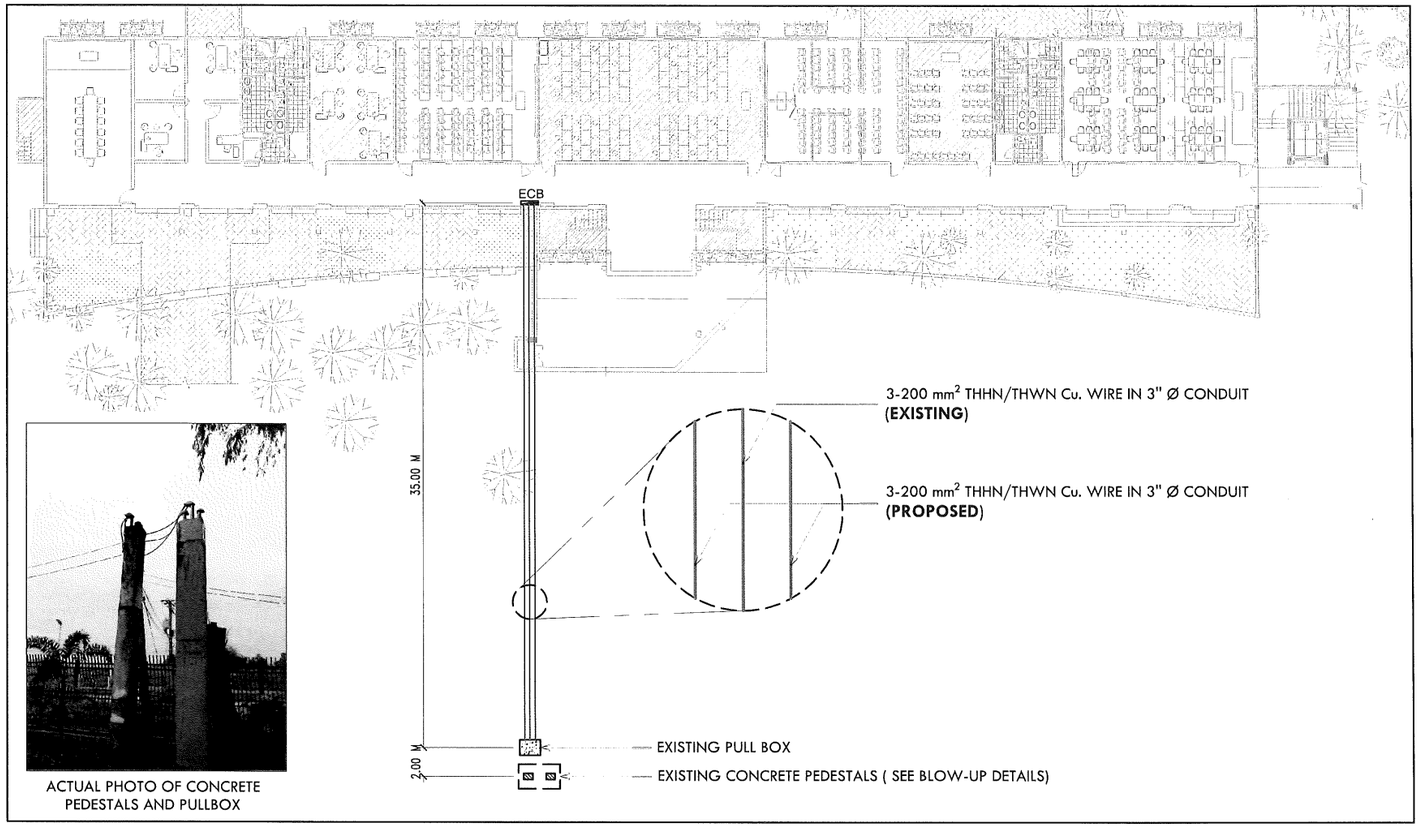


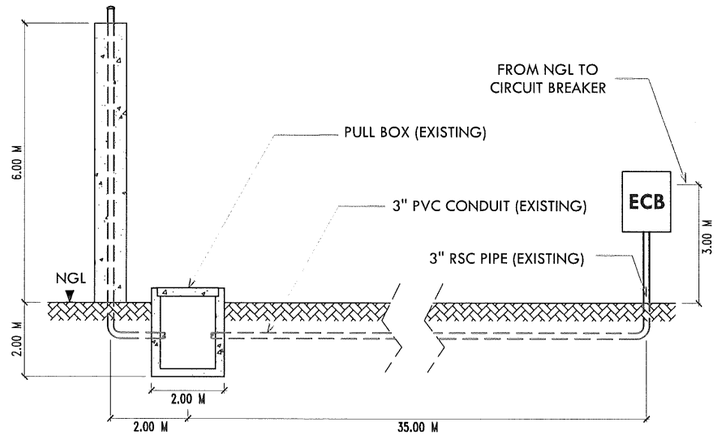
ACTUAL PHOTO OF CONCRETE PEDESTALS AND PULLBOX

