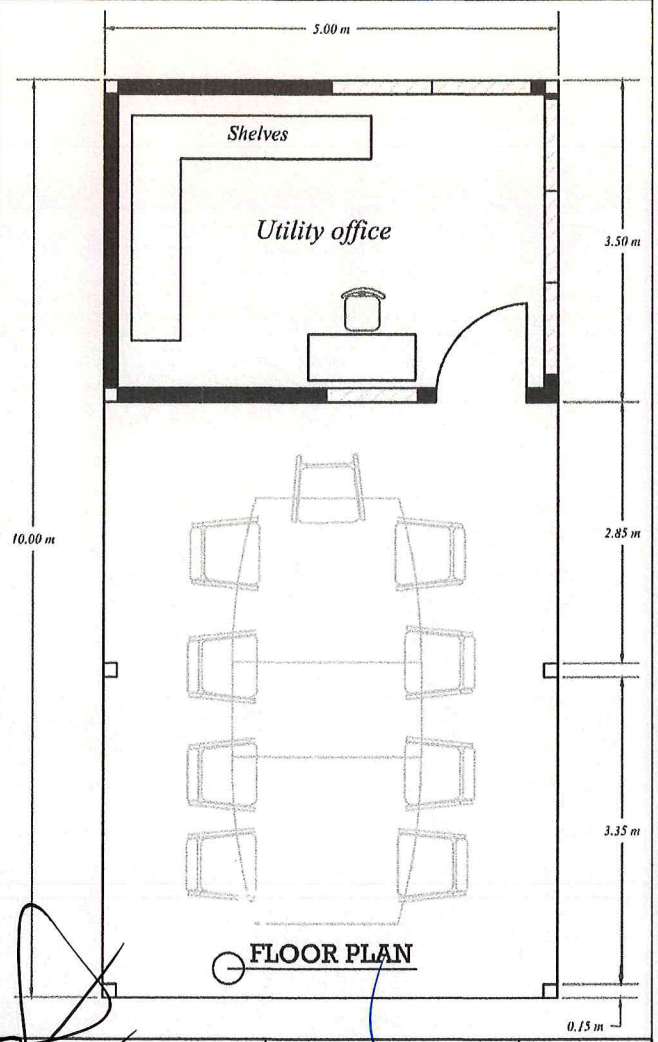
WALL FOOTING DETAILS



PERSPECTIVE

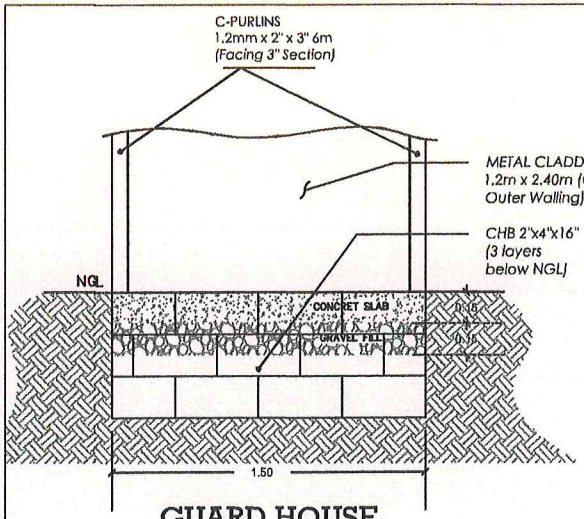


PEDESTAL DETAILS

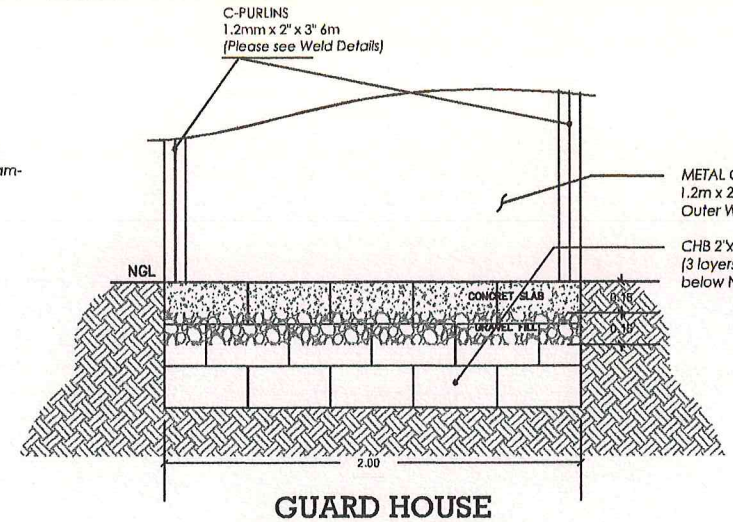


FLOOR PLAN

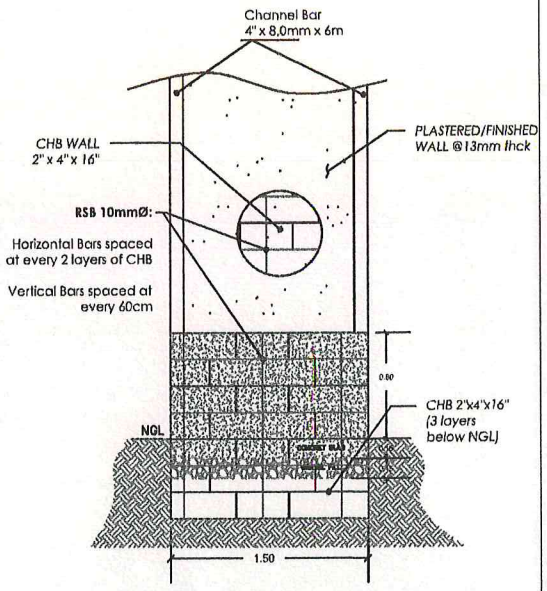
	ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: Republic of the Philippines METRO KIDAPAWAN WATER DISTRICT Lanao, Kidapawan City Tel nos. (064)577-1533. 577-1865. Fax no. (064) 572-5555 E-mail Address: mwdkidapawan_wd@yahoo.com Website: www.mwdkidapawandistrict.gov.ph "Committed to Service, Development and Self-Reliance"	DRAWN BY: MJCTABASA DATE: OCTOBER 2019	PROJECT TITLE: *Utility Shed Details*	Prepared By: MARY JOSELLA C. TARASA, CE CASUAL - PDO Checked By: CANUTO A. CODILLA JR., CE DIVISION MANAGER A PDO	Reviewed By: RAMIL A. CONDEZ, CE, RMP, MBA DEPARTMENT MANAGER A ECD Recommending Approval: WILESPER LISANDRO M. ALQUEZA, CE, RMP,MBA ASST. GENERAL MANAGER FOR OPERATION	Approved By: STELLA M. GONZALES, MPS GENERAL MANAGER	Sheet no. A/20



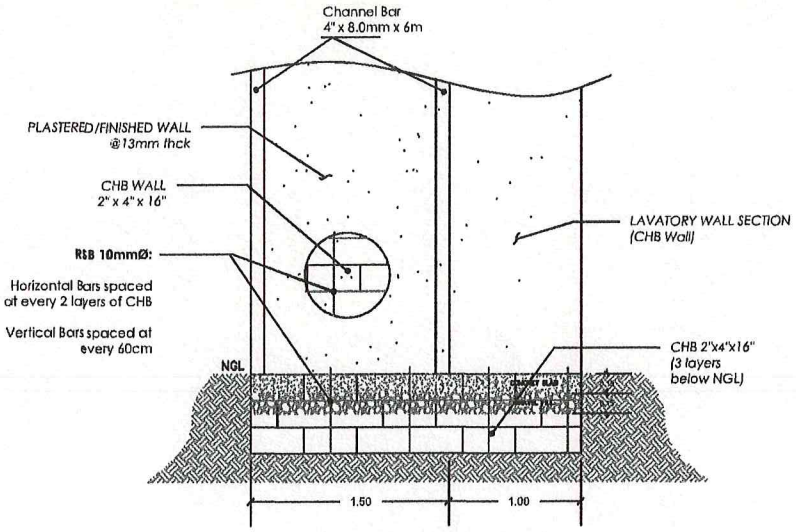
GUARD HOUSE
(Left & Right Profile)



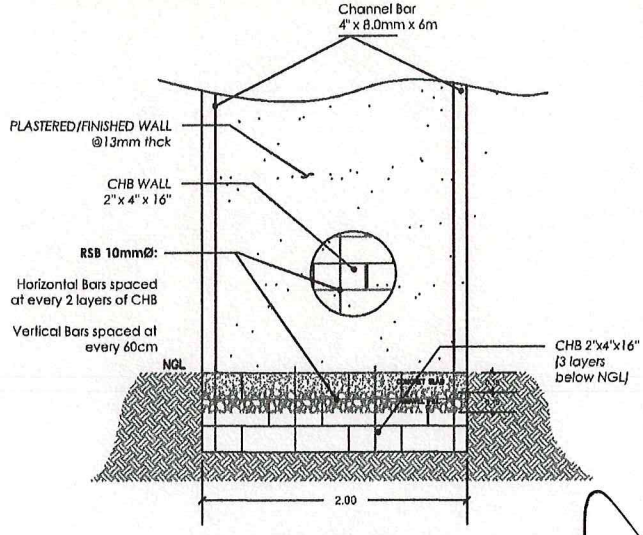
GUARD HOUSE
(Front & Rear Profile)



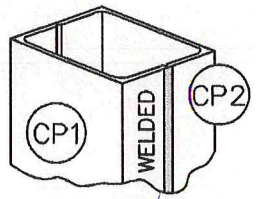
CHLORINE GAS FEEDER SHED
(Profile)



COMFORT ROOM
(Rear Profile)



COMFORT ROOM
(Left/Right Profile)



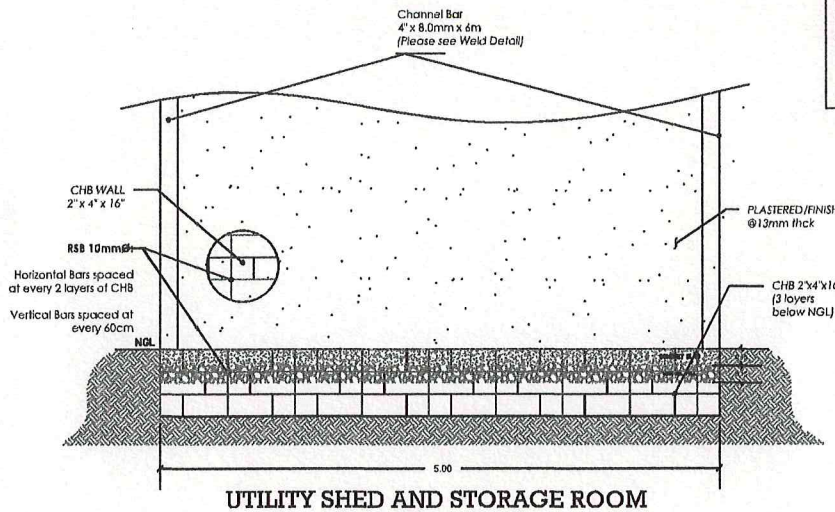
WELD DETAILS
(C-PURLINS)

ISO 9001:2015 CERTIFIED
Certificate No. 65478

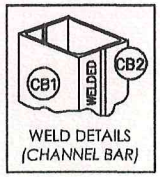
FROM THE OFFICE OF:

Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Lanao, Kidapawan City
Tel nos. (064)577-1533, 577-1865. Fax no. (064) 572-5555
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawandistrict.ph
"Committed to Service, Development and Self-Reliance"

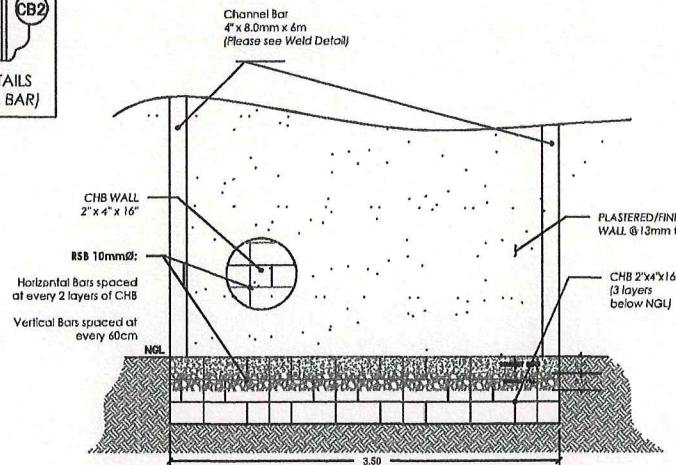
Project Title:	Location:		Prepared By:	Reviewed By:	Approved By:	Sheet no.
WATER IMPOUNDING STRUCTURE	MKWD Service Area		MARY JOSELLE C. TABASA, CE CASUAL - PDO	RAMIL A. CONDEZ, CE, RMP, MBA DEPARTMENT MANAGER A ECD	STELLA M. GONZALES, MPS GENERAL MANAGER	S / 34
Sheet Content:	Drawn By:	Date:	Checked By:	Recommending Approval:		
STRUCTURAL DETAILS	MJCTABASA	APRIL 2020	CAMILO A. CODILLA JR., CE DIVISION MANAGER A PDD	WILESPER LISANDRO M. ALQUEZA, CE, RMP,MBA ASST. GENERAL MANAGER FOR OPERATION		



UTILITY SHED AND STORAGE ROOM
(Front/Rear Profile)

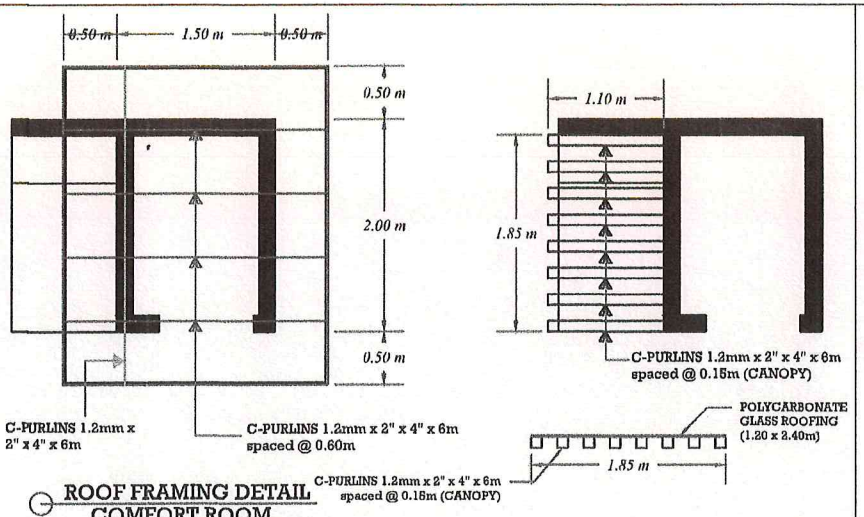


WELD DETAILS
(CHANNEL BAR)

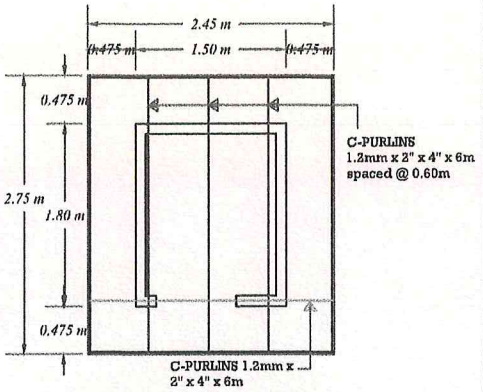


UTILITY SHED AND STORAGE ROOM
(Left /Right Profile)

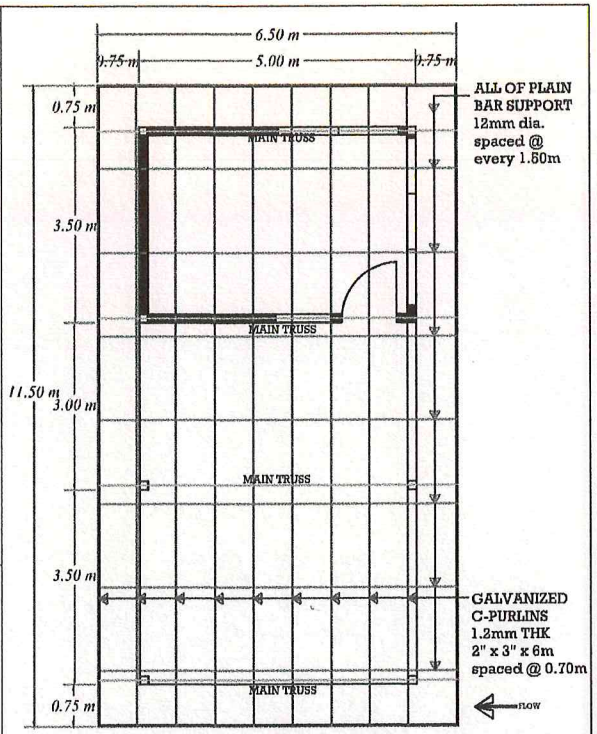
	ISO 9001:2015 CERTIFIED Certificate No. 44478	FROM THE OFFICE OF: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Lanao, Kidapawan City Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawan-waterdistrict.ph *"Committed to Service, Development and Self-Reliance"*	Project Title: **WATER IMPOUNDING STRUCTURE**	Location: MKWD Service Areas	Prepared By: **MARY JOSELLE C. TABASA, CE** CASUAL - PDO	Reviewed By: **RAMIL A. CONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD	Approved By: **STELLA M. GONZALES, MPS** GENERAL MANAGER	Sheet no. **S / 35**
			Sheet Contents: STRUCTURAL DETAILS	Drawn By: MJCTABASA	Date: APRIL 2020	Checked By: **CAMILO A. CODILLA JR., CE** DIVISION MANAGER A PDO	Recommending Approval: **WILESPER L. SANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	



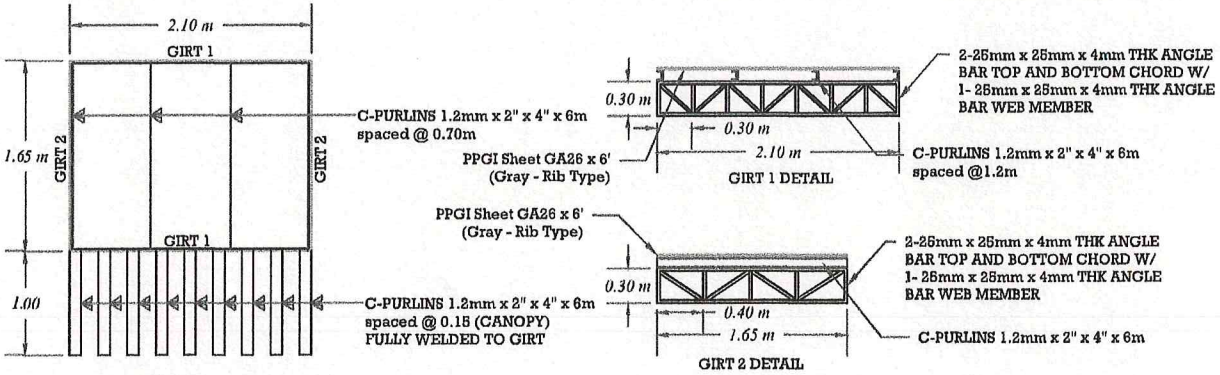
ROOF FRAMING DETAIL
COMFORT ROOM



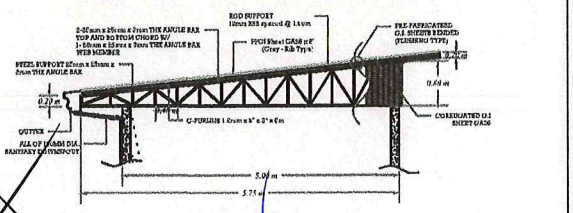
CHLORINE GAS FEEDER SHED
TREATMENT FACILITY



ROOF FRAMING DETAIL
UTILITY SHED AND STORAGE ROOM



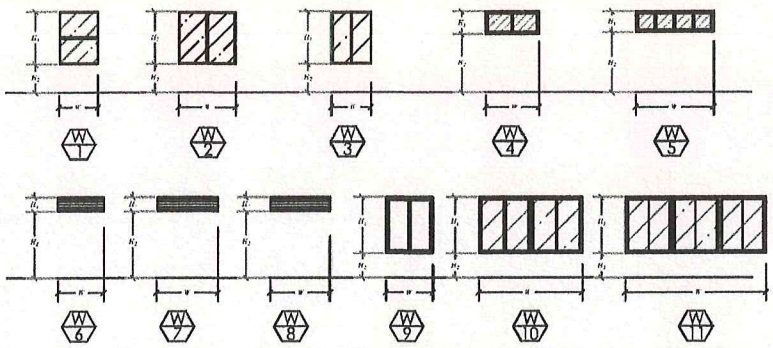
ROOF FRAMING DETAIL
GUARD HOUSE



MAIN TRUSS DETAIL

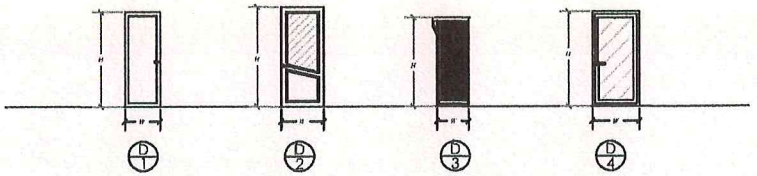
	ISO 9001:2015 CERTIFIED Certificate No. 44478	FROM THE OFFICE OF: Republic of the Philippines **METRO KIDAPAWAN WATER DISTRICT** Lanao, Kidapawan City Tel nos. (064)577-1333, 577-1865. Fax no. (064) 572-5555 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawan.com.ph *"Committed to Service, Development and Self-Reliance"*	DRAWN BY: MJCTABASA DATE: OCTOBER 2019	PROJECT TITLE: *ROOF FRAMING DETAIL*	Prepared By: **MARY JOSELLE C. TABASA, CE** CASUAL - PDD Checked By: **CARLITO A. CODILLA JR., CE** DIVISION MANAGER A PDD	Reviewed By: **RAMIL A. CONDEZ, CE, RMP, MBA** DEPARTMENT MANAGER A ECD Recommending Approval: **WILESPER LEANDRO M. ALQUEZA, CE, RMP,MBA** ASST. GENERAL MANAGER FOR OPERATION	Approved By: **STELLA M. GONZALES, MPS** GENERAL MANAGER	Sheet no. **S/30**

SCHEDULE OF WINDOWS



WINDOW MARK	LOCATION OF WINDOW	NO. OF PIECES	SIZE OF WINDOW			TYPE OF WINDOW
			W	H_1	H_2	
W1	• GUARD HOUSE (FRONT)	1	0.90 m	1.20 m	0.80 m	• Single-hung type Glass Window
W2	• GUARD HOUSE (RIGHT SIDE)	1	1.20 m	1.20 m	0.80 m	• Double Casement type Glass Window
W3	• GUARD HOUSE (REAR SIDE)	1	0.90 m	1.20 m	0.80 m	• Double Casement type Glass Window
W4	• COMFORT ROOM (REAR SIDE)	1	1.20 m	0.55 m	1.85 m	• Glass Sliding Window
W5	• COMFORT ROOM (RIGHT SIDE)	1	1.70 m	0.50 m	1.90 m	• Glass Sliding Window
W6	• CHLORINE GAS FEEDER SHED (REAR)	1	1.00 m	0.30 m	1.70 m	• Louver Window
W7	• CHLORINE GAS FEEDER SHED (RIGHT)	1	1.30 m	0.30 m	1.70 m	• Louver Window
W8	• CHLORINE GAS FEEDER SHED (LEFT)	1	1.30 m	0.30 m	1.70 m	• Louver Window
W9	• UTILITY SHED&STORAGE ROOM (FRONT)	1	1.00 m	1.20 m	0.80 m	• Casement type Glass Window
W10	• UTILITY SHED&STORAGE ROOM (REAR)	1	2.20 m	1.20 m	1.00 m	• Casement type Glass Window
W11	• UTILITY SHED&STORAGE ROOM (RIGHT)	1	3.00 m	1.20 m	1.00 m	• Casement type Glass Window

SCHEDULE OF DOORS



DOOR MARK	LOCATION OF DOOR	NO. OF PIECES	SIZE OF DOOR		TYPE OF DOOR
			W	H	
D1	• GUARD HOUSE (FRONT)	1	0.75 m	2.00 m	• Glass Panel Door
D2	• COMFORT ROOM	1	0.90 m	2.10 m	• Tinted Glass Panel Door and Steel Frame
D3	• CHLORINE GAS FEEDER SHED	1	0.70 m	2.00 m	• Steel Swing Door
D4	• UTILITY SHED & STORAGE ROOM	1	1.00 m	2.00 m	• Glass Panel Door

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Lanao, Kidapawan City
Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555
E-mail Address: mwdkidapawan_wds@yahoo.com
Website: www.metrokidapawan-waterworks.com
"Committed to Service, Development and Self-Reliance"

DRAWN BY: MJCTABASA

DATE: OCTOBER 2019

PROJECT TITLE: *Schedule of Doors and Windows*

Prepared By: **MARY JOSELLE C. TABASA, CE**, CASUAL - PDO

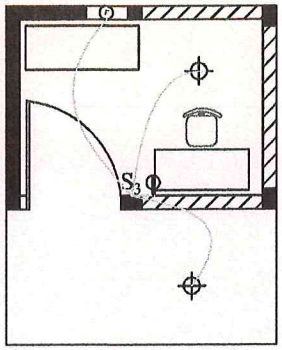
Checked By: **CAMILO A. CODILLA JR., CE**, DIVISION MANAGER A PDD

Reviewed By: **RAHIL A. CONDEZ, CE, RMP, MBA**, DEPARTMENT MANAGER A EGD

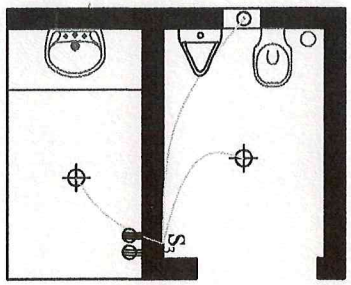
Recommending Approval: **WILESPER U. SANDRO M. ALQUEZA, CE, RMP,MBA**, ASST. GENERAL MANAGER FOR OPERATION

Approved By: **STELLA M. GONZALES, MPS**, GENERAL MANAGER

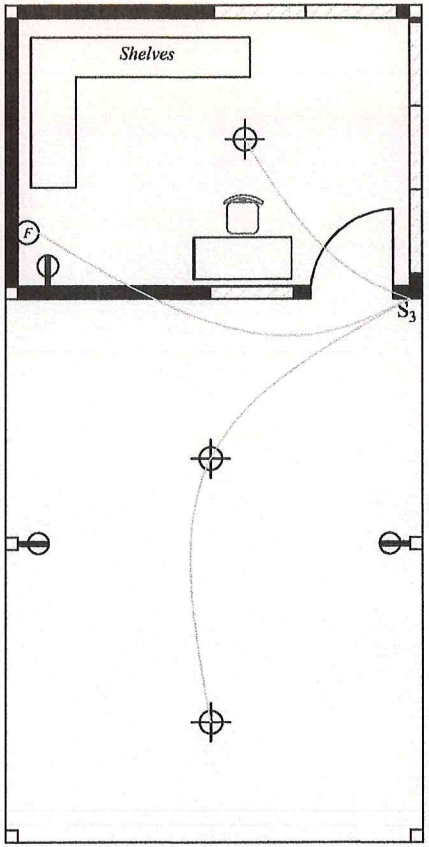
Sheet no. **S/44**



GUARD HOUSE



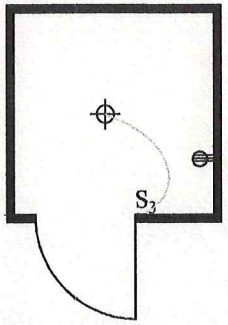
COMFORT ROOM



UTILITY SHED

LEGEND:

- S_3 *Three-gang Switch*
- *Light Bulb (LED)*
- *Convenience Outlet (2 gang)*
- *Convenience Outlet (3 gang)*
- (F) *Wall Mounted Exhaust Fan*



CHLORINE GAS FEEDER SHED

GENERAL NOTES & SPECS.

1. ALL ELECTRICAL WORKS HEREIN SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITION OF PHILLIPINE ELECTRICAL CODE, THE REQUIREMENTS OF THE LOCAL BUILDING OFFICIAL AND THE ELECTRIC UTILITY SERVING THE AREA.

2. ALL ELECTRICAL MATERIALS TO BE USED SHALL BE NEW AND OF THE APPROVED TYPE FOR BOTH LOCATION AND PURPOSES.

3. ALL ELECTRICAL WORKS SHALL BE DONE UNDER THE SUPERVISION OF A DULY LICENSED REGISTERED ELECTRICAL ENGINEER OR REGISTERED MASTER ELECTRICIAN.

ISO 9001:2015 CERTIFIED
Certificate No. 44478

FROM THE OFFICE OF:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Lanao, Kidapawan City
Tel nos. (064)577-1333, 577-1865. Fax no. (064) 572-5555
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawan.gov.ph
"Committed to Service, Development and Self-Reliance"

DRAWN BY: MJCTABASA

DATE: OCTOBER 2019

PROJECT TITLE: *Electrical Layout*

Prepared By:
MARY JOSELLE C. TABASA, CE
CASUAL - PDD

Checked By:
CANUTO A. CODILLA JR., CE
DIVISION MANAGER A PDD

Reviewed By:
RAMILL A. CONDEZ, CE, RMP, MBA
DEPARTMENT MANAGER A ECD

Recommending Approval:
WILESPER LISANDRO M. ALQUEZA, CE, RMP,MBA
ASST. GENERAL MANAGER FOR OPERATION

Approved By:
STELLA M. GONZALES, MPS
GENERAL MANAGER

Sheet no.
E/02

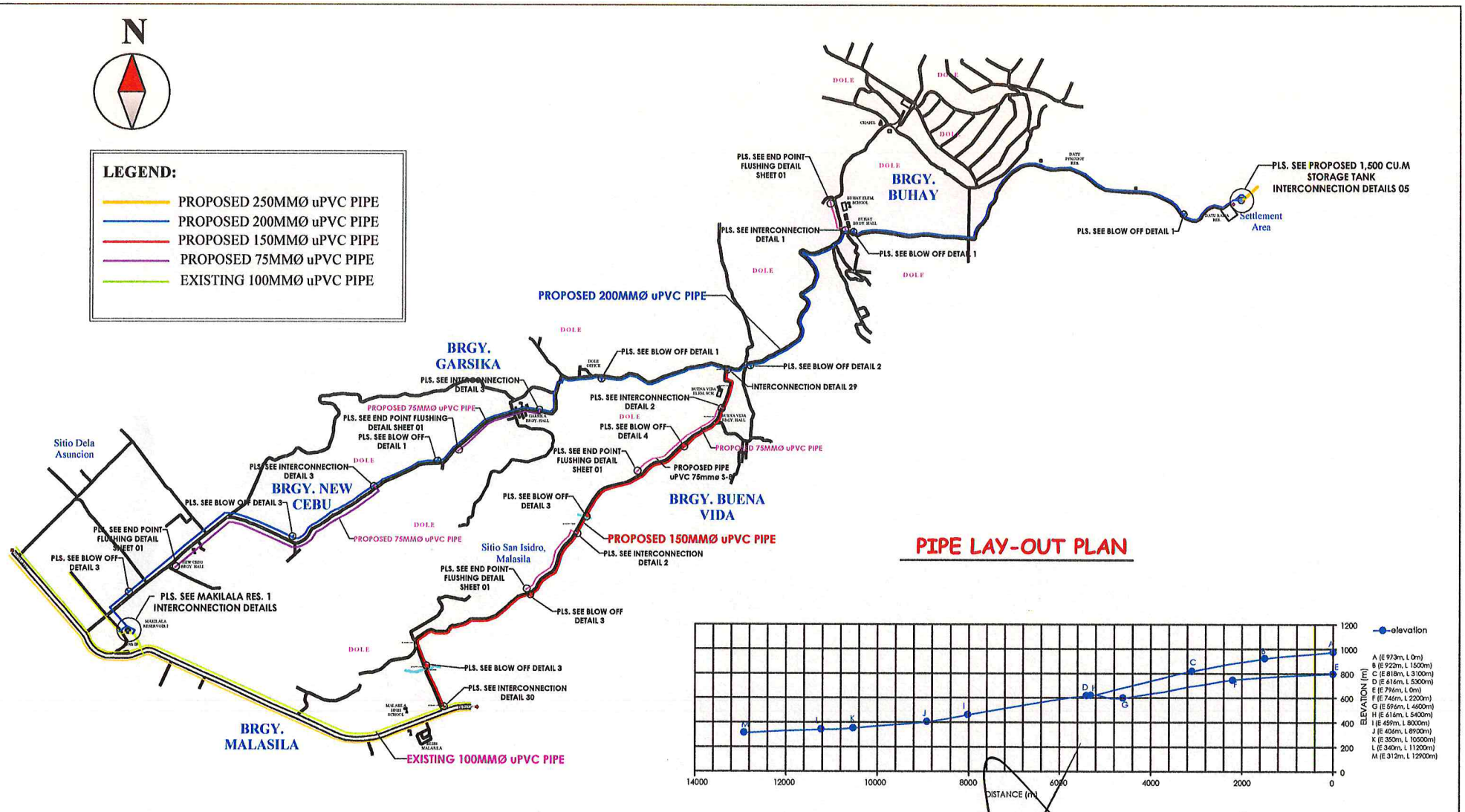
PACKAGE 3

CIVIL WORKS FOR PIPELINES

PACKAGE 3 LOT A

CIVIL WORKS FOR PIPELINES

PIPELINES



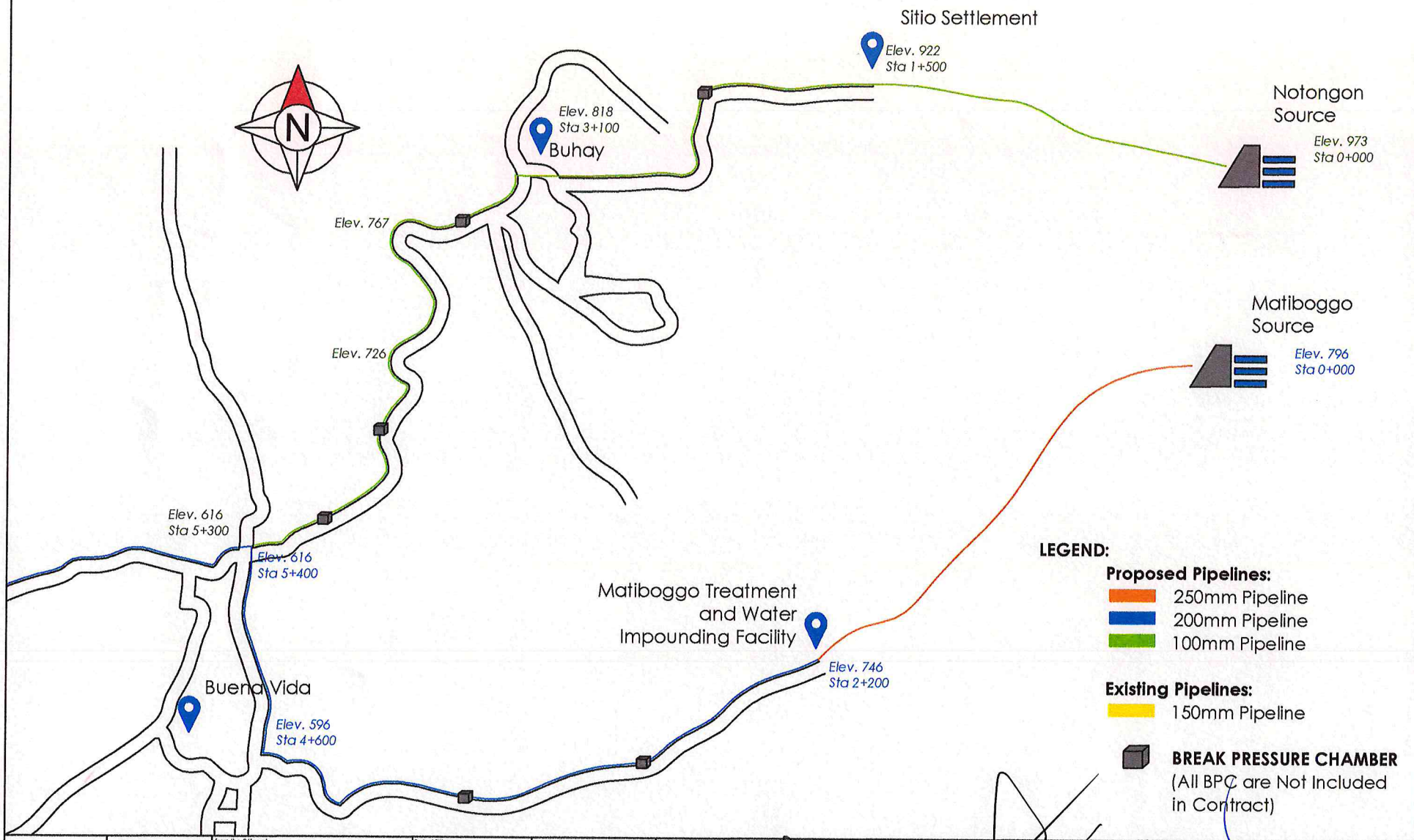
PIPE LAY-OUT PLAN

ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title: NOTONGON - BUHAY - GARSIKA - NEW CEBU & POBLACION LINE MAK. COT.	Location: Makilala, North Cotabato	Prepared by: **ENGR. MARY JOSELLE C. TABASA** Casual - PDD	Reviewed by: **ENGR. RAMIL A. CONDEZ, RMP/MBA** Department Manager A - ECD
Sheet Content: PIPE LAYOUT PLAN	Drawn By: ARGIL / Date: AUGUST 2019	Checked by: **ENGR. CANUTO A. CODILLA, JR.** Division Manager A - PDD	Recommending Approval: **ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA** AGM for Operations
			Approved by: **STELLA M. GONZALES, MPS** General Manager
			Sheet No. **ML/01**

PIPE LAYOUT PLAN

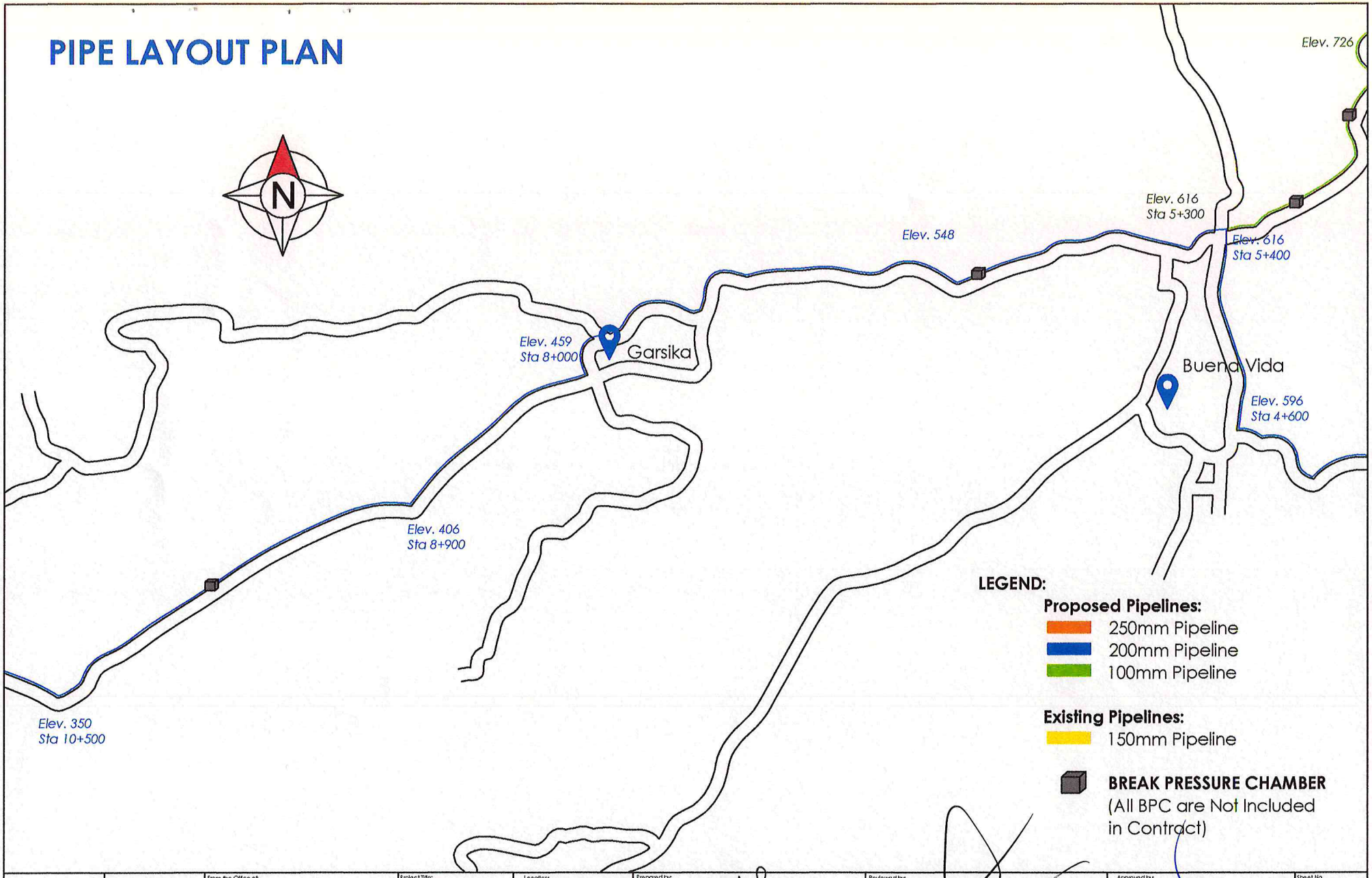


ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1665
E-mail Address: mwdkidapawan_water@yahoo.com.ph
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title:	Location:		Prepared by:	Reviewed by:	Approved by:	Sheet No.
NOTONGON - MATIBOGGO PIPELINE SYSTEM	Makilala, North Cotabato		ENGR. MARY JOSELLE C. TABASA Senior Engineer B - PDD	ENGR. RAMIL A. CONDEZ, RMP/MBA Department Manager A - ECD	STELLA M. GONZALES, MPS General Manager	ML/57
Sheet Content:	Drawn By:	Date:	Checked by:	Recommending Approval:		
PIPE LAYOUT	RSUM	JUN 2020	ENGR. CANUTO A. CODILLA, JR. Division Manager A - PDD	ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA AGM for Operations		

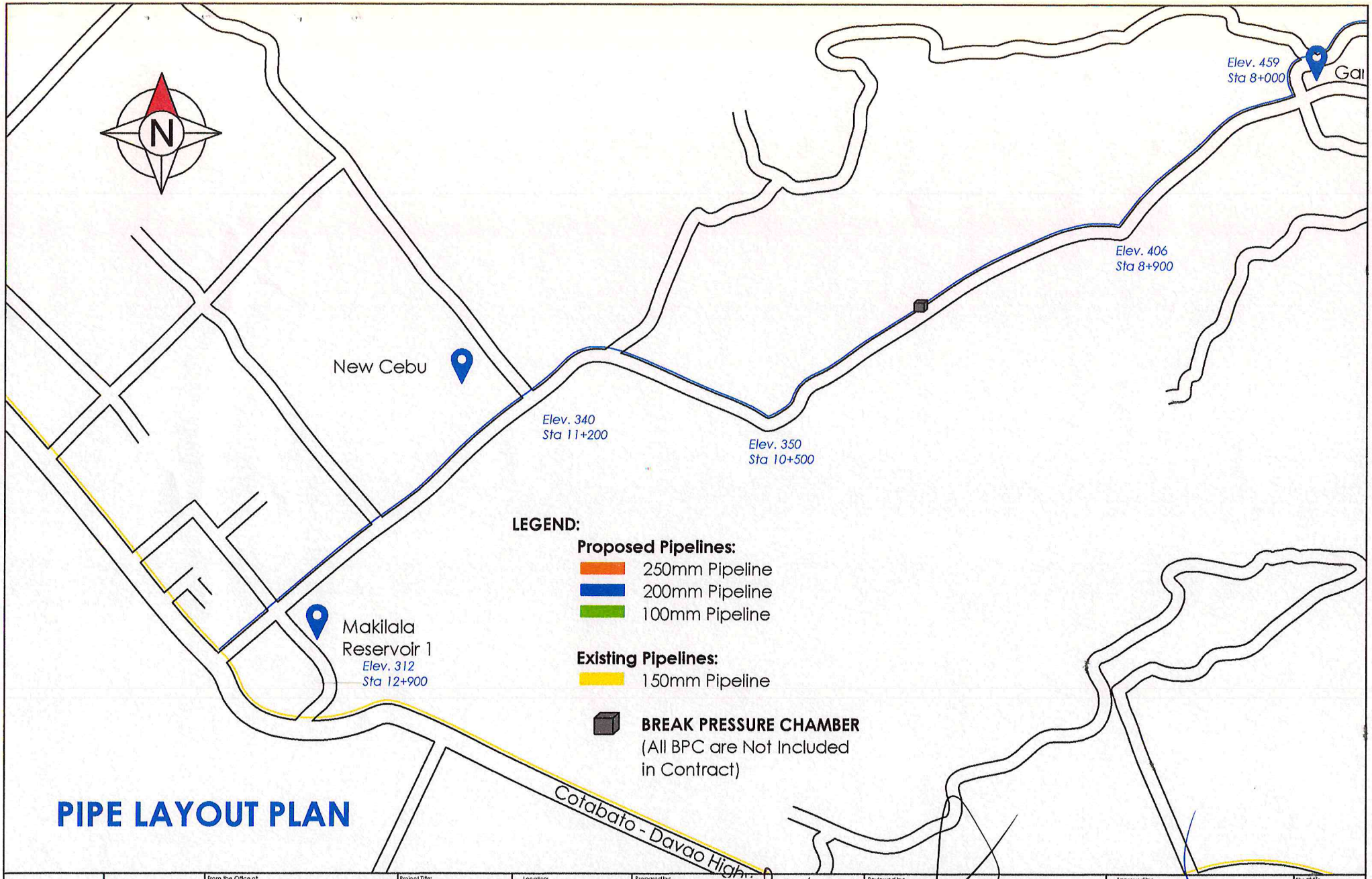
PIPE LAYOUT PLAN



ISO 9001:2015 CERTIFIED
Certificate No. 66478

From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwater.ph
"Committed to Service, Development and Self-Reliance"

Project Title:	Location:		Prepared by:	Reviewed by:	Approved by:	Sheet No.
NOTONGON - MATIBOGGO PIPELINE SYSTEM	Makilala, North Cotabato		ENGR. MARY JOSELLE C. TABAS Senior Engineer B - PDD	ENGR. RAMIL A. CONDEZ, RMP/MBA Department Manager A - ECD	STELLA M. GONZALES, MPS General Manager	ML/58
Sheet Content:	Drawn By:	Date:	Checked by:	Recommending Approval:		
PIPE LAYOUT	RSUM	JUN 2020	ENGR. CANUTO A. CODILLA, JR. Division Manager A - PDD	ENGR. WILESPER LISANDRO M. ALQUEZA, RMP/MBA AGM for Operations		

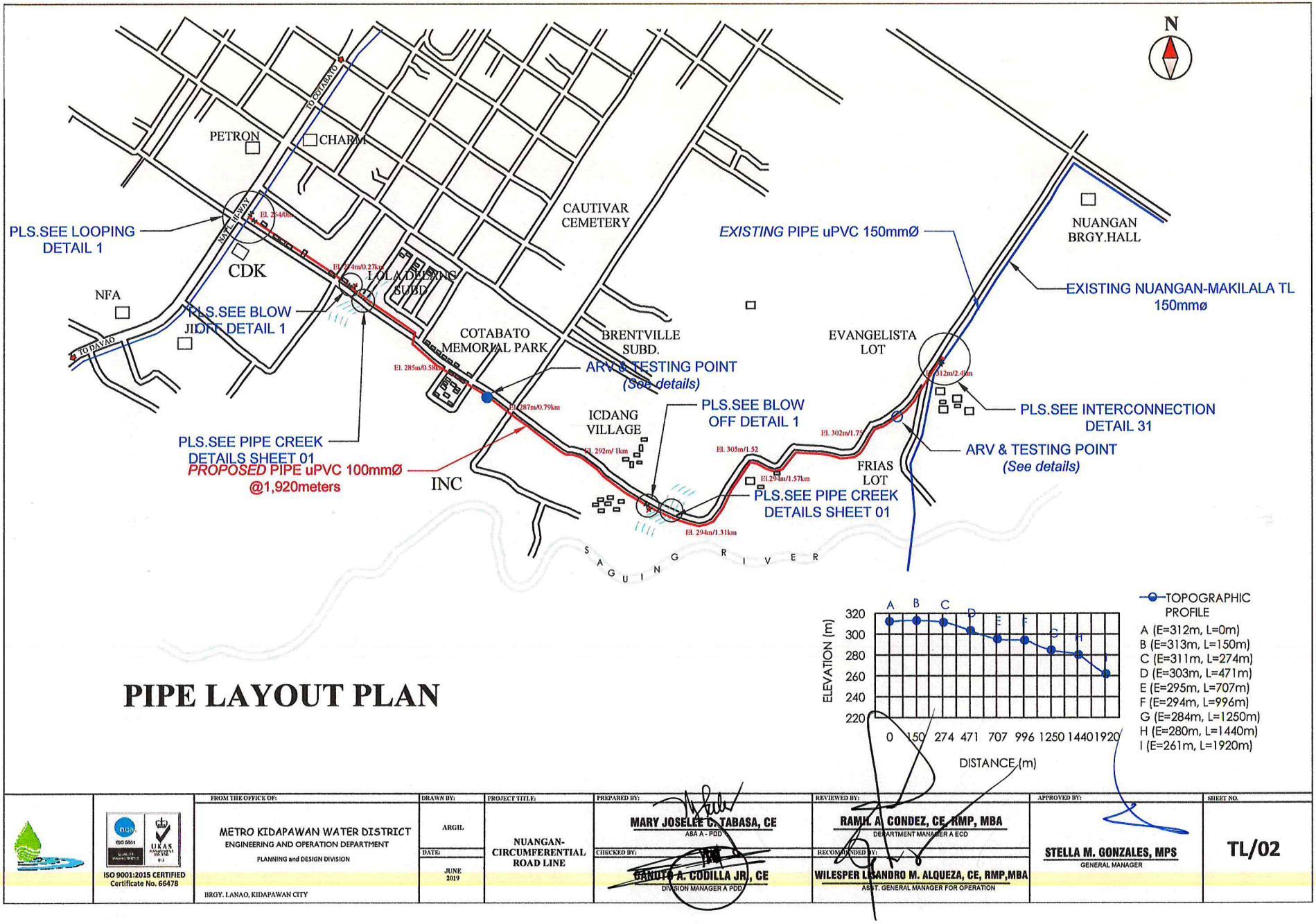


PIPE LAYOUT PLAN

ISO 9001:2015 CERTIFIED
Certificate No. 66478

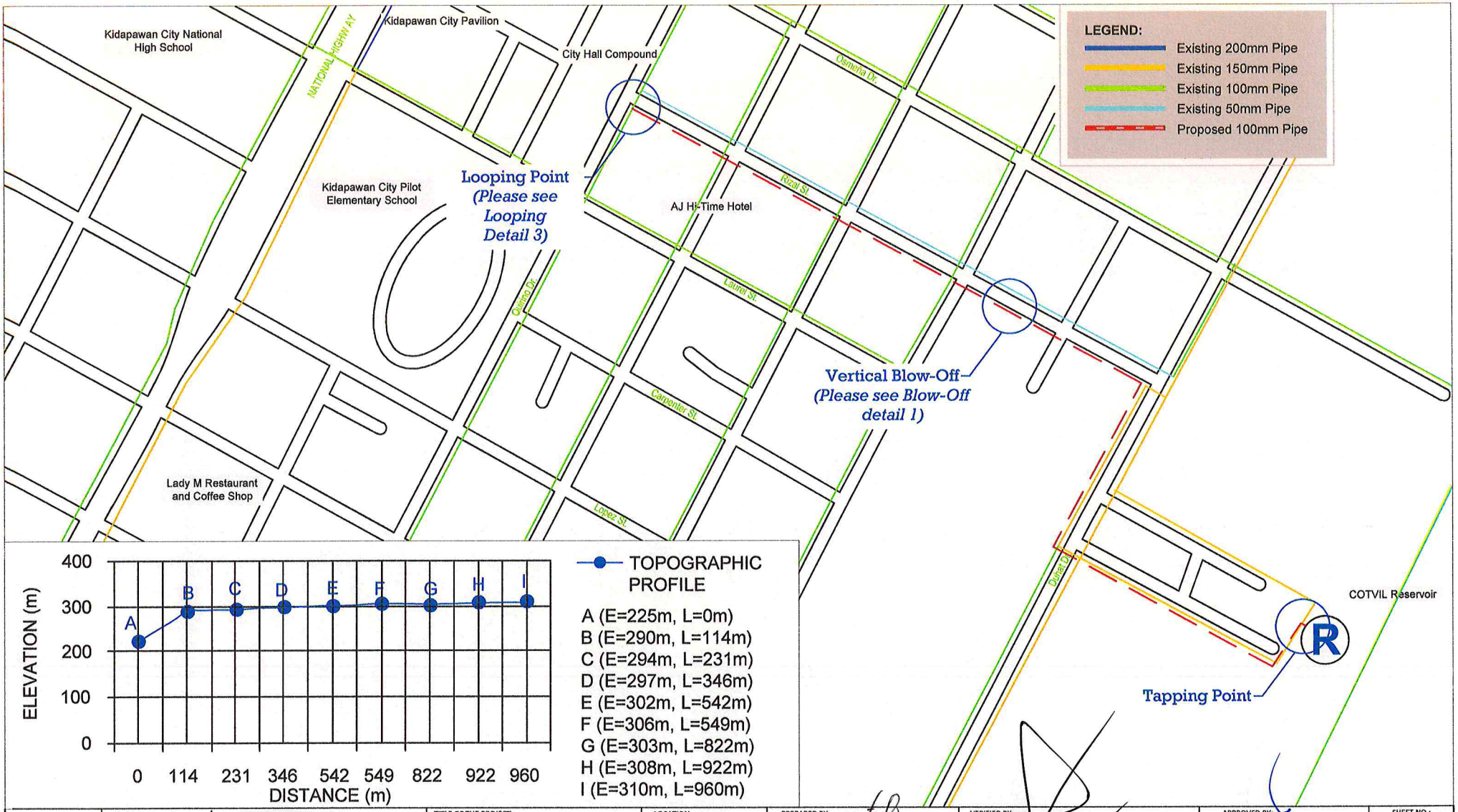
From the Office of:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

Project Title:	Location:	Prepared by:	Reviewed by:	Approved by:	Sheet No.
NOTONGON - MATIBOGGO PIPELINE SYSTEM	Makilala, North Cotabato	ENGR. MARY JOSELLE C. TABASA Senior Engineer B - PDD	ENGR. RAMIL A. CONDEZ, RMP/MBA Department Manager A - ECD	STELLA M. GONZALES, MPS General Manager	ML/59
Sheet Content:	Drawn by: / Date:	Checked by:	Recommending Approval:		
PIPE LAYOUT	RSUM / JUN 2020	ENGR. CANUTO A. CODILLA, JR. Division Manager A - PDD	ENGR. WILESPER ALESSANDRO M. ALQUEZA, RMP/MBA AGM for Operations		



PIPE LAYOUT PLAN

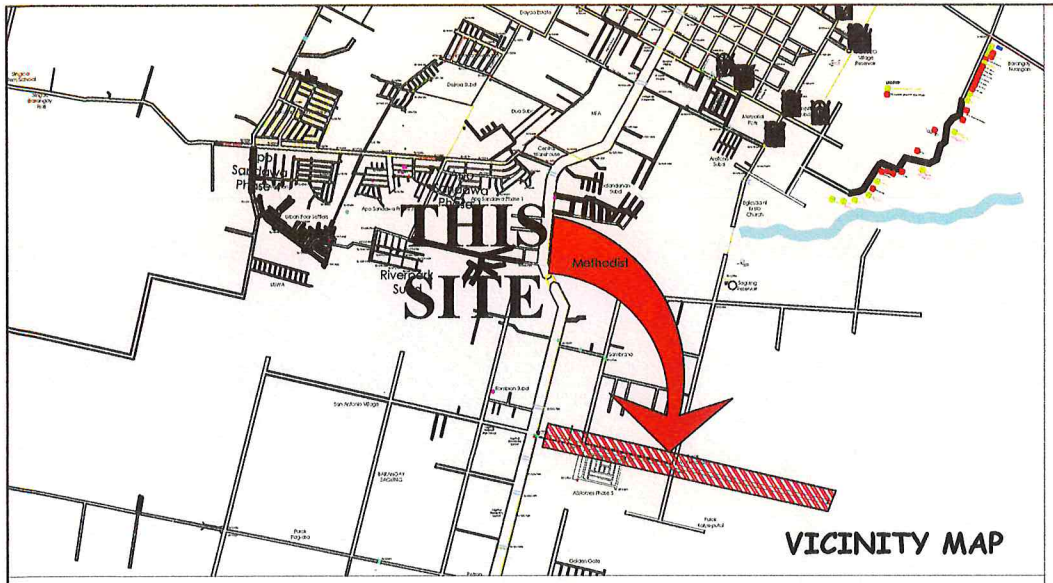
	ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATION DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: ARGIL DATE: JUNE 2019	PROJECT TITLE: NUANGAN-CIRCUMFERENTIAL ROAD LINE	PREPARED BY: MARY JOSELLE C. TABASA, CE, ASA A - PDD CHECKED BY: DANILO A. CODILLA JR., CE, DIVISION MANAGER A PDD	REVIEWED BY: RAMIL A. CONDEZ, CE, RMP, MBA, DEPARTMENT MANAGER A ECD RECOMMENDED BY: WILESPER LEANDRO M. ALQUEZA, CE, RMP,MBA, ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER	SHEET NO. TL/02

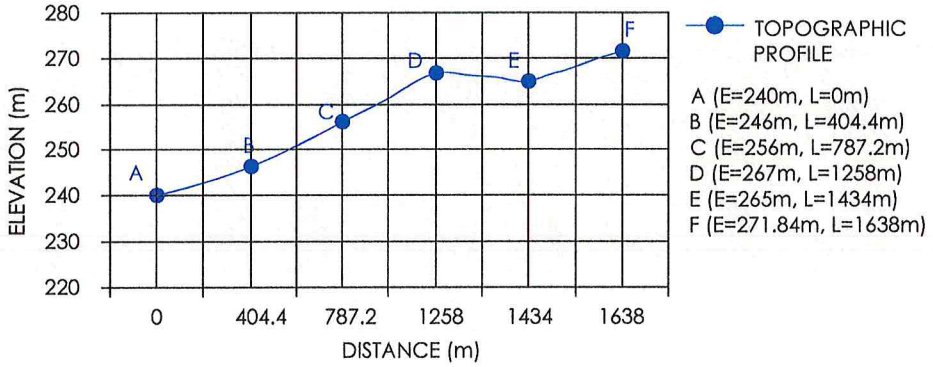


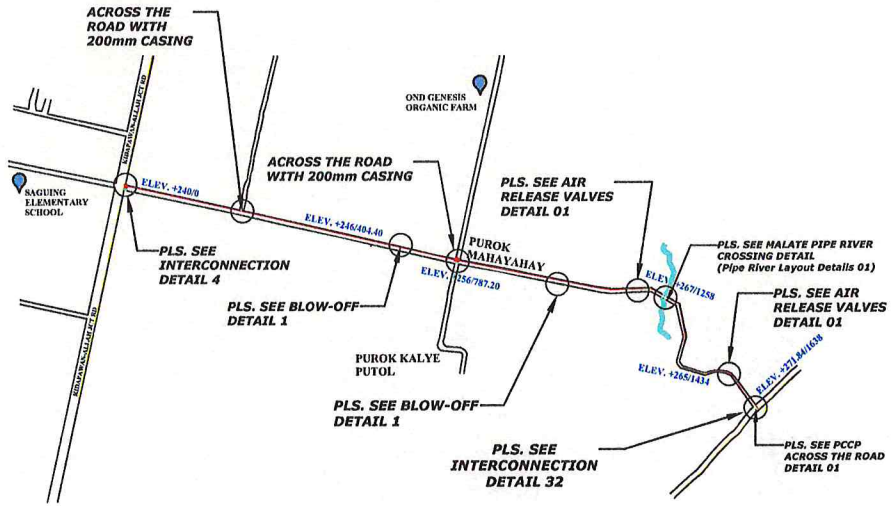
ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

TITLE OF THE PROJECT:	LOCATION	PREPARED BY:	VERIFIED BY:	APPROVED BY:	SHEET NO.:
COTELCO VILLAGE - QUIRINO DRIVE LINE	Poblacion, Kidapawan City	JOEAN R. OPILAS, JO/PDD	RAMIL A. CONDEZ, CE/RMP/MBA, DEPARTMENT MANAGER, MKWD-ECD	STELLA M. GONZALES, MPS, GENERAL MANAGER, MKWD	TL/18
SHEET CONTENT:	DRAWN BY: / DATE:	CHECKED BY:	REVIEWED BY:		
PIPE LAY OUT	JROpilas / JUNE 2019	CANUTO A. COBILLA, JR, CE, DIVISION MANAGER A, MKWD-PDD	WILESPER ALEJANDRO M. ALQUEZA, CE/RMP/MBA, AGM FOR OPERATIONS, MKWD		







Legend:
- Existing Pipe 150mmø CCI
- Existing Pipe 150mmø uPVC
- Existing Pipe 100mmø uPVC
- Existing Pipe 75mmø uPVC
- Existing Pipe 50mmø uPVC
- Proposed Pipe 100mmø uPVC
- Proposed Pipe 50mmø uPVC

PIPE LAYOUT

PUROK MAHAYAHAY TL, SAGUING,KC

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
METRO KIDAPAWAN WATER DISTRICT
ENGINEERING AND OPERATION DEPARTMENT
PLANNING and DESIGN DIVISION
BRGY. LANAO, KIDAPAWAN CITY

DRAWN BY: JOpilas
DATE: JUNE 2019

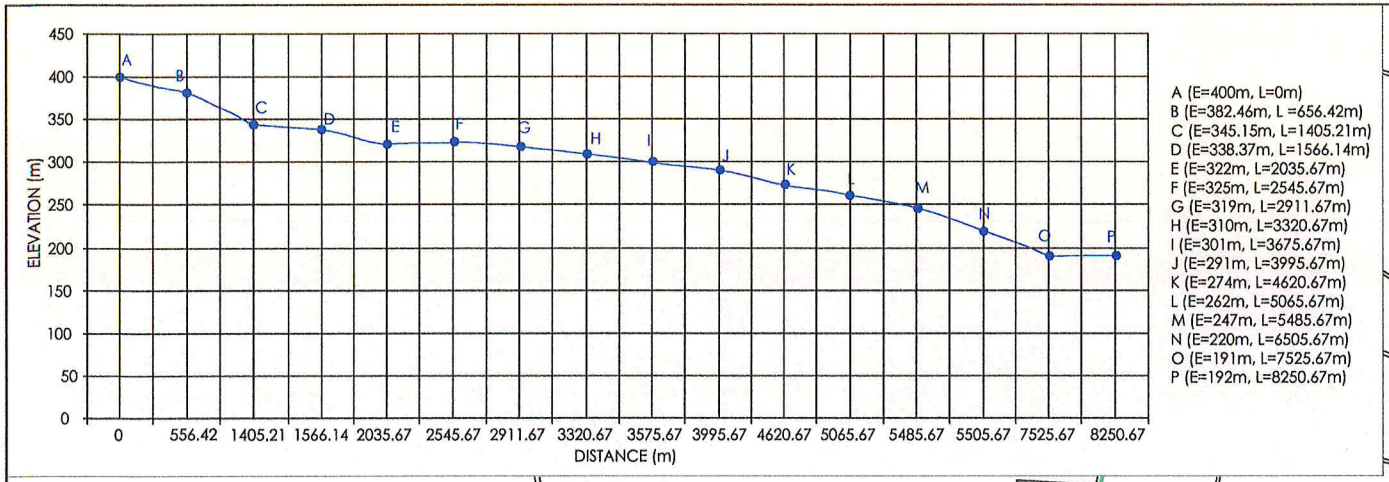
PROJECT TITLE: PUROK MAHAYAHAY TL, SAGUING,KC

PREPARED BY: JOEAN R. OPILAS, JOPOD
CHECKED BY: CAMILO A. CODILLA JR., CE, DIVISION MANAGER A ECO

REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP, DEPARTMENT MANAGER A ECD
RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA, ASST. GENERAL MANAGER FOR OPERATION

APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER

APPROVED BY: TL/11



A (E=400m, L=0m)
B (E=382.46m, L =656.42m)
C (E=345.15m, L=1405.21m)
D (E=338.37m, L=1566.14m)
E (E=322m, L=2035.67m)
F (E=325m, L=2545.67m)
G (E=319m, L=2911.67m)
H (E=310m, L=3320.67m)
I (E=301m, L=3675.67m)
J (E=291m, L=3995.67m)
K (E=274m, L=4620.67m)
L (E=262m, L=5065.67m)
M (E=247m, L=5485.67m)
N (E=220m, L=6505.67m)
O (E=191m, L=7525.67m)
P (E=192m, L=8250.67m)

PLS SEE BLOW-OFF DETAIL 1

PROPOSED MANONGOL-BALINDOG LINE 150mmø uPVC PIPE

PLS SEE BLOW-OFF DETAIL 3

PLS SEE INTERCONNECTION DETAIL 5

PLS SEE BLOW-OFF DETAIL 3

PLS SEE INTERCONNECTION DETAIL 6 *(New Carcar)*

PLS SEE BLOW-OFF DETAIL 2

PLS SEE LINE INTERCONNECTION DETAIL 2 *(Abalos Res., Kalasuyan)*

MANONGOL-KALASUYAN LINE 150mmø uPVC PIPE

New Bohol Barangay Hall

Brgy New Carcar

BOMBEO SUBD.

Brgy Kalasuyan Proper

Amala 1 Subd

Amala 2 Subd

Amala 3 Subd

Luvimin Barangay Hall

HABITAT

LGU PABAHAY P2

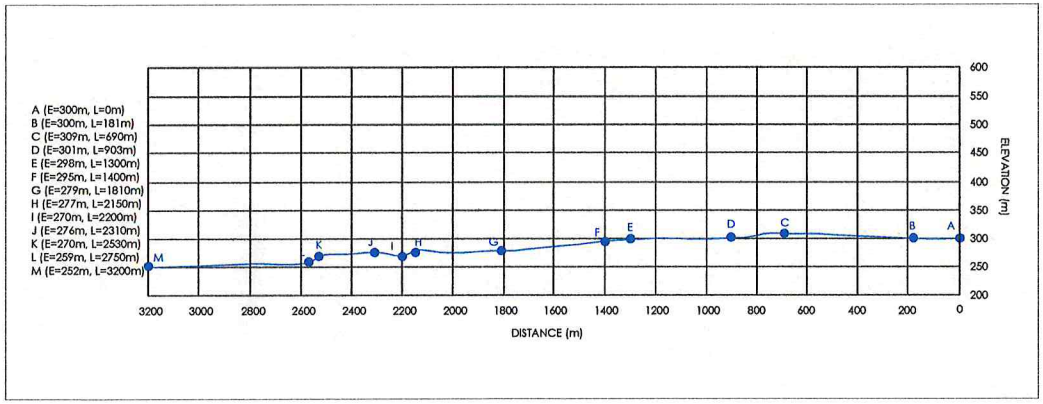
Upper Luvimin

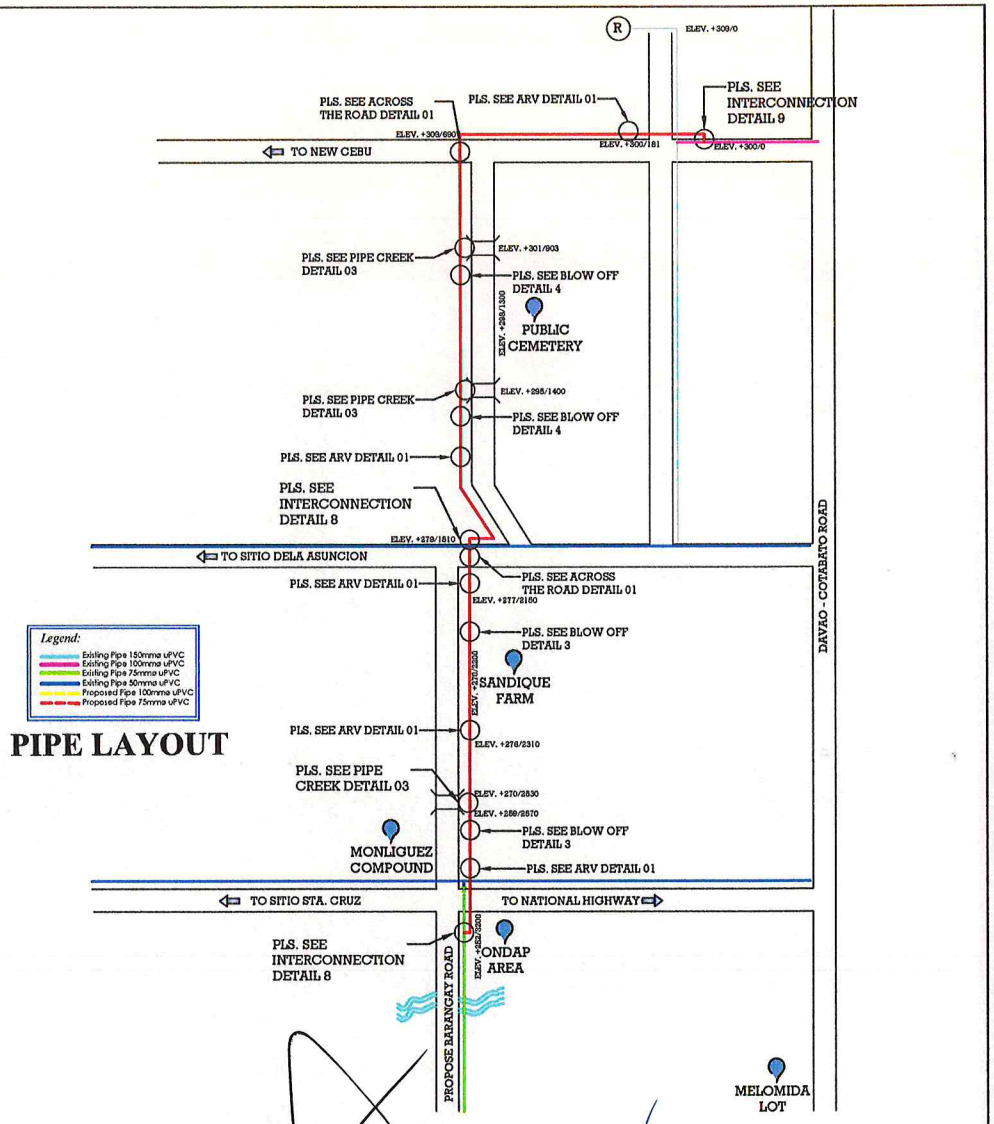
Balindog Elementary School

University of Southern

PIPE LAY-OUT PLAN

ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATIONS DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: JOpilas	PROJECT TITLE: MANONGOL TO BALINDOG TL	PREPARED BY: JOEAN B. OPILAS JOP/DO	REVIEWED BY: RAMIL A. CONDEZ, CE,RMP,MBA DEPARTMENT MANAGER A ECD	APPROVED BY: STELLA M. GONZALES, MPS GENERAL MANAGER	SHEET NO: ML/60
		DATE: AUGUST 2019		CHECKED BY: CANUTO A. CODILLA, CE DIVISION MANAGER A PDD	RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE,RMP,MBA ASST. GENERAL MANAGER FOR OPERATION		





PIPE LAYOUT

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
METRO KIDAPAWAN WATER DISTRICT
ENGINEERING AND OPERATION DEPARTMENT
PLANNING and DESIGN DIVISION
BRGY. LANAO, KIDAPAWAN CITY

DRAWN BY: JOpilas
DATE: AUGUST 2019

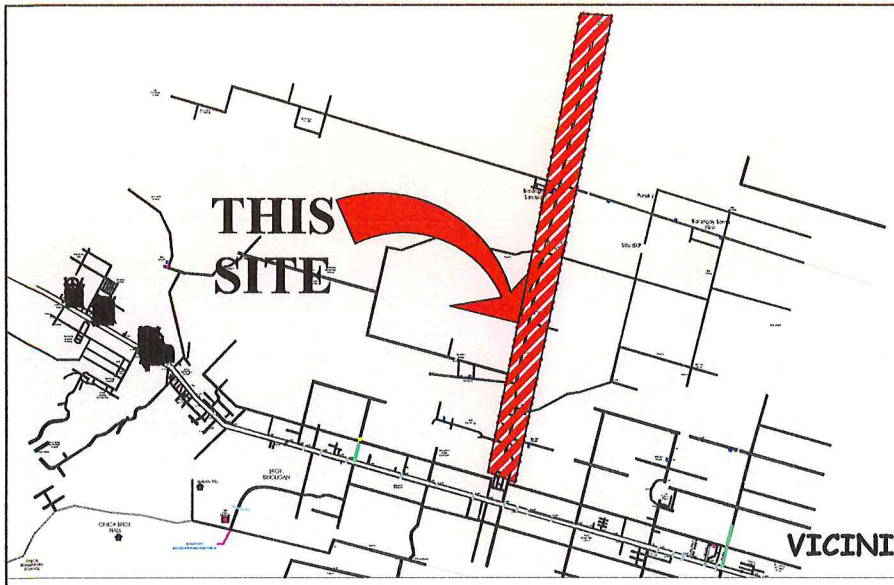
PROJECT TITLE: PIN LINES TO MAKILALA RESERVOIR 1, MAKILALA

PREPARED BY: JOEAN R. OPILAS, JO/PDD
CHECKED BY: CANUTO A. CODILLA JR., CE, DIVISION MANAGER A ECD

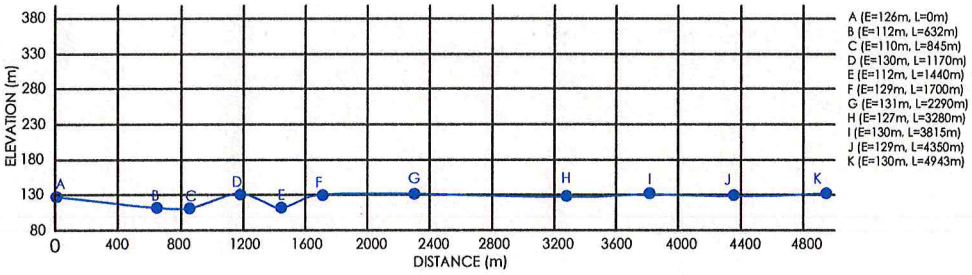
REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP, DEPARTMENT MANAGER A ECD
RECOMMENDED BY: WILESPER JISANDRO M. ALQUEZA, CE/RMP/MBA, ASST. GENERAL MANAGER FOR OPERATION

APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER

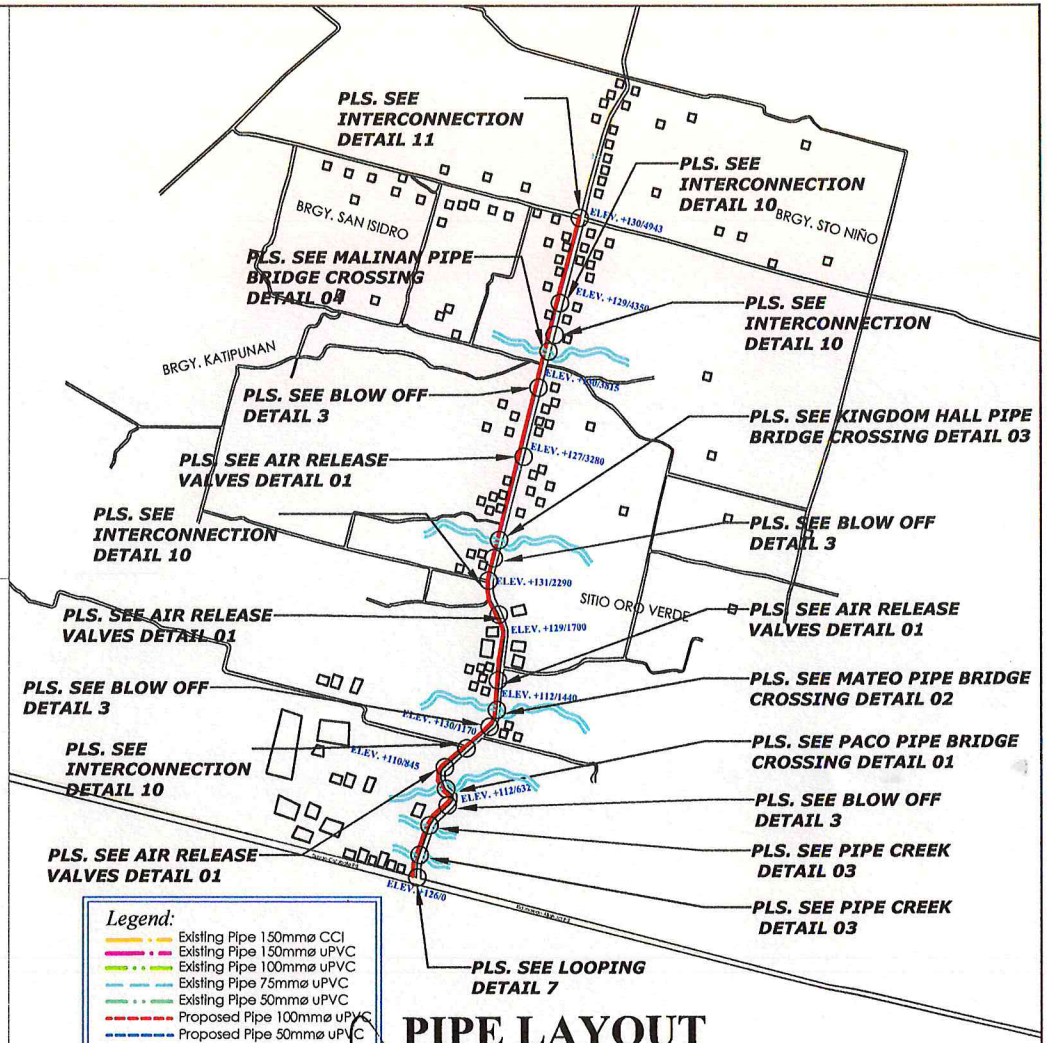
SHEET NO: ML/12



VICINITY MAP



A (E=126m, L=0m)
B (E=112m, L=632m)
C (E=110m, L=845m)
D (E=130m, L=1170m)
E (E=112m, L=1440m)
F (E=129m, L=1700m)
G (E=131m, L=2290m)
H (E=127m, L=3280m)
I (E=130m, L=3815m)
J (E=129m, L=4350m)
K (E=130m, L=4943m)



PIPE LAYOUT

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
METRO KIDAPAWAN WATER DISTRICT
ENGINEERING AND OPERATION DEPARTMENT
PLANNING and DESIGN DIVISION
BRGY. LANAO, KIDAPAWAN CITY

DRAWN BY: JOplias
DATE: AUGUST 2019

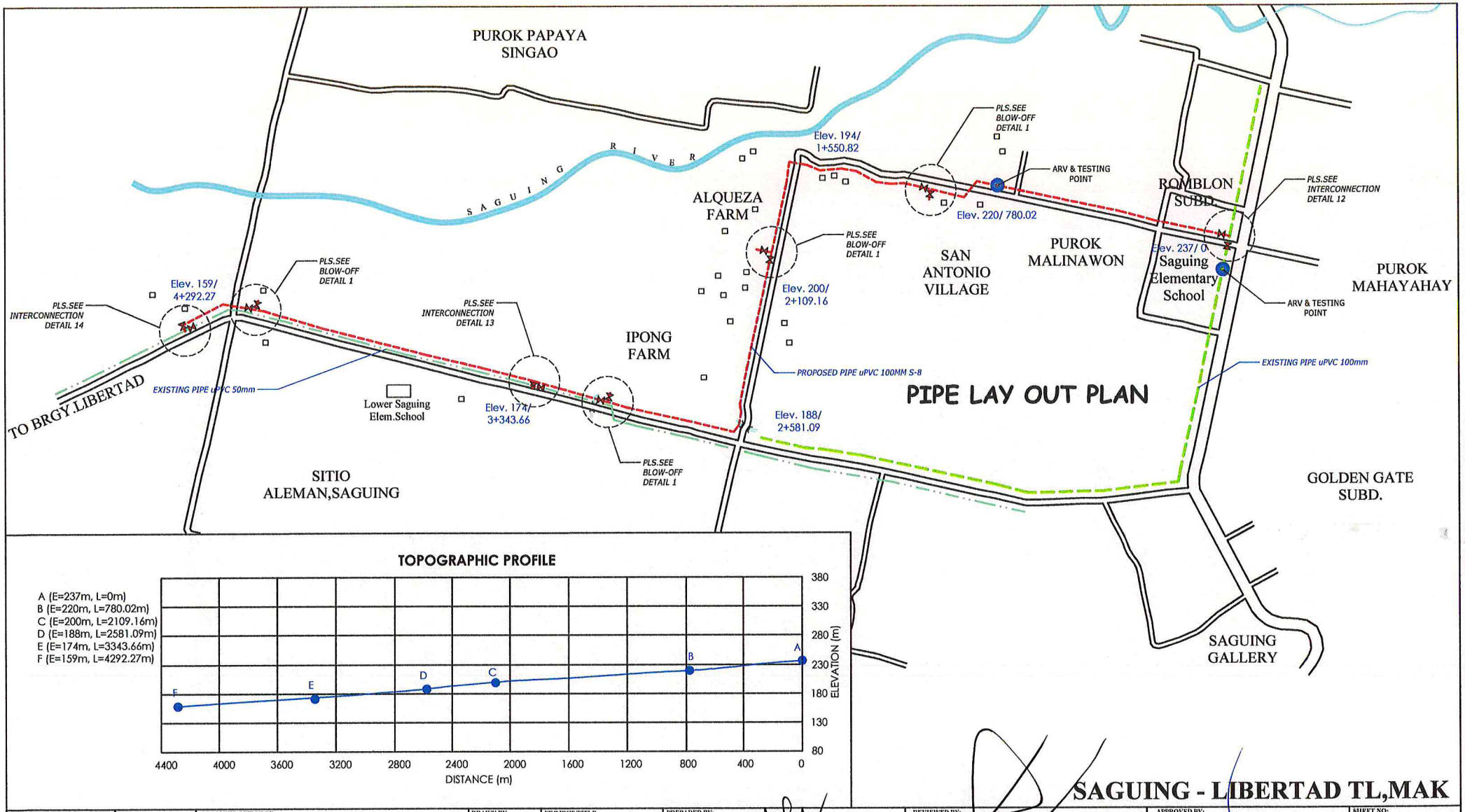
PROJECT TITLE: PACO TO STO. NINO TRANSMISSON LINE

PREPARED BY: JOEAN M. OPLAS, JO/PDD
CHECKED BY: CANUTO A. CODILLA JR., CE, DIVISION MANAGER A ECD

REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP, DEPARTMENT MANAGER A ECD
RECOMMENDED BY: VILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA, ASST. GENERAL MANAGER FOR OPERATION

APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER

SHEET NO: ML/17



TOPOGRAPHIC PROFILE

A (E=237m, L=0m)
B (E=220m, L=780.02m)
C (E=200m, L=2109.16m)
D (E=188m, L=2581.09m)
E (E=174m, L=3343.66m)
F (E=159m, L=4292.27m)

SAGUING - LIBERTAD TL,MAK

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
METRO KIDAPAWAN WATER DISTRICT
ENGINEERING AND OPERATIONS DEPARTMENT
PLANNING and DESIGN DIVISION
BRGY. LANAO, KIDAPAWAN CITY

DRAWN BY: ARGIL
DATE: AUGUST 2019

PROJECT TITLE: SAGUING - LIBERTAD TL,MAK

PREPARED BY: MARY JOSELLE C. TABASA, CE, ASA A - PDO

CHECKED BY: CANDITO A. CODILLA, CE, DIVISION MANAGER A- PDO

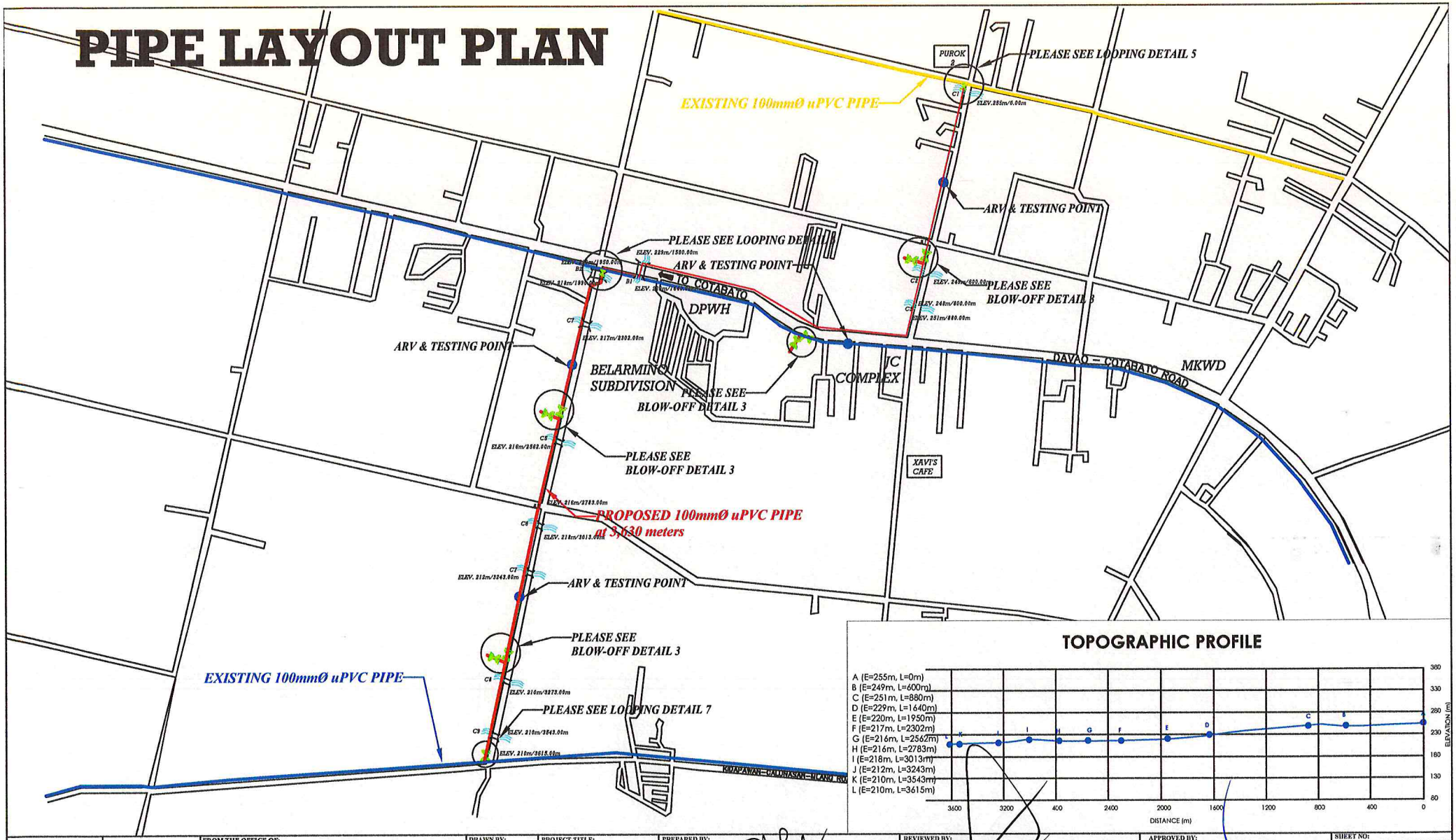
REVIEWED BY: RAMIL A. CONDEZ, CE,RMP,MBA, DEPARTMENT MANAGER A ECO

RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE,RMP,MBA, ASST. GENERAL MANAGER FOR OPERATION

APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER

SHEET NO: ML/26

PIPE LAYOUT PLAN



TOPOGRAPHIC PROFILE

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
Republic of the Philippines
METRO KIDAPAWAN WATER DISTRICT
Brgy. Lanao, Kidapawan City
Tel Nos. (064)577-1533, 577-1865
E-mail Address: metrokidapawan_wd@yahoo.com
Website: www.metrokidapawanwd.gov.ph
"Committed to Service, Development and Self-Reliance"

