



INTERNSHIP REPORT

ON

BBT AND CABLE INSTALLATIONS

By

Asiful Amin  
Id-2005-2-80-031

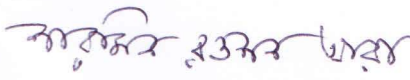
Submitted to the

Department of Electrical and Electronic Engineering  
Faculty of Sciences and Engineering  
East West University

In partial fulfillment of the requirements for the degree of  
Bachelor of Science in Electrical and Electronic Engineering  
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Approved By

  
Academic Advisor <sup>2.2.2010</sup>

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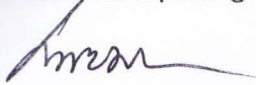
## TO WHOM IT MAY CONCERN

Date: 15<sup>th</sup> July, 2009

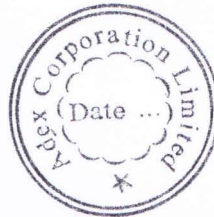
This is to certify that Asiful Amin, ID- 2005-2-80-031, East West University served from 6<sup>th</sup> May, 2009 to 30<sup>th</sup> June, 2009 in GrameenPhone Corporate Headquarters Project under the Electrical Contractor of the project **Adex Corporaion Ltd** as the "Field Engineer" on behalf of Technological Aid Ltd. which is a subcontractor of our reputed organization.

His responsibility is to ensure quality and monitoring of progress of work, supervision of Electrical Wiring, BBT installation, and checking the work as per drawing of Electrical Systems of GrameenPhone Corporate Headquarters Project, Bashundhara R/A Dhaka and making report of the daily works.

His work and reporting was supervised by me.



Mohiuddin Ahmed Sarker  
Engineer  
Planning, Scheduling and HSE, GPCHQ Project  
Adex Corporation Ltd.



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## Acknowledgment

I would like to thank **Mohiuddin Ahmed Sarker**(Engineer, Adex Corporation Ltd.), Supervisor in my internship for providing me the drawings (AutoCAD) , catalogues(PDF), data (excel, word) for this report.

I also express my gratitude to my academic advisor, Ms. **Sharmin Rowshan Ara** for her generous support .

I am also thankful to **Md. Abdullah** (Engineer, Adex Corporation Ltd.) to help in learning AutoCAD design.

I am grateful to my friends, **Faisal Ahmed, Khaled Rahman Ayon, R.H.M. Sharaful Islam**(Students, East West University), for providing support in formatting and editing this report.

## Executive Summary

Today power sector is facing lots of problems to meet the needs of consumer. Lots of organizations are installing their own power system. Transmission of power is a major part of power system .Bus-bar, conduit and cable installations are important for the transmission of power. This internship provided the opportunity of planning and monitoring the installation of the power system. The internship provided the opportunity to learn about the BBT installation. BBT installation is very new in our country and it requires knowledge about electrical installation. The internship gives the opportunity to work as an executive. Working in practical field was challenging. The purpose of the internship is fully served by gaining experience in this particular field of engineering.



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## Introduction

### 1.1.1 Company Profile:

**Technological Aid** is a well established company in power plant installation and is providing excellent service to its customers since 1996. The company is also expert in industrial electrical designing and installation. It has also a vast experience in indoor house electrical designing and installation.

The goal of this company is to establish number one position in electrical designing and installation. It has high ambition to give its customer the best service and place a higher rank of belief among people all around the world. It is working for some of the best known organizations of Bangladesh. It has recently worked as a subcontractor with **Summit power Ltd** in various projects like 33MW power plant installations located at Jangalia in Comilla and Maona in Gazipur. It has also worked recently with **Adex Corporation Ltd** In the project site of North South University, Dhaka. The company will keep providing valuable service to customers in Bangladesh and try to reach its goal by expanding its capacity in abroad.

#### Technological Aid Information:

Company Name : Technological Aid

Year of Establishment : 1981

Motto of The Company : Specialize in power plant & industrial electrical design & installations

Number of Employees : Total - 760

Engineers	- 21
Supervisors	- 100
Workers	- 625
Others	- 14

Board Members :

1. Engr. Moin Uddin Ahmed
2. Engr. Sharif Ali Khan

Branch Office : Chittagong,

Type of Business : Electrical Contractor



Head Office Location : "Paltan City" 51,51/A Purana Paltan(6<sup>th</sup> floor), Dhaka-1000.

**Email :** [moin2005@agnionline.com](mailto:moin2005@agnionline.com)

**Telephone:** 7160829

**Bankers:** Islami Bank Ltd , Sonali Bank

### 1.1.2 Particulars of operation site & Supervisors

The internship job was to work as a field engineer for **Technological Aid** to help and monitor in a site .The site was a construction site. The site was **Grameen Phone Corporate Headquarter**. The company was a subcontractor of the projects electrical installations. The contractor for the projects was **ADEX Corporation Ltd**.