GENERAL NOTES AND SPECIFICATIONS

1. ALL ELECTRICAL INSTALLATION HEREIN SHALL BE DONE IN ACCORDANCE WITH PROVISIONS OF THE LATEST EDITION OF PHILIPPINE ELECTRICAL CODE WITH THE RULES AND REGULATIONS OF THE NATIONAL AND LOCAL AUTHORITIES CONCERNED IN THE ENFORCEMENT OF ELECTRICAL LAWS AND ORDINANCES AND WITH THE REQUIREMENTS OF THE POWER COMPANY CONCERNED.
2. ALL ELECTRICAL WORKS HEREIN SHALL BE EXECUTED BY EXPERIENCED MEN UNDER THE SUPERVISION OF A DULY LICENSED REGISTERED ELECTRICAL ENGINEER OR PROFESSIONAL ELECTRICAL ENGINEER.
3. MATERIALS THAT PROVIDES SUPPORT, ADDED SAFETY, AND ACCESS, SUCH AS PULL BOXES, JUNCTION BOXES, BENDS AND OTHER FITTINGS SHALL BE PROVIDED EVEN IF NOT EXPLICITLY STATED IN THE PLAN.
4. THE ELECTRICAL SERVICE ENTRANCE POWER FOR THE BUILDING SHALL BE 230V, THREE PHASE, 3-WIRE + GROUND, 60 HZ.
5. WIRES SHALL BE COLOR CODED AS FOLLOWS:
   LINE 1 --- RED LINE 2 --- YELLOW LINE 3 --- BLUE GROUND --- GREEN
6. WIRING METHOD SHALL BE AS FOLLOWS:
   a. FOR EMBEDDED PIPE -POLYVINYL CHLORIDE CONDUIT SCHEDULE 40 (PVC SCH 40)
   b. FOR RUN EXPOSED PIPE -ELECTRICAL METALLIC TUBING CONDUIT (EMT)
7. ALL MATERIALS TO BE USED SHALL BE BRAND NEW AND APPROVED TYPE FOR THE PARTICULAR LOCATION AND PURPOSE OF USAGE.
8. ALL WIRES SHALL BE COPPER AND THERMOPLASTIC INSULATED TYPE "THHN" UNLESS OTHERWISE INDICATED IN THE PLAN. THE MINIMUM
   SIZE OF WIRE FOR POWER AND LIGHTING CIRCUIT SHALL BE 3.5mm.
9. GROUNDING SYSTEM SHALL BE PROVIDED TO ALL EQUIPMENT PANEL BOARD AND NON-CURRENT CARRYING METAL IN ACCORDANCE WITH THE PHILIPPINE ELECTRICAL CODE REQUIREMENT.
10. MOUNTING HEIGHTS SHALL BE AS FOLLOWS:
    a. LIGHTING SWITCHES -1.4m ABOVE THE FINISHED FLOOR
    b. CONVENIENCE OUTLET -0.3m ABOVE THE FINISHED FLOOR
    c. PANEL BOARD -1.8m ABOVE THE FINISHED FLOOR
    d. AIR-CONDITIONER OUTDOOR BREAKER -AT CONVENIENT HEIGHT NEAR EQUIPMENT
11. ANY DISCREPANCY IN LOCATION AND RATING OF ELECTRICAL EQUIPMENT SHALL BE VERIFIED WITH THE OWNER AND CHANGES SHALL BE MADE ACCORDINGLY.
12. PROVIDE LABEL OF CIRCUIT BREAKERS ON EACH PANEL BOARD.

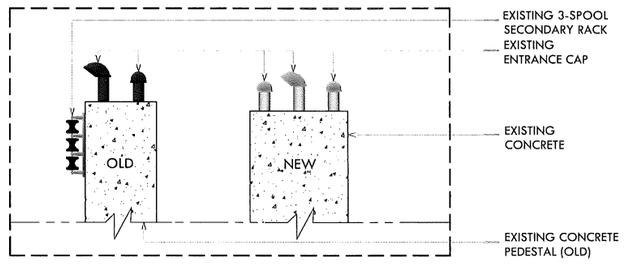
CAFA BUILDING MAIN FEEDER LINE LAYOUT

SCALE: 1:400 MTS



EXISTING CONCRETE PEDESTAL TO ECB DETAIL

SCALE: NTS



BLOW-UP OF EXISTING CONCRETE PEDESTALS

SCALE: NTS

NOTES:

1. OLD SET OF MAIN FEEDER LINE FROM THE EXISTING OLD CONCRETE PEDESTAL WILL BE PULLED OUT.

   COLOR CODING OF OLD MAIN FEEDER LINE:
   LINE 1 - BLACK LINE 2 - BLACK LINE 3 - BLACK
2. NEW SET OF MAIN FEEDER LINE WILL BE INSTALLED AT THE EXISTING NEW CONCRETE PEDESTAL TO PANEL ECB.