DRAWN BY: MJCTABASA
DATE: AUGUST 2019

PROJECT TITLE: LANAO TO MAGSAYSAY LINE

PREPARED BY: **MARY JOSELLE C. TABASA, CE**
CASUAL - PDO

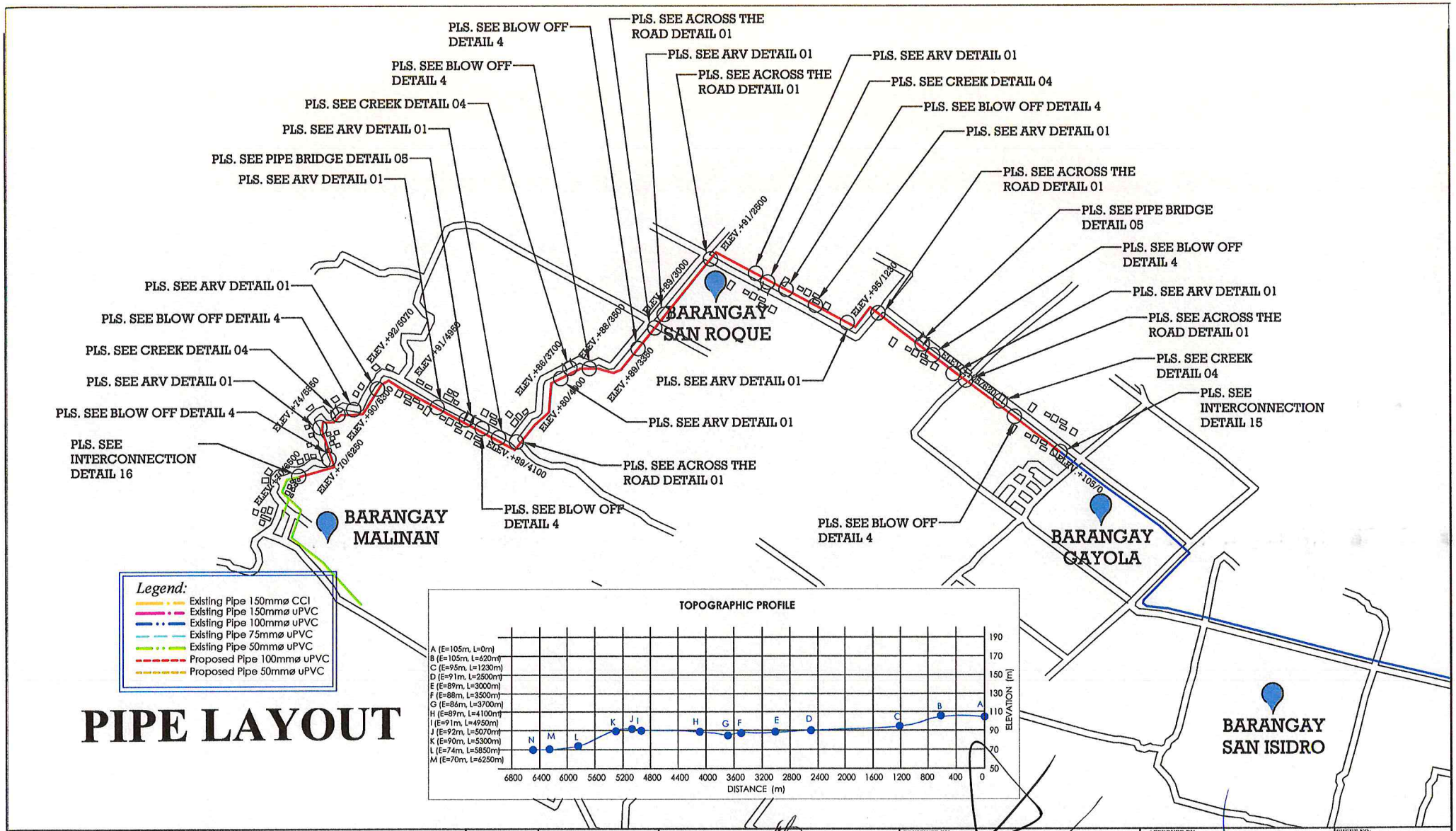
CHECKED BY: **CARLITO A. CODILLA JR., CE**
DIVISION MANAGER A ECD

REVIEWED BY: **RAMIL A. CONDEZ, CE, RMP, MBA**
DEPARTMENT MANAGER A ECD

RECOMMENDED BY: **WILESPER LISANDRO M. ALQUEZA, CE, RMP,MBA**
ASST. GENERAL MANAGER FOR OPERATION

APPROVED BY: **STELLA M. GONZALES, MPS**
GENERAL MANAGER

SHEET NO: **ML/30**



PIPE LAYOUT

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
METRO KIDAPAWAN WATER DISTRICT
ENGINEERING AND OPERATION DEPARTMENT
PLANNING and DESIGN DIVISION
BRGY. LANAO, KIDAPAWAN CITY

DRAWN BY: JOpilas
DATE: AUGUST 2019

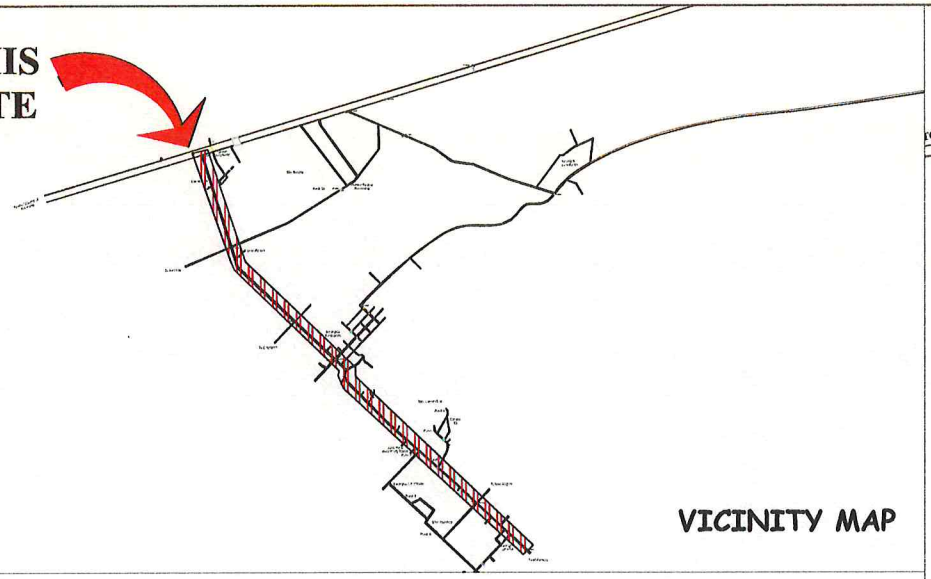
PROJECT TITLE: BRGY. GAYOLA - MALINAN ML

PREPARED BY: JOEAN H. OPILAS, JO/PDO
CHECKED BY: CARLITO A. CODILLA JR., CE, DIVISION MANAGER A ECD

REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP, DEPARTMENT MANAGER A ECD
RECOMMENDED BY: WILESPER ALEJANDRO M. ALQUEZA, CE/RMP/MBA, ASST. GENERAL MANAGER FOR OPERATION

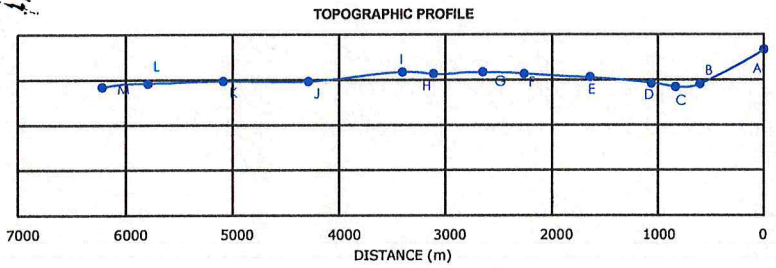
APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER

SHEET NO: ML/35

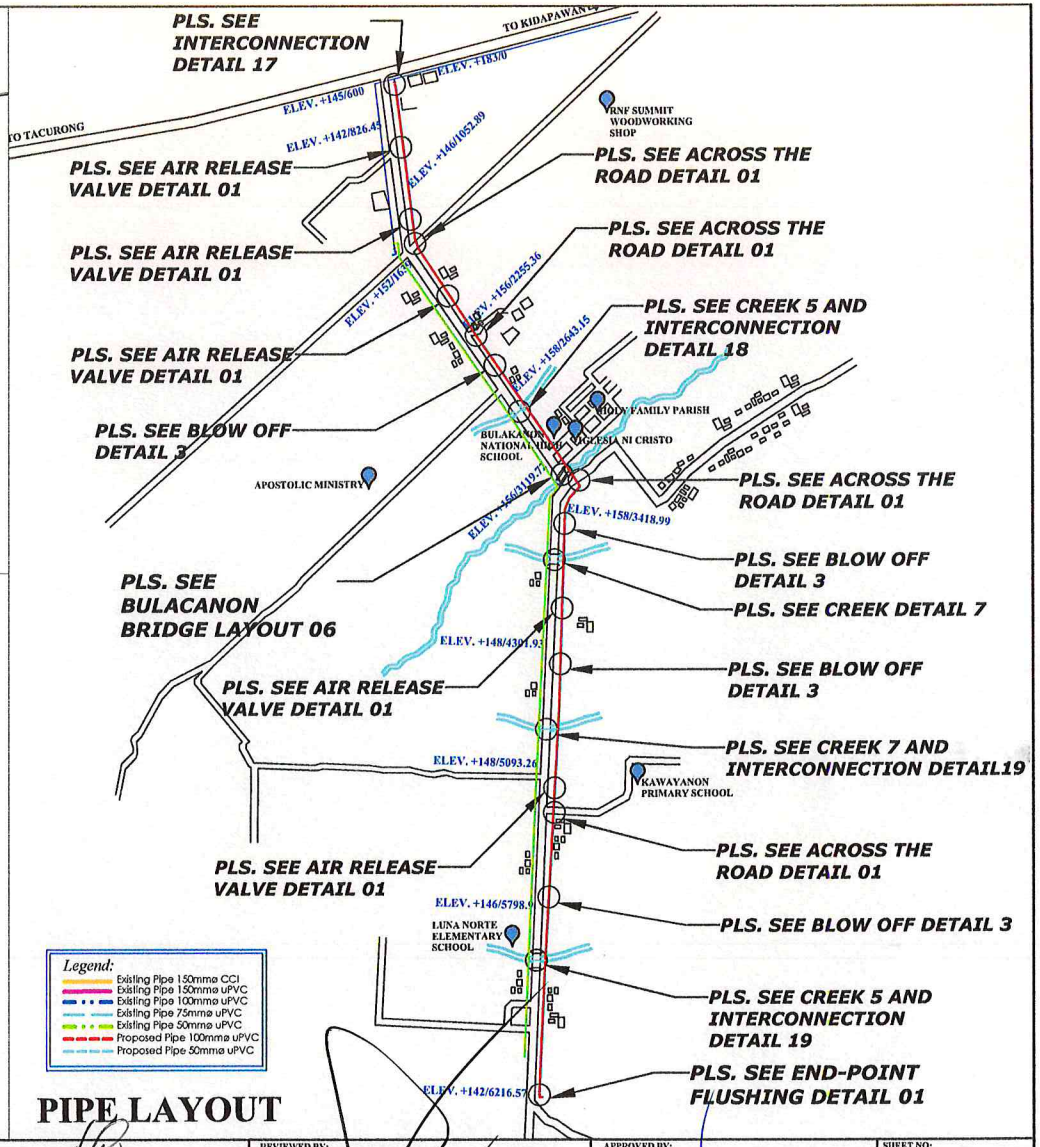


VICINITY MAP

TOPOGRAPHIC PROFILE



A (E=183m L=0m)
B (E=145m, L=600m)
C (E=142m, L=826.45m)
D (E=146m, L=1052.89m)
E (E=152m, L=1639m)
F (E=156m, L=2255.36m)
G (E=158m, L=2643.15m)
H (E=156m, L=3119.72m)
I (E=158m, L=3418.99m)
J (E=148m, L=4301.93m)
K (E=148m, L=5093.26m)
L (E=146m, L=5798.90m)
M (E=142m, L=6216.57m)



PIPE LAYOUT

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
METRO KIDAPAWAN WATER DISTRICT
ENGINEERING AND OPERATIONS DEPARTMENT
PLANNING and DESIGN DIVISION
BRGY. LANAO, KIDAPAWAN CITY

DRAWN BY: JOpilas
DATE: AUGUST 2019

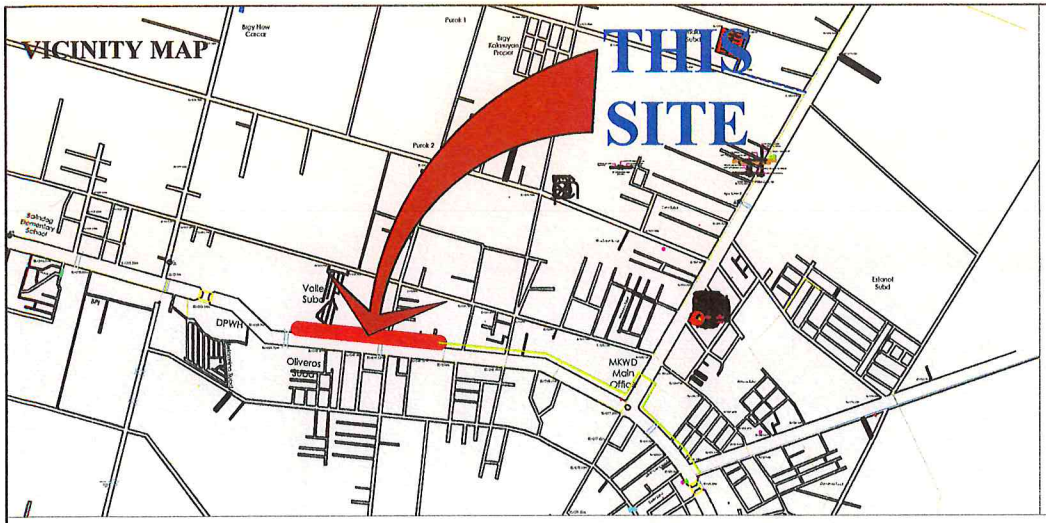
PROJECT TITLE: SAN VICENTE - LUNA NORTE LINE

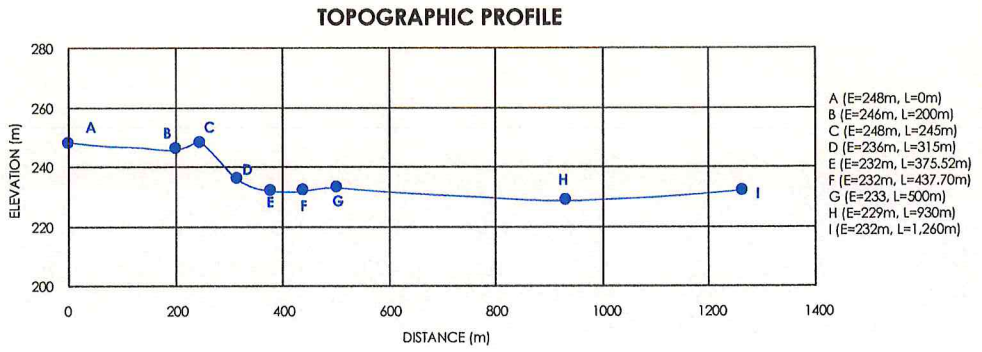
PREPARED BY: JOEAN R. OPILAS, JO - PDD
CHECKED BY: CARLITO A. CODILLA, CE, DIVISION MANAGER A, PDD

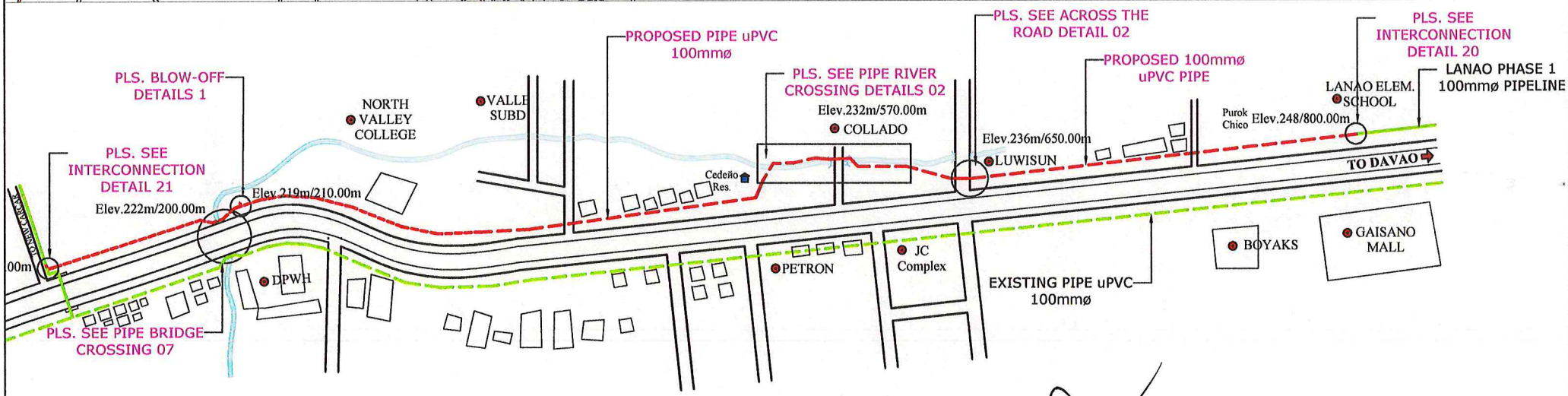
REVIEWED BY: RAMIL M. CONDEZ, CE,RMP,MBA, DEPARTMENT MANAGER A ECD
RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE,RMP,MBA, ASST. GENERAL MANAGER FOR OPERATION

APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER

SHEET NO: ML/41







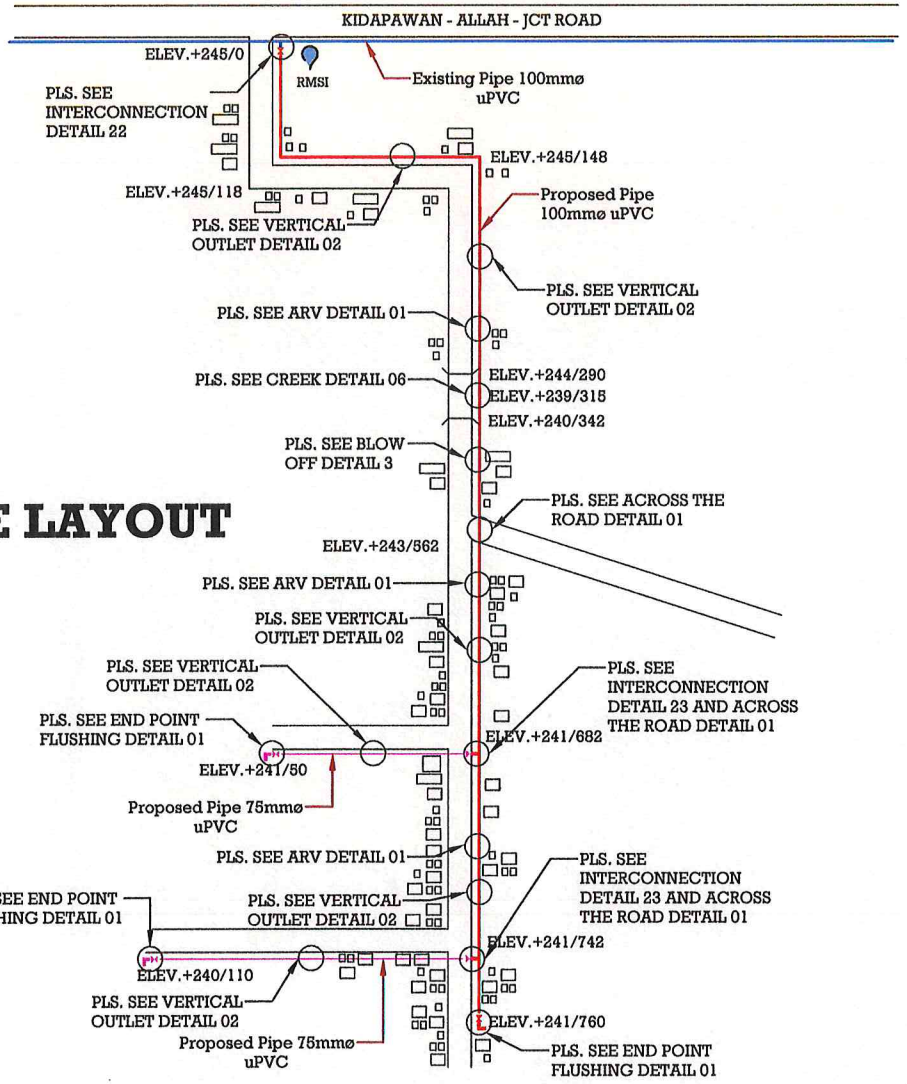
NOTE: TOTAL LENGTH OF CONCRETE PAVEMENT FOR CHISELING IS 67 L.M

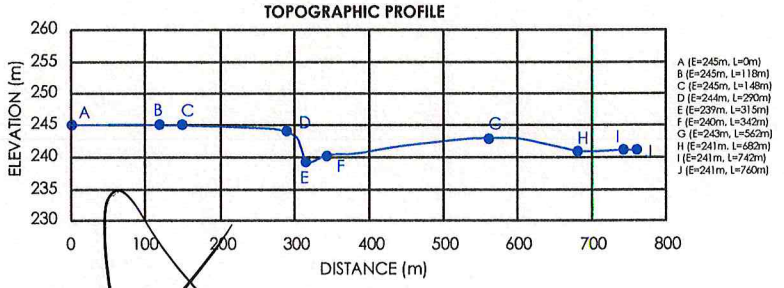
LANAO -BALINDOG ML, KC

ISO 9001:2015 CERTIFIED
Certificate No. 66478

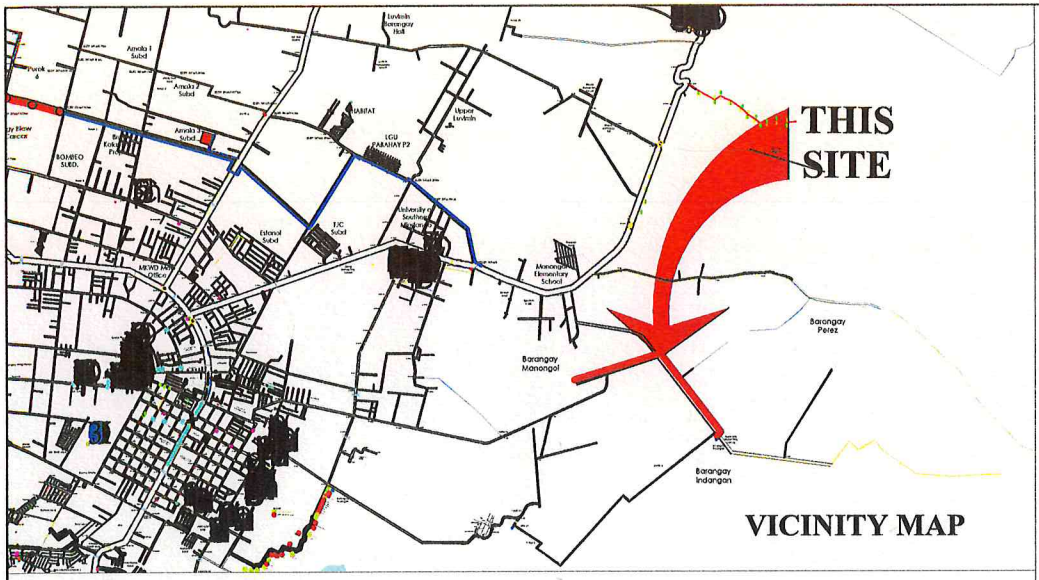
FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT, ENGINEERING AND OPERATIONS DEPARTMENT, PLANNING and DESIGN DIVISION, BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: ARGIL DATE: AUGUST 2019	PROJECT TITLE: LANAO -BALINDOG ML, KC	PREPARED BY: MARY JOSELLE C. TABASA, CE, ASA A - PDO CHECKED BY: CANUTO A. CODILLA, CE, DIVISION MANAGER A- PDO	REVIEWED BY: RAMIL A. CONDEZ, CE,RMP,MBA, DEPARTMENT MANAGER A ECO RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE,RMP,MBA, ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER	SHEET NO: ML/48

PIPE LAYOUT



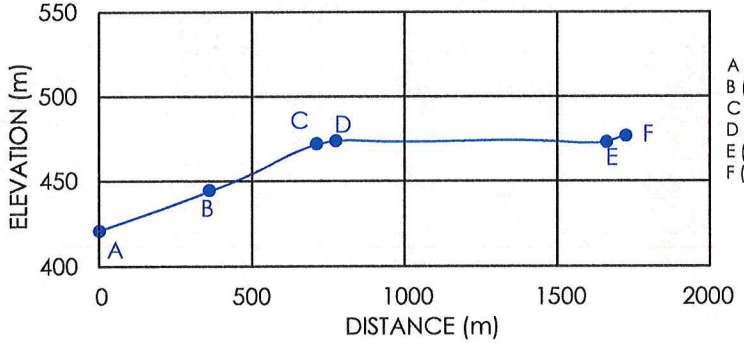


ISO 9001:2015 CERTIFIED Certificate No. 6647B	FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATION DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: JOpilas DATE: AUGUST 2019	PROJECT TITLE: LANAO DL (HIMULATAN) - PUROK 4D SAGING	PREPARED BY: JOEAN R. OPILAS JO/DO CHECKED BY: CANUTO A. CODILLA JR., CE DIVISION MANAGER A ECD	REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP DEPARTMENT MANAGER A ECD RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS GENERAL MANAGER	SHEET NO: DL/01

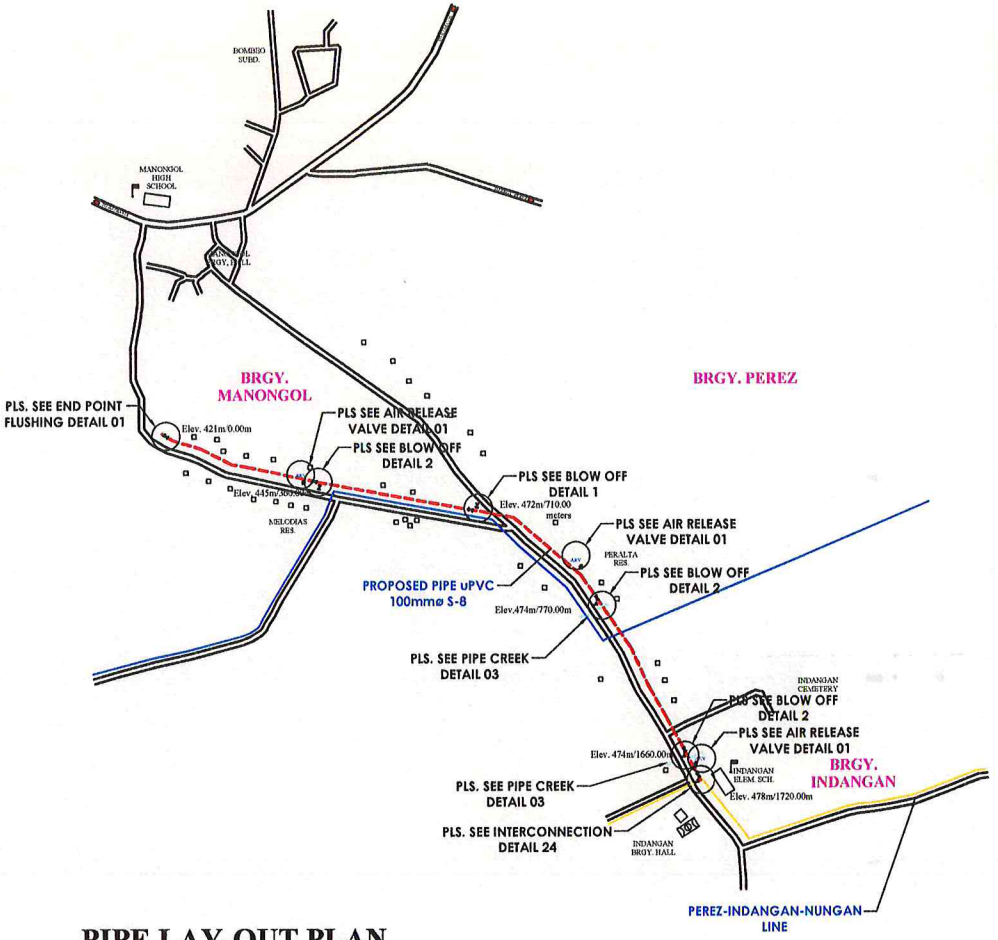


VICINITY MAP

TOPOGRAPHIC PROFILE



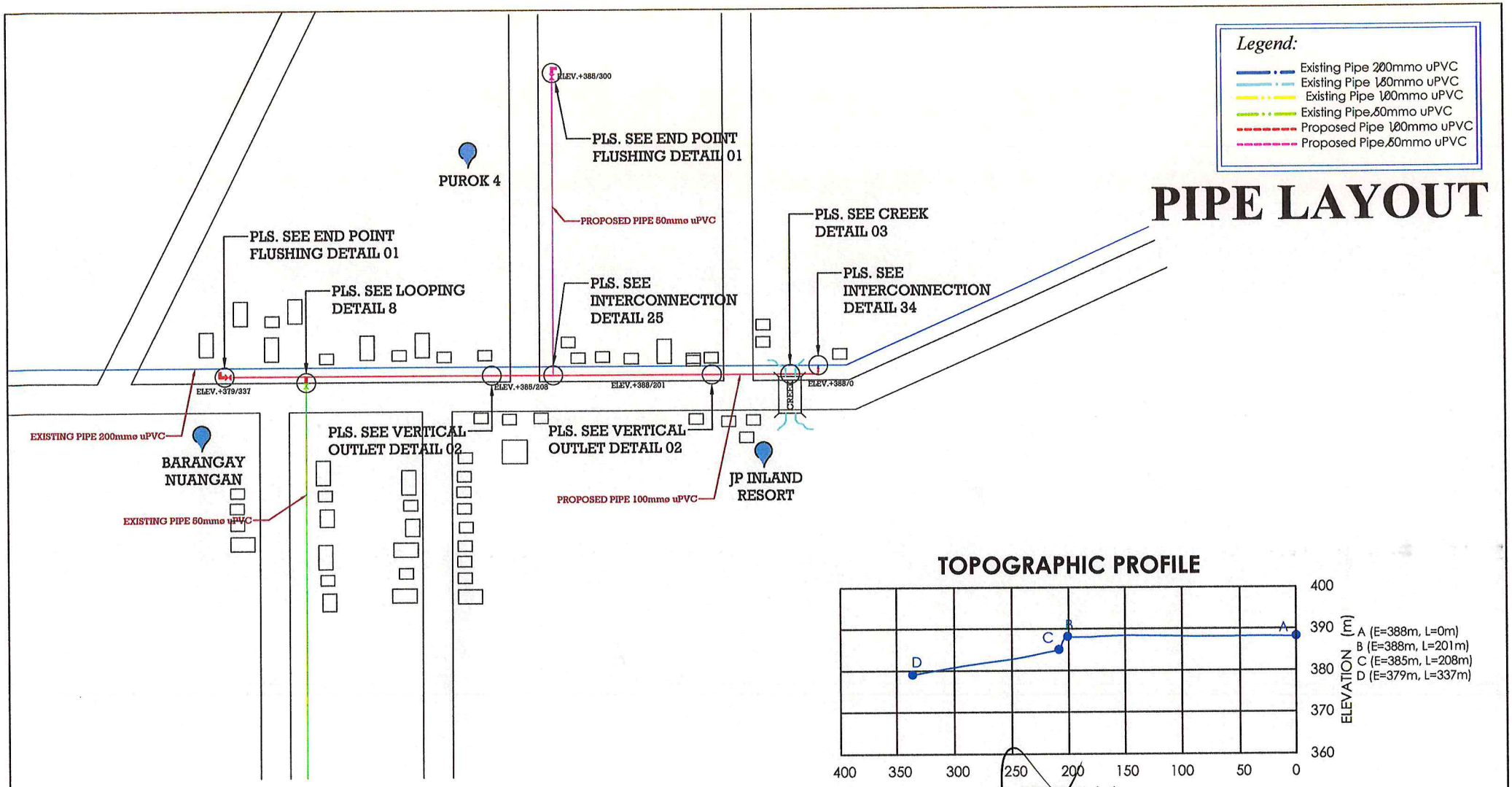
A (E=478m, L=0m)
B (E=474m, L=60m)
C (E=474m, L=490m)
D (E=472m, L=1010m)
E (E=445m, L=1360m)
F (E=421m, L=1720m)



PIPE LAY-OUT PLAN

	ISO 9001:2015 CERTIFIED Certificate No. 66478	FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATIONS DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: ARGIL DATE: AUGUST 2019	PROJECT TITLE: PEREZ TO INDANGAN DL, KC	PREPARED BY: MARY JOSELLE C. TABASA, CE, ASA A - PDO CHECKED BY: CANUTO A. GODILLA, CE, DIVISION MANAGER A- PDO	REVIEWED BY: RAMIL A. CONDEZ, CE,RMP,MBA, DEPARTMENT MANAGER A-EOD RECOMMENDED BY: WILESPER LASANDRO M. ALQUEZA, CE,RMP,MBA, ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER	SHEET NO: DL/08

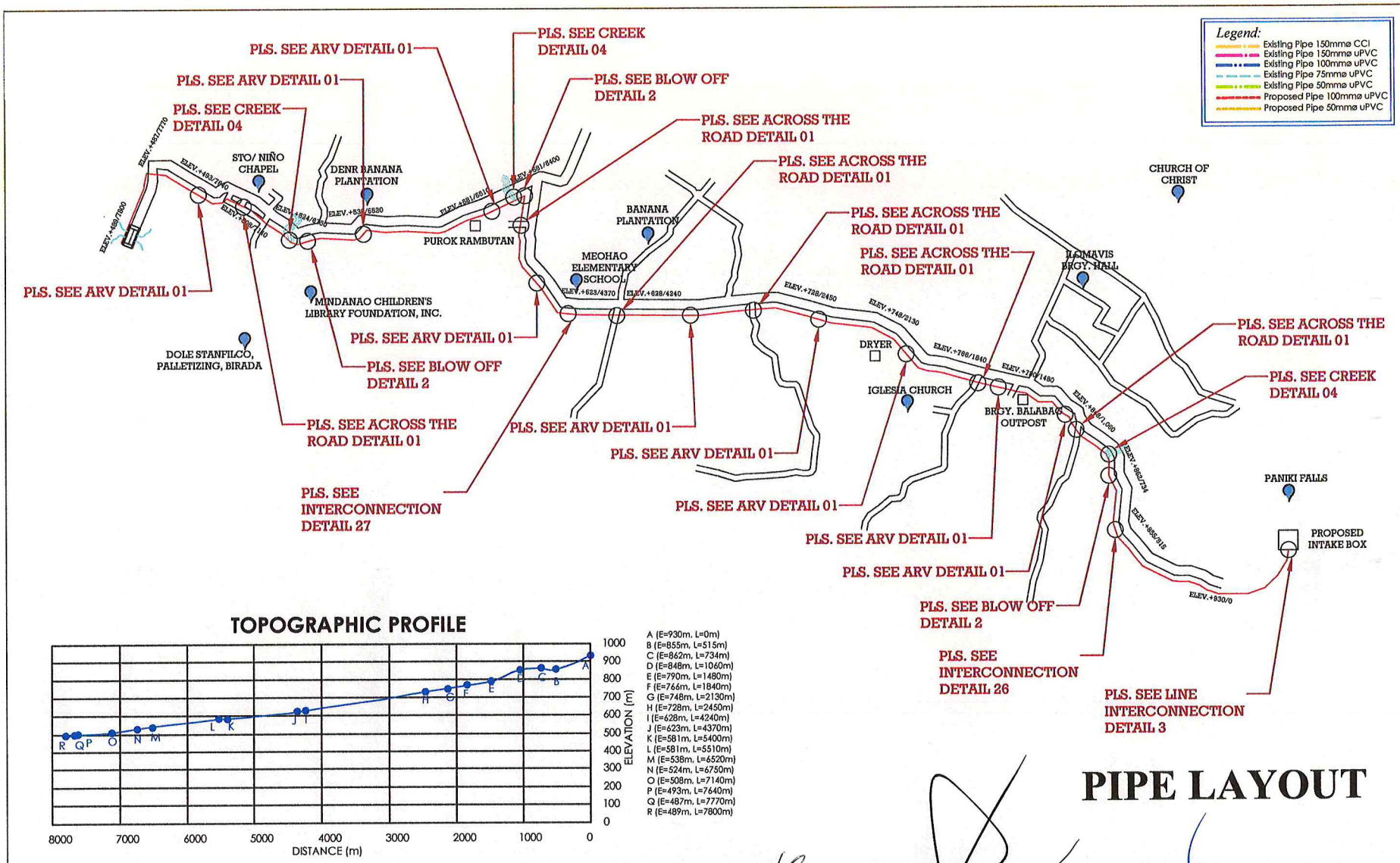
PIPE LAYOUT



TOPOGRAPHIC PROFILE

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF: METRO KIDAPAWAN WATER DISTRICT ENGINEERING AND OPERATION DEPARTMENT PLANNING and DESIGN DIVISION BRGY. LANAO, KIDAPAWAN CITY	DRAWN BY: JOpllas DATE: AUGUST 2019	PROJECT TITLE: NUANGAN DL, KC	PREPARED BY: JOEAN B. OPLAS, OPDD CHECKED BY: CANUTO A. CODILLA JR., CE, DIVISION MANAGER A ECD	REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP, DEPARTMENT MANAGER A ECD RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA, ASST. GENERAL MANAGER FOR OPERATION	APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER	SHEET NO: DL/13



TOPOGRAPHIC PROFILE

A (E=930m, L=0m)
B (E=855m, L=515m)
C (E=862m, L=734m)
D (E=848m, L=1060m)
E (E=790m, L=1480m)
F (E=766m, L=1840m)
G (E=748m, L=2130m)
H (E=728m, L=2450m)
I (E=628m, L=4240m)
J (E=623m, L=4370m)
K (E=581m, L=5400m)
L (E=581m, L=5510m)
M (E=538m, L=6520m)
N (E=524m, L=6750m)
O (E=508m, L=7140m)
P (E=493m, L=7640m)
Q (E=487m, L=7770m)
R (E=489m, L=7800m)

PIPE LAYOUT

ISO 9001:2015 CERTIFIED
Certificate No. 66478

FROM THE OFFICE OF:
METRO KIDAPAWAN WATER DISTRICT
ENGINEERING AND OPERATION DEPARTMENT
PLANNING and DESIGN DIVISION
BRGY. LANAO, KIDAPAWAN CITY

DRAWN BY: JOpilas
DATE: OCTOBER 2019

PROJECT TITLE: BALABAG SPRING SOURCE DEVELOPMENT AND MAIN LINE

PREPARED BY: JOEAN M. OPILAS, JO/PDD

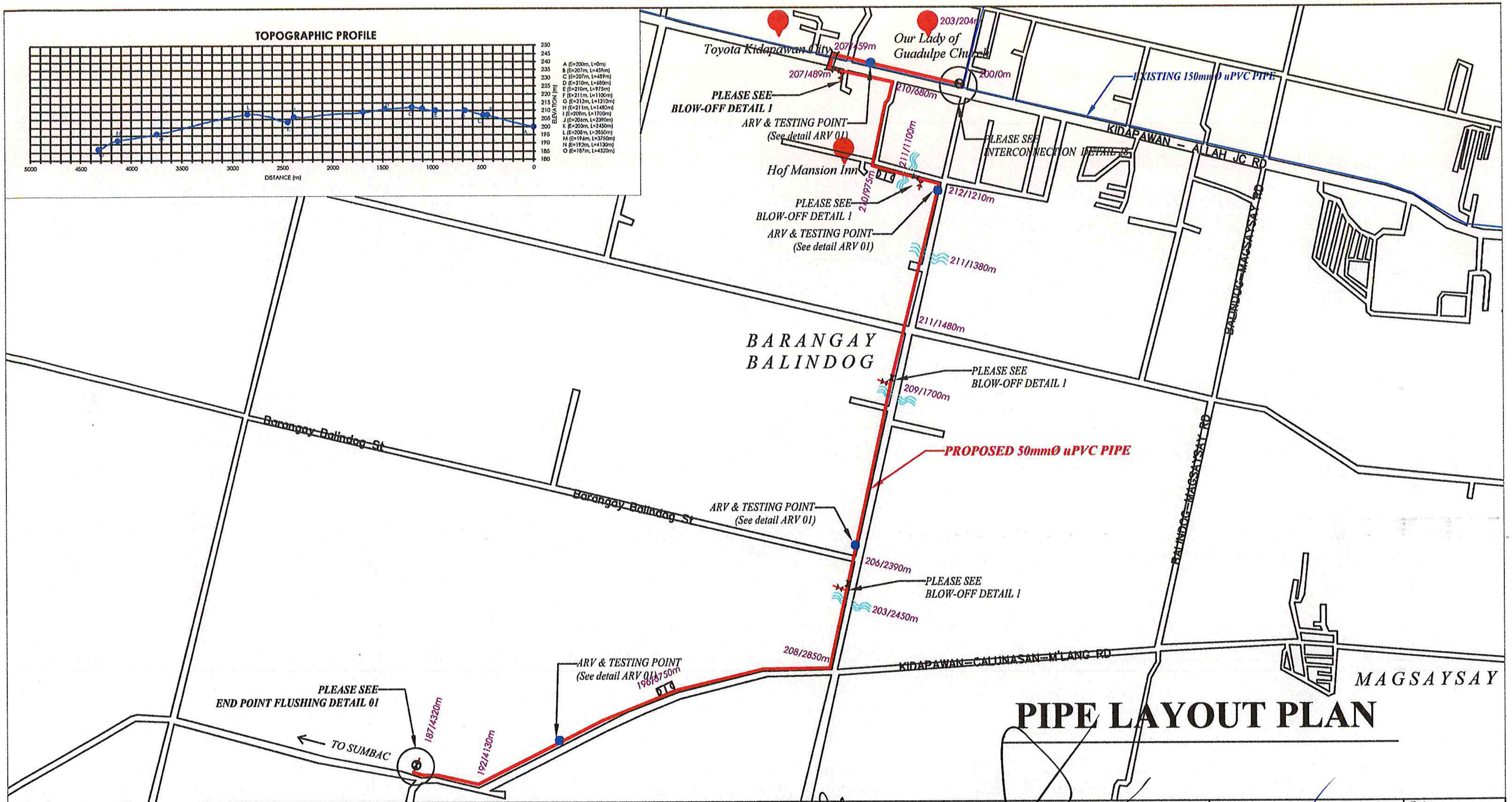
CHECKED BY: CANUTO A. CODILLA JR., CE, DIVISION MANAGER A ECD

REVIEWED BY: RAMIL A. CONDEZ, CE,MBA,RMP, DEPARTMENT MANAGER A ECD

RECOMMENDED BY: WILESPER LISANDRO M. ALQUEZA, CE/RMP/MBA, ASST. GENERAL MANAGER FOR OPERATION

APPROVED BY: STELLA M. GONZALES, MPS, GENERAL MANAGER

SHEET NO. PL/02



PIPE LAYOUT PLAN

FROM THE OFFICE OF:	DRAWN BY:	PROJECT TITLE:	Prepared By:	Reviewed By:	Approved By:	Sheet no.
Republic of the Philippines METRO KIDAPAWAN WATER DISTRICT Lanao, Kidapawan City Tel nos. (064)577-1533, 577-1865, Fax no. (064) 572-5555 E-mail Address: metrokidapawan_wd@yahoo.com Website: www.metrokidapawanwd.gov.ph "Committed to Service, Development and Self-Reliance"	MJCTABASA	KALAISAN WATER IMPOUNDING STRUCTURE AND TL	MARY JOSELLE C. TABASA, CE CASUAL - PDD	RAMIL A. CONDEZ, CE, RMP, MBA DEPARTMENT MANAGER A ECD	STELLA M. GONZALES, MPS GENERAL MANAGER	PL/12
ISO 9001:2015 CERTIFIED Certificate No. 66478	DATE: OCTOBER 2019		Checked By: CANUTO A. CODILLA JR., CE DIVISION MANAGER A PDD	Recommending Approval: WILESPER LISANDRO M. ALQUEZA, CE, RMP, MBA ASST. GENERAL MANAGER FOR OPERATION		

TECHNICAL DETAILS AND SPECIFICATIONS

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

PIPE TRENCH EXCAVATION DETAILS

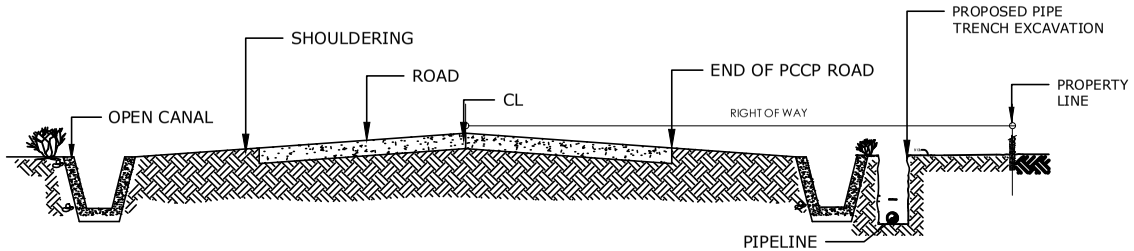
DATE: JANUARY 2021

DWG. NO.: 01

REVISIONS		
	BY	DATE

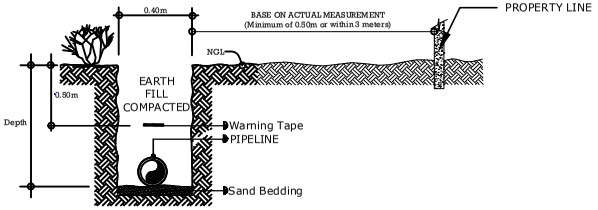
PIPE TRENCH EXCAVATION DETAIL

N T S



PIPE TRENCH TABLE

	Width	Depth
50mmø	0.40m	1.00m
75mmø	0.40m	1.00m
100mmø	0.40m	1.00m
150mmø	0.45m	1.10m
200mmø	0.50m	1.10m
250mmø	0.50m	1.10m



PIPE CROSS SECTION DETAIL

GENERAL NOTES:

Alignment of pipeline trench should always be between the property and the existing pipelines or within three (3) meters away from the property line.

All asphalt and concrete debris should be hauled away immediately to avoid using them as backfill materials.

No trenching should be allowed to start and proceed without the required bollards, barricades and warning devices.

Unless otherwise shown or ordered, excavation for pipelines shall be open cut trenches. Trench should be straight, with vertical sides centered on the pipe centerline

Trench excavation should not extend too far ahead of pipe laying for safety reasons. The maximum amount of open trench permitted at any one time at one location shall be 300 meters, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater.

Barricades and warning lights shall be provided and maintained for all trenches left open overnight, except at intersections and driveways in which case of heavy steel plates adequately braced bridges or other type of crossing capable of supporting vehicular traffic shall be furnished as directed by the Engineer. Or, do not leave open trenches overnight at all. An open trench presents a danger to the construction

The trench walls may have to be "sloping" when the soil is not stable.

For curve alignments, the trench width should be greater than the usual to accommodate the permissible deflection of the joints.

Trench bottom must be uniform, free from humps, abrupt change of direction hard objects, large object /or sharp stones, and tree roots.

Trenches shall be over-excavated beyond the desired depth only when ordered by the Engineer such over excavation be to the depth ordered. The trench shall then be refilled to the grade of the bottom of the pipe with sand until the pipe is covered with the specified thickness and then with selected granular materials obtained from the excavation.

In unstable ground, during over-excavation, the trench walls may be shored or sloped.

Except where trees are shown on the drawings to be removed, trees shall be protected from injury during construction operations and no tree is to be removed without written permission or permit if necessary. Tree roots can be trimmed and cut if it is an obstruction only with the permission of the Engineer.

Water must be kept out of the trench during construction so that the pipe will not become contaminated. Dewatering pumps should be used in the trench if necessary, to remove any building up of water.

SURFACE RESTORATION:

All damaged and disturbed area due to pipe laying activities must be restored to its original condition.

Damaged concrete/asphalt pavement restoration is strictly enforced upon the completion of the pipe laying and hydro testing activities.

All concrete pavement surfaces and all concrete base under an asphaltic mix surfaces to be restored shall be scored concrete cutting equipment into clean straight lines.

Clean the sides of the pavements removing foreign particles using clean tap water.

The cases of damaged, adjacent pavements, the damaged area should be included in the surface restoration and inside the perimeter of the scored portion.

In the cases of damaged, removed or disturbed fences, post, street signs, surface structures, and other properties, whether through failure or deliberately to efficiently perform the repair works shall be replaced.

The prepared concrete mixture for the surface restoration should have a compressive strength of 3000 psi. A concrete mixture ratio of 1part cement, 2 parts sand and 3 parts aggregate will produce a concrete mix of approximately 3000 psi.

The restored portion should have the same thickness or greater than the existing concrete/asphalt pavement.

When the concrete is slightly hardened, scrape it using s stick broom.

Secure the area using the barricades, warning devices and steel plates (if necessary) to protect the newly restored portion until the concrete reaches its maximum strength.

Barricades, warning devices and steel plates should be removed on the site three (3) to five (5) days, or as approved by the agency covering the area or DPWH.

WARNING TAPE:

The Contractor shall furnish for each pipe, above or equal to 75 mm, an Alu-foil tape (minimum width is 4 cm)

The warning tape shall be laid into the trench between two backfill layers at 30 cm above the pipe.

SAND BEDDING AND SAND FILL MATERIALS:

GENERAL

The purpose of this standard is to specify minimum requirements for sand used for bedding and sand fill in pipe trenches, which is fit for this purpose and will ensure install adequate support and will achieve their design life.

To the satisfaction of the MKWD representative, the sand shall be free from:

a. Cohesive and organic lumps
b. Rocks or other sharp particles likely to damage pipes or protective coatings,
c. Weeds or other vegetative or their seeds.

The sand shall comply with the criteria detailed in the Table below of this Technical Standard.

TEST	DESCRIPTION / SIEVE SIZE (mm)	CRITERIA / PERCENT PASSING
PRACTICAL SIZE DISTRIBUTION	9.5	100
	6.7	95 - 100
	4.75	90 - 100
	2.36	75 - 100
	1.18	40 - 100
	0.600	20 - 95
	0.300	10 - 55
	0.150	0 - 55
	0.0075	0 - 10

When requested by the MKWD Representative, a 25 kg sample of packing sand shall be submitted and sent for testing to any government accredited laboratory and witnessed by the MKWD representative.

Each Sample shall be clearly marked with the following information:

a. Test Standard and type of material
b. Contract number
c. Name of Contractor
d. Origin of supply

All relevant test results or certificates shall be submitted to MKWD Representative immediately when they become available.

APPLICATION

a. The trench bottom must be properly leveled and free from large and/or sharp stones and objects so that the full length of the pipe will have continuous, firm support.
b. Sand bedding should be spread over the trench bottom to the full width of the trench with the thickness of 150mm.
c. Compacted sand shall also serve as a backfill material to the both sides of the pipelines and 150mm. above the outside diameter of the pipe. Also refer to the "Trench Excavation detail".

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

DATE: JANUARY 2021

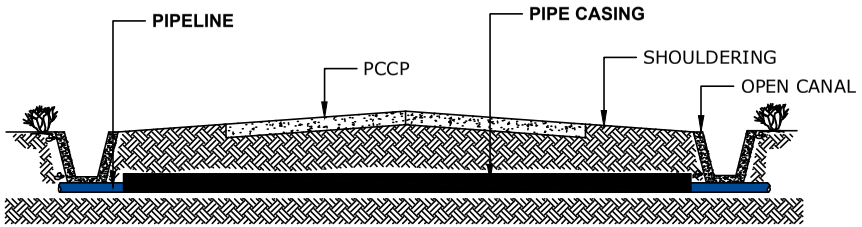
ACROSS THE ROAD DETAILS

DWG. NO.: 01

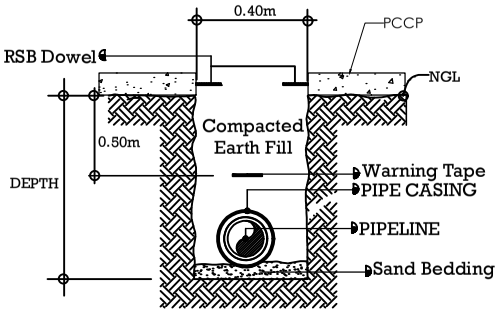
REVISIONS

BY	DATE

ACROSS THE ROAD DETAIL
N T S



LONGITUDINAL SECTION DETAIL



PIPE TRENCH TABLE

	Width	Depth
50mmø	0.40m	1.00m
75mmø	0.40m	1.00m
100mmø	0.40m	1.00m
150mmø	0.45m	1.10m
200mmø	0.50m	1.10m
250mmø	0.50m	1.10m

CROSS SECTION DETAIL

GENERAL NOTES:

EXCAVATION / PREPARATION

- Advance written notice should be given to the government agencies concerned, affected driveways of households and other establishments for information.
- Excavation permits, if necessary, should have been secured from the government agencies that have jurisdiction over the project.
- Always refer to the detailed plan for the correct field location, alignment, trench and bedding specifications before mobilization and excavation begins.
- Make sure that all the necessary bollards, barricades and warning devices or whatever is needed are properly placed to protect the safety of the construction crew and the public.
- All asphalt and concrete debris should be hauled away immediately to avoid using them as backfill materials.

ROAD CROSSING

- All roads approved for open cut trenching or pipeline road crossing, shall be well tamped throughout the backfilling operation, and an adequate amount of gravel be spread over the affected area.
- The depth of the road crossing shall be maintained at the same elevation throughout the entire width of the road allowance or proposed road allowance.
- Road crossings under roads which are to be improved may be required to be installed to a greater depth.
- It shall not be a requirement for crossings to be 90 degrees to the road but they shall be properly marked with warning signs.
- Road crossings shall be installed in a manner which will cause the least inconvenience to the traveling public.
- Due to work being performed on a pipeline or integral part thereof, a detour shall be provided and adequately maintained with ample signs. During the hours of darkness, all warning and detour signs and excavations shall be illuminated.

SURFACE RESTORATION

- All damaged and disturbed area due to pipe laying activities must be restored to its original condition.
- Damaged concrete/asphalt pavement restoration is strictly enforced upon the completion of the pipe laying and hydro testing activities.
- All concrete pavement surfaces and all concrete base under an asphaltic mix surfaces to be restored shall be scored concrete cutting equipment into clean straight lines.
- The cases of damaged, adjacent pavements, the damaged area should be included in the surface restoration and inside the perimeter of the scored portion.
- The restored portion should have the same thickness or greater than the existing concrete/asphalt pavement.
- When the concrete is slightly hardened, scrape it using s stick broom.
- Secure the area using the barricades, warning devices and steel plates (if necessary) to protect the newly restored portion until the concrete reaches its maximum strength.
- Barricades, warning devices and steel plates should be removed on the site three (3) to five (5) days, or as approved by the agency covering the area or DPWH.

WARNING TAPE:

The Contractor shall furnish for each pipe, above or equal to 75 mm, an Alu- foil tape (minimum width is 4 cm)

The warning tape shall be laid into the trench between two backfill layers at 30 cm above the pipe.

SAND BEDDING AND SAND FILL MATERIALS:

GENERAL

The purpose of this standard is to specify minimum requirements for sand used for bedding and sand fill in pipe trenches, which is fit for this purpose and will ensure install adequate support and will achieve their design life.

To the satisfaction of the MKWD representative, the sand shall be free from:

a. Cohesive and organic lumps
b. Rocks or other sharp particles likely to damage pipes or protective coatings,
c. Weeds or other vegetative or their seeds.

The sand shall comply with the criteria detailed in the Table below of this Technical Standard.

TEST	DESCRIPTION / SIEVE SIZE (mm)	CRITERIA / PERCENT PASSING
PRACTICAL SIZE DISTRIBUTION	9.5	100
	6.7	95 - 100
	4.75	90 - 100
	2.36	75 - 100
	1.18	40 - 100
	0.600	20 - 95
	0.300	10 - 55
	0.150	0 - 55
	0.0075	0 - 10

When requested by the MKWD Representative, a 25 kg sample of packing sand shall be submitted and sent for testing to any government accredited laboratory and witnessed by the MKWD representative.

Each Sample shall be clearly marked with the following information:

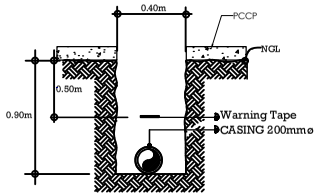
a. Test Standard and type of material
b. Contract number
c. Name of Contractor
d. Origin of supply

All relevant test results or certificates shall be submitted to MKWD Representative immediately when they become available.

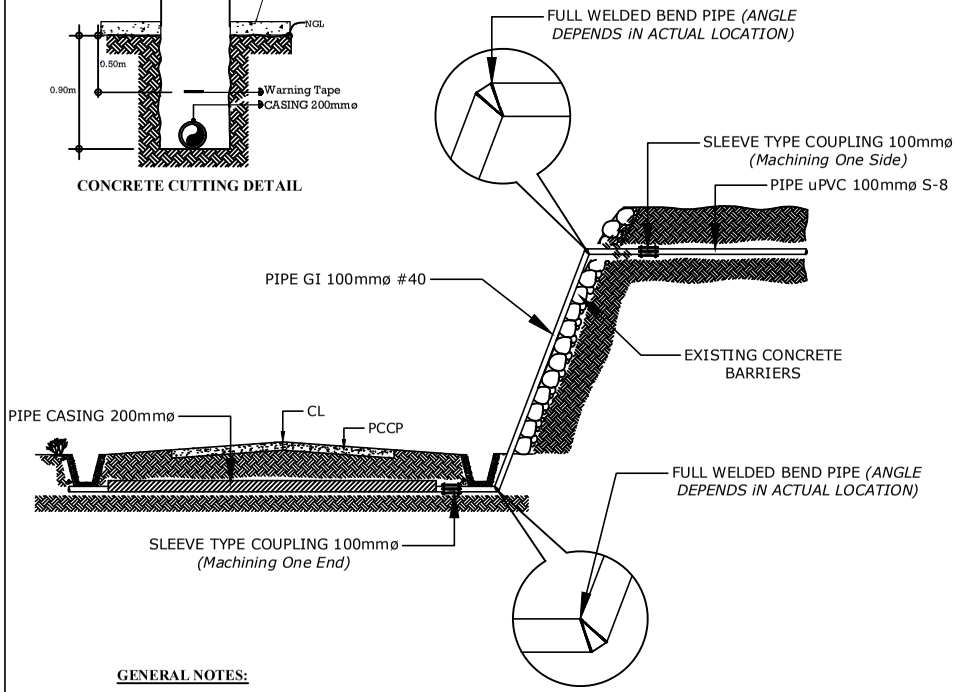
APPLICATION

a. The trench bottom must be properly leveled and free from large and/or sharp stones and objects so that the full length of the pipe will have continuous, firm support.
b. Sand bedding should be spread over the trench bottom to the full width of the trench with the thickness of 150mm.
c. Compacted sand shall also serve as a backfill material to the both sides of the pipelines and 150mm. above the outside diameter of the pipe. Also refer to the "Trench Excavation detail".

TECHNICAL STANDARD DETAILS



CONCRETE CUTTING DETAIL



GENERAL NOTES:

EXCAVATION / PREPARATION

- Advance written notice should be given to the government agencies concerned, affected driveways of households and other establishments for information.
- Excavation permits, if necessary, should have been secured from the government agencies that have jurisdiction over the project.
- Always refer to the detailed plan for the correct field location, alignment, trench and bedding specifications before mobilization and excavation begins.
- Make sure that all the necessary bollards, barricades and warning devices or whatever is needed are properly placed to protect the safety of the construction crew and the public.
- All asphalt and concrete debris should be hauled away immediately to avoid using them as backfill materials.

ROAD CROSSING

- All roads approved for open cut trenching or pipeline road crossing, shall be well tamped throughout the backfilling operation, and an adequate amount of gravel be spread over the affected area.
- The depth of the road crossing shall be maintained at the same elevation throughout the entire width of the road allowance or proposed road allowance.
- Road crossings under roads which are to be improved may be required to be installed to a greater depth.
- It shall not be a requirement for crossings to be 90 degrees to the road but they shall be properly marked with warning signs.
- Road crossings shall be installed in a manner which will cause the least inconvenience to the traveling public.
- Due to work being performed on a pipeline or integral part thereof, a detour shall be provided and adequately maintained with ample signs. During the hours of darkness, all warning and detour signs and excavations shall be illuminated.

SURFACE RESTORATION

- All damaged and disturbed area due to pipe laying activities must be restored to its original condition.
- Damaged concrete/asphalt pavement restoration is strictly enforced upon the completion of the pipe laying and hydro testing activities.
- All concrete pavement surfaces and all concrete base under an asphaltic mix surfaces to be restored shall be scored concrete cutting equipment into clean straight lines.
- The cases of damaged, adjacent pavements, the damaged area should be included in the surface restoration and inside the perimeter of the scored portion.
- The restored portion should have the same thickness or greater than the existing concrete/asphalt pavement.
- When the concrete is slightly hardened, scrape it using s stick broom.
- Secure the area using the barricades, warning devices and steel plates (if necessary) to protect the newly restored portion until the concrete reaches its maximum strength.
- Barricades, warning devices and steel plates should be removed on the site three (3) to five (5) days, or as approved by the agency covering the area or DPWH.

WARNING TAPE:

The Contractor shall furnish for each pipe, above or equal to 75 mm, an Alu- foil tape (minimum width is 4 cm)

The warning tape shall be laid into the trench between two backfill layers at 30 cm above the pipe.

SAND BEDDING AND SAND FILL MATERIALS:

GENERAL

The purpose of this standard is to specify minimum requirements for sand used for bedding and sand fill in pipe trenches, which is fit for this purpose and will ensure install adequate support and will achieve their design life.

To the satisfaction of the MKWD representative, the sand shall be free from:

a. Cohesive and organic lumps
b. Rocks or other sharp particles likely to damage pipes or protective coatings,
c. Weeds or other vegetative or their seeds.

The sand shall comply with the criteria detailed in the Table below of this Technical Standard.

TEST	DESCRIPTION / SIEVE SIZE (mm)	CRITERIA / PERCENT PASSING
PRACTICAL SIZE DISTRIBUTION	9.5	100
	6.7	95 - 100
	4.75	90 - 100
	2.36	75 - 100
	1.18	40 - 100
	0.600	20 - 95
	0.300	10 - 55
	0.150	0 - 55
	0.0075	0 - 10

When requested by the MKWD Representative, a 25 kg sample of packing sand shall be submitted and sent for testing to any government accredited laboratory and witnessed by the MKWD representative.

Each Sample shall be clearly marked with the following information:

a. Test Standard and type of material
b. Contract number
c. Name of Contractor
d. Origin of supply

All relevant test results or certificates shall be submitted to MKWD Representative immediately when they become available.

APPLICATION

a. The trench bottom must be properly leveled and free from large and/or sharp stones and objects so that the full length of the pipe will have continuous, firm support.
b. Sand bedding should be spread over the trench bottom to the full width of the trench with the thickness of 150mm.
c. Compacted sand shall also serve as a backfill material to the both sides of the pipelines and 150mm. above the outside diameter of the pipe. Also refer to the "Trench Excavation detail".

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

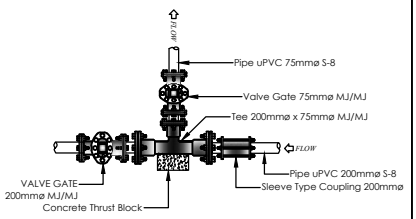
DATE: JANUARY 2021

ACROSS THE ROAD DETAILS

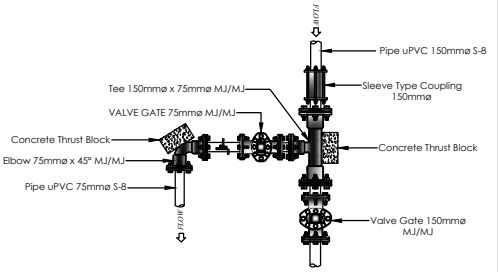
DWG. NO.: 02

REVISIONS		
	BY	DATE

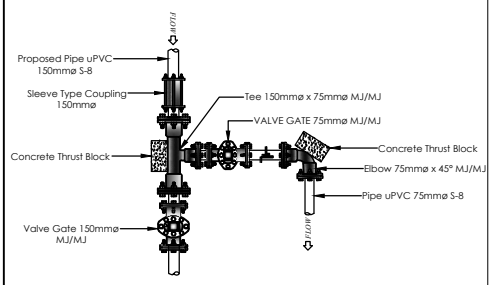
INTERCONNECTION DETAILS
"TEE CONNECTIONS"



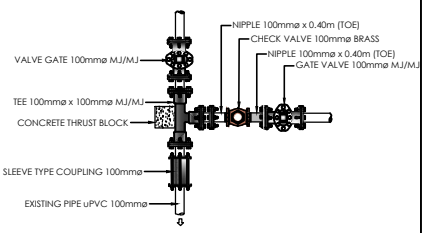
INTERCONNECTION DETAIL 1
200mmØ x 75mmØ



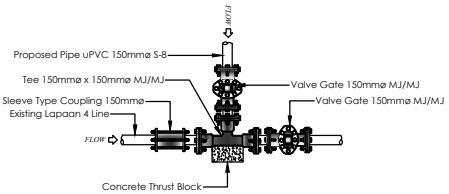
INTERCONNECTION DETAIL 2
150mmØ x 75mmØ



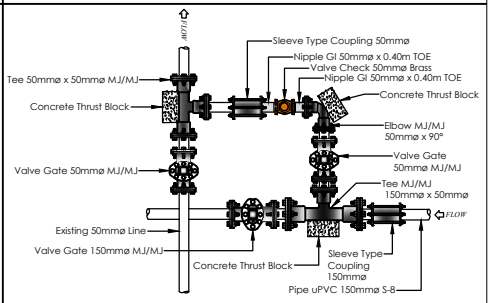
INTERCONNECTION DETAIL 3
150mmØ x 75mmØ



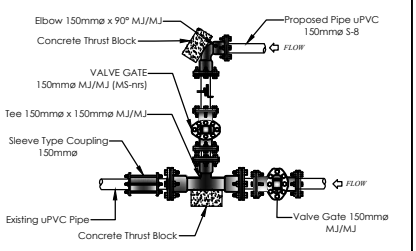
INTERCONNECTION DETAIL 4
100mmØ x 100mmØ



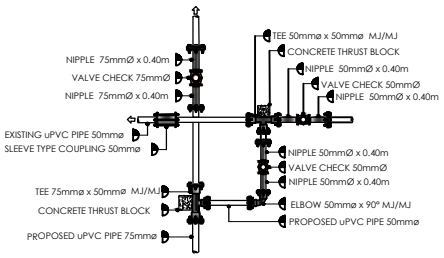
INTERCONNECTION DETAIL 5
150mmØ x 150mmØ



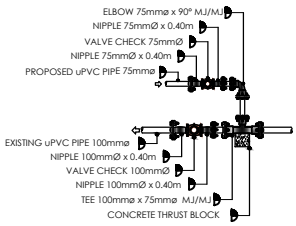
INTERCONNECTION DETAIL 6
150mmØ x 50mmØ | 50mmØ x 50mmØ



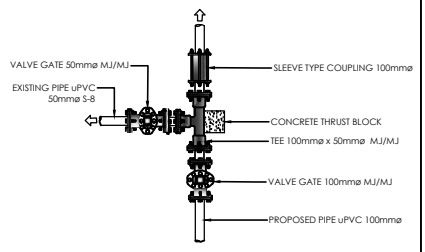
INTERCONNECTION DETAIL 7
150mmØ x 150mmØ



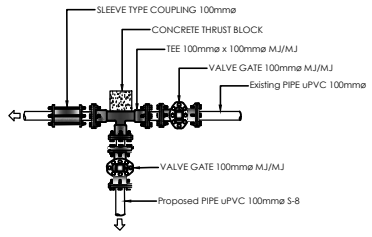
INTERCONNECTION DETAIL 8
75mmØ x 50mmØ | 50mmØ x 50mmØ



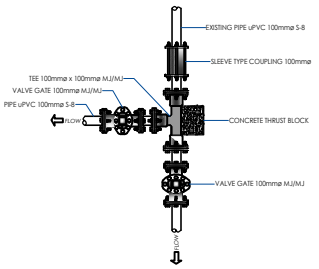
INTERCONNECTION DETAIL 9
100mmØ x 75mmØ



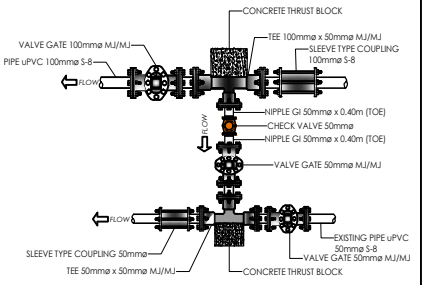
INTERCONNECTION DETAIL 10
100mmØ x 50mmØ



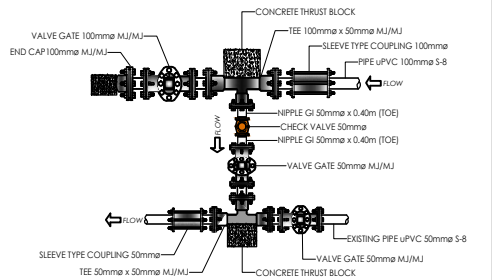
INTERCONNECTION DETAIL 11
100mmØ x 100mmØ



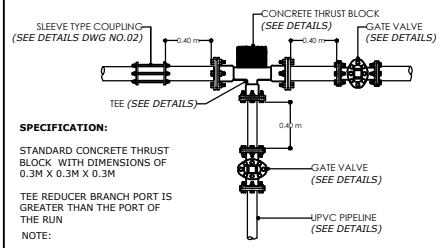
INTERCONNECTION DETAIL 12
100mmØ x 100mmØ



INTERCONNECTION DETAIL 13
100mmØ x 50mmØ | 50mmØ x 50mmØ



INTERCONNECTION DETAIL 14
100mmØ x 50mmØ | 50mmØ x 50mmØ (w/ End Cap)



SPECIFICATION:

STANDARD CONCRETE THRUST BLOCK WITH DIMENSIONS OF 0.3M X 0.3M X 0.3M

TEE REDUCER BRANCH PORT IS GREATER THAN THE PORT OF THE RUN

NOTE:

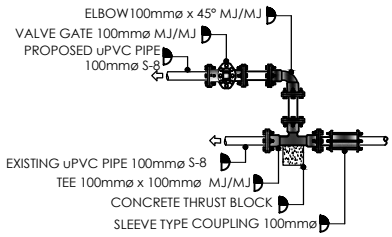
MINIMUM GAP BETWEEN FITTINGS MUST BE A MINIMUM OF 0.4 METERS

ALL FITTINGS MUST CONFORM TO THE STANDARD SET BY MKWD

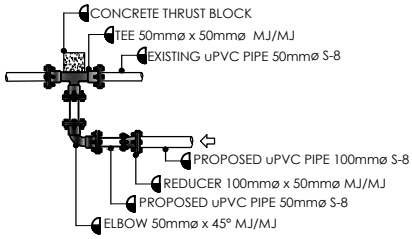
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		INTERCONNECTION DETAILS (TEE)	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 01

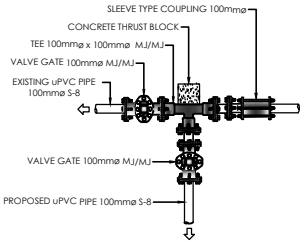
INTERCONNECTION DETAILS
"TEE CONNECTIONS"



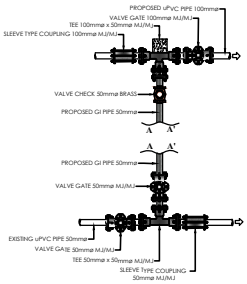
INTERCONNECTION DETAIL 15
100mmØ x 100mmØ



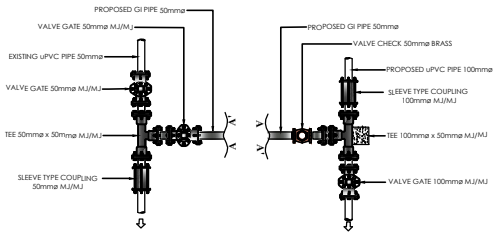
INTERCONNECTION DETAIL 16
50mmØ x 50mmØ



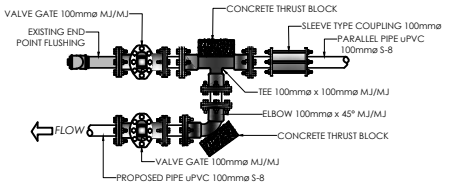
INTERCONNECTION DETAIL 17
100mmØ x 100mmØ



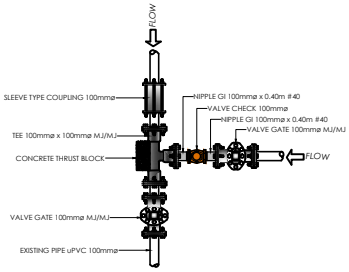
INTERCONNECTION DETAIL 18
100mmØ x 50mmØ | 50mmØ x 50mmØ



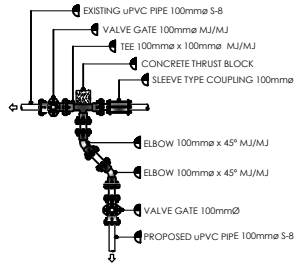
INTERCONNECTION DETAIL 19
50mmØ x 50mmØ | 100mmØ x 50mmØ



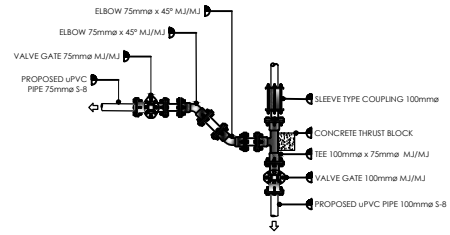
INTERCONNECTION DETAIL 20
100mmØ x 100mmØ



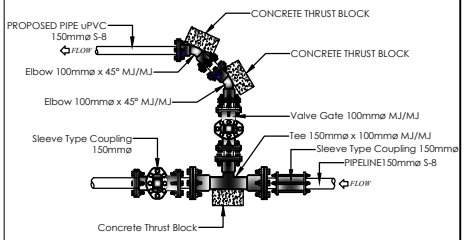
INTERCONNECTION DETAIL 21
100mmØ x 100mmØ



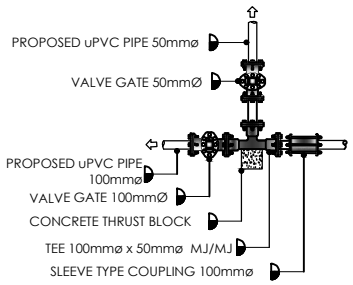
INTERCONNECTION DETAIL 22
100mmØ x 100mmØ



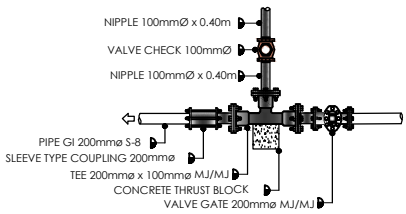
INTERCONNECTION DETAIL 23
100mmØ x 75mmØ



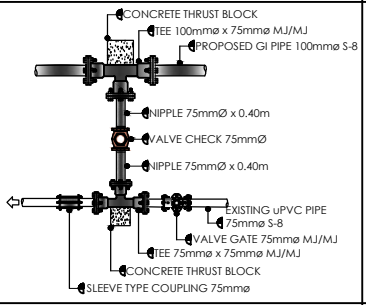
INTERCONNECTION DETAIL 24
150mmØ x 100mmØ



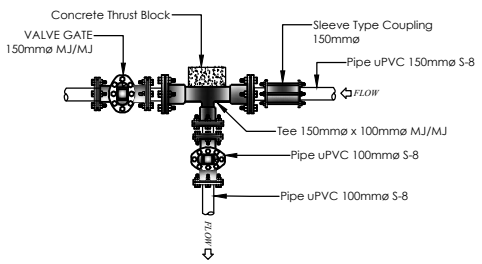
INTERCONNECTION DETAIL 25
100mmØ x 50mmØ



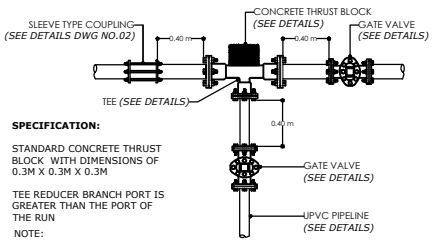
INTERCONNECTION DETAIL 26
200mmØ x 100mmØ



INTERCONNECTION DETAIL 27
100mmØ x 75mmØ | 75mmØ x 75mmØ



INTERCONNECTION DETAIL 28
150mmØ x 100mmØ



SPECIFICATION:

STANDARD CONCRETE THRUST BLOCK WITH DIMENSIONS OF 0.3M X 0.3M X 0.3M

TEE REDUCER BRANCH PORT IS GREATER THAN THE PORT OF THE RUN

NOTE:

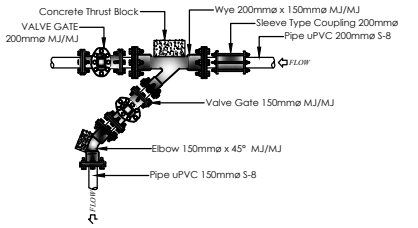
MINIMUM GAP BETWEEN FITTINGS MUST BE A MINIMUM OF 0.4 METERS

ALL FITTINGS MUST CONFORM TO THE STANDARD SET BY MKWD

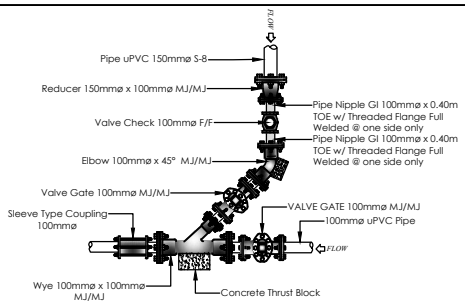
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		INTERCONNECTION DETAILS (TEE)	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 02

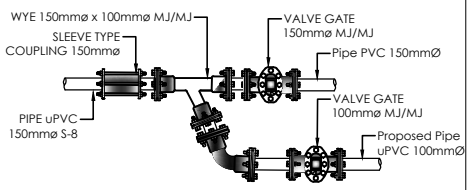
INTERCONNECTION DETAILS
"WYE CONNECTIONS"



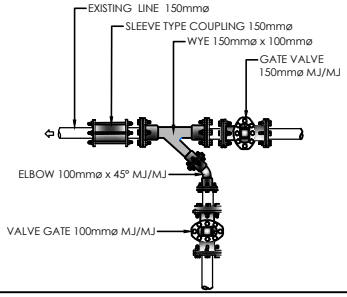
INTERCONNECTION DETAIL 29
200mmØ x 150mmØ



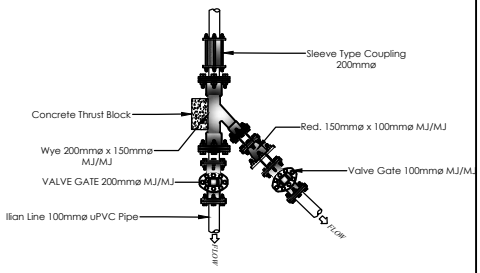
INTERCONNECTION DETAIL 30
100mmØ x 100mmØ



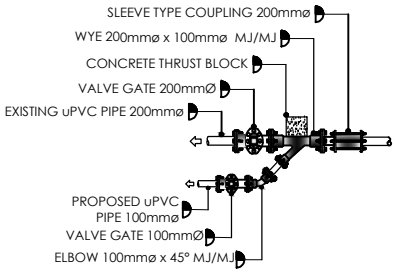
INTERCONNECTION DETAIL 31
150mmØ x 100mmØ



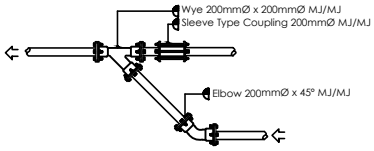
INTERCONNECTION DETAIL 32
150mmØ x 100mmØ



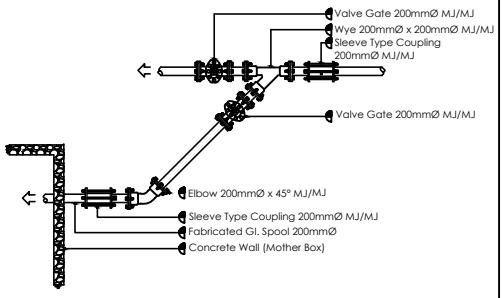
INTERCONNECTION DETAIL 33
200mmØ x 150mmØ



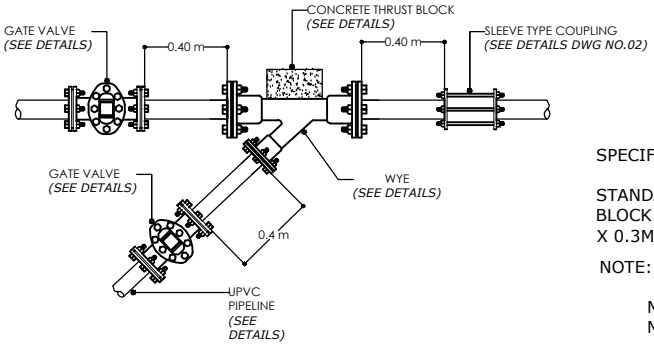
INTERCONNECTION DETAIL 34
200mmØ x 100mmØ



INTERCONNECTION DETAIL 35
200mmØ x 200mmØ



INTERCONNECTION DETAIL 36
200mmØ x 200mmØ



SPECIFICATION:

STANDARD CONCRETE THRUST BLOCK WITH DIMENSIONS OF 0.3M X 0.3M X 0.3M

NOTE:

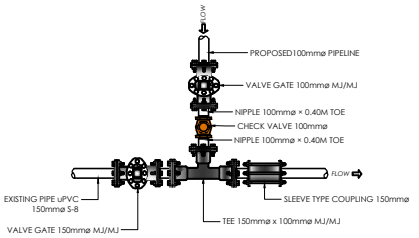
MINIMUM GAP BETWEEN FITTINGS MUST BE A MINIMUM OF 0.4 METERS

ALL FITTINGS MUST CONFORM TO THE STANDARD SET BY MKWD

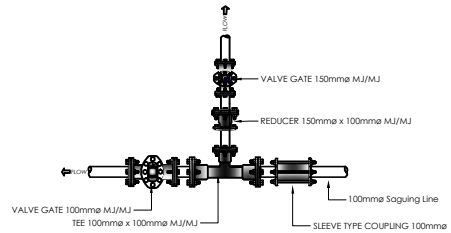
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		INTERCONNECTION DETAILS (WYE)	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 03

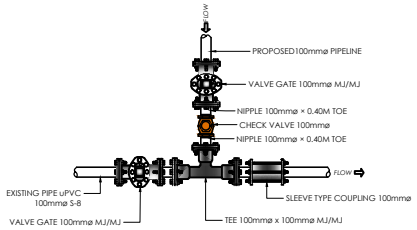
LOOPING DETAILS



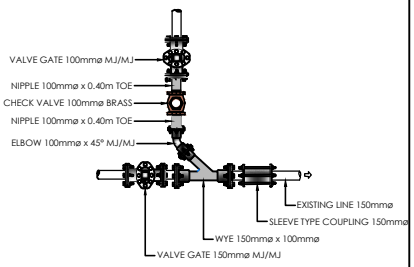
LOOPING DETAIL 1
150mmØ x 100mmØ



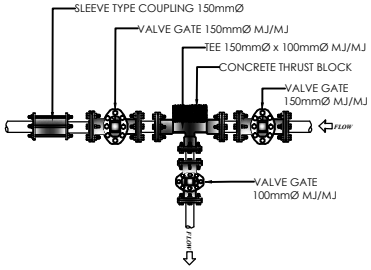
LOOPING DETAIL 2
100mmØ x 100mmØ



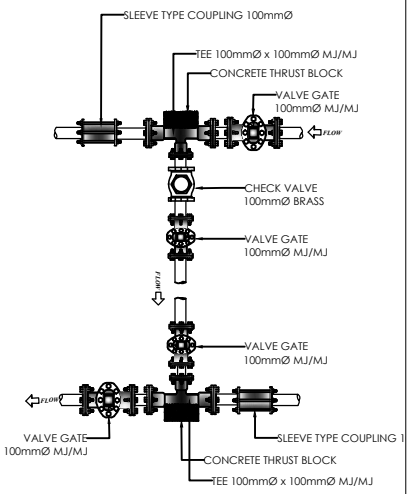
LOOPING DETAIL 3
100mmØ x 100mmØ



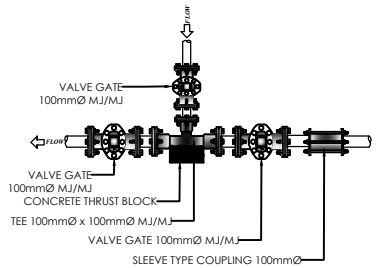
LOOPING DETAIL 4
150mmØ x 100mmØ



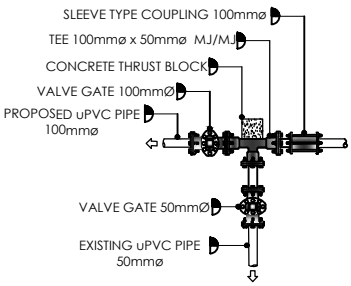
LOOPING DETAIL 5
150mmØ x 100mmØ



LOOPING DETAIL 6
100mmØ x 100mmØ | 100mmØ x 100mmØ

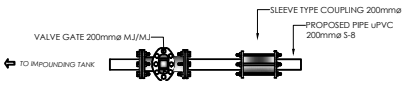


LOOPING DETAIL 7
100mmØ x 100mmØ

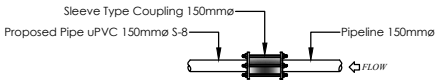


LOOPING DETAIL 8
100mmØ x 50mmØ

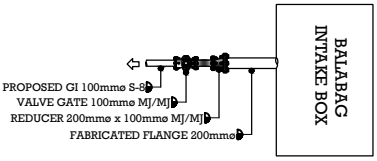
LINE INTERCONNECTION DETAILS



LINE INTERCONNECTION DETAIL 1
200mmØ



LINE INTERCONNECTION DETAIL 2
150mmØ



LINE INTERCONNECTION DETAIL 3
Reducer 200mmØ x 100mmØ

SPECIFICATION:

STANDARD CONCRETE THRUST BLOCK WITH DIMENSIONS OF 0.3M X 0.3M X 0.3M

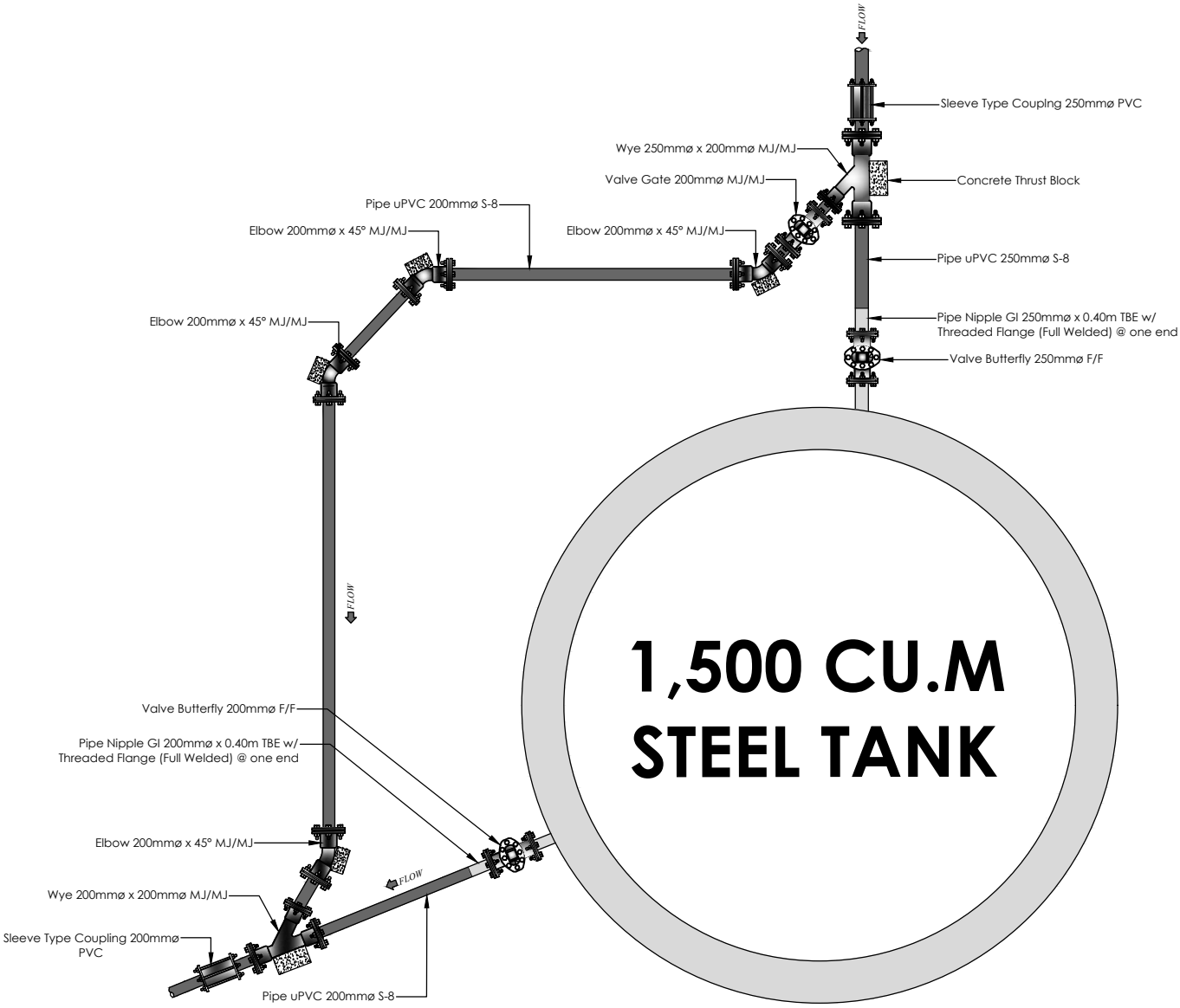
NOTE:

MINIMUM GAP BETWEEN FITTINGS MUST BE A MINIMUM OF 0.4 METERS

ALL FITTINGS MUST CONFORM TO THE STANDARD SET BY MKWD

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		INTERCONNECTION DETAILS (LOOPING)	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 04

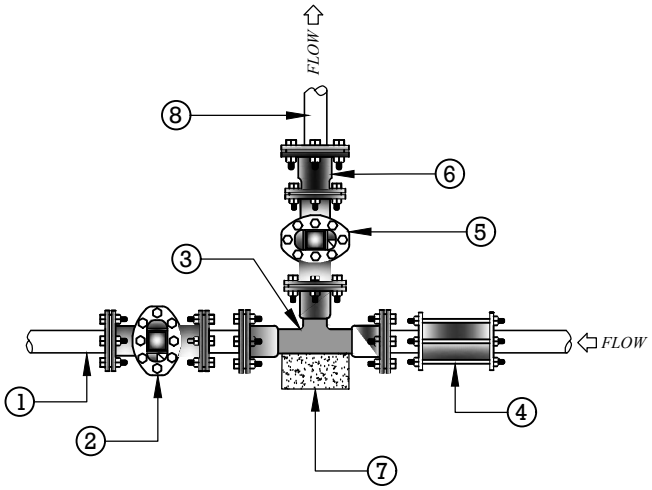


1,500 CU.M STEEL TANK
INTERCONNECTION DETAILS

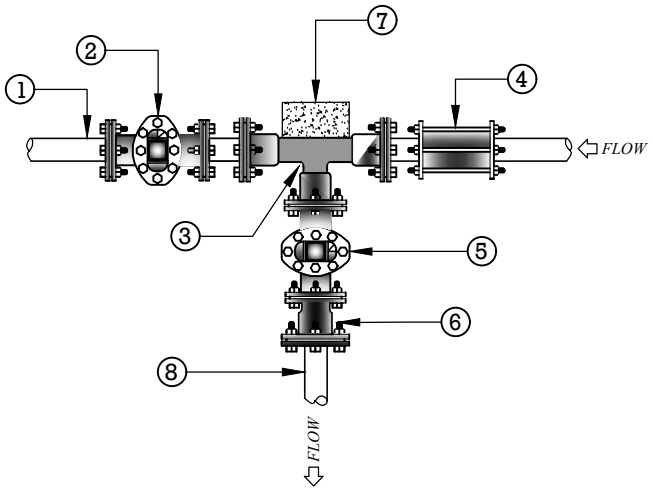
TECHNICAL STANDARD DETAILS

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		INTERCONNECTION DETAILS (RESERVOIR)	REVISIONS BY / DATE
	SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 05

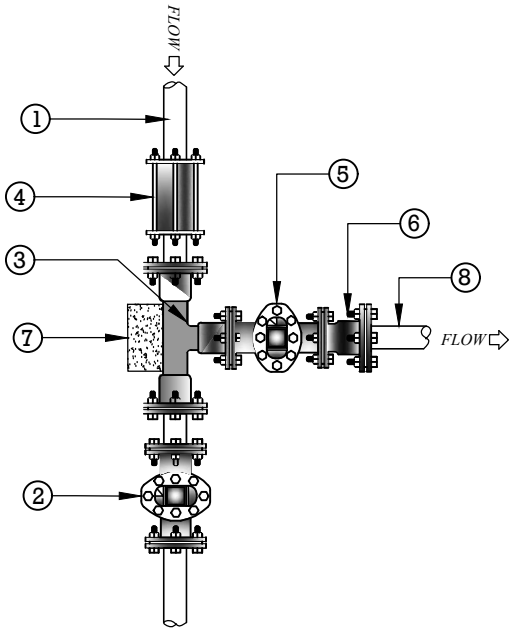
LEGEND:	
SYMBOL	*DESCRIPTION*
1	**PIPE** uPVC S-8 (Inlet)
2	**GATE VALVE** MJ/MJ
3	**TEE** MJ/F
4	**SLEEVE TYPE COUPLING**
5	**GATE VALVE** F/F
6	**ADAPTER** MJ/F
7	**CONCRETE THRUST BLOCK**
8	**PIPE** uPVC S-8 (Outlet)



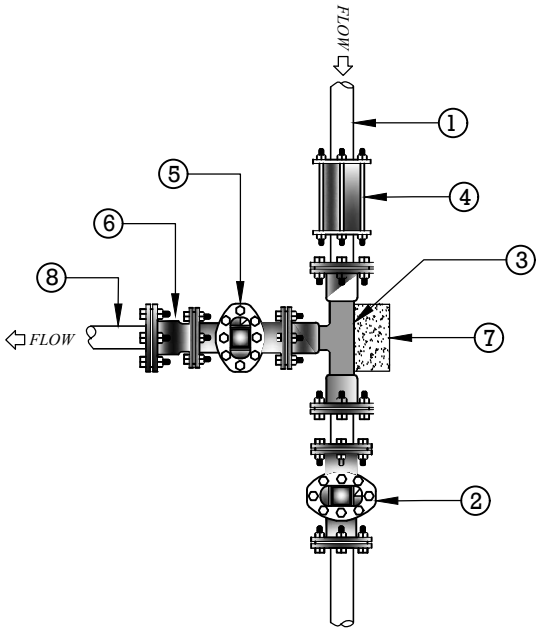
BLOW-OFF DETAIL 1



BLOW-OFF DETAIL 2



BLOW-OFF DETAIL 3



BLOW-OFF DETAIL 4

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		BLOW-OFF DETAILS	REVISIONS	
			BY	DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 01	

TECHNICAL STANDARD DETAILS

BLOW-OFF CONNECTIONS		
CONNECTION	FITTING/PIPE NO.	FITTING/PIPE SIZE
TEE 50mm x 50mm	1	50mm
	2	50mm
	4	50mm
	5	50mm
	6	50mm
	8	50mm
TEE 75mm x 75mm	1	75mm
	2	75mm
	4	75mm
	5	75mm
	6	75mm
	8	75mm
TEE 75mm x 50mm	1	75mm
	2	75mm
	4	75mm
	5	50mm
	6	50mm
	8	50mm
TEE 100mm x 100mm	1	100mm
	2	100mm
	4	100mm
	5	100mm
	6	100mm
	8	100mm
TEE 100mm x 75mm	1	100mm
	2	100mm
	4	100mm
	5	75mm
	6	75mm
	8	75mm
TEE 100mm x 50mm	1	100mm
	2	100mm
	4	100mm
	5	50mm
	6	50mm
	8	50mm
TEE 150mm x 150mm	1	150mm
	2	150mm
	4	150mm
	5	150mm
	6	150mm
	8	150mm

BLOW-OFF CONNECTIONS		
CONNECTION	FITTING/PIPE NO.	FITTING/PIPE SIZE
TEE 150mm x 100mm	1	150mm
	2	150mm
	4	150mm
	5	100mm
	6	100mm
	8	100mm
TEE 150mm x 75mm	1	150mm
	2	150mm
	4	150mm
	5	75mm
	6	75mm
	8	75mm
TEE 150mm x 50mm	1	150mm
	2	150mm
	4	150mm
	5	50mm
	6	50mm
	8	50mm
TEE 200mm x 200mm	1	200mm
	2	200mm
	4	200mm
	5	200mm
	6	200mm
	8	200mm
TEE 200mm x 150mm	1	200mm
	2	200mm
	4	200mm
	5	150mm
	6	150mm
	8	150mm
TEE 200mm x 100mm	1	200mm
	2	200mm
	4	200mm
	5	100mm
	6	100mm
	8	100mm
TEE 200mm x 75mm	1	200mm
	2	200mm
	4	200mm
	5	75mm
	6	75mm
	8	75mm

BLOW-OFF CONNECTIONS		
CONNECTION	FITTING/PIPE NO.	FITTING/PIPE SIZE
TEE 200mm x 50mm	1	200mm
	2	200mm
	4	200mm
	5	50mm
	6	50mm
	8	50mm
TEE 250mm x 250mm	1	250mm
	2	250mm
	4	250mm
	5	250mm
	6	250mm
	8	250mm
TEE 250mm x 200mm	1	250mm
	2	250mm
	4	250mm
	5	200mm
	6	200mm
	8	200mm
TEE 250mm x 150mm	1	250mm
	2	250mm
	4	250mm
	5	150mm
	6	150mm
	8	150mm
TEE 250mm x 100mm	1	250mm
	2	250mm
	4	250mm
	5	100mm
	6	100mm
	8	100mm
TEE 250mm x 75mm	1	250mm
	2	250mm
	4	250mm
	5	75mm
	6	75mm
	8	75mm
TEE 250mm x 50mm	1	250mm
	2	250mm
	4	250mm
	5	50mm
	6	50mm
	8	50mm

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

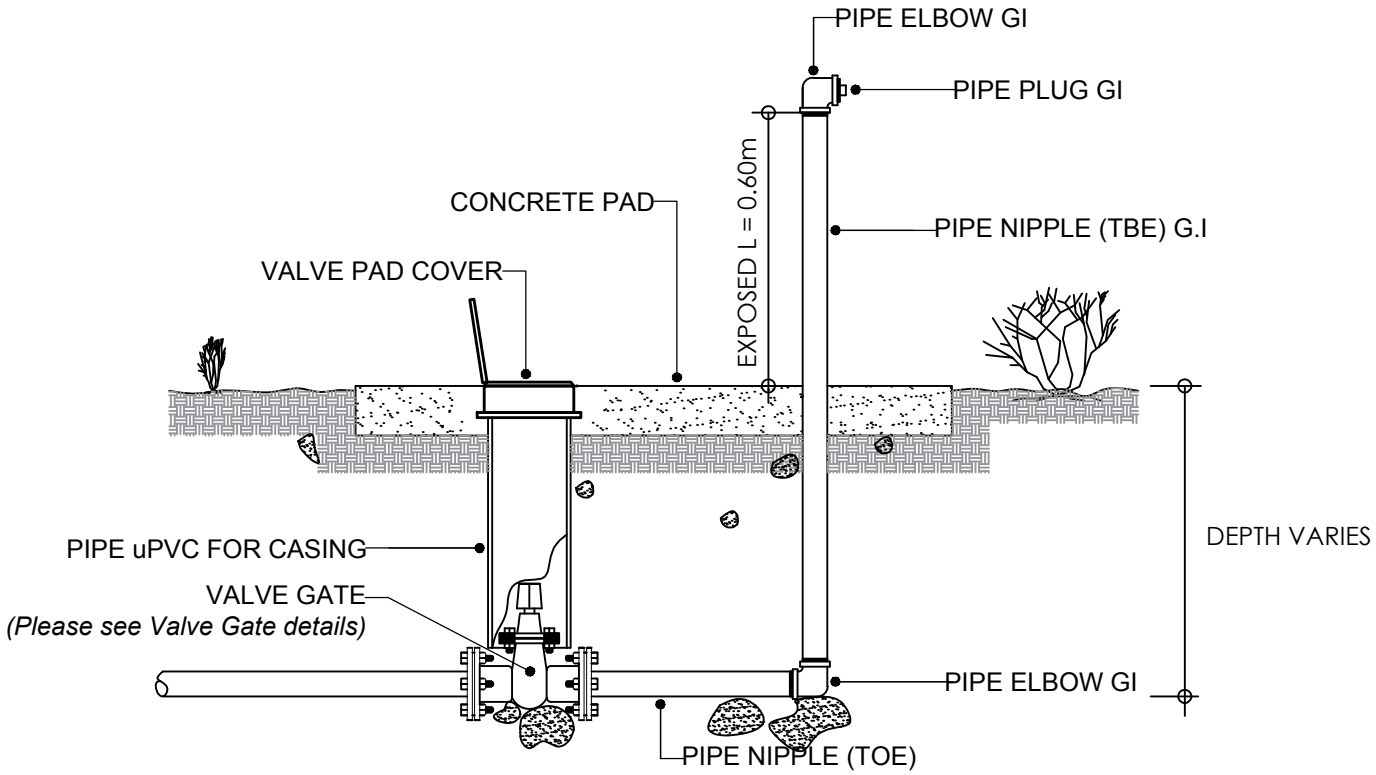
DATE: JANUARY 2021

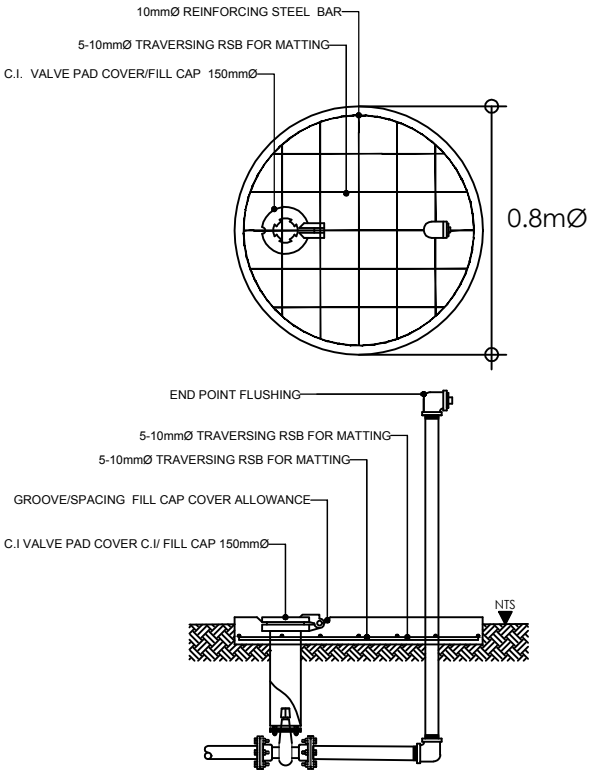
BLOW-OFF DETAILS

DWG. NO.: 02

REVISIONS

BY	DATE





CONCRETE PAD DETAIL
(SINGLE VALVE W/ END-POINT FLUSHING)

SPECIFICATION:

STANDARD CONCRETE PAD WITH DIMENSIONS OF 0.80MØ X 0.15M THK

USE 150mmØ uPVC PIPE FOR CASING

SIZES OF FITTINGS (ELBOWS, PLUGS, NIPPLES) SHOULD BE THE SAME WITH THE DESIGNED PIPE SIZE

NOTE:

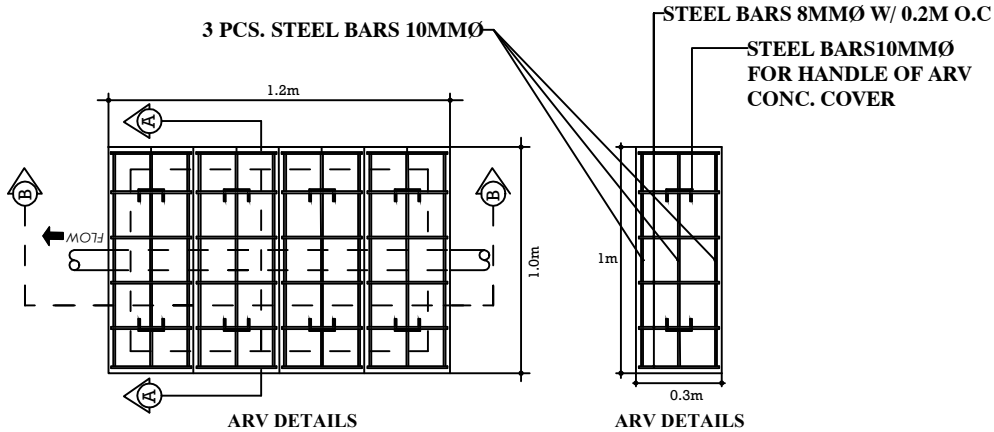
MINIMUM GAP BETWEEN FITTINGS MUST BE A MINIMUM OF 0.4 METERS

ALL FITTINGS MUST CONFORM TO THE STANDARD SET BY MKWD

PIPE SIZE (mm)	DEPTH OF EPF (m)
50	0.6
75	0.8
100	0.9
150	1.0
200	1.2
250	1.4
300	1.6

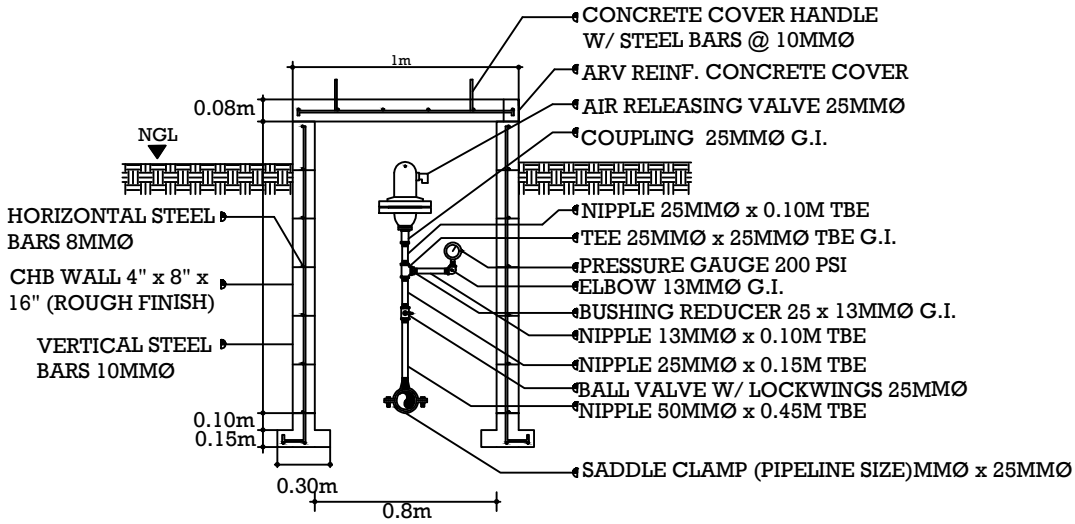
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		END POINT FLUSHING DETAILS	REVISIONS
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 01

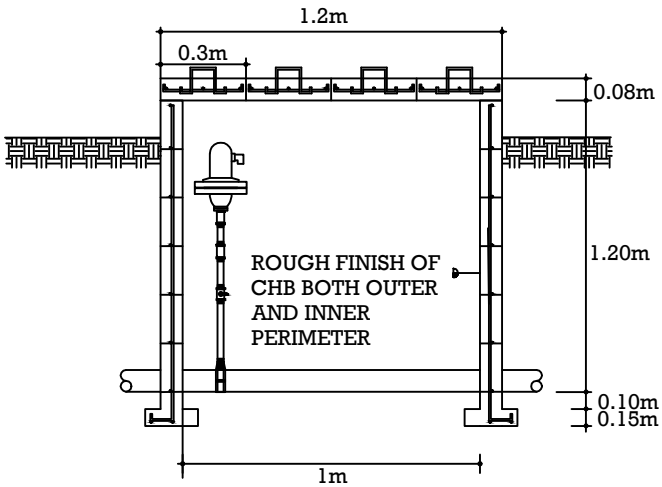


ARV DETAILS
(TOP VIEW)

ARV DETAILS
(ARV BOX COVER)



ARV DETAILS
(CROSS SECTION A-A)

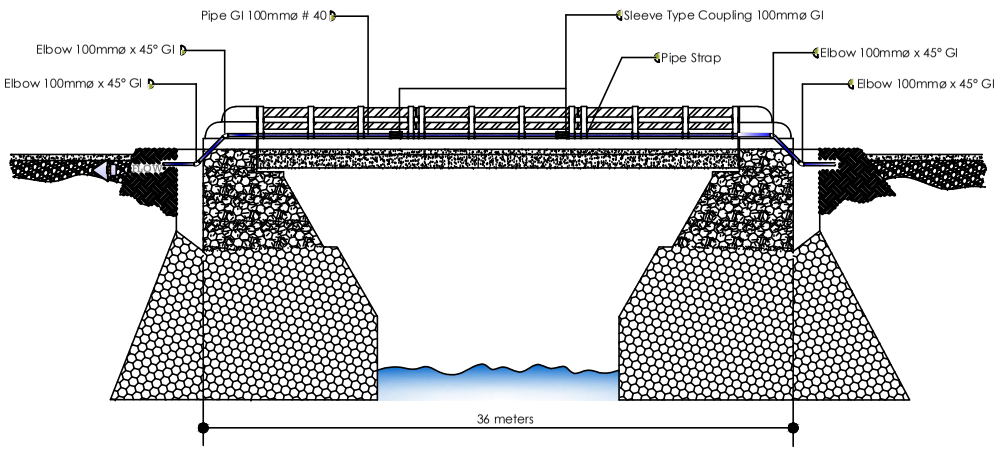


ARV DETAILS
(CROSS SECTION B-B)

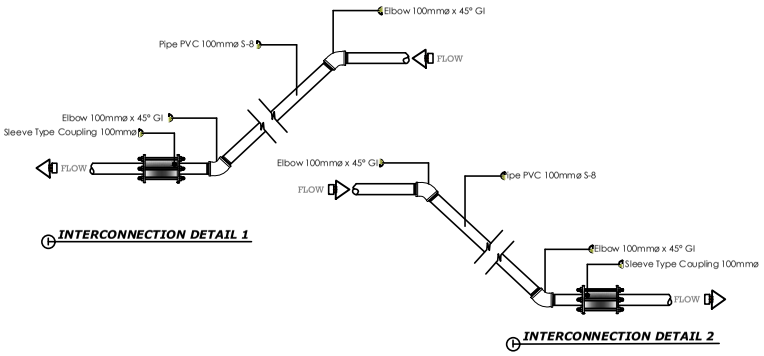
TECHNICAL STANDARD DETAILS

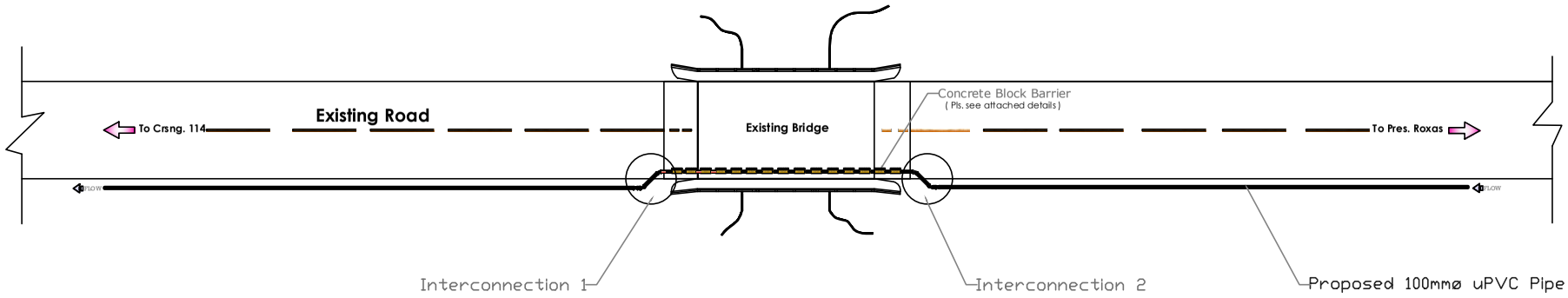
PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		AIR RELEASE VALVE DETAILS	REVISIONS	
			BY	DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 01	

TECHNICAL STANDARD DETAILS



Pipe Bridge Lay-out Plan





PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

DATE: JANUARY 2021

PIPE BRIDGE CROSSING
LAYOUT DETAILS

DWG. NO.: 01

REVISIONS					
DATE					
BY					

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

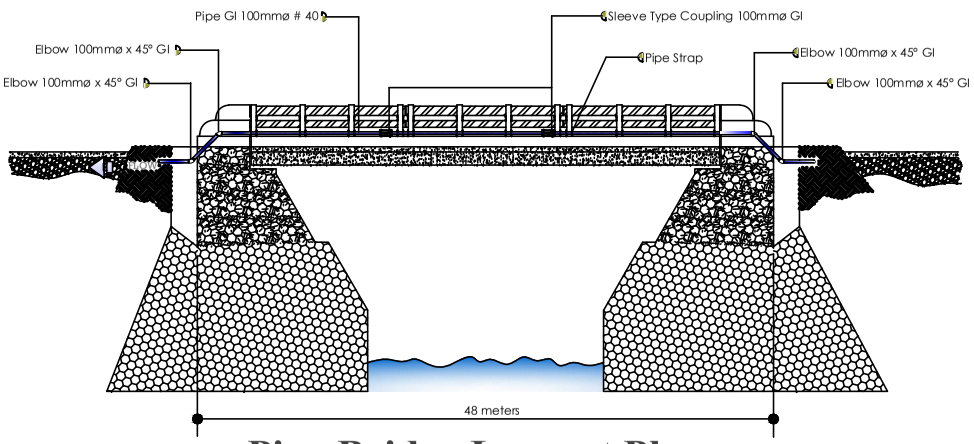
DATE: JANUARY 2021

PIPE BRIDGE CROSSING
LAYOUT DETAILS

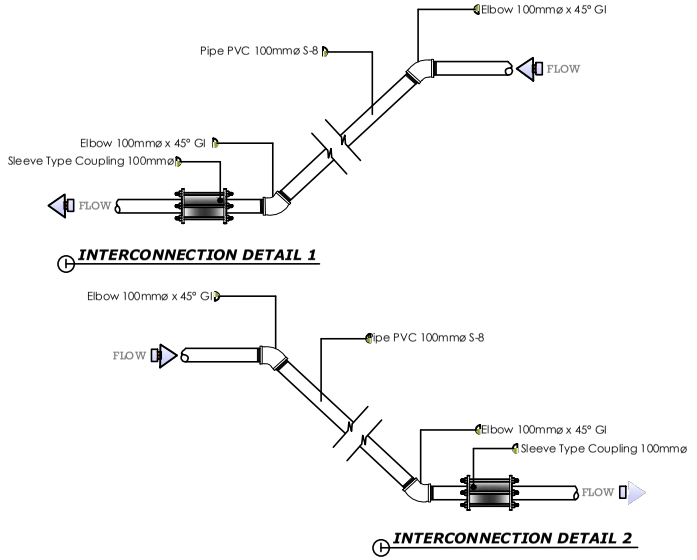
DWG. NO.: 02

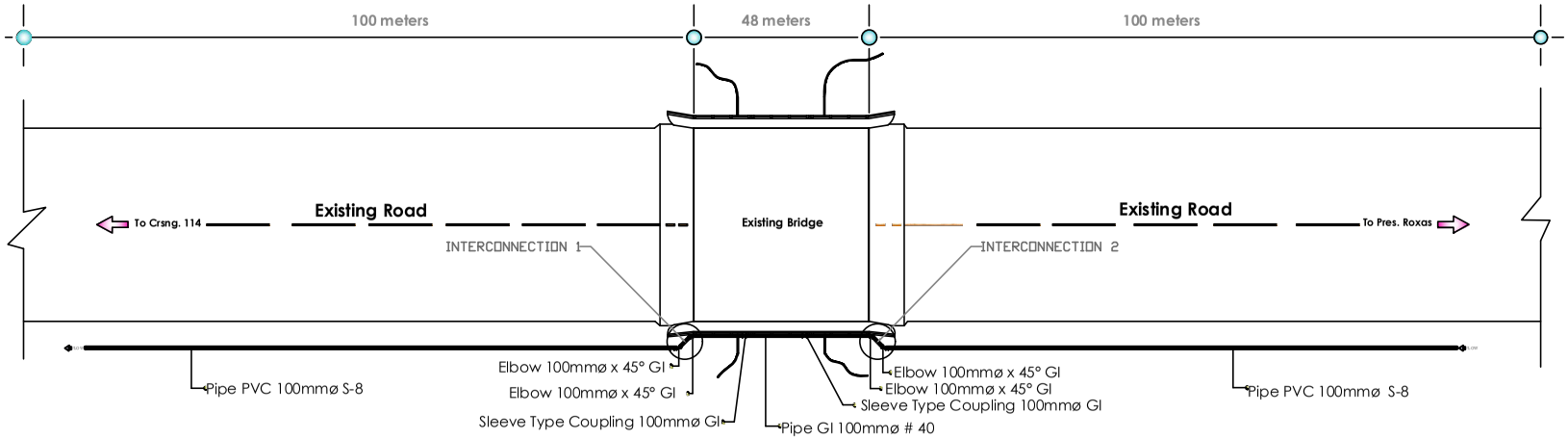
REVISIONS

BY	DATE



Pipe Bridge Lay-out Plan





TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

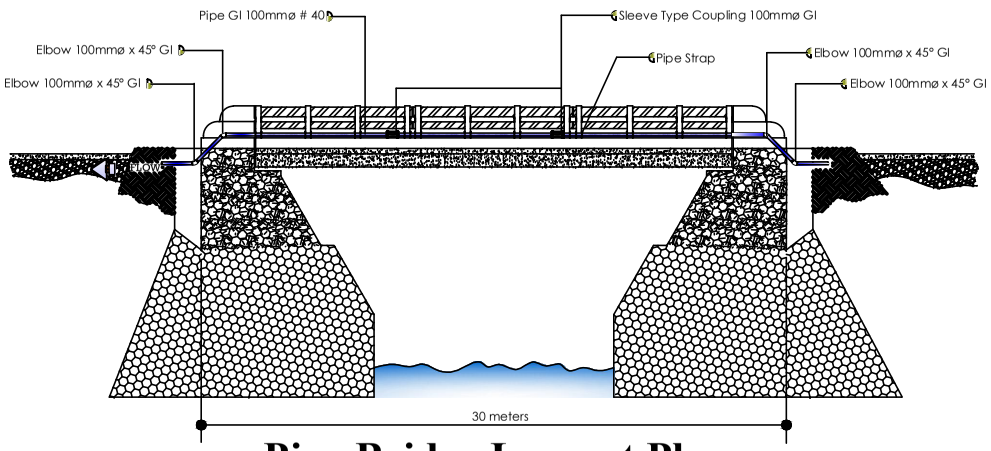
DATE: JANUARY 2021

PIPE BRIDGE CROSSING
LAYOUT DETAILS

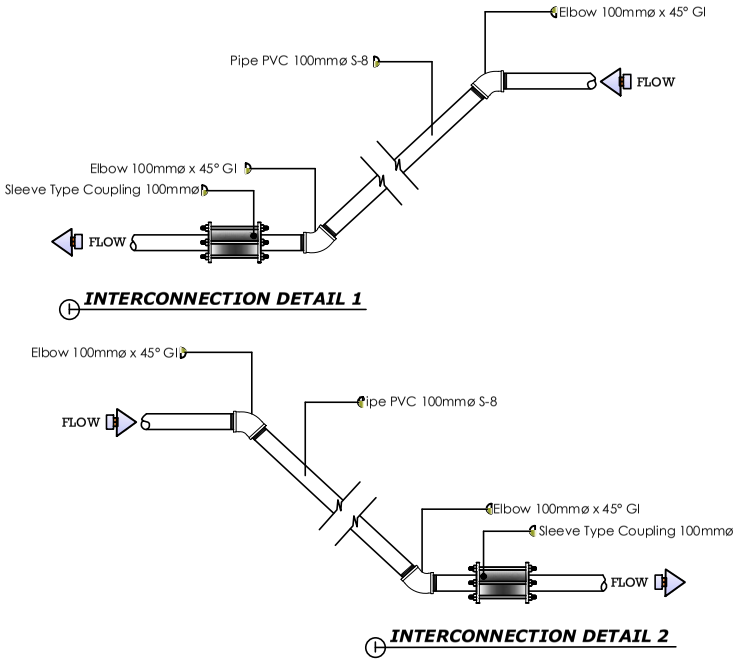
DWG. NO.: 03

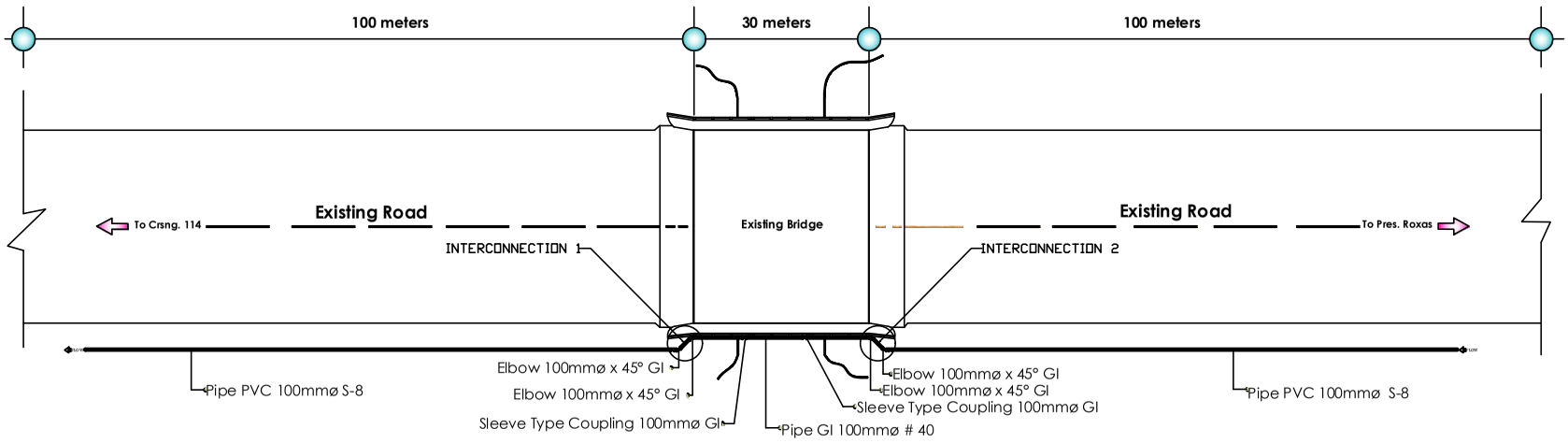
REVISIONS

BY	DATE



Pipe Bridge Lay-out Plan





TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

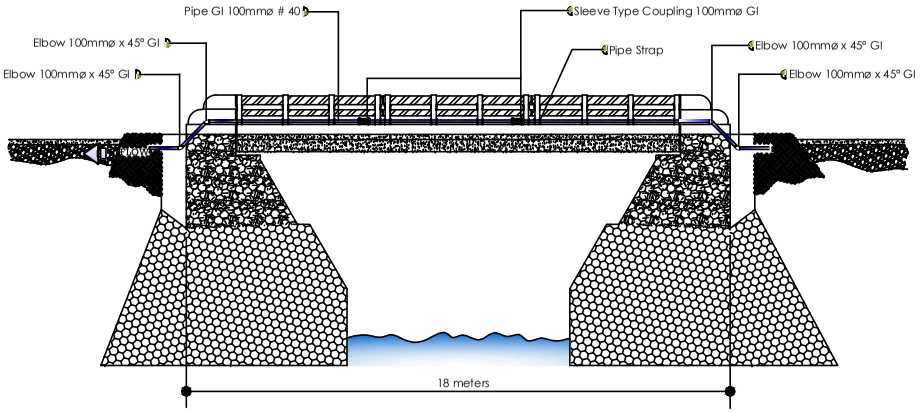
DATE: JANUARY 2021

PIPE BRIDGE CROSSING
LAYOUT DETAILS

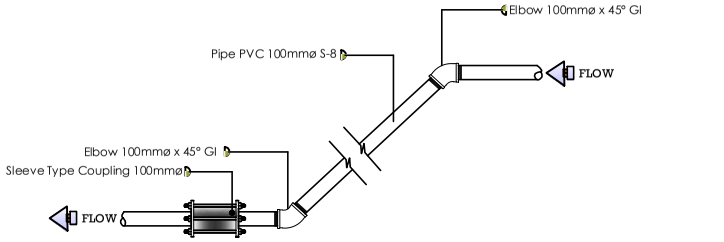
DWG. NO.: 04

REVISIONS

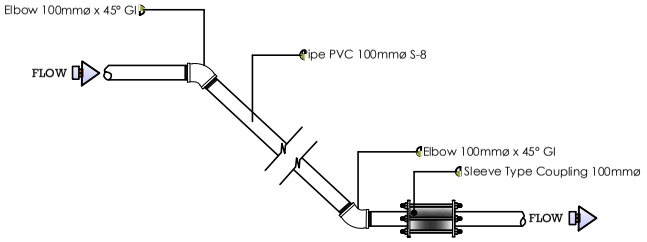
BY	DATE



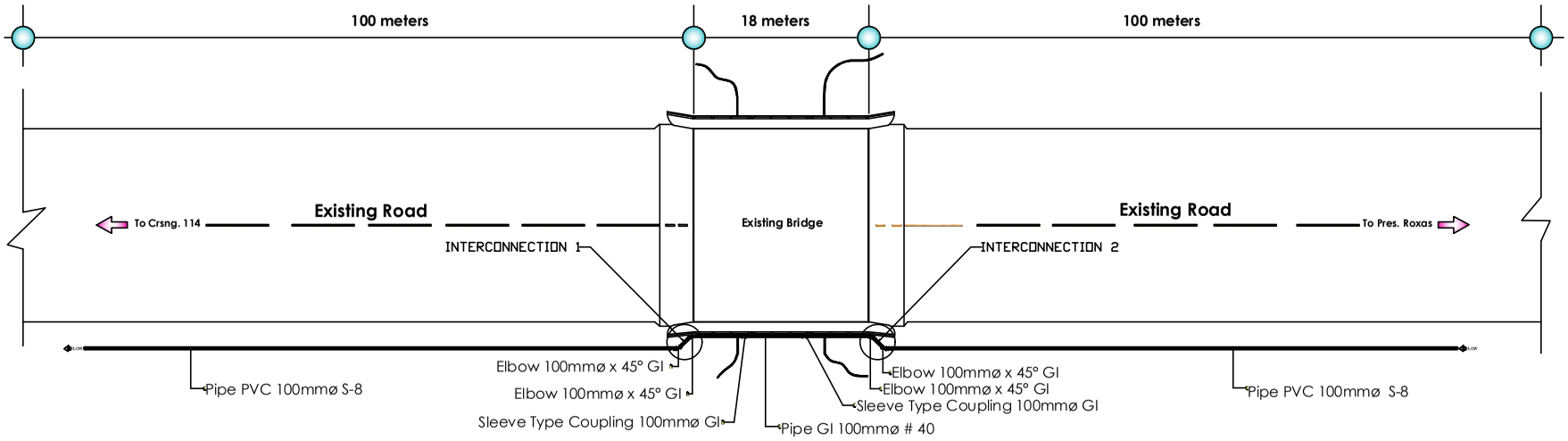
Pipe Bridge Lay-out Plan



INTERCONNECTION DETAIL 1



INTERCONNECTION DETAIL 2



TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

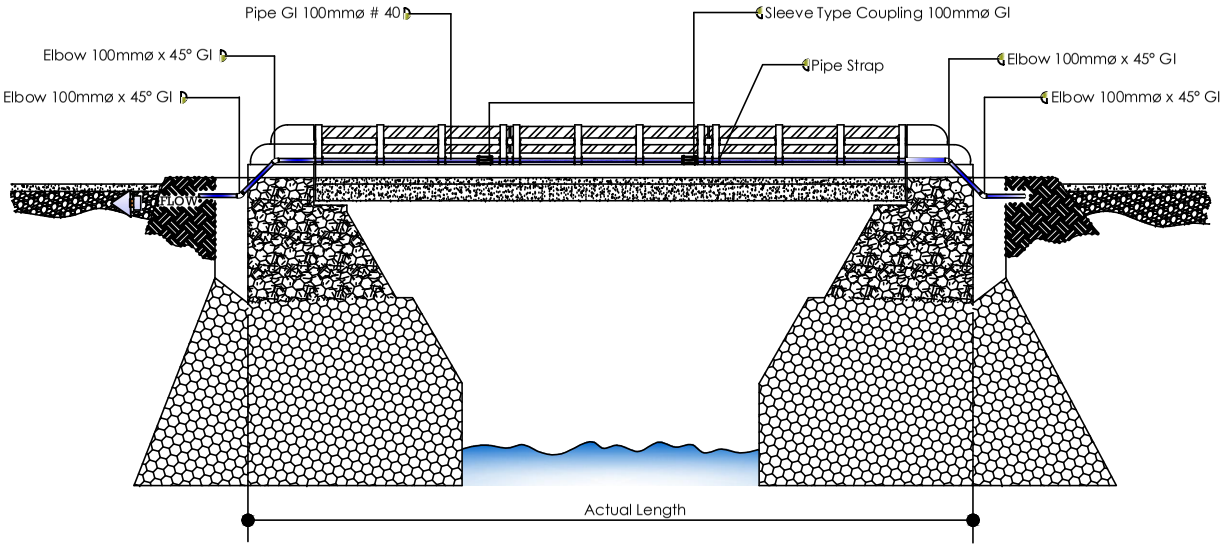
DATE: JANUARY 2021

PIPE BRIDGE CROSSING
LAYOUT DETAILS

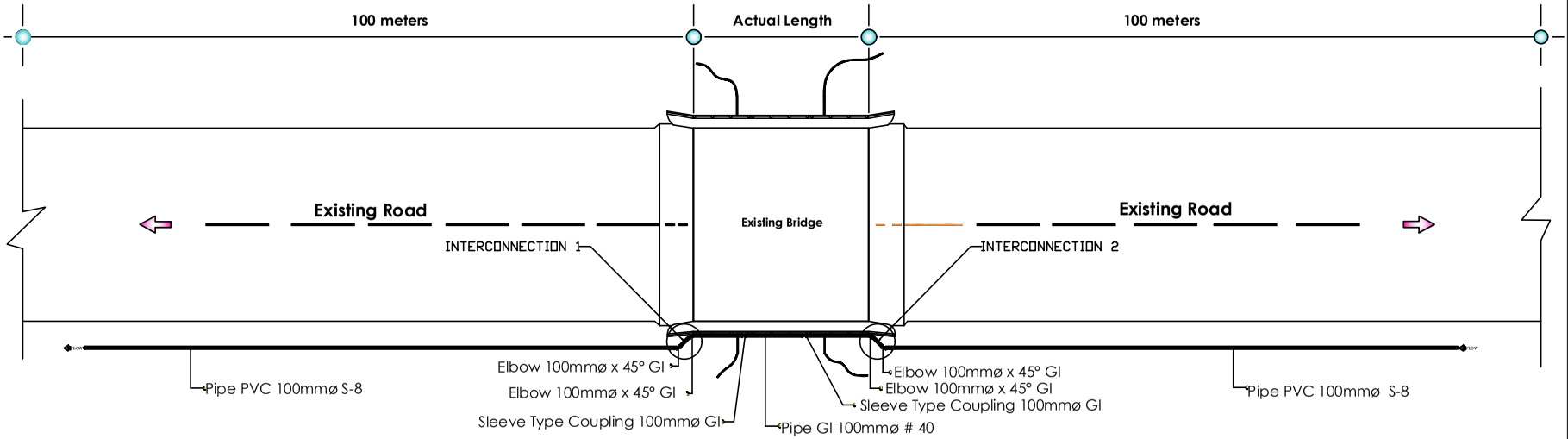
DWG. NO.: 05

REVISIONS

BY	DATE



Pipe Bridge Lay-out Plan



TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

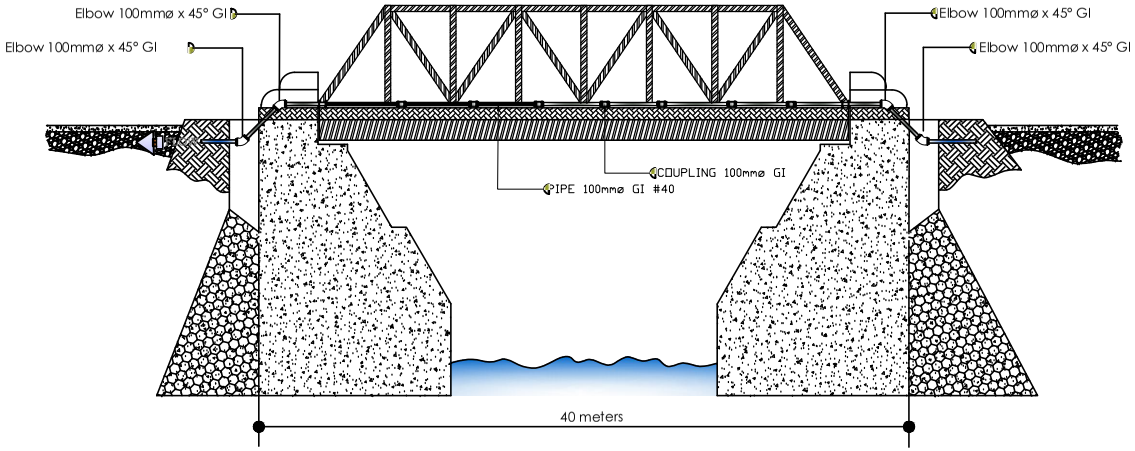
DATE: JANUARY 2021

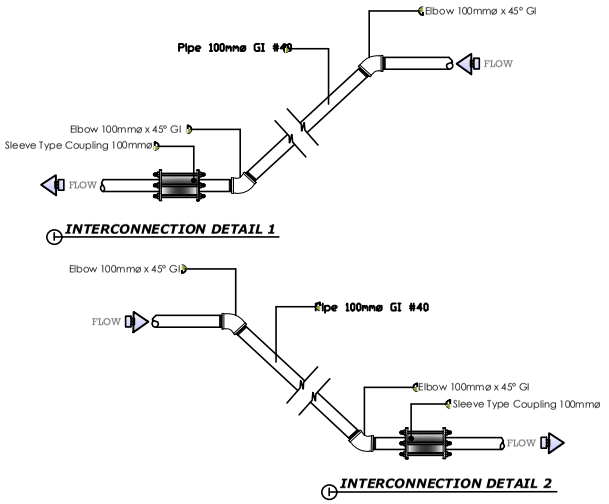
PIPE BRIDGE CROSSING
LAYOUT DETAILS

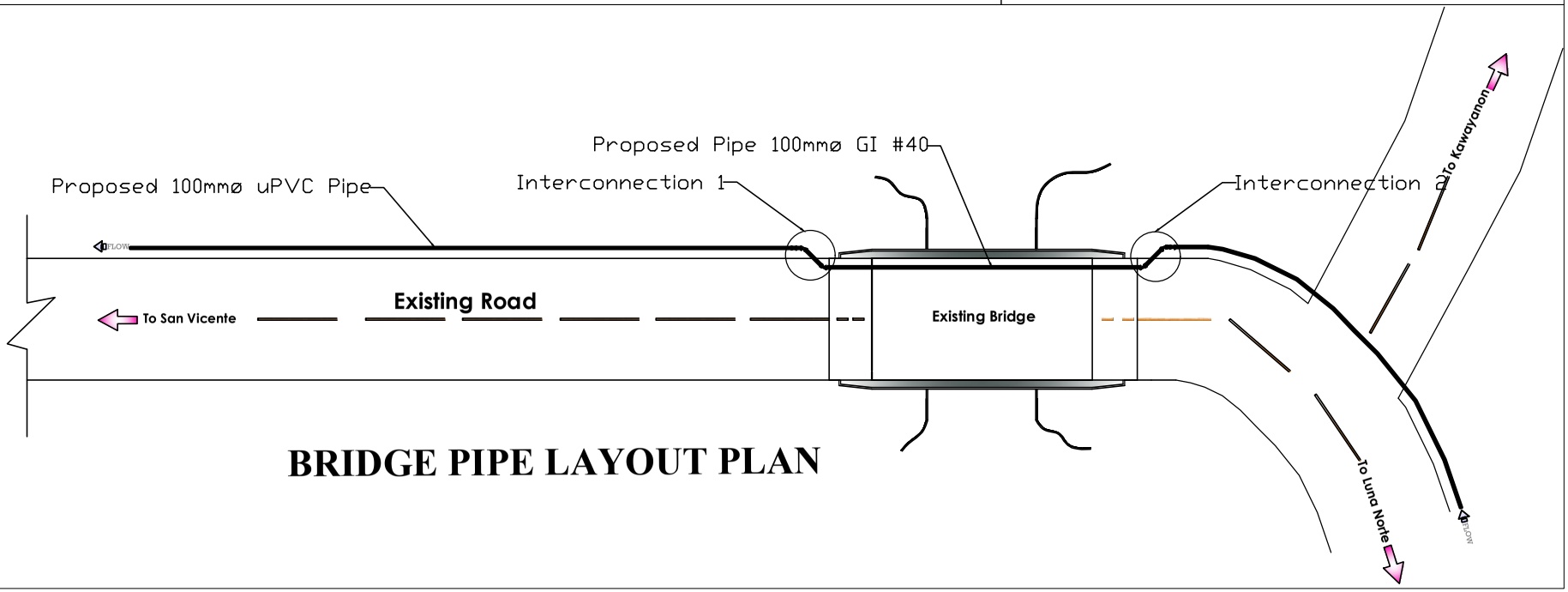
DWG. NO.: 06

REVISIONS

BY	DATE







BRIDGE PIPE LAYOUT PLAN

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

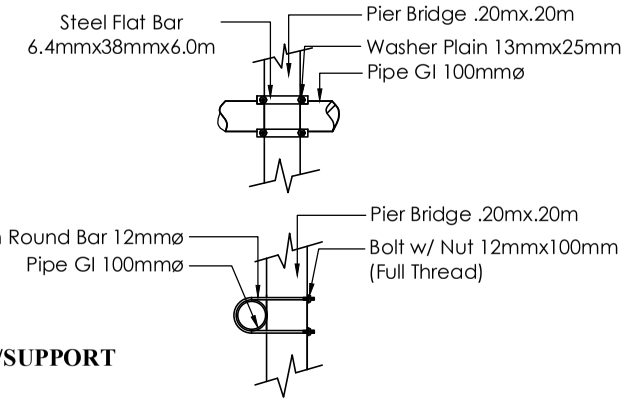
DATE: JANUARY 2021

PIPE BRIDGE CROSSING
LAYOUT DETAILS

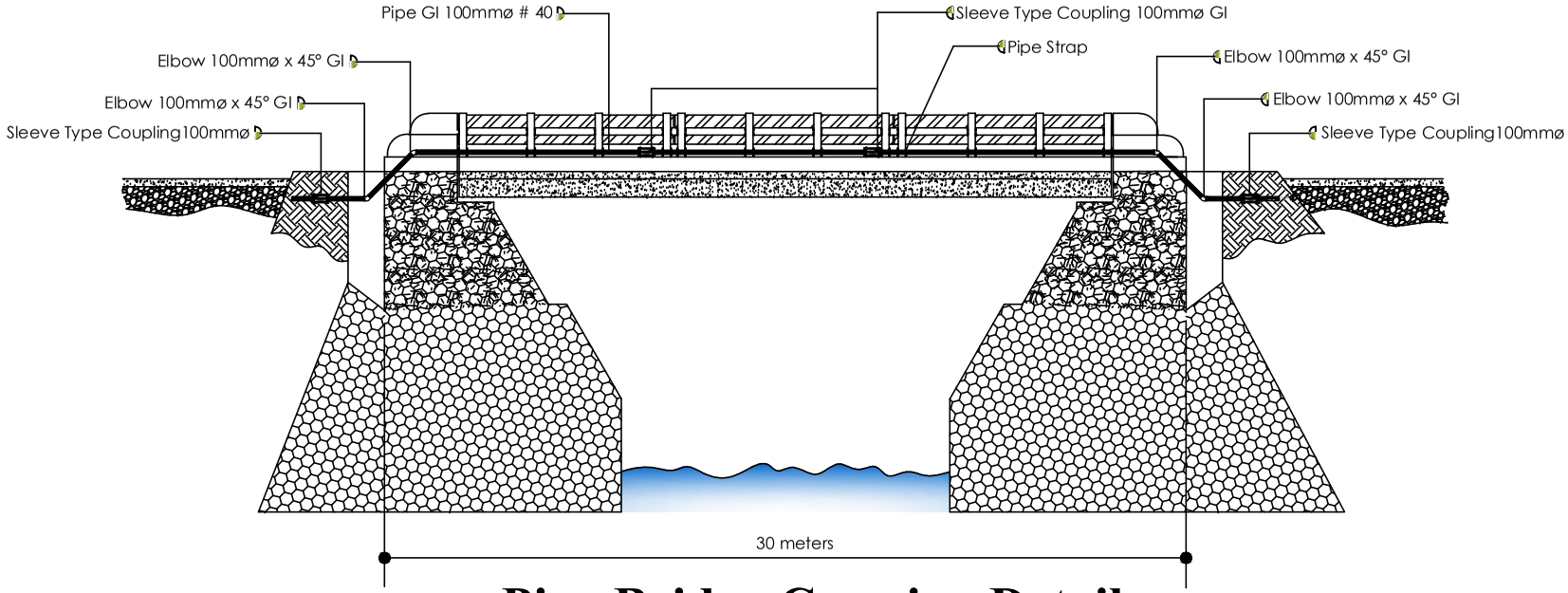
DWG. NO.: 07

REVISIONS

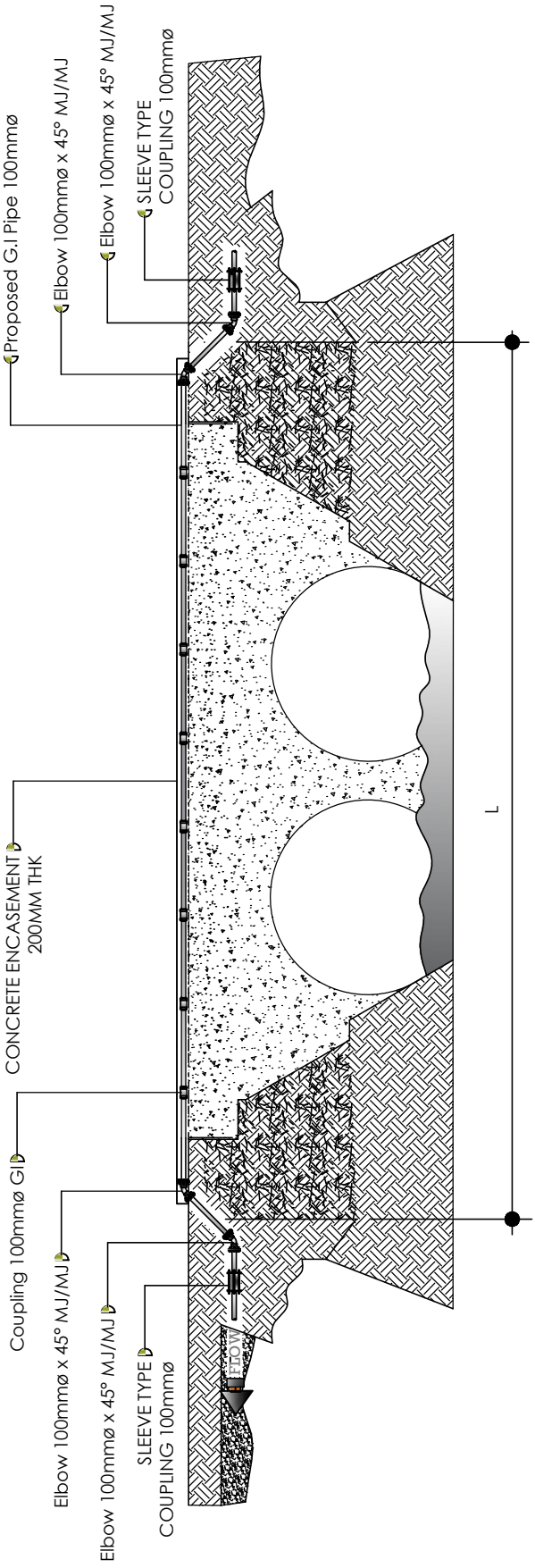
BY	DATE



PIPE STEEL STRAP/SUPPORT DETAILS



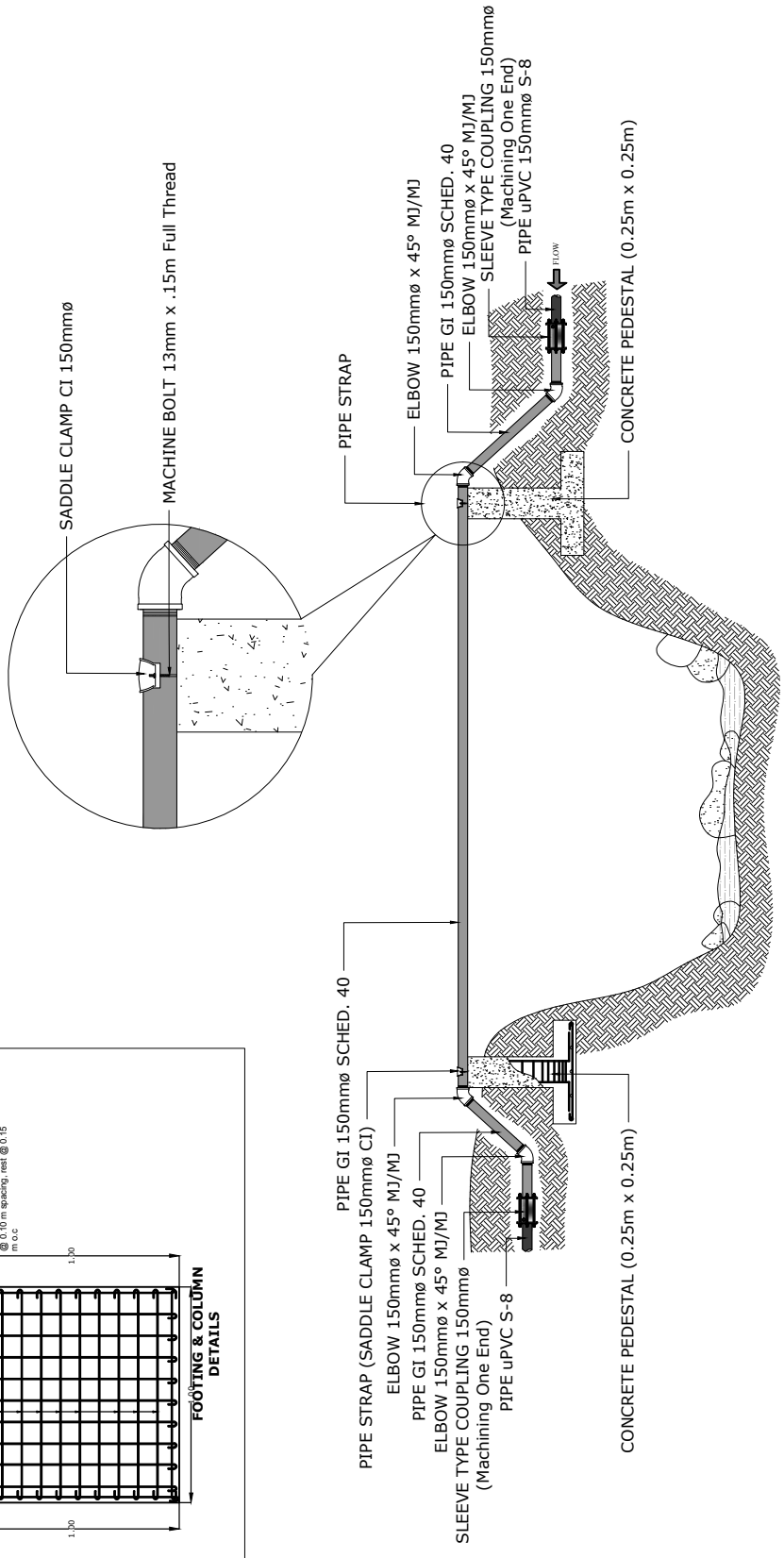
Pipe Bridge Crossing Details

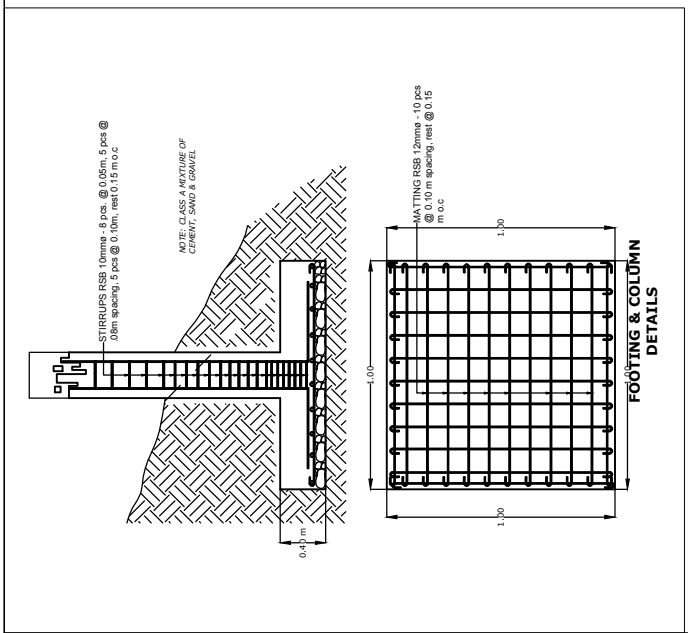


Pipe Creek Lay-out Plan

TECHNICAL STANDARD DETAILS

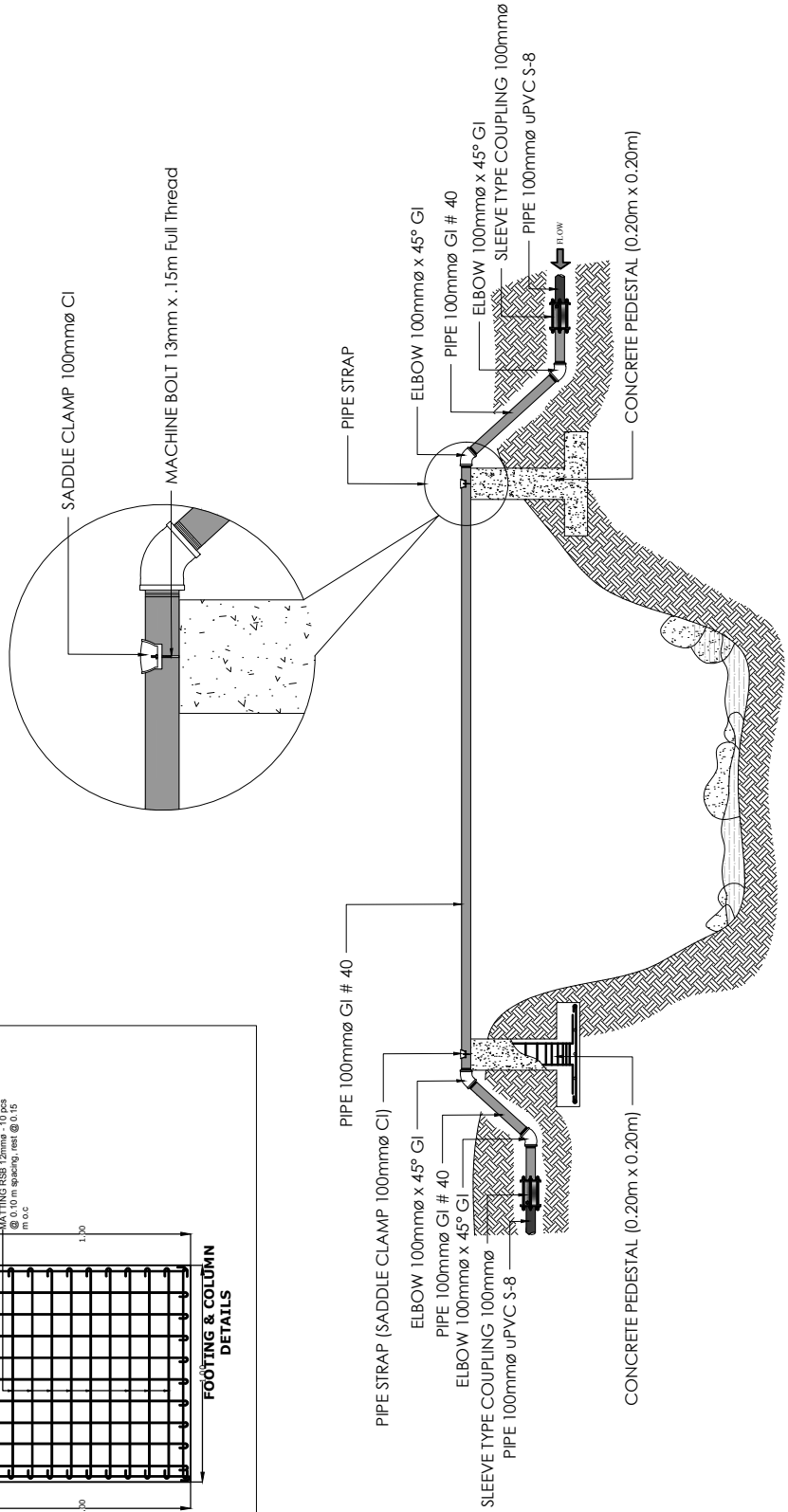
PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PIPE CREEK LAYOUT DETAILS		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 01	

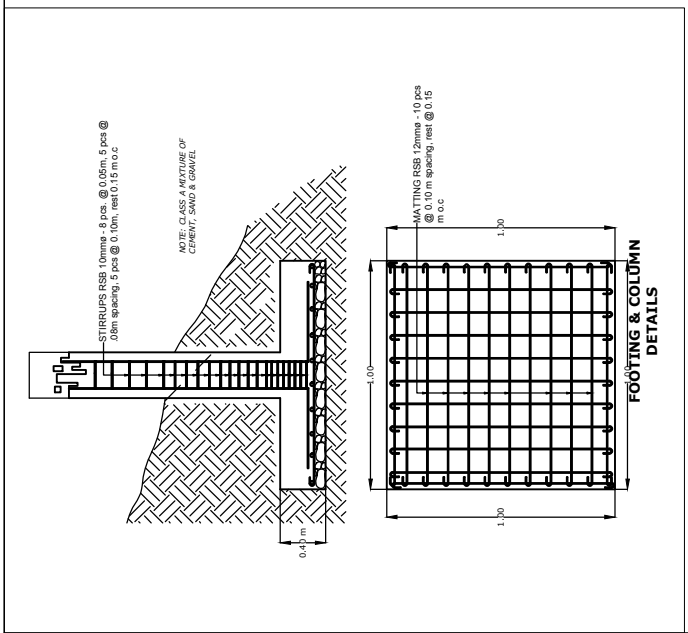




TECHNICAL STANDARD DETAILS

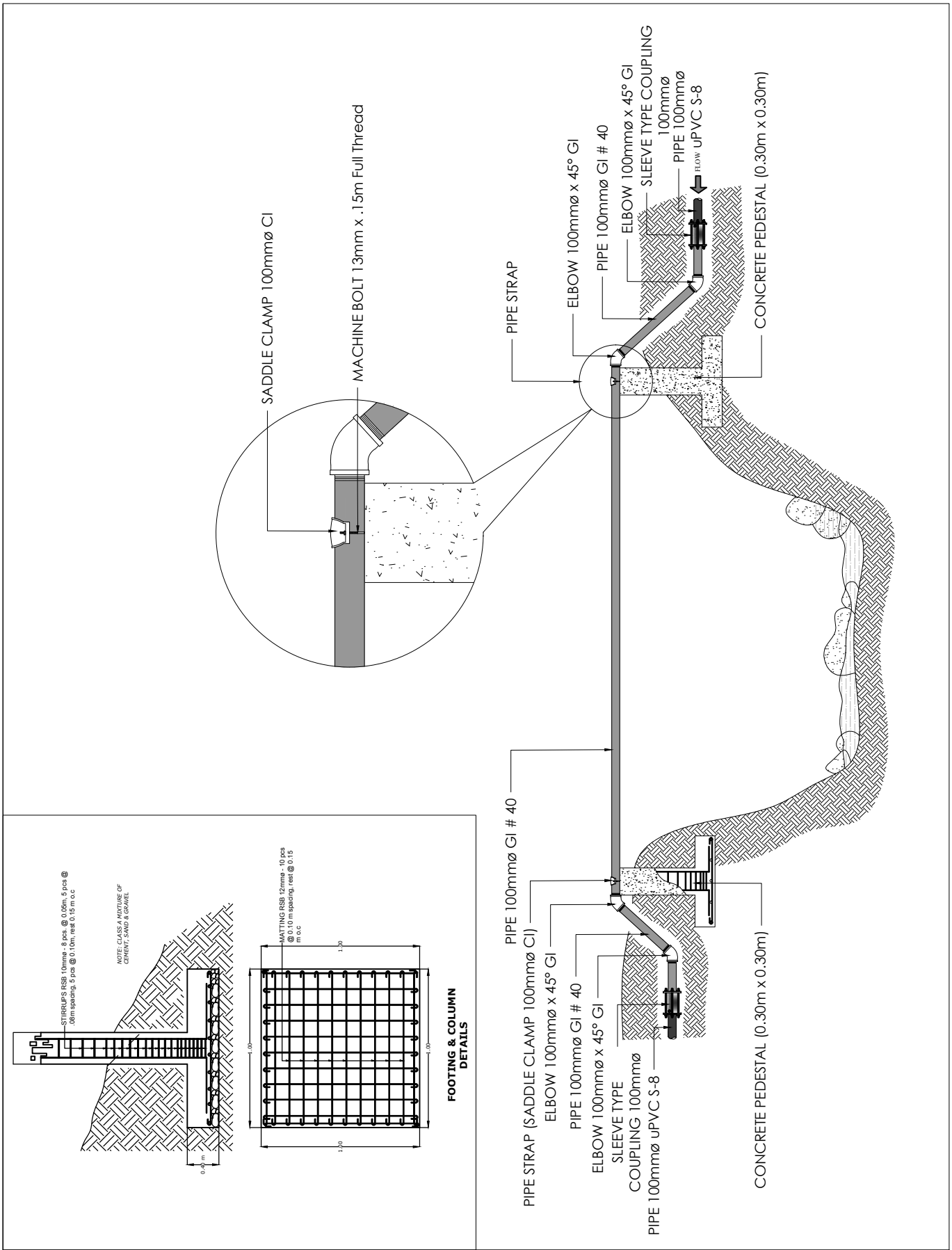
PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PIPE CREEK CROSSING DETAILS		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 02	





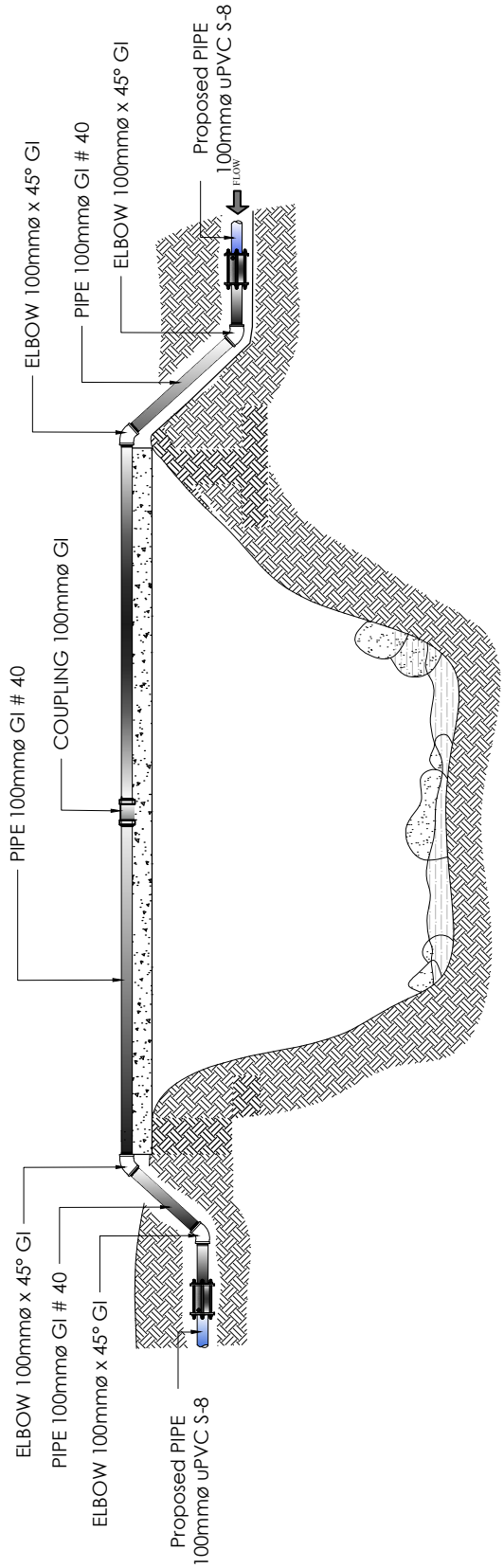
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PIPE CREEK CROSSING DETAILS		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 03	



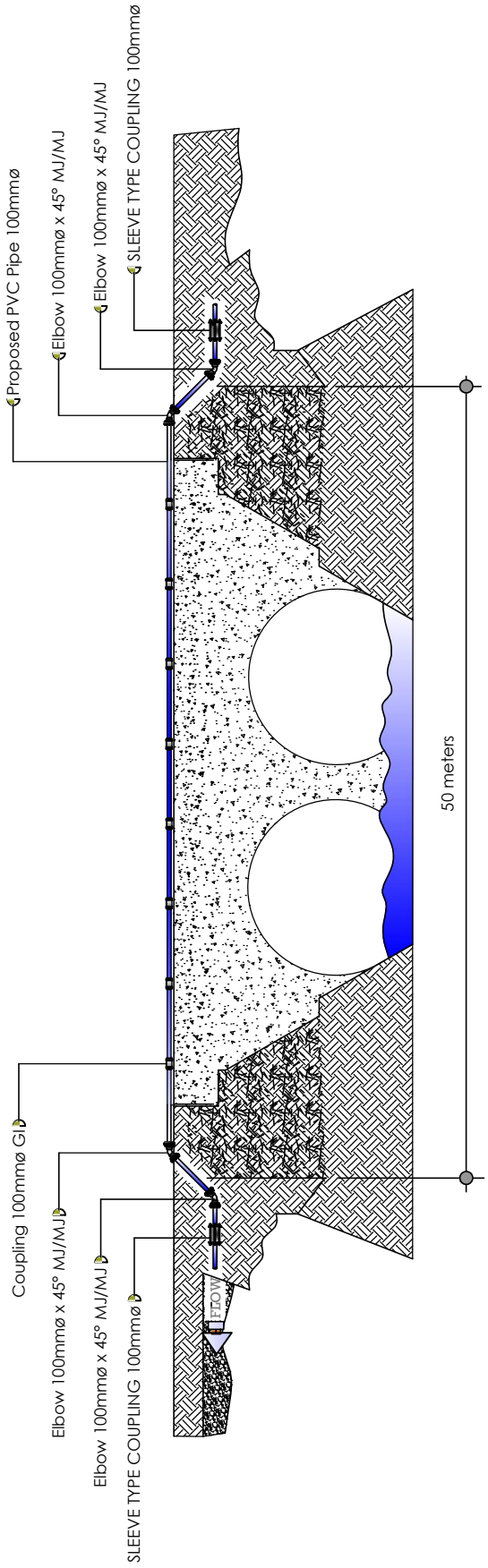
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PIPE CREEK CROSSING DETAILS		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 04	



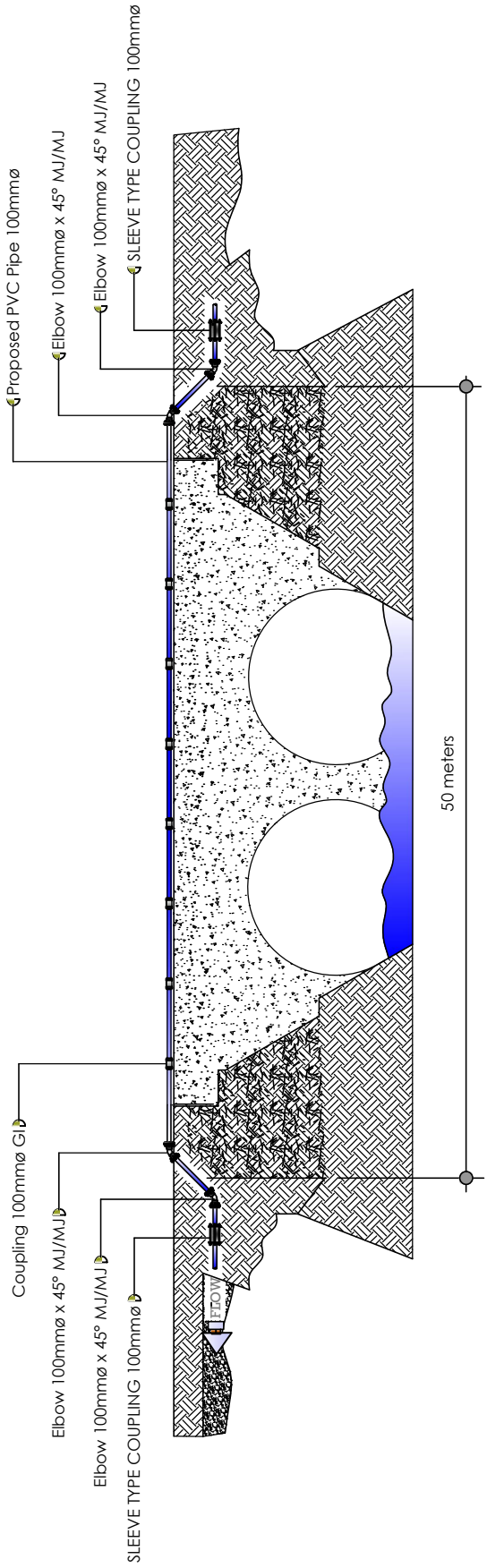
TECHNICAL STANDARD DETAILS

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PIPE CREEK CROSSING DETAILS	REVISIONS BY / DATE
	SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 05



TECHNICAL STANDARD DETAILS

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PIPE CREEK CROSSING DETAILS	REVISIONS BY / DATE
	SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 06



TECHNICAL STANDARD DETAILS

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PIPE CREEK CROSSING DETAILS	REVISIONS BY / DATE
	SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 07

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

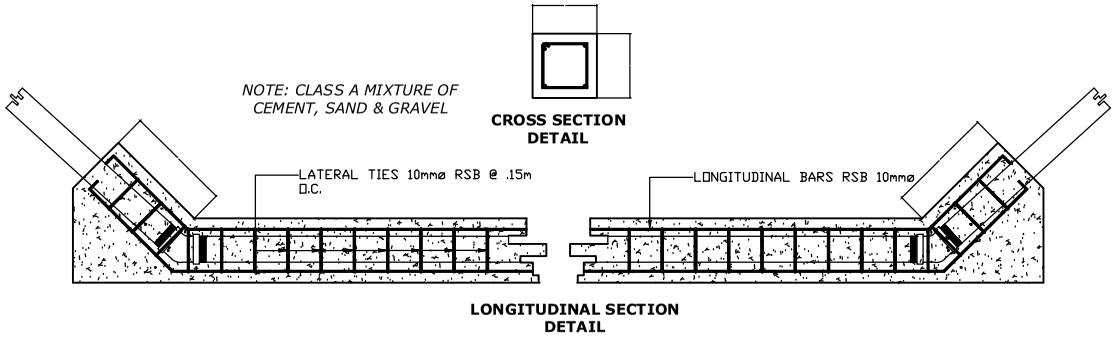
DATE: JANUARY 2021

PIPE RIVER
LAYOUT DETAILS

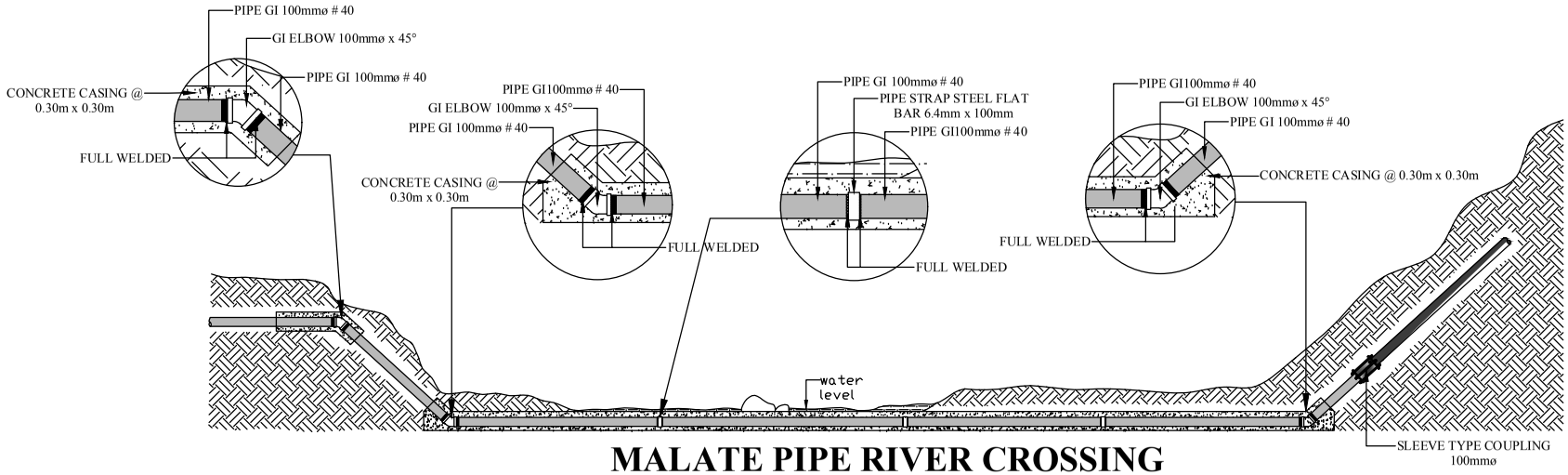
DWG. NO.: 01

REVISIONS

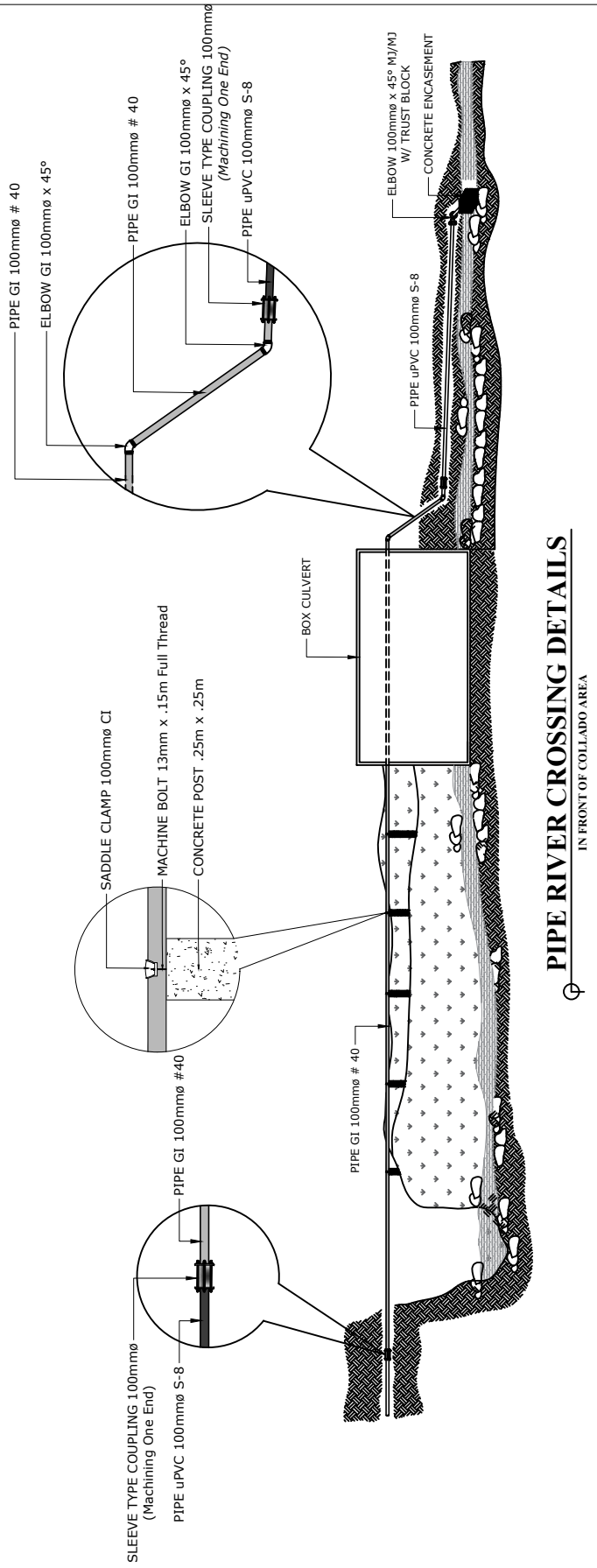
BY	DATE



CONCRETE CASING DETAILS



MALATE PIPE RIVER CROSSING DETAIL



TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PIPE RIVER LAYOUT DETAILS		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 02	