Name of the supervisors-Mohiuddin Ahmed Sarker, Engineer

Planning, Scheduling and HSE, GPCHQ project  
ADEX Corporation Ltd.

And - Md. Abdullah, Engineer

Installations & Shop Drawing, GPCHQProject  
ADEX Corporation Ltd.

### 1.2 Objective of the Internship

Objective of this internship was to get acquainted with the practical job in electrical and electronics field. Theoretical knowledge gathered from university was implemented by attending this internship program .This report contains project site details according to the guideline provided by the EEE department and the internship supervisor. The major purpose of the project was to an estimation of power material and monitoring and installation of BBT, conduit and cable. If someone wants to be experienced in power sector he has to work in the practical field. This internship helped in gaining knowledge about substation, generator, BBT and cable installation.

This internship also provided opportunity to gain experience as an office executive and to work as an efficient and well organized officer.

### 1.3 Scope and Methodology

There were various scopes in the project site. The job of the electrical contractors was to install an 11KV substation, to supply power to every point of the building through the help of BBT, cables, conduits, panels/distribution board, switches etc. The installation of these materials and devices were also had to be done by the contractor.

This internship included learning and supervision of BBT and cable installations.

The responsibilities included taking instruction from the supervisor, giving instructions to the workers, checking the installation. In these steps the indications was provided by the drawings according to site description. Daily work progress was reported to the site office.



## Chapter 02

### Detail of internship work

#### 2.1 Job summary

My job in the project was to monitor and check the installations of BBT and cable. I had to keep record of daily progress of work. Submission of report to my supervisor including detailed description of daily work was mandatory. My other job was to maintain the electricians, keep the record of materials used. I also helped in designing and approving of the design. For the approval of drawing we had to attend meeting with the Grameen Phone representatives and the consultant company-VIA (Vistara & Icon Architect) representatives.

#### 2.2 BBT installations

This report includes the catalogue and manual that used for BBT installation. Understanding this manual completely with the help of other engineers was the next step. The electricians were being commanded about the procedure of installing the BBT according to design. There are lots of problems in practical field. With The help of the senior engineers and BBT expert electricians the problems were overcome. The following catalogue explains both the installation for horizontal (parallel to ceiling) and vertical (goes through riser from basement to Level-9) BBT installation. For horizontal BBT installation we used hangers (page-19). The hanger was joined to ceiling through the help of isolator box and thread rod. The vertical BBT installations were done with the help of spring hangers. For BBT to floor wiring, the Flange End Box (page-18) and set top box/tap off box (Page-24-26) was attached.

##### 2.2.1 Hanger

The BBT is mounted from the wall with the hangers. The horizontal spring hangers are used for BBT which is parallel to ceiling.

##### 2.2.2 Isolator Box

BBT is hold by the isolator box which is mounting from the hanger. The isolator Box is an rectangular shaped box which is attached to the ceiling with the help of thread rod . The isolator box and thread rod are shown in figure-2.2.1. In the figure the thread rod is regarded as Fixing Rod.