   COLOR CODING OF NEW MAIN FEEDER LINE:
   LINE 1 - RED LINE 2 - YELLOW LINE 3 - BLUE
3. 2 SETS OF 3-200 mm² THHN/THWN Cu. WIRE WILL BE USED IN THE MAIN FEEDER LINE, THE SET OF WIRE IN THE OLD CONCRETE PEDESTAL WILL BE PULLED OUT AND THE NEW SET OF WIRE WILL BE INSTALLED AT THE NEW CONCRETE PEDESTAL.
4. USE PVC WATERPROOF SEALANT WHEN JOINING PVC PIPES.
5. FOR THE INFORMATION ON THE APPROPRIATE WIRE SIZE TO BE USED, REFER TO CODE OF WIRES.

TARLAC STATE UNIVERSITY
Facilities Development and Management Office
Romulo Boulevard, Tarlac City, Philippines 2300

PROJECT TITLE: UPGRADING OF ELECTRICAL SYSTEM AT COLLEGE OF ARCHITECTURE AND FINE ARTS BUILDING	PROFESSIONAL ELECTRICAL ENGINEER: ENGR. NATHANIEL S. ACOSTA	PRC NO : 0003768 VALIDITY: 02-20-2024 PTR NO : 05269813 DATE ISSUED: 01-03-23 ISSUED AT : TARLAC CITY TIN : 248-470-077	OWNER: DR. ARNOLD E. VELASCO
PROJECT LOCATION: SAN ISIDRO EXTENSION CAMPUS, TARLAC STATE UNIVERSITY			SHEET CONTENTS: AS SHOWN DATE: OCTOBER , 2023