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

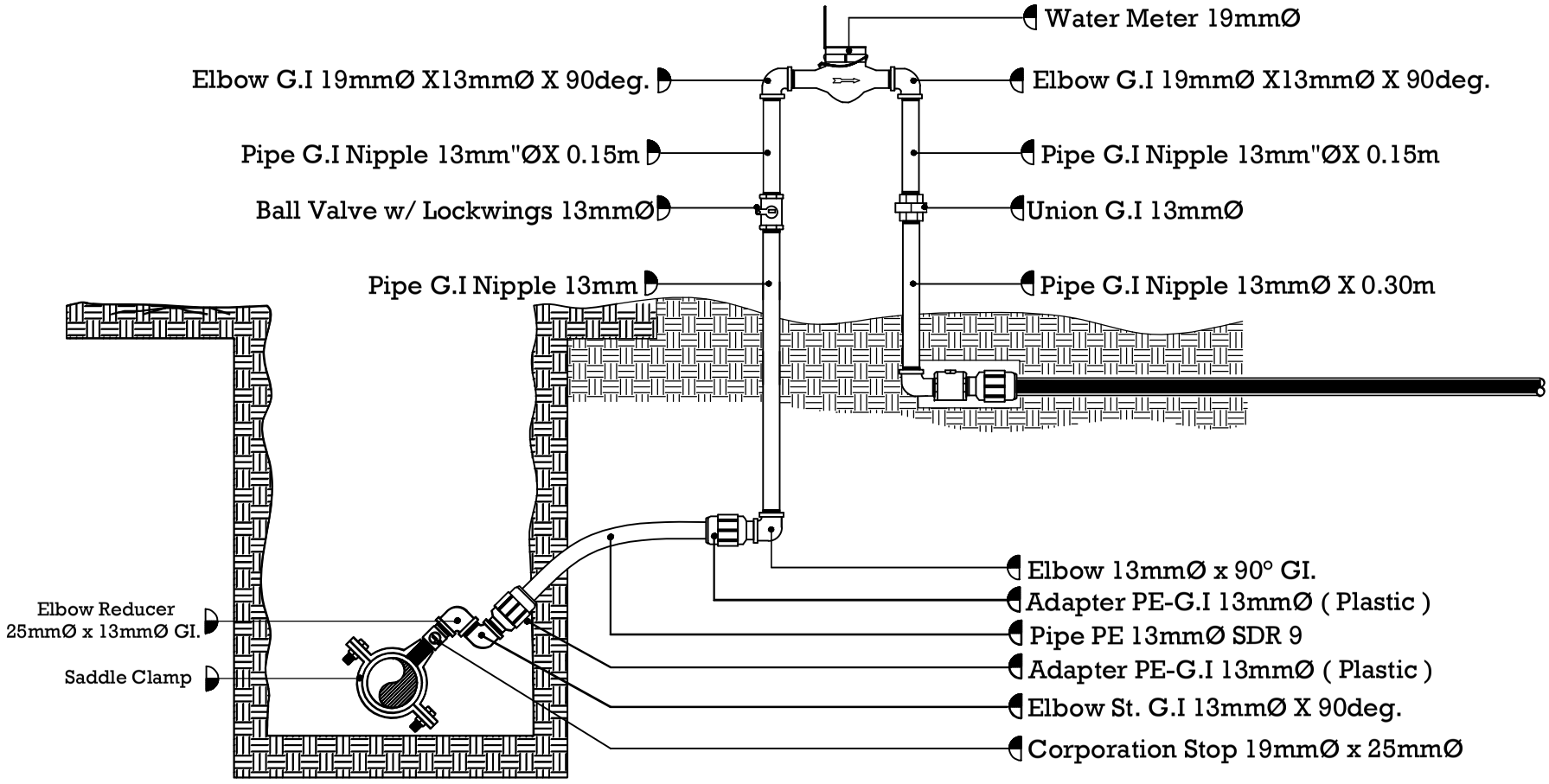
BY: DESIGN UNIT

STANDARD VERTICAL OUTLET

DATE: JANUARY 2021

DWG. NO.: 01

REVISIONS		
DATE	BY	



STANDARD INDIVIDUAL CONNECTION

13mmø

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

BY: DESIGN UNIT

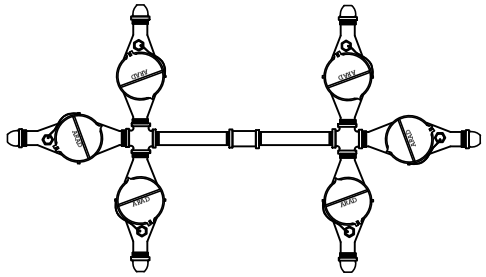
DATE: JANUARY 2021

STANDARD VERTICAL OUTLET

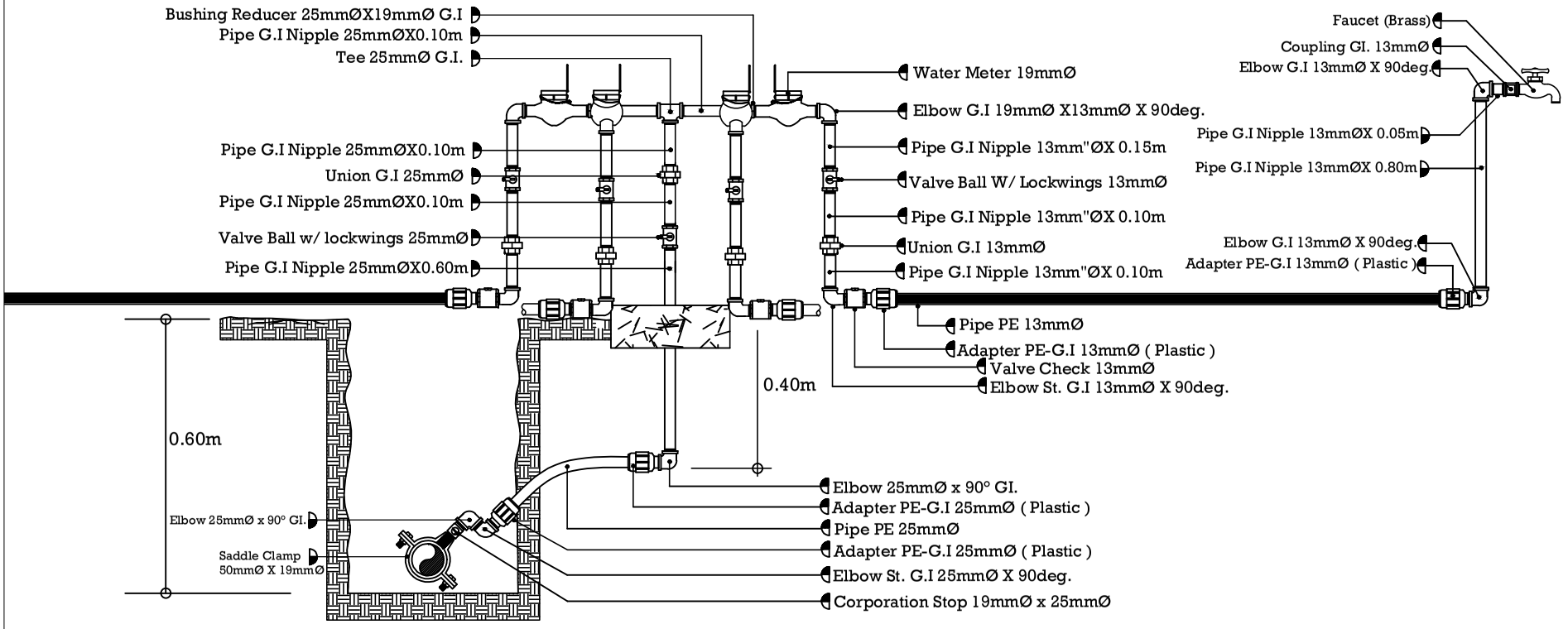
DWG. NO.: 02

REVISIONS

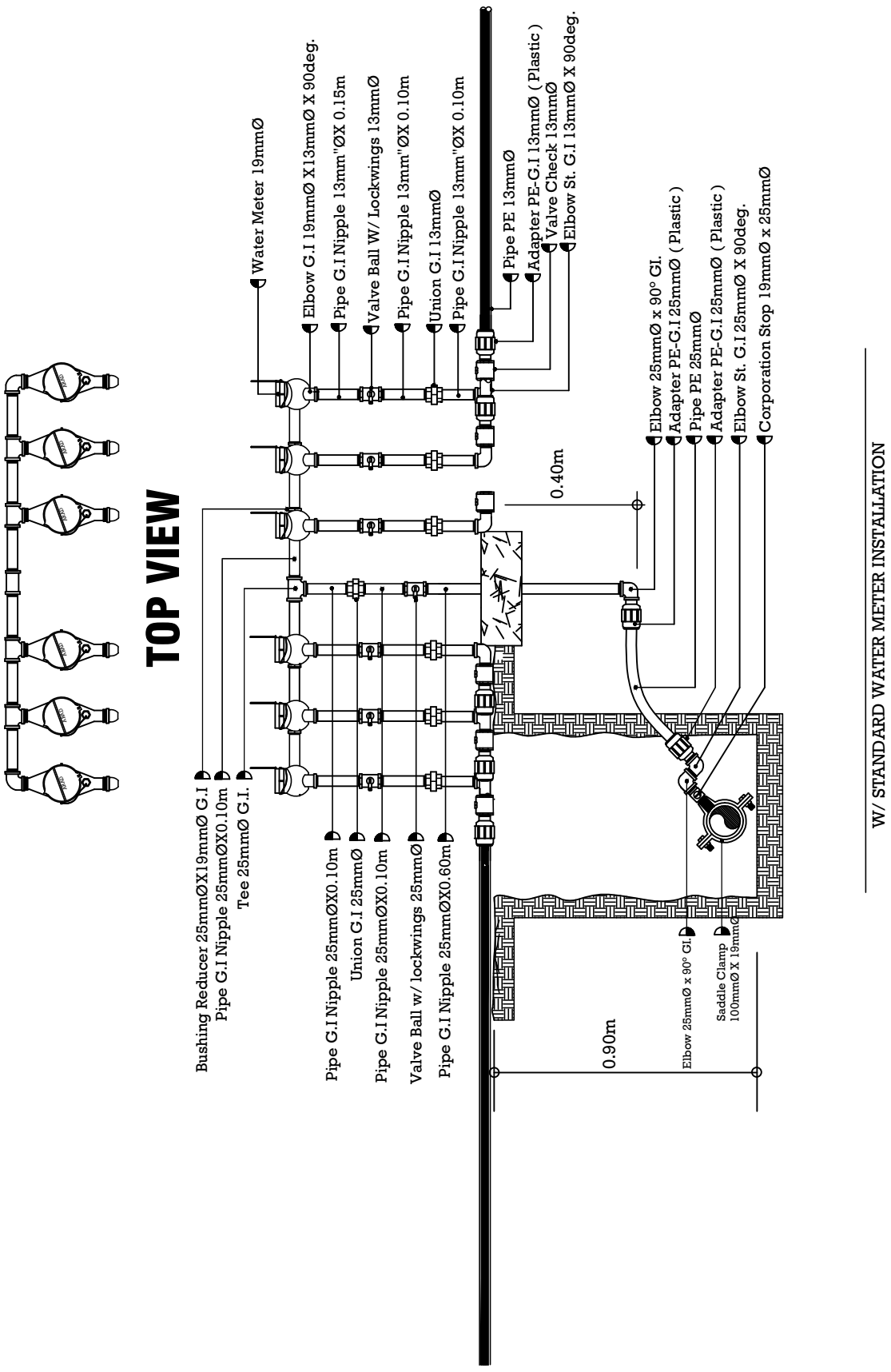
BY	DATE



TOP VIEW



W/ STANDARD WATER METER INSTALLATION



TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		STANDARD VERTICAL OUTLET	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: JANUARY 2021	DWG. NO.: 03

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

SCALE: N.T.S

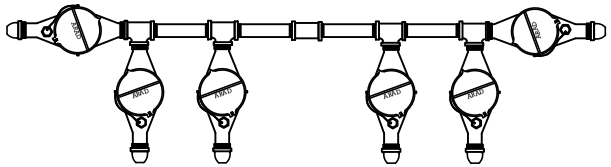
BY: DESIGN UNIT

DATE: JANUARY 2021

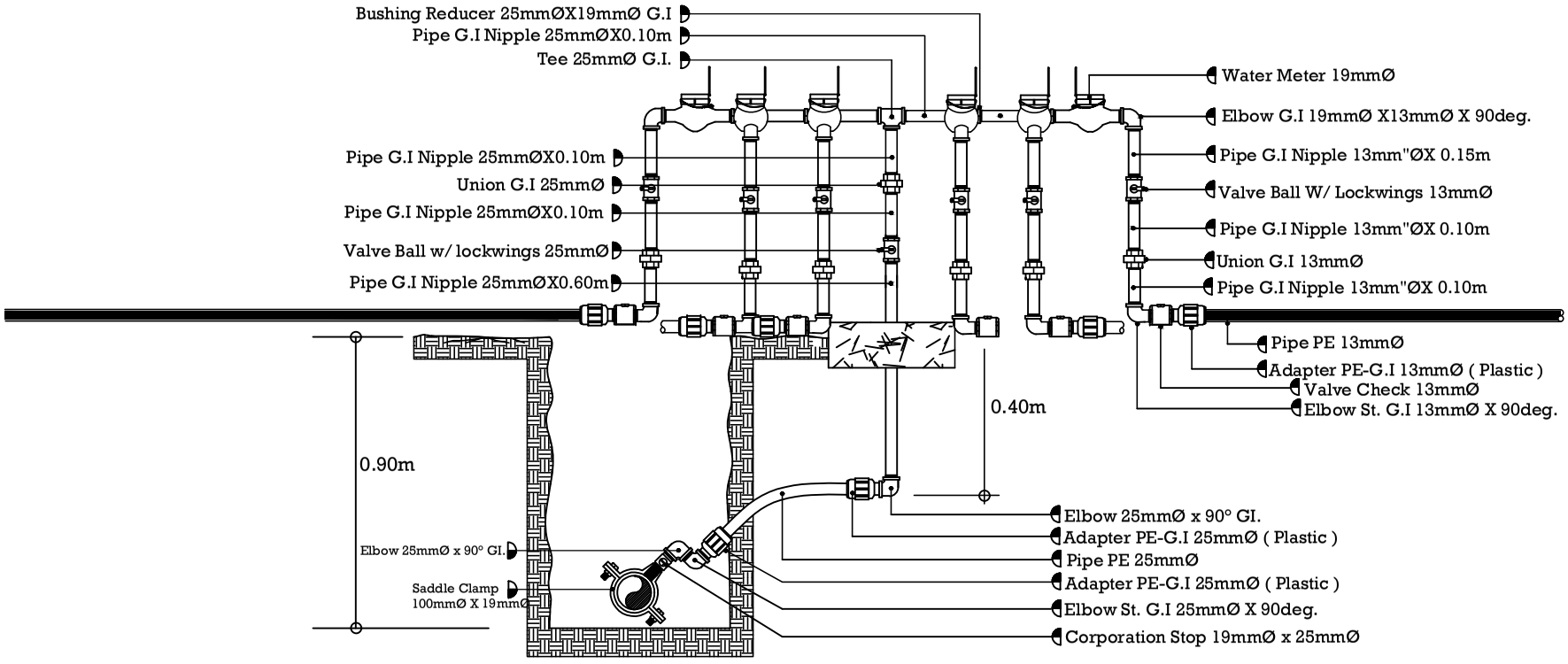
STANDARD VERTICAL OUTLET

DWG. NO.: 04

REVISIONS		
DATE	BY	



TOP VIEW



W/ STANDARD WATER METER INSTALLATION

Stainless Steel Penstock Gate

- ✓ *Stainless Steel Grade 316*
- ✓ *High A-class penstock design based on DIN 19569-4/AWWA C560/BS 7775*

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		TITLE: STAINLESS STEEL PENSTOCK GATE	REVISIONS BY:	DATE:
			DATE: JANUARY 2021	NO.	
	SCALE: N.T.S	BY: GDT			

MODULAR MECHANIZED CLARIFIER AND FLOCCULATION TANK

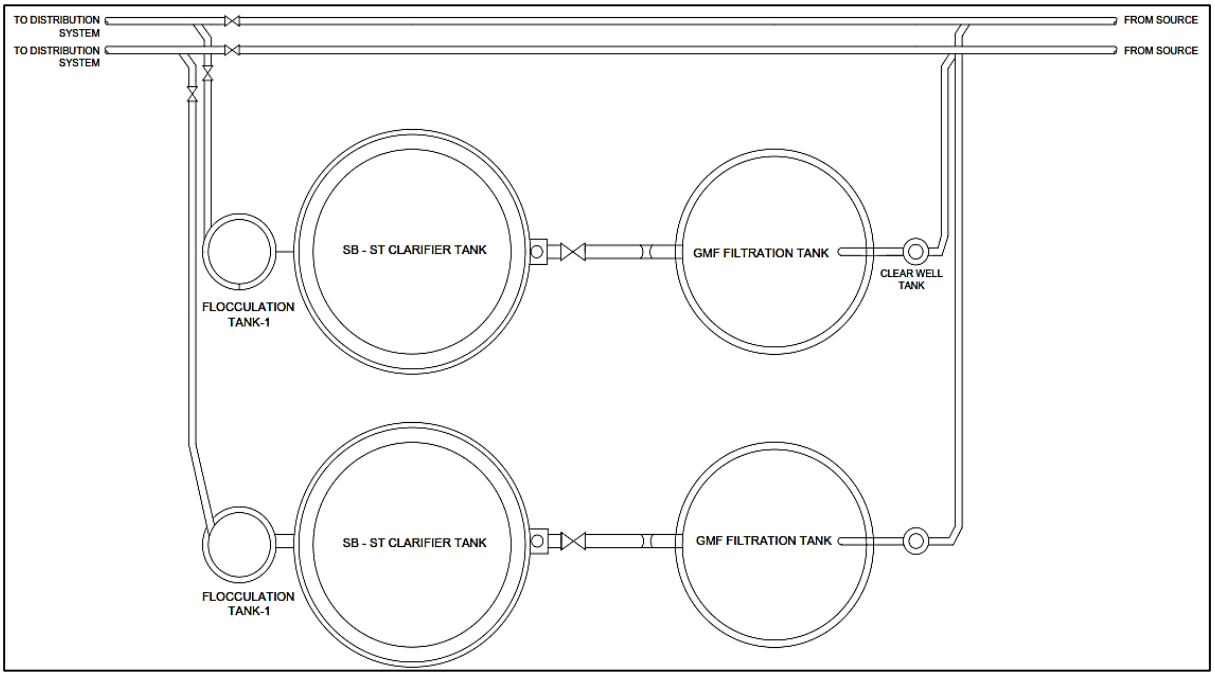


Figure 1. Modular Mechanized Clarifier and Flocculation Tanks Schematic

Modular mechanized Clarifier and Flocculation Tank *(Please see Figure 1. Schematic Diagram)*	a) Capacity: Q=150 lps (2 units) – Steel Structure (Corrosion Protection: Enamel Coated)
	b) Turbidity Level of Raw Water to be Treated = 1000 NTU to 2 NTU Output
	c) Inlet pipe=200mmØ line and 150mmØ line *Sch 40 GI Pipe (ASTM A53-A GALV)* Nominal Pipe Size / Outside Diameter / Wall Thickness 150mm / 6.625" / 0.28" 200mm / 8.625" / 0.322"
	d) Approximate Dimension per Clarifier Tank: L=8.0m, W=3.0m and H=6.0m
	e) Approximate Dimension per Flocculation Tank: H=7.0m and D=2.0m
	f) Compact Design Inclusion:
	- Clarifier, flocculation, Filtration System and Water Treatment & Disinfection
	- The treatment plant shall be capable of meeting the mandatory requirements of the Philippine National Standards for Drinking Water (PNSWD) 2017
	g) Q (output)=150 lps (per unit)
	h) Piping System- provision for tapping point to connect pipeline network-100meters-200mmØ OUTLET. Material Protection Requirement: Pipes must be coated in heavily pigmented water based exterior latex paint for protection against exposure to sunlight and UV radiation
	i) One (1) Hectare Lot-Site Development (concrete fencing and concrete base) with road network
	j.) Can Withstand Magnitude 8.0 Earthquake
	k.) Free delivery, installation, commissioning, and performance testing and product demonstration/training.

GENERAL NOTES
AS PER LWUA STANDARD SPECIFICATION

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		TITLE: **MODULAR MECHANIZED CLARIFIER AND FLOCCULATION TANK**		REVISIONS BY: / DATE:
		DATE: JANUARY 2021	NO. 1	
SCALE: N.T.S	BY: GDT			

10KW HYDRO-ELECTRIC TURBINE

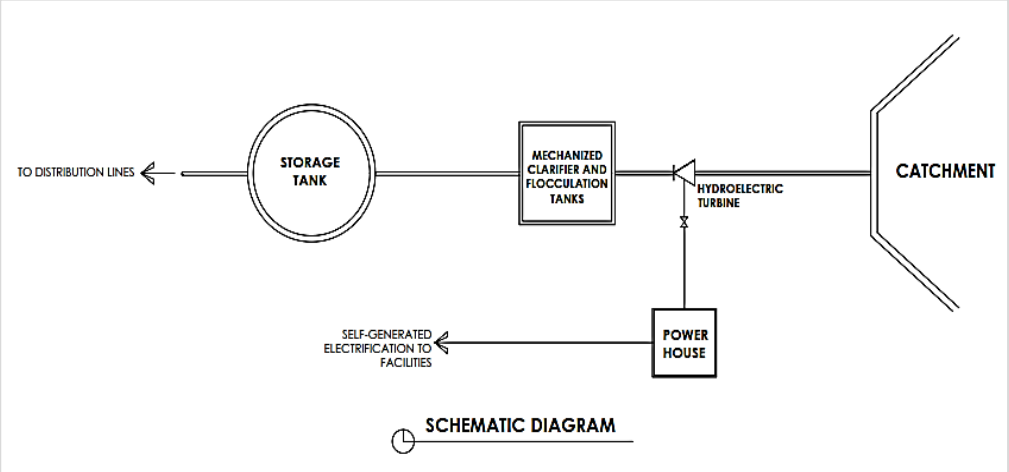


Figure 2. Hydroelectric Power Facility Schematic Diagram

Installation of Hydro-electric power facility (Please see Figure 2. Schematic Diagram)	Inclusions:
	1 unit 10 KW Hydro-electric turbine Main Parameters: - Type = Single Nozzle Turgo Turbine - Control System = Dual (Manual & Automatic System) - Runner Material = Cast Iron (Corrosion and Cavitation Resistant, at least 12% chromium to exhibit atmospheric corrosion resistance) - Voltage = 220V/60Hz - Rated Water Head = 30-38 meters - Rated Flow Rate Range = 40-50 LPS - Output = 10,000W - Efficiency = 87-96% - Pipe Diameter = 200mm - Turbine's Individual Lubricate System = must ensure a service life of at least 30years - with Operations Manual Generator - Brushless Excitation type, with installed AVR device to ensure a steady output voltage - Model: SF10.0-4 - Style: PMG - Output: 10,000W - Voltage: 230 or 110V - Current: 43.47A - Frequency: 50 or 60HZ - Rotary Speed: 1500 RPM - Single Phase Permanent Magnet generator - Power Factor: 1.0 - Altitude: ≤ 3000m - Insulation Grade: B/B - Protection Grade: IP44

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **HYDRO-ELECTRIC TURBINE**		**REVISIONS**
				BY: / **DATE:**
		DATE:	**NO.**	
	SCALE: **N.T.S** / **BY:** **GDT**	**JANUARY 2021**	**1**	

	- Temperature: -25~+50 °C - Relative Humidity: ≤ 90% - With Operations manual Control Box / Control Panel - Model: WY10-1 - Safety Protection: Short Circuit Protection Insulation Protection Over Load Protection Grounding Fault Protection
	1 lot Turbine Control Room
	1 lot Transformer, Panel, and Storage Batteries Please see Section VI Clause 28.0, 29.0 and 30.0
	1 lot installation and configuration services
	1 lot additional necessary accessories

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		TITLE: HYDRO-ELECTRIC TURBINE	REVISIONS BY:	REVISIONS DATE:
			DATE:	NO.	
	SCALE: N.T.S	BY: GDT	JANUARY 2021	2	

GENERAL NOTES AND SPECIFICATIONS

GENERAL NOTES

1.0 STANDARDS AND REFERENCES

THE FOLLOWING SHALL GOVERN THE DESIGN FABRICATION AND CONSTRUCTION OF THE PROJECT.

1.1 NATIONAL STRUCTURAL CODE OF THE PHILIPPINES (N.S.C.P 2015) VOL 1, SEVENTH EDITION

2.0 DESIGN CRITERIA

2.1 LOADINGS

A. DEAD LOAD

CONCRETE	23.56kN/m³
STEEL	76.93kN/m³
150 mm THK. CHB WALL	2.73 kPa
150 mm THK. CHB WALL	2.11 kPa

B. LIVE LOAD

ROOF	1.00 kPa
CLASSROOMS	1.90 kPa
TOILETS	1.90 kPa
CORRIDORS ABOVE, STAIRS	3.80 kPa
CORRIDORS ON GROUND	4.80 kPa

C. WIND LOAD

BUILDING CATEGORY = 1 (ESSENTIAL FACILITIES)
EXPOSURE = D (FLAT, UNOBSTRUCTED AREAS AND WATER SURFACES)
MAXIMUM WIND VELOCITY, V=340KPH

$P = qh\,[(GCpf)-(GCpi)]$ (DESIGN WIND PRESSURE)

WHERE: qh=VELOCITY PRESSURE (kPa)
GCpf=EXTERNAL PRESSURE COEFFICIENT
GCpi=INTERNAL PRESSURE COEFFICIENT

D. SEISMIC LOAD

$V = \frac{CvI}{RT} W$ (DESIGN BASE SHEAR)

$Vmax = \frac{2.50CaI}{RT} W$ $Vmin = 0.11CaIW$

$Vmin = \frac{0.80ZNvI}{R} W$ (ZONE 4)

WHERE: W = TOTAL DEAD LOAD
T = NATURAL PERIOD = Ct(h)
WHERE: C = NUMERICAL COEFFICIENT
h = BUILDING HEIGHT
I = IMPORTANCE FACTOR = 1.50
R = NUMERICAL FACTOR = 8.50
SEISMIC COEFFICIENT Cv = 0.44Nv
Ca=0.64Nv
NEAR SOURCE FACTOR (5 km) Nv = 1.5
Na = 1.2
Z = SEISMIC ZONE = 0.40 (ZONE4)
S = SOIL TYPE = D

2.2 DESIGN STRESSES

A. CONCRETE COMPRESSIVE STRENGTH @28 DAYS:	
a. FOOTINGS, COLUMNS, BEAMS AND SLABS	fc = 20.7 MPa (3,000psi)
b. SLAB ON FILL	fc = 17.5 MPa (2,500psi)
B. REINFORCING STEEL BARS	
a. FOR BARS 16mm AND GREATER (INTERMEDIATE GRADE DEFORMABLE BAR)	fy = 275 MPa (40,000psi)
b. FOR BARS LESS THAN 16mm (STRUCTURAL GRADE DEFORMED BAR)	fy = 230 MPa (33,000psi)
C. STRUCTURAL STEEL ASTM-A36	
FOR TRUSSES, BRACINGS, & STRUTS	fy = 248 MPa (36,000psi)
D. PURLINS	
COLD FORMED LIGHT	fy = 248 MPa (36,000psi)
E. MASONRY UNIT (CHB)	
NON-LOADING BEARING CHB WALLS	fm' = 3.45MPa (500psi)
F. WELDS	E - 60XX ELECTRODE
G. STRUCTURAL BOLTS ASTM-A307	a. Ft = 96.60 mPa (14,000psi)
	b. Ft = 69.00 mPa (10,000psi)

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		STRUCTURAL GENERAL NOTES		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01	

3.0 IN THE INTERPRETATION OF THE DRAWING DIMENSIONS SHALL GOVERN. DISTANCES AND SIZES SHALL NOT BE SCALED FOR CONSTRUCTIONS PURPOSES

4.0 IN REFERENCES TO OTHER DRAWINGS, SEE ARCHITECTURAL DRAWINGS FOR DEPRESSIONS IN FLOOR SLABS, OPENINGS IN THE WALLS AND SLABS, INTERIOR PARTITIONS, LOCATIONS OF DRAINS ETC.

5.0 IN CASE OF DISCREPANCIES AS TO THE LAYOUT, DIMENSIONS AND ELEVATIONS BETWEEN THE STRUCTURAL PLANS AND ARCHITECTURAL DRAWINGS, THE CONSTRUCTORS SHALL NOTIFY BOTH THE STRUCTURAL ENGINEER AND ARCHITECTS.

6.0 ALL CONCRETE WORKS AND CONCRETE REINFORCEMENTS HALL BE DONE IN ACCORDANCE WITH THE ACI.318-14M BUILDING CODE REQUIREMENT AND ALL STRUCTURAL STEEL WORKS ACCORDING WITH THE WITH AISC-05 IN SO FAR AS THEY DO NOT CONFLICT WITH THE LOCAL BUILDING CODE REQUIREMENT.

7.0 ACI REFERS TO AMERICAN CONCRETE INSTITUTE, AISC REFERS TO AMERICAN INSTITUTE OF STEEL CONSTRUCTION AND ASTM REFERS TO AMERICAN SOCIETY FOR TESTING MATERIALS.

8.0 CONSTRUCTION NOTES AND TYPICAL DETAILS APPLY TO ALL DRAWINGS UNLESS OTHERWISE SHOWN OR MODIFY TYPICAL DETAILS AS DIRECTED TO MEET SPECIAL CONDITIONS.

9.0 SHOP DRAWING WITH ERECTION AND PLACING DIAGRAMS OF ALL STRUCTURAL STEELS, MISCELLANEOUS IRON, PRE-CAST CONCRETE, ETC. SHALL BE SUBMITTED FOR ENGINEERS APPROVAL BEFORE FABRICATION.

10.0 CONTRACTOR SHALL NOTE AND PROVIDE ALL MISCELLANEOUS CURBS, SILLS, STOOLS, EQUIPMENT AND MECHANICAL BASES THAT ARE REQUIRED BY THE ARCHITECTURAL, ELECTRICAL AND MECHANICAL DRAWINGS.

11.0 ALL RESULTS OF THE MATERIAL TESTING FOR CONCRETE, REINFORCING BARS & STRUCTURAL STEEL MUST BE NOTED & APPROVED BY THE MATERIALS ENGINEER/STRUCTURAL DESIGNER.

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		STRUCTURAL GENERAL NOTES	REVISIONS BY	DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 02	

NOTES ON CONCRETE MIXES & PLACING

1. ALL CONCRETE SHALL DEVELOP A MIN. COMPRESSIVE STRENGTH AT THE END OF TWENTY EIGHT (28) DAYS W/ CORRESPONDING MAXIMUM SIZE AGGREGATE & SLUMP AS FOLLOWS.

LOCATION	28 DAYS STRENGTH	MAX. SIZE OF AGGREGATE	MAX SLUMP
ALL OTHERS, INCLUDING SUSPENDED SLABS	3000 PSI (20.7 MPa)	20mm	100mm
COLUMNS	3000 PSI (20.7 MPa)	20mm	100mm
BEAMS, SLABS	3000 PSI (20.7 MPa)	20mm	100mm
SLAB ON FILL	2500 PSI (17.5 MPa)	20mm	100mm

2. MAINTAIN MINIMUM CONCRETE COVER FOR REINFORCING STEEL AS FOLLOWS.
   - SUSPENDED SLABS ---------- 20mm
   - SLAB ON GRADE ---------- 40mm
   - WALLS ABOVE THE GRADE ---------- 25mm
   - BEAMS STIRRUPS AND COLUMN TIES ---------- 40mm
   - WHERE CONCRETE IS EXPOSED TO EARTH BUT POURED AGAINST FORMS ---------- 50mm
   - WHERE CONCRETE IS DEPOSITED DIRECTLY AGAINST EARTH ---------- ---------- 75mm
3. CONCRETE SHALL BE DEPOSITED IN ITS FINAL POSITION WITHOUT SEGREGATION RE-HANDLING OR PLACING SHALL BE DONE PREFERABLY WITH BUGGIES, BUCKETS OR WHEELBARROWS, NO CHUTES WILL BE ALLOWED EXCEPT TO TRANSFER CONCRETE FROM HOPPERS TO BUGGIES, WHEELBARROWS OR BUCKETS IN WHICH CASE THEY SHALL NOT EXCEED SIX (6) METERS IN AGGREGATE LENGTH.
4. NO DEPOSITING OF CONCRETE SHALL BE ALLOWED WITHOUT THE USE OF VIBRATORS UNLESS AUTHORIZED IN WRITING DESIGNER AND ONLY FOR UNUSUAL CONDITIONS WHERE VIBRATIONS ARE EXTREMELY DIFFICULT TO ACCOMPLISH.
5. ALL ANCHOR BOLTS, DOWELS, AND OTHER INSERTS SHALL BE PROPERLY POSITIONED & SECURED IN PLACE PRIOR TO PLACING OF CONCRETE.
6. ALL CONCRETE SHALL BE KEPT FOR A MINIMUM OF SEVEN CONSECUTIVE DAYS IMMEDIATELY AFTER POURING BY THE USE Of WET BURLAP, FOG SPRAYING, CURING COMPOUNDS OR OTHER APPROVED METHODS.
7. STRIPPING OF FORMS AND SHORES:
   - FOUNDATION ---------- 24 HRS
   - SUSPENDED SLAB EXCEPT WHEN ADDITIONAL LOADS ARE IMPOSED ---------- 8 DAYS
   - WALLS ---------- 21 DAYS
   - BEAMS ---------- 14 DAYS
   - COLUMNS ---------- 21 DAYS
8. THE CONTRACTOR SHALL SUBMIT THE SCHEDULE OF POURING THE LOCATION OF THE CONSTRUCTION JOINTS TO THE STRUCTURAL ENGINEER AT LEAST (4) DAYS PRIOR TO THE POURING FOR APPROVAL.
9. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ADEQUATE FORMS AND SHORINGS UNTIL THE CONCRETE MEMBERS HAVE ATTAINED THEIR WORKING CONDITION AND STRENGTH.

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		STRUCTURAL GENERAL NOTES	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 03

NOTES ON FOOTINGS

1. FOOTINGS ARE DESIGNED FOR AN ALLOWANCE SOIL BEARING PRESSURE OF 96KPa (2000psi). CONCRETE SHALL REPORT TO THE ENGINEER IN WRITING, THE ACTUAL SOIL CONDITIONS UNCOVERED AND CONFIRM ACTUAL BEARING CAPACITY OF SOIL BEFORE DEPOSITING CONCRETE.
2. FOOTING SHALL REST AT LEAST 150mm BELOW NATURAL GRADE LINE UNLESS OTHERWISE INDICATE IN PLANS. NO FOOTING SHALL REST ON FILL.
3. MINIMUM CONCRETE PROTECTION FOR REINFORCEMENT SHALL BE 75mm CLEAR FOR CONCRETE DEPOSITED THE GROUND AND 50mm FOR CONCRETE DEPOSITED AGAINST A FORMWORK.
4. IN CASES WHERE THE SOIL CONDITION IS SUCH THAT THE MINIMUM ALLOWABLE SOIL PRESSURE OF 96KPa (2000psi) CAN NOT BE ATTAINED AT A PRACTICAL DEPTHS THE USE OF MICROPILES, BORED PILES, OR DRIVEN PILES MAY BE ADOPTED IN LIEU OF STANDARD ISOLATED FOOTINGS.

NOTES ON REINFORCEMENT

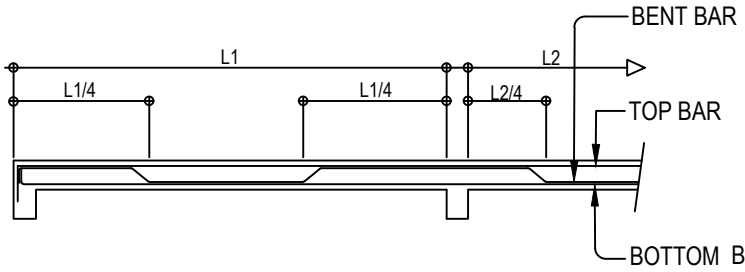
1. UNLESS OTHERWISE NOTED IN PLANS, THE YIELD STRENGTH OF REINFORCING BARS SHALL BE:
   A. FOOTINGS, FOOTING BEAMS AND GIRDERS ---------- fy = 275MPa (40,000psi)
   B. COLUMNS AND SHEAR WALLS ---------- fy = 275MPa (40,000psi)
   C. BEAMS AND GIRDER ---------- fy = 275MPa (40,000psi)
   D. NON-LOAD BEARING WALL PARTITIONS, BEDDED SLABS
   FLOOR & ROOF SLABS PARAPETS, CATCH BASIN, SIDE WALK ---------- fy = 275MPa (40,000psi)
2. ALL REINFORCING BARS SIZE 10mm OR LARGER SHALL BE DEFORMED IN ACCORDANCE WITH THE ASTM A-706 BARS SMALLER THAN 10mm MAY BE PLAIN.
3. SPLICES SHALL BE SECURELY WIRED TOGETHER & SHALL LAMP OR EXTEND IN ACCORDANCE w/ TABLE B (TABLE OF LAP SPLICE & ANCHORAGE LENGTH) UNLESS OTHERWISE SHOWN DRAWINGS, SPLICES SHALL BE STAGGERED WHENEVER POSSIBLE.

TECHNICAL STANDARD DETAILS

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		STRUCTURAL GENERAL NOTES	REVISIONS BY / DATE
	SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 04

NOTES ON CONCRETE SLABS

1. ALL SLAB REINFORCEMENTS SHALL BE 20mm CLEAR MINIMUM FROM BOTTOM THE TOP OF SLAB.
2. UNLESS OTHERWISE SHOWN, REINFORCEMENT IN CONTINUOUS ELEVATED SLAB SHALL BE CUT AS FOLLOWS;

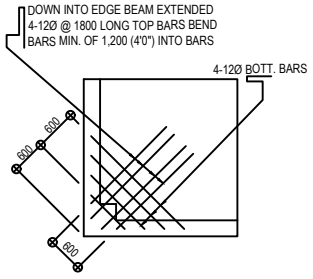


3. IF SLABS ARE REINFORCED BOTHWAYS BARS ALONG THE SHORTER SPAN SHALL BE PLACED BELOW THOSE ALONE THE LONG SPAN AT THE CENTER AND OVER THE LONGER SPAN FOR REINFORCING BARS NEAR THE SUPPORTS, THE SPACING OF THE BARS AT THE COLUMN STRIPS SHALL NOT BE MORE THAN ONE AND A HALF (1) SLAB THICKNESS.

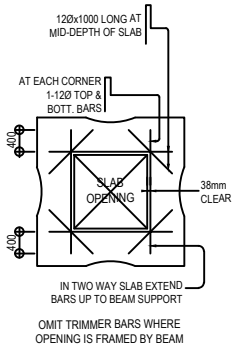
4. TEMPERATURE BARS FOR SLAB SHALL BE GENERALLY PLACED NEAR THE FACE IN THE TENSION AND SHALL NOT BE LESS THAT 0.0025 X GROSS-SECTIONAL AREA (Ag) OF THE SLAB. (SEE SCHEDULE BELOW)

SCHEDULE OF MINIMUM SLAB REINFORECEMENT	
	MINIMUM TEMPERATURE BARS
100mm	10mm Ø @250mm EACH WAY
125mm	10mm Ø @250mm EACH WAY
150mm	10mm Ø @250mm EACH WAY
175mm	10mm Ø @250mm EACH WAY
200mm	10mm Ø @250mm EACH WAY

5. UNLESS OTHERWISE NOTED IN THE PLANS ALL BEDDED SLABS SHALL BE REINFORCED WITH 10mm Ø AT 250mm O.C. EACH WAY TO CENTER OF SLAB AND CONTRACTION JOINTS FOR THE SAME SHALL NOT BE LESS THAN 3.65 METER APART.
6. PROVIDE EXTRA REINFORCEMENTS FOR CORNER SLAB (TWO ADJACENT DISCONTINUES EDGES) AS SHOWN BELOW.
7. CONCRETE SLAB REINFORCEMENT BE PROPERLY SUPPORTED WITH 10mm STEEL CHAIR PR APPROVED EQUIVALENT SPACED AT 1.0 METER ON CENTER BOTHWAYS.



TYPICAL CORNER SLAB DETAIL



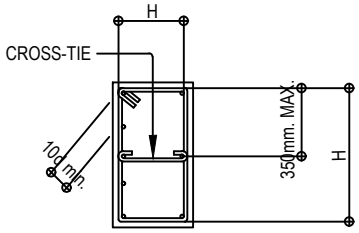
TYPICAL SLAB OPENING DET.

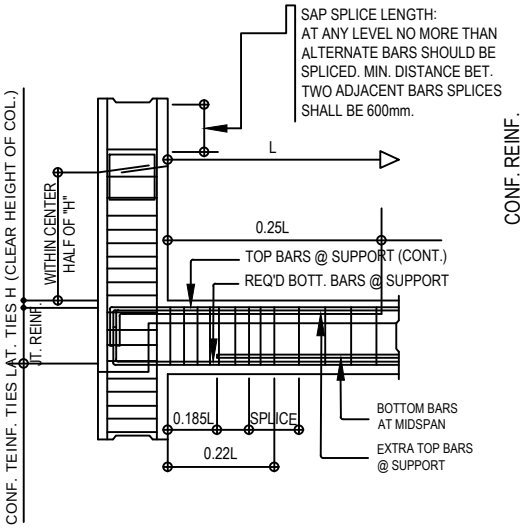
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		STRUCTURAL GENERAL NOTES		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 05	

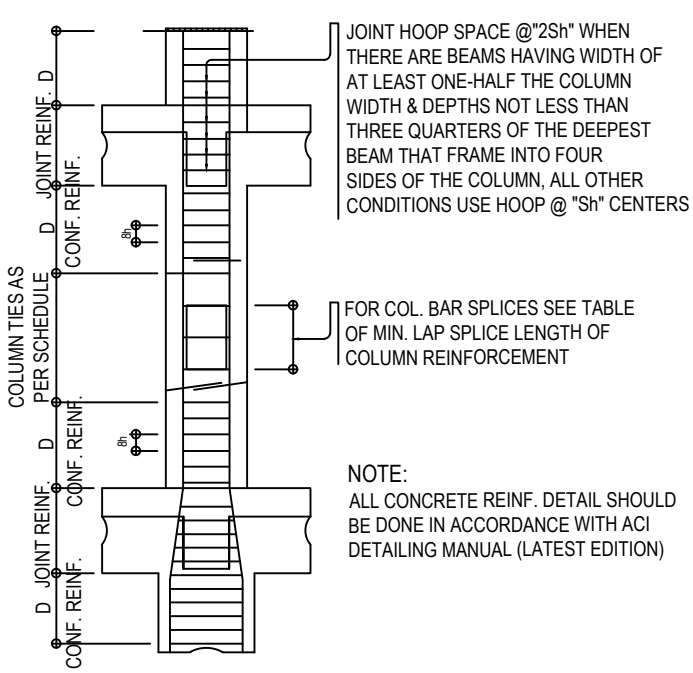
NOTES ON COLUMNS

1. PROVIDE EXTRA SETS OF TIES AT 100 O.C. FOR TIED COLUMN REINFORCEMENT ABOVE AND BELOW BEAM-COLUMN CONNECTIONS FOR A DISTANCE FROM FACE OF CONNECTION EQUAL TO GREATER OF THE OVERALL THICKNESS OF COLUMN, 1/6 THE CLEAR HEIGHT OF COLUMN OR 450mm.
2. COLUMN TIES SHALL BE PROTECTED EVERYWHERE BY A COVERING OF CONCRETE CAST MONOLITHICALLY WITH THE CORE WITH A MINIMUM THICKNESS OF 40mm AND NOT LESS THAN 40 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE IN MILLIMETERS.
3. WHERE COLUMNS CHANGE IN SIZE, VERTICAL REINFORCEMENT SHALL BE OFFSET AT A SLOPE MONOLITHICALLY WITH THE CORE MINIMUM THICKNESS OF 40mm AND NOT LESS THAN 40 TIMES THE MAXIMUM SIZE COARSE AGGREGATE IN MILLIMETERS.
4. UNLESS OTHERWISE INDICATED IN THE PLANS, LAP SPLICES FOR VERTICAL COLUMN REINFORCEMENTS SHALL BE MADE WITHIN THE CENTER HALF OF COLUMN HEIGHT, AND THE SPLICE LENGTH SHALL BE LESS THAN 40 BAR DIAMETERS, WELDING OR APPROVED MECHANICAL DEVICES MAY BE USED PROVIDED THAT NOT MORE THAN ALTERNATE BARS ARE WELDED OR MECHANICALLY SPLICED AT ANY LEVEL AND THE VERTICAL DISTANCES BETWEEN THESE WELDS OR SPLICES OF ADJACENT BARS IS NOT LESS THAN 600mm.





TYP. DETAIL OF COL. LAP SPLICE & EXT. GIRDER TO COL. CONNECT



TYPICAL COLUMN ELEV. SHOWING DOWELS AND TIES SPACING

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		STRUCTURAL GENERAL NOTES		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 06	

NOTES ON BEAMS AND GIRDERS

1. UNLESS, OTHERWISE NOTED IN PLANS, CAMBER ALL BEAMS AND GIRDER AT LEAST 6mmØ FOR EVERY 4.50 M OF SPAN, EXCEPT CANTILEVERS FOR WHICH THE CAMBER SHALL BE AS NOTED IN PLANS OR AS ORDERED BY THE ENGINEER BUT IN NO CASE LESS THAN 20mm FOR EVERY 3.0 M OF FREE SPAN.
2. TYPICAL BARS BENDING AND CUTTING DETAILS FOR BEAMS SHALL BE AS SHOWN IN FIG. B-1.

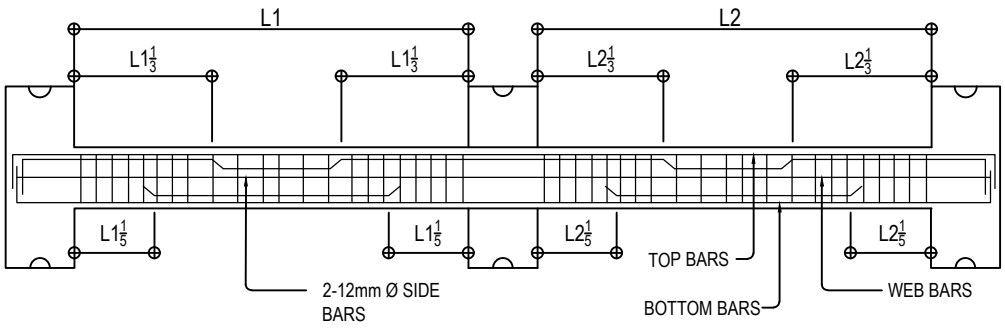
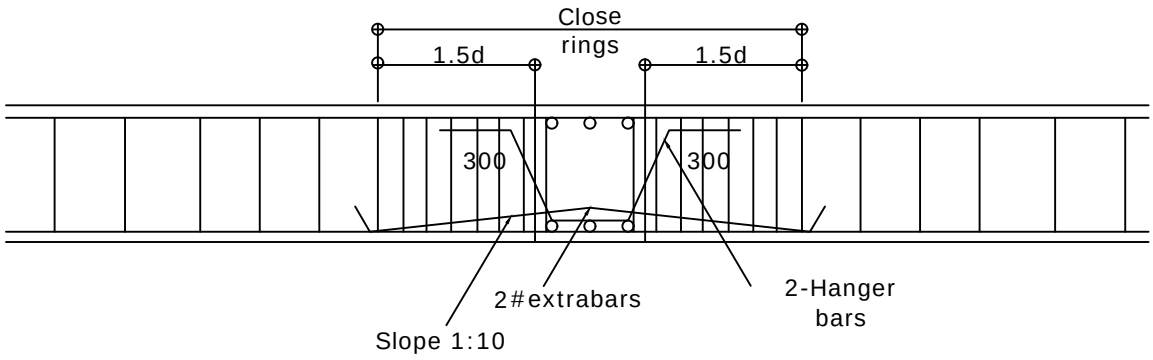


FIGURE B-1



GRID BEAM DETAILS

TABLE 'A'
TENSION BARS
TABLE OF LAP SPLICE & ANCHORAGE LENGTH (mm)

BAR SIZES (DEFORMED MM)	fc`= 20.7MPa(300psi)		fc`= 27.6 MPa (4000psi)	
	EMBEDMENT	LAPPED	EMBEDMENT	LAPPED
Ø10	300	300	300	300
Ø12	300	300	300	300
Ø16	300	400	300	400
Ø20	400	550	350	500
Ø25	600	800	550	750
Ø28	750	1000	650	850
Ø32	950	1300	850	1100

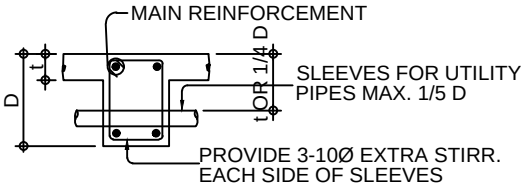
NOTES:
1. TOP PLAIN BARS, MULTIPLY VALUE BY 2
2. NOT MORE THAN 33% OF THE BARS SHALL BE SPLICED WITHIN THE REQUIRED LAP LENGTH

TABLE 'B'
COMPRESSION BARS
TABLE OF LAP SPLICE & ANCHORAGE LENGTH (mm)

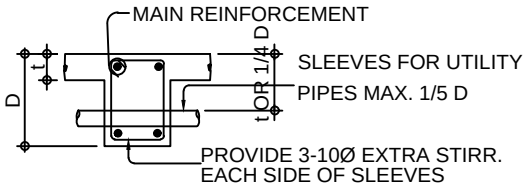
BAR SIZES (DEFORMED MM)	fc`= 20.7MPa(300psi)		fc`= 27.6 MPa (4000psi)	
	EMBEDMENT	LAPPED	EMBEDMENT	LAPPED
Ø10	225	300	200	300
Ø12	275	300	250	300
Ø16	350	400	325	400
Ø20	450	500	475	500
Ø25	550	625	550	625
Ø28	625	675	625	675
Ø32	700	775	700	775

NOTES:
1. TOP PLAIN BARS, MULTIPLY VALUE BY 2
2. NOT MORE THAN 33% OF THE BARS SHALL BE SPLICED WITHIN THE REQUIRED LAP LENGTH
3. VALUES GIVEN ABOVE CAN ALSO BE USED FOR COLUMNS

3. IF THE BEAM REINFORCING BARS END IN A WALL, THE CLEAR DISTANCE FROM THE BAR TO THE FARTHER FACE OF THE WALL IS NOT LESS THAN 25mm. EMBEDMENT LENGTH SHALL BE SHOWN IN A TABLE 'A' FOR TENSION BARS TABLE 'B' FOR COMPRESSION BARS UNLESS SPECIFIED IN PLAN. TOP BARS SHALL NOT BE SPLICED WITHIN THE COLUMN OR TWO STIRRUPS SHALL BE PROVED AT ALL SPLICES.
4. IF THERE ARE TWO OR MORE LAYERS OF REINFORCING BARS, USED 25mm BAR SEPARATORS SPACED AT 1.0M ON CENTER ON NO CASE SHALL THERE BE THAN TWO (2) SPARATORS BETWEEN LAYERS OF BARS.
5. MINIMUM CONCRETE PROTECTION FOR REINFORCING BARS OR STEEL SHAPES SHALL BE AS SHOWN IN FIGURE B-2 UNLESS ELSEWHERE.



TYP. DET. FOR SLEEVES
THRU CONCRETE BEAM
FIG. B-2



TYP. DET. FOR SLEEVES
THRU CONCRETE BEAM
FIG. B-3

6. WHEN A BEAM CROSSES A GIRDER, REST BEAM ON TOP OF GIRDER BARS, BEAM REINFORCING BARS SHALL BE SYMMETRICAL ABOUT THE CENTERLINE WHENEVER POSSIBLE.
7. GENERALLY, NO SPLICES SHALL BE PERMITTED AT POINTS WHERE CRITICAL BENDING STRESSES OCCUR, SPLICES WHERE SO PERMITTED SHALL BE INDICATED IN TABLE 'A' AND 'B'. WELDED SPLICES SHALL DEVELOP IN TENSION AT LEAST 125% OF THE SPLICED YIELD STRENGTH OF THE BAR NOT MORE THAN 50% OF THE BARS AT ANY ONE SECTION IS ALLOWED TO BE SPLICED THEREIN.

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

STRUCTURAL
GENERAL NOTES

SCALE: N.T.S | BY: DESIGN UNIT

DATE: FEBRUARY 2021

DWG. NO.: 08

REVISIONS	
BY	DATE

NOTES ON CONCRETE HOLLOW BLOCK WALLS

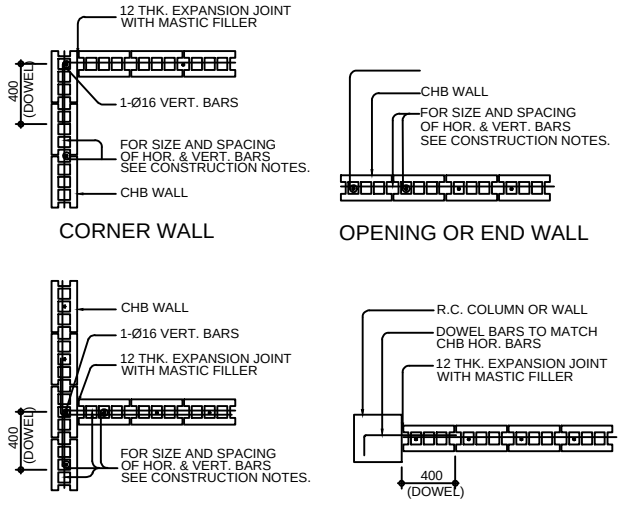
1. UNLESS OTHERWISE SHOWN IN PLANS ALL CONCRETE HOLLOW BLOCKS AND CERAMIC BLOCKS SHALL BE REINFORCED AS SHOWN IN THE SCHEDULE OF CONCRETE HOLLOW BLOCKS AND CERAMIC BLOCK REINFORCEMENT.
2. PROVIDE 150mm x 300mm STIFFENER COLUMN REINFORCED WITH 4-12mm WITH 10mm Ø TIES AT 150mm ON CENTERWHERE CONCRETE HOLLOW BLOCK TERMINATES AND AT EVERY 3.0M LENGTH OF CONCRETE HOLLOW BLOCK WALLS UNLESS NOTED IN STRUCTURAL PLANS.

NOTES ON CONCRETE HOLLOW BLOCKS WALLS REINFORCEMENTS			
BLOCK THICKNESS	REINFORCEMENT		NOTES
	HORIZONTAL	LAPPED	A. MINIMUM LAPS AT SPLICE= 0.25 M B. PROVIDE RIGHT ANGLED REINFORCEMENT AT CORNERS 0.92 m LONG C.WHERE CHB OR CER. BLK. WALL DOWELS WITH THE SAME SIZE AS VER. OR HOR. REINFORCEMENT SHALL BE PROVIDED
75 mm	10mm Ø EVERY 3RD LEVEL	10mm Ø @ 600mm O.C.	
125 mm	10mm Ø EVERY 3RD LEVEL	10mm Ø @ 600mm O.C.	
150mm	10mm Ø EVERY 3RD LEVEL	10mm Ø @ 600mm O.C.	
200 mm	12mm Ø EVERY 3RD LEVEL	10mm Ø @ 600mm O.C.	

REINFORCING CONCRETE LINTEL BEAMS IN CONCRETE BLOCK WALLS

LINTELS IN BLOCK WALLS

CLEAR SPAN (L)	TOTAL LENGTH (L+0.40M)	MIN. fc' (MPa)	HEIGHT OF LINTEL (mm)	REINFORCEMENT		
				BOTTOM	TOP	STIRRUPS
1.20 M	1.60 M	14.0	200	1-Ø 10	1-Ø 10	Ø6mm @ 200mm
1.50 M	1.90 M		200	1-Ø 10	1-Ø 10	Ø6mm @ 200mm
1.80 M	2.20 M		200	1-Ø 12	1-Ø 10	Ø6mm @ 200mm
2.10 M	2.50 M	17.0	250	1-Ø 12	1-Ø 10	Ø6mm @ 200mm
2.40 M	2.90 M		250	1-Ø 12	1-Ø 10	Ø6mm @ 200mm
2.70 M	3.10 M		250	1-Ø 16	1-Ø 12	Ø10mm @ 200mm
3.00 M	3.40 M	20.0	300	1-Ø 16	1-Ø 12	Ø10mm @ 200mm
3.30 M	3.70 M		300	1-Ø 16	1-Ø 12	Ø10mm @ 200mm
3.60 M	4.00 M		300	1-Ø 20	1-Ø 12	Ø10mm @ 200mm



CORNER WALL | OPENING OR END WALL

INTERSECTION WALL | INTERSECTING R.C. COLUMN OR WALL

TYPICAL CONNECTION DETAIL OF MASONRY WALL

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

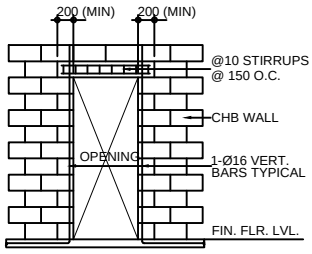
STRUCTURAL
GENERAL NOTES

SCALE: N.T.S | BY: DESIGN UNIT

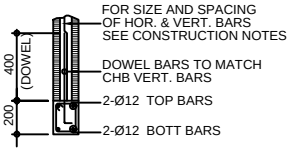
DATE: FEBRUARY 2021

DWG. NO.: 09

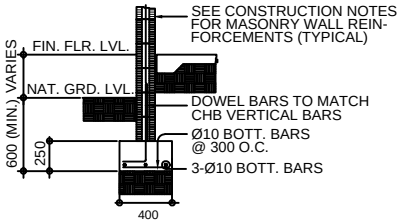
REVISIONS	
BY	DATE



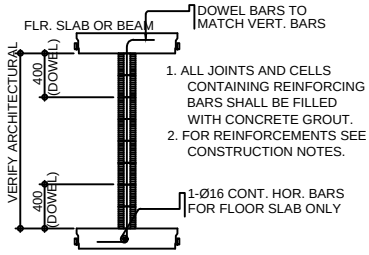
ELEVATION



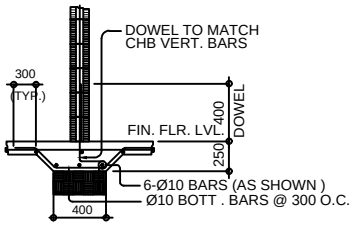
SECTION

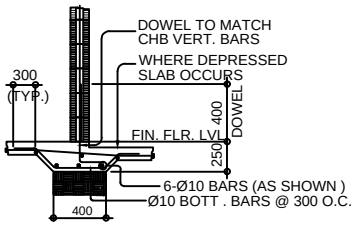


TYP. DET. OF LINTEL BEAM AT CHB WALL OPENING

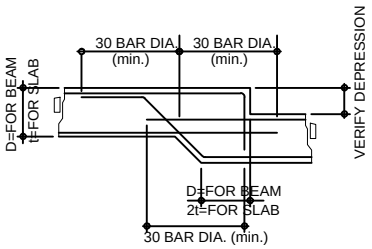


TYP. SECTION OF MASONRY PARTITION REINFORCEMENTS

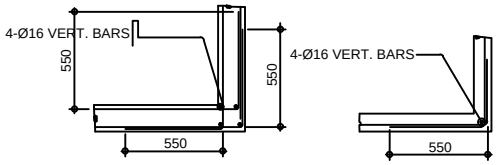




TYPICAL CHB FOOTING DETAILS
(WHERE APPLICABLE)



TYPICAL DETAIL FOR BEAM OR SLAB CHANGE SOFFIT



TYPICAL CONNECTION DETAIL OF R.C. WALL AT CORNERS

NOTES ON CONCRETE WALLS

1. ALL WALLS SHALL BE REINFORCED ACCORDING TO THE FOLLOWING SCHEDULE OF WALL REINFORCED UNLESS OTHERWISE INDICATED IN THE PLANS.

WALL THICKNESS	REINFORCEMENT			VERTICAL SECTION
	HORIZONTAL	VERTICAL	REMARKS	
100mm	Ø 10mm @ 250mm O.C.	Ø 10mm @ 300mm O.C.	HORIZONTAL BARS AT CENTERS VERTICAL BARS STAGGED OUT	VER. BARS / HOR. BARS
125mm	Ø 10mm @ 200mm O.C.	Ø 10mm @ 250mm O.C.		
150mm	Ø 12mm @ 250mm O.C.	Ø 12mm @ 300mm O.C.		

REINFORCED BARS SHALL HAVE 25m CLEAR CONCRETE COVER FROM FACE OF WALL EXCEPT FOR WALLS IN CONTACT WITH THE GROUND WHERE A MINIMUM OF 60mm SHALL BE PROVIDED AND FOR EXPOSED FACES OF FORMED WALLS WHERE THE MINIMUM SHALL BE 50mm CLEAR.

2. CARRY VERTICAL BARS AT LEAST 60mm ABOVE FLOOR LEVEL TO PROVIDE FOR SPLICES WHEN NECESSARY STOP AT 50mm BELOW TOP SLAB OR SOLID BAND WHERE THE WALL ENDS VERTICAL AND HORIZONTAL BARS SHALL BE SPLICED BT LAPPING A DISTANCE EQUAL TO 30 DIAMETERS AND WIRED SECURELY WITH 16 G.I. WIRE PROVIDED THAT SPLICES IN ADJACENT BARS ARE STAGGERED AT LEAST .50M O.C.
3. UNLESS OTHERWISE NOTED IN THE PLANS, ALL OPENINGS IN WALLS 250mm OR THICKER SHALL BE REINFORCED AROUND WITH 2-20mmØ BARS. FOR 225mm, 200mm, 175mm, 150mm THICK WALLS, USE 2-16mmØ. FOR 125mm AND 100mm THICK WALLS, USE 2-12mmØ BARS. ALL WALLS SPANNING SHALL HAVE VERTICAL REINFORCEMENT BENT A U-FORM LIKE STIRRUPS AND SPACED ACCORDING TO THE SCHEDULE UNLESS OTHERWISE NOTED.

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

STRUCTURAL
GENERAL NOTES

SCALE: N.T.S | BY: DESIGN UNIT | DATE: FEBRUARY 2021 | DWG. NO.: 10

REVISIONS	
BY	DATE

NOTES ON WELDS

1. USE E60xx ELECTRODES FOR ALL MEMBERS WELDED.
2. WELDS SHALL DEVELOP THE FULL STREBGTH OF MEMBERS JOINED UNLESS OTHERWISE SHOWN OR DETAILED IN THE DRAWINGS.

NOTES ON STRUCTURAL STEEL

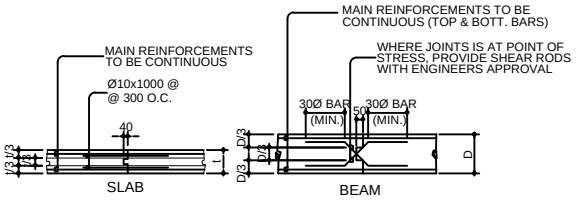
1. STRUCTURAL STEEL TO BE USED FRO FABRICATION AND ERECTION OF THIS STRUCTURE SHALL COMPLY WITH ALL THE PERTINENT PROVISION OF AISC SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDING LATEST EDITION.
2. ALL STRUCTURAL STEEL SHAPES SHALL CONFORM TO ASTM A36 STRUCTURAL STEEL UNLESS OTHERWISE INDICATED.
3. ALL WELDED CONNECTIONS SHALL DEVELOP THE FULL STRENGTH OF THE MEMBERS CONNECTED.
4. UNLESS OTHERWISE SPECIFIED ALL WELDING RODS SHALL CONFORM WITH E60 ELECTRODES.
5. ALL BOLTS USED UNLESS OTHERWISE SPECIFIED SHALL BE ASTM A307 BOLTS.

NOTES ON EMBEDED PIPES

1. ALL EMBEDED PIPES FOR UILITIES ETC. THAT PASS THRU BEAMS SHALL NOT EXCEED 100mm IN DIAMETER OR 1/3 BEAM DEPTH WHICHEVER IS LESS, UNLESS OTHERWISE APPROVED IN WRITING BY THE STRUCTURAL ENGINEER.
2. NO PIPES SHALL BE ALLOWED TO PASS THRU BEAMS VERTICALLY.
3. NO PIPES SHALL BE EMBEDED IN COLUMNS.

NOTES ON CONSTRUCTION JOINTS IN CONCRETE

1. WHERE A CONSTRUCTION JINT IS TO BE MADE, THE SURFACE OF CONCRETE SHALL BE CLEANED AND ALL LAITANCE AND STANDING WATER REMOVED SHEAR KEY SHALL BE PROVIDE AT THE JOINT.

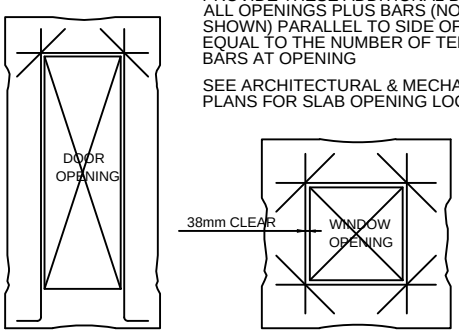


TYPICAL SLAB & BEAM
CONSTRUCTION JOINT DET.

NOTE:

PROVIDE THESE ADDITIONAL BARS FOR ALL OPENINGS PLUS BARS (NOT SHOWN) PARALLEL TO SIDE OF OPENING EQUAL TO THE NUMBER OF TERMINATED BARS AT OPENING

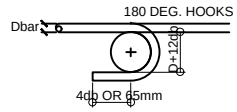
SEE ARCHITECTURAL & MECHANICAL PLANS FOR SLAB OPENING LOCATION.

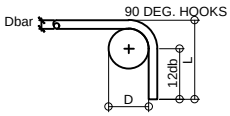


TYP. EXTERIOR WDW. & DOOR OPENING

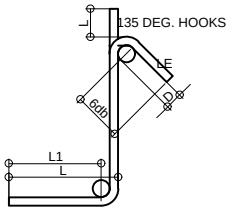
NOTES ON STIRRUPS

1. ALL REINFORCEMENT SHALL BE BENT COLD UNLESS OTHERWISE PERMITTED BY THE STRUCTURAL ENGINEER.
2. AS SHOWN IN THE DESIGN DRAWINGS OR PERMITTED BY THE STRUCTURAL ENGINEER.
3. TIES & CLOSE STIRRUPS MUST BE AT 135.





MAIN BAR END HOOKS (ALL GRADES)				
BAR SIZE (DEFORMED)	DIAMETER (mm)	180° HOOK		90° HOOK
		D+2db	L	L
10mm Ø	60	75	125	150
12mm Ø	75	100	150	200
16mm Ø	95	125	175	250
20mm Ø	115	150	200	300
25mm Ø	150	200	230	450
28mm Ø	240	300	350	550
32mm Ø	300	335	450	600



STIRRUP AND THE TIE HOOKS (ALL GRADES)				
BAR SIZE (DEFORMED)	DIAMETER (mm)	180° HOOK		90° HOOK
		D+2db	L	L
10mm Ø	40	125	85	100
12mm Ø	50	165	115	115
16mm Ø	65	200	140	150
20mm Ø	115	300	165	300
32mm Ø	150	335	230	405

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

STRUCTURAL
GENERAL NOTES

REVISIONS	
BY	DATE

SCALE: N.T.S | BY: DESIGN UNIT

DATE: FEBRUARY 2021

DWG. NO.: 11

PLUMBING NOTES

GENERAL CONDITION

A. THE WORKS EXECUTED UNDER THIS PROJECT SHALL INCLUDE ALL MATERIALS, LABOR AND EQUIPMENT NECESSARY FOR THE COMPLETION OF THE BUILDING AS SHOWN ON THE DRAWING AND AS SPECIFIED HEREIN AFTER. ALL WORKS SHALL BE DONE UNDER THE DIRECT SUPERVISION OF A LICENSE PLUMBER AND IN STRICT ACCORDANCE WITH THE SPECIFICATION AND OF THE METHOIDS AS PRESCRIBED BY THE NATIONAL PLUMBING CODE OF THE PHILIPPINES.

B. DRAWING SPECIFICATION

THE DRAWINGS AND SPECIFICATIONS SHALL BE CONSIDERED COORDINATIVE. ANYTHING NOT SHOWN ON THE PLANS BUT SPECIFIED SHALL BE PART OF THE WORK.

C. ALTERNATION OF PLANS AND CHANGE IN BUILDING MATERIALS

NO ALTERATION ON THE PLAN AND CHANGE OF THE MATERIALS SHALL BE WITHOUT FIRST CONSULTING THE ENGINEER-IN-CHARGE.

D. GOOD AND PROPER ENGINEERING PRACTICE SHALL BE THE GUIDELINES FOR THE CONSTRUCTIONS OF UNSPECIFIED ITEMS OF WORKS.

MATERIALS

1. PVC (POLY VINYL CHLORIDE) PIPES AND FITTINGS FOR SOIL, WASTE AND VENT PIPES
2. BRONZE GATE VALVE " CRANE PN-36"
3. POLYPROPYLENE PIPES AND FITTINGS - ALL COLD WATERLINES (FUSIOTHERM)
4. WATER CLOSET - HCG BRAND (WALL-HUNG . UNDER COUNTER TYPE)
5. LAVATORIES -HCG BRAND (WALL-HUNG / UNDER COUNTER TYPE)
6. KITCHEN SINK -STAINLESS W/ FITTINGS & ACCESSORIES.
7. SOAP AND TISSUE HOLDER- PORCELAIN.
8. TOWEL BARS AND HOOK - STAINLESS STEEL
9. DRAINS: FLOOR DRAINS SHALL BE HIGH GRADE STRONG, TOUGH AND EVEN-GRAINED METALS EITH ADJUSTABLE SCREWED COVER NICKEL PLATED
10. SHOWER HEAD AND VALVE MUST BE HCG.
11. USE FLOOR FALNGE FOR WATER CLOSET.

INSTALLATION

1. INSTALL PLUMBING FIXTURES FREE AND OPEN TO AFFORD EASY ACCESS FOR CLEANING.
2. INSTALL PLUMBING FIXTURE AS INDICATED ON DRAWINGS FURNISHING ALL BRACKET, CLEATS , PLATES AND ANCHORS REQUIRED TO SUPPORT FIXTURES RIGIDLY IN PLACE.
3. INSTALL ALL FIXTURES AND ACCESSORIES IN LOCATIONS DIRECTED IN ACCORDANCE WITH MANUFACTURE'S INSTRUCTION, MINIMIZING PIPE FITTINGS.
4. PROTECT ITEMS WITH APPROVAL MEANS TO MAINTAIN PERFECT CONDITIONS, REMOVE WORK DAMAGED OR DEFECTIVE AND REPLACED WITH PERFECT WORK WITHOUT EXTRA COST TO OWNER.
5. ALL G.I SOIL, WASTE AND DRAINAGE PIPE SHALL HAVE MINIMUM SLOPE OF 2%
6. VERTICAL PIPE SHALL BE SECURED STRONGLY BY HOOKS TO BUILDING FRAMING. PROVIDE SUITABLE BRACKET OR CHAIRS AT THE FLOORS FROM WHICH THEY START. WHERE AN END OR CIRCUIT VENT PIPE FROM ANY FIXTURE OR LINE OF FIXTURE IN CONNECTION SHALL BE AT LEAST FOUR (4) FET 1.20M ABOVE THE FLOOR LINE IN WHICH FIXTURES LOCATED, TO PREVENT USE OF ANY VENT LINE AS A WASTE. HORIZONTAL PIPE SHALL BE SUPPORTED BY WELL SECURED STRAP HANGERS.
7. G.I PIPES - USE TEFLON TAPE OR WHITE LEAD WHEN TIGHTENING THREADED JOINTS.
8. MAIN VENTS PIPE MUST BE 2" DIA. PVC PIPE.

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PLUMBING NOTES		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01	

ROUGH IN

1. PROVIDE CORRECTLY LOCATED OPENING OF PROPER SIZE WHRE REQUIRED IN WALLS AND FLOORS FOR PASSED OF PIPES.
2. ALL ITEMS TO BE EMBEDDED IN CONCRETE SHALL BE THOROUGHLY CLEAN AND FREE FROM ALL RUST, SCALE AND PAINT.
3. ALL CHANGES IN PIPES SIZES ON SOIL, WASH AND DRAIN LINES SHALL BE PROVIDED WITH REDUCING FITTINGS OR RECESSES REDUCERS FOR CHANGES IN PIPE SIZESPROVIDE REDUCING FITTINGS.
4. HIGH CORROSIVE NATURE NATURE GROUND WITHIN SITE SHALL BE TAKEN INTO ACCOUNT BY PLUMBER. PROTECTIVE FEATURES SHALL BE INSTALLED TO PREVENT CORROSION OR ALL WATER PIPES INSTALLED UNDERGROUND.
5. EXTEND PIPING TO ALL FIXTURES, OUTLET AND EQUIPMENT FROM GATE VALVES INSTALLED IN THE BRANCH NEAR THE RISER.
6. ALL PIPES SHALL BE CUT ACCURATELY TO MEASUREMENTS, AND WORKED INTO PLACE WITHOUT SPRINGING OR FORCING .
7. CORE SHALL BE TAKEN AS NOT WEAKER STRUCTURAL PORTIONS OF THE BUILDING.
8. HYDRO TESTING AT LEAST (!25 PSI) OR (125 LBS/SQUARE INCH).
9. HYDRO TESTING AT LEAST 24 HOURS STANDING PRESSURE.
10. ALL SANITARY LINES AT THE LEAK TEST FREE/ A LEAST 24 HOUR FULL OF WATER.
11. HANGERS AND SUPPORT STRICTLY IMPLEMENTED.

PLUMBING NOTES

ALL PLUMBING WORKS HEREIN SHALL BE EXECUTED ACCORDING TO THE REQUIREMENTS OF THE PHILIPPINE NATIONAL PLUMBING CODE AND THE RULES AND REGULATIONS OF EXISTING LOCAL CODES AND ORDINANCES.

REFER TO ALL ELECTRICAL, STRUCTURAL AND ARCHITECTURAL PLANS AND SPECIFICATIONS AND INVESTIGATE ALL POSSIBLE INTER-FRENCES AND CONDITIONS AFFECTING THE PLUMBING WORKS.

IT IS NOT INTENDED THAT THE DRAWING SHALL SHOW EVERY PIPEFITTING, VALUE, APPLIANCES OTHER. FURNISH AND INSTALL IF NECESSARY ALL SUCH ITEM, WHETHER SPECIFICALLY MENTIONED OR NOT OR INDICATED ON DRAWINGS TO COMPLETE THE SYSTEM IN ACCORDANCE WITH THE BEST PRACTICE OF THE TRADE AND TO THE SATISFACTION OF THE ARCHITECT.

WHERE A BRANCH SERVING MORE THAN ONE FIXTURE INCREASE THE SIZE OF THE BRANCH INCREASE PROPORTIONATELY.

PROVIDE MATERIAL THAT ARE NEW & THAT CONFORM WITH THE STANDARD OF UNDER-WRITERS LABORATORIES INCORPORATED.

SUBMIT SAMPLES OF MATERIAL FOR APPROVAL AS REQUIRED BY THE ARCHITECT.

CONFORM ALL APPLICABLE PIPES AND MATERIALS FOR VARIOUS SERVICES TO STANDARDS

INSTALL ALL PLUMBING FIXTURES FREE AND OPEN IN MANNER FOR ACCESS FOR CLEANING, FURNISH BRACKETS, CLEATS AND ANCHOR REQUIRED TO SUPPORT THE FIXTURES RIGIDLY IN PLACE.

KEEP AWAY AT SUFFICIENT DISTANCE BUT NOT LESS THAN 1/2" (12.7mm), LL SERVICE PIPES, VALVES AND FITTINGS FROM SURFACES AND LOCATIONS WHICH MAY REQUIRE FINISH COATS AND COVERING.

TECHNICAL STANDARD DETAILS

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		PLUMBING NOTES	REVISIONS BY / DATE
	SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 02

ELECTRICAL NOTES

GENERAL NOTES

1. THE ELECTRICAL INSTALLATION HEREIN SHALL BE DONE IN ACCORDANCE WITH THE PLANS AND SPECIFICATION. THE APPLICABLE PROVISIONS OF THE LATEST EDITIONS OF THE PHILIPPINE ELECTRICAL CODE, THE RULES AND REGULATIONS OF THE LOCAL ENFORCING AUTHORITY AND THE REQUIREMENT OF THE LOCAL POWER COMPANY.

2. THE ELECTRICAL WORKS HEREIN SHALL BE EXECUTED BY EXPERIENCED MEN UNDER THE DIRECT SUPERVISION OF A DULY LICENSED ELECTRICAL ENGINEER. WORKS ARE NEATLY PLACED, SECURELY FASTENED AND PROPERLY FINISH.

3. SERVICE ENTRANCE SHALL BE AS PER SINGLE LINE POWER RISER DIAGRAM

4. ALL MATERIALS SHALL BE NEW AND APPROVED TYPE AND SHALL CONFORM WITH THE PROVISIONS OF UL, INC.

5. ALL REVISIONS AND CHANGES IN THE PLAN SHALL BE IN DIRECT OR WRITTEN APPROVAL OF THE DESIGN ENGINEER.

6. ALL CONDUIT SHALL BE PVC EXCEPT SERVICE ENTRANCE WHICH SHALL BE RSC WHICH SHALL BE CONCRETE ENCASED.

7. ELECTRICAL TRADE SIZE SHALL BE MINIMUM 15mmø AND IN NO CASE SHALL BE MORE THAN THE EQUIVALENT 0F 4-QUARTER BENDS IN ANY RUN.

8. CONDUIT SHALL BE PROTECTED AGAINST DAMAGE DURING CONSTRUCTION. ALL ENDS OF CONDUITS SHALL BE PLUGGED TO PREVENT ENTRANCE OF WATER, MOISTURE, FOREIGN MATERIALS AFTER INSTALLATION.

9. ALL UNDERGROUND CONDUIT SHALL BE CONCRETE ENCASED 50mm ALL AROUND. DEPTH OF 600MM BELOW FINISHED GRADE LINE PASSING THROUGH DRIVEWAY /PARKING AREA AND 300MM ON OTHER AREAS. A REMOVABLE CIRCUIT DIRECTORY SHALL BE PROVIDED FOR THE PANEL BOARD FOR BRANCH CIRCUIT NUMBER AND MARKING FOR EACH FUNCTION. CIRCUIT SHALL BE WIRED ACCORDING TO PANEL BOARD SCHEDULE.

10. CONTRACTOR SHALL PROVIDE WIRING PROVISIONS FOR THE FOLLOWING SPECIAL OUTLETS AND AUXILIARY EQUIPMENT
    A. TELEPHONE / PABX SYSTEM
    B. ACU OUTLET

11. UPON COMPLETION OF ELECTRICAL CONSTRUCTION WORKS, THE FOLLOWING TEST SHALL BE PERFORMED BY CONTRACTOR. ALL TEST SHALL BE WITNESSED VY THE DESIGN ENGINEER/ PROJECT ENGINEER.
    A. INSULATION RESISTANCE TESTS
    B. GROUND RESISTANCE TESTS

GENERAL SPECIFICATIONS

1. ALL ELECTRICAL INSTALLATIONS TO BE UNDERTAKEN SHALL BE CONFORM WITH THE LATEST EDITION OF THE PHILIPPINE ELECTRICAL CODE, THE NATIONAL ELECTRICAL CODE, RULES AND REGULATIONS OF THE ENFORCING AUTHORITY AND THE POWER UTILITY COMPANY.

2. ALL AUXILIARY WORKS SHOULD CONFORM TO THE NATIONAL BUILDING CODE& STANDARD, PHILIPPINE SAFETY CODE AND ELECTRONICS & COMMUNICATIONS ENGINEERING LAWS.

3. ALL VOICE AND DATA LINES SHALL CONFORM TO EIA/TIA-568 & ISO /IEC 11801 STANDARDS

4. ALL AUXILIARY WORKS EQUIPMENT, CABINETS, TERMINAL BLOCKS, ANTENNA 7 ETC., SHOULD HAVE A GROUND SEPARATE FROM THAT OF THE ELECRICAL GROUND SYSTEM WITH A VALUE OF 25 OHMS.

5. THE ELECTRIC SERVICE ENTRANCE SHALL BE 3-PHASE. 3-WIRE, 240V, 60 Hz.

6. ALL BURIED CONDUITS SHOULD BE PVC PIPES ELECTRICAL GRADE AND ALL ABOVE FLOOR CONDUIT SHOULD BE METALLIC CONDUIT.

7. THE ELECTRICAL WIRING INSTALLATION SHALL BE DONE IN RIGID METAL CONDUIT, FLEXIBLE CONDUITS SHALL BE USED WHERE REQUIRED. MINIMUM SIZE FOR ALL CONDUIT SHALL BE 15mm VIA ELECTRICAL TRADE SIZE FOR METAL CONDUIT, MATSUSHITA KOREAN STEEL PIPE OR NIPPON PIPE BRAND SHALL BE USED

8. ALL WIRE SHALL BE COPPER AND THERMOPLASTIC INSULATED TYPE "THHN" OR "THW" UNLESS OTHERWISE INDICATED. THE MINIMUM SIZE FOR POWER AND LIGHTING SHALL BE 3.5mm^2.

9. THE CONTRACTOR SHALL VERIFY AND ORIENT THE ACTUAL LOCATION OF SERVICE ENTRANCE FOR CONNECTION TO THE POWER SUPPLY, AND ALSO THE ACTUAL LOCATION OF TELEPHONE SYSTEM ENTRANCE FOR CONNECTION TO THE LOCAL TELEPHONE CABLE FACILITIES.

TECHNICAL STANDARD DETAILS

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		ELECTRICAL NOTES	REVISIONS BY / DATE
	SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01

10. ALL PIPE SLEEVES SHALL BE PROVIDED WITH PROPER SUPPORT- OR ANCHORAGE NECESSARY FOR PERMANENT CONNECTION WITH CONCRETE WALLING OR BEAM.

11. ALL SERVICE EQUIPMENT , SWITCHES PANEL BOARDS , LIGHTING FIXTURE AND ALL NON-CURRENT CARRYING METAL PARTS SHALL BE PROPERLY GROUNDED IN ACCORDANCE WITH THE LATEST EDITION OF PHILIPPINE ELECTRICAL CODE.

12. ALL 20-AMPERE CIRCUIT HOMERUNS TO PANEL BOARDS MORE THAN 30 METERS IN LENGTH SHALL BE 5.5mm² UNLESS OTHERWISE SPECIFIED.

13. ALL FEEDERS SHALL BE INSTALLED AS INDICATED ON PLANS BRANCH CIRCUIT HOMERUN WIRES SHALL BE INSTALLED IN INDIVIDUAL HOMERUN.

14. ANY DISCREPANCY IN LOCATION AND RATINGS OF EQUIPMENT AND APPARATUS SHALL BE VERIFIED WITH THE OWNER OR ANY OF HIS REPRESENTATIVES AND CHANGES SHALL BE MADE ACCORDINGLY.

15. ALL MATERIALS TO BE USED AND THE EQUIPMENT TO BE INSTALLED SHALL BE BRAND NEW AND MUST BE OF THE APPROVED TYPE. FOR THE PARTICULAR LOCATION AND PURPOSE INTENDED.

16. ALL FLUORESCENT LAMP FIXTURE SHALL HAVE NORMAL POWER FACTOR AND RAPID START BALLAST AND LAMPS SHALL BE WARM WITHE THROUGHOUT UNLESS OTHERWISE SPECIFIED BY THE ARCHITECT.

17. THE MOUNTING HEIGHT OF WIRING DEVICE WALL WAS AS FOLLOWS

A.) LIGHT SWITCHES	1200mm ABOVE FINISH FLOOR LINE
B.) CONVENIENCE OUTLET	300mm ABOVE FINISH FLOOR LINE
C.) EMERGENCY LIGHT OUTLET	2400mm ABOVE FINISH FLOOR LINE
D.) PANEL BOARDS AND CABINET	1400mm ABOVE FINISH FLOOR LINE

18. ALL MOUNTING HEIGHT SHALL BE SUBJECT TO ARCHITECTS APPROVAL PRIOR TO INSTALLATION

19. FOR EACH SPARE BRANCH CIRCUIT IN PANELBOARD, PROVIDE ONE 20mmø EMPTY CONDUIT TERMINATED TO 100mm OCTAGONAL BOX ABOVE CEILING.

20. PROVIDE PULL WIRES IN ALL SPARE DUCT AND EMPTY CONDUITS.

21. SHOULD THERE BE UNAVOIDABLE SITUATIONS LIKE PARALLEL CONDUITS WITH ELECTRICAL WORKS AND THE MINIMUM DISTANCE OF 1 METER IS NOT APPLICABLE, EITHER THE ELECTRICAL WIRES OR THE AUXILIARY CABLES MUST BE ENCLOSED IN A METALLIC CONDUIT.

22. SHOULD THERE BE UNAVOIDABLE SITUATIONS LIKE PARALLEL CONDUITS WITH ELECTRICAL WORKS AND THE MINIMUM DISTANCE OF 1 METER IS NOT APPLICABLE, EITHER ELECTRICAL WIRES OR THE AUXILIARY CABLES MUST BE ENCLOSED IN AMETALLIC CONDUIT AND A GROUNDING CABLE SHOULD BE USED.

23. ALL ENTRANCE FACILITIES MUST NOT CONFORM TO SINGLE UTILITY COMPANY ENTRY ONLY BUT MUST PROVIDE SPARE FOR OTHER UTILITY COMPANIES.

24. ALL ELECTRICAL INSTALLATION TO BE UNDERTAKEN SHALL BE UNDER A DIRECT AND IMMEDIATE SUPERVISION OF A DULY LICENSED PROFESSIONAL ELECTRICAL ENGINEER.

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

ELECTRICAL NOTES

SCALE: N.T.S | BY: DESIGN UNIT | DATE: FEBRUARY 2021 | DWG. NO.: 02

REVISIONS	
BY	DATE

MATERIALS AND WORKMANSHIP

1 SAFEGUARDING OF EQUIPMENT, MATERILAS AND WORK

THE CONTRACTOR SHALL PROPERLY SAFEGUARD ALL EQUIPMENT, MATERIALS AND WORK AGAINST LOSS, DAMAGES, MALICIOUS MISCHIEF, OR TAMPERING BY UNAUTHORIZED PERSONS UNTIL ACCEPTANCE OF THE WORK BY THE OWNER AND ADMINISTRATION. LOCKED AND COVERED STORAGE OR CONTINUOUS SURVEILLANCE BY A WATCHMAN SHALL BE PROVIDED IF REQUIRED TO ACCOMPLISH THIS PURPOSE.