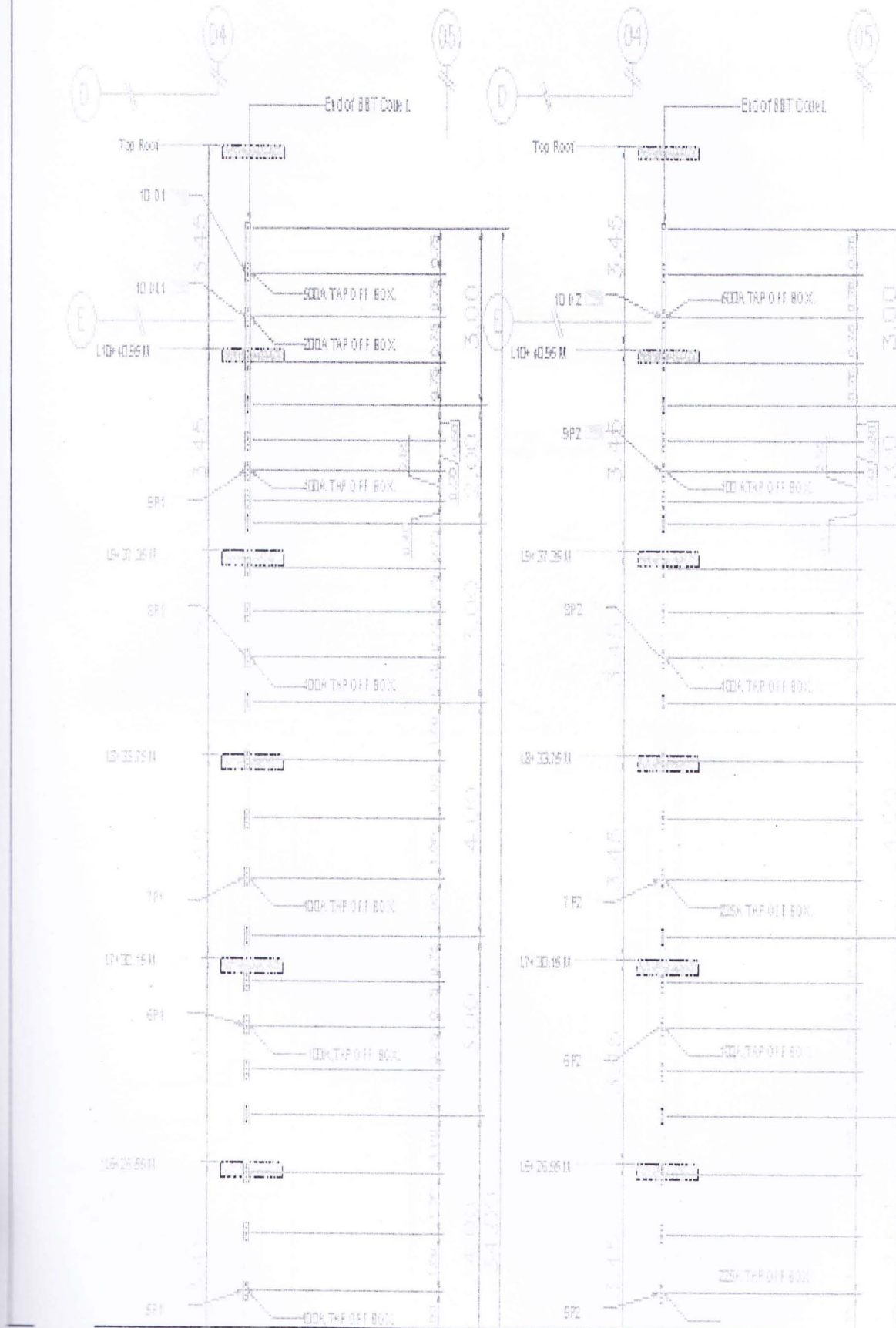


Figure 2.2.2.1: Vertical BBT installation-100Ampere (From Level-5 to Level-10)