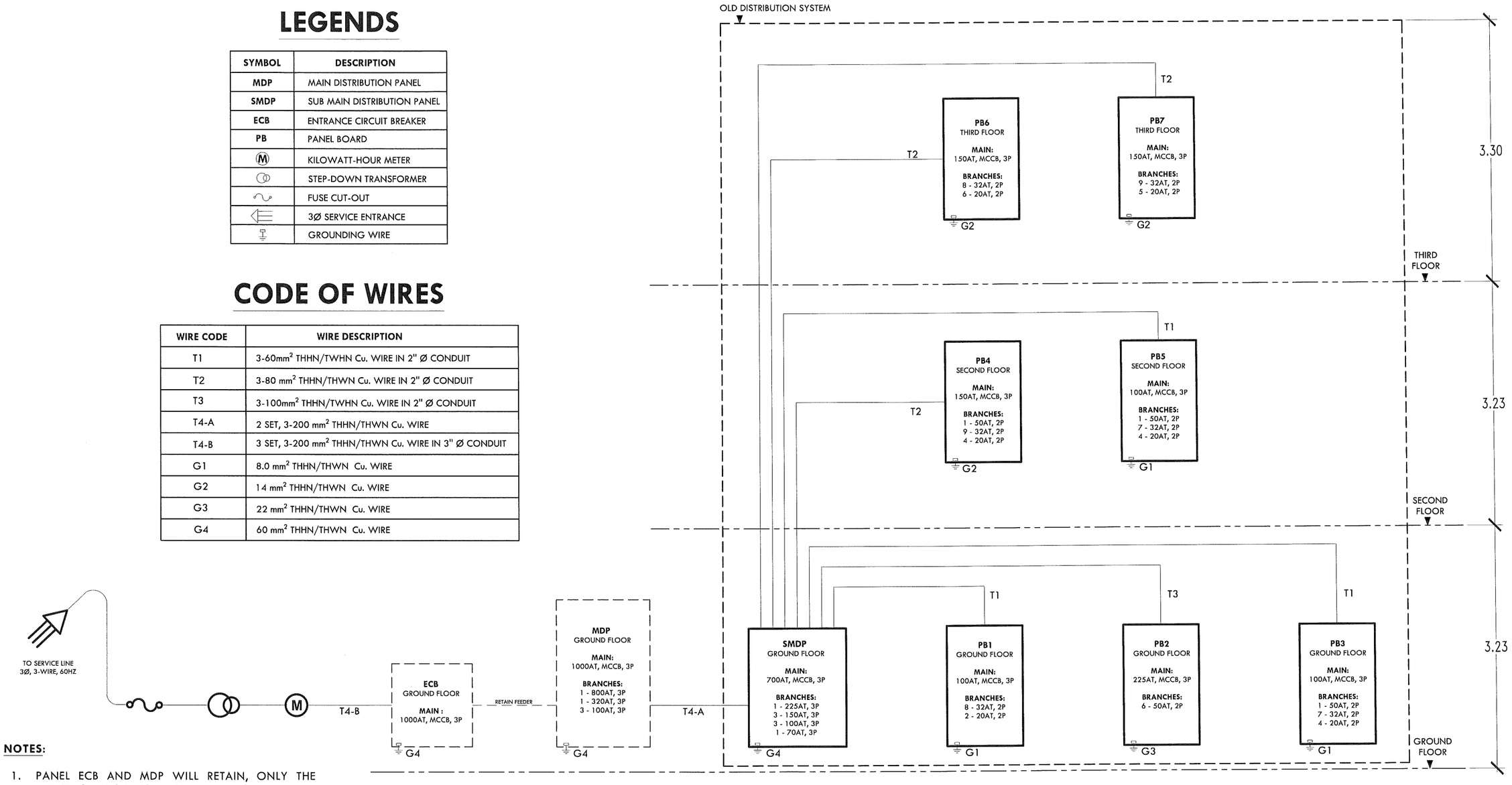
SHEET NO: E-01
PAGE NO: 1/5

LEGENDS

SYMBOL	DESCRIPTION
MDP	MAIN DISTRIBUTION PANEL
SMDP	SUB MAIN DISTRIBUTION PANEL
ECB	ENTRANCE CIRCUIT BREAKER
PB	PANEL BOARD
Ⓜ	KILOWATT-HOUR METER
	STEP-DOWN TRANSFORMER
	FUSE CUT-OUT
	3Ø SERVICE ENTRANCE
	GROUNDING WIRE

CODE OF WIRES

WIRE CODE	WIRE DESCRIPTION
T1	3-60mm^2 THHN/TWHN Cu. WIRE IN 2" Ø CONDUIT
T2	3-80 mm^2 THHN/THWN Cu. WIRE IN 2" Ø CONDUIT
T3	3-100mm^2 THHN/TWHN Cu. WIRE IN 2" Ø CONDUIT
T4-A	2 SET, 3-200 mm^2 THHN/THWN Cu. WIRE
T4-B	3 SET, 3-200 mm^2 THHN/THWN Cu. WIRE IN 3" Ø CONDUIT
G1	8.0 mm^2 THHN/THWN Cu. WIRE
G2	14 mm^2 THHN/THWN Cu. WIRE
G3	22 mm^2 THHN/THWN Cu. WIRE
G4	60 mm^2 THHN/THWN Cu. WIRE



NOTES:

1. PANEL ECB AND MDP WILL RETAIN, ONLY THE FEEDER OF EACH PANEL WILL BE REPLACED.
2. FOR THE INFORMATION ON THE APPROPRIATE WIRE SIZE TO BE USED, REFER TO CODE OF WIRES.

RISER DIAGRAM LAYOUT

SCALE: NTS

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UPGRADING OF ELECTRICAL SYSTEM AT COLLEGE OF ARCHITECTURE AND FINE ARTS BUILDING

PROJECT LOCATION:
SAN ISIDRO EXTENSION CAMPUS, TARLAC STATE UNIVERSITY

PROFESSIONAL ELECTRICAL ENGINEER:
ENGR. NATHANIEL S. ACOSTA

PRC NO : 0003768 VALIDITY: 02-20-2024
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ISSUED AT : TARLAC CITY TIN : 248-470-077