2 NEW MATERIALS AND EQUIPMENTS

UNLESS OTHERWISE SPECIFICALLY SHOWN, OR PERMITTED BY THE ENGINEER, ALL MATERIALS AND EQUIPMENT INCORPORATED IN THE WORK SHALL BE NEW AND OF CURRENT MANUFACTURE. THE ENGINEER MAY REQUEST THE CONTRACTOR TO FURNISH MANUFACTURER'S CERTIFICATE TO THIS EFFECT.

3 CONTRACTOR'S UTILITIES

A. UNLESS OTHERWISE SPECIFIED IN THE SPECIAL PROVISIONS, THE OWNER SHALL FURNISH, WITHOUT CHARGE, REASONABLE QUANTITIES OF WATER REQUIRED BY THE CONTRACTOR IN THE PERFORMANCE OF THE WORK UNDER THE CONTRACT. HOWEVER, THE CONTRACTOR SHALL PROVIDE THE FACILITIES NECESSARY TO CONVEY THE WATER FROM THE OWNER DESIGNATED SOURCE TO THE POINTS OF USE.

B. THE CONTRACTOR SHALL PROVIDE HIS OWN TELEPHONE AND ALL ELECTRIC POWER REQUIRED IN THE PERFORMANCE OF THE WORK UNDER THE CONTRACT, AND SHALL PAY ALL INSTALLATION CHARGES AND MONTHLY BILLS IN CONNECTION HEREWITH.

4 TITLE TO MATERIALS FOUND ON THE WORKS

THE OWNER RESERVES THE RIGHT TO RETAIN TITLE TO ALL SOILS, STONE, SAND, GRAVEL AND OTHER MATERIALS DEVELOPED AND OBTAINED FROM THE EXCAVATION AND FROM OTHER OPERATIONS CONNECTED WITH THE WORK. UNLESS OTHERWISE SPECIFIED IN THE SPECIAL PROVISIONS, NEITHER THE CONTRACTOR NOR ANY SUB-CONTRACTOR SHALL HAVE ANY RIGHT, TITLE OR INTEREST IN OR TO ANY SUCH MATERIALS. THE CONTRACTOR WILL BE PERMITTED TO USE IN HIS WORK, WITHOUT CHARGE, ANY SUCH MATERIALS WHICH MEET THE REQUIREMENTS OF THE SPECIFICATIONS AND DRAWINGS.

5 DEFECTIVE EQUIPMENTS, MATERIALS OR WORK

A. INSPECTION OF THE WORK SHALL NOT RELIEVE THE CONTRACTOR OF ANY OF HIS OBLIGATIONS UNDER THE CONTRACT. EVEN THOUGH THE EQUIPMENT, MATERIALS OR WORK REQUIRED TO BE PROVIDED UNDER THE CONTRACT HAVE BEEN INSPECTED, ACCEPTED, AND ESTIMATED FOR PAYMENT, THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, REPLACE OR REPAIR ANY SUCH EQUIPMENT, MATERIALS, OR WORK FOUND TO BE DEFECTIVE OR OTHERWISE NOT TO COMPLY WITH THE REQUIREMENTS OF THE CONTRACT UP TO THE END OF THE MAINTENANCE AND GUARANTEE PERIOD.

B. ANY EQUIPMENT OR MATERIALS BROUGHT UPON THE JOB SITE BY THE CONTRACTOR AND SUBSEQUENTLY REJECTED BY THE ENGINEER AS NOT COMPLYING WITH THE REQUIREMENTS OF THE CONTRACT SHALL BE REMOVED IMMEDIATELY BY THE CONTRACTOR TO A SATISFACTORY DISTANCE FROM THE JOB SITE.

C. IF THE CONTRACTOR SHALL FAIL TO REPAIR OR REPLACE UNSATISFACTORY EQUIPMENT, MATERIALS, OR WORK, OR TO REMOVE UNSATISFACTORY EQUIPMENT O OR MATERIALS FROM THE JOB SITE, WITHIN TEN (10) CALENDAR DAYS AFTER BEING ORDERED TO DO SO BY THE ENGINEER, THE ENGINEER, ACTING ON BEHALF OF THE OWNER, MAY MAKE THE ORDERED REPAIRS OR REMOVE THE CONDEMENED EQUIPMENT OR MATERIALS AND THE OWNER SHALL DEDUCT THE COST THEREOF FROM ANY MONEYS DUE OR TO BECOME DUE THE CONTRACTOR.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **MATERIALS AND WORKMANSHIP**		**REVISIONS**
					BY: / **DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY:** PDD	**JANUARY 2021**	**1**	

6 RUBBISH CONTROL

DURING THE PROGRESS OF THE WORK, THE CONTRACTOR SHALL KEEP THE SITE OF THE WORK AND OTHER AREAS USED BY HIM IN A NEAT AND CLEAN CONDITION, AND FROM ANY ACCUMULATION OF RUBBISH.

7 DUST CONTROL

THE CONTRACTOR SHALL AT ALL TIMES CONDUCT HIS WORK SO AS TO AVOID UNNECESSARY DUST. HE SHALL PROVIDE ADEQUATE EQUIPMENT AND WATER AS DETERMINED BY THE ENGINEER TO BE NECESSARY FOR ACCOMPLISHMENT OF THIS OBJECTIVE.

8 CLEANING UP

THE CONTRACTOR SHALL PROMPTLY REMOVE FROM THE VICINITY OF THE COMPLETE WORK, ALL RUBBISH, UNUSED MATERIALS, CONCRETE FORMS, EQUIPMENTS, AND TEMPORARY STRUCTURES USED DURING CONSTRUCTION. ADDITIONAL CLEAN-UP WORK, IF PROVIDED IN THE SPECIAL PROVISIONS, SHALL BE PERFORMED BY THE CONTRACTOR.

9 CHARACTER OF WORKMEN

ONLY QUALIFIED PERSONNEL AND SKILLED WORKMEN SHALL BE EMPLOYED ON THE SITE EXCEPT IN POSITIONS NORMALLY OCCUPIED BY UNSKILLED LABOR. WHEN REQUIRED IN WRITING BY THE ENGINEER, THE CONTRACTOR OR ANY SUB-CONTRACTOR SHALL DISCHARGE ANY PERSON WHO IS, IN THE OPINION OF THE ENGINEER, INCOMPETENT, DISORDERLY OR OTHERWISE UNSATISFACTORY, AND SHALL NOT AGAIN EMPLOY SUCH DISCHARGED PERSON ON THE WORK EXCEPT WITH THE WRITTEN CONSENT OF THE ENGINEER. SUCH DISCHARGED PERSON SHALL NOT BE THE BASIS OF ANY CLAIM FOR DAMAGES AGAINST THE OWNER OR ANY OF HI AGENTS.

IF THE CONTRACTOR PERMITS SUCH A PERSON ON THE WORK SITE, WITHOUT THE CONSENT OF THE ENGINEER, THIS ALONE SHALL BE SUFFICIENT TO IMMEDIATELY SUSPEND THE CONTRACT UNTIL THE ENGINEER'S INSTRUCTIONS HAVE BEEN FULFILLED.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** MATERIALS AND WORKMANSHIP	**REVISIONS** BY:	DATE:
			DATE:	**NO.**	
	SCALE: NTS	**BY:** PDD	JANUARY 2021	2	

VALVES

1 GENERAL

a. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL VALVES AS SPECIFIED HEREIN AND AS SHOWN ON THE DRAWINGS. ALL VALVES SHALL BE NEW AND CURRENT MANUFACTURER.
b. FLANGED VALVES MAY BE RAISED OR PLAIN FACED SERRATED GASKET SURFACE. FLANGES OF VALVES FOR WATER WORKING PRESSURE OF 1.2 MPA (175 PSI) OR LESS SHALL BE FACED AND DRILLED TO 125 LB. AMERICAN STANDARD DIMENSION; FLANGES OF VALVES FOR WATER WORKING PRESSURES GREATER THAN 1.2 MPA (175 PSI) SHALL BE FACED AND DRILLED TO 250 LB. AMERICAN STANDARD DIMENSION.
c. EACH VALVES BODY SHALL BE TESTED UNDER A TEST PRESSURE EQUAL TO TWICE ITS DESIGN WATER WORKING PRESSURE, EXCEPT THAT THE GATE VALVES SHALL BE TESTED IN ACCORDANCE WITH "STANDARD GATE VALVES FOR ORDINARY WATER WORKS SERVICE" (AWWA C-500).
d. ALL BURIED VALVES SHALL BE PROVIDED WITH EXTERIOR PROTECTIVE COATING IN ACCORDANCE WITH THE PROVISIONS OF DIVISION 27, PAINTING AND COATING.
e. WHEN THE OPERATING NUT OF BURIED VALVE IS LOCATED MORE THAN 1.5 METERS (5 FT) BELOW THE GROUND SURFACE, THE CONTRACTOR SHALL PROVIDE AND INSTALL IN THE VALVE BOX A STEM EXTENSION. THE BOTTOM OF THE EXTENSION SHALL BE SECURELY FASTENED TO THE OPERATING NUT OF THE VALVE, AND THE TOP OF THE EXTENSION SHALL BE CENTERED IN THE VALVE BOX.
f. THE CONTRACTOR SHALL FURNISH SIX (6) TEE-HANDLE VALVE KEY OF SUFFICIENT LENGTH TO PERMIT OPERATION OF ALL BURIED VALVES REGARDLESS OF DEPTH, BY OPERATORS OF AVERAGE HEIGHT WORKING IN NORMAL POSITION.
g. VALVE OPERATION SHALL TURN COUNTER CLOCKWISE TO OPEN.
h. SHOP DRAWINGS FOR ALL VALVES SHALL BE FURNISH IN ACCORDANCE WITH SECTION7.02.

2 GATE VALVES

A. VALVES THIS SECTION APPLIES TO GATE VALVES 75 MM (3 IN) THROUGH 300 MMM (12 IN) IN SIZE ALL VALVES SHALL CONFORM TO THE "STANDARD FOR GATE VALVES FOR ORDINARY WATER WORKS SERVICES" (AWWA C-500). GATE VALVES WHERE PIPELINE DESIGN PRESSURE IS 1.0 MPA (150 PSI) OR LESS SHALL BE DESIGNED FOR A MINIMUM WATER WORKING PRESSURE 1.0 MPA (150 PSI) AND SHALL BE CAST IRON BODIED, BOTTOM-WEDGING, DOUBLE DISC WITH PARALLEL SEATS. DISC SHALL BE CAST IRON WITH BRONZE DISC RINGS AND SEAT RING SHALL BE BRONZE AND REPLACEABLE. THE VALVE SHALL BE NON-RISING STEM WITH MINIMUM OF TWO "O" RINGS SEALS (AT LEAST ONE ABOVE THE STEM COLLAR), OR RISING STEM WHEN SHOWN ON THE DRAWINGS. THE VALVES SHALL HAVE 50MM (2 IN) SQUARE OPERATING NUT WITH A CAST ARROW SHOWING DIRECTION IN WHICH THE NUT IS TO BE TURNED TO OPEN THE VALVE. VALVE SHALL BE CONSTRUCTED TO PERMIT THE REPLACEMENT OF THE "O" RINGS ABOVE THE STEM COLLAR UNDER FULL WORKING WATER PRESSURE WITH THE VALVE IN THE FULL OPEN POSITION. THE VALVE SHALL BE COATED IN ACCORDANCE WITH DIVISION 27- PAINTING AND COATINGS.

RELIABILITY TESTING

WHENEVER CONDITION WARRANTS, LWUA MAY REQUIRE A RELIABILITY TEST TO BE CONDUCTED IN THE FOLLOWING MANNER:

FOR EVERY SIZE AND TYPE OF WEDGING MECHANISM, TWO SAMPLE GATE VALVES REPRESENTING EACH LOT OF ONE HUNDRED (100) PIECES OR LESS SHALL BE TESTED FOR RELIABILITY OF OPERATION. THIS TEST IS IN ADDITION TO THOSE REQUIRED UNDER SECTION 28.2 AND 28.3 OF AWWA C-500.

AFTER GATE VALVES HAVE PASSED THE REQUIRED TESTS UNDER THE AFORE-MENTIONED STANDARD, SAMPLE GATE VALVES SHALL BE SUBJECTED TO FATIGUE STRESSES INDUCED BY UNBALANCED WORKING WATER PRESSURE. AT AN INITIAL FULLY OPEN POSITION, PRESSURE AT 1.0 MPA (150 PSI) MINIMUM SHALL BE INTRODUCED AT ONE END OF THE VALVE. AT THE SAME PRESSURE THE VALVE SHALL BE SLOWLY CLOSED AND HELD IN THAT POSITION FOR TWENTY (20

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **VALVES**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**1**		

SECONDS) AFTER WHICH IT IS AGAIN OPENED FULLY. OPENING AND CLOSING OF THE VALVE SHALL BE REPEATED FIFTY (50) TIMES ON EACH END, THE PRESSURE OF 1.0 MPA (150 PSI)

SUBSEQUENT EXAMINATION OF THE OPERATING PARTS, I.E. , BODY SEAT RINGS DISC RINGS, STEM, STEM THREADS, STEM NUTS AND STEM PACKING MUST SHOW NO INDICATION OF FAILURE OR OTHER DEFECTS THAT ADVERSELY AFFECT THE PROPER FUNCTIONING OF PARTS AND OPERATION OF THE VALVE.

AFTER THIS TEST, THE STUFFING BOX SHALL BE REMOVED FROM THE BONNET AND THE O-RINGS ABOVE THE STEM COLLAR SHALL REPLACE UNDER FULL WORKING WATER PRESSURE WITH THE VALVE IN THE FULLY OPEN POSITION.

IN THE EVENT THAT ANY OF THE FIRST TWO SAMPLES TESTED FAIL TO PASS THE TEST, A SECOND SAMPLE OF FOUR SHALL BE TESTED. FAILURE OF ANY OF ONE IN THE SECOND SAMPLE WILL BE GROUNDS FOR REJECTION OF THE WHOLE LOT. IF ALL FOUR IN THE SECOND SAMPLE PASS, THE LOT WILL BE ACCEPTED.

3 BUTTERFLY VALVES

A. VALVES

BUTTERFLY VALVES SHALL CONFORM TO THE "AWWA STANDARD FOR RUBBER-SEATED BUTTERFLY VALVES: (AWWA C-504), SUBJECT TO THE FOLLOWING REQUIREMENTS: VALVES SHALL BE OF CLASS 150B, AND UNLESS OTHERWISE SHOWN MAY BE EITHER SHORT BODIED OR LONG BODIED. SHAFT SEALS SHALL BE DESIGNED FOR USE WITH STANDARD SPLIT V TYPE PACKING OR "O" RING SEALS. THE VALVE ENDS SHALL BE EITHER FLANGED OR OF THE WATER TYPE EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWINGS.

B. OPERATORS

OPERATORS SHALL CONFORM TO THE ABOVE REFERENCED AWWA STANDARD, SUBJECT TO THE FOLLOWING REQUIREMENTS: VALVES SHALL BE EQUIPPED WITH 50 MM (2 IN) SQUARE OPERATING NUTS OR WITH HAND WHEELS 600 MM (24 IN) MAXIMUM DIAMETER AS SHOWN, AND SHALL FURNISH A WRITTEN CERTIFICATION STATING THAT THE OPERATOR TORQUE HAS BEEN COMPUTED AND THE OPERATORS HAVE BEEN SIZED TO MEET THE FULL AWWA CLASS SPECIFIED IN SUBJECTION (A) HEREIN.

4 CHECK VALVES

CHECK VALVES 100 MM (4 IN) AND LARGER SHALL HAVE FLANGED CONNECTION AND BE OF THE SWING TYPE WITH OUTSIDE LEVER AND WEIGHT. THE VALVES SHALL BE DESIGNED FOR A MINIMUM WATER WORKING PRESSURE OF 1.0 MPA (150 PSI) AND SHALL HAVE 125 LB AMERICAN STANDARD FLANGES. VALVE BODIES SHALL BE CAST IRON OR STEEL. THE VALVES SHALL HAVE BRONZE GATE RINGS AND SEAT RINGS AND TYPE 18-8 STAINLESS STEEL HINGE PINS. THE CHECK VALVES SHALL BE DESIGNED SO THAT DISC AND BODY SEAT MAY BE EASILY REMOVED WITHOUT REMOVING VALVE FROM THE LINE. THE VALVES SHALL BE COATED IN ACCORDANCE WITH DIVISION 27.

5 AIR-VACUUM AND AIR RELEASE VALVES

AIR – VACUUM AND AIR RELEASE VALVES SHALL HAVE SCREWED CONNECTIONS. THE BODIES SHALL BE OF HIGH-STRENGTH CAST IRON AND THE FLOAT SHALL BE OF STAINLESS STEEL. FLOAT GUIDES BUSHING, LEVER PEN AND ALL OTHER INTERNAL PARTS SHALL BE CONSTRUCTED OF STAINLESS STEEL BRONZE. SEAT WASHER AND GASKET SHALL BE OF A MATERIAL INSURING WATER-TIGHTNESS WITH MINIMUM OF MAINTENANCE. VALVES SHALL BE DESIGNED FOR A WATER WORKING PRESSURE OF NOT LESS THAN 1.0MPA (150 PSI). ALL VALVES SHALL BE DESIGNED TO AUTOMATICALLY OPERATE SO THAT THEY WILL (A) POSITIVELY OPEN UNDER ATMOSPHERIC PRESSURE AS WATER DRAINS FROM THE BODY OF THE VALVE IT WILL ALLOW AIR TO FLOW INTO THE PIPE WHILE IT IS BEING EMPTIED, (B) POSITIVELY CLOSE AS WATER, UNDER LOW HEAD, FILLS THE BODY OF THE VALVE, (C) NOT BLOW SHUT UNDER HIGH VELOCITY AIR DISCHARGE, AND (D) PERMIT THE ESCAPE OF ACCUMULATED AIR UNDER PRESSURE WHILE THE PIPE IS IN OPERATION.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **VALVES**	**REVISIONS**	
				BY:	**DATE:**
			DATE:	**NO.**	
				2	
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**		

6 AIR AND VACUUM VALVES

AIR VACUUM VALVES OF SIZES UP TO AND INCLUDING 75 MM (3 IN) IN DIAMETER SHALL HAVE SCREWED CONNECTION EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWINGS. THE BODIES SHALL E OF HIGH STRENGTH CAST IRON AND THE FLOAT SHALL BE OF STAINLESS STEEL. ALL INTERNAL PARTS SUCH AS FLOAT GUIDES, BUSHINGS AND BAFFLE RETAINING SCREWS, ETC., SHALL BE EITHER STAINLESS STEEL OR BRONZE. SEAT WAS HERS AND GASKET SHALL BE OF A MATERIAL INSURING WATER TIGHTNESS WITH A MINIMUM OF MAINTENANCE. VALVES SHALL BE DESIGNED FOR WATER TIGHTNESS WITH A MINIMUM OF MAINTENANCE. VALVES SHALL BE DESIGNED FOR A WATER WORKING PRESSURE OF NOT LESS THAN 1.0 MPA (150 PSI). ALL VALVES SHALL BE DESIGNED TO AUTOMATICALLY OPERATE SO THAT THEY WILL (A) POSITIVELY OPEN UNDER ATMOSPHERIC PRESSURE (AS WATER DRAINS FROM THE BODY OF THE VALVE IT WILL ALLOW AIR TO FLOW INTO THE PIPE WHILE IT IS BEING EMPTIED, (B) POSITIVELY (C) NOT BLOW SHUT UNDER HIGH VELOCITY DISCHARGE. THE VALVE SHALL BE SIMILAR TO ACPE MODEL NO. 141, NO. 142, NO. 144 OR NO. 146 (DEPENDING ON SIZE SHOWN ON THE DRAWING).

7 AIR RELEASE VALVES

AIR RELEASE VALVE UP TO AND INCLUDING 75 MM (3 IN) IN DIAMETER SHALL HAVE SCREWED CONNECTION, EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWING AND SHALL BE DESIGNED FOR A WATER WORKING PRESSURE OF 1.0 MPA (150 PSI). THE BODY SHALL BE OF HIGH STRENGTH CAST IRON AND SHALL BE OF MATERIAL INSURING WATER TIGHTNESS WITH A MINIMUM OF MAINTENANCE. THE VALVE SHALL BE DESIGNED TO AUTOMATICALLY PERMIT THE ESCAPE OF ACCUMULATED AIR UNDER PRESSURE WHILE THE PIPE IS OPERATION. THE VALVES SHALL BE EITHER DIRECT OR LEVER OPERATING.

8 CORPORATION STOP

CORPORATION STOP SHALL BE AS SHOWN ON THE PLANS

9 MISCELLANEOUS SMALL VALVES

VALVES 50 MM (2 IN) AND SMALLER UNLESS OTHERWISE SHOWN, SHALL BE ALL BRONZE OR BRASS WITH SCREWED CONNECTION DESIGNED FOR A WATER WORKING PRESSURE NOT LESS THAN 1.0 <PA (150 PSI). GATE VALVES SHALL BE RISING STEMS WITH DOUBLE DISC AND PARALLEL SEATS.

10 PLUG VALVES

PLUG VALVES SHALL BE LUBRICATED 50 MM (2 IN) SEMI-STEEL STRAIGHTWAY VALVES WITH A WORKING PRESSURE OF 175 LBS. THE VALVE SHALL BE WRENCH OPERATED TWO-BOLT COVER TYPE WITH SCREWED ENDS. COMPLETE LOCKING DEVICE ASSEMBLY SHALL BE PROVIDED FOR EACH VALVE WHERE INDICATED ON THE DRAWINGS.

11 FLOAT VALVES

FLOAT VALVE SHALL FUNCTION AUTOMATICALLY TO OPEN WIDE WHEN LIQUID LEVEL REACHES A PREDETERMINED LOW POINT AND TO SHUT DRIP TIGHT WHEN A PREDETERMINED HIGH POINT IS REACHED. THE VALVE SHALL BE FLANGED CONNECTED.

12 ALTITUDE VALVES

THE VALVE SHALL CONTROL THE HIGH LEVEL IN THE RESERVOIR. IT SHALL BE VIABLE TO PROVIDE TWO-WAY FLOW. VALVE SHALL BE A NON-THROTTLING TYPE VALVE, AND REMAIN FULLY OPEN UNTIL MAXIMUM WATER ELEVATION IN THE RESERVOIR IS REACHED. IT SHALL CLOSE AT HIGH WATER LEVEL AND OPEN FOR RETURN FLOW WHEN PRESSURE AT THE VALVE INLET IS BELOW THE RESERVOIR PRESSURE.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **VALVES**	**REVISIONS**	
				BY:	**DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**	**3**	

13 PRESSURE REDUCING VALVE

THE PRESSURE REDUCING VALVE SHALL BE OF THE DIAPHRAGM TYPE EQUIPPED WITH A PILOT SPRING TO PROVIDE A RANGE OF DOWNSTREAM PRESSURE SETTING FROM ……MPA (……..PSI) TO …….MPA (…….PSI). THE VALVE SHALL BE SET FOR ……..(MPA) (……..PSI) AT THE FACTORY AND SHALL HAVE THE PRESSURE REDUCING VALVE SHALL BE DESIGNED FOR A MINIMUM WATER WORKING PRESSURE OF 1.0 MPA (150 PSI) AND SHALL BE FACTORY TESTED UNDER A HYDROSTATIC PRESSURE OF AT LEAST 2.0 MPA (300 PSI). THE VALVE BODY AND COVER SHALL BE CAST IRON MEETING THE REQUIREMENT OF ASTM A48. THE VALVE SHALL HAVE …… ENDS , AND THE VALVE DISC SHALL BE NON-METALLIC AND RENEWABLE. THE MAIN VALVE TRIM SHALL BE AT BRONZE AS SPECIFIED IN ASTM SPECIFICATION B62 AND THE VALVE SEAT SHALL BE REPLACEABLE. THE PILOT CONTROL SYSTEM SHALL BE OF BRASS WITH TYPE 18-8 STAINLESS STEEL TRIM. THE DIAPHRAGM SHALL BE OF HEAVILY REINFORCED SYNTHETIC RUBBER AND SHALL BE FULLY SUPPORTED BY THE VALVE BOD. THE VALVE SHALL BE COATED AS REQUIRED IN DIVISION 27 PAINTING AND COATING.

14 PRESSURE RELIEF VALVE

THE PRESSURE RELIEF VALVE SHALL BE OF THE DIAPHRAGM TYPE EQUIPPED WITH A PILOT VALVE SPRING. THE VALVE SHALL PROVIDE A RANGE OF PRESSURE RELIEF SETTING FROM …. MPA (….PSI) TO …..MPA (….PSI) AT THE FACTORY. THE VALVE SHALL BE DESIGNED FOR A WATER WORKING PRESSURE NOT LESS THAN 1.0 MPA (150 PSI) AND BE FACTORY TESTED UNDER A HYDROSTATIC PRESSURE OF AT LEAST 2.0 MPA (300 PSI). THE VALVE SHALL HAVE …….. ENDS, THE DICS SHALL BE NON-METALLIC AND RENEWABLE, AND THE VALVE SEAT SHALL BE REPLACEABLE. THE MAIN VALVE TRIM SHALL BE OF BRONZE CONFORMING TO ASTM SPECIFICATION B62. THE PILOT CONTROL SHALL BE FULLY SUPPORTED BY THE VALVE BODY. THE VALVE SHALL HAVE A ……. PATTERN AND SHALL BE COATED IN ACCORDANCE WITH DIVISION 27.

15 FLAP VALVES

FLAP VALVES SHALL BE OF CAST IRON, HAVING BRONZE SEATING FACES AND STAINLESS STEEL LOW ZINC BRONZE HINGE PINS. THE FLAP VALVES SHALL HAVE FLANGED OR SPIGOT FRAMES AS SHOWN ON THE DRAWINGS.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **VALVES**	**REVISIONS**	
				BY:	**DATE:**
			DATE:		
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**	**NO. 4**	

ROOFING AND TINERY

1 SCOPE OF WORK

THE WORK INCLUDES ALL LABOR, MATERIALS, EQUIPMENT, PLANT AND OTHER FACILITIES AND THE SATISFACTORY PERFORMANCE OF ALL WORKS NECESSARY TO COMPLETE ALL ROOFING AND TINNERY WORKS AS SHOWN ON THE DRAWINGS AND AS SPECIFIED HEREIN.

THE MATERIALS SUPPLIED BY THE CONTRACTOR ON THIS ITEM SHALL CONFORM TO THE US STANDARD OR TO ANY OTHER INTERNATIONAL STANDARDS OF EQUAL VALUE.

2 CORRUGATED ASBESTOS CEMENT ROOFING

A. MATERIALS: (PLACA ROMANA SHEET)

ASBESTOS CEMENT ROOFING MATERIALS SHALL CONFORM TO THE LATEST STANDARD SPECIFICATIONS ISO/R 394. THE SHEET SHALL HAVE A NATURAL CEMENT GRAY FINISH WITH EXTERNAL SMOOTH SURFACE TEXTURE. THE MINIMUM CORRUGATION PER SHEET SHALL BE FOUR (4) WITH MINIMUM THICKNESS OF 4.5 MM (3/16"). THE SIZE PER SHEET SHALL BE 1.20M X 0.81M GALVANIZED IRON STRAP COMPLETE WITH STOVE BOLTS, NUT, LEAD AND FELT WASHERS SHALL BE USED FOR WOOD PURLINS.

ACCESSORIES:

1. RIDGE ROLLS IN PAIRS, TOP AND BOTTOM PIECES, USED FOR RIDGE COVERING.
2. RIDGE END CAPS IN PAIRS TOP AND BOTTOM PIECES, USED FOR RIDGE END COVERING.
3. LIGHTWEIGHT RIDGE ROLLS, USED AS HIP ROLLS FOR COVERING THE HIPS, IN PAIRS TOP AND BOTTOM PIECES.
4. EAVE FLASHINGS IN PIECES, USED FOR COVERING THE GAPS OF THE CORRUGATIONS AT THE EAVE.
5. PLASTIC CEMENT, APPLY ON ALL OVERLAPPINGS, JOINTS AND AROUND THE HEAD OF THE FASTENERS AFTER INSTALLATION.

B. MATERIALS: (STANDARD CORRUGATED)

ASBESTOS CEMENT ROOFING MATERIALS SHALL CONFORM TO THE LATEST STANDARD SPECIFICATIONS ISO/R 393. THE SHEET SHALL HAVE A NATURAL CEMENT GRAY FINISH WITH EXTERNAL SMOOTH SURFACE TEXTURE. THE MINIMUM CORRUGATION PER SHEET SHALL BE SEVEN (7) WITH THICKNESS OF 4.5 MM (3/16"). THE SIZE PER SHEET SHALL BE 0.98 M X 1.83M- 3.04 M. GALVANIZED IRON STRAP COMPLETE WITH STOVE BOLT, NUT, LEAD AND WASHER SHALL BE USED FOR WOOD PURLINS.

ACCESSORIES:

1. RIDGE ROLLS IN PAIRS, TOP AND BOTTOM PIECES, USED FOR RIDGE COVERING.
2. RIDGE END CAP IN PAIRS, TOP AND BOTTOM PIECES, USED FOR RIDGE END COVERING.
3. HIP ROLLS IN PAIRS, TOP AND BOTTOM PIECES, USED FOR HIP COVERING.
4. PLASTIC CEMENT, APPLY ON ALL OVERLAPPINGS, JOINTS, AND AROUND THE HEAD OF THE FASTENERS AFTER INSTALLATION.

THE MATERIALS SHALL BE STORED IN SUCH A MANNER TO PREVENT DAMAGE TO THE MATERIALS.

3 TINNERY

A. MATERIALS

ALL GALVANIZED IRON SHEET SHALL HAVE A MINIMUM THICKNESS GAUGE #26.

1. GUTTER SHALL BE FORMED STRICTLY IN ACCORDANCE WITH THE DETAILED DRAWINGS.
2. FACIA CAP.
3. SOLDERING LEAD- NIKOLITE BRAND OR EQUIVALENT.
4. RIVETS- COPPER RIVETS IMPORTED BRAND.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **ROOFING AND TINERY**	**REVISIONS**	
				BY:	**DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**	**1**	

B. INSTALLATION AND WORKMANSHIP

GUTTER SHALL HAVE A SLOPE OF 3.18MM PER 30 CM TOWARDS THE DOWNSPOUT. JOINTS SHALL BE RIVETED AND SOLDERED THAT WILL ENSURE A WATERTIGHT WORKMANSHIP.

4 WATERPROOFING

A. THE WATERPROOFING MEMBRANE SHALL BE A COLD-APPLIED SELF ADHESIVE RUBBERIZED ASPHALT COATED TO A HIGH QUALITY POLYETHYLENE SHEET WITH A COMBINED THICKNESS OF 0.07 INCH. THE MATERIALS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

1. PERMEANCE- 0.003 PERMS

2. ELONGATION- 25% (MIN.)

3. CYCLING OVER CRACKS (0 TO 1") NO EFFECT AFTER 1000 CYCLES.

4. RESISTANCE TO HYDROSTATIC PRESSURE- 75 FT. OF WATER.

B. APPLICATION PROCEDURE

1. THE CONCRETE SURFACE SHALL BE CURED FOR A MINIMUM OF SEVEN (7) DAYS AND SHALL BE SURFACE DRY. SURFACES SHALL BE BROOM CLEANED, SHALL BE FREE OF VOIDS, LOOSE AGGREGATE, SHARP PROTRUSIONS, FORM RELEASE AGENTS OR OTHER CONTAMINANTS.

2. THE CONCRETE SURFACES SHALL BE PRIMED AS RECOMMENDED BY THE MANUFACTURER. PRIMER SHALL BE DRIED ONE HOUR OR UNTIL TACK FREE. SURFACES NOT COVERED WITHIN 36 HOURS SHALL BE REPRIMED, BUT SHALL BE CLEAN, DRY AND FREE OF GREASE, OIL, DUST OR OTHER CONTAMINANTS.

3. MEMBRANE SHALL BE APPLIED TO PRIMED SURFACES WHICH ARE DRY AND FREE OF DIRT. MEMBRANE SHALL BE LAID FROM LOW POINTS OR DRAINS TOWARD HIGH POINTS IN SHINGLED FASHION. EACH STRIP SHOULD OVERLAP A MINIMUM OF 6.35CM AND SHOULD BE ROLLED DOWN FIRMLY AND COMPLETELY.

4. ALL INSIDE AND OUTSIDE CORNERS SHALL BE DOUBLE COVERED WITH MEMBRANE BY APPLYING AN INITIAL STRIP OF MINIMUM 30 CM WIDTH CENTERED ALONG THE AXIS OF THE CORNER. A CANT STRIP SHALL BE USED IN INSIDE CORNERS. OUTSIDE CORNERS SHALL BE ROUNDED.

5. CONSTRUCTION AND CONTROL JOINTS SHALL BE DOUBLE COVERED WITH MEMBRANE. OVER PROPERLY SEALED EXPANSION JOINTS, A DOUBLE THICKNESS OF MEMBRANE SHALL BE APPLIED.

6. THE PERIMETER OF THE MEMBRANE PLACED IN ANY DAY'S OPERATION AND ALL OUTSIDE EDGES OF MEMBRANE SHALL HAVE A TROWELLED BEAD OF MANUFACTURER'S RECOMMENDED MASTIC APPLIED AFTER THE MEMBRANE IS PLACED.

7. AREAS AROUND DRAINS, POSTS OR OTHER PROTRUSIONS SHALL HAVE A DOUBLE LAYER OF MEMBRANE AND SHALL BE LIBERALLY COATED WITH MASTIC AFTER THE APPLICATION OF THE MEMBRANE.

8. IMMEDIATELY BEFORE COVERING THE MEMBRANE, A CAREFUL INSPECTION SHALL BE MADE AND ANY HOLES, TEARS, MISALIGNED OR WRINKLED SEAMS OR OTHER DISCONTINUITIES SHALL BE PATCHED WITH MEMBRANE OR MASTIC.

9. THE SPECIFIED COVERING MATERIAL SHALL BE PLACED ON THE MEMBRANE WITHIN FIVE (5) DAYS AFTER APPLICATION.

10. THE CONTRACTOR SHALL PERFORM THE WORK IN STRICT ACCORDANCE WITH THE MANUFACTURER'S PRINTED RECOMMENDATIONS.

11. IMMEDIATELY PRIOR TO COVERING THE WATERPROOFING SHEET, A CAREFUL INSPECTION SHALL BE MADE FOR ACCIDENTAL DAMAGE AND ANY DAMAGED AREA SHALL BE CLEANED AND PATCHED WITH FRESH WATERPROOFING SHEET.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **ROOFING AND TINERY**		**REVISIONS**	
			BY:	**DATE:**
	DATE:	**NO.**		
SCALE: NTS **BY: PDD**	**JANUARY 2021**	**2**		

12. IMMEDIATELY AFTER THE WATERPROOFING SHEET IS PLACED AND KEPT INTACT, LAY THE WIRE REINFORCEMENT. WIRE MESH SHALL CONFORM TO THE SPECIFICATIONS FOR WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT AASHTO DESIGNATED M55. THE TYPE OF MESH SHALL BE APPROVED BY ENGINEER.

C. FINISHES

1. MORTAL TOPPING

OVER THE ENTIRE SURFACE THUS FORMED, 1:6 MIX NEAT CEMENT MORTAR SHALL BE SPREAD WITH A MINIMUM THICKNESS OF ONE (1) INCH WITH EXPANSION JOINTS IN BOTH DIRECTIONS AND NOT GREATER THAN SIX (6) METERS ON CENTERS. CONCRETE MIX SHALL BE STEEL TROWELED AND FINISHED SMOOTH. THE FINISHED SURFACE WILL SLOPE TOWARDS THE ROOF DRAINS.

2. ROOF DRAINS

ROOF DRAINS SHALL HAVE CAST IRON BODY, INSTALLED IN LOCATIONS INDICATED ON PLANS. DRAINS SHALL BE PROVIDED WITH FLASHING CLAMP DEVICE FOR MAKING WATERTIGHT CONNECTIONS WITH WATERPROOFING MEMBRANE, UNLESS OTHERWISE SPECIFIED.

5 COVE LIGHT: (ACRYLIC LIGHT DIFFUSER)

A. THE INSTALLATION ACRYLIC CEILING LIGHT DIFFUSER SHALL BE AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER. ACRYLIC LIGHT DIFFUSER SHALL BE PROVIDED WITH 1" ALUMINUM T-RUNNERS AND OTHER INCIDEN TALS NECESSARY TO COMPLETE THE WORK.

B. MATERIALS SPECIFIED IN THIS PARTICULAR ITEM IN U.S STANDARD ACRYLIC PLASTIC 1/16+ THICK TO BE MEASUSED BY MACHINE BY QUALIFIED TECHNICIANS ACCORDING TO THE DETAILED DRAWINGS.

1. ALUMINUM T-RUNNERS AND HANGERS SHALL BE OF COMMERCIAL QUALITY AND OF PROPER ALLOY, FREE FROM DEFECTS IMPAIRING STRENGTH AND DURABILITY.

2. PLASTIC SHALL BE ACRYLIC CONFORMING WITH FEDERAL STANDARD.

C. CONSTRUCTION REQUIREMENTS

1. ALL PARTS OF THE WORK SHALL BE OF THE MATERIALS DESIGN AND DIMENSIONS AS SHOWN ON THE DRAWINGS AND HEREIN SPECIFIED. UNLESS OTHERWISE SPECIFICALLY DIRECTED, HOWEVER, METHODS OF FABRICATION, ASSEMBLY AND INSTALLATION SHALL BE AT THE MANUFACTURER.

2. PRE-MOULDING SHALL BE DONE IN ONE PIECE OF ACRYLIC SHEET IN THE FACTORY TO ENSURE QUALITY WORKMANSHIP.

3. ALUMINUM T-RUNNERS SHALL BE CUT ON THE SITE TO FIT PROPERLY THE REQUIRED COVER.

D. PROTECTION OF LIGHT DIFFUSERS

1. PROTECTION SHALL BE PROVIDED WHEREVER NECESSARY TO PREVENT THE LIGHT DIFFUSER FROM BREAKAGE.

2. NO LIGHT DIFFUSER SHALL BE INSTALLED UNLESS THE NECESSARY FINISH ON THE CEILING HAS BEEN COMPLETED

E. INSTALLATION

1. ALL WORK SHALL BE INSTALLED BY SKILLED WORKMEN SPECIFICALLY TRAINED IN THIS TYPE OF WORK.

2. ALL UNITS OF LIGHT DIFFUSER SHALL FIT IN AND OUT CONVENIENTLY ESPECIALLY WHEN REPAIR WORK SHALL BE NECESSARY.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **ROOFING AND TINERY**		**REVISIONS**	
			BY:	**DATE:**
	DATE:	**NO.**		
SCALE: NTS **BY: PDD**	**JANUARY 2021**	**3**		

REINFORCED CONCRETE

01 WORK INCLUDED

THE WORK TO BE UNDERTAKEN UNDER THIS SECTION SHALL INCLUDE ALL LABOR, MATERIALS, EQUIPMENT, PLANT AND OTHER FACILITIES AND THE SATISFACTORY PERFORMANCE OF ALL WORK NECESSARY TO COMPLETE ALL CONCRETE WORK SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN. ALL WORK INCLUDED UNDER THIS SECTION SHALL BE SUBJECT TO THE GENERAL CONDITIONS ACCOMPANYING THESE SPECIFICATIONS. THE CONTRACTOR IS REQUIRED TO REFER ESPECIALLY THERETO.

02 MATERIALS

a. CEMENT

EXCEPT AS MAYBE OTHERWISE PROVIDED IN THESE SPECIFICATIONS, CEMENT SHALL CONFORM TO THE "STANDARD SPECIFICATIONS FOR PORTLAND CEMENT" (ASTM C-150 – LATEST REVISION) AND SHALL BE TYPE 1.

b. CONCRETE AGGREGATES

1. CONCRETE AGGREGATES SHALL BE WELL GRADED, CLEAN, HARD PARTICLES OF GRAVEL OR CRUSHED ROCK CONFORMING TO THE "STANDARD SPECIFICATION FOR CONCRETE AGGREGATES" (ASTM-C-33 – LATEST REVISION).

2. THE MAXIMUM SIZE OF THE AGGREGATES SHALL NOT BE LARGER THAN ONE-FIFTH (1/5) OF THE NARROWEST DIMENSION BETWEEN FORMS AND NOT LARGER THAN THREE-FOURTHS (3/4) OF THE MINIMUM CLEAR SPACING BETWEEN INDIVIDUAL REINFORCING BARS OR BUNDLE OF BARS, AND IN NO CASE LARGER THAN 38 MM (1-1/2 IN.) IN DIAMETER EXCEPT THAT LARGER DIAMETERS MAY BE ALLOWED IN MASSIVE CONCRETING WITH WRITTEN PERMISSION FROM THE ENGINEER.

c. WATER

WATER USED IN MIXING CONCRETE SHALL BE CLEAN AND FREE FROM INJURIOUS AMOUNTS OF OILS, ACIDS, ALKALI, ORGANIC MATERIALS OR OTHER SUBSTANCES THAT MAY BE DELETERIOUS TO CONCRETE OR STEEL.

d. REINFORCING STEEL

ALL REINFORCING STEEL BARS USED SHALL BE NEW AND FREE FROM RUST, OIL, DEFECTS, GREASES OR KINKS. THEY SHALL CONFORM TO THE LATEST EDITION OF ASTM A-615 "SPECIFICATIONS FOR DEFORMED BILLET STEEL BARS FOR CONCRETE REINFORCEMENT" MINIMUM GRADE 40.

e. ADMIXTURE

AT THE CONTRACTOR'S OPTION, OR AT THE REQUEST OF THE ENGINEER, BUT IN EITHER CASE AT THE EXPENSE OF THE CONTRACTOR, AN ADMIXTURE MAY BE ADDED TO THE CONCRETE TO CONTROL THE SET, EFFECT WATER REDUCTION AND INCREASE WORKABILITY. SUCH ADMIXTURE MAY BE EITHER A HYDROXYLATED CARBOXYLIC AND ACID TYPE OR A HYDROXYLATED POLYMER TYPE, BUT SHALL CONTAIN NO CALCIUM CHLORIDE. THE REQUIRED QUANTITIES OF CEMENT SHALL BE USED IN THE MIX REGARDLESS OF WHETHER OR NOT ANY ADMIXTURE IS USED. THE QUANTITY OF ADMIXTURE USED AND THE METHOD OF MIXING ALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. WHERE THE AIR TEMPERATURE AT THE TIME OF PLACEMENT IS EXPECTED TO BE CONSISTENTLY OVER 26.7ºC (80ºF), SUCH ADMIXTURE SHALL BE SUPER CONCRETE EMULSIONS' "PLASTIMENT", "MASTER BUILDER'S", "POZZOLITH 300R', OR SUBSTITUTE.

f. CALCIUM CHLORIDE

EXCEPT AS OTHERWISE SPECIFIED FOR ARCHITECTURAL FINISH THE USE OF CALCIUM CHLORIDE IN CONCRETE WILL NOT BE PERMITTED.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **REINFORCED CONCRETE**		**REVISIONS**
					BY: / **DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY:** PDD	**JANUARY 2021**	**1**	

.03 STORAGE OF MATERIALS

CEMENT AND AGGREGATES SHALL BE STORED IN SUCH A MANNER AS TO PREVENT DETERIORATION OR INTRUSION BY FOREIGN MATTER. ANY MATERIAL WHICH HAS DETERIORATED OR WHICH HAS BEEN DAMAGED SHALL NOT BE USED FOR CONCRETE. STEEL SHALL BE STORED UNDER COVER OR OTHERWISE PREVENTED FROM RUSTING.

04 TESTING OF MATERIALS

THE OWNER OR HIS DULY AUTHORIZED REPRESENTATIVE OR THE ENGINEER SHALL PERIODICALLY ORDER THE TEST OF ANY MATERIAL SUPPLIED BY THE CONTRACTOR ENTERING INTO CONCRETE OR REINFORCED CONCRETE TO DETERMINE ITS SUITABILITY FOR THE INTENDED PURPOSE. SUCH TESTS SHALL BE IN ACCORDANCE WITH THE STANDARDS OF THE AMERICAN SOCIETY FOR TESTING AND MATERIALS, AS NOTED ELSEWHERE IN THESE SPECIFICATIONS. SAMPLES SHALL BE PROVIDED BY THE CONTRACTOR WITHOUT COST TO THE OWNER. EXPENSES FOR THE TESTING AND COST OF TRANSPORTING SAMPLES TO TESTING LABORATORY SHALL BE BORNE BY THE OWNER. COPIES OF RESULTS OF TESTS SHALL BE FURNISHED TO THE OWNER PROMPTLY. COMPRESSIVE STRENGTH SPECIMENS FOR TEST OF CONCRETE DURING CONSTRUCTION SHALL BE ACCORDING TO "MAKING AND CURING OF CONCRETE COMPRESSION AND FLEXURAL STRENGTH TEST SPECIMENS IN THE FIELD" (ASTM C-31).

05 CONTROLLED STRENGTHS OF CONCRETE

a. CONCRETE FOR STRUCTURAL ELEMENTS, INCLUDING SLABS ON GRADE WITHIN WATER-RETAINING STRUCTURES AND STAIRS SHALL DEVELOP A MINIMUM 28-DAY COMPRESSIVE CYLINDER STRENGTH OF 20.68 MEGA PASCAL MPA (3000 PSI) UNLESS OTHERWISE SPECIFIED IN THE PLANS.

b. CONCRETE FOR NON-STRUCTURAL ELEMENTS SUCH AS CRADLES, UNREINFORCED ENCASEMENT, THRUST BLOCKS, AND PARTITIONS WALLS, SHALL DEVELOP A MINIMUM 28-DAY CYLINDER STRENGTH OF 17.25MPA (2500 PSI) UNLESS OTHERWISE SPECIFIED IN THE PLANS.

21.06 METHOD OF DETERMINING STRENGTH; TRIAL BATCH

THE CONTRACTOR SHALL SUBMIT DESIGN MIXES AND TEST RESULTS OF SAMPLES MADE IN ACCORDANCE WITH "STANDARD METHOD OF MAKING AND CURING CONCRETE COMPRESSION AND FLEXURE TEST SPECIMENS IN THE LABORATORY" (ASTM C-192 – LATEST REVISION) AND "STANDARD METHOD OF TEST FOR COMPRESSIVE STRENGTH OF MOLDED CONCRETE CYLINDER" (ASTM DESIGNATION C-39) FOR EACH STRENGTH REQUIRED, STATING THE PROPOSED SLUMP AND THE PROPORTIONAL WEIGHTS OF CEMENT, SATURATED SURFACES DRY AGGREGATES AND WATER. THESE MIXES SHALL BE PROVED BY PRELIMINARY TESTS THIRTY (30) DAYS BEFORE CONCRETING AND SHALL SHOW A 28-DAY STRENGTH OF FIFTEEN PERCENT (15%) HIGHER THAN THE ULTIMATE STRENGTH REQUIRED. NO SUBSTITUTIONS SHALL BE MADE IN THE MATERIALS OR MIX WITHOUT ADDITIONAL TESTS TO SHOW THAT THE QUALITY OF CONCRETE IS SATISFACTORY.

07 CONCRETE PROPORTION AND CONSISTENCY

a. THE PROPORTIONS OF AGGREGATES TO CEMENT FOR ANY CONCRETE SHALL BE SUCH AS TO PRODUCE A MIXTURE WHICH WILL WORK READILY INTO THE CORNERS AND ANGLES OF THE FORMS AND AROUND REINFORCEMENT WITH THE METHOD OF PLACING EMPLOYED ON THE WORK BUT WITHOUT PERMITTING THE MATERIALS TO SEGREGATE, OR EXCESS FREE WATER TO COLLECT ON THE SURFACE. THE COMBINED AGGREGATES SHALL BE OF SUCH COMPOSITION OF SIZES THAT WHEN SEPARATED ON THE NO. 4 STANDARD SIEVE, THE WEIGHT PASSING THE SIEVE (FINE AGGREGATE) SHALL NOT BE LESS THAN THIRTY PERCENT (30%) OF THE TOTAL, EXCEPT THAT THESE PROPORTIONS DO NOT NECESSARILY APPLY TO LIGHT-WEIGHT AGGREGATES.

b. THE METHODS OF MEASURING CONCRETE MATERIALS SHALL BE SUCH THAT THE PROPORTIONS CAN BE ACCURATELY CONTROLLED AND EASILY CHECKED AT ANY TIME DURING THE WORK. MEASUREMENT OF MATERIALS FOR READY-MIXED CONCRETE SHALL CONFORM TO THE "STANDARD SPECIFICATIONS FOR READY-MIXED CONCRETE" (ASTM C-94 – LATEST REVISION) WHERE APPLICABLE.

c. AGGREGATES SHALL BE MEASURED OUT BY WEIGHT AND TO WITHIN ONE PERCENT (1%). CEMENT SHALL CONFORM TO 40 KG (88 LBS.) PER SACK AND THIS IS TO BE VERIFIED FROM TIME TO TIME. WATER SHALL BE MEASURED BY WEIGHT OR VOLUME TO WITHIN ONE AND ONE-HALF PERCENT (1 – 1/2%).

d. THE WATER SHALL IN NO CASE EXCEED 21.24 LITERS AND 25.67 LITERS (5.62 AND 6.79 US GALLONS) PER SACK OF CEMENT FOR ALL CONCRETE WITH SPECIFIED STRENGTH OF F'C = 20.68 MPA (3000 PSI) AND 17.25 MPA (2500 PSI), RESPECTIVELY. SLUMPS SHALL BE WITHIN THE FOLLOWING LIMITS:

PORTION OF STRUCTURE	SLUMP MILLIMETERS	INCHES
COLUMNS AND END SUPPORTED BEAMS, GIRDER	50 – 100	2 – 4
WALLS AND THIN VERTICAL SECTIONS	75 – 125	3 – 5
FOOTINGS, SLABS ON GRADE AND CANTILEVERED BEAMS, AND SLABS	50 – 80	2 – 3

SLUMPS SHALL BE ACCORDING TO "TEST OF SLUMP FOR PORTLAND CEMENT CONCRETE" (ASTM C-143).

e. THE MINIMUM CEMENT CONTENT FOR 20.68 MPA (3000 PSI) CONCRETE SHALL BE 8.39 SACKS PER CUBIC METER OF CONCRETE.

f. JOB MIX ADJUSTMENTS ON WATER CONTENT SHALL BE ALLOWED ONLY WITH ENGINEER'S PERMISSION AND PROVIDED THAT CEMENT IS ALSO ADDED TO MAINTAIN THE ORIGINAL WATER-CEMENT RATIO OF THE DESIGN MIX.

08 EXCLUSION OF WATER

NO CONCRETE SHALL BE PLACED IN ANY STRUCTURE UNTIL ALL WATER ENTERING THE SPACE TO BE FILLED WITH CONCRETE HAS BEEN PROPERLY CUT OFF OR HAS BEEN DIVERTED BY PIPES, OR OTHER MEANS, AND CARRIED OUT OF THE FORMS, CLEAR OF THE WORK. NO CONCRETE SHALL BE DEPOSITED UNDER WATER WITHOUT THE EXPLICIT PERMISSION OF THE ENGINEER, AND THEN ONLY IN STRICT ACCORDANCE WITH HIS DIRECTIONS, NOR SHALL THE CONTRACTOR, WITHOUT EXPLICIT PERMISSION ALLOW STILL WATER TO RISE ON ANY CONCRETE UNTIL THE CONCRETE HAS ATTAINED ITS INITIAL SET. WATER SHALL NOT BE PERMITTED TO FLOW OVER THE SURFACE OF ANY CONCRETE IN SUCH MANNER AND AT SUCH VELOCITY AS WILL INJURE THE SURFACE FINISH OF THE CONCRETE. PUMPING OR OTHER NECESSARY DEWATERING OPERATIONS FOR REMOVING GROUND WATER IF REQUIRED, WILL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

09 MIXING CONCRETE

a. NO HAND MIXING SHALL BE ALLOWED EXCEPT IN EMERGENCY SUCH AS MIXER BREAKDOWN DURING CONCRETING OPERATIONS AND THIS SHALL STOP AS SOON AS THE POUR IS COMPLETED, AT A CONSTRUCTION JOINT SHOWN OR OTHERWISE DESIGNATED BY THE ENGINEER. ALL CONCRETE SHALL BE MACHINE MIXED FOR AT LEAST ONE AND ONE-HALF (1-1/2) MINUTES AFTER ALL MATERIALS INCLUDING WATER, ARE IN THE MIXING DRUM.

b. THE MIXER SHALL BE OF AN APPROVED SIZE AND TYPE WHICH WILL INSURE A UNIFORM DISTRIBUTION OF MATERIAL THROUGHOUT THE MASS. IT SHALL BE EQUIPPED WITH A DEVICE FOR ACCURATELY MEASURING AND CONTROLLING THE AMOUNT OF MIXING WATER IN EACH BATCH.

c. THE FIRST BATCH OF CONCRETE MATERIALS PLACED IN THE MIXER SHALL CONTAIN A SUFFICIENT EXCESS OF CEMENT, SAND AND WATER TO COAT THE INSIDE OF THE DRUM WITHOUT REDUCING THE CEMENT OF THE MIX TO BE DISCHARGED.

d. RETEMPERING, I.E. REMIXING WITH THE ADDITION OF WATER TO CONCRETE THAT HAS BEEN PARTIALLY HARDENED, WILL NOT BE PERMITTED.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **REINFORCED CONCRETE**	**REVISIONS**	
				BY:	**DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**	**3**	

10 PREPARATION OF SURFACES FOR CONCRETING

a. EARTH SURFACES SHALL BE THOROUGHLY WETTED BY SPRINKLING, PRIOR TO THE PLACING OF ANY CONCRETE, AND THESE SURFACES SHALL BE KEPT MOIST BY FREQUENT SPRINKLING UP TO THE TIME OF PLACING CONCRETE THEREON. THE SURFACE SHALL BE FREE FROM STANDING WATER, MUD AND DEBRIS AT THE TIME OF PLACING CONCRETE.

b. CONCRETE SURFACES UPON OR AGAINST WHICH CONCRETE IS TO BE PLACED, WHERE THE PLACEMENT OF THE OLD CONCRETE HAS BEEN STOPPED OR INTERRUPTED SO THAT, IN THE OPINION OF THE ENGINEER, THE NEW CONCRETE CANNOT BE INCORPORATED INTEGRALLY WITH THE THAT PREVIOUSLY PLACED, ARE DEFINED AS CONSTRUCTION JOINTS. THE SURFACE OF HORIZONTAL JOINTS SHALL BE LEVELED WITH A WOODEN FLOAT TO PROVIDE A REASONABLY SMOOTH SURFACE. A SURFACE CONSISTING LARGELY OF COARSE AGGREGATE SHALL BE AVOIDED. EXCEPT WHERE THE DRAWING CALL FOR JOINT SURFACES TO BE PAINTED, THE JOINT SURFACES SHALL BE CLEANED OF ALL LAITANCE, LOOSE OR DEFECTIVE CONCRETE, AND FOREIGN MATERIAL. SUCH CLEANING SHALL BE ACCOMPLISHED BY SAND-BLASTING FOLLOWED BY THOROUGH WASHING. ALL POOLS OF WATER SHALL BE REMOVED FROM THE SURFACE OF CONSTRUCTION JOINTS BEFORE THE NEW CONCRETE IS PLACED. AFTER THE SURFACES HAVE BEEN PREPARED TO THE SATISFACTION OF THE ENGINEER, ALL APPROXIMATELY HORIZONTAL CONSTRUCTION JOINTS SHALL BE COVERED WITH A LAYER OF MORTAR APPROXIMATELY 25 MM (1 IN.) THICK. THE MORTAR SHALL HAVE THE SAME PROPORTION OF CEMENT AND SAND AS THE REGULAR CONCRETE MIXTURE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER. THE WATER CEMENT RATIO OF THE MORTAR IN PLACE SHALL NOT EXCEED THAT OF THE CONCRETE TO BE PLACED UPON IT, AND THE CONSISTENCY OF THE MORTAR SHALL BE SUITABLE FOR PLACING AND WORKING IN THE MANNER HEREINAFTER SPECIFIED. THE MORTAR SHALL BE SPREAD UNIFORMLY AND SHALL BE WORKED THOROUGHLY INTO ALL IRREGULARITIES OF THE SURFACE, AND THE WIRE BROOMS SHALL BE USED WHERE POSSIBLE TO SCRUB THE MORTAR INTO THE SURFACE. CONCRETE SHALL BE PLACED IMMEDIATELY UPON THE FRESH MORTAR.

c. WHEN THE PLACING OF CONCRETE IS TO BE INTERRUPTED LONG ENOUGH FOR THE CONCRETE TO TAKE A SET, THE WORKING FACE SHALL BE GIVEN A SHAPE BY THE USE OF FORMS OR OTHER MEANS, THAT WILL SECURE PROPER UNION WITH SUBSEQUENT WORK; PROVIDE THAT CONSTRUCTION JOINTS SHALL BE MADE ONLY WHERE APPROVED BY THE ENGINEER.

11 PLACING CONCRETE

a. CONCRETE WHICH UPON OR BEFORE PLACING IS FOUND NOT TO CONFORM TO THE REQUIREMENTS SPECIFIED HEREIN SHALL BE REJECTED AND IMMEDIATELY REMOVED FROM THE WORK. CONCRETE WHICH IS NOT PLACED IN ACCORDANCE WITH THESE SPECIFICATIONS, OR WHICH IS OF INFERIOR QUALITY, AS DETERMINED BY THE ENGINEER, SHALL BE REMOVED AND REPLACED BY AND AT THE EXPENSE OF THE CONTRACTOR. NO CONCRETE SHALL BE PLACED EXCEPT IN THE PRESENCE OF A DULY AUTHORIZED REPRESENTATIVE OF THE ENGINEER. CONCRETE SHALL NOT BE PLACED WHEN UNSUITABLE HEAT OR WIND CONDITIONS WILL PREVENT PROPER PLACEMENT AND CURING, AS DETERMINED BY THE ENGINEER. PRIOR TO PLACING ANY CONCRETE, THE CONTRACTOR SHALL GIVE THE ENGINEER TWENTY-FOUR (24) HOURS WRITTEN NOTICE.

b. CONCRETE SHALL BE DEPOSITED IN ITS FINAL POSITION WITHOUT SEGREGATION, RE-HANDLING, OR FLOWING. PLACING SHALL BE DONE PREFERABLY WITH BUGGIES, BUCKETS, OR WHEELBARROWS. NO CHUTES WILL BE ALLOWED EXCEPT TO TRANSFER CONCRETE FROM HOPPERS TO BUGGIES, WHEELBARROWS OR BUCKETS IN WHICH CASE, THEY SHALL NOT EXCEED SIX METERS (TWENTY FEET) IN AGGREGATE LENGTH.

c. PLACING OF CONCRETE WITH A FREE DROP OR FALL MORE THAN 1.20 METERS (4 FEET) SHALL NOT BE ALLOWED, EXCEPT WHEN APPROVED BY THE ENGINEER AND WHEN APPROVED SHEET METAL CONDUITS, PIPES, OR "ELEPHANT TRUNKS" ARE EMPLOYED. WHEN EMPLOYED, THESE CONVEYORS SHALL BE KEPT FULL OF CONCRETE AND THE ENDS KEPT BURIED IN THE NEWLY PLACED CONCRETE AS POURING PROGRESSES.

d. CONCRETE IN FORMS SHALL BE DEPOSITED IN UNIFORM HORIZONTAL LAYERS NOT DEEPER FROM 450MM (18 IN.) AND CARE SHALL BE TAKEN TO AVOID INCLINED LAYERS OR INCLINED CONSTRUCTION JOINTS EXCEPT WHERE SUCH ARE REQUIRED FOR SLOPING MEMBERS. EACH LAYER SHALL BE PLACED WHILE THE PREVIOUS LAYER IS STILL SOFT. THE RATE OF PLACING CONCRETE IS FORMS SHALL NOT EXCEED 1.5METERS (5 FEET) OF VERTICAL RISE PER HOUR.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **REINFORCED CONCRETE**	**REVISIONS**	
				BY:	**DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**	**4**	

12 FORMS

a. GENERAL

THE CONTRACTOR SHALL PROVIDE FORMS TO CONFINE THE CONCRETE AND SHAPE IT TO THE REQUIRED LINES. PLASTERING, IN GENERAL, SHALL NOT BE ALLOWED. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR THE ADEQUATE DESIGN OF ALL FORMS. HOWEVER, ANY FORMS WHICH IN THE OPINION OF THE ENGINEER ARE UNSAFE OR INADEQUATE IN ANY RESPECT MAY AT ANY TIME BE CONDEMNED BY THE ENGINEER, AND THE CONTRACTOR SHALL PROMPTLY REMOVE THE CONDEMNED FORMS FROM THE WORK AND REPLACE THEM AT HIS OWN EXPENSE. A SUFFICIENT NUMBER OF FORMS OF EACH KIND SHALL BE PROVIDED TO PERMIT THE REQUIRED RATE OF PROGRESS TO BE MAINTAINED. WHENEVER IN THE OPINION OF THE ENGINEER, ADDITIONAL FORMS ARE NECESSARY TO MAINTAIN THE PROGRESS SCHEDULE, SUCH ADDITIONAL FORMS SHALL BE PROVIDED BY THE CONTRACTOR AT HIS OWN EXPENSE. THE DESIGN AND INSPECTION OF CONCRETE FORMS, FALSEWORK AND SHORING SHALL COMPLY WITH APPLICABLE SAFETY REGULATIONS, AND AS MAY BE SPECIFIED IN THE GENERAL CONDITIONS OF THESE SPECIFICATIONS.

b. MATERIALS

EXCEPT AS OTHERWISE EXPRESSLY APPROVED BY THE ENGINEER, ALL LUMBER BROUGHT ON THE JOB SITE FOR USE AS FORMS, SHORING, OR BRACING SHALL BE NEW MATERIAL. ALL FORMS SHALL BE SMOOTH SURFACE FORMS AND SHALL BE OF THE FOLLOWING MATERIALS:

WALLS	–	STEEL OR PLYWOOD PANELS
COLUMNS	–	STEEL, PLYWOOD OR SURFACED LUMBER
ROOF	–	PLYWOOD
ALL OTHER WORK	–	STEEL PANELS, PLYWOOD OR SURFACED LUMBER

PLYWOOD SHALL BE MANUFACTURED ESPECIALLY FOR CONCRETE FORM WORK AND SHALL BE OILED WITH AN APPROVED FORM OIL AND EDGE SEALED.

c. COLUMN FORMS SHALL BE CHECKED FOR PLUMPNESS BEFORE CONCRETE IS DEPOSITED. HAND HOLES SHALL BE PROVIDED IN COLUMN FORMS AT LOWEST POINTS OF POUR LIFTS TO RENDER THIS SPACE ACCESSIBLE FOR CLEANING.

d. ALL GIRDER, BEAM AND SLAB CENTERLINES SHALL BE CROWNED AT LEAST 6.3MM (1/4 IN.) IN ALL DIRECTIONS FOR EVERY 4.57 METERS (15 FT.) SPAN. HOWEVER, CAMBERS FROM ALL CANTILEVERS SHALL BE AS INDICATED ON THE PLANS OR OBTAINED FROM THE ENGINEER BY THE CONTRACTOR.

e. THE FOLLOWING ARE THE TOLERANCE LIMITS FOR FORMWORK:

1. VARIATION FROM PLUMB:

IN LINES AND SURFACES OF COLUMNS, PIERS, WALLS AND RISERS:

IN 3.05 M (10 FT.)	6.3MM (1/4 IN)
6.10 M (20 FT.) MAX	9.5MM (3/8 IN)
12.20M (40 FT.) OR MORE	19.0MM (3/4 IN)

FOR EXPOSED CORNER COLUMNS AND/OR PIERS, CONTROL JOINT GROOVES AND OTHER CONSPICUOUS LINES:

IN ANY BAY 6.10M (20 FT.) MAX	6.3MM (1/4 IN)
IN 12.20 M (40 FT.) OR MORE	13.0MM (1/2 IN)

2. VARIATION IN CROSS-SECTIONAL DIMENSIONS OF COLUMNS AND PIERS, BEAMS AND IN THICKNESS OF WALLS AND SLABS:

MINUS . . . . . 6.3MM (1/4 IN)

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **REINFORCED CONCRETE**		**REVISIONS**	
			BY:	**DATE:**
	DATE:	**NO.**		
SCALE: NTS **BY: PDD**	**JANUARY 2021**	**5**		

PLUS . . . . . 13.0MM (1/2 IN)

3. FOOTINGS

VARIATION IN DIMENSION ON DRAWINGS (APPLIED TO CONCRETE ONLY AND NOT TO REINFORCING BARS OR DOWELS):

MINUS . . . . . 13.0MM (1/2 IN)
PLUS . . . . . 50.0MM (2 IN)

MISPLACEMENT OF ECCENTRICITY, TWO PERCENT (2%) OF THE FOOTINGS WIDTH IN THE DIRECTION OF MISPLACEMENT BUT NOT TO EXCEED 50.0MM (2 IN).

REDUCTION IN THICKNESS . . . . FIVE PERCENT (5%) AT SPECIFIED THICKNESS

4. VARIATION IN STEPS:

(1) IN A FLIGHT OF STEPS

RISE . . . . . 3.2 MM (1/8 IN)
TREAD . . . . . 6.3 MM (1/4 IN)

(2) IN CONSECUTIVE STEPS

RISE . . . . . 1.6 MM (1/16 IN)
TREAD . . . . . 3.2 MM (1/8 IN)

WHEN REQUIRED FOR ANOTHER WORK, OR WHEN REQUESTED BY THE OWNER OR HIS ENGINEER, THE CONTRACTOR SHALL REMOVE OR RELOCATE SHORING, BUT EXISTING SHORING SHALL NOT BE DISTURBED UNTIL NEW SHORES ARE SET IN POSITION.

f. DESIGN

1. ALL FORMS SHALL BE TRUE IN EVERY RESPECT TO THE REQUIRED SHAPE AND SIZE, SHALL CONFORM TO THE ESTABLISHED ALIGNMENT AND GRADE AND SHALL BE OF SUFFICIENT STRENGTH AND RIGIDITY TO MAINTAIN THEIR POSITION AND SHAPE UNDER THE LOADS AND OPERATIONS INCIDENT TO PLACING AND VIBRATING THE CONCRETE. SUITABLE AND EFFECTIVE MEANS SHALL BE PROVIDED ON ALL FORMS FOR HOLDING ADJACENT EDGES AND ENDS OF PANELS AND SECTIONS TIGHTLY TOGETHER AND IN ACCURATE ALIGNMENT SO AS TO PREVENT THE FORMATION OF RIDGES, FINS, OR OFFSETS, OR SIMILAR SURFACE DEFECTS IN THE FINISHED CONCRETE. PLYWOOD, 16.0MM (5/8 IN) AND GREATER IN THICKNESS, MAY BE FASTENED DIRECTLY TO STUDDING IF THE STUDS ARE CLOSE ENOUGH TO PREVENT VISIBLE DEFLECTION MARKS IN CONCRETE. THE FORMS SHALL BE TIGHT SO AS TO PREVENT THE LOSS OF WATER, CEMENT AND FINES DURING PLACING AND VIBRATING OF THE CONCRETE. ADEQUATE CLEAN-OUT HOLES SHALL BE PROVIDED AT THE BOTTOM OF EACH LIFT OF FORMS. THE SIZE, NUMBER AND LOCATION OF SUCH CLEANOUTS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

2. CONCRETE CONSTRUCTION JOINTS WILL NOT BE PERMITTED AT LOCATIONS OTHER THAN THOSE SHOWN OR SPECIFIED, EXCEPT AS MAY BE APPROVED BY THE ENGINEER. WHEN A SECOND LIFT IS PLACED ON HARDENED CONCRETE, SPECIAL PRECAUTION SHALL BE TAKEN IN THE WAY OF THE NUMBER, LOCATION AND TIGHTENING OF TIES AT THE TOP OF THE OLD LIFT AND BOTTOM OF THE NEW TO PREVENT ANY UNSATISFACTORY EFFECT WHATSOEVER ON THE CONCRETE. PIPE STUBS AND ANCHOR BOLT SHALL BE SET IN THE FORM WHERE REQUIRED.

3. UNLESS OTHERWISE SHOWN, EXTERIOR CORNERS IN CONCRETE MEMBERS SHALL BE PROVIDED WITH 19.0MM (3/4 IN) CHAMFERS. RE-ENTRANT CORNERS IN CONCRETE MEMBERS SHALL NOT HAVE FILLETS UNLESS OTHERWISE SHOWN.

4. RESERVOIR FORMS AND FALSEWORK SUPPORTING THE ROOF SLAB SHALL BE DESIGNED FOR A MINIMUM ADDITIONAL LIVE LOAD OF 0.96 KPA (20 PSF).

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **REINFORCED CONCRETE**		**REVISIONS**
				BY: / **DATE:**
		DATE:	**NO.**	
	SCALE: NTS / **BY:** PDD	**JANUARY 2021**	**6**	

g. FORM TIES

FORM TIES WITH INTEGRAL WATER STOPS SHALL BE PROVIDED WITH A CORK OR OTHER SUITABLE MEANS FOR FORMING A CONICAL HOLE TO INSURE THAT THE FORM-TIE MAY BE BROKEN OFF BACK OF THE FACE OF THE CONCRETE. THE MAXIMUM DIAMETER OR REMOVABLE CONES FOR ROD TIES, OR OF OTHER REMOVABLE FORM TIE FASTENERS HAVING A CIRCULAR CROSS-SECTION, SHALL NOT EXCEED 38 MM (1-1/2 IN) AND ALL SUCH FASTENERS SHALL BE SUCH AS TO LEAVE HOLES OF REGULAR SHAPE FOR REAMING. HOLES LEFT BY THE REMOVAL OF FASTENERS FROM THE ENDS OF SNAP-TIES OR FORM-TIES SHALL BE REAMED WITH SUITABLE TOOTHED REAMERS SO AS TO LEAVE THE SURFACES OF THE HOLES CLEAN AND ROUGH BEFORE BEING FILLED WITH MORTAR AS PROVIDED IN SECTION 21.20. WIRE TIES FOR HOLDING FORM WILL NOT BE PERMITTED. NO FORM-TYING DEVICE OR PART THEREOF, OTHER THAN METAL, SHALL BE LEFT EMBEDDED IN THE CONCRETE, NOR SHALL ANY TIE BE REMOVED IN SUCH MANNER AS TO LEAVE A HOLE EXTENDING THROUGH THE INTERIOR OF THE CONCRETE MEMBER. THE USE OF SNAP-TIES WHICH CAUSE SPALLING OF THE CONCRETE UPON FORM STRIPPING OR TIE REMOVAL WILL NOT BE PERMITTED. IF STEEL PANEL FORMS ARE USED, RUBBER GROMMETS SHALL BE PROVIDED WHERE THE TIES PASS THROUGH THE FORM IN ORDER TO PREVENT LOSS OF CEMENT PASTE. WHERE METAL RODS EXTENDING THROUGH THE CONCRETE ARE USED TO SUPPORT OR TO STRENGTHEN FORMS, THE RODS SHALL REMAIN EMBEDDED AND SHALL TERMINATE NOT LESS THAN 25MM (1 IN.) BACK FROM THE FORMED FACE OR FACES OF THE CONCRETE. FORM TIES OR METAL RODS LEFT EMBEDDED IN CONCRETE OF WATER RETAINING TANKS SHALL BE EQUIPPED WITH AN INTEGRAL METAL WATER STOP OF NOT LESS THAN 38MM (1-1/2 IN.) IN DIAMETER.

h. VERTICAL SURFACES

ALL VERTICAL SURFACES OF CONCRETE MEMBERS SHALL BE FORMED, EXCEPT WHERE PLACEMENT OF THE CONCRETE AGAINST THE GROUND IS CALLED FOR ON THE DRAWINGS OR EXPLICITLY AUTHORIZED BY THE ENGINEER. NOT LESS THAN 25MM (1 IN.) OF CONCRETE SHALL BE ADDED TO THE THICKNESS OF THE CONCRETE MEMBER AS SHOWN WHERE CONCRETE IS PERMITTED TO BE PLACED AGAINST TRIMMED GROUND IN LIEU OF FORMS. SUCH PERMISSION WILL BE GRANTED ONLY FOR MEMBERS OF COMPARATIVELY LIMITED HEIGHT AND WHERE THE CHARACTER OF THE GROUND IS SUCH THAT IT CAN BE TRIMMED TO THE REQUIRED LINES AND WILL STAND SECURELY WITHOUT CAVING OR SLOUGHING UNTIL THE CONCRETE HAS BEEN PLACED.

i. MAINTENANCE OF FORMS

FORMS SHALL BE MAINTAINED AT ALL TIMES IN GOOD CONDITION, PARTICULARLY AS TO SIZE, SHAPE, STRENGTH, RIGIDITY, TIGHTNESS AND SMOOTHNESS OF SURFACE. FORMS, WHEN IN PLACE, SHALL CONFORM TO THE ESTABLISHED ALIGNMENT AND GRADES. BEFORE CONCRETE IS PLACED, THE FORMS SHALL BE THOROUGHLY CLEANED. THE FORMS SURFACES SHALL BE TREATED WITH A NON-STRAINING MINERAL OIL OR OTHER LUBRICANT APPROVED BY THE ENGINEER. ANY EXCESS LUBRICANT SHALL BE SATISFACTORILY REMOVED BEFORE PLACING THE CONCRETE. IN ADDITION, ALL FORMS SHALL BE GIVEN A PRELIMINARY OIL TREATMENT BY THE MANUFACTURER OR SHALL BE OILED BY THE CONTRACTOR AT LEAST TWO (2) WEEKS IN ADVANCE OF THEIR USE. CARE SHALL BE EXERCISED TO KEEP OIL OFF THE SURFACES OF STEEL REINFORCEMENT AND OTHER METAL ITEMS TO BE EMBODIED IN CONCRETE. FORMS MAY BE REUSED IF IN GOOD CONDITION AND IF APPROVED BY THE ENGINEER. LIGHT SANDING BETWEEN USES WILL BE REQUIRED WHEREVER NECESSARY IN THE OPINION OF THE ENGINEER TO OBTAIN UNIFORM SURFACE TEXTURE ON ALL EXPOSED CONCRETE SURFACES. EXPOSED CONCRETE SURFACES ARE DEFINED AS SURFACES WHICH ARE PERMANENTLY EXPOSED TO VIEW. IN THE CASE OF FORMS FOR THE INSIDE WALL SURFACES OF HYDRAULIC STRUCTURES, UNUSED TIE ROD HOLES SHALL BE COVERED WITH METAL CAPS OR SHALL BE FILLED BY OTHER METHODS APPROVED BY THE ENGINEER.

j. REMOVAL OF FORMS

DIRECTIONS OF THE ENGINEER CONCERNING THE REMOVAL OF FORMS SHALL BE STRICTLY FOLLOWED, AND THIS WORK SHALL BE DONE WITH CARE SO AS TO AVOID INJURY TO THE CONCRETE. NO HEAVY LOADING ON GREEN CONCRETE WILL BE PERMITTED. IN THE CASE OF ROOF SLABS AND ABOVE-GROUND FLOOR SLABS, FORMS SHALL REMAIN IN PLACE UNTIL TEST CYLINDERS FOR THE ROOF CONCRETE ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 15.52 MPA (2,250 PSI) PROVIDED THAT NO FORMS SHALL BE DISTURBED OR REMOVED UNDER AN INDIVIDUAL PANEL OR UNIT BEFORE THE CONCRETE IN THE ADJACENT PANEL OR UNIT HAS ATTAINED A STRENGTH OF 15.52 MPA (2,250 PSI) AND HAS BEEN IN PLACE FOR A MINIMUM OF SEVEN (7) DAYS. THE TIME REQUIRED TO ESTABLISH SAID STRENGTH WILL BE DETERMINED BY THE ENGINEER WHO WILL MAKE SEVERAL TEST CYLINDERS FOR THIS PURPOSE FROM CONCRETE USED IN THE FIRST GROUP OF ROOF PANELS PLACED. IF THE TIME SO DETERMINED IS MORE THAN THE

SEVEN DAY MINIMUM, THEN IT SHALL BE USED AS THE MINIMUM LENGTH OF TIME. FORMS FOR ALL VERTICAL WALLS AND COLUMNS, SHALL REMAIN IN PLACE AT LEAST THREE

(3) DAYS AFTER THE CONCRETE HAS BEEN PLACED. FORMS FOR ALL PARTS OF THE WORK NOT SPECIFICALLY MENTIONED HEREIN SHALL REMAIN IN PLACE FOR PERIODS OF TIME AS ORDERED BY THE ENGINEER.

13 CONSTRUCTION JOINTS

a. GENERAL

CONSTRUCTION JOINTS SHALL BE PROVIDED WHERE SHOWN ON THE DRAWINGS. SPECIAL CARE SHALL BE USED TO PREPARE CONCRETE SURFACES AT JOINTS WHERE BONDING BETWEEN TWO SECTIONS OF CONCRETE IS REQUIRED. UNLESS OTHERWISE INDICATED ON THE DRAWINGS, SUCH BONDING WILL BE REQUIRED AT ALL HORIZONTAL JOINTS IN WALLS. SURFACES SHALL BE PREPARED IN ACCORDANCE WITH SECTION 21.10. EXCEPT WHERE OTHERWISE SHOWN OR SPECIFIED, AT ALL JOINTS WHERE WATERSTOPS ARE REQUIRED, THE JOINT FACE OF THE FIRST POUR SHALL BE COATED WITH AN APPROVED BOND BREAKER APPLIED IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER. IT SHALL CONTAIN A COLORING AGENT SO THAT AREAS OF APPLICATIONS WILL BE READILY DISTINGUISHABLE FOR A SIX MONTH PERIOD IN SUNLIGHT. THE SURFACES OF THE GROOVE FOR THE SEALANT SHALL NOT BE COATED. CONCRETE NEXT TO WATERSTOPS SHALL BE PLACED IN ACCORDANCE WITH SUBSECTION 21.16 (B).

b. CONSTRUCTION JOINT SEALANT

WHERE SHOWN, CONSTRUCTION JOINTS IN FLOOR SLABS SHALL BE PROVIDED WITH TAPERED GROOVES WHICH SHALL BE FILLED WITH A CONSTRUCTION JOINT SEALANT. THE MATERIAL USED FOR FORMING THE TAPERED GROOVES SHALL BE LEFT IN THE GROOVES UNTIL JUST BEFORE THE GROOVES ARE CLEANED AND FILLED WITH JOINT SEALANT. AFTER REMOVING THE FORMS FROM THE GROOVES, ALL LAITANCE AND FINS SHALL BE REMOVED, AND THE GROOVES SHALL BE SANDBLASTED. THE GROOVES SHALL BE ALLOWED TO BECOME THOROUGHLY DRY, AFTER WHICH THEY SHALL BE BLOWN OUT; IMMEDIATELY THEREAFTER, THEY SHALL BE PRIMED AND FILLED WITH THE CONSTRUCTION JOINT SEALANT. THE PRIMER USED SHALL BE SUPPLIED BY THE SAME MANUFACTURER SUPPLYING THE SEALANT. NO SEALANT WILL BE PERMITTED TO BE USED WITHOUT A PRIMER. CARE SHALL BE USED TO COMPLETELY FILL THE SEALANT GROOVES. AREAS DESIGNATED TO RECEIVE A SEALANT FILLET SHALL BE THOROUGHLY CLEANED, AS OUTLINED FOR THE TAPERED GROOVES, PRIOR TO APPLICATION OF THE SEALANT. THE SEALANT SHALL BE POLYURETHANE POLYMER DESIGNED FOR BONDING TO CONCRETE WHICH IS CONTINUOUSLY SUBMERGED IN WATER. NO MATERIAL WILL BE ACCEPTABLE WHICH HAS AN UNSATISFACTORY HISTORY AS TO BOND OR DURABILITY WHEN USED IN THE JOINTS OF HYDRAULIC STRUCTURES. PRIOR TO ORDERING THE SEALANT MATERIAL, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL SUFFICIENT DATA TO SHOW GENERAL COMPLIANCE WITH THE SPECIFICATIONS REQUIREMENTS. THE MATERIAL SHALL MET THE FOLLOWING REQUIREMENTS:

WORK LIFE	45-90 MINUTES
TIME TO REACH 20 SHORE "A" HARD-NESS (AT 25ºC, 200 GR. QUANTITY)	24 HOURS, MAXIMUM
ULTIMATE HARDNESS	30-40 SHORE "A"
TENSILE STRENGTH	1.73 MPA (250 PSI) MIN.
ULTIMATE ELONGATION	400 PERCENT, MINIMUM
TEAR RESISTANCE (DIE C ASTM D624)	13.4 KG PER CM (75 LB. PER INCH) OF THICKNESS, MINIMUM
COLOR	LIGHT GRAY

IN ADDITION, THE MATERIAL SHALL SHOW NO SIGNS OF ADHESIVE OR COHESIVE FAILURE WHEN TESTED IN ACCORDANCE WITH THE FOLLOWING PROCEDURE:

1. SEALANT SPECIMEN SHALL BE PREPARED BETWEEN TWO CONCRETE BLOCKS 25MM X 50MM X 76MM (1IN X 2IN X 3IN) IN SIZE. SPACING BETWEEN THE BLOCKS SHALL BE 13MM (1/2IN). COATED SPACERS 50MM X 38MM X 13MM (2IN X 1 1/2IN X 1/2IN) SHALL BE USED TO INSURE SEALANT CROSS-SECTIONS OF 13MM X 50MM (1/2 IN X 2IN) WITH A WIDTH OF 13MM (1/2IN).

2. SEALANT SHALL BE CAST AND CURED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS EXCEPT THAT CURING PERIOD SHALL NOT EXCEED TWENTY-FOUR (24) HOURS.

3. FOLLOWING THE CURING PERIOD, THE GAP BETWEEN BLOCKS SHALL BE WIDENED TO 31.7MM (1 1/4IN). SPACERS SHALL BE USED TO MAINTAIN THIS GAP FOR TWENTY FOUR (24) HOURS PRIOR TO INSPECTION FOR FAILURE.

CERTIFIED TEST REPORTS FROM THE SEALANT MANUFACTURER ON THE ACTUAL BATCH OF MATERIAL BEING SUPPLIED INDICATING COMPLIANCE WITH THE ABOVE REQUIREMENTS SHALL BE FURNISHED TO THE ENGINEER BEFORE THE SEALANT IS USED ON THE JOB. THE PRIMER AND SEALANT SHALL BE PLACED STRICTLY IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER, TAKING SPECIAL CARE TO PROPERLY MIX THE SEALANT PRIOR TO APPLICATION. BEFORE ANY SEALANT IS PLACED, THE CREW DOING THE WORK SHALL BE CAREFULLY INSTRUCTED AS TO THE PROPER METHOD OF APPLICATION BY A REPRESENTATIVE OF THE SEALANT MANUFACTURER. ALL SEALANT SHALL CURE AT LEAST SEVEN (7) DAYS BEFORE THE STRUCTURE IS FILLED WITH WATER.

c. WATERSTOPS

1. WATERSTOPS SHALL BE EXTRUDED FROM AN ELASTOMERIC POLYVINYLCHLORIDE COMPOUND CONTAINING THE NECESSARY PLASTICIZERS, RESINS, STABILIZERS, AND OTHER MATERIALS NECESSARY TO MEET THE REQUIREMENTS OF THESE SPECIFICATIONS. NO RECLAIMED OR SCRAP MATERIAL SHALL BE USED. THE WATERSTOP MANUFACTURER SHALL FURNISH TO THE ENGINEER CURRENT TEST REPORTS AND A WRITTEN CERTIFICATION THAT THE MATERIAL TO BE SHIPPED TO THE JOB SITE MEETS THE FOLLOWING PHYSICAL REQUIREMENTS:

PHYSICAL PROPERTY, SHEET MATERIAL		VALUE	ASTM STD.
TENSILE STRENGTH – MINIMUM		12.07 MPA (1750 PSI)	D412, DIE C
ULTIMATE ELONGATION-MINIMUM		350%	D412, DIE C
LOW TEMP. BRITTLENESS-MAXIMUM	-37ºC	D746 (-35ºF)	
STIFFNESS IN FLEXURE-MINIMUM		2.76 MPA (400 PSI)	D747
ACCELERATE EXTRACTION			
TENSILE STRENGTH-MINIMUM		10.35 MPA (1500 PSI)	D412, DIE C
ULTIMATE ELONGATION-MINIMUM		300%	D412, DIE C
EFFECT OF ALKALIES			
CHANGE IN WEIGHT (%)		+0.25/-0.10	-
CHANGE IN DUROMETER, SHORE A	+5		
FINISHED WATERSTOPS			
TENSILE STRENGTH-MINIMUM MPA		0.67	D412, DIE C
ULTIMATE ELONGATION-MINIMUM (%)		280	D412, DIE C

2. QUALIFICATION SAMPLES

PRIOR TO PRODUCTION OF THE MATERIAL REQUIRED UNDER THIS CONTRACT, QUALIFICATION SAMPLES SHALL BE SUBMITTED. SUCH SAMPLES SHALL CONSIST OF EXTRUDED OR MOLDED SECTIONS OF EACH SIZE OR SHAPE TO BE USED, AND SHALL BE ACCOMPLISHED SO THAT THE MATERIAL AND WORKMANSHIP REPRESENTS IN ALL RESPECTS THE MATERIAL TO BE FURNISHED UNDER THIS CONTRACT. THE BALANCE OF THE MATERIAL TO BE USED UNDER THIS CONTACT SHALL NOT BE PRODUCED UNTIL AFTER THE ENGINEER HAS APPROVED THE QUALIFICATION SAMPLES.

3. SPLICES AND JOINTS

PRIOR TO USE OF THE WATERSTOP MATERIAL IN THE FIELD, A SAMPLE OF A FABRICATED CROSS CONSTRUCTED OF EACH SIZE OR SHAPE OF MATERIAL TO BE USED SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. THESE SAMPLES SHALL BE FABRICATED SO THAT THE MATERIAL AND WORKMANSHIP REPRESENT IN ALL RESPECTS THE

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **REINFORCED CONCRETE**		**REVISIONS**
				BY: / **DATE:**
		DATE:	**NO.**	
	SCALE: NTS / **BY: PDD**	**JANUARY 2021**	**9**	

FITTINGS TO BE FURNISHED UNDER THIS CONTRACT. FIELD SAMPLES OF FABRICATED FITTINGS (CROSSES, TEES, ETC.) WILL BE SELECTED AT RANDOM BY THE ENGINEER FOR TESTING BY A LABORATORY AT THE OWNER'S EXPENSE. WHEN TESTED, THEY SHALL HAVE TENSILE STRENGTH ACROSS THE JOINTS EQUAL TO ATLEAST 4.14 MPA (600 PSI). FIELD SPLICES AND JOINTS SHALL BE MADE IN ACCORDANCE WITH THE WATERSTOP MANUFACTURER'S INSTRUCTION USING A THERMOSTATICALLY-CONTROLLED HEATING IRON.