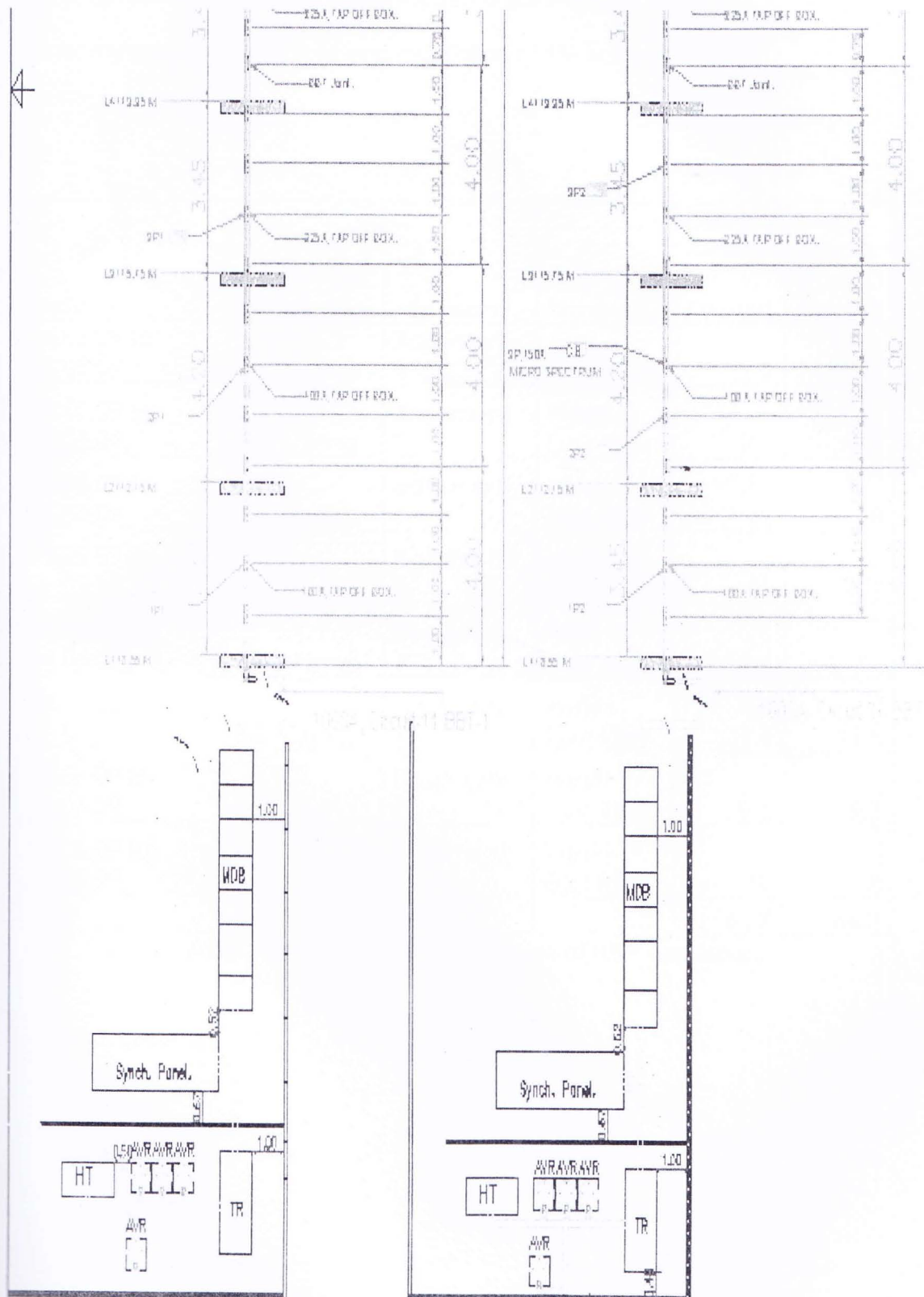


Figure 2.2.2.2: Vertical BBT installation-100Ampere (From basement-1 to level-4)



Through the riser there was also an 800 ampere BBT installation. The 800Ampere BBT is as same as 1000ampere so the design of that is not included here

Under my supervision the following installation of BBT has been done.

Date	Work Description	Location	Raceway	800 Amper e (Meter)	1000 Amper e (Meter)
06.05.09 to 07.05.09	BBT Laying	Basement-1	West Riser	2	2.4
09.05.09 to 14.05.09	BBT Laying	Basement-1	West+ East Riser	7.5	10.5
16.05.09 to 21.05.09	BBT Laying	Basement-1	West+ East Riser	8	8
23.05.09 to 28.05.09	BBT Laying	Basement-1	West+ East Riser	11	5.7
30.05.09 to 04.06.09	BBT Laying	Basement-1	West+ East Riser	8.6	11
06.06.09 to 11.06.09	BBT Laying	Basement-1	West+ East Riser	7.4	11.5
20.06.09 to 25.06.09	BBT Laying	Basement-1	West+ East Riser	9.2	9.2
26.06.09 to 30.06.09	BBT Laying	Basement-1	West+ East Riser	10	8
<b>total</b>				63.7	66.3

**Table 2.2:** Work Progress Description of BBT installations

## 2.2.3 BBT Installations Manual

### Busway Isolation Joint Assembly

#### INSTALLATION

1. Remove the tie channel bolts from each side of the busway joint. Remove both tie channels.
2. Remove the joint pack from the busway by loosening the joint bolt and removing the 10-32 screws. Ease the joint pack out to the side. If there are any questions, contact a Square D representative.
3. Install the isolation joint assembly from the side. Secure it with the 10-32 screws. NOTE: It may be necessary to loosen the bolt securing the isolation joint assembly before sliding it into place. Hand-tighten the bolt to a maximum of 2 lb-ft (2.7 N•m).
4. Install the two red tie channels as shown in Figure 1. (Two red tie Channels, 16 tie channel bolts, and 10-32 screws are provided.) Do not remove the isolation joint.

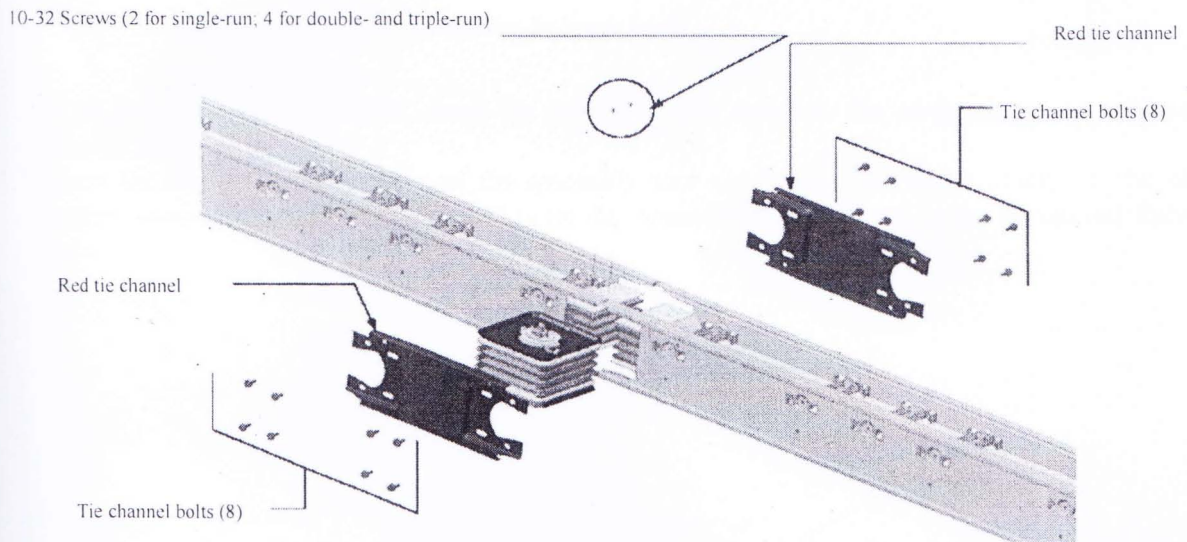


Figure: Isolation Joint Assembly

## Installation:

### Join the Busway Lengths

1. Orient the straight lengths of the busway with the top covers facing the same direction.
2. Slide the busway lengths together end-to-end (Figure 1). Loosen the bolts through the joint pack, but do not remove them.