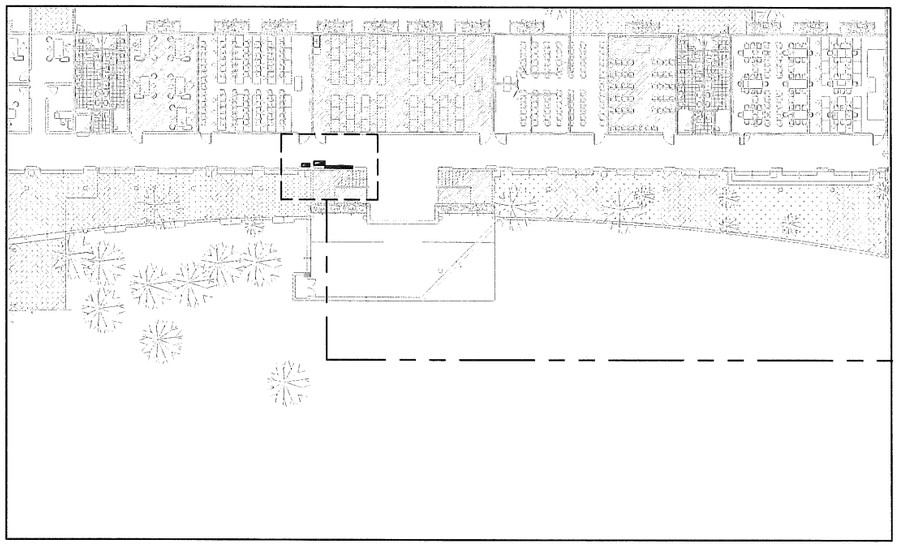
OWNER:
DR. ARNOLD E. VELASCO

SHEET CONTENTS:
AS SHOWN

DATE: OCTOBER , 2023

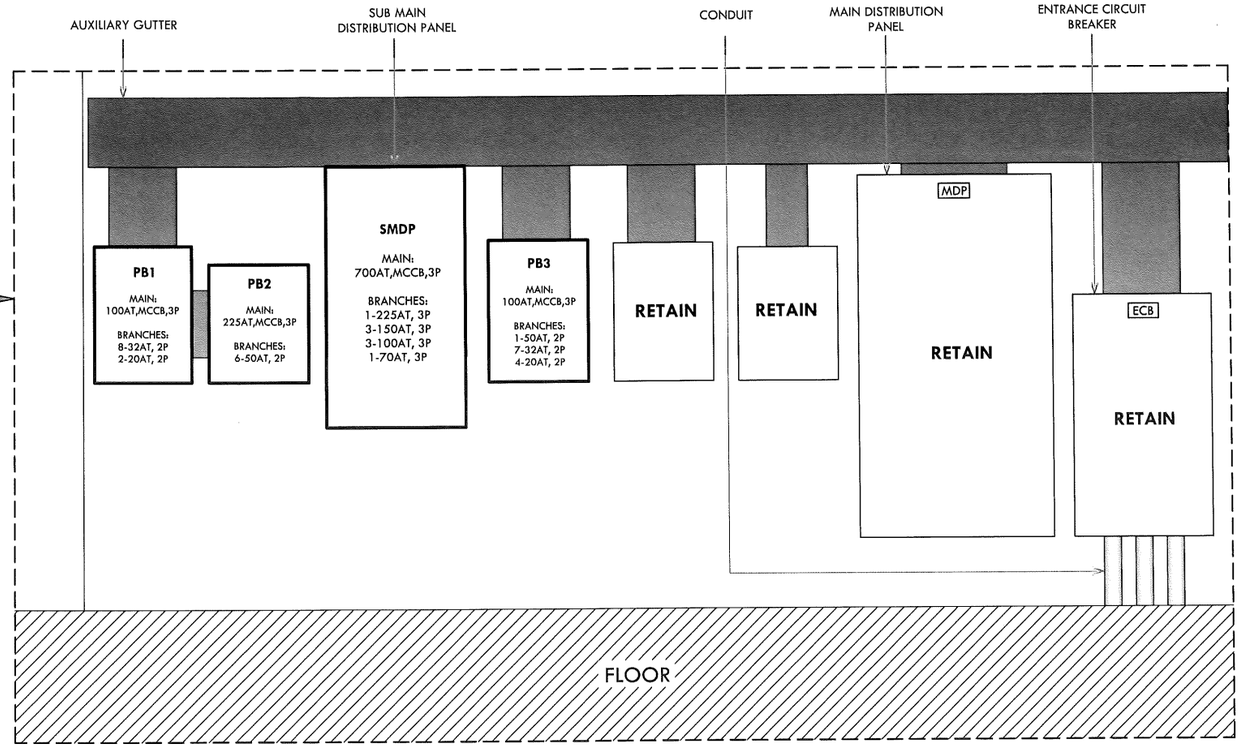
SHEET NO:
E - 02

PAGE NO:
2/5



CAFA BUILDING GROUND FLOOR

SCALE 1:400 MTS



BLOW-UP OF GROUND FLOOR PANEL BOARDS

SCALE: NTS

NOTES:

1. PB1, PB2, PB3, PB4, PB5, PB6, PB7 AND SMDP WILL BE REPLACED WITH NEW SET OF PANEL BOARDS INCLUDING CIRCUIT BREAKERS.
2. REWIRING OF FEEDER LINES WILL BE DONE ON PANEL BOARDS THAT WILL BE REPLACED.
3. FOR INFORMATION ON THE APPROPRIATE WIRE SIZE TO BE USED ON EACH PANEL BOARD, REFER TO CODE OF WIRES.