4. FLAT-STRIP WATERSTOPS

FLAT-STRIP WATERSTOPS, WHERE REQUIRED, SHALL BE AS SHOWN. AT NO PLACE SHALL THE THICKNESS BE LESS THAN 4.76MM (0.1875 IN). ADEQUATE MEANS SHALL BE PROVIDED FOR ANCHORING THE WATERSTOP IN CONCRETE. IN PLACING FLAT-STRIP WATERSTOPS IN THE FORMS, MEANS SHALL BE PROVIDED TO PREVENT THEM FROM BEING FOLDED OVER BY THE CONCRETE AS IT IS PLACED. HORIZONTAL WATERSTOPS SHALL BE HELD IN PLACE WITH CONTINUOUS SUPPORTS TO WHICH THE TOP EDGE OF THE WATERSTOP SHALL BE TACKLED. VERTICAL WATERSTOPS SHALL BE HELD IN PLACE WITH LIGHT WIRE TIES ON 450MM (18IN) CENTERS WHICH SHALL BE PASSED THROUGH THE EDGE OF THE WATERSTOP AND TIED TO THE TWO CURTAINS OF REINFORCING STEEL. IN PLACING CONCRETE AROUND WATERSTOPS, CONCRETE SHALL BE WORKED UNDER THE WATERSTOPS BY HAND SO AS TO AVOID THE FORMATION OF AIR AND ROCK POCKETS.

d. EXPANSION JOINT FILLER

WHERE EXPANSION JOINT FILLER IS INDICATED ON THE DRAWINGS, THE MATERIAL SHALL BE OF THE PERFORMED NON-EXTRUDING TYPE JOINT FILLER WHICH MAY BE CONSTRUCTED OF OPEN CELLULAR SPONGE RUBBER, OR CLOSED CELLULAR SPONGE RUBBER OF FIRM TEXTURE. BITUMINOUS FIBER TYPE WILL NOT BE PERMITTED. ALL NON-EXTRUDING AND RESILIENT-TYPE PERFORMED EXPANSION JOINT FILLERS SHALL CONFORM TO THE REQUIREMENTS AND TESTS SET FORTH IN "SPECIFICATIONS FOR PREFORMED SPONGE RUBBER AND CORK EXPANSION JOINT FILLERS FOR CONCRETE PAVING AND STRUCTURAL CONSTRUCTION", TYPE (ASTM DESIGNATION D-1752), EXCEPT AS OTHERWISE PROVIDED HEREIN.

14 CORROSION PROTECTION REQUIREMENT

PIPES, CONDUITS, DOWELS AND OTHER FERROUS ITEMS REQUIRED TO BE EMBEDDED IN CONCRETE CONSTRUCTION SHALL BE SO POSITIONED AND SUPPORTED PRIOR TO PLACEMENT OF CONCRETE THAT THERE WILL BE A MINIMUM OF 50MM (2-IN) CLEARANCE BETWEEN SAID ITEMS AND ANY PART OF THE CONCRETE REINFORCEMENT. SECURING SUCH ITEMS IN POSITION BY WIRING OR WELDING THEM TO THE REINFORCEMENT WILL NOT BE PERMITTED.

15 ORDER OF PLACING CONCRETE

a. THE ORDER OF PLACING CONCRETE IN ALL PARTS OF THE WORK SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER. IN ORDER TO MINIMIZE THE EFFECTS OF SHRINKAGE, THE CONCRETE SHALL BE PLACED IN UNITS AS BOUNDED BY CONSTRUCTION JOINTS AS SHOWN ON THE DRAWINGS. THE PLACING OF UNITS SHALL BE DONE BY PLACING ALTERNATE UNITS IN A MANNER SUCH THAT EACH UNIT PLACED SHALL HAVE CURED AT LEAST SEVEN (7) DAYS BEFORE THE CONTIGUOUS UNIT OR UNITS ARE PLACED, EXCEPT THAT VERTICAL WALLS SHALL BE PLACED UNTIL THE WALL FOOTINGS HAVE CURED AT LEAST FOURTEEN (14) DAYS, AND THE CORNER SECTIONS OF VERTICAL WALLS SHALL NOT BE PLACED UNTIL ALL THE ADJACENT WALL PANELS HAVE CURED AT LEAST FOURTEEN (14) DAYS.

b. THE SURFACE OF THE CONCRETE SHALL BE LEVEL WHENEVER A RUN OF CONCRETE IS STOPPED. TO INSURE A LEVEL, STRAIGHT JOINT ON THE EXPOSED SURFACE OF WALLS, A WOOD STRIP AT LEAST 19.0MM (0.75-IN) THICK SHALL BE TACKED TO THE FORMS ON THESE SURFACES. THE CONCRETE SHALL BE CARRIED ABOUT 13.0MM (0.50-IN) ABOVE THE UNDERSIDE OF THE STRIP. ABOUT ONE HOUR AFTER THE CONCRETE IS PLACED, THE STRIP SHALL BE REMOVED AND ANY IRREGULARITIES IN THE EDGE FORMED BY THE STRIP SHALL BE LEVELED WITH A TROWEL AND ALL LAITANCE SHALL BE REMOVED.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **REINFORCED CONCRETE**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**10**		

21.16 TAMPING AND VIBRATING

a. AS CONCRETE IS PLACED IN THE FORMS OR IN EXCAVATIONS, IT SHALL BE THOROUGHLY SETTLED AND COMPACTED THROUGHOUT THE ENTIRE DEPTH OF THE LAYER WHICH IS BEING CONSOLIDATED, INTO A DENSE, HOMOGENOUS MASS, FILLING ALL CORNERS AND ANGLES, THOROUGHLY EMBEDDING THE REINFORCEMENT, ELIMINATING ROCK POCKETS AND BRINGING ONLY A SLIGHT EXCESS OF WATER TO THE EXPOSED SURFACE OF CONCRETE DURING PLACEMENT.

b. CARE SHALL BE USED IN PLACING CONCRETE AROUND WATERSTOPS. THE CONCRETE SHALL BE CAREFULLY WORKED BY RODDING AND VIBRATING TO MAKE SURE THAT ALL AIR AND ROCK POCKETS HAVE BEEN ELIMINATED. WHERE FLAT-STRIP TYPE WATERSTOPS ARE USED, THE CONCRETE SHALL BE WORKED UNDER THE WATERSTOPS BY HAND MAKING SURE THAT ALL AIR AND ROCK POCKETS HAVE BEEN ELIMINATED.

c. CONCRETE IN WALLS SHALL BE INTERNALLY VIBRATED AND AT THE SAME TIME RAMMED, STIRRED, OR WORKED WITH SUITABLE APPLIANCES, TAMPING BARS, SHOVELS, OR FORKED TOOLS UNTIL IT COMPLETELY FILLS THE FORMS OR EXCAVATIONS AND CLOSES SNUGLY AGAINST ALL SURFACES. SUBSEQUENT LAYERS OF CONCRETE SHALL NOT BE PLACED UNTIL THE LAYERS PREVIOUSLY PLACED HAVE BEEN WORKED THOROUGHLY AS SPECIFIED. EXCEPT IN SPECIAL CASES WHERE THEIR USE IS DEEMED IMPRACTICABLE BY THE ENGINEER, THE CONTRACTOR SHALL USE INTERNALLY VIBRATED, HIGH SPEED POWER VIBRATORS NOT LESS THAN 8000 RPM OF AN APPROVE IMMERSION TYPE IN SUFFICIENT NUMBERS, WITH STANDBY UNITS AS REQUIRED, TO ACCOMPLISH THE RESULTS HEREIN SPECIFIED WITHIN FIFTEEN (15) MINUTES AFTER CONCRETE OF THE PRESCRIBED CONSISTENCY IS PLACED IN THE FORMS. THE VIBRATING HEAD SHALL BE KEPT FROM CONTACT WITH THE SURFACES OF THE FORMS. CARE SHALL BE TAKEN NOT TO VIBRATE CONCRETE EXCESSIVELY OR TO WORK IT IN ANY MANNER THAT CAUSES SEGREGATION OF ITS FACE.

17 CURING AND WATERPROOFING

a. GENERAL

ALL CONCRETE SHALL BE CURED FOR NOT LESS THAN FOURTEEN (14) DAYS AFTER PLACING, IN ACCORDANCE WITH THE METHODS SPECIFIED HEREIN FOR THE DIFFERENT PARTS OF THE WORK, AND DESCRIBED IN DETAIL IN THE FOLLOWING SUBSECTIONS.

SURFACE TO BE CURED OR WATERPROOF	METHOD
UNSTRIPPED WOODEN FORMS	1
CONSTRUCTION JOINTS BETWEEN FOOTINGS AND WALL, AND BETWEEN FLOOR SLABS AND COLUMNS	2
ENCASEMENT CONCRETE AND THRUST BLOCKS	3
ALL CONCRETE SURFACES NOT SPECIFICALLY PROVIDED FOR ELSEWHERE IN THIS SUBSECTION	4
FLOOR SLABS IN HYDRAULIC STRUCTURES AND EXTERIOR SURFACES OF EXPOSED ROOF SLABS	5
EXTERIOR BURIED SURFACES OF WALLS	6

b. METHOD 1

WOODEN FORMS SHALL BE WETTED IMMEDIATELY AFTER CONCRETE HAS BEEN POURED AND SHALL BE KEPT WET WITH WATER UNTIL REMOVED. IF FORMS ARE REMOVED WITHIN FOURTEEN (14) DAYS OF PLACING THE CONCRETE, CURING SHALL BE CONTINUED IN ACCORDANCE WITH THE APPLICABLE METHOD FOR THE PARTICULAR STRUCTURE AS SET OUT IN METHODS 2, 4, 5 AND 6 BELOW.

c. METHOD 2

THE SURFACE SHALL BE COVERED WITH BURLAP MATS WHICH SHALL BE KEPT WET WITH WATER FOR THE DURATION OF THE CURING PERIOD, UNTIL THE CONCRETE IN THE WALLS HAS BEEN PLACED. NO CURING COMPOUND SHALL BE APPLIED TO SURFACES CURED UNDER METHOD 2.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **REINFORCED CONCRETE**	**REVISIONS**	
				BY:	**DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**	**11**	

d. METHOD 3

THE SURFACE SHALL BE COVERED WITH MOIST EARTH, NOT LESS THAN FOUR (4) HOURS NOR MORE THAN TWENTY-FOUR (24) HOURS, AFTER THE CONCRETE IS PLACED.

e. METHOD 4

1. THE SURFACE SHALL BE SPRAYED WITH A LIQUID CURING COMPOUND WHICH WILL NOT AFFECT THE BOND OF PAINT TO THE CONCRETE SURFACE. IT SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AT A MAXIMUM COVERAGE RATE OF 4.91M^2/L (200 FT^2/GAL) IN SUCH MANNER AS TO COVER THE SURFACE WITH A UNIFORM FILM WHICH WILL SEAL THOROUGHLY.

2. WHERE THE CURING COMPOUND METHOD IS USED, CARE SHALL BE EXERCISED TO AVOID DAMAGE TO THE SEAL DURING THE CURING PERIOD. SHOULD THE SEAL BE DAMAGED OR BROKEN BEFORE THE EXPIRATION OF THE CURING PERIOD, THE BREAK SHALL BE REPAIRED IMMEDIATELY BY THE APPLICATION OF ADDITIONAL CURING COMPOUND OVER THE DAMAGED PORTION.

3. WHEREVER CURING COMPOUND MAY HAVE BEEN APPLIED BY MISTAKE TO SURFACES AGAINST WHICH CONCRETE SUBSEQUENTLY IS TO BE PLACED AND TO WHICH IT IS TO ADHERE, SAID COMPOUND SHALL BE ENTIRELY REMOVED BY SANDBLASTING PRIOR TO THE PLACING OF NEW CONCRETE.

4. WHERE CURING COMPOUND IS SPECIFIED, IT SHALL BE APPLIED WITHIN TWO (2) HOURS AFTER COMPLETION OF THE FINISH OR UNFORMED SURFACES, AND WITHIN TWO (2) HOURS AFTER REMOVAL OF FORMS ON FORMED SURFACES. REPAIRS REQUIRED TO BE MADE TO FORMED SURFACES SHALL BE MADE WITHIN THE SAID 2 HOUR PERIOD; PROVIDED, HOWEVER, THAT ANY SUCH REPAIRS WHICH CANNOT BE MADE WITHIN THE SAID 2-HOUR PERIOD SHALL BE DELAYED UNTIL AFTER THE CURING COMPOUND HAS BEEN APPLIED. WHEN REPAIRS ARE TO BE MADE TO AN AREA ON WHICH CURING COMPOUND HAS BEEN APPLIED, THE AREA INVOLVED SHALL FIRST BE SANDBLASTED TO REMOVE THE CURING COMPOUND, FOLLOWING WHICH REPAIRS SHALL BE MADE AS PROVIDED UNDER SECTION 21.20.

f. METHOD 5

IMMEDIATELY AFTER THE CONCRETE HAS BEEN TROWELED, IT SHALL BE GIVEN A COAT OF CURING COMPOUND IN ACCORDANCE WITH SUBSECTION (E) HEREIN. NOT LESS THAN ONE (1) HOUR OR MORE THAN FOUR (4) HOURS AFTER THE COAT OF CURING COMPOUND HAS BEEN APPLIED, THE SURFACE SHALL BE WETTED WITH WATER DELIVERED THROUGH A FOG NOZZLE AND CONCRETE CURING BLANKETS SHALL BE PLACED ON THE SLABS. THE CURING BLANKETS SHALL CONSIST OF ONE OF THE FOLLOWING TWO TYPES.

1. SHEETS OF HEAVY, WATERPROOF SISALKRAFT PAPER LAID WITH THE EDGES BUTTED TOGETHER AND WITH THE JOINTS BETWEEN STRIPS SEALED WITH 50MM (2-IN) WIDE STRIPS OF SEALING TAPE OR WITH THE EDGES LAPPED NOT LESS THAN 76MM (3-IN) AND FASTENED TOGETHER WITH A WATERPROOF CEMENT TO FORM A CONTINUOUS WATERTIGHT JOINT.

2. SHEETS OF CLEAR POLYETHYLENE HAVING A THICKNESS OF NOT LESS THAN SIX (6) MILS LAID WITH EDGES BUTTED TOGETHER AND WITH THE JOINTS BETWEEN SHEETS SEALED WITH 25MM (1 IN) WIDE STRIPS OR ACETATE TAPE.

THE CURING BLANKETS SHALL BE LEFT IN PLACE DURING THE 14-DAY CURING AND SHALL NOT BE REMOVED UNTIL AFTER CONCRETE FOR ADJACENT WORK HAS BEEN PLACED. SHOULD THE CURING BLANKETS BECOME TORN OR OTHERWISE INEFFECTIVE, THE CONTRACTOR SHALL REPLACE DAMAGED SECTIONS. DURING THE FIRST SEVEN (7) DAYS OF THE CURING PERIOD, NO TRAFFIC OF ANY NATURE AND NO DEPOSITING, TEMPORARY OR OTHERWISE, OF ANY MATERIALS SHALL BE PERMITTED ON THE CURING BLANKETS. DURING THE REMAINDER OF THE CURING PERIOD, FOOT TRAFFIC AND TEMPORARY DEPOSITING OF MATERIALS THAT IMPOSE LIGHT PRESSURE WILL BE PERMITTED ONLY ON TOP OF PLYWOOD SHEETS 16MM (5/8 IN) MINIMUM THICKNESS LAID OVER THE CURING BLANKET.

g. METHOD 6

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **REINFORCED CONCRETE**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**12**		

1. THE SURFACE SHALL BE SPRAYED WITH A WATERPROOFING AGENT CONSISTING OF AN ASPHALT EMULSION IMMEDIATELY AFTER THE WALL FORMS HAVE BEEN REMOVED. APPLICATION SHALL BE IN TWO COATS. THE FIRST COAT SHALL BE DILUTED TO ½ STRENGTH BY THE ADDITION OF WATER AND SHALL BE SPRAYED ON SO AS TO PROVIDE A MAXIMUM COVERAGE RATE OF 2.43 M^2/L (100 FT^2/GAL) OF DILUTE SOLUTION. THE SECOND COAT SHALL CONSIST OF AN APPLICATION OF THE SPECIFIED MATERIAL, UNDILUTED, AND SHALL BE SPRAYED ON SO AS TO PROVIDE A MAXIMUM COVERAGE RATE OF 2.45 M^2/L (100 FT^2/GAL).

2. AS SOON AS THE ASPHALT EMULSION APPLIED IN ACCORDANCE WITH SUBSECTION 21.17 (G) (1), HAS TAKEN AN INITIAL SET, THE ENTIRE AREA THUS COATED SHALL BE COATED WITH WHITEWASH. ANY FORMULA FOR MIXING THE WHITEWASH MAY BE USED WHICH PRODUCES A UNIFORMLY COATED WHITE SURFACE AND WHICH SO REMAINS UNTIL PLACING OF THE BACKFILL. SHOULD THE WHITEWASH FAIL TO REMAIN ON THE SURFACE UNTIL BACKFILL IS PLACED, THE CONTRACTOR SHALL APPLY ADDITIONAL WHITEWASH AS ORDERED BY THE ENGINEER.

18 CARE AND REPAIR OF CONCRETE

THE CONTRACTOR SHALL PROTECT ALL CONCRETE AGAINST INJURY OR DAMAGE FROM EXCESSIVE HEAT, LACK OF MOISTURE, OVERSTRESS, OR ANY OTHER CAUSE UNTIL FINAL ACCEPTANCE BY THE OWNER. PARTICULAR CARE SHALL BE TAKEN TO PREVENT THE DRYING OF CONCRETE AND TO AVOID ROUGHENING OR OTHERWISE DAMAGING THE SURFACE. ANY CONCRETE FOUND TO BE DAMAGED OR WHICH MAY HAVE BEEN ORIGINALLY DEFECTIVE, OR WHICH BECOMES DEFECTIVE AT ANY TIME PRIOR TO THE FINAL ACCEPTANCE OF THE COMPLETE WORK, OR WHICH DEPARTS FROM THE ESTABLISHED LINE OR GRADE, OR WHICH FOR ANY OTHER REASON DOES NOT CONFORM TO THE SPECIFICATIONS, SHALL BE SATISFACTORILY REPAIRED OR REMOVED AND REPLACED WITH ACCEPTABLE CONCRETE AT THE CONTRACTOR'S EXPENSE.

19 FINISH OF CONCRETE SURFACES

a. ALL FINISHED OR FORMED SURFACES SHALL CONFORM ACCURATELY TO THE SHAPE, ALIGNMENT, GRADES AND SECTIONS AS INDICATED ON THE PLANS OR AS PRESCRIBED BY THE ENGINEER. SURFACES SHALL BE FREE FROM FINS, BULGES, RIDGES, OFFSETS, HONEYCOMBING, OR ROUGHNESS OF ANY KIND, AND SHALL PRESENT A FINISHED, SMOOTH, CONTINUOUS HARD SURFACE.

b. EXCEPT AS OTHERWISE PROVIDED HEREIN, UNFORMED TOP SURFACES OF CONCRETE SHALL BE BROUGHT TO UNIFORM SURFACES AND WORKED WITH SUITABLE TOOLS TO A REASONABLY SMOOTH WOODFLOAT FINISH. EXCESSIVE FLOATING OF SURFACES WHILE THE CONCRETE IS PLASTIC WILL NOT BE PERMITTED. ALL SURFACES SHALL BE PLACED MONOLITHICALLY WITH THE BASE SLAB. DUSTING OF DRY CEMENT AND SAND ON THE CONCRETE SURFACE TO ABSORB EXCESS MOISTURE WILL NOT BE PERMITTED. FLOOR SLABS AND EXPOSED TOPS OF WALLS AND CURBS SHALL BE GIVEN A STEEL TROWEL FINISH. AT THE CONTRACTOR'S OPTION, THE ABOVE-MENTIONED FLOOR SLABS MAY BE FINISHED WITH A POWER FLOAT AFTER SCREEDING. SUBSEQUENT TO THE AFORE-MENTIONED FINISH, ALL SLOPING SURFACES OF FLOOR SLABS SHALL BE LIGHTLY BROOMED TO PROVIDE A SKID-RESISTANT SURFACE.

20 TREATMENT OF SURFACE DEFECTS

a. AS SOON AS FORMS ARE REMOVED, ALL EXPOSED SURFACES SHALL BE CAREFULLY EXAMINED AND ANY IRREGULARITIES SHALL BE IMMEDIATELY RUBBED OR GROUND IN A SATISFACTORY MANNER IN ORDER TO SECURE A SMOOTH, UNIFORM, AND CONTINUOUS SURFACE. PLASTERING OR COATING OF SURFACES TO BE SMOOTHED WILL NOT BE PERMITTED. NO REPAIRS SHALL BE MADE UNTIL AFTER INSPECTION BY THE ENGINEER, AND THEN ONLY IN STRICT ACCORDANCE WITH HIS DIRECTIONS. CONCRETE CONTAINING VOIDS, HOLES, HONEYCOMBING, OR SIMILAR DEPRESSION DEFECTS, SHALL BE COMPLETELY REMOVED AND REPLACED; PROVIDED THAT WHERE REQUIRED OR APPROVED BY THE ENGINEER, DEFECTS SHALL BE REPAIRED WITH GUNITE OR WITH CEMENT MORTAR PLACED BY AN APPROVED COMPRESSED AIR MORTAR GUN. IN NO CASE WILL EXTENSIVE PATCHING OF HONEYCOMBED CONCRETE BE PERMITTED. ALL REPAIRS AND REPLACEMENTS HEREIN SPECIFIED SHALL BE PROMPTLY EXECUTED BY THE CONTRACTOR AT HIS OWN EXPENSE.

b. DEFECTIVE SURFACES TO BE REPAIRED AS SPECIFIED IN SUBSECTION (A) HEREON, SHALL BE CUT BACK FROM TRUELINE A MINIMUM DEPTH OF 13.0MM (1/2 IN) OVER THE ENTIRE AREA. FEATHERED EDGES SHALL BE AVOIDED. WHERE CHIPPING OR CUTTING TOOLS ARE NOT REQUIRED IN ORDER TO DEEPEN THE AREA PROPERLY, THE SURFACE SHALL BE PREPARED FOR BONDING BY THE REMOVAL OF ALL LAITANCE OR SOFT MATERIAL, AND NOT LESS THAN

0.79 MM (1/32 IN) DEPTH OF THE SURFACE FILM FROM ALL HARD PORTIONS, BY MEANS OF AN EFFICIENT SANDBLAST. AFTER CUTTING AND SANDBLASTING, THE SURFACE SHALL BE WETTED SUFFICIENTLY IN ADVANCE OF SHOOTING WITH GUNITE OR WITH CEMENT MORTAR SO THAT WHILE THE REPAIR MATERIAL IS BEING APPLIED, THE SURFACES UNDER REPAIR WILL REMAIN MOIST, BUT NOT SO WET AS TO OVERCOME THE SUCTION UPON WHICH A GOOD BOND DEPENDS. THE MATERIAL USED FOR REPAIR PURPOSES SHALL CONSIST OF MIXTURE OF ONE (1) SACK OF CEMENT TO 0.08 M^3 (3 CU.FT.) OF SAND. FOR EXPOSED WALLS, THE CEMENT SHALL CONTAIN SUCH A PROPORTION OF WHITE PORTLAND CEMENT AS IS REQUIRED TO MAKE THE COLOR OR THE PATCH MATCH THE COLOR OF THE SURROUNDING CONCRETE.

c. HOLES LEFT BY THE TIE-ROD CONES SHALL BE REAMED WITH SUITABLE TOOTHED REAMERS SO AS TO LEAVE THE SURFACES OF THE HOLES CLEAN AND ROUGH. THESE HOLES THEN SHALL BE REPAIRED IN AN APPROVED MANNER WITH DRY-PACKED MORTAR. HOLES LEFT BY FORM-TYPING DEVICES HAVING A RECTANGULAR CROSS-SECTION, AND OTHER IMPERFECTION HAVING A DEPTH GREATER THAN THEIR LEAST SURFACE DIMENSION, SHALL NOT BE REAMED BUT SHALL BE REPAIRED IN AN APPROVED MANNER WITH DRY-PACKED MORTAR.

d. ALL REPAIRS SHALL BE BUILT UP AND SHAPED IN SUCH A MANNER THAT THE COMPLETED WORK WILL CONFORM TO THE REQUIREMENTS OF SECTION 21.19 USING APPROVED METHODS WHICH WILL NOT DISTURBED THE BOND, CAUSE SAGGING, OR HORIZONTAL FRACTURES. SURFACES OF SAID REPAIRS SHALL RECEIVE THE SAME KIND AND AMOUNT OF CURING TREATMENT AS REQUIRED FOR THE CONCRETE IN THE REPAIRED SECTION.

e. PRIOR TO FILLING ANY STRUCTURE WITH WATER, ANY CRACKS THAT MAY HAVE DEVELOPED SHALL BE "VEE'D" AS SHOWN ON THE DRAWINGS AND FILLED WITH SEALANT CONFORMING TO THE REQUIREMENTS OF SUBSECTION 21.13 (B).

21 ARCHITECTURAL FINISH

ALL PROMINENTLY EXPOSED EXTERIOR, VERTICAL, ABOVE-GROUND CONCRETE SURFACES SHALL BE GIVEN AN ARCHITECTURAL FINISH AS FOLLOWS:

IMMEDIATELY AFTER THE FORMS ARE STRIPPED, THE CONCRETE SURFACE SHALL BE INSPECTED AND ANY POOR JOINTS, VOIDS, ROCK POCKETS, OR OTHER DEFECTIVE AREA SHALL BE REPAIRED AND ALL FORMTIE FASTENER HOLES FILLED AS REQUIRED IN SECTION 21.20 AFTER THE CONCRETE HAS CURED AT LEAST FOURTEEN (14) DAYS, WET THE SURFACE AND APPLY WITH A BRUSH, A GROUT MADE BY MIXING ONE (1) PART PORTLAND CEMENT AND ONE (1) PART OF FINE SAND THAT WILL PASS A NO.16 SIEVE WITH SUFFICIENT WATER TO GIVE IT THE CONSISTENCY OF THICK PAINT. THE CEMENT USED IN SAID GROUT SHALL BE ONE-HALF GRAY AND ONE-HALF WHITE PORTLAND CEMENT, OR AS DIRECTED BY THE ENGINEER. CALCIUM CHLORIDE IN THE AMOUNT OF FIVE PERCENT (5%) BY VOLUME OF THE CEMENT SHALL BE USED IN THE BRUSH COAT. THE FRESHLY APPLIED GROUT SHALL BE VIGOROUSLY RUBBED INTO THE CONCRETE SURFACE WITH A WOOD FLOAT FILLING ALL SMALL AIR HOLES. THE SURFACE SHALL THEN BE KEPT MOIST FOR AN HOUR OR MORE, DEPENDING ON THE WEATHER, UNTIL THE GROUT HARDENS SUFFICIENTLY SO THAT IT CAN BE SCRAPED FROM THE SURFACE WITH THE EDGE OF A STEEL TROWEL WITHOUT DISTURBING GROUT IN THE AIR HOLES. AFTER ALL THE SURFACE GROUT HAS BEEN REMOVED WITH A STEEL TROWEL, THE SURFACE SHALL BE ALLOWED TO DRY AND WHEN DRY, SHALL BE VIGOROUSLY RUBBED WITH BURLAP TO REMOVED COMPLETELY ALL SURFACE GROUT SO THAT THERE IS NO VISIBLE PAINT-LIKE FILM OF GROUT ON THE CONCRETE. THE ENTIRE CLEANING OPERATION FOR ANY AREA MUST BE COMPLETED THE DAY IT IS STARTED, AND NO GROUT SHALL BE LEFT ON THE SURFACE OVERNIGHT. CLEANING OPERATIONS FOR ANY GIVEN DAY SHALL BE TERMINATED AT PANEL JOINTS. IT IS ESSENTIAL THAT THE VARIOUS OPERATIONS BE CAREFULLY TIMED TO SECURE THE DESIRED EFFECT WHICH IS A LIGHT-COLORED CONCRETE SURFACE OF UNIFORM COLOR AND TEXTURE WITHOUT ANY APPEARANCE OF A PAINT OR GROUT FILM. IN THE EVENT THAT IMPROPER MANIPULATION RESULTS IN AN INFERIOR FINISH, THE CONTACTOR SHALL RUB SUCH INFERIOR AREAS WITH CARBORUNDUM BRICKS AS DIRECTED BY THE ENGINEER. BEFORE BEGINNING ANY OF THE FINAL TREATMENT ON EXPOSED SURFACES THE CONTRACTOR SHALL TREAT IN A SATISFACTORY MANNER AN AREA OF AT LEAST 18.6 M2 (200 FT2) IN SOME INCONSPICUOUS PLACE SELECTED BY THE ENGINEER AND SHALL PRESERVE SAID TREATED AREA UNDISTURBED UNTIL THE COMPLETION OF THE JOB. ALL ARCHITECTURALLY-TREATED CONCRETE SURFACES SHALL CONFORM TO THE APPROVED SAMPLE IN TEXTURE, COLOR AND QUALITY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN AND PROTECT THE CONCRETE FINISH

a. AT THE CONTRACTOR'S OPTION, READY-MIXED CONCRETE MAY BE USED MEETING THE REQUIREMENTS AS TO MATERIALS, BATCHING, MIXING, TRANSPORTING AND PLACING AS SPECIFIED HEREIN AND IN THE REQUIREMENTS OF THE "SPECIFICATIONS FOR READY-MIXED CONCRETE" (ASTM C-94), INCLUDING THE SUPPLEMENTARY REQUIREMENTS SPECIFIED IN SUBSECTIONS (B) THROUGH (G) HEREIN.

b. READY-MIXED CONCRETE SHALL BE DELIVERED TO THE SITE OF THE WORK, AND DISCHARGE SHALL BE COMPLETED WITHIN ONE HOUR AFTER THE ADDITION OF THE CEMENT TO THE AGGREGATES OR BEFORE THE DRUM HAS BEEN REVOLVED 250 REVOLUTIONS, WHICHEVER IS FIRST. IN HOT WEATHER, OR UNDER CONDITIONS CONTRIBUTING TO QUICK STIFFENING OF THE CONCRETE, OR WHEN THE TEMPERATURE OF THE CONCRETE IS 29.44ºC (85ºF) OR ABOVE, THE TIME BETWEEN THE INTRODUCTION OF THE CEMENT TO THE AGGREGATES AND DISCHARGE SHALL NOT EXCEED FORTY-FIVE (45) MINUTES.

c. TRUCK MIXERS SHALL BE EQUIPPED WITH ELECTRICALLY-ACTUATED COUNTERS BY WHICH THE NUMBER OF REVOLUTIONS OF THE DRUM OR BLADES MAY BE READILY VERIFIED. THE COUNTER SHALL BE OF THE RESETTABLE, RECORDING TYPE, AND SHALL BE MOUNTED IN THE DRIVER'S CAB. THE COUNTERS SHALL BE ACTUATED AT THE TIME OF STARTING MIXERS AT MIXING SPEEDS.

d. EACH BATCH OF CONCRETE SHALL BE MIXED IN A TRUCK MIXER FOR NOT LESS THAN SEVENTY (70) REVOLUTIONS OF THE DRUM OR BLADES AT THE RATE OF ROTATION DESIGNATED BY THE MANUFACTURER OF THE EQUIPMENT. ADDITIONAL MIXING, IF ANY, SHALL BE AT THE SPEED DESIGNATED BY THE MANUFACTURER OF THE EQUIPMENT AS AGITATING SPEED. ALL MATERIALS INCLUDING MIXING WATER SHALL BE IN THE MIXER DRUM BEFORE ACTUATING THE REVOLUTION COUNTER FOR DETERMINING THE NUMBER OF REVOLUTIONS OF MIXING.

e. TRUCK MIXERS AND THEIR OPERATION MUST BE SUCH THAT THE CONCRETE THROUGHOUT THE MIXED BATCH AS DISCHARGED IS WITHIN ACCEPTABLE LIMITS OF UNIFORMITY WITH RESPECT TO CONSISTENCY, MIX AND GRADING. IF SLUMP TESTS TAKEN AT APPROXIMATELY THE ¼ AND ¾ POINTS OF THE LOAD DURING DISCHARGE GIVE SLUMPS DIFFERING BY MORE THAN 25MM (1-IN) WHEN THE SPECIFIED SLUMP IS 76MM (3-IN) OR LESS, OR IF THEY DIFFER BY MORE THAN 50MM (2 IN) WHEN THE SPECIFIED SLUMP IS MORE THAN 76MM (3-IN), THE MIXER SHALL NOT BE USED ON THE WORK UNLESS THE CAUSING CONDITION IS CORRECTED AND SATISFACTORY PERFORMANCE IS VERIFIED BY ADDITIONAL SLUMP TESTS. ALL MECHANICAL DETAILS OF THE MIXER, SUCH AS WATER MEASURING AND DISCHARGE APPARATUS, CONDITION OF THE BLADES, SPEED ROTATION, GENERAL MECHANICAL CONDITION OF THE UNIT, AND CLEARANCE OF THE DRUM, SHALL BE CHECKED BEFORE A FURTHER ATTEMPT TO USE THE UNIT WILL BE PERMITTED.

f. EACH BATCH OF READY-MIXED CONCRETE DELIVERED AT THE JOB SITE SHALL BE ACCOMPANIED BY A TICKET FURNISHED TO THE ENGINEER AND SHOWING VOLUME OF CONCRETE, THE WEIGHT OF CEMENT IN KILOGRAMS (POUNDS), AND TOTAL WEIGHT OF ALL INGREDIENTS IN KILOGRAMS (POUNDS). THE TICKET SHALL ALSO SHOW THE TIME OF DAY AT WHICH THE MATERIALS WERE BATCHED.

g. THE USE OF NON-AGITATING EQUIPMENT FOR TRANSPORTING READY-MIXED CONCRETE WILL NOT BE PERMITTED. COMBINATION TRUCK AND TRAILER EQUIPMENT FOR TRANSPORTING READY-MIXED CONCRETE WILL NOT BE PERMITTED. THE QUALITY AND QUANTITY OF MATERIALS USED IN READY-MIXED CONCRETE AND IN BATCH AGGREGATES SHALL BE SUBJECT TO CONTINUOUS INSPECTION AT THE BATCHING PLANT BY THE ENGINEER.

23 SLIPFORM PROCESS IN CONCRETE WORK

a. GENERAL

THE USE OF SLIPFORM IN CONCRETE WORK IS OPTIONAL FOR THIS PROJECT. HOWEVER, SHOULD THE CONTRACTOR DECIDE TO ADOPT SLIPFORM IN CONCRETING, THE PROCEDURES/ GUIDELINES OUTLINED BELOW SHALL BE FOLLOWED:

b. FORM MATERIAL

EITHER STEEL, PLYWOOD OR TIMBER SHEATING SHALL BE USED.

c. DEPTH OF FORMS

THE EFFECTIVE DEPTH OF ANY SLIP FORM SHALL BE A MINIMUM OF 1.00 M (39 IN) AND A MAXIMUM OF 2.00 M (78 IN).

d. YOKES

ADDITIONAL SUPPORTS SHALL BE PROVIDED IN ORDER TO PREVENT BUCKLING OF THE JACK RODS.

e. BRACING AND WORKING PLATFORM

THE CONTRACTOR SHALL PROVIDE ADEQUATE BRACING WHICH SHALL BE A PART OF THE WORKING PLATFORM. PLYWOOD NOT LESS THAN 19MM (0.75-IN) THICK MAY BE USED AS THE WORKING PLATFORM. THE TOP OF THE WORKING PLATFORM SHALL BE IN THE SAME LEVEL AS THE TOPS OF THE INSIDE FORMS, TO PERMIT DIRECT SHOVELING OF CONCRETE FROM THE DECK INTO THE FORMS.

f. JACKING SYSTEM

THE CONTRACTOR SHALL USE HYDRAULIC LIFTING GEAR WITH HYDRAULIC JACKS BEARING AGAINST RODS BURIED IN THE CONCRETE. ALTERNATELY, THE FORMS MAY BE LIFTED BY WINCHES AND CABLE, RACK AND PINION OR HUNG FROM STEEL RODS. HYDRAULICALLY OPERATED JACKS WITH CAPACITIES RANGING FROM 3,000, 4,500 AND 6,000 KILOGRAMS SHALL BE USED. JACKS SHALL BE CYLINDRICAL IN SHAPE WITH A HOLE IN THE CENTER THROUGH WHICH THE JACK ROD PASSES, WITH TWO SETS OF JAWS WHICH ALTERNATELY LIFT AND GRIP.

g. JACK RODS

THE CONTRACTOR SHALL USE 25MM (1-IN) DIAMETER SMOOTH MILD STEELS BARS WITH THREADED ENDS FOR EASY COUPLING FOR EXTENSION. JACK RODS SHALL REMAIN IN PLACE AS PART OF THE REINFORCEMENT. UNSUPPORTED LENGTH OF JACK RODS SHALL NOT BE MORE THAN 0.60M (2-IN) ON MAXIMUM LOAD. WHERE RODS PASS THROUGH LARGE FORMED OPENINGS, THEY MUST BE BRACED ADEQUATELY.

h. CONTROL OF THE JACKING PROCESS

A SUITABLE PROCESS DISTRIBUTION SYSTEM FROM A CONTROL HYDRAULIC PUMP SHALL BE USED. THE CONTRACTOR SHALL OPERATE ALL JACKS AT THE SAME SPEED TO GIVE UNIFORM LIFT, CARE BEING TAKEN THAT THE JACKS CARRY THE SAME LOADS. ALL JACKS SHALL BE PROVIDED WITH THE SAME HYDRAULIC PRESSURE TO AVOID CASES WHERE SOME WILL LIFT MORE SLOWLY THAN THE OTHERS.

TO CONTROL THE LEVEL OF THE FORMS DURING THE JACKING PROCESS, PLASTIC PIPES WITH COLORED WATER MAY BE USED, CARE BEING TAKEN TO PURGE OUT OR REMOVE ENTRAPPED AIR IN THE PLASTIC PIPE.

i. CONTROL AND TOLERANCES

AS JACKING PROCEEDS, PROVISIONS SHALL BE MADE TO LIMIT ANY DEVIATIONS FROM THE VERTICAL. A PLUMB BOB SHALL BE USED DURING THE ENTIRE OPERATION.

j. REINFORCEMENT

1. VERTICAL REINFORCEMENT PLACED SHALL BE HELD IN POSITION BY TEMPLATES MOUNTED ON THE FORMS AND MOVING WITH THEM. STEEL SHALL BE LAPPED AND TIED TO THE ROD BELOW AND SHALL BE HELD AT THE TOP BY THE TEMPLATES AT HEIGHTS OF FROM 1.20 TO 3.00M (3.94 TO 9.84 FT) FROM THE DECK. WHERE DIFFICULTIES ARE ENCOUNTERED IN THE USE OF TEMPLATES, THE CONTRACTOR SHALL WELD A PIECE OF STEEL TO THE YOKES JUST ABOVE THE TOP OF THE FORMS TO GUIDE THE REINFORCEMENT INTO THE CORRECT POSITION.

2. HORIZONTAL REINFORCEMENT SHALL BE PLACED AS WORK PROGRESSES. THE CONTRACTOR SHALL THREAD THE BARS THROUGH THE YOKES AND TIE OR WELD THESE TO THE VERTICAL STEEL TO CONTROL BUCKLING. STEEL SHOULD BE OF SHORT LENGTHS, SAY 3.00M (9.37 FT) TO PERMIT EASY HANDLING. THE REINFORCING STEEL SHOULD BE PLACED ON THE WORKING PLATFORM IN THE CORRECT ORDER FOR PLACEMENT.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **REINFORCED CONCRETE**		**REVISIONS**	
			BY:	**DATE:**
	DATE:	**NO.**		
SCALE: NTS **BY: PDD**	**JANUARY 2021**	**16**		

k. FORMING OPENINGS AND RECESSES

THE CONTRACTOR SHALL EMPLOY SPECIAL TECHNIQUES TO FORM OPENINGS FOR DOORS, FOR CONNECTIONS OF BEAMS AND FLOORS, AND FOR PROVISIONS OF NIBS AND HAUNCHES. TOOTHED OR DOVETAILED CONNECTIONS SHALL BE USED.

l. HANDLING CONCRETE

THE CONTRACTOR SHALL USE THE COMMON METHOD FOR SLIPFORMING STRUCTURAL CORES BY DEPOSITING THE CONCRETE ON THE WORKING PLATFORM AND SHOVELING IT INTO ITS FINAL POSITION. CRANE AND BUCKET OR HOIST AND BARROWS MAY BE USED.

m. NORMAL CONCRETING OPERATIONS

AFTER THE SLIP PROCESS HAS STARTED, THE WORKMEN SHALL PLACE THE CONCRETE CONTINUOUSLY AROUND THE STRUCTURE IN 150MM TO 220MM (6 TO 8.8 IN) LAYERS, BY SHOVELING SAME INTO FORMS. ON CEASING CONCRETING THE FORMS SHALL BE KEPT MOVING TO PREVENT FORMATION OF EXCESSIVE ADHESION. THE "HACK-OFF" PROCESS SHALL INVOLVE JACKING AT A DECREASING RATE, ABOUT 2-3 HOURS AFTER PLACING OR UNTIL THE FREEBOARD IS ABOUT 450MM TO 500MM (18 TO 20 IN). WHEN CONCRETING RESUMES AGAIN THE WORKERS SHALL JACK THE FORMS UP ABOUT 25 TO 50MM (1 TO 2 IN) BEFORE POURING CONCRETE.

n. CARE AND MAINTENANCE OF FORMWORK

AFTER CONCRETING HAS CEASED, THE EXPOSED FORMS MUST BE CLEANED AND OILED. CARE SHOULD BE TAKEN TO PREVENT COATING OF REINFORCING STEEL AND SPILLAGE ONTO THE SET CONCRETE.

o. FINISHING AND CURING

1. FINISHING

WHERE SMALL HOLES AND DEPRESSIONS OCCUR, A SPONGE FLOAT TO FILL SMALL HOLES SHALL BE USED TO IMPROVE THE OVERALL APPEARANCE OF THE FINISHED SURFACE.

2. CURING

POTABLE WATER SHALL BE USED FOR CURING. WHEREVER POSSIBLE WATER SHALL BE SPRAYED DIRECTLY INTO THE SURFACE. THE CONTRACTOR SHALL PROVIDE SUITABLE AND ADEQUATE WATER SUPPLY AT THE WORKING PLATFORM. WORKERS SHALL APPLY WATER TO THE CONCRETE SURFACE INTERMITTENTLY. WHERE THE FINISHED STRUCTURE IS TO BE EXPOSED TO THE ELEMENTS, THE WETTING ACTION OF RAIN TO COMPLETE THE CEMENT HYDRATION MAY BE USED AS A CURING METHOD.

24 PLACING REINFORCEMENT

a. ALL REINFORCEMENT SHALL BE PLACED IN ACCORDANCE WITH THE PLANS FURNISHED BY THE ENGINEER. IN CASE OF ANY DOUBT OR AMBIGUITY IN PLACING OF STEEL, THE CONTRACTOR SHALL CONSULT WITH THE ENGINEER WHOSE DECISION SHALL BE FINAL IN SUCH CASES.

b. ALL LOOSE RUST OR SCALE, ALL ADHERING MATERIALS, AND ALL OIL OR OTHER MATERIALS WHICH TEND TO DESTROY BOND BETWEEN THE CONCRETE AND THE REINFORCEMENT SHALL BE REMOVED BEFORE PLACING THE STEEL AND BEFORE CONCRETING BEGINS.

c. METAL REINFORCEMENT SHALL BE ACCURATELY PLACED AND ADEQUATELY SECURED BY USING ANNEALED IRON WIRE TIES OR SUITABLE CLIPS AT INTERSECTIONS AND SHALL BE SUPPORTED BY CONCRETE OR METAL SUPPORTS, SPACERS OR METAL HANGERS. THE MINIMUM CLEAR DISTANCE BETWEEN PARALLEL BARS SHALL BE ONE AND ONE-HALF (1 -1/2) TIMES THE DIAMETER FOR ROUND BARS, AND TWICE THE SIDE DIMENSION FOR SQUARE BARS. IN NO CASE SHALL THE CLEAR DISTANCE BETWEEN BARS BE LESS THAN 25MM (1-IN) NOR LESS THAN ONE AND ONE-THIRD (1-1/3) TIMES THE MAXIMUM SIZE OF THE COARSE AGGREGATE. WHERE BARS ARE USED IN TWO OR MORE LAYERS,

THE BARS IN THE UPPER LAYERS SHALL BE PLACED DIRECTLY ABOVE THOSE IN THE LOWER LAYERS AT A CLEAR DISTANCE OF NOT LESS THAN 25MM (1 IN).

d. BENDS FOR STIRRUPS AND TIES SHALL BE MADE AROUND A PIN HAVING A DIAMETER NOT LESS THAN SIX (6) TIMES THE MINIMUM THICKNESS OF THE BAR, EXCEPT THAT FOR BARS LARGER THAN 25MM (1-IN), THE PIN SHALL NOT BE LESS THAN EIGHT (8) TIMES THE MINIMUM THICKNESS OF THE BAR. ALL BARS SHALL BE BENT COLD.

e. REINFORCEMENT STEEL SHALL NOT BE STRAIGHTENED OR REBENT IN A MANNER THAT WILL INJURE THE MATERIAL. BARS WITH KINKS OR BENDS NOT SHOWN ON THE DRAWINGS SHALL NOT BE USED. HEATING OF THE REINFORCEMENT WILL BE PERMITTED ONLY WHEN APPROVED BY THE ENGINEER.

25 OFFSETS AND SPLICES IN REINFORCEMENT

a. IN SLABS, BEAMS, AND GIRDERS, SPLICES OR REINFORCEMENT AT POINTS OF MAXIMUM STRESS SHALL BE GENERALLY AVOIDED, AND MAY BE ALLOWED ONLY UPON WRITTEN APPROVAL OF SPLICE DETAILS BY THE ENGINEER. SPLICES SHALL PROVIDE SUFFICIENT LAP TO TRANSFER STRESS BETWEEN BARS BY BONDING SHEAR OR BY BUTT WELDING TO DEVELOP IN TENSION AT LEAST ONE HUNDRED TWENTY-FIVE PERCENT (125%) OF THE SPECIFIED YIELD STRENGTH OF THE REINFORCING BAR. SPLICES IN ADJACENT BARS SHALL BE GENERALLY STAGGERED.

b. WHERE CHANGES IN THE CROSS-SECTION OF A COLUMN OCCUR, THE LONGITUDINAL BARS SHALL BE OFFSET IN A REGION WHERE LATERAL SUPPORT IS AFFORDED. WHERE OFFSET, THE SLOPE OF THE INCLINED PORTION OF THE BAR WITH THE AXIS OF THE COLUMN SHALL NOT BE MORE THAN ONE IN SIX IN THE CASE OF TIED COLUMNS, THE TIES SHALL BE SPACED NOT OVER 76MM (3-IN) ON CENTER FOR A DISTANCE OF 300MM (12 IN) BELOW THE ACTUAL POINT OF OFFSET UNLESS OTHERWISE SHOWN ON THE PLANS.

26 TEST ON CONCRETE

a. THE OWNER OR THE ENGINEER MAY REQUIRE A REASONABLE NUMBER OF TESTS ON CONCRETE TO BE MADE DURING THE PROGRESS OF THE WORK, NOT LESS THAN FOUR (4) CYLINDRICAL SPECIMENS SHALL BE MADE FOR EACH TEST OF WHICH AT LEAST TWO (2) SHALL BE RESERVED FOR 28-DAY TEST. NOT LESS THAN ONE TEST SHALL BE MADE FOR VERY FIFTY (50) CUBIC METERS OF CONCRETE AND IN NO CASE LESS THAN ONE TEST FOR EACH DAY'S CONCRETING. SAMPLES SHALL BE SECURED AND MOLDED IN ACCORDANCE WITH "STANDARD METHOD OF SAMPLING FRESH CONCRETE" (ASTM C-172-LATEST REVISION) AND "STANDARD METHOD OF MAKING AND CURING TEST SPECIMENS IN THE FIELD" (ASTM C-31-LATEST REVISION). STRENGTH TEST SHALL BE MADE IN ACCORDANCE WITH THE "STANDARD METHOD OF TEST FOR COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS" (ASTM C-39-LATEST REVISION).

   THE CONTRACTOR SHALL PROVIDE THE SAMPLES TO BE TAKEN AT THE PLACE OF DEPOSIT AND AS SPECIFIED BY THE ENGINEER AND SHALL ALSO BOX SAMPLES FOR SHIPMENT, PACKING THEM TO PREVENT DAMAGE FROM SHARP BLOWS. THE OWNER OR HIS DULY AUTHORIZED REPRESENTATIVE SHALL TRANSPORT THE TEST CYLINDERS TO A LABORATORY FOR TESTING. THE OWNER SHALL PAY COSTS OF SAID TRANSPORTATION AND TESTING OF THE SAMPLES.

b. TO CONFORM TO THE REQUIREMENTS OF THESE SPECIFICATIONS, THE AVERAGE STRENGTH OF TEST SAMPLES REPRESENTING EACH CLASS OF CONCRETE AS WELL AS THE AVERAGE OF ANY FIVE (5) CONSECUTIVE STRENGTH TESTS REPRESENTING EACH CLASS OF CONCRETE, SHALL BE EQUAL TO OR GREATER THAN THE SPECIFIED STRENGTH AND NOT MORE THAN ONE STRENGTH TEST IN TEN SHALL HAVE AN AVERAGE VALUE LESS THAN NINETY PERCENT (90%) THE SPECIFIED STRENGTH.

c. SHOULD THE TEST FAIL TO GIVE THE REQUIRED STRENGTH, THE OWNER SHALL HAVE THE RIGHT TO ORDER A CHANGE IN THE PROPORTIONS OR IN THE PROCEDURES OF CURING OF THE CONCRETE FOR THE REST OF THE STRUCTURE.

27 LIQUIDATED DAMAGES

(FOR FAILURE TO MEET CONCRETE STRENGTH REQUIREMENTS) – FOR FAILURE TO MEET THE SPECIFIED STRENGTHS OF CONCRETE WHICH HAS BEEN DESIGNED, PREPARED, AND DEPOSITED BY THE CONTRACTOR, THE CONTRACTOR SHALL PAY THE OWNER AS LIQUIDATED DAMAGES, NOT AS PENALTY OR FORFEITURE, THE FOLLOWING SCHEDULE APPLIED ON THE AMOUNT OF CONCRETE REPRESENTED BY THE SAMPLES.

1. FOR CONCRETE LESS THAN ONE HUNDRED PERCENT (100%) BUT GREATER THAN OR EQUAL TO NINETY PERCENT (90%) OF SPECIFIED STRENGTHS, PAYMENT OF FIFTY PESOS (₱50.00) PER CUBIC METER OF CONCRETE.

2. FOR CONCRETE LESS THAN NINETY PERCENT (90%) BUT GREATER THAN OR EQUAL TO EIGHTY PERCENT (80%) OF SPECIFIED STRENGTHS, PAYMENT ONE HUNDRED PESOS (₱100.00) PER CUBIC METER OF CONCRETE.

3. FOR CONCRETE LESS THAN EIGHTY PERCENT (80%) OF THE SPECIFIED STRENGTH, REMOVAL OF THE CONCRETE SO DEPOSITED AND THE REPLACEMENT OF SAME AT THE EXPENSE OF THE CONTRACTOR.

(i.) IN ANY CASE OF FAILURE TO MEET SPECIFIED STRENGTH, THE CONTRACTOR MAY, AT HIS EXPENSE, OBTAIN CONCRETE CORE SAMPLES FROM THE POURED CONCRETE AND THE COMPRESSIVE STRENGTH OF SAME AS DETERMINED BY A COMPETENT TESTING AUTHORITY SHALL BE TAKEN AS CONCLUSIVE EVIDENCE OF ITS STRENGTH AND INTEGRITY, PROVIDED THE CORINGS WILL NOT IMPAIR THE SAFETY OF THE STRUCTURE AND CAN BE SATISFACTORILY REPLACED.

TO DETERMINE ADEQUACY OF AFFECTED PARTS, THE OWNER SHALL HAVE THE OPTION TO ORDER LOAD TESTS ON PARTS OF THE STRUCTURE WHERE CONCRETE STRENGTH TESTS ARE BELOW EIGHTY PERCENT (80%) OF SPECIFIED. THESE TESTS SHALL BE IN ACCORDANCE WITH ACI-318, LATEST REVISION, RECOMMENDATIONS AND THEIR COST SHALL BE BORNE BY THE CONTRACTOR.

(ii.) IN CASE OF FAILURE OF SAMPLES TO MEET SPECIFIED STRENGTHS TO THE EXTENT MENTIONED IN (1) OR (2) OR (3) ABOVE, THE CONTRACTOR SHALL BE REQUIRED TO PROLONG THE CURING OF THE POURED CONCRETE AS DIRECTED BY THE ENGINEER, IN ADDITION TO PAYMENT OF THE LIQUIDATED DAMAGES MENTIONED ABOVE.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **REINFORCED CONCRETE**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**19**		

PIPING

1 GENERAL

A. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL PIPE, FITTINGS, CLOSURE, PIECES, SUPPORTS, BOLTS, NUTS, GASKETS, JOINTING MATERIALS, AND APPURTENANCES AS SHOWN AND SPECIFIED, AND AS REQUIRED FOR A COMPLETE AND WORKABLE PIPING SYSTEM. SHOP DRAWINGS OF ALL PIPING SYSTEMS SHALL BE FURNISHED IN ACCORDANCE WITH SECTION 7.02.

B. ALL BOLTS, NUTS, AND STUDS IN THE ASSEMBLY OF PIPING SHALL CONFORM TO THE REQUIREMENTS OF DIVISION 22, MISCELLANEOUS METALWORK.

C. ALL EXPOSED PIPING SHALL BE ADEQUATELY SUPPORTED WITH DEVICES OF APPROPRIATE DESIGN. WHERE DETAILS ARE SHOWN, THE SUPPORTS SHALL CONFORM THERETO AND SHALL BE PLACED AS INDICATED; PROVIDED THAT SUPPORT FOR ALL PIPING SHALL BE COMPLETE AND ADEQUATE REGARDLESS OF WHETHER OR NOT SUPPORTING DEVICES ARE SPECIFICALLY SHOWN.

D. ALL PIPES SHALL BE LAID IN A UNIFORM PROFILE AS SHOWN ON THE DRAWINGS.

2 MORTAR LINED AND ENAMEL OR MORTAR COATED STEEL PIPE

A. GENERAL

MORTAR LINED AND ENAMEL OR MORTAR COATED STEEL PIPE MATERIALS AND METHOD OF MANUFACTURE OF STRAIGHT PIPE AND PIPE SPECIALS SHALL CONFORM TO FEDERAL SPECIFICATIONS SS-P-385A DATED JANUARY 31, 1964 AND AMENDMENT 1 DATED FEBRUARY 27, 1968 (HEREINAFTER REFERRED TO AS "FED SPEC"), SUBJECT TO THE EXCEPTIONS AND SUPPLEMENTAL REQUIREMENTS CONTAINED IN THE FOLLOWING SUBSECTIONS. THE PIPE, OF THE DIAMETER AND CLASS SHOWN, SHALL BE FURNISHED COMPLETE WITH RUBBER GASKETS IF REQUIRED AND ALL SPECIALS AND BENDS SHALL BE PROVIDED AS SHOWN. FOR PIPE 350 MM (14 IN) IN DIAMETER OR LARGER, THE NOMINAL DIAMETER SPECIFIED OR SHOWN SHALL BE THE INSIDE DIAMETER AFTER LINING. PIPE SMALLER THAN 350MM (14 IN) IN DIAMETER MAY BE FURNISHED IN STANDARD OUTSIDE DIAMETERS. PLATE THICKNESS SPECIFIED OR SHOWN ARE NOMINAL THICKNESSES. SHOP DRAWINGS OF ALL PIPE AND SPECIALS SHALL BE FURNISHED IN ACCORDANCE WITH SECTION 7.02.

B. CEMENT

SECTION 3.2.1 OF FED. SPEC. IS DELETED. CEMENT SHALL CONFORM TO ASTM C-150 AND SHALL BE TYPE 1 FOR PIPE LININGS AND COATINGS.

C. AGGREGATE

SECTION 3.2.2 OF FED. SPEC. IS MODIFIED TO PERMIT FINE AGGREGATE CONFORMING TO ASTM C33.

D. CYLINDER MATERIAL

SECTION 3.2.3.1 OF FED SPEC. IS DELETED. CYLINDERS SHALL BE FABRICATED FROM HOT-ROLLED CARBON STEEL SHEETS OR PLATES CONFORMING TO ASTM A-570 GRADES C, D OR E, ASTM A-283BGRADE D; STEEL PIPE CONFORMING TO ASTM A-139 GRADE B; OR, IF APPROVED BY THE ENGINEER, HIGH STRENGTH LOW-ALLOY STEEL CONFORMING TO ASTM A-572 GRADE 42.

E. RUBBER GASKET

WHERE RUBBER GASKETS ARE PROVIDED SECTIONS 3.2.5 THROUGH 3.2.5.7 OF FE. SPEC. ARE DELETED. THE RUBBER GASKET SHALL BE THE CONTINUOUS RING TYPE, MADE OF A SPECIAL COMPOSITION RUBBER. THE COMPOUND SHALL BE OF FIRST GRADE NATURAL CRUDE, SYNTHETIC RUBBER, OR A SUITABLE COMBINATION THEREOF. THE GASKET SHALL BE SO FORMED AND CURED AS TO BE DENSE, HOMOGENEOUS, AND HAVE A SMOOTH SURFACE FREE OF BLISTERS, PITS AND OTHER IMPERFECTIONS. THE GASKETS SHALL BE OF SUFFICIENT VOLUME TO FILL SUBSTANTIALLY THE RECESS PROVIDED WHEN THE JOINT IS ASSEMBLED AND SHALL BE THE SOLE ELEMENT DEPENDED UPON TO MAKE THE JOINT WATER-TIGHT. GASKETS SHALL BE FURNISHED WITH THE PIPE. THE COMPOUND SHALL CONFORM TO THE PHYSICAL REQUIREMENTS LISTED BELOW:

PHYSICAL REQUIREMENT	VALUE	FED. TEST METHOD STD. NO. 601
TENSILE STRENGTH, MIN		
NATURAL RUBBER	15.85 MPA (2300PSI)	4111
SYNTHETIC RUBBER AND COMBINATION	14.47 MPA (2100 PSI)	4111
ULTIMATE ELONGATION, PERCENT MIN.		
NATURAL	500%	4121
SYNTHETIC AND COMBINATION	425%	4121
SHORE DUROMETER, TYPE A COMPRESSION SET,	40-65	3021
PERCENT OF ORIGINAL DEFLECTION MAX.	20%	3111
TENSILE STRENGTH AFTER AGING, PERCENT OF ORIGINAL TENSILE STRENGTH, MIN.	80%	7111*
(OXYGEN PRESSURE TEST OR AIR HEAT TEST)		7221**
* TIME 48 HOURS TEMPERATURE 70°C (158°F) 2.0 MPA (300 PSI). **96 HOURS AT 70°C (158°F).		

F..WELDED JOINTS

WHERE WELDED JOINTS ARE PROVIDED, WELD BELL TYPE JOINTS MAY BE USED, OR THE BELL BE CUT BACK, OR A FILLER ROD ADDED SO AS TO PERMIT A FIELD WELD BETWEEN THE BELL AND SPIGOT JOINT RINGS.

G. PIPE DESIGN

THE 2ND AND 3RD SENTENCES OF SECTION 3.3.1, TABLE 1, AND SECTION 6.3 OF FED. SPEC. ARE DELETED. DESIGN PARAMETERS SHALL BE AS FOLLOWS:

NOMINAL ID MM (IN).....	100 (4)		600(24)	TO	500(2)
CLASS.....	150	150			
MINIMUM STEEL CYLINDER THICKNESS					
MM.....	2.66	3.42			
(IN).....	(0.147)	(0.1345)			

H. LINING

THE REFERENCES TO TABLE 1 AND TO TOLERANCE OF LINING THICKNESS CONTAINED IN SECTION 3.5.2 OF FED. SPEC. ARE DELETED. EXCEPT WHERE OTHERWISE SPECIFIED OR SHOWN, LINING THICKNESS SHALL BE AS FOLLOWS, WITH A TOLERANCE OF PLUS OR MINUS TWENTY-FIVE PERCENT (25%):

NOMINAL PIPE DIAMETER MM(IN)	LINING THICKNESS MM(IN)
UNDER 300 (12)	6(1/4)
300 (12) TO 400 (16)	13 (1/2)
OVER 400 (16)	19 (3/4)

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **PIPING**	**REVISIONS**	
				BY:	**DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**	**2**	

I. COATING

1. GENERAL

THE COATING STEEL PIPE SHALL BE OF COAL TAR ENAMEL OR CEMENT MORTAR AS SPECIFIED HEREIN

2. COAL TAR ENAMEL COATING

THE PIPE SMALLER THAN 450MM (18 IN) DIAMETER SHALL BE FACTORY-COATED WITH COAL TAR ENAMEL AND BONDED ASBESTOS FELT WRAP AS SPECIFIED IN SECTION 3 OF "AWWA STANDARD FOR COAL-TAR-PROTECTIVE COATINGS AND LININGS FOR STEEL WATER PIPELINES-ENAMEL AND TAPE-HOT APPLIED" (AWWA C-203).

PIPE 450MM (18 IN) DIAMETER AND LARGER, SHALL BE FACTORY COATED WITH COAL-TAR ENAMEL, FIBROUS GLASS MAT AND BONDED ASBESTOS FELT WRAP AS SPECIFIED IN SECTION A1.5 OF SAID AWWA STANDARD.

COATING MATERIALS AND METHODS OF APPLICATION SHALL CONFORM TO SAID AWWA STANDARD EXCEPT WHERE MODIFIED BY SAID SECTION A1.5.

3. CEMENT MORTAR COATING

THE REFERENCE TO THE EXTRUSION OF PLACEMENT, TABLE 1 AND COATING THICKNESS CONTAINED IN SECTION 3.5.3 OF FED. SPEC. ARE DELETED. EXCEPT WHERE OTHERWISE SPECIFIED OR SHOWN, COATING THICKNESS SHALL BE 25 MM (1 IN) MINIMUM. IN ADDITION, THE SECOND SENTENCE OF SECTION 3.2.4.2 OF FED. SPEC. IS DELETED. MORTAR FOR PIPE COATING SHALL CONSIST OF ONE (1) PART CEMENT TO NOT MORE THAN THREE (3) PARTS SAND BY WEIGHT.

J. CURING

THE CURING PERIODS SPECIFIED IN SECTION 3.6.2 AND 3.6.4 OF FED. SPEC. ARE MINIMUM PERIODS. CURING OF THE LINING SHALL CONTINUE UNTIL THE EXTERIOR COATING IS APPLIED. THE ENDS OF THE PIPE SHALL BE SEALED WITH HEAVY PLASTIC SHEET DURING THE PERIODS BETWEEN PLACEMENT OF THE LINING AND COATING, AND BETWEEN PLACEMENT OF THE COATING AND THE TIME THE PIPE IS LOWERED INTO THE TRENCH. IF PIPE IS STEAM-CURED, THE CONTRACTOR SHALL FURNISH TO THE ENGINEER COPIES OF RECORDER CHARTS SHOWING TEMPERATURE AND DURATION OF CURING PERIOD.

K. COMPRESSIVE STRENGTH FOR MORTAR

THE LAST SENTENCE OF SECTION 4.4.1 OF FED. SPEC. IS DELETED. CYLINDERS SHALL BE MOLDED AND TESTED IN ACCORDANCE WITH ASTM C39 OR C109.

L. HYDROSTATIC PRESSURE TEST

THE 151.68 MPA (22,000 PSI) STEEL STRESS SPECIFIED IN SECTION 4.4.2 OF FED. SPEC. SHALL BE CHANGED TO READ "172.36 MPA (25,000 PSI)".

M. SPECIALS

1. DEFINITION

SPECIAL ARE DEFINED AS BENDS, REDUCERS, WYES, TEES, CROSSES, OUTLETS, AND MANIFOLDS, WHEREVER LOCATED, AND ALL PIPING ABOVE GROUND OR IN STRUCTURES.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**3**		

2. DESIGN

EXCEPT AS OTHERWISE PROVIDED HEREIN, MATERIALS, FABRICATION AND SHOP TESTING OF STRAIGHT PIPE SHALL CONFORM TO THE "AWWA STANDARD FOR STEEL WATER PIPE 6 INCHES AND LARGER" (AWWA C-200). MINIMUM PLATE THICKNESS OF SPECIALS SHALL BE COMPUTED USING THE FOLLOWING FORMULA:

$$T = \frac{DP}{2(Y/S)}$$
$$23.04$$

WHERE:

T= PLATE THICKNESS IN INCHES
D= OUTSIDE DIAMETER OR STEEL CYLINDER IN INCHES
P= DESIGN PRESSURE IN PSI
S= FACTOR OF SAFETY 2.50.
Y= SPECIFIED YIELD POINT OF STEEL IN PSI.

BUT IN NO CASE SHALL THE DESIGN STRESS (Y/S) EXCEED 91 MPA (13,200 PSI) NOR SHALL PLATE THICKNESS BE LESS THAN THE FOLLOWING:

NOMINAL PIPE DIAMETER (MM)	PIPE MANIFOLDS PIPING ABOVE GROUND PIPING IN STRUCTURES	ELBOWS BENDS REDUCERS
600 AND UNDER	4.76 MM	10-GA
625 TO 1200	6.35 MM	6.35 MM
OVER 1200	7.94 MM	7.94 MM

3. OUTLETS, TEES, WYES AND CROSSES

OUTLETS SHALL BE WELDED TO THE STEEL CYLINDER OF THE PIPE FOLLOWING APPLICATION OF MORTAR COATING TO THE CYLINDER. FOLLOWING THIS, ALL OUTLETS LARGER THAN 50 MM (2 IN) IN DIAMETER SHALL BE PROVIDED WITH STEEL REINFORCING SADDLES, WRAPPER PLATES OR CROTCH PLATES, OR THEY SHALL BE FABRICATED IN THEIR ENTIRETY OF STEEL PLATES HAVING A THICKNESS EQUAL TO THE SUM OF THE REQUIRED THICKNESS OF THE SADDLE OR WRAPPER PLATE, PLUS THE CYLINDER TO WHICH THEY ARE ATTACHED.

SUCH SADDLES OR WRAPPER PLATES SHALL BE OF STEEL PLATE AT LEAST 1.25 TIMES THE THICKNESS OF THE PIPE CYLINDER TO WHICH OUTLET IS ATTACHED. THE TOTAL CROSS-SECTIONAL AREA OF THE SADDLE OR WRAPPER PLATE SHALL BE AT LEAST 1.25 TIMES THE PRODUCT OF THE CUT-OUT LENGTH AND THE PLATE THICKNESS OF THE PIPE, AS DETERMINED BY THE EQUATION IN SECTION (N) (2). THE OVERALL WIDTH OF THE SADDLE OR WRAPPER PLATE SHALL BE NOT MORE THAN 2 TIMES, AND NOT LESS THAN 1.67 TIMES, THE MAXIMUM DIMENSION OF THE CUT-OUT. OUTLETS 300 MM (12 IN) AND SMALLER MAY BE FABRICATED FROM SCHEDULE 30 OR HEAVIER STEEL PIPE IN THE STANDARD OUTSIDE DIAMETERS, I.E., 324 MM (12-3/4MM), 273 MM (10-3/4 IN), 219 MM (8-5/8 IN), 169 MM (6-5/8 IN), AND 114 MM (4-1/2 IN).

WHERE REQUIRED CROTCH PLATES SHALL BE PROVIDED, DESIGNED ACCORDING TO THE NOMOGRAPH METHOD DESCRIBED IN AWWA MANUAL M-11, SECTION 19.50, OR AWWA JOURNAL, VOL. 47, NO.6 JUNE 1955, PP. 617 TO 623.

TEES, WYES, AND CROSSES SHALL EITHER BE FABRICATED OF STEEL PLATE, OR PROVIDED WITH WRAPPER PLATES OR WITH CROTCH PLATES. THE TOTAL THICKNESS OF THE PLATE OR PLATES, EXCLUSIVE OF CROTCH PLATES, BEING SUCH THAT WHEN MULTIPLIED BY THE DIAMETER OF THE OPENING WILL BE NOT LESS THAN 1.25 TIMES THE CROSS-SECTIONAL AREA OF THE CUTOUT. WHERE TEES, WYES OR CROSSES ARE FABRICATED FROM STEEL PLATE WITHOUT WRAPPER PLATES, THE THICKNESS OF THE PLATE SHALL BE NOT LESS THAN 2.5 TIMES THE REQUIRED SHOWN IN THE PROCEEDING TABLE FOR SUCH FITTINGS.

4. DIMENSIONS

UNLESS OTHERWISE SHOWN, DIMENSIONS OF SPECIALS SHALL CONFORM TO "AWWA STANDARD FOR DIMENSIONS FOR STEEL WATER PIPE FITTINGS" (AWWA C-208) FOR SERVICE IN TRANSMISSION AND DISTRIBUTION SYSTEMS."

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **PIPING**	**REVISIONS** BY:	DATE:
			DATE:	**NO.**	
	SCALE: NTS	**BY:** PDD	**JANUARY 2021**	**4**	

5. STEEL WELDING FITTINGS

STEEL WELDING FITTINGS SHALL CONFORM TO ASTM A-234.

6. ENDS OF MECHANICAL-TYPE COUPLINGS

EXCEPT AS OTHERWISE PROVIDED HEREIN, WHERE MECHANICAL-TYPE COUPLINGS ARE INDICATED, THE ENDS OF THE PIPE SHALL BE BANDED WITH TYPE C COLLARED ENDS USING DOUBLE FILLET WELDS. WHERE PIPE 300 MM (12 IN) AND SMALLER IS FURNISHED IN STANDARD SCHEDULE THICKNESS, AND WHERE THE WALL THICKNESS EQUALS OR EXCEEDS THE COUPLING MANUFACTURER'S MINIMUM WALL THICKNESS, THE PIPE ENDS MAY BE GROOVED.

7. FLANGES

WHERE THE DESIGN PRESSURE IS 1.2 MPA (175 PSI) OR LESS, FLANGES SHALL CONFORM TO EITHER AWWA C-207 CLASS D OR E, OR ANSI B16. 5 1.0 MPA (150 PSI) CLASS. WHERE THE DESIGN PRESSURE IS GREATER THAN 1.2 MPA (PSI), FLANGES SHALL CONFORM TO ANSI B16.5 2.0 MPA (300 PSI) CLASS. FLANGES SHALL HAVE FLAT OR RAISED FACES. FLANGES SHALL BE ATTACHED WITH BOLT HOLES STRADDLING THE VERTICAL AXIS OF THE PIPE.

8. SHOP TESTING

UPON COMPLETION OF WELDING, BUT BEFORE LINING AND COATING, EACH SPECIAL SHALL BE BULK-HEADED AND TESTED UNDER A HYDROSTATIC PRESSURE OF NOT LESS THAN ONE AND ONE-HALF (1-1/2) TIMES THE PRESSURE FOR WHICH THE PIPE HAS BEEN DESIGNED PROVIDED, HOWEVER, THAT IF STRAIGHT PIPE USED IN FABRICATING THE SPECIAL HAS BEEN PREVIOUSLY TESTED IN ACCORDANCE WITH SUBSECTION (M) (2) HEREIN, THE CIRCUMFERENTIAL WELDS MAY BE TESTED BY A DYE PENETRANT PROCESS USING TURCO DY-CHECK OR APPROVED EQUAL, WITH NO FURTHER HYDROSTATIC TEST. ANY PINHOLDS OR POROUS WELDS WHICH MAY BE REVEALED BY THE TEST SHALL BE CHIPPED OUT AND REWELDED AND THE SPECIAL RETESTED.

9. LINING

ALL REQUIREMENTS PERTAINING TO THICKNESS, APPLICATION AND CURING OF LINING SPECIFIED FOR STRAIGHT PIPE SHALL APPLY TO SPECIALS, WITH THE FOLLOWING PROVISIONS. IF THE SPECIAL CANNOT BE LINED CENTRIFUGALLY, IT SHALL BE LINED BY HAND. IN SUCH CASE, THE LINING SHALL BE REINFORCED WITH 50 MM X 100 MM (2 IN X 4 IN) NO. 12 WELDED WIRE FABRIC POSITIONED APPROXIMATELY IN THE CENTER OF THE LINING. THE WIRE SPACED 50 MM (2 IN.) ON CENTERS SHALL EXTEND CIRCUMFERENTIALLY AROUND THE PIPE WITH THE FABRIC SECURELY FASTENED TO THE PIPE. SPLICES SHALL BE LAPPED 100 MM (4 IN) AND THE FREE ENDS TIED OR LOOPED TO ASSURE CONTINUITY.

10. COATING

ALL REQUIREMENTS PERTAINING TO THICKNESS, APPLICATION AND CURING OF COATING SPECIFIED FOR STRAIGHT PIPE SHALL APPLY TO SPECIALS. UNLESS OTHERWISE SHOWN, THE COATING ON THE BURIED PORTION OF A PIPE SECTION PASSING THROUGH A STRUCTURE WALL SHALL EXTEND 50 MM (2 IN) INSIDE THE OUTER SURFACE OF THE WALL, OR THE WALL FLANGE, IF ONE IS INDICATED. PIPE ABOVE GROUND OR IN STRUCTURE SHALL BE FILLED-PAINTED AS SPECIFIED IN DIVISION 27, PAINTING.

11. MARKING

A MARK INDICATING THE TRUE VERTICAL AXIS OF THE SPECIAL SHALL BE PLACED ON THE TOP AND BOTTOM OF THE SPECIAL.

N. INTERNAL BRACING

1. GENERAL

PIPE SECTIONS 450 MM (18 IN) AND LARGER SHALL BE BRACED INTERNALLY AS SOON AS PRACTICABLE AFTER THE CEMENT MORTAR LINING HAS BEEN APPLIED. BRACING SHALL REMAIN IN THE PIPE UNTIL INSTALLATION AND BACKFILLING HAVE BEEN COMPLETED.

2. 450 (18 IN) THROUGH 750 MM (30 IN) DIAMETER PIPE

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**5**		

PIPE SECTION SHALL BE BRACED WITHIN 300 MM (12 IN) OF ECAH END WITH TWO 2 X 4S WEDGED IN THE PIPE AT RIGHT ANGLES TO EACH OTHR.

3. LARGER THAN 1200 MM (48 IN) DIAMETER PIPE

PIPE SECTIONS SHALL BE BRACED WITHIN 300 MM (12 IN) OF EACH END, AND AT INTERVALS NOT EXCEEDING 3 M (10 FT) ALONG THE PIPE LENGTH, WITH TWO 4 X 4S WEDGED IN THE PIPE AT RIGHT ANGLES.

O. CLEANLINESS OF PIPE

THE INTERIOR OF EACH PIPE SECTION AND SPECIAL SHALL BE CLEAN AND FREE OF FOREIGN MATERIALS WHEN THEY ARE DELIVERED TO SITE OF THE WORK.

P. TRANSPORT AND HANDLING

1. GENERAL

COAL TAR ENAMEL AND CEMENT MORTAL COATED STEEL PIPE SHALL BE TRANSPORTED AND HANDLED AS SPECIFIED HEREIN. ANY PIPE SECTION THAT BECOMES DAMAGED AS A RESULT OF IMPROPER TRANSPORTING, HANDLING OR STOCKPILING SHALL BE REAPIRED TO THE SATISFACTION OF THE ENGINEER. WHERE DAMAGED AREAS ARE EXTENSIVE OR WHERE, IN THE ENGINEER'S OPINION, FIELD REPAIRS ARE NOT PRACTICABLE, THE ENGINEER MAY ORDER THE CONTRACTOR TO REMOVE THE DAMAGED PIPE SECTION FROM THE SITE OF THE WORK AND REPLACE IT WITH A NEW SECTION.

2. COAL TAR ENAMEL COATED STEEL PIPE

TRANSPORTING AND HANDLING OF ENAMEL COATED PIPE SHALL CONFORM TO THE REQUIREMENTS OF AWWA STANDARD C-203. AFTER ENAMEL COATED PIPE HAS BEEN DELIVERED TRENCH SIDE, ANY SECTION OF PIPE WHICH, IN THE ENGINEER'S OPINION, INDICATES POSSIBLE COATING DAMAGE, SHALL BE SPARK TESTED BY THE CONTRACTOR. ANY DAMAGED AREAS IN THE ENAMEL COATING SHALL BE FIELD-REPAIRED USING HOT COAL TAR ENAMEL OR SECTION OF PIPE REPLACED AS SPECIFIED ABOVE.

3. CEMENT MORTAR COATED STEEL PIPE

PIPE SHALL BE LIFTED BY MEANS OF A PADDED FORK LIFT OR BY BELT SLINGS IN SUCH A MANNER AS TO MINIMIZE BENDING OF THE PIPE SECTION AND PREVENT DAMAGE TO THE COATING. WHEN BEING TRANSPORTED, PIPE SHALL BE SUPPORTED IN MANNER THAT WILL PREVENT DISTORTION OR DAMAGE TO THE LINING OF COATING. WHEN NOT BEING HANDLED, PIPE SHALL BE STOCKPILED ON TIMBER CRADLES OR PROPERLY PREPARED GROUND WITH ALL ROCK ELIMINATED. DAMAGED PIPE SHALL BE REPAIRED OR REPLACED AS SPECIFIED ABOVE.

Q. INSTALLATION OF PIPING

1. GENERAL

UNLESS OTHERWISE PROVIDED, THE CONTRCATOR SHALL FURNISH AND INSTALL ALL PIPES, SPECIALS, FITTINGS, CLOSURE PIECES, VALVES, SUPPORTS, BOLTS, NUTS, GASKETS, JOINTING MATERIALS AND ALL OTHER APPURTENANCES AS SHOWN AND AS REQUIRED TO PROVIDE A COMPLETE AND WORKABLE INSTALLATION. WHERE PIPE SUPPORT DETAILS ARE SHOWN, THE SUPPORTS SHALL CONFORM THERETO AND SHALL BE PLACED AS INDICATED; PROVIDED THAT THE SUPPORT FOR ALL EXPOSED PIPING SHALL BE COMPLETE AND ADEQUATE REGARDLESS OF WHETHER OR NOT SUPPORTING DEVICES ARE SPECIFICALLY SHOWN. CONCRETE THRUSTS BLOCK, ANCHOR BLOCKS OR WELDED JOINTS SHALL BE PROVIDED AT ALL JUNCTIONS, CHANGES IN DIRECTION EXCEEDING 11-1/2 DEGREES OR WHERE OTHERWISE SHOWN. AT ALL TIMES WHEN THE WORK OF INSTALLING PIPE IS NOT IN PROGRESS, ALL OPENINGS INTO THE PIPE AND THE ENDS OF THE PIPE IN TRENCHES OR STRUCTURES SHALL BE KEPT TIGHTLY CLOSED TO PREVENT ENTRANCE OF ANIMALS AND FOREIGN MATERIALS. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT THE PIPE FROM FLOATING DUE TO WATER ENTERING THE TRENCH FROM ANY SOURCE, SHALL ASSUME FULL RESPONSIBILITY FOR ANY DAMAGE DUE TO THIS CAUSE AND SHALL AT HIS OWN EXPENSE RESTORE AND REPLACE THE PIPE TO ITS SPECIFIED CONDITION AND GRADE IF IT IS DISPLACED DUE TO FOLATING. THE CONTRACTOR SHALL MAINTAIN THE INSIDE OF THE PIPE FREE FROM FOREIGN MATERIALS AND IN A CLEAN AND SANITARY CONDITION UNTIL ITS ACCEPTANCE BY THE OWNER.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS**	
			BY:	**DATE:**
	DATE:	**NO.**		
SCALE: NTS **BY: PDD**	**JANUARY 2021**	**6**		

2. LAYING

TRENCHES SHALL BE IN A REASONABLY DRY CONDITION WHEN THE PIPE IS LAID, NECESSARY FACILITIES INCLUDING SLINGS SHALL BE PROVIDED FOR LOWERING AND PROPERLY PLACING THE PIPE SECTION IN THE TRENCH WITHOUT DAMAGE. THE PIPE SECTIONS SHALL BE LAID TO THE LINE AND GRADE WHEN SHOWN AND THEY SHALL BE CLOSELY JOINED TO FORM A SMOOTH FLOW LINE. IMMEDIATELY BEFORE PLACING EACH SECTION OF PIPE IN FINAL POSITION FOR JOINTING, THE BEDDING FOR THE PIPE SHALL BE CHECKED FOR FIRMNESS AND UNIFORMITY OF SURFACE.

3. RUBBER AND GASKET JOINTS

THE RUBBER GASKET JOINT SHALL BE MADE BY PROPERLY LUBRICATING THE RUBBER GASKET WITH A SUITABLE VEGETABLE COMPOUND SOAP BEFORE IT IS PLACED IN THE GROOVE AT THE SPIGOT END. THE GASKET SHALL BE STRETCHED OVER THE SPIGOT OF THE PIPE AND CAREFULLY SEATED IN THE GROOVE, WITH CARE TAKEN TO EQUALIZE THE STRESS IN THE GASKET AROUND THE CIRCUMFERENCE OF THE JOINT. THE GASKET SHALL NOT BE TWISTED, ROLLED, CUT, CRIMPED, OR OTHERWISE, INJURED OR FORCED OUT OF POSITION DURING THE CLOSURE OF THE JOINT. A "FEELER" GAGE SHALL BE USED TO CHECK THE POSITION OF THE RUBBER GASKET AFTER THE JOINT HAD BEEN TELESCOPED,

4. FIELD-WELDED JOINTS

FIELD WELDING OF PIPE JOINTS SHALL CONFORM TO THE REQUIREMENTS OF THE "AWWA STANDARDS FOR FIELD WELDING OF STEEL WATER PIPE JOINTS" (AWWA C-206). PRIOR TO WELDING, THE JOINT SHALL BE MADE UP IN ACCORADANCE WITH SUBSECTION (Q) (3) AND (Q) (5) HEREIN. SUCH JOINTS SHALL BE INSPECTED AND APPROVED BY THE ENGINEER BEFORE ANY PROTECTIVE COATING IS PLACED AROUND THE OUTSIDE OF THE JOINTS.

5. PROTECTIVE COATINGS

WITH PIPE SMALLER THAN 450 MM (18 IN) IN DIAMETER, BEFORE THE SPIGOT IS INSERTED INTO THE BELL, THE BELL SHALL BE DAUBED WITH MORTAR CONTAINING ONE (1) PART CEMENT TO THREE (3) PARTS SAND. THE SPIGOT END THEN SHALL BE FORCED TO THE BOTTOM OF THE BELL AND EXCESS MORTAR ON THE INSIDE OF THE JOINT SHALL BE SWABBED OUT. WITH PIPE 450 MM (18 IN) IN DIAMETER AND LARGER, JOINTS SHALL BE POINTED ON THE INSIDE WITH MORTAR AS SPECIFIED FOR FIELD JOINTS IN AWWA STANDARD C-205 AFTER THE BACKFILL HAS BEEN PLACED. AFTER COATED PIPE SECTIONS HAVE BEEN JOINED, THE COATING SHALL BE MADE CONTINUOUS ACROSS THE JOINTS FORMING A COATING EQIUIVALENT TO THE FACTORY-APPLIED COATING OF ADJACENT PIPE SECTIONS. COATING AND SPARK TESTING OF COAL TAR ENAMEL FIELD JOINTS SHALL BE AS SPECIFIED IN AWWA STANDARD C-203 AND SHALL BE PERFORMED AT THE EXPENSE OF THE CONTRACTOR. THE USE OF COAL TAR TAPE TO PROVIDE THE REQUIRED PROTECTION WILL NOT BE PERMITTED.

AFTER THE PIPE SECTIONS ON CEMENT MORTAR COATED PIPE HAVE BEEN JOINED, BUT BEFORE BACKFILLING HAS BEEN COMPLETED, THE OUTSIDE ANNULAR SPACE BETWEEN PIPE SECTIONS SHALL BE COMPLETELY FILLED WITH GROUT. THE GROUT SHALL BE POURED IN SUCH A MANNER THAT ALL EXPOSED PORTIONS OF METAL JOINTS SHALL BE COMPLETELY PROTECTED WITH CEMENT MORTAR. GROUT SHALL CONSIST OF ONE (1) PART CEMENT TO THREE (3) PARTS SAND, BY WEIGHT AND SHALL BE SUFFICIENTLY FLUID TO PERMIT IT TO BE POURED INTO THE JOINT SPACE. EXTERIOR FIELD JOINTS SHALL BE COATED WITH CEMENT MORTAR, RETAINED BY SUITABLE FORMS, SO AS TO BRIDGE THE JOINT. THE MORTAR SHALL BE COMPACTED WITHIN THE FORM TO PRODUCE DENSE COATING WITHOUT VOIDS. THE JOINT COATING SHALL BE KEPT MOSIT UNTIL THE BACKFILL IS PLACED.

6. BUTT-STAPS

WHERE A BUTT-STRAP IS USED, BOTH THE INTERIOR AND EXTERIOR SURFACES OF THE BUTT-STRAP SHALL BE GIVEN A COATING EQUIVALENT TO THE FACTORY-APPLIED COATING OF THE ADJOINING PIPE SECTIONS. MORTAR COATING SHALL BE REINFORCED WITH WIRE MESH. THE MORTAR LINING SHALL BE REINFORCED WITH WIRE MESH WHERE THE EXPOSED LENGTH OF THE BUTT-STRAP, AS MEASURED BETWEEN THE ENDS OF THE CONNECTED PIPE SECTION, EXCEEDS 100MM (4 IN). BUTT-STRAPS USED AS CLOSURE PIECES SHALL BE PROVIDED WITH HAND HOLES FOR REPAIR OF THE LINING AS SHOWN ON STANDARD DRAWING CD-106R.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**7**		

3 SMALL STEEL PIPES

UNLESS OTHERWISE SHOWN, GALVANIZED STEEL PIPE IN SIZES 150MM (6 IN) IN DIAMETER AND SMALLER, SHALL CONFORM TO THE REQUIREMENTS OF THE "SPECIFICATIONS FOR BLACK AND HOT-DIPPED ZINC-COATED (GALVANIZED) WELDED AND SEAMLESS STEEL PIPE FOR ORDINARY USES" (ASTM A-120), AND SHALL BE SCHEDULE 40. GALVANIZED STEEL PIPE SHALL NOT BE CEMENT MORTAR-LINED UNLESS OTHERWISE SHOWN. FITTINGS FOR GALVANIZED STEEL PIPE SHALL BE OF GALVANIZED MALLEABLE IRON. GALVANIZED AND BLACK STEEL PIPE SHALL NOT BE USED FOR BURIED SERVICE, EXCEPT WHERE SHOWN O THE DRAWINGS.

GALVANIZED STEEL PIPE FOR SERVICE CONNECTIONS SHALL BE ALLOWED ONLY AS SPECIFICALLY SHOWN ON THE DRAWINGS. THE PIPE SHALL BE WRAPPED WITH A 500 MICRON THICK PVC TAPE TO A TOTAL THICKNESS OF 1000 MICRONS, WITH HALF WIDTH OVER-LAPPING. PVC TAPE SHALL BE OF A TYPE APPROVED BY THE ENGINEER AND SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

4 CAST IRON WATER PIPE

A. MATERIALS

BELL AND SPIGOT CAST IRON PIPE SHALL CONFORM TO THE REQUIREMENTS OF THE FOLLOWING:

1. "CAST IRON PIPE CENTRIFUGALLY CAT IN METAL MOLDS FOR WATER OR OTHER LIQUIDS" (AWWA C-106) OR "CAST IRON PIPE CENTRIFUGALLY CAST IN SAND-LINED MOLDS FOR WATER OR OTHER LIQUIDS" (AWWA C-108), AND SHALL BE CLASS 100 OR CLASS 150 WHERE SHOWN ON THE DRAWINGS AND AS INDICATED IN THE BID SCHEDULE, OR

2. "ISO RECOMMENDATION R-13; CAST IRON PIPES, SPECIAL CASTINGS AND CAST IRON PARTS FOR PRESSURE MAIN LINES". THE PIPE SHALL BE CLASS LA, HOWEVER, THE HYDROSTATIC TEST PRESSURE SHALL BE 2.45 MA (355 PSI) FOR ALL SIZES.