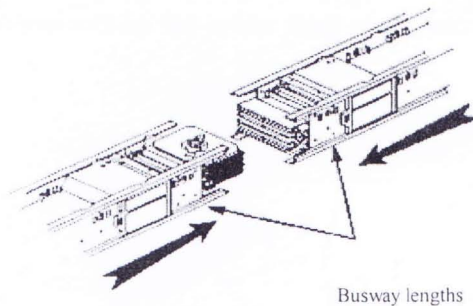


Figure 1: Position the busway lengths

3. With busway ends in position, hook the joint assembly tool into the surge clamp on one length (Figure 2).
4. Insert the rod through the hole of the assembly tool and behind the surge clamp on the other length. Ensure that the joint bolt head is on the bottom when mounted in the horizontal flatwise position.

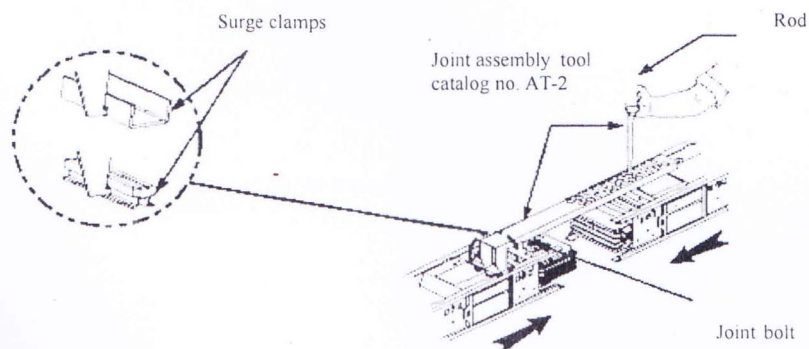


Figure 2: Join the busway lengths





## Install the Cover Plates

1. Mount the top cover as follows:

- Remove the protective paper from the sealants on the top cover plate (Figure 1).
- Place the top cover plate (marked L1, L2, or L3 depending on the joint configuration) on the top side of the joint.

c. Match the mounting holes on the top cover plate to the holes on the baffles, and attach the cover with 1/4-20 x 1/2-inch (6-508 x 13 mm) screws.

2. Mount the bottom cover using the same procedure used to install the top cover. The bottom cover plate has a hole in the center of it.

NOTE: When installing an elbow, flanged end, or cable tap box, remove the protective paper from the two sealants on the center edge of the two duct sides (Figure 1).

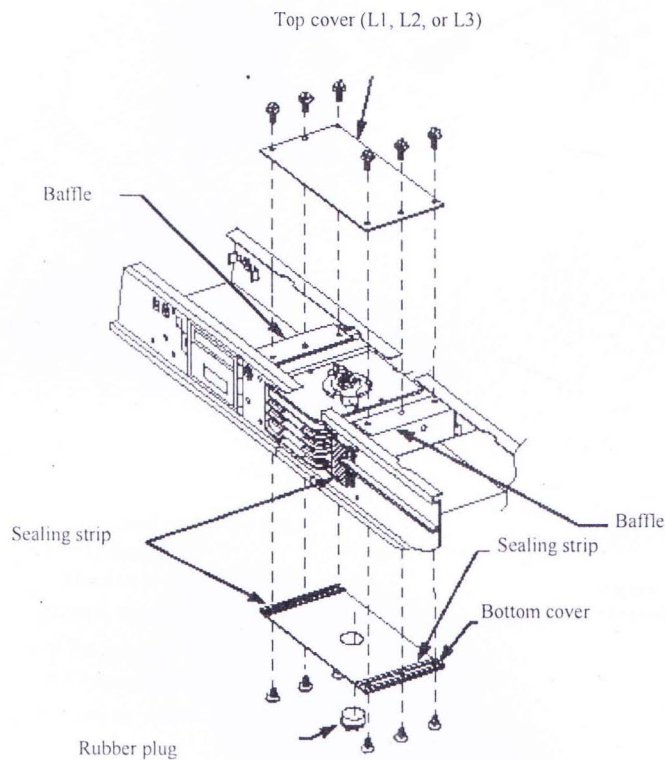
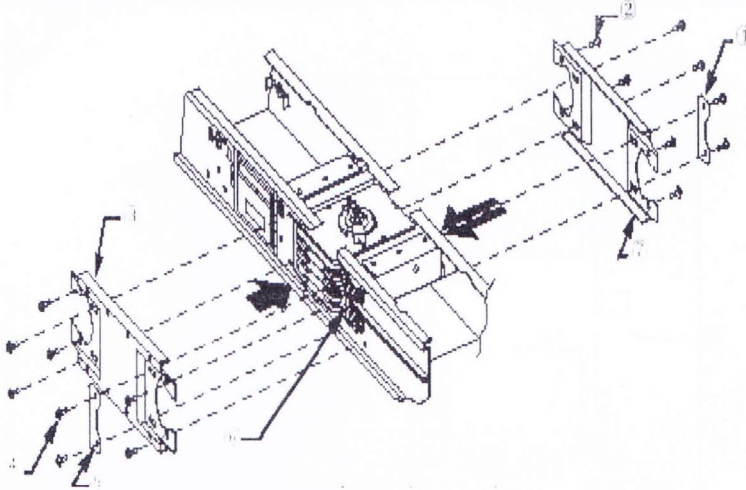