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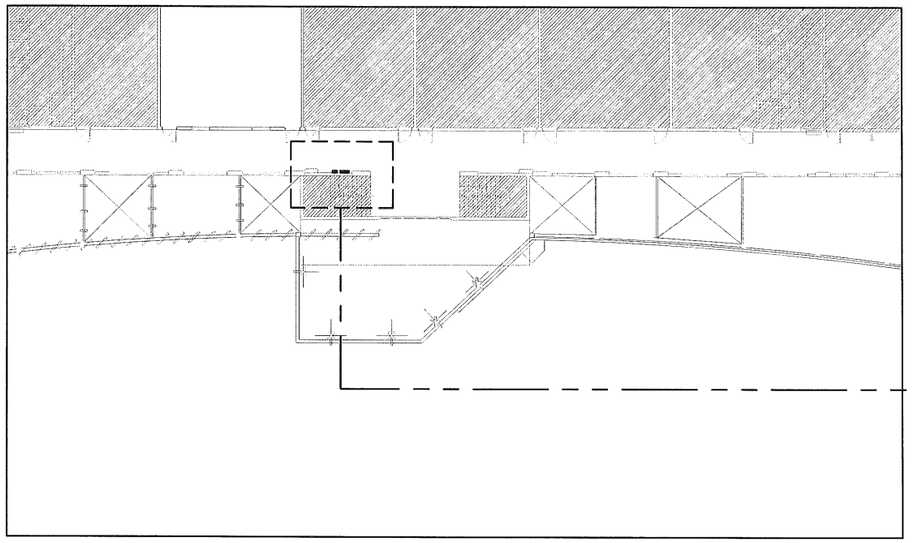
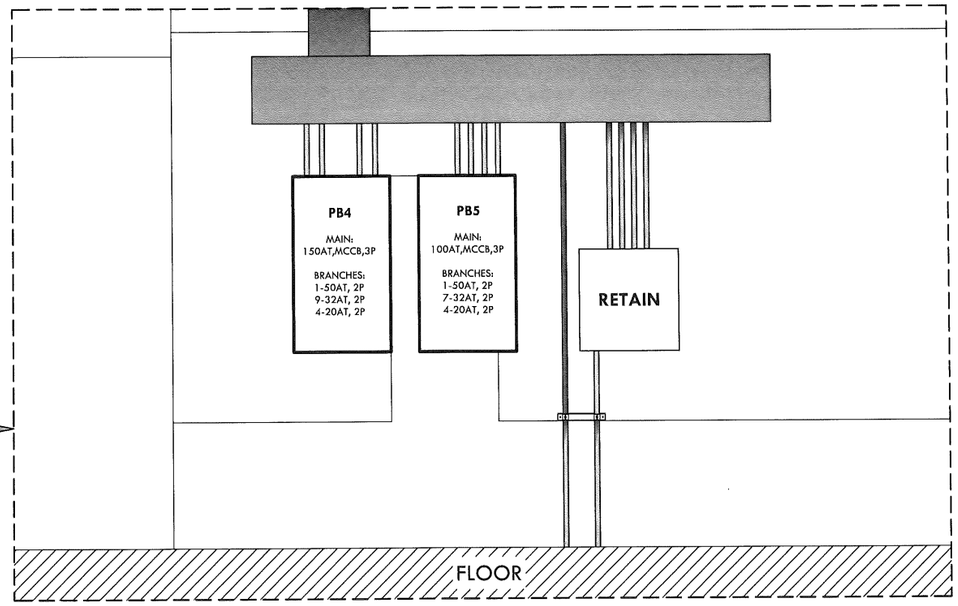
		ISSUED AT : TARLAC CITY	TIN : 248-470-077		DATE: OCTOBER , 2023 PAGE NO: 3/5