B. FLANGES

STANDARDS FLANGED CAST IRON PIPE FITTINGS SHALL CONFORM TO THE REQUIREMENTS OF THE "AMERICAN STANDARD FOR CAST-IRON PIPE FLANGES AND FLANGED FITTINGS" (ANSI B16.1), CLASS 125.

C. SHORT BODY CAST IRON FITTINGS

SHORT BODY CAST IRON FITTINGS SHALL CONFORM TO THE REQUIREMENTS OF THE "AMERICAN STANDARD FOR CAST-IRON AND DUCTILE IRON FITTINGS, 2-IN THROUGH 48 IN, FOR WATER AND OTHER LIQUIDS" (AWWA C-110) OR "CAST IRON PIPES, SPECIAL CASTINGS AND CAST IRON PARTS FOR PRESSURE MAIN LINES", ISO R13. FITTINGS SHALL HAVE A WALL THICKNESS OF NOT LESS THAN THAT OF THE PIPE WITH WHICH THEY ARE USED AND THE ENDS SHALL HAVE INSIDE DIAMETERS SUITABLE FOR MAKING A WATER TIGHT JOINT WITH THE CAST IRON PIPE FURNISHED.

D. CAST IRON PIPE JOINTS

CAST IRON PIPE SHALL BE FURNISHED WITH BELL AND SPIGOT ENDS WITH RUBBER "PUSH-ON" JOINTS, FLANGED JOINTS, OR FLEXIBLE COUPLINGS AS SHOWN. AT THE OPTION OF THE CONTRACTOR, A MECHANICAL JOINT MAY BE SUBSTITUTED ON ALL CAST IRON PIPE AND FITTINGS FOR WHICH A BELL AND SPIGOT JOINT IS CALLED FOR. THE MECHANICAL JOINT SHALL CONFORM TO THE REQUIREMENTS OF THE "AMERICAN STANDARD FOR RUBBER GASKET JOINTS FOR CAST-IRON AND DUCTILE IRON PRESSURE PIPE AND FITTINGS" (AWWA C-111), CLASS 150, EXCEPT THAT INSIDE DIAMETERS SHALL BE SUITABLE FOR MAKING WATER TIGHT JOINT WITH THE CAST IRON PIPE FURNISHED.

E. CEMENT MORTAR LINING

CAST IRON PIPE AND FITTING SHALL BE LINED WITH CEMENT MORTAR IN ACCORDANCE WITH THE REQUIREMENTS OF THE "AMERICAN STANDARD FOR CEMENT-MORTAR LINING FOR CAST-IRON PIPE AND DUCTILE-IRON PIPE AND FITTINGS FOR WATER: (AWWA C-104).

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **PIPING**	**REVISIONS**	
				BY:	**DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**	**8**	

F. INSTALLATION

CAST IRON PIPE AND FITTING SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF THE "STANDARD FOR INSTALLATION OF CAST-IRON WATER MAINS" (AWWA C-600).

5 CAST IRON SOIL PIPE

CAST IRON SOIL PIPE AND FITTINGS SHALL BE BELL AND SPIGOT PIPE CONFORMING TO THE REQUIREMENTS FOR EXTRA-HEAVY SOIL PIPE AND FITTINGS OF THE "SPECIFICATIONS FOR CAST IRON SOIL PIPE AND FITTINGS" (ANSI A112.5.1). THE PIPE SHALL BE COAL-TAR PITCH COATED.

6 ASBESTOS-CEMENT WATER PIPE

a. MATERIALS

ASBESTOS-CEMENT PIPE SHALL CONFORM TO THE LATEST EDITION OF THE FOLLOWING SPECIFICATION:

1. INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO), RECOMMENDATION R 160 "ASBESTOS CEMENT PRESSURE PIPES", SUBJECT TO THE FOLLOWING ADDITIONAL REQUIREMENTS:

   (A) CLASSIFICATION: SERIES II, CLASS 2.45 MPA.

   (B) INTERNAL HYDRAULIC PRESSURE TEST: A TEST PRESSURE OF 2.45 MPA (355 PSI) SHALL BE APPLIED TO EACH LENGTH OF PIPE. THE TEST SHALL BE PERFORMED IN ACCORDANCE WITH ISO 160, CLAUSE 2.6.1 EXCEPT THAT THE APPLICATION AND MAINTENANCE OF THE TEST PRESSURE MAY BE IN ACCORDANCE WITH THE REQUIREMENTS OF AWWA C-400, SECTION 5.2.2.1, AT THE MANUFACTURER'S OPTION.

   (C) LONGITUDINAL BENDING TEST: A LONGITUDINAL BENDING TEST SHALL BE PERFORMED ON EACH LENGTH OF PIPE IN SIZES UP TO AND INCLUDING 200 MM (8 IN) DIAMETER WHEN THE LENGTH EXCEEDS 2.9M (9.5 FT). THE TEST SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF AWWA C-400 SECTION 5.2.3, CLASS 100.

   (D) TRANSVERSE CRUSHING TEST: A TRANSVERSE CRUSHING TEST SHALL BE PERFORMED AS SPECIFIED IN ISO R160, CLAUSE 2.6.3. THE NUMBER OF TESTS SHALL BE AS SPECIFIED IN ISO R160 CLAUSE 4.2.3.

   (E) ACCEPTANCE TESTS: THE CONSIGNMENT SHALL BE DELIVERED WITH ACCEPTANCE TESTS, AS SPECIFIED IN IDO R160 SECTION 4, SUBJECT TO THE ADDITIONAL REQUIREMENTS INCLUDED HEREIN.

   (F) MANUFACTURER'S CERTIFICATE: THE MANUFACTURER SHALL SUPPLY THE OWNER WITH A CERTIFICATE SHOWING THAT THE PIPE HAS BEEN TESTED IN ACCORDANCE WITH, AND SATISFIES THE REQUIREMENTS OF, THE SPECIFICATIONS AS MODIFIED HEREIN.

   (G) PIPE JOINTS: THE TOLERANCE IN DIMENSIONS OF PIPE AND COUPLINGS, AS WELL AS THE DIMENSIONS AND SPECIFICATIONS OF RUBBER JOINTING RINGS, SHALL BE SUCH THAT AN INTERNAL HYDRAULIC PRESSURE OF 2.45MPA (355 PSI) CAN BE MAINTAINED WITHOUT LEAKAGE WHEN THE PIPES ARE SET AT THE MAXIMUM ANGULAR DEVIATION INDICATED BY THE MANUFACTURER OF THE PIPE.

2. FITTINGS SHALL BE OF CAST IRON CONFORMING IN GENERAL TO THE REQUIREMENTS OF THE "AMERICAN STANDARD FOR CAST-IRON AND DUCTILE-IRON FITTINGS, 2 IN THROUGH 48 IN, FOR WATER AND OTHER LIQUIDS" (AWWA C-110) OR "CAST IRON PIPES, SPECIAL CASTINGS AND CAST IRON PARTS FOR PRESSURE MAIN LINES, ISO R13, PROVIDED, HOWEVER, THAT THE ENDS SHALL BE DESIGNED FOR RUBBER RING JOINTS. FITTINGS SHALL BE CEMENT-MORTAR LINE AND SHALL HAVE INSIDE DIAMETERS SUITABLE FOR MAKING A WATER TIGHT JOINT WITH THE ASBESTOS CEMENT PIPE FURNISHED.

3. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS SHOWING MATERIALS AND METHOD OF JOINING THE PIPE TO CAST IRON FITTINGS AND VALVES O THE ENGINEER FOR APPROVAL PRIOR TO PLACING AN ORDER FOR THE MATERIALS IN ACCORDANCE WITH SECTION 7.02.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **PIPING**	**REVISIONS** **BY:**	**DATE:**
			DATE:	**NO.**	
	SCALE: **NTS**	**BY:** **PDD**	**JANUARY 2021**	**9**	

b. TRANSPORTATION OF ASBESTOS CEMENT PIPES FROM THE MANUFACTURING PLANT TO AND PROPER STOCKPILING IN THE CONTRACTOR'S STORAGE YARD AT THE JOBSITE SHALL BE THE RESPONSIBILITY OF THE MANUFACTURER. EVERY SHIPMENT UPON REACHING THE JOBSITE SHALL BE SUBJECTED TO ONE HUNDRED PERCENT (100%) VISUAL INSPECTION. IF LESS THAN TWO PERCENT (2%) OF THE PIPES SHIPPED ARE FOUND WITH VISIBLE DAMAGE, A REPRESENTATIVE SAMPLE EQUIVALENT TO FIVE PERCENT (5%) OF THE LOT, SELECTED AT RANDOM, SHALL BE SUBJECTED TO HYDROSTATIC TEST AT 1.0MPA (150 PSI), THE PRESSURE MAINTAINED FOR THIRTY (30) SECONDS. IF TWENTY PERCENT (20%) OR MORE THE FIVE PERCENT (5%) SAMPLES FAIL. THE WHOLE LOT SHALL BE SUBJECTED TO HYDRO TEST.

IN THE VISUAL INSPECTION, IF TWO PERCENT (2%) OR MORE OF THE LOT SHIPPED EXHIBIT VISIBLE DAMAGE, THE WHOLE LOT SHALL BE SUBJECTED TO HYDROSTATIC TEST IN THE SAME MANNER AS DESCRIBED ABOVE.

ONLY THOSE WHICH WILL PASS THIS JOBSITE HYDRO TEST, WHEN REQUIRED UNDER THE FOREGOING SPECIFICATIONS, SHALL BE ACCEPTED BY THE CONTRACTOR AND LATER INSTALLED IN THE PROJECT.

TESTING SHALL BE PERFORMED BY THE MANUFACTURER AT NO COST TO THE OWNER.

c. INSTALLATIONS

1. GENERAL

ASBESTOS-CEMENT PIPE SHALL BE INSTALLED IN ACCORDANCE WITH THE "STANDARD FOR INSTALLATION OF ASBESTOS-CEMENT WATER PIPE" (AWWA C-603), EXCEPT THAT THE PIPE SHALL NOT BE LAID USING EARTH MOUND

2. INSPECTION

PRIOR TO INSTALLATION, ALL ASBESTOS-CEMENT PIPE AND COUPLINGS AND ALL RUBBER RINGS SHALL BE INSPECTED FOR DAMAGE AND DEFECTS IN MATERIALS AND WORKMANSHIP. ALL DAMAGED OR DEFECTIVE MATERIALS SHALL BE REJECTED AND REMOVED FROM THE JOB SITE.

3. JOINING TO CAST IRON

JOINTS BETWEEN ASBESTOS-CEMENT PIPE AND CAST-IRON VALVES AND FITTINGS SHALL BE SEALED WITH A RUBBER RING GASKET. AFTER ASSEMBLING THE JOINT, THE POSITION OF THE RUBBER RING GASKETS SHALL BE LOCATED AN EVEN DISTANCE FROM THE FACE OF THE VALVE OR FITTING, FOR THE FULL CIRCUMFERENCE OF THE PIPE.

7 PVC (POLYVINYL CHLORIDE) PIPE

a. MATERIALS

1. PIPE SHALL CONFORM TO THE REQUIREMENTS OF "AWWA STANDARD FOR POLYVINYL CHLORIDE (PVC) PRESSURE PIPE, 4-IN THROUGH 12-IN (AWWA C-900) AND AS INDICATED IN THE BID SCHEDULE. THE PIPE SHALL HAVE STEEL PIPE EQUIVALENT OR CAST IRON EQUIVALENT OUTSIDE DIMENSIONS AND FURNISHED WITH RUBBER RING GASKET JOINTS.

ALTERNATE OUTSIDE DIAMETERS AND WALL THICKNESS AS SHOWN BELOW WILL BE ALLOWED FOR THE SPECIFIED PRESSURE CLASS.

NOMINAL PIPE SIZE (MM)	OUTSIDE DIAMETER (MM)	NOMINAL WALL THICKNESS (MM)	
		CLASS 100	CLASS 150
75	90	4.3	5.1
100	110	5.3	6.3
150	160	7.7	9.1
200	225	10.8	12.8
250	280	13.4	15.9
300	315	15.0	17.9
350	355	16.9	20.1

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS**
				BY: / **DATE:**
		DATE:	**NO.**	
	SCALE: NTS / **BY:** PDD	**JANUARY 2021**	**10**	

THE ISO SHORT TERM PRESSURE TEST MAY BE USED IN LIEU OF THE 5 SECOND AWWA HYDROSTATIC PROOF TEST PROVIDING THE FOLLOWING CRITERIA IS USED. A SHORT TERM HYDROSTATIC PRESSURE TEST SHALL BE PERFORMED ON A SPECIMEN PRODUCED FROM EACH EXTRUSION OUTLET AT THE BEGINNING OF PRODUCTION OF EACH SPECIFIC MATERIAL, TYPE OR SIZE AND THEREAFTER ONCE EVERY TWO HOURS AND UPON START UP FOLLOWING ANY PLANNED OR UNPLANNED INTERRUPTION OF PRODUCTION. THE BELL, INCLUDING ANY REINFORCEMENT SLEEVE, HALL BE INCLUDED AS PART OF AT LEAST 50 PERCENT OF THE TEST SPECIMENS. ONE SHORT TERM HYDROSTATIC PRESSURE TEST FAILURE FROM A PRODUCTION RUN REQUIRING FOUR LESS TEST SHALL CAUSE THE REJECTION OF ALL PIPE FROM PRODUCTION RUN. PIPE FROM PRODUCTION RUNS REQUIRING FIVE OR MORE TESTS SHALL BE REJECTED UPON THE SECOND TEST SPECIMEN FAILURE. A PRODUCTION RUN TO BE REJECTED PER SET OF SPECIMENS TESTED SHALL IN NO CASE EXCEED 8 HOURS PRODUCTION. AN AFFIDAVIT OF COMPLIANCE TO THESE SPECIFICATIONS SHALL BE PROVIDED TO THE OWNER.

2. FITTINGS SHALL BE OF CAST IRON OR POLYVINYL CHLORIDE (PVC) CAST IRON FITTINGS SHALL BE CEMENT MORTAR LINED AND SHALL CONFORM TO THE REQUIREMENTS OF THE "STANDARD FOR CAST IRON AND DUCTILE IRON FITTINGS, 2-IN THROUGH 48-IN FOR WATER AND OTHER LIQUIDS (AWWA C-110), OR TO THE "ISO RECOMMENDATION R-13, CAST IRON PIPES, SPECIAL CASTINGS AND CAST IRON PARTS FOR PRESSURE MAIN LINES". PVC FITTINGS SHALL IN GENERAL CONFORM TO "SOCKET TYPE POLYVINYL CHLORINE (PVC) PLASTIC PIPE FITTINGS SCHEDULE 40 (ASTM D-2466), TYPE 1 (NORMAL IMPACT). THE INSIDE DIAMETER OF FITTINGS SHALL BE SUITABLE FOR MAKING A WATER TIGHT JOINT WITH THE PIPE FURNISHED. JOINTS FOR PIPE AND FITTINGS SHALL BE ESPECIALLY CONSTRUCTED FOR JOINING WITH NEOPRENE RING GASKETS. A SUFFICIENT NUMBER OF RING GASKETS AND LUBRICANT SHALL BE FURNISHED TO PROVIDE FOR A TWO PERCENT (2%) OVER-RUN. PIPE AND FITTINGS SHALL BE LABELLED BY THE MANUFACTURER TO INDICATE CLASS RATING, TYPE MATERIAL, MANUFACTURER'S TRADE NAME AND PRODUCTION CODE. THE MINIMUM THICKNESS FOR POLYVINYL CHLORIDE (PVC) FLANGES SHALL BE AS FOLLOWS:

NOMINAL PIPE SIZE			MINIMUM PLATE THICKNESS		
75	MM	(3 IN)	25	MM	(1 IN)
100	MM	(4 IN)	28	MM	(1-1/8 IN)
150	MM	(6 IN)	32	MM	(1-1/4 IN)
200	MM	(8 IN)	35	MM	(1-3/8 IN)

b. INSTALLATION

AFTER A SECTION OF PIPE HAS BEEN LOWERED INTO THE PREPARED TRENCH AND IMMEDIATELY BEFORE JOINING THE PIPE, THE ENDS OF THE PIPE TO BE JOINED SHALL BE CLEANED, AND THE RUBBER GASKET LUBRICATED, WITH A VEGETABLE COMPOUND SOAP ALL IN ACCORDANCE WITH THE PIPE MANUFACTURER'S INSTRUCTIONS. ASSEMBLY OF THE PIPE LENGTHS SHALL BE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE MANUFACTURER OF THE TYPE OF JOINT USED. ALL SPECIAL TOOLS AND APPLIANCE REQUIRED FOR JOINING THE PIPE SHALL BE PROVIDED BY THE CONTRACTOR. WHEN CUTTING OR MACHINING OF THE PIPE IS NECESSARY, ONLY TOOLS AND METHODS RECOMMENDED BY THE PIPE MANUFACTURER AND APPROVED BY THE ENGINEER SHALL BE EMPLOYED.

8 PE (POLYETHYLENE) PLASTIC PIPE

a. MATERIALS

POLYETHYLENE PIPE SHALL BE MANUFACTURED FROM TYPE IV, CLASS C, GRADE P34 EXTRUSION COMPOUND AS DEFINED BY ASTM D1248 WITH A HYDROSTATIC DESIGN STRESS OF 630 PSI. ALTERNATE POLYETHYLENE PIPE EXTRUSION COMPOUND PE 3408 ACCORDING TO THE PLASTICS PIPE INSTITUTE (PPI) WITH A HYDROSTATIC DESIGN STRESS OF 800 PSI MAY BE USED. ALL COMPOUNDS USED SHALL BE VIRGIN PLASTIC. CLEAN REWORK MATERIAL FROM THE MANUFACTURER'S OWN PIPE PRODUCTION MAY BE USED SO LONG AS THE ORIGINAL WAS VIRGIN MATERIAL AND OF THE SAME TYPE, CLASS AND GRADE AS REQUIRED ABOVE. THE PIPE SHALL MEET THE REQUIREMENTS OF THE NATIONAL SANITATION FOUNDATION FOR POTABLE WATER USE AS TESTED BY THE NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY OR OTHER APPROVED TESTING LABORATORIES AND SHALL BE MADE FROM NON-TOXIC, NON-LEAD BASED PLASTICISER APPROVED BY THE ENGINEER.

b. DIMENSION

WHEN MEASURED ACCORDING TO THE METHODS AS DESCRIBED IN ASTM D2122, POLYETHYLENE PIPE SHALL CONFORM TO EITHER OF THE FOLLOWING DIMENSIONS DEPENDING ON THE TYPE OF EXTRUSION COMPOUND USED AS STIPULATED ABOVE.

1. EXTRUSION COMPOUND TYPE IV, CLASS C, GRADE P34 (ACCORDING TO ASTM D1248).

NOMINAL SIZE (MM)	(IN)	OUTSIDE DIA. (MM)	WALL THICKNESS MIN.	MAX.
75	3	90	10.14	11.52
100	4	110	12.39	14.08
150	6	160	18.03	20.49
200	8	225	25.35	28.80

2. EXTRUSION COMPOUND PE 3408 (ACCORDING TO PPI TECHNICAL REPORT 4-8-78).

NOMINAL SIZE (MM)	(IN)	OUTSIDE DIA. (MM)	WALL THICKNESS MIN.	MAX.
75	3	90	8.18	9.30
100	4	110	10.00	11.36
150	6	160	14.55	16.53
200	8	225	20.45	23.24

c. RATING

ALL POLYETHYLENE PIPES SHALL BE RATED FOR USE WITH WATER AT 23ºC AND AT A MINIMUM WORKING PRESSURE OF 1.1MPA (160 PSI).

d. BURST PRESSURE REQUIREMENT

THE MINIMUM BURST PRESSURE REQUIREMENT FOR POLYETHYLENE PIPE WHEN SUPPLIED UNDER THIS SPECIFICATIONS SHALL BE 4.3MPA (650 PSI) WHEN DETERMINED IN ACCORDANCE WITH ASTM D-1599. THE TIME OF TESTING OF EACH SPECIMEN SHALL BE BETWEEN 60 AND 70 SECONDS.

OTHER REQUIREMENTS WITH RESPECT TO WORKMANSHIP, MECHANICAL PROPERTIES AND TESTING SHALL BE IN ACCORDANCE WITH ASTM D-2239.

e. MARKING

ALL PE PIPES SHALL BE CLEARLY MARKED AT INTERVALS OF NOT MORE THAN 1.0 LM WITH NOMINAL SIZE, TYPE OF MATERIAL, MANUFACTURER'S TRADE NAME AND PRODUCTION CODE.

f. INSTALLATION

ALL PE PIPES WHEN SUPPLIED UNDER THIS SPECIFICATIONS SHALL BE JOINED EMPLOYING EITHER OF THE FOLLOWING METHODS:

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS** BY: / DATE:
		DATE: **JANUARY 2021**	**NO.** **12**	
	SCALE: **NTS** / **BY:** **PDD**			

1. BUTT-FUSION

WHEN THE PIPES SUPPLIED UNDER THIS SPECIFICATIONS ARE INSTALLED AND JOINED BY THIS METHOD, THE WORK SHALL BE CARRIED OUT ONLY BY WELL QUALIFIED PERSONNEL WHO ADHERE STRICTLY TO PRESCRIBED WORKING CONDITIONS USING TOOLS AND PROCEDURES RECOMMENDED BY THE MANUFACTURER AND APPROVED BY THE ENGINEER.

(a) EQUIPMENT – THE EQUIPMENT NEEDED SHALL BE AS DESCRIBED IN ASTM D-2657.

(b) GENERAL PROCEDURE – THE FOLLOWING PROCEDURE SHALL BE FOLLOWED WHEN MAKING A BUTT-FUSION JOINT:

(1) WIPE EACH PIPE-END CLEAN, INSIDE AND OUT TO REMOVE DIRT, WATER, GREASE AND OTHER FOREIGN MATERIAL.

(2) SQUARE THE END OF EACH PIPE SECTION TO BE FUSED USING A FACING TOOL. REMOVE CUTTINGS AND BURRS FROM PIPE ENDS.

(3) CHECK LINE-UP OF PIPE-ENDS IN FUSION MACHINE TO SEE THAT PIPE ENDS MEET SQUARELY AND COMPLETELY OVER THE ENTIRE SURFACE TO BE FUSED. TWO CLAMPS SHOULD BE USED ON EACH END OF PIPE TO BE FUSED FOR SIZES 100MM AND ABOVE.

(4) INSERT THE HEATER PLATE BETWEEN THE ALIGNED PIPE ENDS. BRING AND HOLD THE PIPE ENDS IN CONTACT WITH THE HEATER PLATE. MAINTAIN CONTACT AND ALLOW PIPE TO HEAT AND SOFTEN UNTIL A BEAD OF MOLTEN PLASTIC ROLLS BACK FROM THE ENDS. THIS BEAD WILL BE ABOUT 1.5MM TO 5.0MM BACK FROM THE END OF THE PIPE DEPENDING ON SIZE. SOFTEN APPROXIMATELY 1.5MM ON ALL SIZES UP TO 75MM.ON 75MM TO 150MM HEAT TO 3MM AND FOR THE ABOVE 150MM HEAT TO 5MM. SOFTENING CAN BE JUDGED BY THE APPEARANCE OF THE PIPE END AS THE MATERIAL SOFTENS.

BOTH SURFACES OF THE HEATER PLATE SHALL BE CLEAN AND THE TEMPERATURE MAINTAINED AT 246ºC-260ºC (475ºF TO 500ºF).

(5) CAREFULLY MOVE THE PIPE ENDS AWAY FROM THE HEATER PLATE AND REMOVE THE PLATE. IF THE SOFTENED MATERIAL STICKS TO THE HEATER PLATE, DISCONTINUE THE JOINT. CLEAN HEATER PLATE, RESQUARE PIPE ENDS AND START OVER.

(6) BRING THE HEATED PIPE ENDS TOGETHER WITH THE SPECIFIED PRESSURE TO FORM A UNIFORM DOUBLE BEAD ABOUT 3MM TO 5MM WIDE AROUND THE ENTIRE CIRCUMFERENCE OF THE PIPE.

(7) ALLOW THE JOINT TO COOL AND SOLIDIFY WHILE MAINTAINING THE PRESSURE FOR THE SPECIFIED TIME. INSPECT THE JOINT FOR A UNIFORM NON-POROUS APPEARANCE. IF THE JOINT APPEARS FAULTY, CUT THE JOINT OUT AND REPEAT THE PROCEDURE.

9 PE (POLYETHYLENE) PLASTIC TUBING

a. MATERIALS

THE EXTRUSION COMPOUND SHALL BE EITHER GRADE P33, CLASS C, OR GRADE P34, CLASS C (PE3306 OR PE3406) AS DEFINED BY ASTM D-1248. ALL COMPOUNDS USED SHALL BE VIRGIN PLASTIC EXCEPT THAT CLEAN REWORK MATERIAL FROM THE MANUFACTURER'S OWN PIPE PRODUCTION MAY BE USED SO LONG AS THE ORIGINAL WAS VIRGIN MATERIAL. THE PIPE SHALL MEET THE REQUIREMENTS OF THE NATIONAL SANITATION FOUNDATION (NSF) FOR POTABLE WATER USE AS TESTED BY THE NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY OR OTHER APPROVED TESTING LABORATORIES AND SHALL BE MADE FROM NON-TOXIC, NON-LEAD BASED PLASTICIZER APPROVED BY THE ENGINEER.

b. DIMENSIONS

THE STANDARD DIMENSION RATIO (SDR) SHALL BE 9 WITH NOMINAL DIMENSIONS AS FOLLOWS (IN ENGLISH UNITS):

NOMINAL (MM)	SIZE (IN)	AVERAGE O.D.
19	¾	0.875"
25	1	1.125"
38	1-1/2	1.625"
50	2	2.125"
63	2-1/2	2.874"

c. RATING

ALL SERVICE TUBING SHALL BE RATED FOR USE WITH WATER AT 23.0^{0}C (73.40ºF) AND AT A MINIMUM WORKING PRESSURE OF 1.1MPA (160 PSI). OTHER REQUIREMENTS SHALL BE IN ACCORDANCE WITH ASTM D-2737.

d. MARKING

ALL TUBING SHALL BE CLEARLY MARKED AT INTERVALS OF NOT MORE THAN 0.6M WITH NOMINAL SIZE, TYPE OF MATERIAL (PE 3306, OR PE 3406). STANDARD DIMENSION RATIO (SDR 9), MANUFACTURER'S TRADE NAME AND PRODUCTION CODE, AND THE SEAL OF APPROVAL FROM AN ACCREDITED TESTING LABORATORY.

e. INSTALLATION

THE INSTALLATION AND METHOD OF END CONNECTIONS OF PE PLASTIC TUBING SHALL BE AS SHOWN ON THE DRAWINGS AND AS SPECIFIED IN SECTION 23.10. ALL PROCEDURES AND TOOLS USED SHALL COMPLY WITH THE RECOMMENDATION OF THE MANUFACTURER AND BE APPROVED BY THE ENGINEER.

10 PB (POLYBUTYLENE) PLASTIC TUBING

a. MATERIALS

THE EXTRUSION COMPOUND SHALL BE TYPE II, CLASS C, GRADE 1 POLYBUTYLENE RESIN (PB-2110) AS DEFINED BY ASTM D-2581. ALL COMPOUNDS USED SHALL BE VIRGIN PLASTIC EXCEPT THAT CLEAN REWORK MATERIAL FROM THE MANUFACTURER'S OWN PIPE PRODUCTION MAY BE USED SO LONG AS THE ORIGINAL WAS VIRGIN MATERIAL. THE TUBING SHALL MEET THE REQUIREMENT OF THE NATIONAL SANITATION FOUNDATION (NSF) FOR POTABLE WATER USE AS TESTED BY THE NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY OR OTHER APPROVED TESTING LABORATORIES AND SHALL BE MADE FROM NO-TOXIC, NON-LEAD BASED PLASTICIZER APPROVED BY THE ENGINEER.

b. DIMENSIONS

THE STANDARD DIMENSION RATIO (SDR) SHALL BE A MAXIMUM OF 13.5 WITH AVERAGE DIAMETER, WALL THICKNESS AND TOLERANCE AS HEREIN SPECIFIED, WHEN MEASURED IN ACCORDANCE WITH ASTM D-2122.

THE DIMENSIONAL CRITERIA OF ALL POLYBUTYLENE WATER SERVICE TUBING SHALL CONFORM TO ASTM D-2666 AS FOLLOWS (IN ENGLISH UNITS):

NOMINAL SIZE (MM)	(IN)	AVERAGE O.D.	O.D. TOLERANCE	MIN. WALL THICKNESS	WALL TOLERANCE
13	½	.625	+.008/-.000	.062"	+.010"
19	¾	.875"	+.008/-.000	.065"	+.010"
25	1	1.125	+.010/-.000	.083	+.010
38	1-1/2	1.625	+.012/-.000	.120	+.012
50	2	2.125	+.012/-.000	.157	+.015

c. RATING

ALL SERVICE TUBING SHALL BE RATED FOR USE WITH WATER AT 23.0ºC (73.4ºF) AT MINIMUM HYDROSTATIC DESIGN STRESS OF 6.9MPA (1000 PSI) AND MINIMUM WORKING PRESSURE OF 1.1MPA (160 PSI).

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE: PIPING**		**REVISIONS**	
			BY:	**DATE:**
	DATE:	**NO.**		
SCALE: NTS / **BY: PDD**	**JANUARY 2021**	**14**		

d. MARKING

ALL TUBING SHALL BE CLEARLY MARKED AT INTERVALS OF NOT MORE THAN 0.60M WITH NOMINAL SIZE, TYPE OF MATERIAL (PB2110), STANDARD DIMENSION RATIO (SDR 13.5), PRESSURE RATING (1.1MPA OR 160 PSI), ASTM DESIGNATION (ASTM D2666), MANUFACTURER'S TRADE NAME AND PRODUCTION CODE, AND THE SEAL OF APPROVAL FROM AN ACCREDITED TESTING LABORATORY.

e. INSTALLATION

THE INSTALLATION AND METHOD OF END CONNECTIONS OF PB PLASTIC TUBING SHALL BE AS SHOWN ON THE DRAWINGS AND AS SPECIFIED IN SECTION 23.10. ALL PROCEDURES AND TOOLS USED SHALL COMPLY WITH THE RECOMMENDATIONS OF THE MANUFACTURER AND BE APPROVED BY THE ENGINEER.

11 SERVICE LINES

a. MATERIALS

THE SERVICE LINE PIPING 50MM (2-IN) AND SMALLER SHALL BE POLYETHELENE OR POLYBUTYLENE TUBING AS SPECIFIED HEREIN AND IN THE SIZES SHOWN ON THE DRAWINGS. SERVICE PIPING HAVING DIAMETER LARGER THAN 50MM (2-IN) SHALL BE CONSTRUCTED ON THE SAME MATERIALS APPROVED FOR WATER MAINS OF SIMILAR SIZES.

SMALL TUBING SIZE SERVICE LINES SHALL HAVE PLASTIC OR BRASS FITTINGS AS SHOWN ON THE DRAWINGS USING COLD FLARE METHOD OF CONSTRUCTION OR COMPRESSION TYPE CONNECTIONS AND STAINLESS STEEL INSERTS AS SHOWN. THE BRASS FITTINGS SHALL BE MANUFACTURED ACCORDING TO AWWA STANDARD C 200 "THREADS FOR UNDERGROUND SERVICE LINE FITTINGS" AND SHALL BE SIMILAR IN QUALITY TO THOSE MANUFACTURED BY MULLER CO., DECATU R, III U.S.A., JAMES JONES CO., EL MOTE, CALIFORNIA, U.S.A., OF FORD METER BOX COMPANY, INC., WABUSH, INDIANA, U.SA.

PLASTIC SERVICE CONNECTION FITTINGS SHALL BE MOLDED FROM ABS, POLYPRAPYLENE, ACETAL COPELYMER OR PVC-C AND SHALL HAVE MOLDED THREADS. THE FITTINGS SHALL MEET THE REUIREMENTS OF THE NATIONAL SANITATION FOUNDATION (NSF) TESTING LABORATORIES FOR POTABLE WATER AND SHALL BE MADE WITH NON-TOXIC NON-LEAD BASED PLASTICIZER APPROVED BY THE ENGINEER. IT SHALL FIT THE TUBING AND SHALL BE DESIGNED TO HOLD 1.1MPA (160 PSI) WORKING PRESSURE.

THE FITTINGS SHALL BE CLEARLY AND NEATLY FINISHED AND FREE FROM BURRS OR OTHER DEFECTS LIKELY TO DAMAGE OR SCORE THE PIPE, AND THE BORE SHALL BE FREE FROM IRREGULARITIES WHICH RESTRICTS THE FREE FLOW OF LIQUID. THE INTERNAL AND EXTERNAL SURFACE OF FITTINGS SHALL BE CLEAN AND FREE FROM GROOVES, PINHOLES OR OTHER DEFECTS LIKELY TO AFFECT THE PERFORMANCE AND SERVICE OF THE SYSTEM.

WHERE SADDLES ARE REQUIRED, AS SHOWN ON THE DRAWINGS, THEY SHALL CONFORM TO THE PROVISIONS OF SECTION 23.12.

WELDED OUTLETS ON STEEL PIPE SHALL BE INSULATED FROM BRASS FITTINGS WITH NYLON BUSHINGS APPROVED BY THE ENGINEER.

b. INSTALLATION

ALL WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND APPROVED BY THE ENGINEER. SERVICE TAPS FOR PLASTIC SERVICE LINES SHALL BE MADE BETWEEN 45 DEGREES TO 90 DEGREES FROM THE TOP OF THE PIPE AND ALL THE TUBING SHALL BE LAID IN A SERPENTINE FASHION ALONG THE SERVICE TRENCH BOTTOM TO RESIST PULL-OUT. GALVANIZED STEEL PIPE FOR SERVICE LINES SHALL BE INSTALLED ONLY WHERE SPECIFICALLY SHOWN ON THE STANDARD DRAWINGS. GALVANIZED STEEL PIPE AND PVC TAPE SHALL BE IN ACCORDANCE WITH SECTION 23.03.

UNLESS OTHERWISE DIRECTED, ALL SERVICE LINES SHALL BE INSTALLED PRIOR TO THE HYDROSTATIC TEST OF THE WATER MAIN, AND THEY SHALL BE TESTED WITH PRESSURE TEST OF THE WATER MAIN. EACH STOP COCK VALVE SHALL BE OPERATED TO THOROUGHLY FLUSH THE SERVICE AND REMOVE ANY ACCUMULATED AIR PRESENT PRIOR TO THE HYDROSTATIC TEST.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS / **BY: PDD**	**JANUARY 2021**	**15**		

12 SERVICE SADDLE

a. MATERIALS

WHERE SADDLES ARE REQUIRED AS SHOWN O THE DRAWINGS, THEY SHALL BE CONSTRUCTED OF ONE OR A COMBINATION OF THE FOLLOWING MATERIALS AND COMPLYING, WITH THE REQUIREMENTS AS HEREUNDER INDICATED.

1. BRASS

LEADED RED BRASS, COPPER ALLOY WITH COMMERCIAL DESIGNATION 85-5-5-5 IN ACCORDANCE WITH ASTM B584, UNS NO. 83000.

2. BRONZE

SILICON BRONZE IN ACCORDANCE WITH ASTM B584, UNS NO. 87200.

3. DUCTILE IRON

GRADE 60-40-18 IN ACCORDANCE WITH ASTM A536.

4. CAST IRON

GREY IRON IN ACCORDANCE WITH ASTM A48, CLASS 30.

b. MANUFACTURE

SERVICE SADDLES SHALL BE SUPPLIED EITHER WITH:

1. CLAMP OR SINGLE STRAP OF AT LEAST 50MM (2-IN) WIDE, BOLTED ON EACH SIDE OR BOLTED ON ONE SIDE AND HINGED ON THE OTHER SIDE.

2. DOUBLE STRAP, AS SHOWN ON THE DRAWINGS, EACH WITH A WIDTH NOT LESS THAN 20MM (2/4 IN).

3. STRAPS OR CLAMPS SHALL BE MADE OF ANY OF THE MATERIALS LISTED ABOVE OR OF STEEL HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A153 OF 18-8 STAINLESS STEEL.

ALL PARTS OF THE SERVICE SADDLE INCLUDING THE CLAMP OR STRAP SHALL COMPLY WITH THE FOLLOWING MINIMUM THICKNESS REQUIREMENTS:

PIPE NORMAL DIAMETER		THICKNESS	
75	MM	8	MM
100	MM	8	MM
150	MM	10	MM
200	MM	12	MM
250	MM	15	MM
300	MM	15	MM

SADDLES SHALL BE SHAPED TO THE VARIOUS OUTSIDE PIPE DIAMETER TO WHICH THEY ARE TO BE FITTED AND SHALL BE PROVIDED WITH AN APPROVED RESILIENT NEOPRENE RUBBER GASKET WITH A MINIMUM BEARING WIDTH OF 12 MM (1/2 IN). THE TAPPING THREAD SHALL BE T LEAST 30MM DEEP AND DRILLED IN ACCORDANCE WITH IRON PIPE (I.P.) THREAD DIMENSIONS.

13 MECHANICAL-TYPE COUPLINGS

MECHANICAL-TYPE COUPLINGS SHALL BE DESIGNED FOR A WATER WORKING PRESSURE NOT LESS THAN THE DESIGN PRESSURE OF THE PIPE ON WHICH THEY ARE TO BE INSTALLED, AND SHALL BE EQUIPPED WITH GRADE H RUBBER GASKETS. COUPLINGS SHALL BE GUSTIN-BACON OR VICTAULIC STYLE 44 WHEN PIPE ENDS ARE BANDED, AND GUSTIN-BACON OR VICTAULIC STYPE 77 WHEN PIPE ENDS ARE GROOVED. BURIED OR SUBMERGED COUPLINGS SHALL BE COATED IN ACCORDANCE WITH SECTION 27.13 (C) (3) (GG).

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS**	
			BY:	**DATE:**
	DATE:	**NO.**		
SCALE: NTS **BY: PDD**	**JANUARY 2021**	**16**		

14 SLEEVE-TYPE COUPLINGS

SLEEVE-TYPE COUPLINGS SHALL BE PROVIDED WHERE SHOWN, AND SHALL BE SMITH-BLAIR, STYLE 411 OR STYLE 412, EQUIVALENT STYLES MANUFACTURED BY DRESSER, OR APPROVED SUBSTITUTE. COUPLINGS SHALL BE OF STEEL WITH STEEL BOLTS, WITHOUT PIPE STOP, AND SHALL BE OF SIZES TO FIT THE PIPE AND FITTING SHOWN. THE MIDDLE RING SHALL BE NOT LESS THAN 6MM (1/4 IN) IN THICKNESS AND SHALL BE 125 TO 175MM (5 TO 7 IN) LONG FOR STANDARD STEEL COUPLINGS, AND 400MM (16-IN) LONG FOR LONG-SLEEVED COUPLINGS. BOLTS FOR EXPOSED COUPLING SHALL BE HOT-DIP GALVANIZED. BURIED BOLTS AND SLEEVE-TYPE COUPLINGS SHALL BE COATED IN ACCORDANCE WITH SECTION 27.13 (C) (3) (GG).

15 GASKET AND BOLTS

a. EXCEPT AS OTHERWISE PROVIDED, GASKETS FOR FLANGED JOINTS SHALL BE 1.5MM (1/16 IN) THICK LAMINATED ASBESTOS FIBER.

b. WHEREVER BLIND FLANGES ARE SHOWN, THE GASKETS SHALL CONSIST OF 3MM (1/8 IN) THICK CLOTH-INSERTED RUBBER SHEET WHICH SHALL BE CEMENTED TO THE SURFACE OF THE BLIND FLANGE.

c. EXCEPT AS OTHERWISE PROVIDED, BOLTS SHALL CONFORM TO THE REQUIREMENTS OF DIVISION 22.

16 PRESSURE GAGES

PRESSURE GAGES SHALL HAVE 89MM (3-1/2 IN) DIALS, 6MM (1/4 IN) THREADED CONNECTIONS AND SHUT-OFF COCKS. GAGES SHALL BE CALIBRATED TO READ 1.0MPA (150 PSI), UNLESS OTHERWISE SHOWN ON THE DRAWINGS. THE PRESSURE ELEMENT OF THE GAGE SHALL BE PROTECTED AGAINST EXCESSIVE PULSATIONS AND SURGES BY AN EXTERNAL PRESSURE SNUBBER.

17 DUCTILE-IRON PIPE

a. MATERIAL

PIPE SHALL CONFORM TO THE REQUIREMENTS OF "AMERICAN NATIONAL STANDARD FOR DUCTILE-IRON PIE, CENTRIFUGALLY CAST IN METAL MOLDS OR SAND-LINES MOLDS FOR WATER OR OTHER LIQUIDS" (ANSI A21.51, AWWA C151). PIPE SHALL HAVE RUBBER GASKET PUSH-ON TYE JOINTS UNLESS OTHERWISE SHOWN ON THE DRAWINGS. PIPE AND FITTINGS SHALL HAVE A BITUMINOUS COATING APPROXIMATELY ONE (1) MIL THICK AND SHALL BE CEMENT MORTAR LINED IN ACCORDANCE WITH "AMERICAN NATIONAL STANDARD FOR CEMENT-MORTAR LINING FOR CAST-IRON AND DUCTILE-IRON PIPE AND FITTINGS FOR WATER", (ANSI A21.4, AWWA C-104). CERTIFICATION SHALL BE PROVIDED TO THE OWNER THAT THE PIPE HAS BEEN MANUFACTURED IN COMPLIANCE WITH THESE SPECIFICATIONS.

b. DESIGN

DESIGN THICKNESS PARAMETERS SHALL BE AS FOLLOWS: FOR 75MM TO 100MM (3-4 IN) DIAMETER PIPE THE THICKNESS CLASS SHALL BE CLASS 51; FOR 150 TO 600MM (6-24 IN) DIAMETER PIPE THE THICKNESS CLASS SHALL BE CLASS 50, UNLESS OTHERWISE SHOWN ON THE DRAWINGS.

c. FITTINGS

FITTINGS SHALL HAVE PUSH-ON TYPE JOINTS OR FLANGED JOINTS WHERE SHOWN. FITTINGS SHALL COMPLY WITH "AMERICAN NATIONAL STANDARD FOR GRAY IRON AND DUCTILE-IRON FITTINGS, 2 IN THROUGH 48 IN. FOR WATER AND OTHER LIQUIDS" (ANSI A21.10, AWWA C-110) EXCEPT THAT PUSH-ON JOINTS SHALL BE IN ACCORDANCE WITH "AMERICAN NATIONAL STANDARD FOR RUBBER-GASKET JOINTS FOR CAST-IRON AND DUCTILE-IRON PRESSURE PIPE AND FITTINGS" (ANSI A21.11, AWWA C-111). FITTINGS SHALL HAVE A PRESSURE RATING NOT LESS THAN 2.45MPA (350 PSI).

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**17**		

d. INSTALLATION

EXCEPT WHERE OTHERWISE SPECIFIED OR SHOWN, DUCTILE IRON PIPE SHALL BE INSTALLED IN ACCORDANCE WITH "AWWA STANDARD FOR INSTALLATION OF CAST-IRON WATER MAINS" (AWWA C-600).

18 CONCRETE DRAIN PIPE

THE CONTRACTOR SHALL FURNISH AND INSTALL CONCRETE DRAIN PIPE WHERE SHOWN ON THE DRAWINGS. CONCRETE DRAIN PIPE SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR CONCRETE DRAIN PIPE OF THE DEPARTMENT OF PUBLIC HIGHWAYS.

19 STEEL CASING

THE CONTRACTOR SHALL FURNISH AND INSTALL TEEL CASING WHERE SHOWN ON THE DRAWINGS. STEEL CASINGS SHALL BE OF WELDED STEEL PIPE OF THE DIAMETERS AND PLATE THICKNESS SHOWN. JOINTS IN STEEL CASINGS MAY BE EITHER BUTT-WELDED, LAP-WELDED, OR WELDED USING BUTT STRAPS. NO PROTECTIVE COATING NEED BE APPLIED TO CASINGS. CASINGS SHALL BE INSTALLED AS REQUIRED IN ACCORDANCE WITH DETAILS AS SHOWN, AND SUBJECT TO THE APPROVAL OF THE AGENCY HAVING JURISDICTION.

20 WARNING TAPE

a. MATERIAL

THE CONTRACTOR SHALL FURNISH FOR EACH PIPE ABOVE OR EQUAL TO 75MM AN ALU-FOIL TAPE (MINIMUM WIDTH IS 4CM) WITH THE MENTION "ATTENTION WATER MAIN".

b. INSTALLATION

THE WARNING TAPE SHALL BE LAID INTO THE TRENCH BETWEEN TWO BACKFILL LAYERS AT 30CM ABOVE THE PIPE

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PIPING**		**REVISIONS**
				BY: / **DATE:**
		DATE:	**NO.**	
	SCALE: NTS / **BY:** PDD	**JANUARY 2021**	**18**	

PAINTING AND COATING

1 GENERAL

THE WORK INCLUDED IN THIS SECTION CONSISTS OF THE FURNISHING OF ALL LABOR, MATERIALS, APPARATUS, SCAFFOLDING AND ALL APPURTENANT WORK IN CONNECTION WITH PAINTING AND COATING IN ACCORDANCE WITH THESE SPECIFICATIONS. ANY SUBCONTRACTOR FOR PAINTING AND COATING SHALL BE APPROVED BY THE ENGINEER.

2 SCOPE

THE FOLLOWING SURFACES ARE TO BE PAINTED EXCEPT WHERE OTHERWISE SPECIFIED OR SHOWN:

a. ABOVE GROUND PIPING AND OTHER METAL SURFACE.
b. ALL SUBMERGED METAL SURFACES.
c. ALL EXPOSED CONCRETE EXCLUDING RESERVOIRS.
d. ALL STRUCTURAL AND MISCELLANEOUS STEEL
e. ALL EQUIPMENT FURNISHED WITHOUT FACTORY FINISH SURFACES.
f. ALL EXPOSED STEEL MILLIONS, TUBULAR FRAMES, DOOR FRAMES, STEEL SASH, AND METAL WINDOWS.
g. ALL SHEET METAL AND FERROUS METAL TRIM.
h. ALL BUILDING, INTERIO AND EXTERIOR.
i. ALL EXPOSED CONCRETE BLOCK MASONRY.

THE FOLLOWING SURFACES ARE NOT TO BE PAINTED:

a. FERROUS METAL HAVING APPROVED PLATING OR FACTORY APPLIED FINAL PAINT FINISHES
b. NON-FERROUS METALS, UNLESS OTHERWISE NOTED OR INDICATED: GALVANIZED METAL SHALL NOT BE CONSIDERED A NON-FERROUS METAL.
c. EQUIPPED WITH FACTORY FINISHED SURFACES UNLESS OTHERWISE NOTED.

IN NO CASE SHALL ANY CONCRETE, WOOD, METAL OR ANY OTHER SURFACE REQUIRING PROTECTION BE LEFT UNPAINTED EVEN THOUGH NOT SPECIFICALLY DEFINED HEREIN.

3 RIGHT OF REJECTION

NO EXTERIOR PAINTING OR INTERIOR FINISHING SHALL BE DONE UNDER CONDITIONS WHICH MAY JEOPARDIZE THE APPEARANCE OR QUALITY OF THE PAINTING OR FINISHING IN ANY WAY. THE ENGINEER SHALL HAVE THE RIGHT TO REJECT ALL MATERIAL OR WORK THAT IS UNSATISFACTORY, AND REQUIRE THE REPLACEMENT OF EITHER OR BOTH AT THE EXPENSE OF THE CONTRACTOR.

4 PROTECTION OF THE WORK

THE CONTRACTOR SHALL TAKE THE NECESSARY STEPS TO PROTECT THE WORK OF OTHERS DURING THE TIME HIS WORK IS IN PROGRESS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGES TO THE WORK. PAINT SHALL BE APPLIED ONLY DURING PERIOD OF FAVORABLE WEATHER.

5 WORKMANSHIP

ALL THE WORK SHALL BE FIRST CLASS AND IN ACCORDANCE WITH BEST STANDARD PRACTICES OF THE TRADE.

THE CONTRACTOR SHALL EXAMINE CAREFULLY ALL SURFACE TO BE PAINTED AND BEFORE BEGINNING ANY OF HIS WORK SHALL SEE THAT THE WORK OF OTHER TRADE HAS BEEN LEFT OR INSTALLED IN A WORKMANLIKE CONDITION TO RECEIVE PAINT.

METAL SURFACES SHALL BE CLEAN, DRY AND FREE FROM MILL SCALE, RUST, GREASE, OIL OR ANY OTHER SUBSTANCES WHICH COULD AFFECT THE QUALITY OF THE PAINTING.

EACH COAT OF PAINT SHALL BE APPLIED AT PROPER CONSISTENCY AND BRUSHED EVENLY, FREE OF BRUSH MARKS, SAGS, RUNS, AND WITH NO EVIDENCE OF POOR WORKMANSHIP. CARE SHALL BE EXERCISED TO AVOID LAPPING OF

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **PAINTING AND COATING**		**REVISIONS**
					BY: / **DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY:** PDD	**JANUARY 2021**	**1**	

PAINT ON GLASS OR HARDWARE. PAINT SHALL BE SHARPLY CUT TO LINES AND FINISHED PAINT SURFACE SHALL BE FREE FROM DEFECTS OR BLEMISHES.

PROTECTIVE COVERING SHALL BE USED TO PROTECT FLOORS, FIXTURES, AND EQUIPMENT CARE SHALL BE EXERCISED TO PREVENT PAINT BEING SPATTERED ONTO SURFACES WHICH ARE NOT TO BE PAINTED. SURFACES FROM WHICH SUCH PAINT CANNOT BE REMOVED SATISFACTORILY SHALL BE PAINTED OR REPAINTED, AS REQUIRED TO PRODUCE A FINISH SATISFACTORILY TO THE ENGINEER.

NO PAINTING SHALL BE DONE UNDER CONDITION OF WEATHER, MOISTURE OR TEMPERATURE UNSUITED TO GOOD WORK, NOR UNTIL PREVIOUS COAT IS HARD AND DRY.

ALL PAINTING MATERIALS SHALL BE USED IN STRICT ACCORDANCE WITH MANUFACTURER'S DIRECTIONS, SPREAD OR FLOWED ON SMOOTHLY WITH PROPER FILM THICKNESS AND WITHOUT RUNS, SAGS, SKIPS OR OTHER DEFECTS.

6 STORAGE MATERIALS

THE CONTRACTOR SHALL STORE ALL PAINTING MATERIALS AND EQUIPMENT NOT IN IMMEDIATE USE IN A ROOM APPROVED BY THE ENGINEER FOR THAT PURPOSE. THE RECEIVING AND OPENING OF ALL PAINT MATERIALS AND MIXING SHALL BE DONE IN THIS ROOM.

NECESSARY PRECAUTION SHALL BE TAKEN TO PREVENT FIRE. RAGS, WASTE, ETC. , SOILED WITH PAINT SHALL BE REMOVED FROM THE PREMISES AT THE END OF EACH DAY'S WORK, OR STORED IN METAL CONTAINERS WITH METAL COVERS.

7 PREPERATION OF PAINT

PAINT CONTAINERS SHALL BE DELIVERED TO THE JOB SITE IN THE MANUFACTURER'S UNOPENED CONTAINERS AND SHALL BE OPENED ONLY WHEN REQUIRED FOR USE. PAINT SHALL BE MIXED ONLY IN THE DESIGNATED ROOM OR SPACE IN THE PRESENCE OF OWNER'S REPRESENTATIVE. PAINT SHALL BE THOROUGHLY STIRRED OR AGITATED TO A UNIFORMLY SMOOTH CONSISTENCY SUITABLE FOR PROPER APPLICATION. UNLESS OTHERWISE SPECIFIED OR APPROVED, NO MATERIAL SHALL BE REDUCED, CHANGE OR USED EXCEPT IN ACCORDANCE WITH MANUFACTURER'S LABEL OR TAG ON THE CONTAINER. IN ALL CASES, PAINT SHALL BE PREPARED AND HANDLED IN A MANNER TO PREVENT DETERIORATION AND INCLUSION FOR FOREIGN MATTER.

8 PAINT TO BE PROVIDED TO OWNER

THE CONTRACTOR SHALL LEAVE ON THE JOB SITE A MINIMUM OF FOUR (4) LITERS (1 GAL) EACH TYPE AND COLOR OF FINISH PAINT USED IN THE PROJECT. EACH GALLON SHALL BE PROPERLY LABELLED FOR IDENTIFICATION.

9 CLEAN UP

UPON COMPLETION OF HIS WORK, THE CONTRACTOR SHALL REMOVE ALL SURPLUS MATERIALS. ALL PAINT SPILLS SHALL BE REMOVED AND ENTIRE PREMISES SHALL BE FREE FROM RUBBISH, DEBRIS, ETC. , CAUSED BY HIS WORK. HE SHALL PRESENT THE WORK CLEAN AND FREE FROM BLEMISH SO THAT IT IS ACCEPTABLE IN EVERY WAY. ALL GLASS SHALL BE CLEANED OF PAINT SPOTS AND POLISHED, AND THE JOB MADE READY FOR OCCUPANCY BY THE OWNER.

10 MATERIALS

A. MATERIALS

THE CONTRACTOR MAY SUBSTITUTE OTHER PAINT MATERIALS FOR THOSE SPECIFIED IN SECTION 27.13 PROVIDED HE FIRST RECEIVES WRITTEN APPROVAL FROM THE ENGINEER STATING THAT SAID PROPOSE SUBSTITUTED MATERIALS ARE EQUAL TO THAT SPECIFIED AND ARE APPROVED FOR USE. THE PAINTING MATERIAL SHALL BE DELIVERED TO THE JOB IN ORIGINAL CONTAINERS PROPERLY LABELLED WITHOUT EVIDENCE OF TAMPERING, SUBSTITUTION OF CONTENTS, OR DETERIORATION. A COMPLETE LIST OF MATERIALS PROPOSED FOR USE SHALL BE SUBMITTED FOR ENGINEER'S APPROVAL.

B. COLORS AND SAMPLES

ALL FINISH COLORS SHALL BE AS SELECTED BY THE OWNER. IN MULTICOAT WORK USING COLOR PIGMENTED PAINTS, EACH COAT SHALL HAVE SUFFICIENT VARIATION OF COLOR TO EASILY DISTIMGGUISH IT FROM PRECEEDING COAT. USING SPECIFIED OR APPROVED MATERIALS, THREE (3) SAMPLE PANELS OF EACH FINISH, INCLUDING ALL COSTS

THEREOF SHALL BE PREPARED AND SUBMITTED FOR THE OWNER'S APPROVAL. COMPLETED WORK SHALL MATCH APPROVED COLORS AND SAMPLES.

11 PREPARATION OF SURFACES

A. GENERAL

EXCEPT AS OTHERWISE SPECIFIED, SURFACES TO BE PAINTED SHALL BE CLEAN, SMOOTH AND DRY. THE CONTRACTOR SHALL REPORT TO THE ENGINEER IN WRITING ANY SURFACE WHICH CANNOT BE PROPERLY PREPARED FOR PAINTING. IF WORK IS COMMENCED BEFORE DEFECTS HAVE BEEN REPORTED AND CORRECTED, ANY RESULTING UNSATISFACTORY FINISH SHALL BE RECTIFIED BY THE CONTRACTOR AT NO COST TO THE OWNER.

B. CONCRETE AND MASONRY

ALL CONCRETE AND MASONRY SURFACE SHALL CURE THIRTY (30) DAYS DAYS PRIOR TO PAINTING. DIRT, DUST, OIL GREASE, EFFLORESCENCE AND OTHER DELETERIOUS MATTER SHALL BE REMOVED AND SURFACE ROUGHENED WHEN NECESSARY TO INSURE GOOD PAINT ADHESION. THE METHOD OF SURFACE PREPARATION SHALL BE LEFT TO THE DISCRETION OF THE CONTRACTOR, PROVIDED RESULTS OBTAINED ARE SATISFACTORY TO THE ENGINEER. BEFORE APPLICATION OF RESIN EMULSION PAINT, SURFACES SHALL BE PREPARED IN ACCORDANCE WITH MANUFACTURER'S DIRECTIONS. BEFORE APPLICATION OF OIL BASE OR LATEX PAINTS, SURFACES SHALL BE TESTED FOR PRESENCE OF ALKALI. IF ALKALI IS PRESENT, SURFACE SHALL BE NEUTRALIZED AS RECOMMENDED BY THE MANUFACTURER OF THE PAINT MATERIALS TO BE APPLIED.

C.PLASTER

DIRT, DUST, LOOSE PLASTER AND OTHER DELETERIOUS MATTER WHICH WOULD PREVENT GOOD PAINT ADHESION SHALL BE REMOVED. ALL HOLES, CRACKS, AND DEPRESSIONS SHALL BE NEATLY FILLED WITH PATCHING PLASTER MIXED AND APPLIED TO MATCH THE EXISTING PLASTER. PATCHES SHALL BE SANDED FLUSH AND SMOOTH AND PROPERLY SEALED BEFORE APPLYING PRIME COAT. AFTER PRIMING SURFACES, SUCTION SPOTS SHALL BE TOUCHED UP WITH ADDITIONAL PRIME COAT MATERIAL UNTIL SURFACES EVIDENCE A UNIFORM COATING. ENAMEL UNDERCOATS ON SMOOTH PLASTER SHALL BE SANDPAPERED BY HAND (WITH NO. 00 SANDPAPER) AND DUSTED CLEAN BEFORE APPLYING THE SUCCEEDING COAT.

D. METAL

DIRT, SCALE, AND RUST SHALL BE REMOVED BY SCRAPPING, WIRE BRUSHING AND SANDING OR SANDBLASTING AS REQUIRED. OIL AND GREASE SHALL BE REMOVED WITH MINERAL SPIRITS OR APPROPRIATE SOLVENT. BEFORE PAINTING, FERROUS METAL SURFACES, INCLUDING GALVANIZED FERROUS METAL, SURFACES SHALL BE PRETREATED WITH APPROVE PHOSPHORIC ACID ETCHING CLEANER IN ACCORDANCE WITH MANUFACTURER'S DIRECTION TO PRODUCE A CHEMICALLY CLEAN SURFACE. UNLESS ALREADY PERFORMED IN ACCORDANCE WITH SPECIFICATIONS OF OTHER SECTIONS ABRASIONS AND BARE SPOTS IN SHOP PRIME COATINGS SHALL BE TOUCHED UP WITH METAL PRIMER MATCHING SHOP COATINGS. ENAMEL UNDERCOATS SHALL BE SANDPAPERED BY HAND (WITH NO. 00 SANDPAPER) AND DUSTED CLEAN BEFORE APPLYING SUCCEEDING COATS.

E.WOODWORK

UNLESS ALREADY PROPERLY SANDED, WOODWORK, SHALL BE SANDPAPERED SMOOTH BY HAND. BEFORE PRIMING SURFACES, KNOTS PITCH POCKETS AND SAP STREAKS SHALL BE THOROUGHLY CLEANED OF RESIDUE AND TOUCHED UP WITH SHELLAC VARNISH COATING. AFTER PRIMING SURFACE, NAIL HOLES, CRACKS, AND DEPRESSIONS SHALL BE NEATLY FILLED WITH PUTTY OR OTHER APPROVED FILLER, COLORED TO MATCH REQUIRED FINISH. ENAMEL UNDERCOATS SHALL BE SANDED BY HAND (WITH NO.00 SANDPAPER) AND DUSTED CLEAN BEFORE APPLYING SUCCEEDING COAT.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PAINTING AND COATING**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS / **BY: PDD**	**JANUARY 2021**	**3**		

12 APPLICATION OF PAINT

A. GENERAL

ALL PAINTING AND FINISHING SHALL BE PERFORMED BY SKILLED CRAFTSMEN. EACH COAT OF PAINT SHALL BE APPLIED AT PROPER CONSISTENCY, EVENLY, AND FREE OF LAPS, SAGS, AND RUNS AND CUT SHARPLY TO REQUIRED LINES. EXCEPT AS OTHERWISE SPECIFIED OR REQUIRED, PAINT SHALL BE APPLIED ONLY UNDER DRY AND DUST-FREE CONDITIONS THAT WILL INSURE PROPERLY FINISHED SURFACES, FREE OF DEFECTS AND BLEMISHES. PAINT SHALL NOT BE APPLIED WHEN TEMPERATURE IS LIKELY TO BE ABOVE 32°C (90°F). SUFFICIENT TIME SHALL BE ALLOWED BETWEEN COATS TO INSURE PROPER DRYING. ALL PRIMER AND INTERMEDIATE COATS SHALL BE UNSCARRED AND COMPLETELY INTEGRAL AT TIME OF APPLICATION OF EACH SUCCEEDING COAT. THE ENGINEER SHALL BE NOTIFIED WHEN EACH COAT HAS BEEN APPLIED AND IS READY FOR INSPECTION. UNTIL EACH COAT IS INSPECTED AND APPROVED BY ENGINEER, NO SUCCEEDING COATS SHALL BE APPLIED. WHENEVER TWO COATS OF A DARK COLORED PAINT ARE SPECIFIED, THE FIRST COAT SHALL CONTAIN SUFFICIENT POWDERED ALUMINUM TO ACT AS AN INDICATOR FOR PROPER COVERAGE WHEN APPLYING THE SECOND COAT.

B. METHODS OF APPLICATION

EXEPT AS OTHERWISE SPECIFIED OR WHEN IN THE OPINION OF THE ENGINEER, A PARTICULAR METHOD WOULD PRODUCE UNSATISFACTORY RESULTS, PAINT MAY BE APPLIED BY BRUSH, SPRAY, OR OTHER APPLICATION METHOD AT THE OPINION OF THE CONTRACTOR.

C.PRIMING AND BACK PAINTING

1. PRIMING

BEFORE INSTALLATION, ALL SURFACES OF MILLWORK WHICH ARE TO BE PAINTED SHALL BE PRIMED, GIVING PARTICULAR ATTENTION TO SEALING OR CROSS-GRAINED SURFACES. IN ALL CASES, ALL WORK SHALL BE PRIMED AS SOON AS POSSIBLE AFTER DELIVERY TO BUILDINGS, BEFORE OR AFTER INSTALLATION, AS REQUIRED, OR, IN CASE OF PREFABRICATED ITEMS, AT FABRICATOR'S SHOP OR MILL BEFORE SHIPMENT, IF PRACTICABLE. EXCEPT AS OTHERWISE SPECIFIED, PRIMINGS SHALL CONSIST OF FIRST COAT HEREINAFTER SPECIFIED UNDER SECTION 27.13, PAINTING SYSTEMS.

2.BACK PAINTING

WOODWORK, MILLWORK, AND CASEWORK TO BE INSTALLED AGAINST CONCRETE, MASONRY OR PLASTER SHALL BE BACK PAINTED WITH ONE COAT OF EXTERIOR OIL PAINT.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** PAINTING AND COATING		**REVISIONS** BY: / DATE:
		DATE: JANUARY 2021	**NO.** 4	
	SCALE: NTS / **BY:** PDD			

13 PAINTING SYSTEMS

ARCHITECTURAL ITEMS

a. EXTERIOR FINISHES

1. ONE CONCRETE WALLS
   TWO COATS, CONCRETE MASONRY PAINT
2. UNPRIMED FERROUS METAL
   FIRST COAT: RUST INHIBITIVE FERROUS METAL PRIMER
   SECOND COAT: EXTERNAL ENAMEL
   THIRD COAT: EXTERNAL ENAMEL
3. ON CONCRETE BLOCK WALLS
   FIRST COAT: CONCRETE BLOCK-PRIMER SEALER
   SECOND COAT: CONCRETE MASONRY PAINT
   THIRD COAT OR THREE COATS: CONCRETE MASONRY
4. ON WOOD
   FIRST COAT: EXTERIOR WOOD PRIMER
   SECOND COAT: EXTERIOR ENAMEL
   THIRD COAT OR THREE COATS: EXTERIOR ENAMEL

b. INTERIOR FINISHES
   LOCATION OF THE VARIOUS FINISHES ARE LISTED IN THE FINISH SCHEDULE ON THE DRAWINGS OR ELSE WILL BE INDICATED BY THE OWNER.

1. ON PRIMER AND COATED METAL
   TWO COATS OF INTERIOR SEMIGLOSS ENAMEL
2. ON PLASTER
   FIRST COAT: PIGMENTED SEALER
   SECOND COAT: ENAMEL UNDERCOATER
   THIRD COAT: INTERIOR SEMI-GLOSS ENAMEL
3. ON WOOD
   FIRST COAT: ENAMEL UNDERCOATER
   SECOND COAT: SPLIT COAT ENAMEL UNDERCOATER
   THIRD OR THREE COATS: INTER SEMI-GLOSS ENAMEL
4. WOOD STAIN FINISH
   FIRST COAT: OIL STAIN WITH FILLER
   SECOND COAT: BOILED OIL TOP COAT
5. WOOD LACQUER FINISH
   FIRST COAT: WOOD PASTE FILLER WITH NATURAL OIL
   SECOND COAT: TOP COAT OF LACQUER

c. NON-ARCHITECTURAL ITEMS (PIPINGS, VALVES, EQUIPMENT, ETC.)
   PIPING, VALVES, EQUIPMENT, ETC. , IN ROOMS ARE TO BE PAINTED TO MATCH ARCHITECTURAL FINISHES AS FOLLOWS:

1. GALVANIZED PIPES AND DUCTS
   FIRST COAT: GALVANIZED IRON-PRIMER
   SECOND COAT: INTERIOR SEMI-GLOSS ENAMEL
2. BLACK STEEL PIPES
   FIRST COAT: RUST INHIBITIVE METAL PRIMER
   SECOND COAT: INTERIOR SEMI-GLOSS ENAMEL
3. MECHANICAL ITEMS

a) UNGALVANIZED FERROUS METAL
   FIRST COAT: RUST INHIBITIVE METAL PRIMER
   SECOND COAT: INTERIOR SEMI-GLOSS ENAMEL

b) GALVANIZED FERROUS METAL
   FIRST COAT: GALVANIZED IRON PRIMER
   SECOND COAT: INTERIOR SEMI-GLOSS ENAMEL

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PAINTING AND COATING**		**REVISIONS** BY: / DATE:
		DATE: **JANUARY 2021**	**NO.** **5**	
	SCALE: NTS / **BY:** PDD			

c) UNGALVANIZED FERROUS METAL CORROSIVE ENVIRONMENT
FIRST COAT: CHEMICAL AND MOISTURE RESISTANT PRIMER
SECOND: CHEMICAL AND MOISTURE RESISTANT ENAMEL

d) GALVANIZED FERROUS METAL CORROSIVE ENVIRONMENT
FIRST COAT: CHEMICAL AND MOISTURE REISTANT PRIMER
SECOND COAT: CHEMICAL AND MOISTURE RESISTANT ENAMEL

e) SUBMERGED UNGALVANIZED FERROUS METAL
FIRST COAT: ANTI-CORROSION PRIMER
SECOND COAT: EPOXY ESTER ENAMEL

f) SUBMERGED GALVANIZED METAL
FIRST COAT: ANTI-CORROSION PRIMER
SECOND COAT: EPOXY ESTER ENAMEL

g) BURIED MISCELLANEOUS FERROUS SURFACE, VALVES, AND FLANGED JOINTS (EXCLUDING PIPE)
(AS NOTED BELOW 1/)
1/A. ADJOINING COAL TAR ENAMEL COATED STEEL PIPE- COATINGS SHALL CONSIST OF COAL TAR EPOXY APPLICATION IN TWO COATINGS (15 MIL. EACH) AND SHALL BE KOPPERS BITUMASTIC NO. 50, COLD APPLIED OR APPROVED SUBSTITUTE, FOLLOWING WHICH SUCH SURFACE SHALL BE ENCLOSED IN 10 MIL THICK PLASTIC SHEET WITH ALL JOINTS AND EDGES LAPPED AND SEALED WITH TAPE.
B. ADJOINING ALL OTHER TYPES OF PIPE- RICH CEMENT MORTAR COATING TO A MINIUM THICKNESS OF 6MM , FOLLOWING WHICH SUCH SURFACES SHALL BE ENCLOSED IN 10-MIL THICK PLASTIC SHEET WITH ALL JOINTS AND EDGE LAPPED AND SEALED WITH TAPE.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **PAINTING AND COATING**		**REVISIONS**
				BY: / **DATE:**
		DATE:	**NO.**	
	SCALE: NTS / **BY:** PDD	**JANUARY 2021**	**6**	

MISCELLANEOUS METALWORK

1 GENERAL

THE CONTRACTOR SHALL FURNISH, FABRICATE AND INSTALL ALL THE MISCELLANEOUS METALWORKS AS SPECIFIED AND SHOWN. MISCELLANEOUS METALWORK IS DEFINED AS ALL ITEMS REQUIRED TO BE FABRICATED FROM STRUCTURAL STEEL SHAPES, PLATES, BARS AND THEIR PRODUCTS. ALL STRUCTURAL STEEL SHAPES, PLATES, BARS, AND THEIR PRODUCTS SHALL CONFORM TO THE "STANDARD SPECIFICATION FOR STRUCTURAL STEEL." (ASTM DESIGNATION A36). UNLESS OTHERWISE SHOWN, ALL MISCELLANEOUS METALWORK OF FABRICATED STEEL SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 22.02. UNLESS OTHERWISE INDICATED, STAINLESS STEEL METALWORK SHALL BE OF TYPE 18-8 STAINLESS STEEL. ITEMS FABRICATED ON STAINLESS STEEL SHALL NOT BE GALVANIZED. SHOP DRAWINGS OF ALL MISCELLANEOUS METALWORK SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW IN ACCORDANCE WITH SECTION 7.02, "SHOP DRAWINGS."

THE EQUIPMENT SUPPLIED BY THE CONTRACTOR SHALL CONFORM TO THE U.S. STANDARDS AS MENTIONED IN THE FOLLOWING ARTICLES OR TO ANY OTHER INTERNATIONAL STANDARD OF EQUAL VALUE.

2 GALVANIZING

ALL STRUCTURAL STEEL PLATES, SHAPES, BARS AND FABRICATED ASSEMBLIES REQUIRED TO BE GALVANIZED SHALL, AFTER THE STEEL HAS BEEN THOROUGHLY CLEANED OR RUST AND SCALE, BE GALVANIZED IN ACCORDANCE WITH THE "SPECIFICATION FOR ZINC (HOT GALVANIZED) COATINGS ON PRODUCTS FABRICATED FROM ROLLED, PRESSED AND FORGED STEEL SHAPES, PLATES, BARS AND STRIP" (ASTM A-123). ANY GALVANIZED PART THAT BECOMES WARPED DURING THE GALVANIZING OPERATION SHALL BE STRAIGHTENED. BOLTS, ANCHORED BOLTS, NUTS AND SIMILAR THREADED FASTENERS, AFTER BEING PROPERLY CLEANED, SHALL BE GALVANIZED IN ACCORDANCE WITH THE "SPECIFICATIONS FOR ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE" (ASTM A-153). FIELD REPAIRS TO GALVANIZING SHALL BE MADE USING "GALVANO,": GALVO-WELD," OR APPROVED EQUAL.

3 WELDING

ALL WELDING SHALL BE BY THE SHIELDED ARC METHOD AND SHALL CONFORM TO THE "AWS CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION.: QUALIFICATION OF WELDERS SHALL BE IN ACCORDANCE WITH THE "SPECIFICATIONS FOR STANDARD QUALIFICATION PROCEDURE" OF THE AWS.

4 BOLTS

A. THE CONTRACTOR SHALL FURNISH AND SET ALL BOLTS AND ANCHOR BOLTS. EXCEPT WHERE OTHERWISE SHOWN OR SPECIFIED, ALL BOLTS, ANCHOR BOLTS, WASHERS, AND NUTS SHALL BE STEEL, GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH SECTION 22.02.

B. EXCEPT AS OTHERWISE PROVIDED HEREIN, STEEL FOR BOLTS, ANCHOR BOLTS AND CAP SCREWS SHALL BE IN ACCORDANCE WITH "SPECIFICATIONS FOR LOW CARBON STEEL EXTERNALLY AND INTERNALLY THREADED STANDARD FASTENERS," GRADE B (ASTM DESIGNATION A-307), OR "SPECIFICATIONS FOR CARBON STEEL BARS SUBJECT TO MECHANICAL PROPERTY REQUIREMENTS" (ASTM DESIGNATION A-306) OR THREADED PARTS OF ASTM A36 AND SHALL MEET THE FOLLOWING ADDITIONAL REQUIREMENTS: (1) THE NUT MATERIAL SHALL BE FREE-CUTTING STEEL, AND (2) THE NUTS SHALL BE CAPABLE OF DEVELOPING THE FULL STRENGTH OF BOLTS. THREADS SHALL BE COARSE THREAD SERIES CONFORMING TO THE REQUIREMENTS OF THE AMERICAN STANDARD FOR SCREW THREADS. ALL BOLTS AND CAP SCREWS SHALL HAVE HEXAGON HEADS AND NUTS SHALL BE HEAVY HEXAGON SERIES.

C. THREADS ON GALVANIZED BOLTS AND NUTS SHALL BE FORMED WITH SUITABLE TAPS AND DIES SUCH THAT THEY RETAIN THE NORMAL CLEARANCE AFTER HOT-DIP GALVANIZING.

D. UNLESS OTHERWISE SHOWN, ALL BOLTS, ANCHOR BOLTS AND NUTS WHICH ARE BURIED, SUBMERGED, OR INSIDE A COVERED HYDRAULIC STRUCTURE SHALL BE HOP-DIP GALVANIZED PER SECTION 22.02, AND THEN COATED WITH TWO COATS OF COAL TAR EPOXY, AFTER INSTALLATION.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		**TITLE:** **MISCELLANEOUS AND METAL WORK**	**REVISIONS**	
				BY:	**DATE:**
			DATE:	**NO.**	
	SCALE: NTS	**BY: PDD**	**JANUARY 2021**	**1**	

5 LADDERS

ALL LADDERS SHALL BE FABRICATED OF CARBON STEEL AND GALVANIZED AFTER FABRICATION.

6 STEEL PIPIE HANDRAILS

STEEL PIPE HANDRAILS SHALL BE STANDARD 38 MM (1-1/2 IN) BLACK STEEL PIPE MADE UP BY WELDING. RAILING SHALL BE SHOP-FABRICATED INTO EASILY HANDLED UNITS AND HOT-DIP GALVANIZED AFTER FABRICATION. FIELD WELDING OF PIPE HANDRAIL JOINTS WILL BE PERMITTED ONLY IF APPROVED BY THE ENGINEER, AND THEN ONLY IN ACCORDANCE WITH HIS INSTRUCTIONS. SUBMERGED STEEL PIPE SHALL BE COATED WITH TWO COATS OF COAL-TAR EPOXY AFTER INSTALLATION.

7 PIPE COLUMNS

PIPE COLUMN STEEL SHALL CONFORM TO THE "SPECIFICATIONS FOR WELDED AND SEAMLESS STEEL PIPE," (ASTM A53), GRADE B. PIPE COLUMNS THAT WOULD BE SUBMERGED SHALL BE COATED WITH TWO COATS OF COAL-TAR EPOXY.

8 METAL DECKING

METAL DECKING SHALL BE OF THE SIZE AND GAGE SHOWN ON THE DRAWINGS AND SHALL MEET THE REQUIREMENTS OF THE SPECIFICATION FOR THE "DESIGN OF LIGHT GAGE, COLD-FORMED STEEL STRUCTURAL MEMBERS," OF THE AMERICAN IRON AND STEEL INSTITUTE. THE STEEL SHALL BE GALVANIZED AFTER FABRICATION,

9 SAFETY STAIR TREADS

ALUMINUM SAFETY STAIR TREADS 100 MM (4-IN) WIDE SHALL BE PROVIDED ON ALL STAIRS, AND ELSEWHERE WHERE SHOWN.

10 METAL GRATING AND FLOOR HATCHES

A. GENERAL

METAL GRATING AND FLOOR HATCHES SHALL BE OF THE DESIGN, SIZES AND TYPES SHOWN. ALUMINUM IN CONTACT WITH OTHER METAL OR CONCRETE SHALL BE PAINTED WITH ONE (1) COAT OF ZINC CHROMATE AND TWO (2) COATS OF APPROVED ALUMINUM METAL-AND-MANSORY PAINT.

B. METAL GRATING

METAL GRATING SHALL BE FABRICATED OF ALUMINUM, STAINLESS STEEL OR GALVANIZED STEEL AS SHOWN. NO SINGLE PIECE OF GRATING SHALL WEIGH MORE THAN 25 KG. (55-LBS.) UNLESS SPECIFICALLY DETAILED OTHERWISE. ALUMINUM SHALL BE 6061T6 ALLOY BEARING BARS AND 6063T5 ALLOY CROSS BARS. STAINLESS STEEL SHALL BE TYPE 18-8. ALL GRATING SHALL BE COMPLETELY BANDED.

C. FLOOR HATCHES

FLOOR HATCHES SHALL BE FABRICATED OF STEEL OR ALUMINUM AS SHOWN. HATCHES SHALL BE DOUBLE-SWING, AND SHALL BE FURNISHED WITH TWO (2) STAY BARS DESIGNED TO HOLD THE COVERS IN AN OPEN POSITION AND PROVIDE A RAILING AROUND THE OPENING, STAY BAR BRACKETS DESIGNED TO PROVIDE STORAGE FOR THE BARS WHEN THE LATCH IS CLOSED, FOUR (4) FLUSH HANDS, JOINT GUTTER, AND MOAT-TYPE EDGE DRAIN COMPLETE WITH DRAIN CONNECTION. STEEL HATCHES SHALL BE GALVANIZED AFTER FABRICATION. DRAIN CONNECTION SIZE AND LOCATION SHALL BE AS SHOWN.

11 IRON CASTINGS

IRON CASTINGS SHALL CONFORM TO THE "SPECIFICATIONS FOR GRAY IRON CASTING," (ASTM A48) UNLESS OTHERWISE SHOWN.

12 SEAT ANGLES, SUPPORTS, AND GUIDES

SEAT ANGLES FOR GRATING SHALL BE ALUMINUM OR STEEL AS SHOWN AND OF A SIZE AS SHOWN. GUIDES FOR SLIDE GATES SHALL BE STEEL, OF A SIZE SHOWN, HOT-DIP GALVANIZED AFTER FABRICATION.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **MISCELLANEOUS AND METAL WORK**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**2**		

EARTHWORKS

20.01 GENERAL

THE CONTRACTOR SHALL PERFORM ALL EARTHWORK REQUIRED AND SHOWN ON DRAWINGS.

20.02 COMPACTION TESTS

WHERE THE BACKFILL IS REQUIRED TO BE COMPACTED TO A SPECIFIED DENSITY, TESTS FOR COMPLIANCE MAY BE MADE BY AND AT THE EXPENSE OF THE OWNER, USING THE TEST PROCEDURE SPECIFIED IN METHODS OF TESTS FOR MOISTURE-DENSITY RELATION IN SOILS USING A 10-LB. HAMMER AND 18 INCH DROP (ASTM D 1557), MODIFIED TO USE THREE (3) LAYERS. ALL FIELD DENSITY TESTS SHALL BE PERFORMED IN ACCORDANCE WITH THE TEST PROCEDURE SPECIFIED IN "METHOD OF TEST FOR DENSITY OF SOIL IN PLACE BY THE SAND CONE METHOD" (ASTM D1556).

20.03 EXCAVATION

A. GENERAL

EXCEPT WHEN SPECIFICALLY PROVIDED TO THE CONTRARY, EXCAVATION SHALL INCLUDE THE REMOVAL OF MATERIALS OF WHATEVER NATURE ENCOUNTERED, INCLUDING ALL OBSTRUCTIONS OF ANY NATURE THAT WOULD INTERFERE WITH THE PROPER EXECUTION AND COMPLETION OF THE WORK. THE REMOVAL OF SAID MATERIALS SHALL CONFORM TO THE LINES AND GRADES SHOWN OR ORDERED. UNLESS OTHERWISE PROVIDED, THE ENTIRE CONSTRUCTION SITE SHALL BE STRIPPED OF ALL VEGETATION AND DEBRIS, AND SUCH MATERIALS SHALL BE REMOVED FROM THE SITE PRIOR TO PERFORMING ANY EXCAVATION OR PLACING ANY FILL. THE CONTRACTOR SHALL FURNISH, PLACE, AND MAINTAIN ALL SUPPORTS AND ALL PUMPING, DITCHING, OR OTHER APPROVED MEASURES FOR THE REMOVAL OR EXCLUSION OF WATER, INCLUDING TAKING CARE OF STORM WATER AND WASTE WATER REACHING THE SITE OF THE WORK FROM ANY SOURCE SO AS TO PREVENT DAMAGE TO THE WORK OR ADJOINING PROPERTY.

THE WALLS AND FACES OF ALL EXCAVATIONS IN WHICH WORKERS ARE EXPOSED TO DANGER FROM UNSTABLE GROUND SHALL BE GUARDED AGAINST BY A SHORING SYSTEM, SLOPING OF THE EXCAVATION, OR SOME OTHER ACCEPTABLE METHOD. THE CONTRACTOR SHALL FURNISH, INSTALL, AND MAINTAIN SUCH SHEETING, BRACING, ETC., AS MAY BE NECESSARY TO PROTECT THE WORKERS AND TO PREVENT ANY MOVEMENT OF EARTH WHICH COULD INJURE OR DELAY THE WORK OR ENDANGER ADJACENT STRUCTURES. IN EXCAVATIONS WHICH WOKERS MAY BE REQUIRED TO ENTER, EXCAVATED OR OTHER MATERIALS SHALL BE EFFECTIVELY STORED AND RETAINED AT LEAST 600 MM OR MORE FROM THE EDGE OF THE EXCAVATION. ALL EXCAVATION AND TRENCHING OPERATIONS SHALL CONFORM TO ANY AND ALL NATIONAL, PROVINCIAL AND LOCAL SAFETY REQUIREMENTS.

B. EXCAVATION BENEATH PROPOSE STRUCTURES

EXCEPT WHERE OTHERWISE SPECIFIED FOR A PARTICULAR STRUCTURE OR ORDERED BY THE ENGINEER, EXCAVATION SHALL BE CARRIED TO BE THE GRADE OF THE BOTTOM OF THE FOOTING OR SLAB. WHERE SHOWN OR ORDERED, AREAS BENEATH PROPOSED STRUCTURES SHALL BE OVER EXCAVATED. WHEN SUCH OVER-EXCAVATION IS SHOWN ON THE DRAWINGS, NOTH OVER EXCAVATION AND SUBSEQUENT BACKFILL TO THE REQUIRED GRADE SHALL BE PERFORMED BY THE CONTRACTOR AT HIS OWN EXPENSE. WHEN SUCH OVER-EXCAVATION IS NOT SHOWN BUT IS ORDERED BY THE ENGINEER, SUCH OVER-EXCAVATION AND ANY RESULTING BACKFILL WILL BE PAID FOR UNDER A SEPARATE UNIT PRICE BID ITEM IF SUCH BID ITEM HAS BEEN ESTABLISHED; OTHERWISE PAYMENT WILL BE MADE IN ACCORDANCE WITH NEGOTIATED PRICES. AFTER THE REQUIRED EXCAVATION OR OVER-EXCAVATION HAS BEEN COMPLETED, THE EXPOSED SURFACE SHALL BE SCARIFIED TO A DEPTH OF 150 MM (6-IN.) BROUGHT TO OPTIMUM MOISTURE CONTENT, AND ROLLED WITH HEAVY COMPACTION EQUIPMENT TO INETY-FIVE PERCENT (95%) OF MAXIMUM DENSITY.

C. EXCAVATION BENEATH AREAS TO BE PAVED

EXCAVATION UNDER AREAS TO BE PAVED SHALL EXTEND TO THE BOTTOM OF THE AGGREGATE BASE, IF SUCH BASE IS CALLED FOR; OTHERWISE IT SHALL EXTEND TO THE BOTTOM OF PAVING. AFTER THE REQUIRED EXCAVATION HAS BEEN COMPLETED, THE EXPOSED SURFACE SHALL BE SCARIFIED, BROUGHT TO OPTIMUM MOISTURE CONTENT, AND ROLLED WITH HEAVY COMPACTION EQUIPMENT TO NINETY PERCENT (90%) OF MAXIMUM.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **EARTHWORKS**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS / **BY: PDD**	**JANUARY 2021**	**1**		

D. PIPELINE TRENCH EXCAVATION

1. GENERAL

UNLESS OTHERWISE SHOWN OR ORDERED, EXCAVATION FOR PIPELINES SHALL BE OPEN-CUT TRENCHES. THE BOTTOM OF THE TRENCH, INCLUDING ANY SHORING SHALL HAVE A MINIMUM WIDTH EQUAL TO THE OUTSIDE DIAMETER OF THE PIPE PLUS 300MM (12-IN.) AND A MAXIMUM WIDTH EQUAL TO THE OUTSIDE DIAMETER OF THE PIPE PLUS 600MM (24 IN.). EXCEPT WHEN OTHERWISE SHOWN OR ORDERED BY THE ENGINEER, THE BOTTOM OF THE TRENCH SHALL BE EXCAVATED UNIFORMLY TO THE GRADE OF THE BOTTOM OF THE PIPE. THE TRENCH BOTTOM SHALL BE GIVEN A FINAL TRIM USING A STRING LINE FOR ESTABLISHING GRADE, SUCH THAT EACH PIPE SECTION WHEN FIRST LAID WILL BE WHOLLY IN CONTACT WITH THE GROUND OR BEDDING ALONG THE EXTREME BOTTOM OF THE PIPE. ROUNDING OUT THE TRENCH TO FORM A CRADLE WILL NOT BE REQUIRED. THE MAXIMUM AMOUNT OF OPEN TRENCH PERMITTED AT ANY ONE TIME AND IN ONE LOCATIO SHALL BE 300 METERS, OR THE LENGTH NECESSARY TO ACCOMODATE THE AMOUNT OF PIPE INSTALLED IN A SINGLE DAY, WHICHEVER IS GREATER. ALL NEWLY LAID PIPE SHALL BE BACKFILLED NOT LATER THAN THE FOLLOWING DAY. BARRICADES AND WARNING LIGHTS SATISFACTORY TO THE ENGINEER SHALL BE PROVIDED AND MAINTAINED FOR ALL TRENCHES LEFT OPEN OVERNIGHT EXCEPT AT INTERSECTIONS AND DRIVEWAYS IN WHICH CASE OF HEAVY STEEL PLATES, ADEQUATELY BRACED BRIDGES OR OTHER TYPE OF CROSSING CAPABLE OF SUPPORTING VEHICULAR TRAFFIC SHALL BE FURNISHED AS DIRECTED BY THE ENGINEER.