Figure 1: Install the top and bottom cover plates.



NOTE: Before installing the tie channel bolts, ensure that the tie channel gaskets are inside the metal tie channel and are secured by eight protruding pins. Tie channel gaskets must overlap the top and bottom cover plate edges.

3. Install the two metal tie channels. To do this, insert the tie channel bolts (5/16-18 x 3/4-inch) through the washer plates (on elbow, flanged end, and cable tap box only), metal tie channels, and tie channel gaskets (Figure 2).
4. Torque the tie channel bolts to 12–15 lb-ft (16.5–20.5 N•m).
5. Tighten the rubber plug in the center hole of the bottom cover plate (Figure 1).



1. Tie channel washer and gasket
2. Tie channel bolt
3. Metal tie channel and rubber gasket
4. Tie channel bolt
5. Tie channel washer and gasket
6. Elbow (optional)
7. Metal tie channel and rubber gasket

Figure 2: Install the metal tie channels

## Busway Wall/Floor Flange

### INSTALLATION

1. Disassemble the flange (Figure 1) before mounting to the busway.
2. Remove the tabs as required.
3. For use at a plug-in opening, omit the closing plate. Then, rotate the flange 180 degrees.
4. Reassemble onto the busway.

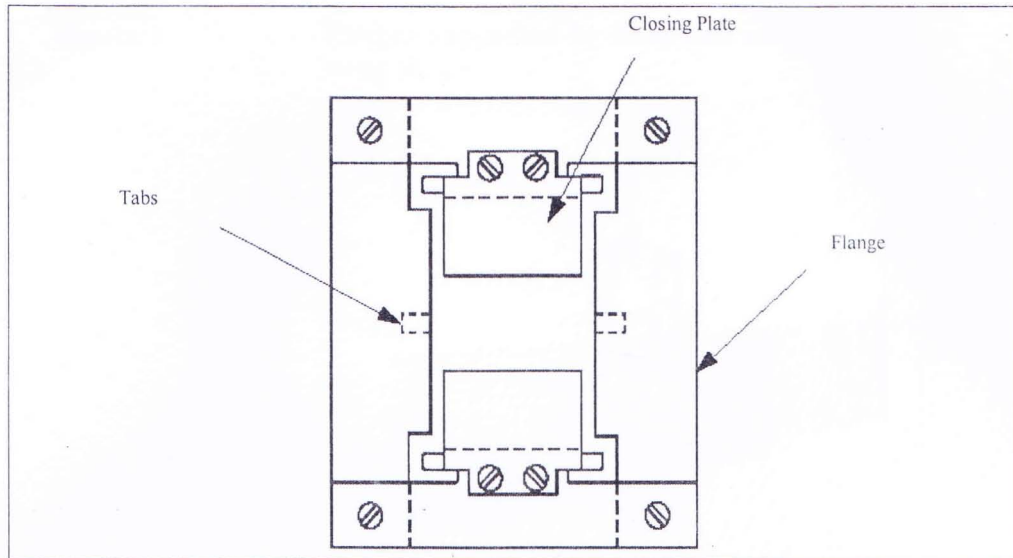


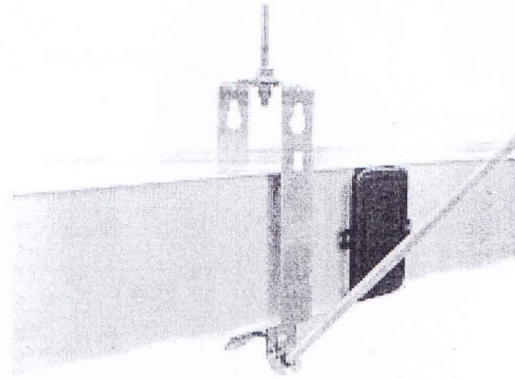
Figure 1 Wall/floor flange assembly