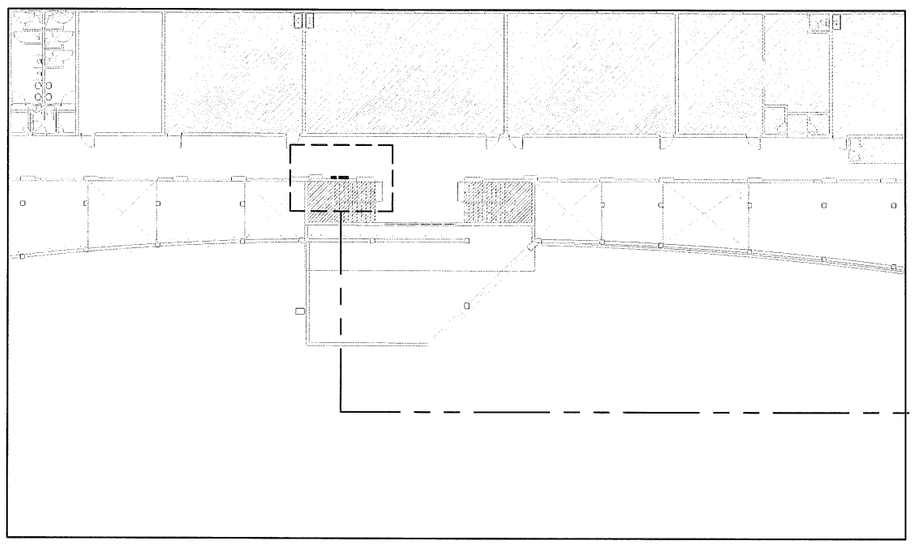
CAFA BUILDING SECOND FLOOR

SCALE: 1:400 MTS



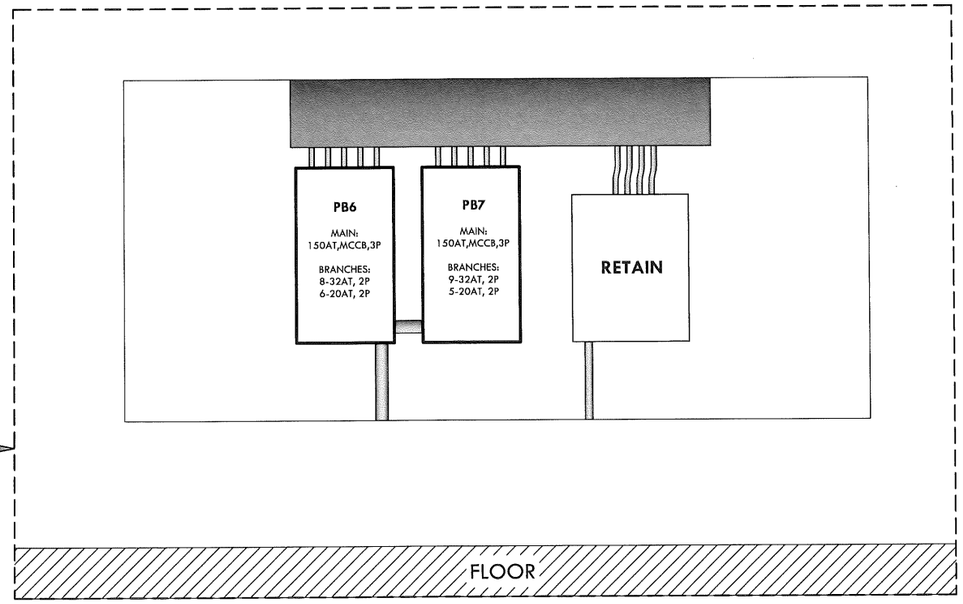
BLOW-UP OF SECOND FLOOR PANEL BOARDS

SCALE: NTS



CAFA BUILDING THIRD FLOOR

SCALE: 1:400 MTS



BLOW-UP OF THIRD FLOOR PANEL BOARDS

SCALE: NTS

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					DATE: OCTOBER , 2023

VOLTAGE DROP CALCULATION

MDP LOADS

CIRCUIT NO.	DESCRIPTION	VOLT-AMPERE			V	A	CIRCUIT BREAKER
		AB	BC	CA			
1	DP1	10639	11590	8822	230	75.71	100AT, 3P
2	DP2	7513	8219	6780	230	49.51	100AT, 3P
3	DP3	6505	7548	6316	230	52.73	100AT, 3P
4	SMDP	78535	77982	64751	230	473.13	700AT, 3P
5	SPARE, 3P						
		103192	105339	87085			

I_{FL} = 1.732x(105,339/230)x0.8DF
I_{FL} = **634.6 A**

- VOLTAGE DROP @ ENTRANCE CIRCUIT BREAKER (ECB)

  3 SET OF 3-200 mm² THHN/THWN Cu. WIRE IN A 3" PVC CONDUIT
  DISTANCE: 40m / EFFECTIVE Z AT 0.85 PF: 0.049 / I_{LOAD}: 560A

  VD = (1.732)(40)(634.6)(0.049/305) / (3)
  VD = 2.3544 V ~ **1.0237%**

- VOLTAGE DROP @ FARTHEST ACU

  ECB > MDP
  VD = (1.732)(5)(634.6)(0.049/305) / (2)
  VD = 0.4414 V ~ **0.1919%**

  MDP > SMDP
  VD = (1.732)(5)(634.6)(0.049/305) / (2)
  VD = 0.4414 V ~ **0.1919%**

  SMDP > PB6
  VD = (1.732)(10)(120)(0.088/305)
  VD = 0.600 V ~ **0.261%**

  PB6 > PB @ ROOM
  VD = (2)(40)(25.6)(0.69/305)
  VD = 4.633 V ~ **2.014%**

  PB @ ROOM > 2HP ACU
  VD = (2)(5)(12)(1.7/305)
  VD = 0.669 V ~ **0.291%**

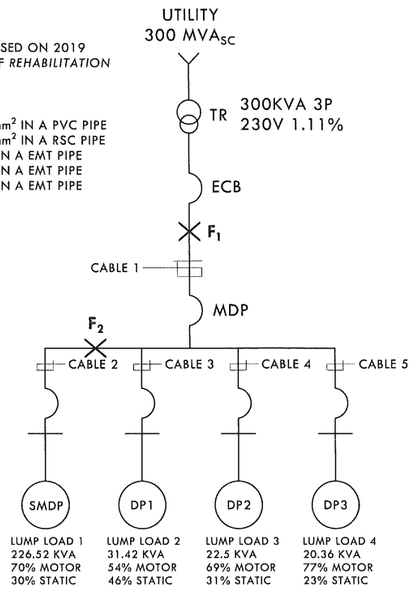
  TOTAL VD AT THE FARTHEST ACU
  VD = 0.1919+0.1919+0.261+2.014+0.291
  VD = **2.9498%**

- TOTAL %VD AT MAIN = **1.0237%**
- TOTAL %VD AT BRANCH = **2.9498%**
- TOTAL %VD OF SYSTEM = **3.9735%**

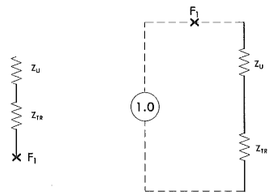
SHORT CIRCUIT CALCULATION

NOTE: DATA ARE BASED ON 2019 ELECTRICAL PLAN OF *REHABILITATION OF CAFA BUILDING.*

CABLE 1: 3x3-200mm² IN A PVC PIPE
CABLE 2: 2x3-200mm² IN A RSC PIPE
CABLE 3: 3-30mm² IN A EMT PIPE
CABLE 4: 3-22mm² IN A EMT PIPE
CABLE 5: 3-22mm² IN A EMT PIPE