2. TRENCH OVER-EXCAVATION WHERE SHOWN

THE TRENCHES SHALL BE OVER-EXCAVATED WHERE SHOWN, TO THE DEPTH SHOWN, THEN BACKFILLED TO THE GRADE OF THE BOTTOM OF THE PIPE WITH SUITABLE SELECTED GRANULAR MATERIAL OR WITH SNAD. SAID BACKFILL SHALL BE BROUGHT TO THE OPTIMUM MOISTURE CONTENT AND COMPACTED TO NINETY PERCENT (95%) OF MAXIMUM DENSITY UNDER PROPOSED STRUCTURES, AND NINETY (90%) ELSEWHERE. WORK SPECIFIED IN THIS SUBSECTION SHALL BE PERFORMED BY THE CONTRACTOR AT HIS OWN EXPENSE.

3. TRENCH OVER-EXCAVATION TO CLEAR OBSTRUCTIONS

TRENCHES SHALL BE OVER-EXCAVATED TO A DEPTH APPROVED BY THE ENGINEER FOR PIPELINE CLEARANCE OF OBSTRUCTIONS. ALL WORK SPECIFIED IN THIS SUBSECTION SHALL BE PERFORMED BY THE CONTRACTOR AT HIS OWN EXPENSE WHEN THE OVER-EXCAVATION PLUS THE COVER OF THE PIPE MEASURED TO EXISTING GROUND SURFACE DOES NOT EXCEED 1.5 METERS, ADDITIONAL PAYMENT WILL BE MADE TO THE CONTRACTOR FOR THE PORTION OF WORK LOCATED BELOW SAID DEPTH. SAID ADDITIONAL PAYMENT WILL BE MADE UNDER SEPARATE UNIT PRICE BID ITEMS FOR OVER-EXCAVATION IF SUCH BID ITEMS HAVE BEEN ESTABLISHED; OTHERWISE PAYMENT WILL BE MADE IN ACCORDANCE WITH NEGOTIATED PRICES.

4. TRENCH OVER-EXCAVATION WHEN ORDERED

TRENCHES SHALL BE OVER-EXCAVATED BEYOND THE DEPTH SHOWN WHEN ORDERED BY THE ENGINEER. SUCH OVER-EXCAVATION SHALL BE TO THE DEPTH ORDERED. THE TRENCH SHALL THEN BE REFILLED TO THE GRADE OF THE BOTTOM OF THE PIPE WITH EITHER SELECTED GRANULAR MATERIAL OBTAINED FROM THE EXCAVATION, SAND, OR CRUSHED ROCK, AT THE OPTION OF THE ENGINEER, WHEN CRUSHED ROCK BEDDING IS ORDERED, WELL-GRADED MATERIAL OF 40MM (1.6 IN.) MAXIMUM SIZE SHALL BE USED. BEDDING MATERIAL SHALL BE PLACED IN LAYERS, BROUGHT TO OPTIMUM MOISTURE CONTENT AND COMPACTED TO NINETY-FIVE PERCENT (95%) OF MAXIMUM DENSITY WHERE THE PIPELINE TRENCH PASSES UNDER STRUCTURES , AND NINETY PERCENT (90%) ELSEWHERE. PAYMENT WILL BE MADE UNDER SEPARATE UNIT PRICE BID ITEMS FOR FURNISHING AND INSTALLING BEDDING AND BACKFILLL IF SUCH BID ITEMS HAVE BEEN ESTABLISHED; OTHERWISE PAYMENT WILL BE MADE IN ACCORDANCE WITH NEGOTIATED PRICES.

E. OVER-EXCAVATED NOT ORDERED, SPECIFIED, OR SHOWN

ANY OVER-EXCAVATION CARRIED BELOW THE GRADE ORDERED, SPECIFIED, OR SHOWN, SHALL BE REFILLED TO THE REQUIRED GRADE WITH SUITABLE SELECTED GRANULAR MATERIAL BY THE CONTRACTOR AT HIS OWN EXPENSE. SUCH MATERIAL SHALL BE MOISTENED AS REQUIRED AND COMPACTED TO NINETY-FIVE PERCENT (95%) OF MAXIMUM DENSITY UNDER STRUCTURES, AND NINETY PERCENT (90%) ELSEWHERE.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **EARTHWORKS**		**REVISIONS**	
				BY:	**DATE:**
		DATE:	**NO.**		
	SCALE: NTS **BY: PDD**	**JANUARY 2021**	**2**		

F. DISPOSAL OF EXCESS EXCAVATED MATERIAL

THE CONTRACTOR SHALL REMOVE AND DISPOSE ALL EXCESS EXCAVATED MATERIAL AT HIS OWN EXPENSE AND IN A MANER APPROVED BY THE ENGINEER.

G. EXCAVATION IN LAWN AREAS

WHERE PIPELINE EXCAVATION OCCURS IN LAWN AREA, THE SOD SHALL BE CAREFULLY REMOVED AND STOCKPILED TO PRESERVE IT FOR REPLACEMENT. EXCAVATED MATERIAL FROM THE TRENCH MAY BE PLACED ON THE LAWN PROVIDED A DROP CLOTH OR OTHER SUITABLE METHOD IS EMPLOYED TO PROTECT THE LAWN FROM DAMAGE. THE LAWN SHALL NOT REMAIN COVERED FOR MORE THAN 72 HOURS. IMMEDIATELY AFTER COMPLETION OF BACKFILLING AND TESTING OF THE PIPELINE, THE SOD SHALL BE REPLACED IN A MANNER SO AS TO RESTORE THE LAWN AS NEAR AS POSSIBLE TO ITS ORIGINAL CONDITION.

H. EXCAVATION IN VICINITY OF TREES

EXCEPT WHERE TREES ARE SHOWN ON THE DRAWINGS TO BE REMOVED TREES SHALL BE PROTECTED FROM INJURY DURING CONSTRUCTION OPERATIONS AND NO TREE IS TO BE REMOVED WITHOUT WRITTEN PERMISSION FROM THE ENGINEER. NO TREE ROOTS OVER 50 MM (2-IN.) IN DIAMETER SHALL BE CUT WITHOUT THE PERMISSION OF THE ENGINEER. TREES SHALL BE SUPPORTED DURING EXCAVATION AS MAY BE DIRECTED BY THE ENGINEER.

20.04 BACKFILL

A. GENERAL

BACKFILL SHALL NOT BE DROPPED DIRECTLY UPON ANY STRUCTURE OR PIPE. MATERIALS USED FOR BACKFILL SHALL BE SELECTED MATERIAL, FREE FROM GRASS, ROOTS, BRUSH, OR OTHER VEGETATION, OR ROCKS HAVING MAXIMUM DIMENSION LARGER THAN 150MM (6-IN.). MATERIAL PLACED WITHIN 150 MM (6-IN.) OF ANY STRUCTURE ORPIPE SHALL BE FRE OF ROCKS OR UNBROKEN MASSES OR EARTHLY MATERIALS HAVING MAXIMUM DIMENSION LARGER THAN 75 MM (3-IN.). BACKFILL SHALL NOT BE PLACED AROUND OR UPON ANY STRUCTURE UNTIL THE CONCRETE HAS ATTAINED SUFFICIENT STRENGTH TO WITHSTAND THE LOADS IMPOSED. BACKFILL AROUND WATER-RETAINING STRUCTURES SHALL NOT BE PLACED UNTIL THE STRUCTURES HAVE BEEN TESTED, AND THE STRUCTURES SHALL BE FULL OF WATER WHOLE BACKFILL IS BEING PLACED.

B. BACKFILL AROUND AND BENEATH POPOSED STRUCTURES AND PAVED AREAS

EXCEPT WHERE OTHERWISE SPECIFIED FOR A PARTICULAR STRUCTURE OR ORDERED BY THE ENGINEER, BACKFILL PLACED AROUND AND BENEATH PROPOSED STRUCTURES AND PAVED AREAS, SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED 200 MM (8-IN.) IN THICKNESS, AS MEASURED BEFORE COMPACTION, WHERE COMPACTION IS ATTAINED BY MEANS OF SHEEPSFOOT ROLLERS. WHERE THE USE OF SHEEPSFOOT ROLLERS IS IMPRACTICAL, THE LAYERS SHALL NOT EXCEED 150 MM (6-IN.) IN THICKNESSBEFORE COMPACTION, AND COMPACTION SHALL BE ATTAINED BY MEANS OF HAND-OPERATED POWER DRIVEN TAMPERS. THE BACKFILL SHALL BE BROUGHT UP EVENLY WITH EACH LAYER MOISTENED AND COMPACTED BY MECHANICAL MEANS TO NINETY-FIVE (95%) OF MAXIMUM DENSITY BENEATH PROPOSED STRUCTURES, AND NINETY PERFECT (90%) OF MAXIMUM DENSITY AROUND THE SIDES OF STRUCTURES AND BENEATH PROPOSED PAVED AREAS.

C. PIPELINE TRENCH BACKFILL

1. PIPELINE TRENCHES SHALL BE BACKFILLED TO A LEVEL OF 150 MM (6-IN.) ABOVE THE TOP OF THE PIPE WITH SELECTED MATERIAL OBTAINED FROM THE EXCAVATION; PROVIDED IF, IN THE ENGINEER'S OPINION, SAID MATERIAL IS UNSUITABLE FOR BACKFILL PURPOSES, BORROW MATERIAL HAVING THE SAND EQUIVALENT VLAUE OF NOT LESS THAN TWENTY (20) (ASTM D-2419) SHALL BE USED FOR THIS PORTION OF THE TRENCH BACKFILL. BORROW MATERIAL WHEN ORDERED BY THE ENGINEER, WILL BE PAID FOR UNDER A SEPARATE UNIT PRICE BID ITEM IF SUCH BID ITEM HAS BEEN ESTABLISHED; OTHERWISE PAYMENT WILL BE MADE IN ACCORDANCE WITH A NEGOTIATED PRICE. SELECTED MATERIAL SHALL FIRST BE BROUGHT UP TO MID-DIAMETER OF THE PIPE AND COMPACTED; THEN THE REMAINDER OF THE BACKFILL TO 150 MM (6-IN.) ABOVE THE PIPE MAY BE PLACED AND COMPACTED. SUCH MATERIAL SHALL BE COMPACTED TO NINETY-FIVE PERCENT (95%) OF MAXIMUM DENSITY WHERE THE TRENCH IS LOCATED UNDER PROPOSED STRUCTURES, AND NINETY PERCENT (90%) OF MAXIMUM DENSITY ELSEWHERE. COMPACTION SHALL BE OBTAINED BY TAMPING IN NOT MORE THAN 150 MM (6-IN.) LAYERS OR BY USING EXCESS WATER AND PASSING A

CONCRETE VIBRATOR BETWEEN THE PIPE AND SIDE OF TRENCH. PRIOR TO ANY FLOODING OR JETTING, THE PIPE SHALL BE FILLED WITH WATER OR CENTER LOADED WITH BACKFILL TO PREVENT FLOATING.

2. AFTER THE INITIAL PORTION OF BACKFILL HAS BEEN PLACED AND SPECIFIED ABOVE, THE REMAINDER OF THE TRENCH SHALL BE BACKFILLED. WHEN COMPACTION OF THE INITIAL PORTION OF BACKFILL IS OBTAINED WITH EXCESS WATER, NOT LESS THAN 4 HOURS SHALL HAVE ELAPSED BETWEEN THE PLACEMENT OF INITIAL BACKFILL AND SUBSEQUENT BACKFILL. THE REMAINDER OF THE BACKFILL SHALL BE SELECTED MATERIAL OBTAINED FROM THE EXCAVATION AND SHALL BE PLACED IN HORIZONTAL LAYERS. EACH LAYER SHALL BE NO MORE THAN 400 MM (16 IN.) IN DEPTH. LAYERS HALL BE MOISTENED, TAMPED, PUDDLED, ROLLED OR OTHERWISE COMPACTED TO:

(A) NINETY FIVE PERCENT (95%) OF MAXIMUM DENSITY WHERE THE TRENCH IS LOCATED IS LOCATED UNDER PROPOSED STRUCTURES;

(B) NINETY PERCENT (90%) OF MAXIMUM DENSITY WHERE TRENCH IS LOCATED UNDER EXISTING OR PROPOSED ASPHALT OR CONCRETE SURFACE;

(C) EIGHTY PERCENT (80%) OF MAXIMUM DENSITY WHERE THE TRENCH IS LOACTED UNDER UNPAVED SHOULDERS, GRAVEL ROADWAYS OR DIRT ROADS;

(D) ONE HUNDRED PERCENT (100%) OF THE NATURAL DENSITY OF THE SURROUNDING AREAS WHERE THE TRENCH IS LOCATED IN UNIMPROVED RIGHT-OF-WAY.

IF THE BACKFILL MATERIAL IS SANDY OR GRANULAR IN NATURE AND THE TRENCH IS NOT LOACTED UNDER A STRUCTURE, THE LAYER CONSTRUCTION MAY BE ELIMINATED, AND COMPACTION MAY BE OBTAINED BY FLOODING AND JETTING, PROVIDED THIS LATTER METHOD IS APPROVED BY THE AGENCY HAVING JURISDICTION OVER THE HIGHWAY OR STREET. IF FLOODING AND JETTING IS PERMITTED, THE REMAINING BACKFILL SHALL BE PLACED IN LAYERS NOT EXCEEDING 900MM (36 IN.) THICKNESS. EACH LAYER SHALL BE FLOODED, JETTED AND RODDED TO SECURE COMPLETE SATURATION OF THE MATERIAL BEFORE PLACING THE NEXT LAYER.

D. EMBANKMENT FILL

THE AREA WHERE AN EMBANKMENT IS TO BE CONSTRUCTED SHALL BE CLEARED OF ALL VEGETATION, ROOTS AND FOREIGN MATERIAL. FOLLOWING THIS, THE SURFACE SHALL BE MOISTENED, SCARIFIED TO A DEPTH OF 150 MM (6 IN.) AND ROLLED OR OTHERWISE MECHANICALLY COMPACTED TO NINETY FIVE PERCENT (95%) OF MAXIMUM DENSITY UNDER PROPOSE STRUCTURES, AND NINETY PERCENT (90%) OF MAXIMUM DENSITY ELSEWHERE.EMBANKMENT FILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED 200MM (8 IN.) IN THICKNESS, AS MEASURED BEFORE COMPACTION, WHERE COMPACTION IS ATTAINED BY MEANS OF SHEEPSFOOT ROLLERS. WHERE THE USE OF SHEEPSFOOT ROLLERS IS IMPRACTOCABLE, THE LAYERS SHALL NOT EXCEED 150 MM (6-IN.) IN THICKNESS BEFORE COMPACTION, AND COMPACTION SHALL BE ATTAINED BY MEANS OF HAND-OPERATED POWER-DRIVEN TAMPERS. THE BACKFILL SHALL BE BROUGHT UP EVENLY WITH EACH LAYER MOISTENED AND COMPACTED BY MECHANICAL MEANS TO NINETY-FIVE PERCENT (95%) OF MAXIMUM DENSITY UNDER PROPOSED STRUCTURES, AND NINETY PERCENT (90%) OF MAXIMUM DENSITY ELSEWHERE. THE TOP 500 MM (20 IN.) OF BACKFILL ON EMBANKMENTS SHALL CONSISTS OF LOAMY EARTH, FREE OF ROCKS LARGER THAN 25 MM (1 IN.) IN MAXIMUM DIMENSION.

GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **EARTHWORKS**		**REVISIONS**
				BY: / **DATE:**
		DATE:	**NO.**	
	SCALE: NTS / **BY:** PDD	**JANUARY 2021**	**4**	

20.05 SLOPE STABILIZING

UNLESS OTHERWISE SPECIFIED ALL EMBANKMENT SLOPES STEEPER THAN THREE (3) UNITS HORIZONTAL TO ONE (1) UNIT VERTICAL SHALL BE STABILIZED BY SODDING AS DIRECTED BY THE ENGINEER. STRIPS OF SOD NOT LESS THAN 300 MM (12 IN.) WIDE SHALL BE PLACED ALONG SLOPE BANKS.

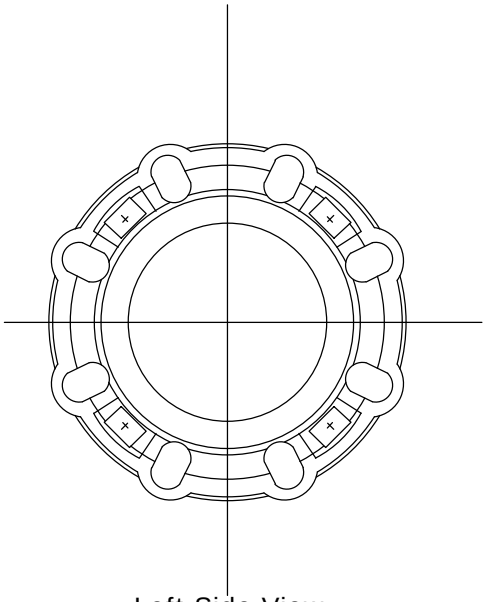
SODS SHALL BE TAKEN ONLY FROM FIELDS NOT LESS THAN THREE (3) YEARS OLD AND HAVE BEEN PREVIOUSLY ROLLED AND MOVED AT LEAST ONCE. SODS TAKEN FROM WILD FIELD THAT HAVE NOT BEEN MOWED WILL NOT BE ACCEPTABLE. SOD SHALL BE OF SUFFICIENT THICKNESS TO PREVENT EXCESSIVE BREAKAGE AND SHALL BE STRIPPED IN THE LARGEST PRACTICABLE WIDTHS AND LENRGTHS. IT SHALL BE TAMPED IN PLACE, PROPERLY LEVELED AND IMMEDIATELY WELL SPRINKLED. ALL SOD NOT IN GOOD CONDITION AFTER BEING TAMPED IN PLACE SHALL BE REMOVED AND REPLACED.

IMMEDIATELY ADTER SETTING OF GRASS SOD, SOD SHALL BE RECOVERED WITH 6 MM (0.24 IN.) OF SCREENED TOPSOIL WHICH HAS BEEN WELL MIXED WITH 460 GRAMS (1 LB.) OF GRASS SEED PER 100 SQ. METRES (1,076 SQ. FT.). SOD SHALL BE REPLACED WITH THE SAME KIND OF SURFACING OR BETTER IN ACCORDANCE WITH THE LATEST SPECIFICATIONS, ROSODDING SHALL CONTINUE UNTIL ACCEPTANCE.

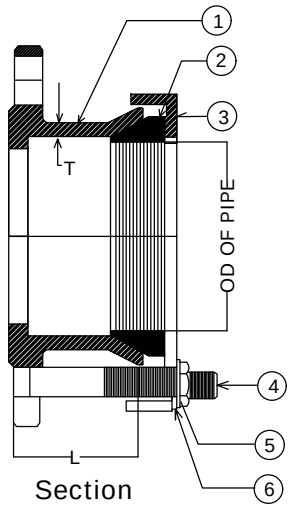
GENERAL NOTES

AS PER LWUA STANDARD SPECIFICATION

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	**TITLE:** **EARTHWORKS**		**REVISIONS**
				BY: / **DATE:**
		DATE:	**NO.**	
	SCALE: NTS / **BY:** PDD	**JANUARY 2021**	**5**	

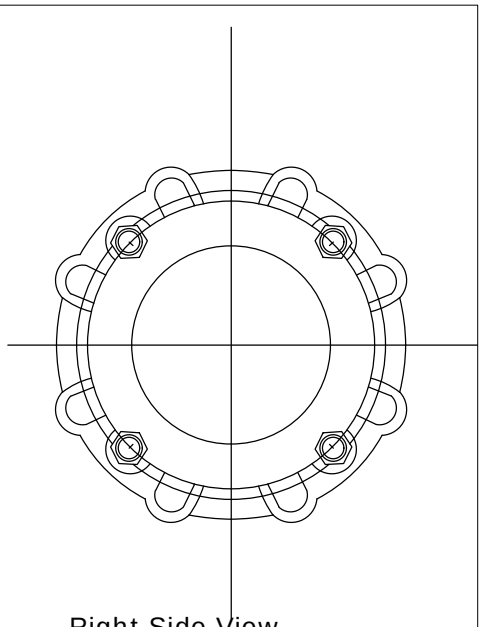


Left Side View



Section

C.I Adaptor Flange/Mech.



Right Side View

C.I. ADAPTOR FLANGE/MECH.

NOMINAL SIZE	OD OF PIPE PVC	L	T	BOLT GLAND		
				NO. OF BOLT	BOLT SIZE	BOLT HOLE
50	63	78	78	2-4	11	14
63	75	78	7	2-4	11	14
75	90	78	7	4	11	14
100	110	78	7.2	4	11	14
150	160	78	7.8	4	11	14
200	225	78	8.4	4	15	18
250	280	90	9	6	15	18
300	315	90	9.6	6	15	18

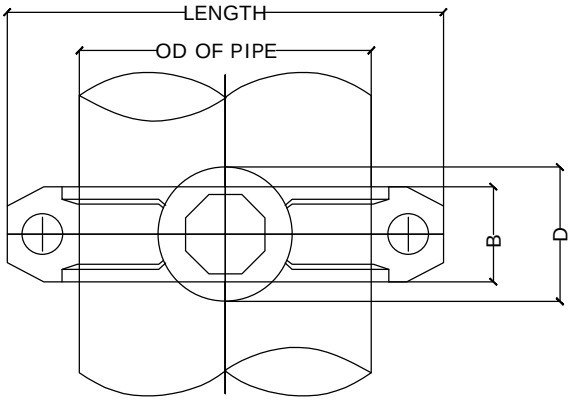
PARTS	MATERIALS	ASTM
1. BODY	1. CAST IRON	A-126 CLASS B
2. RUBBER SEAL	2. RUBBER	EPDM, NBR, SBR
3. GLAND RING	3. CAST IRON	A-126 CLASS B
4. BOLTS	4. STEEL	A-307 GRADE B
5. NUTS	5. STEEL	A-307 GRADE B
6. WASHER	6. STEEL	A-307 GRADE B

NOTES:

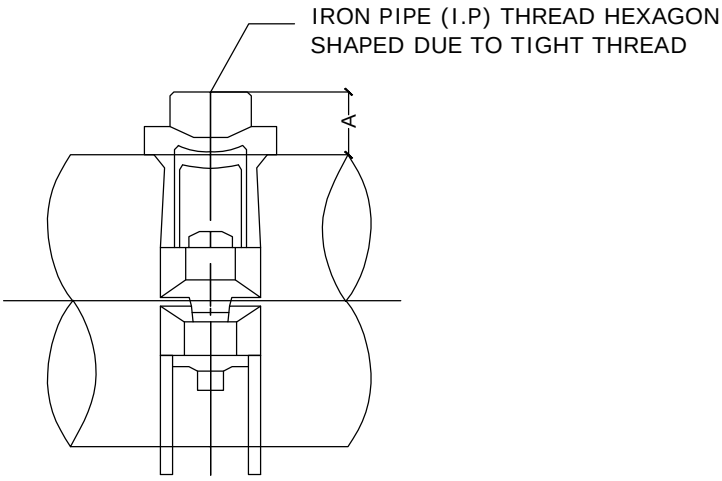
1. ALL DIMENSION ARE IN MILLIMETER
2. MATERIAL IS CAST IRON CONFORM TO ASTM A-126 CLASS B
3. MATERIAL OF BOLTS NUTS & WASHER IS STEEL CONFORM TO ASTM A-307 GRADE B, GALVANIZED AS PER ASTM A-153.
4. SPECIFICATION OF FLANGE CONFORMING TO AWWA STANDARDS
5. INTERIOR & EXTERIOR 100% FOOD GRADE EPOXY POWDER

TECHNICAL STANDARD DETAILS

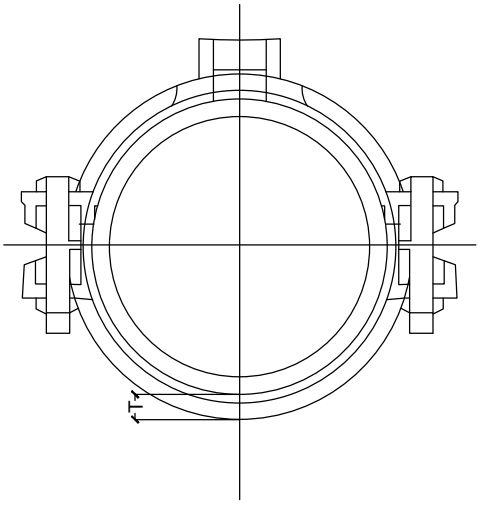
PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		C.I ADAPTOR FLANGE MECHANICAL	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01



TOP VIEW



SIDE VIEW



FRONT VIEW

NOMINAL PIPE SIZE	OD OF PIPE PVC	L	B	D MAX	T	A	MAX (I.P.) THREAD TAP DESIGNATION
50	63	122	43	70	12	28	1"
75	90	152	43	70	12	30	1"
100	110	185	50	78	12	32	2"
150	160	240	50	84	14	33	2"
200	225	310	50	84	16	43	2"

NOTES:

1. MATERIALS IS CAST IRON CONFORMING TO ASTM A-126 LASS B
2. MATERIAL OF BOLTS & NUTS IS STAINLESS STEEL CONFORM TO ASTM A-276 TYPE 304 OR 316
3. MATERIALS OF RUBBER RING GASKET WITH NARROW RAISED RIDGES IS NEOPRENE IN COMPLIANCE TO ISO 4633 CLASS 70 AND SUITABLE FOR DRINKING WATER
4. COATING IS ELECTROSTATICALLY APPLIED EPOXY POWDER
5. SADDLE SHALL NOT LEAK OR BREAK WHEN TESTED UNDER A PRESSURE OF 3000 PSI

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

C.I SADDLE CLAMP FOR PVC

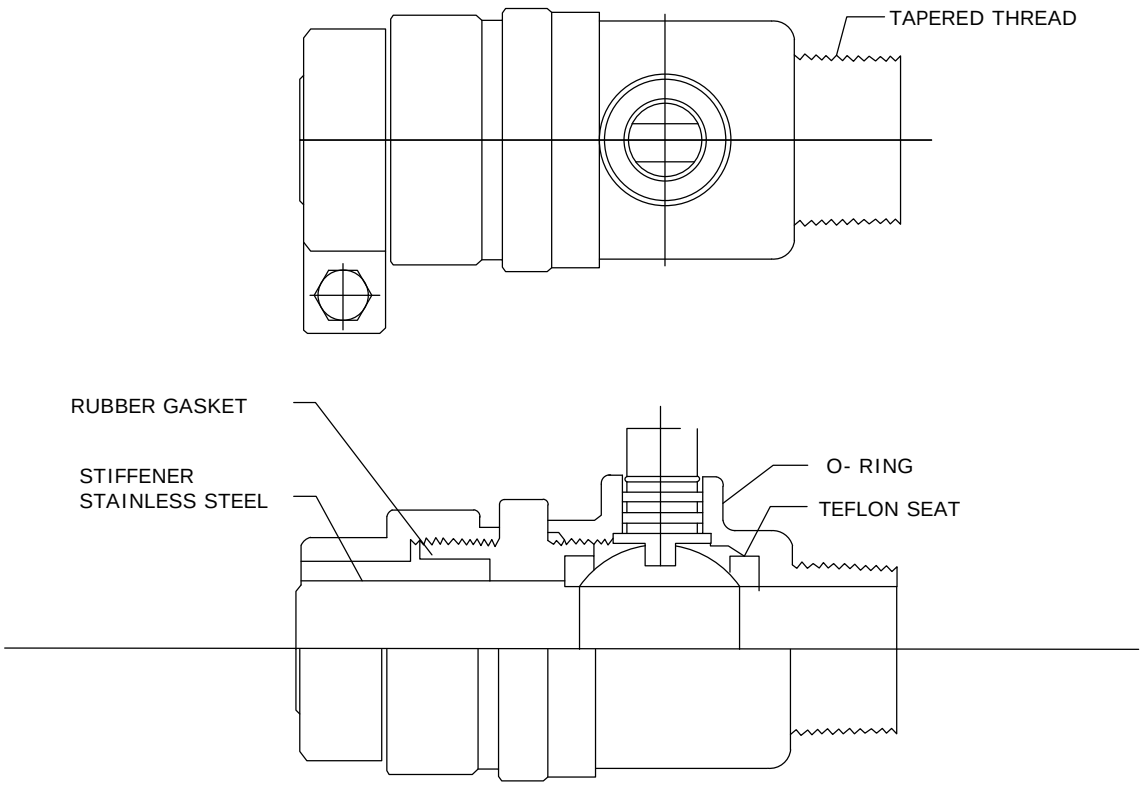
SCALE: N.T.S

BY: DESIGN UNIT

DATE: FEBRUARY 2021

DWG. NO.: 01

REVISIONS	
BY	DATE



BRASS COPORARTION STOP CJ x MTE

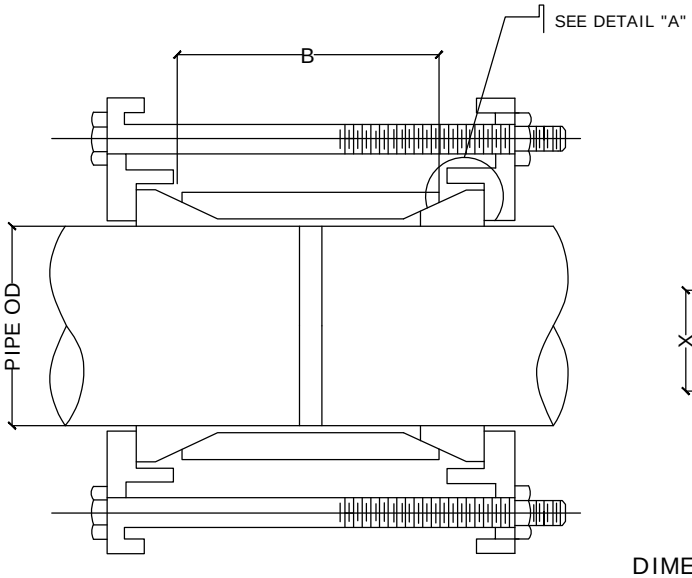
SIZE (in)	1/2	3/4	1	1 1/2	2

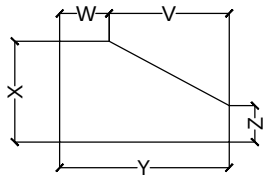
NOTES:

1. BRASS SERVICES CONNECTION FITTINGS IN ACCORDANCE TO AWWA C-800
2. COMPRESSION JOINT SHALL BE PROVIDED WITH STAINLESS STEEL STIFFENER CONFORMING TO ASTM A-276 TYPE 304
3. THE END OF STIFFENER SHALL NOT PROJECT BEYOND THE END OF COMPRESSION JOINT COUPLING
4. OUTSIDE DIAMETER OF STIFFENER SHALL BE THE INSIDE DIAMETER OF THE PE TUBING
5. BALL COMPONENT SHALL BE CHROME PLATED BRASS
6. BRASS CORPORATION STOP ISO, WITH LOCK WASHER, BOLT AND NUT

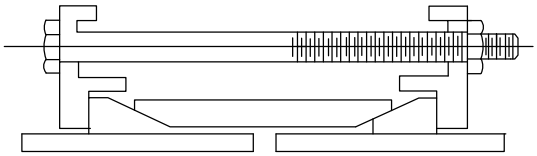
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		BRASS CORPORATION STOP CJ x MTE	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01





C.I SLEEVE TYPE COUPLING FOR GIP



DIMENSION OF RUBBER GASKET

SIZE	V	W	X	Y	Z
50	15.75	7.87	12.20	23.6	3.8
75	15.75	7.87	12.20	23.6	3.8
100	19.05	7.87	15.75	26.9	5.6
150	19.05	7.87	15.75	26.9	5.6
200	19.05	7.87	15.75	26.9	5.6
250	19.05	7.87	15.75	26.9	5.6
300	19.05	7.87	15.75	26.9	5.6

DETAIL "A"

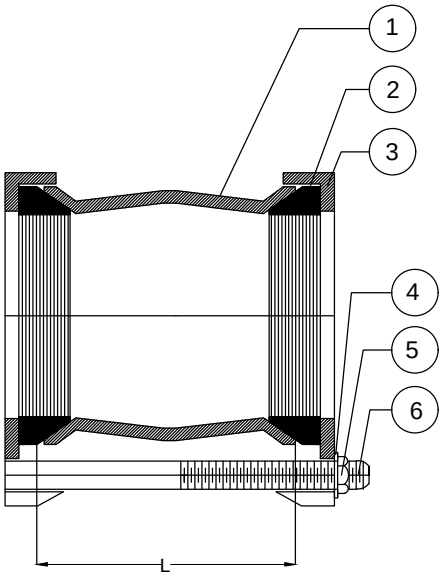
SIZE	PIPI OD GIP	T	B	NO OF BOLT	E	T1	I
50	60.3	10	140	4	25	9.5	4.7
75	88.9	12	140	4	25	9.5	4.7
100	114.3	13	140	4	25	9.5	4.7
150	168.3	14	140	6	25	9.5	4.7
200	219.0	15.2	140	6	25	9.5	4.7
250	273.0	17.2	178	6	25	9.5	4.7
300	323.8	19	178	6	25	9.5	4.7

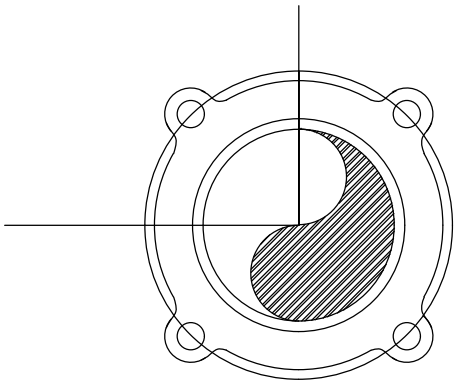
NOTES:

1. ALL DIMENSION ARE IN MILLIMETER
2. MATERIAL IS CAST IRON CONFORM TO ASTM A-126 CLASS B
3. MATERIAL OF BOLTS & NUTS IS STEEL CONFORM TO ASTM A-307 GRADE B. AND HOT DIP GALVANIZED AS PER ASTM A-153.
4. COATING: COALTAR ENAMEL
5. MATERIAL OF RUBBER GASKET CONFORM TO NBR

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	C.I SLEEVE TYPE COUPLING FOR GIP	REVISIONS BY	DATE
	DATE: FEBRUARY 2021	DWG. NO.: 01	
SCALE: N.T.S	BY: DESIGN UNIT		





RIGHT SIDE VIEW

C.I SLEEVE TYPE COUPLING

PARTS:	MATERIALS:	ASTM
1. BODY SLEEVE	CAST IRON	ASTM A-126 CLASSB
2. RUBBER SEAL	RUBBER	EPDM, NBR, SBR
3. GLAND RING	CAST IRON	ASTM A-126 CLASS B
4. WASHER	STEEL	ASTM A-307 GRADE B
5. NUTS	STEEL	ASTM A-307 GRADE B
6. BOLTS	STEEL	ASTM A-307 GRADE B

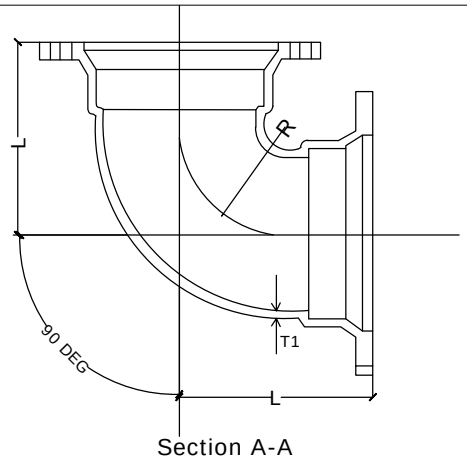
NOMINAL SIZE	OUTSIDE DIAMETER PVC	L	T
50	50	178	5
63	63	178	5
75	75	178	5
100	100	178	5
150	150	178	5
200	200	178	6
250	250	178	6
300	300	178	6

NOTES:

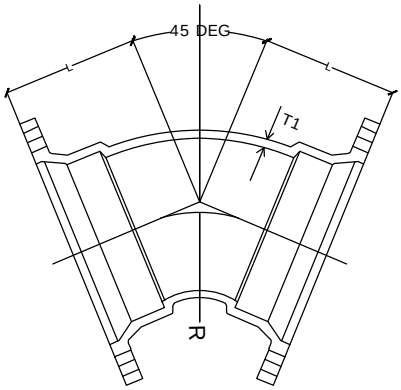
1. ALL DIMENSIONS ARE IN MILLIMETER UNITS
2. MATERIAL IS CAST IRON CONFORM TO ASTM A-125 CLASS B
3. MATERIAL OF BOLTS NUTS & WASHER ARE STEEL CONFORM TO ASTM A-307 GRADE B, ASTM A-563 RESPECTIVELY AND HOT DIP GALVANIZED AS PER ASTM A-153
4. INTERIOR & EXTERIOR COATING IS EXPOXY POWDER

TECHNICAL STANDARD DETAILS

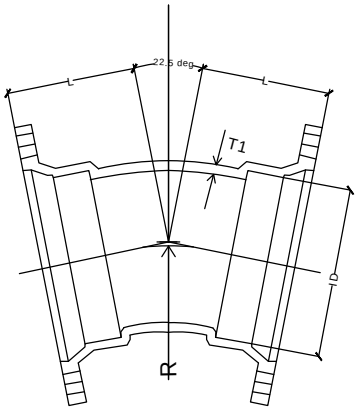
PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		C.I SLEEVE TYPE COUPLING	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01



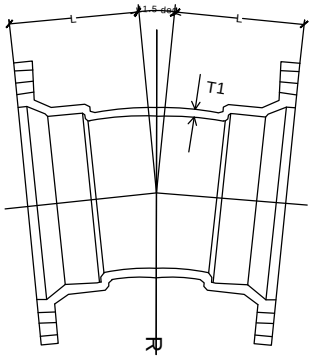
Section A-A
C.I Elbow Mech. Type
90 Degree for PVC Pipe



Section A-A
C.I Elbow Mech. Type
45 Degree for PVC Pipe



Section A-A
C.I Elbow Mech. Type
22.5 Degree for PVC Pipe



Section A-A
C.I Elbow Mech. Type
11.5 Degree for PVC Pipe

NOMINAL SIZE	ID	T1	90 DEGREES		45 DEGREES		22.5 DEGREES		11.25 DEGREES	
			R	L	R	L	R	L	R	L
50	69	7.0	47	125	62	95	63.7	90	129	90
75	96	7.0	102	152	92	101.6	192	90	387.3	90
100	116	7.2	165	165	122	114.3	255.1	101	515.8	101
150	166	7.8	152	203	184	135	382.5	127	774.7	127
200	231	8.4	178	229	214	152	345	140	901.7	140
250	166	9.0	228	290	276	155	574.5	165	1160.5	165
300	321	9.6	254	335	336	186	701.5	190	1417.6	190

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETER UNITS
2. MATERIAL IS CAST IRON CONFORMING TO ASTM A-126 CLASS B.
3. MATERIAL OF BOLTS & NUTS IS STEEL CONFORM TO ASTM A-307 GRADE B. AND HOT DIP GALVANIZED AS PER ASTM A-153
4. COATING IS BITUMINOUS COALTAR ENAMEL 50 MICRONS THICK. FITTINGS SHALL BE LINED WITH CEMENT MORTAL CONFORMING TO AWWA -104
5. GASKET MATERIAL SHALL BE SBR, NBR, OR EPDM CONFORMING TO ISO 4633 CLASS 70, AND SUITABLE FOR DRINKING WATER.
6. THE DESIGN POLYGON TYPE
7. THIS PRODUCT CONFORMS TO REQUIRED HYDROSTATIC TESTING SPECIFICATION OF AWWA C-110 AND LWUA STANDARDS

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

C.I ELBOW MECHANICAL TYPE 90 deg., 45 deg., 22.5 deg., & 11.25 deg. for PVC

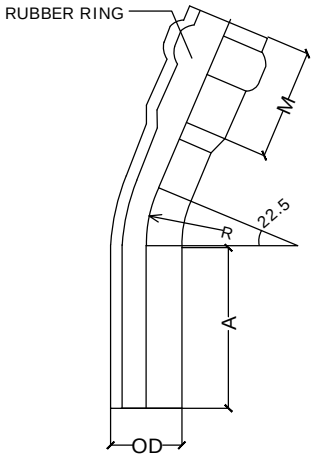
SCALE: N.T.S

BY: DESIGN UNIT

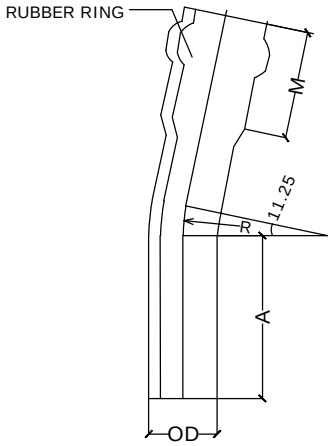
DATE: FEBRUARY 2021

DWG. NO.: 01

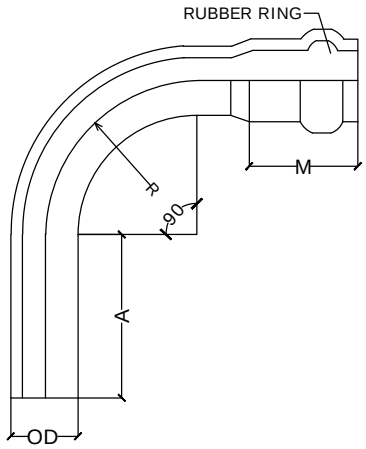
REVISIONS	
BY	DATE



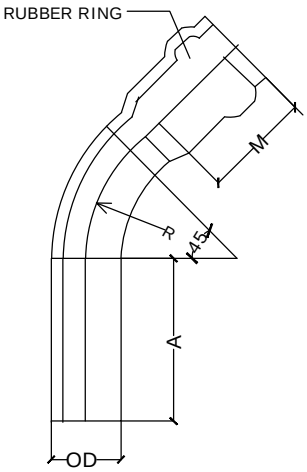
uPVC ELBOW BE/PE 22.5 deg



uPVC ELBOW BE/PE 11.25 deg



uPVC ELBOW BE/PE 90 deg



uPVC ELBOW BE/PE 45 deg

ALL DIMENSION ARE IN MILLIMETER UNITS

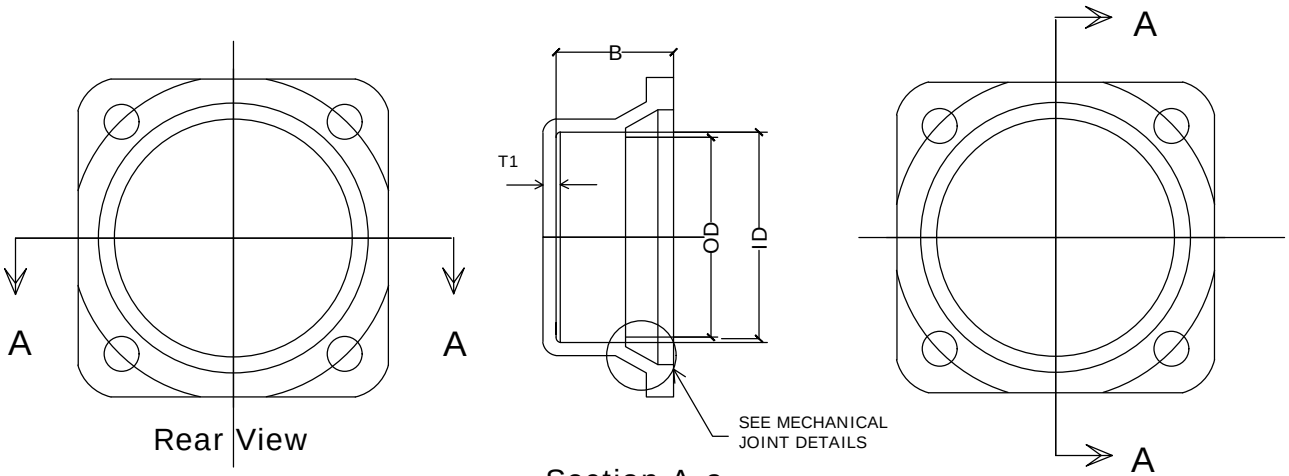
NOMINAL SIZE		OUTSIDE DIAMETER	90 DEGREE				45 DEGREE				22.5 DEGREE				11.25 DEGREE			
MM	IN	O.D.	R	A	M	TOTAL LENGTH	R	A	M	TOTAL LENGTH	R	A	M	TOTAL LENGTH	R	A	M	TOTAL LENGTH
50	2	63	230	150	110	671	230	150	110	491	230	150	110	401	230	150	110	356
75	3	90	250	200	130	793	250	200	130	597	250	200	130	498	250	200	130	449
100	4	110	290	220	155	895	290	220	155	668	290	220	155	554	290	220	155	497
150	6	160	480	225	160	1264	480	225	160	887	480	225	160	669	480	225	160	604
200	8	225	750	310	200	1797	780	310	200	1209	750	310	200	914	750	310	200	767

NOTES:

1. MINIMUM WALL THICKNESS IS EQUIVALENT TO SERIES 8 PIPE WALL THICKNESS SPECIFICATION

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	UPVC ELBOW BE/PE	REVISIONS BY	DATE
SCALE: N.T.S BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01	



C.I End Cap Mech . Type

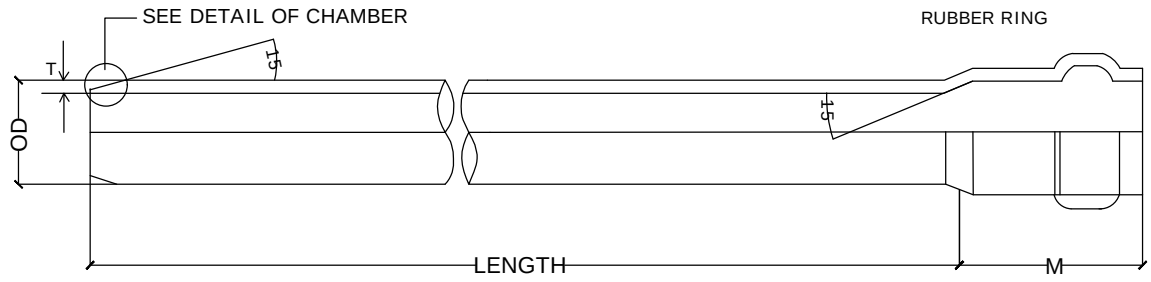
SIZE	OD OF PIPE PVC	ID	B	T1
50	63	69	63.5	7
75	90	96	63.5	7
100	110	116	63.5	7.2
150	160	166	63.5	7.8
200	225	231	63.5	8.4
250	280	286	63.5	9
300	315	321	63.5	9.6
300	355	361	63.5	9.6

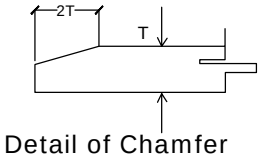
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETER UNITS
2. MATERIAL IS CAST IRON CONFORMING TO ASTM A-126 CLASS B.
3. MATERIAL OF BOLTS & NUTS IS STEEL CONFORM TO ASTM A-307 GRADE B. AND HOT DIP GALVANIZED AS PER ASTM A-153
4. COATING IS BITUMINOUS COALTAR ENAMEL 50 MICRONS THICK. FITTINGS SHALL BE LINED WITH CEMENT MORTAL CONFORMING TO AWWA C-104
5. GASKET MATERIAL SHALL BE SBR, NBR, OR EPDM CONFORMING TO ISO 4633 CLASS 70, AND SUITABLE FOR DRINKING WATER.
6. THIS DESIGN IS POLYGON TYPE

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	C.I END CAP MECHANICAL TYPE FOR PVC		REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01





Detail of Chamfer

UPVC PIPES

NOMINAL SIZE		NOMINAL	TOLERANCE		LENGTH	SOCKET/HUB LENGTH (M)	WALL THICKNESS			
							SERIES 8 (C-150)		SERIES 10 (C-100)	
MM	IN.	OD	OD	OVALITY	(L)	MINIMUM	MIN.	MAX.	MIN.	MAX.
50	2	63	+ 0.3	+ 0.8	6000	97	3.6	4.16	3.0	3.50
63	2.5	75	+ 0.3	+ 0.9	6000	101	4.3	4.93	3.6	4.16
75	3	90	+ 0.3	+ 1.1	6000	107	5.2	5.92	4.4	5.04
100	4	110	+ 0.4	+ 1.4	6000	114	6.3	7.13	5.3	6.03
150	6	160	+ 0.5	+ 2.0	6000	131	9.2	10.32	7.7	8.67
200	8	225	+ 0.7	+ 2.7	6000	154	12.9	14.39	10.8	12.08
250	10	280	+ 0.9	+ 3.0	6000	173	16.0	17.80	13.5	15.05
300	12	315	+ 1.0	+ 3.8	6000	195	18.0	20.00	15.20	6.75
350	14	355	+ 1.1	+ 4.3	6000	207	20.3	22.53	17.10	19.01

MATERIAL

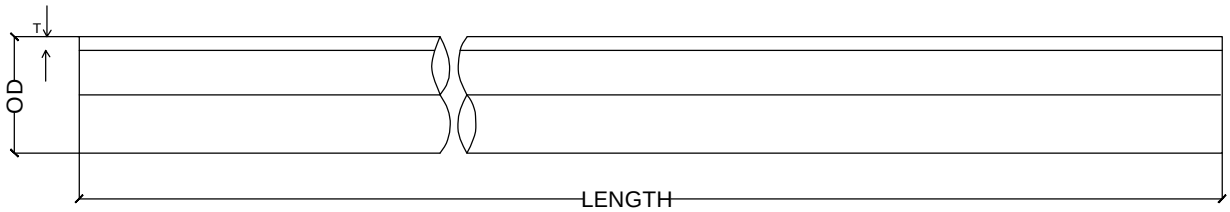
uPVC MATERIAL IS IN ACCORDANCE TO PNS 291
RING GASKET: SBR, NBR, EPDM OR BUNA-N
CLASS 50, CONFORMING TO PNS-1008/ISO-4633 AND
SUITABLE FOR DRINKING WATER

JOINTS

UPVC PIPES SHALL BE PUSH-ON TYPE JOINT WITH
RUBBER GASKET

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		uPVC PIPES	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01



HDPE ISO 4427:2002

SIZE		NOMINAL OUTSIDE DIAMETER (OD) MM	STANDARD CUTTING LENGTH (L)	T-WALL THICKNESS	
				SDR 9	SDR 9
MM	IN.		METERS	MM	MM
1/2	13	20	300	1.8	2.3
3/4	19	25	150	2.3	2.8
1	25	32	100	2.9	3.6

MATERIAL

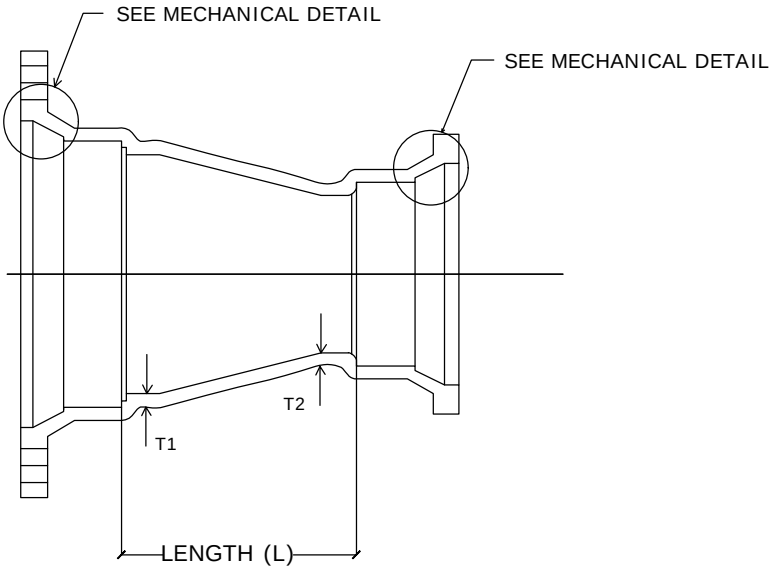
THE EXTRUSION COMPOUND SHALL BE EITHER GRADE P33, CLASS C OR GRADE P34, CLASS C (PE 3306 OF PE 3406) AS DEFINED BY ASTM D 1248 OR PE 3408 AS DESCRIBED IN PPI TECHNICAL REPORT.

COLOR:

BLACK

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		HDPE		REVISIONS
				BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01	



Section
C.I Reducer Mech. Type

SIZE		LENGTH	WALL THICKNESS	
D1	D2	L	T1	T2
75	50	90	7.0	7.0
100	50	150	7.2	7.0
100	75	90	7.2	7.0
150	50	230	7.8	7.0
150	75	190	7.8	7.0
150	100	150	7.8	7.2
200	50	300	8.4	7.0
200	75	250	8.4	7.0
200	100	250	8.4	7.2
200	150	150	8.4	7.8

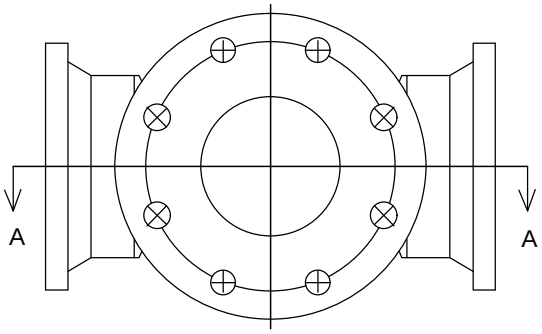
SIZE		LENGTH	WALL THICKNESS	
D1	D2	L	T1	T2
250	50	360	9	7.0
250	75	330	9	7.0
250	100	300	9	7.2
250	150	250	9	7.8
250	200	150	9	8.4
300	50	410	9.6	7.0
300	75	390	9.6	7.0
300	100	370	9.6	7.2
300	150	350	9.6	7.8
300	200	250	9.6	8.4
300	250	150	9.6	9

NOTES:

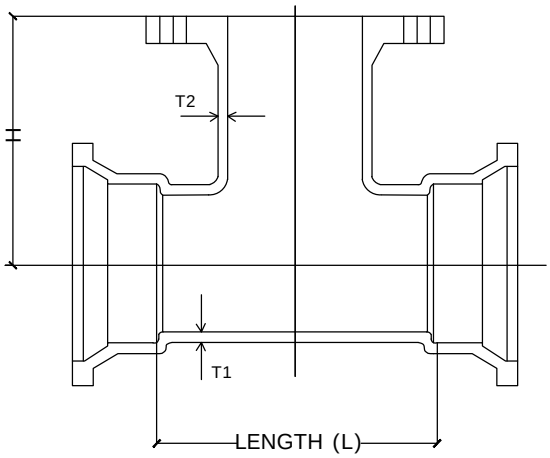
1. ALL DIMENSION ARE IN MILLIMETER UNITS
2. MATERIAL IS CAST IRON CONFORMING TO ASTM A-126 CLASS B
3. MATERIAL OF BOLTS & NUTS IS STEEL CONFORM TO ASTM A-307 GRADE B. AND ASTM A-563, RESPECTIVELY, AND HOT DIP GALVANIZED AS PER ASTM A-153.
4. COATING IS BITUMINOUS COALTAR ENAMEL 50 MICRONS THICK. FITTINGS SHALL BE LINED WITH CEMENT MORTAR AS PER TO AWWA C-104
5. GASKET MATERIAL SHALL BE SBR, NBR OR EPDM CONFORMING TO ISO 4633 CLASS 70 AND SHALL BE SUITABLE FOR DRINKING WATER.
6. THIS DESIGN POLYGON TYPE

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		REDUCER MECHANICAL TYPE	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01

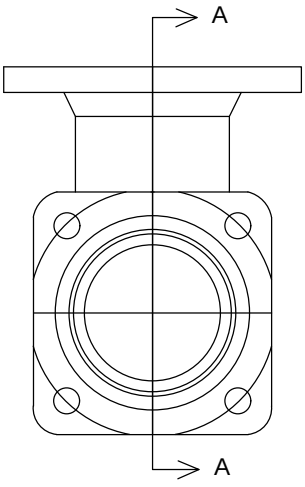


Top View



Section A-A
C.I Tee Mech Flange

SIZE		L	H	T1	T2
RUN	BRANCH				
50	50	130	140	7	7
75	50	170	165	7	7
75	75	170	165	7	7
100	50	145	165	7.2	7
100	75	170	175	7.2	7
100	100	190	180	7.2	7.2
150	50	160	190	7.8	7
150	75	170	200	7.8	7
150	100	195	210	7.8	7.2
150	150	255	220	7.8	7.8
200	50	165	215	8.4	7
200	75	175	225	8.4	7
200	100	200	230	8.4	7.2
200	150	255	245	8.4	7.8
200	200	315	260	8.4	8.4
250	50	165	265	9	7
250	75	180	225	9	7
250	100	200	230	9	7.2
250	150	260	245	9	7.8
250	200	315	260	9	8.4
250	250	375	260	9	9
300	50	180	295	9.6	7
300	75	180	295	9.6	7
300	100	205	300	9.6	7.2
300	150	260	310	9.6	7.8
300	200	320	320	9.6	8.4
300	250	380	330	9.6	9
300	250	435	340	9.6	9.6



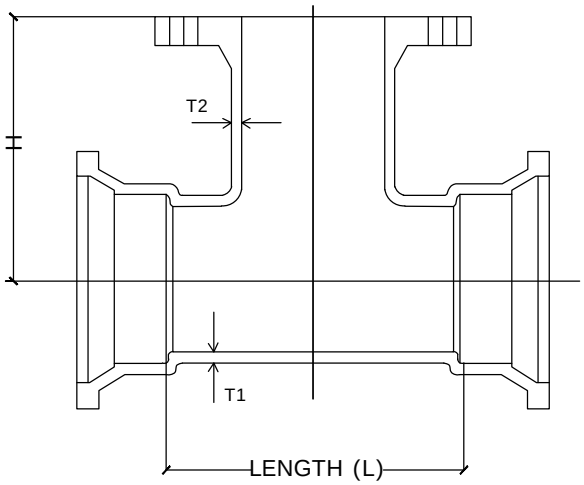
Side View

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETER UNITS
2. MATERIAL IS CAST IRON CONFORMING TO ASTM A-126 CLASS B.
3. MATERIAL OF BOLTS & NUTS IS STEEL CONFORM TO ASTM A-307 GRADE B. AND HOT DIP GALVANIZED AS PER ASTM A-153
4. COATING IS BITUMINOUS COALTAR ENAMEL 50 MICRONS THICK. FITTINGS SHALL BE LINED WITH CEMENT MORTAL CONFORMING TO AWWA C-104
5. GASKET MATERIAL SHALL BE SBR, NBR, OR EPDM CONFORMING TO ISO 4633 CLASS 70, AND SUITABLE FOR DRINKING WATER.
6. SPECIFICATION OF FLANGE CONFORM TO AWWA STANDARD

TECHNICAL STANDARD DETAILS

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	C.I TEE MECHANICAL/ FLANGE	REVISIONS BY / DATE
	SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021 / DWG. NO.: 01



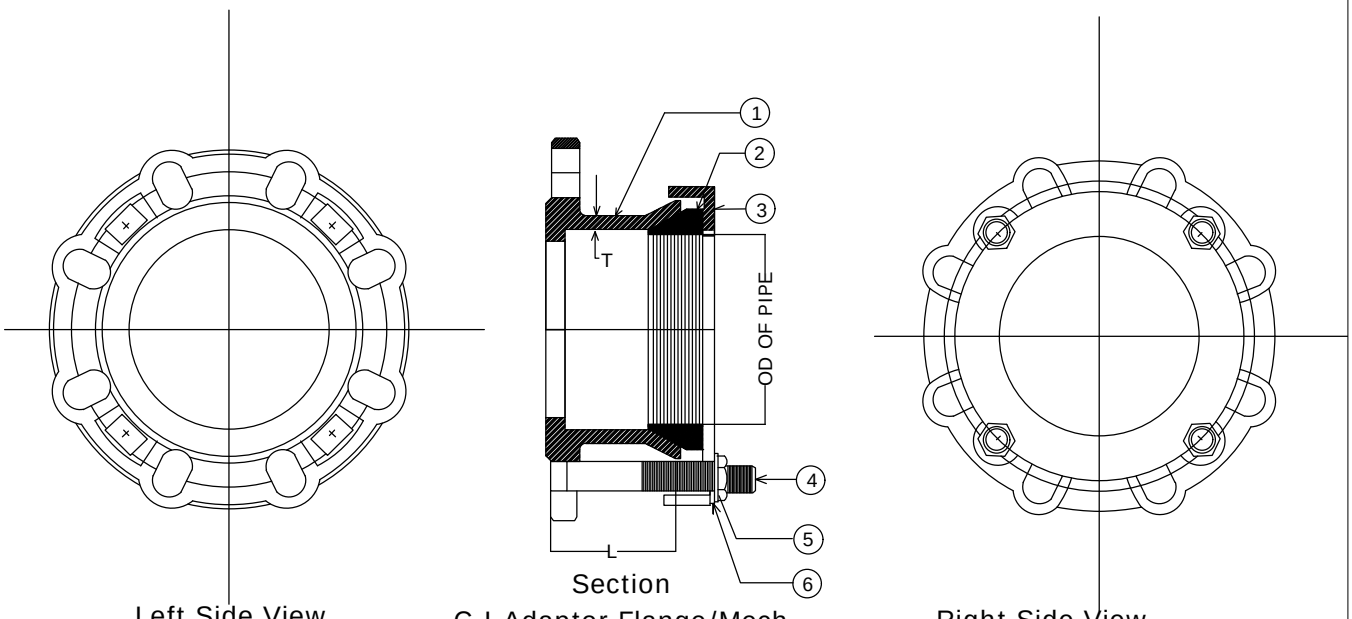
NOTES:

1. ALL DIMENSION ARE IN MILLIMETER UNITS
2. MATERIAL IS CAST IRON CONFORMING TO ASTM A-126 CLASS B
3. MATERIAL OF BOLTS & NUTS IS STEEL CONFORM TO ASTM A-307 GRADE B. AND ASTM A-563, RESPECTIVELY, AND HOT DIP GALVANIZED AS PER ASTM A-153.
4. COATING IS BITUMINOUS COALTAR ENAMEL 50 MICRONS THICK. FITTINGS SHALL BE LINED WITH CEMENT MORTAR AS PER TO AWWA C-104
5. GASKET MATERIAL SHALL BE SBR, NBR OR EPDM CONFORMING TO ISO 4633 CLASS 70 AND SHALL BE SUITABLE FOR DRINKING WATER.
6. THIS DESIGN POLYGON TYPE

SIZE		L	H	T1	T2
RUN	BRANCH				
50	50	130	65	7	7
63	50	130	70	7	7
63	63	130	70	7	7
75	50	170	75	7	7
75	75	170	75	7	7
100	50	190	100	7.2	7
100	75	200	100	7.2	7
100	100	200	100	7.2	7.2
150	50	125	115	7.8	7
150	75	170	120	7.8	7
150	100	195	120	7.8	7.2
150	150	255	125	7.8	7.8
200	50	130	140	8.4	7
200	75	175	145	8.4	7
200	100	200	145	8.4	7.2
200	150	255	150	8.4	7.8
200	200	315	155	8.4	8.4

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT	C.I TEE MECHANICAL TYPE	REVISIONS	
		BY	DATE
	DATE: FEBRUARY 2021	DWG. NO.: 01	
SCALE: N.T.S	BY: DESIGN UNIT		



Left Side View

Section

C.I Adaptor Flange/Mech.

Right Side View

C.I. ADAPTOR FLANGE/MECH.

NOMINAL SIZE	OUTSIDE DIAMETER PIPE RANGE	L	BOLT GLAND		
			NO. OF BOLT	BOLT SIZE	BOLT HOLE
50	90-102.6	78	4	11	14
100	110-130.6	78	4	11	14
150	160-174.7	78	4	11	14
200	217.2-226.8	78	4	15	18

PARTS	MATERIALS	ASTM
1. BODY	CAST IRON	A-126 CLASS B
2. RUBBER SEAL	RUBBER	EPDM, NBR, SBR
3. GLAND RING	CAST IRON	A-126 CLASS B
4. BOLTS	STEEL	A-307 GRADE B
5. NUTS	STEEL	A-307 GRADE B
6. WASHER	STEEL	A-307 GRADE B

NOTES:

1. ALL DIMENSION ARE IN MILLIMETER UNITS
2. MATERIAL IS CAST IRON CONFORM TO ASTM A-126 CLASS B
3. MATERIALS OF BOLTS NUTS & WASHER ARE STEEL CONFORM TO ASTM-307 GRADE B, ASTM A-563 RESPECTIVELY AND HOT DIP GALVANIZED AS PER ASTM A-153.
4. SPECIFICATION OF FLANGE CONFORMING TO AWWA STANDARDS
5. INTERIOR & EXTERIOR 100% FOOD GRADE EPOXY POWDER AS PER AWWA C-550
6. THIS DESIGN IS MANUFACTURER STANDARD
7. MECHANICAL JOINT SHALL COMPLY AND PASS PRESSURE TEST REQUIREMENT OF AWWA C-110 & AWWA C-111 OR ISO 2531
8. RUBBER SEALS SHALL CONFORM WITH ISO 4633, SUITABLE FOR DRINKING/CHLORINATED WATER

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

UNIVERSAL FLANGE ADAPTOR MJ/FE

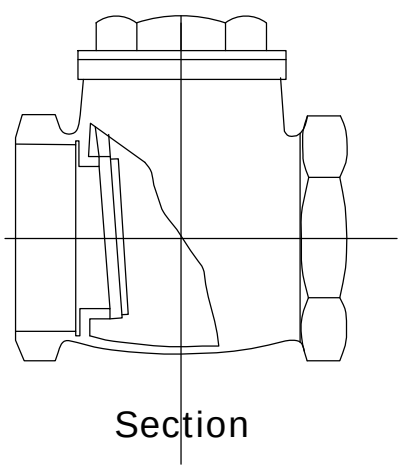
SCALE: N.T.S

BY: DESIGN UNIT

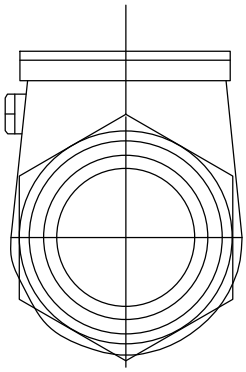
DATE: FEBRUARY 2021

DWG. NO.: 01

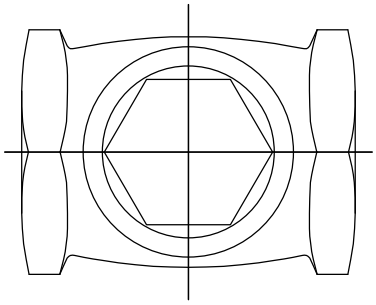
REVISIONS	
BY	DATE



Section



Side View



Top View

Size (in)	1/2	3/4	1	1 1/4	1 1/2	2	3
MINIMUM WEIGHT PER SET (kg.)	0.20	0.29	0.45	0.62	0.79	1.14	3.80
INLET THREAD DESIGNATION	1/2	3/4	1	1 1/4	1 1/2	2	3
OUTLET THREAD DESIGNATION	1/2	3/4	1	1 1/4	1 1/2	2	3

NOTES:

1. BRASS VALVES AND FITTING BODIES SHALL BE MANUFACTURED FROM COPPER ALLOY UNS No. C83600 IN ACCORDANCE WITH ASTM 584

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

BRASS CHECK VALVE
THREADED TYPE

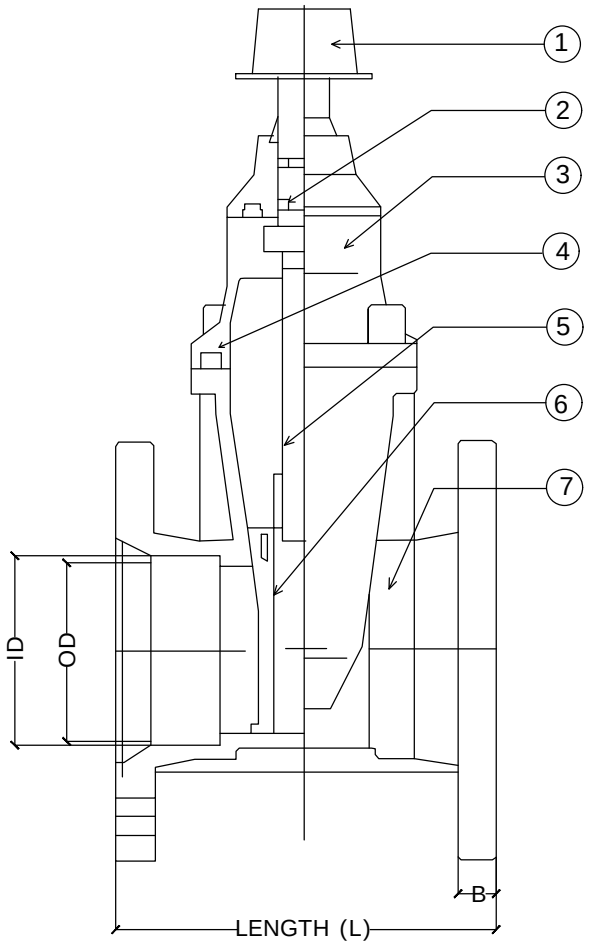
SCALE: N.T.S

BY: DESIGN UNIT

DATE: FEBRUARY 2021

DWG. NO.: 01

REVISIONS	
BY	DATE



COMPONENT

1. OPERATING NUT
2. O-RING
3. BONNET
4. GASKET BONNET
5. STEM
6. WEDGE
7. VALVE BODY

C.I GATE VALVE MECHANICAL JOINT TYPE

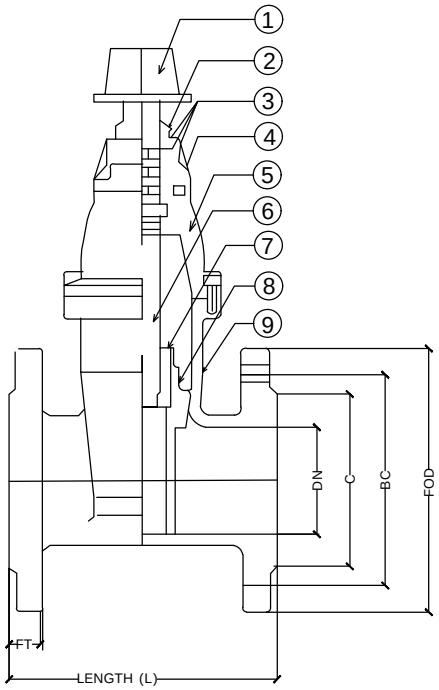
DN	OUTSIDE DIAMETER (OD)	INSIDE DIAMETER (ID)	LENGTH (L)	B
50	63	65	178	15.9
63	75	79	178	15.9
75	90	94	203	19.1
100	110	114	229	19.1
150	160	164	267	19.1
200	225	229	291	20.0
250	280	284	330	20.0

NOTES:

1. TECHNOLOGY CONDITION ON DESIGN AND MANUFACTURE IN CONFORMITY TO ANSI/AWWA C-509-1994.
2. RESILIENT SEATED WEDGE MADE OF DUCTILE IRON WITH ASTM A-536
3. 50mm SQUARE OPERATING NUT WITH ARROW MARK FOR OPENING DIRECTION.
4. COUNTERCLOCKWISE OPENING DIRECTION
5. RATED WORKING PRESSURE 16 BARS MINIMUM
6. COATING & LINING SHALL CONFORM TO AWWA C-550 ELECTROSTATICALLY APPLIED EPOXY POWDER OR EQUIVALENT.
7. GATE VALVE SHOULD BE NON-RISING STEM (NRS)

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		C.I GATE VALVE MECHANICAL TYPE	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01



NOTES:

1. TECHNOLOGY CONDITION ON DESIGN AND MANUFACTURE IN CONFORMITY TO ANSI/AWWA C-509-1994.
2. RESILIENT SEATED WEDGE MADE OF DUCTILE IRON WITH ASTM A-536 65-45-12 FULLY ENCAPSULATED WITH NBR/EPDM RUBBER COATED.
3. 50mm SQUARE OPERATING NUT WITH ARROW MARK FOR OPENING DIRECTION.
4. COUNTERCLOCKWISE OPENING DIRECTION
5. RATED WORKING PRESSURE 16 BARS MINIMUM
6. COATING & LINING SHALL CONFORM TO AWWA C-550 ELECTROSTATICALLY APPLIED EPOXY POWDER OR EQUIVALENT.
7. GATE VALVE SHOULD BE NON-RISING STEM (NRS)

PARTS:	MATERIALS	ASTM:
1. OPERATING NUT	CAST IRON	A-126 CLASS B
2. SPLASH MOTE SEAT RING	RUBBER	NBR
3. O-RING (3)	RUBBER	NBR
4. O-RING	RUBBER	NBR
5. BONNET	CAST IRON	A-126 CLASS B
6. STEM (COLD ROLLED THREAD)	STAINLESS STEEL	ANSI 420
7. STEM NUT	BRONZE	B62 C83600
8. WEDGE	DUCTILE IRON ENCAPSULATED	A-536 W/ NBR/EPDM COATED
9. VALVE BODY	CAST IRON	A-126 CLASS B

DN	LENGTH (L)	D DIA.	C	FOD	BC	NO. OF BOLT	BOLT SIZE DIA	BOLT HOLE DIA
50	178	20	100	152.4	120.6	4	16	19
75	203	24	132	190.5	152.4	4	16	19
100	229	24	156	228.6	190.4	8	16	19
150	267	28	211	279.4	241.0	8	20	23
200	292	32	266	342.9	298.4	8	20	23
250	330	36	319	406.4	362.0	12	22	25
300	356	42	370	482.6	431.8	12	22	25

GATE VALVE FLANGE TYPE
RESILIENT SEATED WEDGE TYPE
AWWA C-509

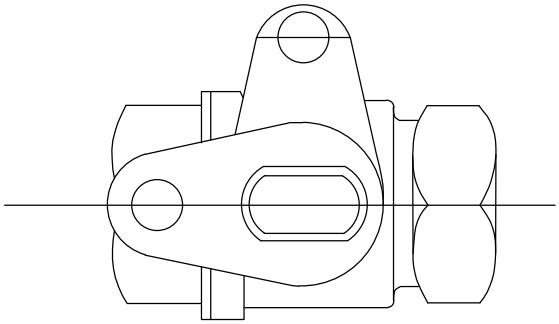
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

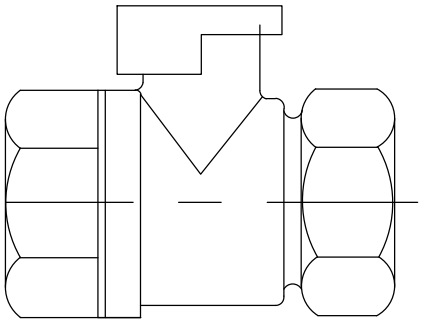
GATE VALVE FLANGE TYPE RESILIENT WEDGE TYPE

SCALE: N.T.S | BY: DESIGN UNIT | DATE: FEBRUARY 2021 | DWG. NO.: 01

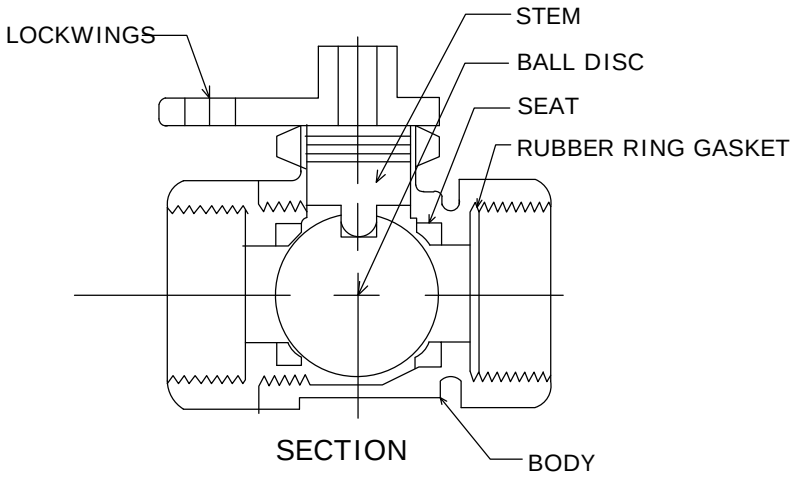
REVISIONS	
BY	DATE



TOP VIEW



FRONT VIEW



SECTION

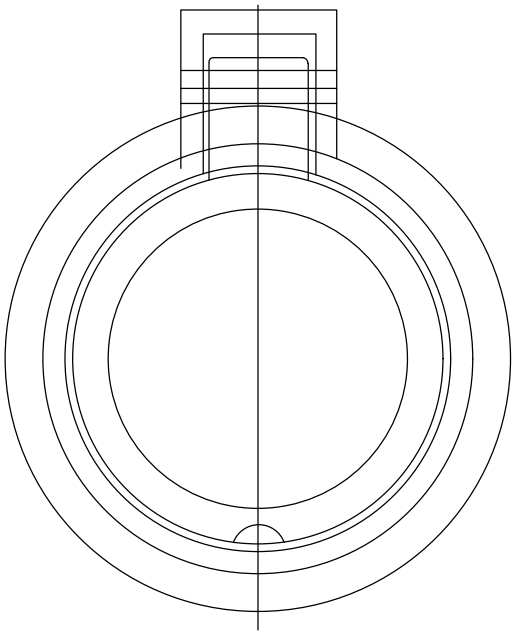
NOTES:

1. BRASS VALVES AND FITTINGS BODIES SHALL BE MANUFACTURED FROM COPPER ALLOY UNS No. C83600 IN ACCORDANCE WITH ASTM 584
2. LOCKWING SHALL OPEN TO COUNTERCLOCKWISE TURN
3. LOCKWING SHALL HAVE AT LEAST 8mm DIAMETER PADLOCK HOLES .
4. WHEN FULLY OPENED ANGLE VALVE SHALL HAVE A CIRCULAR UNOBSTRUCTED WAY

SIZE (IN)	1/2	3/4	1	1-1/2	2

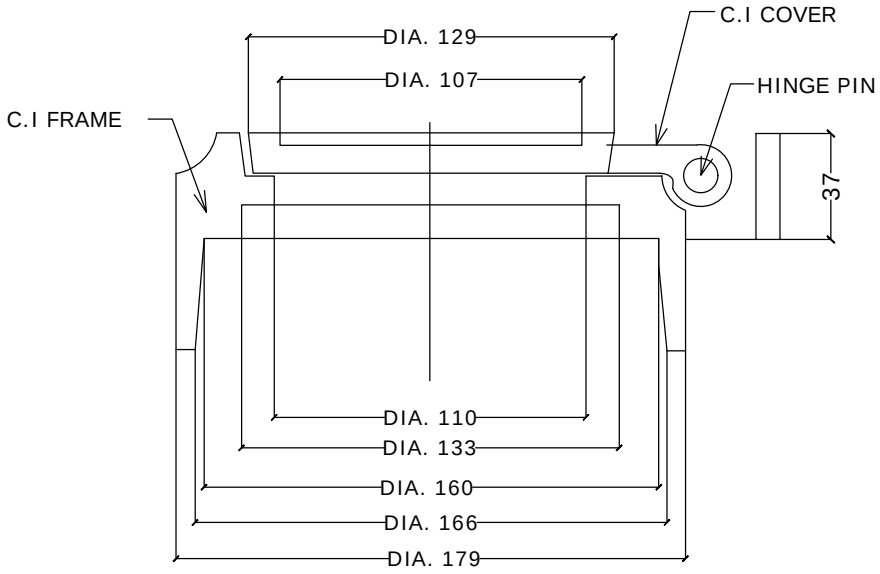
TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		BRASS BALL VALVE WITH LOCKWING	REVISIONS BY / DATE
SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01



TOP VIEW

C.I VALVE BOX COVER 150mm



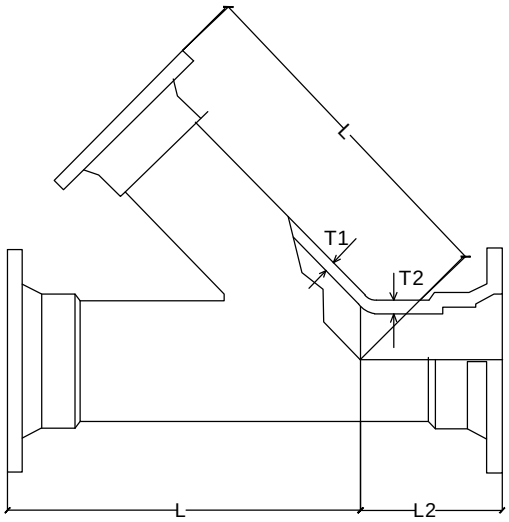
Section
Frame & Cover

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETER UNITS
2. MATERIAL IS CAST IRON CONFORMING TO ASTM A-126 CLASS B
3. COATING FINISH: BITUMINOUS COALTAR ENAMEL

TECHNICAL STANDARD DETAILS

	PLANNING AND DESIGN DIVISION OF METRO KIDAPAWAN WATER DISTRICT		C.I VALVE BOX COVER 150mm	REVISIONS BY / DATE
	SCALE: N.T.S	BY: DESIGN UNIT	DATE: FEBRUARY 2021	DWG. NO.: 01



C.I WYE MECHANICAL TYPE

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETER UNITS
2. MATERIAL IS CAST IRON CONFORMING TO ASTM A-126 CLASS B
3. MATERIAL OF BOLTS & NUTS IS STEEL CONFORM TO ASTM A-307 GRADE B.AND HOT DIP GALVANIZED AS PER ASTM A-153.
4. COATING IS BITUMINOUS COALTAR ENAMEL50 MICRONS THICK. FITTING SHALL BE LINED WITH CEMENT MORTAL CONFORMING TO AWWA C-104.
5. GASKET MATERIAL SHALL BE SBR, NBR, OR EPDM CONFORMING TO ISO 4633 CLASS 70, AND SUITABLE FOR DRINKING WATER.
6. THIS DESIGN IS POLYGON TYPE

NOMINAL SIZE		BODY LENGTH		BODY THICKNESS	
RUN	BRANCH	(L)	L2	T1	T2
50	50	230	95	7	7
75	75	254	76.2	7	7
100	50	265	140	7.2	7
100	75	370	140	7.2	7
100	100	370	140	7.2	7.2
150	75	406	153.4	7.8	7
150	100	406	152.4	7.8	7.2
150	150	406	152.4	7.8	7.8
200	75	445	163.5	8.4	7
200	100	445	163.5	8.4	7.2
200	150	445	163.5	8.4	7.8
200	200	518.5	187.5	8.4	8.4
250	75	518.5	187.5	9	7
250	100	518.5	187.5	9	7.2
250	150	518.5	187.5	9	7.8
250	200	585	187.5	9	8.4
250	250	585	187.5	9	9
300	75	585	187.5	9.6	7
300	100	585	187.5	9.6	7.2
300	150	585	187.5	9.6	7.8
300	200	585	187.5	9.6	8.4
300	250	635	203.2	9.6	9
300	300	635	203.2	9.6	9.6

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

C.I WYE MECHANICAL TYPE

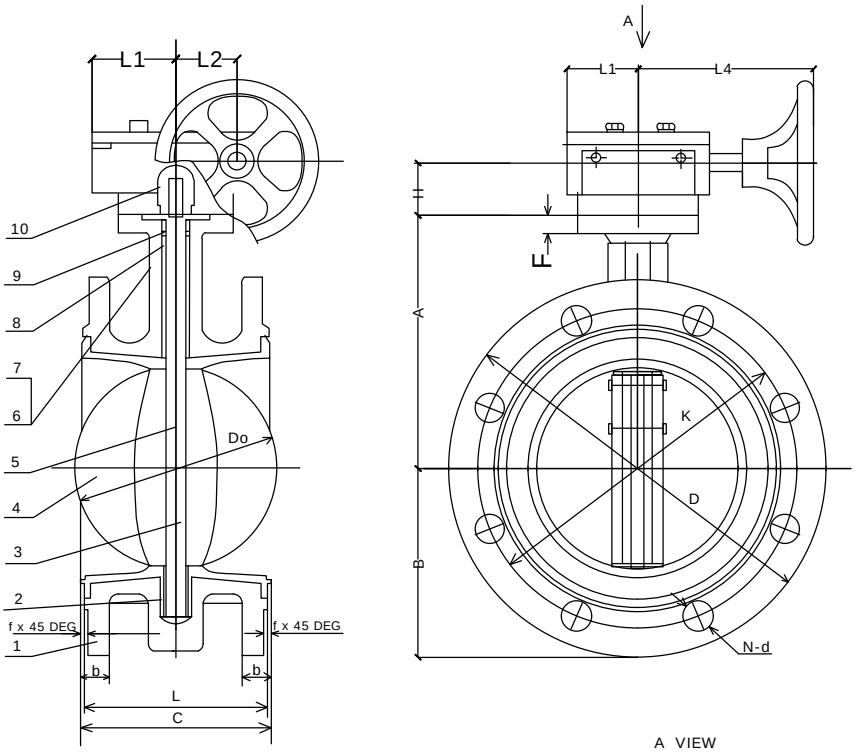
SCALE: N.T.S

BY: DESIGN UNIT

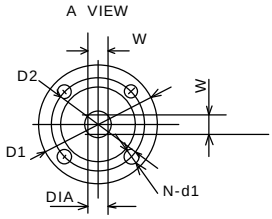
DATE: FEBRUARY 2021

DWG. NO.: 01

REVISIONS	
BY	DATE



REV	DESCRIPTION	DESIGN	CHECK	APPR	DATE
SHELL TEST 2.4 MPA	SEAT TEST (Hyd) 1.76 MPA	SEAT TEST(Air)			
STANDARD AND TECHNICAL	DESIGN API 609				
FACE TO FACE EN 558-1	END FLANGE ANSI B16.5				
TOP FLANGE ISO 5211	INSPECTION AND TEST EN12266				



NO.	PART NAME	QTY	MATERIALS
1	BODY	1	DI+EPDM
2	KONG BUSHING	2	LUBRICATING BRONZE
3	STEM	1	SS420
4	DISC	1	DI
5	TAPER PIN	1-2	SS420
6	RIVET	2	L3
7	TAG	1	SS304
8	SHORT BUSHING	2	LUBRICATING BRONZE
9	O-RING	1	NBR

SIZE	A	B	H	D	K	N-d	Do	d	L	C	b	f	D1	D2	N-d1	F	DIA.	W	L1	L2	L3	L4
DN50(2")	120	80	40	152.4	120.6	4-19	52.6	89	108	111	19	3	65	50	4-7	13	12.6	9	53	45	53	155
DN65(2.5")	130	89	40	177.8	139.7	4-19	64.3	106	112	115	19	3	65	50	4-7	13	12.6	9	53	45	53	155
DN80(3")	145	95	40	190.5	152.4	4-19	78.8	120	114	117	19	3	65	50	4-7	13	12.6	9	53	45	53	155
DN100(4")	155	114	40	228.6	190.5	8-19	104	144	127	130	19	3	90	70	4-10	13	15.77	11	53	45	53	155
DN125(5")	170	125	40	254	215.9	8-22.4	123.3	170	140	143	19	3	90	70	4-10	13	18.92	14	53	45	53	155
DN150(6")	190	139	40	279.4	241.3	8-22.4	155.7	197	140	155	19	3	90	70	4-10	13	18.92	14	53	45	53	155
DN200(8")	205	170	40	342.9	298.5	8-22.4	202.4	252	152	168	20	3	125	102	4-12	13	22.1	17	76	63	76	237
DN250(10")	235	198	40	406.4	361.9	12-25.4	250.4	305	165		22	3	125	102	4-12	13	28.54	22	76	63	76	237

TECHNICAL STANDARD DETAILS

PLANNING AND DESIGN DIVISION
OF METRO KIDAPAWAN WATER DISTRICT

BUTTERFLY VALVE FLANGE
TYPE 50MM TO 250MM

SCALE: N.T.S

BY: DESIGN UNIT

DATE: FEBRUARY 2021

DWG. NO.: 01

REVISIONS	
BY	DATE