### Hanger

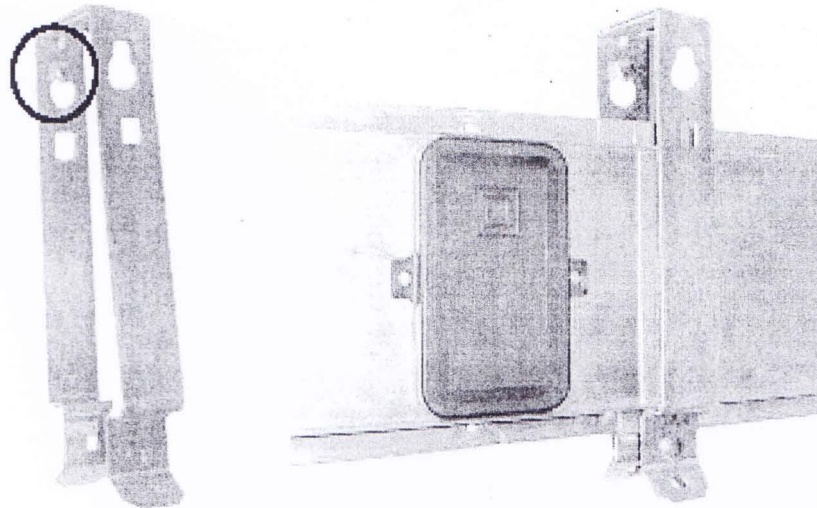
Refer to Figures 1 and 2 to install the hanger. The hanger spacing shall not exceed 10 ft (120 in) in length.

1. Attach the hanger to wall or drop rods in a straight, level line.
2. Push the busway up into the hanger until both flanges are seated securely on the bottom of the busway.
3. Install the bolt and nut (supplied) in the hanger. Tighten the nut securely.

**Figure 1: Hanger Supported by Drop Rod with Optional Sway Brace**



**Figure 2: Wall Mounting Hardware and Hanger Mounted to the Wall**

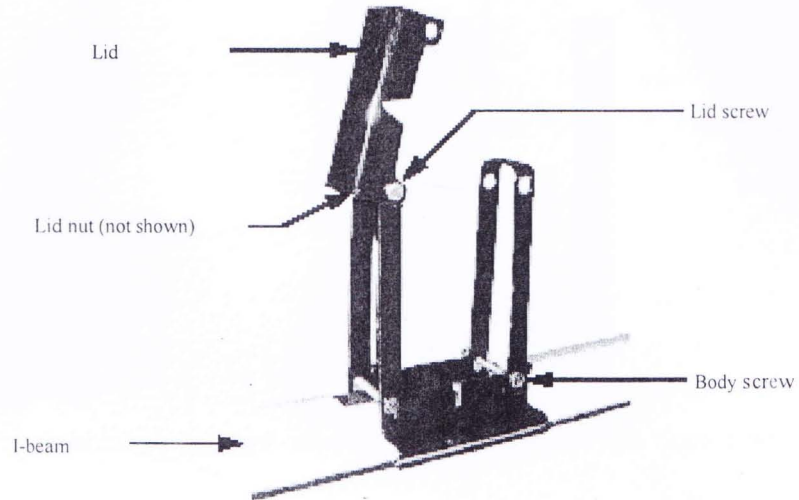


## Support Clamp

Refer to Figure 3, and Figures 4 and 5 to install the support clamp. The support clamp spacing shall not exceed 10 ft (120 in) in length.

1. Fasten the support clamp onto the bottom or top of the I-beam while aligning all support clamps in a straight and level line.
2. Secure the support clamps into position with the body screws and nuts.
3. Remove the lid screw and nut from one side of the support clamp lid, and rotate the lid aside.

**Figure 3:** Support Clamp, Body Screws, and Nuts Assembly; Lid Screw and Nut Removal

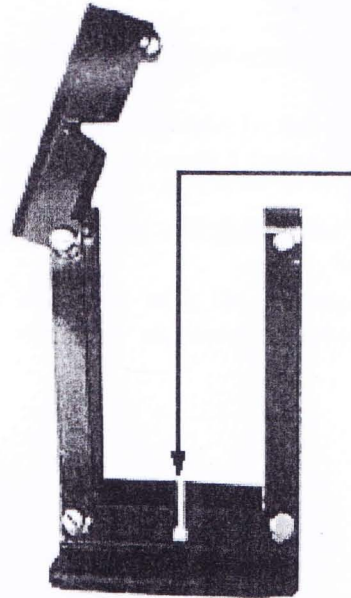




4. Lower or lift the busway into position until the busway flange (Figure 5) is seated into the support clamp slot (provided)(Figure 4).