•• FOR FAULT 1



- FOR UTILITY IMPEDANCE, Z_U
  $Z_U = KVA_{TR} / KVA_{UTILITY}$
  $Z_U = 300 / 3000000$
  Z_U = **0.001 PU**

- FOR TRANSFORMER IMPEDANCE
  $Z_{TR} = \%Z_{TR} / 100$
  $Z_{TR} = 4.8 / 100$
  Z_{TR} = **0.048 PU**

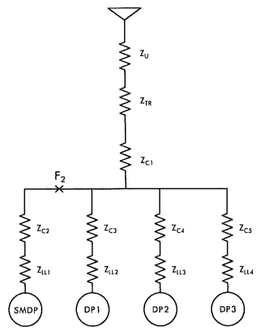
  $Z_{TOTAL} = 0.001+0.048$
  Z_{TOTAL} = **0.049 PU**

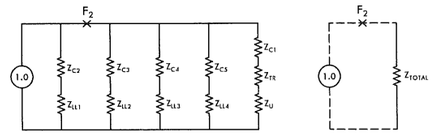
- **FOR I_{F1}**

  $I_F = (1.0 / Z_{TOTAL}) \times (KVA_{TR} \times 1000/1.732 \times 230)$
  $I_F = (1.0 / 0.049) \times (300x1000/1.732x230)$
  I_F = 15,368.68 A ~ **15.368 KAIC (USE 22 KAIC)**

•• FOR FAULT 2

IMPEDANCE DIAGRAM





- FOR UTILITY IMPEDANCE, Z_U
  $Z_U = KVA_{TR} / KVA_{UTILITY}$
  $Z_U = 300 / 3000000$
  Z_U = **0.001 PU**

- FOR TRANSFORMER IMPEDANCE
  $Z_{TR} = \%Z_{TR} / 100$
  $Z_{TR} = 4.8 / 100$
  Z_{TR} = **0.048 PU**

- FOR Z_{C1}
  $Z = SQRT(0.035^2+0.049^2)x40 / 305x3$
  $Z = 0.002632$ OHMS

  $Z_{C1} = Z_{OHMIC} \times KVA_B / KV^2x1000$
  $Z_{C1} = 0.002632x300 / 0.230^2x1000$
  Z_{C1} = **0.01492 PU**

- FOR Z_{C2}
  $Z = SQRT(0.049^2+0.035^2)x5 / 305x2$
  $Z = 0.0004935$

  $Z_{C2} = 0.0004935x300 / 0.230^2x1000$
  Z_{C2} = **0.0280 PU**

- FOR Z_{C3}
  $Z = SQRT(0.20^2+0.057^2)x5 / 305$
  $Z = 0.00341$ OHMS

  $Z_{C3} = 0.00341x300 / 0.230^2x1000$
  Z_{C3} = **0.01933 PU**

- FOR Z_{C4}
  $Z = SQRT(0.031^2+0.06^2)x300 / 305$
  $Z = 0.002214$ OHMS

  $Z_{C4} = 0.002214x300 / 0.230^2x1000$
  Z_{C4} = **0.01256 PU**

- FOR Z_{C5}
  $Z = SQRT(0.031^2+0.06^2)x15 / 305$
  $Z = 0.003321$ OHMS

  $Z_{C5} = 0.003321x300 / 0.230^2x1000$
  Z_{C5} = **0.01883 PU**

- FOR Z_{LL1}
  $Z_{LL1} = 0.278 \times KVA_{TR} / KVA_{LOAD} \times \%MOTOR$
  $Z_{LL1} = 0.278 \times 300 / 226.52 \times 0.7$
  Z_{LL1} = **0.526 PU**

- FOR Z_{LL2}
  $Z_{LL2} = 0.278 \times 300 / 31.42 \times 0.54$
  Z_{LL2} = **4.915 PU**

- FOR Z_{LL3}
  $Z_{LL3} = 0.278 \times 300 / 22.5 \times 0.69$
  Z_{LL3} = **5.372 PU**

- FOR Z_{LL4}
  $Z_{LL4} = 0.278 \times 300 / 20.36 \times 0.77$
  Z_{LL4} = **5.320 PU**

Z_{TOTAL} = **0.05548 PU**

- **FOR I_{F2}**

  $I_{SC(SYM)} = (1.0/Z_{TOTAL}) \times ((KVA_{TR} \times 1000)/1.732x230))$
  $I_{SC(SYM)} = (1.0/0.025387) \times ((300x1000)/1.732x230))$
  $I_{SC(SYM)}$ = 13,574.23 A ~ **13.574 KAIC (USE 22 KAIC)**

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SHEET NO:	E -05
PAGE NO:	5/5