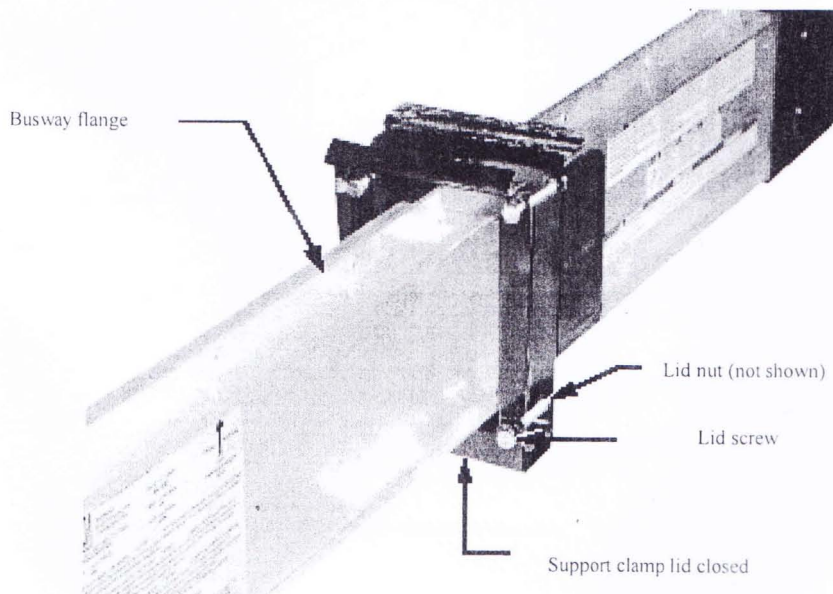


**Figure 4: Support Clamp Slot**



5. Swing the support clamp lid closed, and reinstall the lid screw and nut. Secure both lid screws and nuts.

**Figure 5: Lid Screw and Nut Reinstallation**



# Busway Flatwise/Edgewise Hangers

## Flatwise Mounting

For steps 1–7, see Figure 2.

1. Raise the busway to the final installation location and provide temporary support.
2. Place one hanger channel on top of the busway as close as possible to a busway joint pack.
3. Place a hanger half on one side of the busway and secure it to the hanger channel with the supplied 1/2 in. Grade 5 fastening hardware.
4. Place the second hanger channel underneath the busway and secure it to the hanger half with the supplied 1/2 in. Grade 5 fastening hardware.
5. Place the second hanger half opposite and diagonally opposed to the installed hanger half and secure it to the hanger channels with the supplied 1/2 in. Grade 5 fastening hardware as shown in Figure 2.
6. Fasten two hanger clamps to the busway ductside flanges and tighten the 1/2 in. nuts to 125–150 lb-in (14–17 N·m).
7. Fully constrain and mount the entire hanger assembly with the busway to a seismic restraint support structure as detailed by the seismic/structural engineer of record in accordance with ASCE 7.

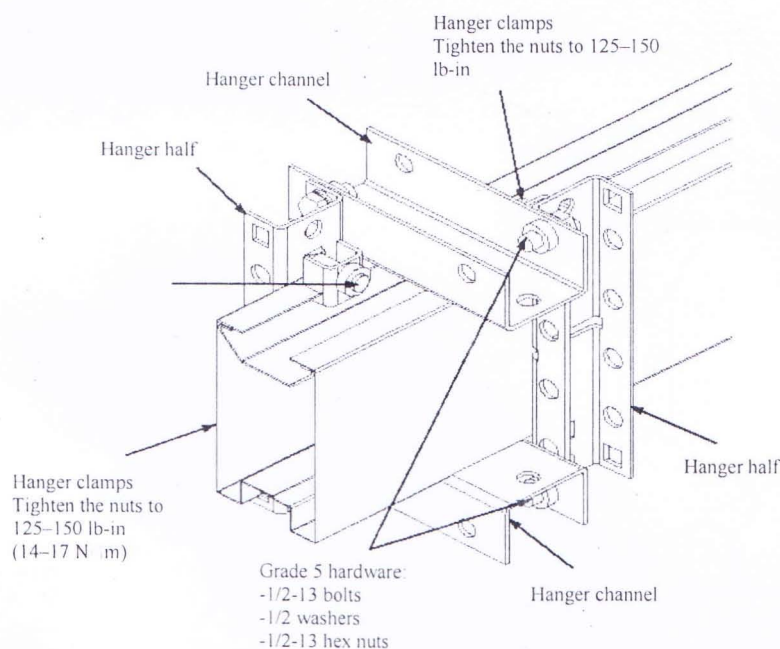


Figure 2: Flatwise Hanger Assembly Mounting

### Edgewise Mounting

For steps 1–6, see Figure 3.

1. Raise the busway to the final installation location and provide temporary support.
2. Place one hanger half on top of the busway as close as possible to a busway joint pack.
3. Place a hanger channel on each side of the busway and secure them to the hanger half with the supplied 1/2 in. Grade 5 fastening hardware.
4. Place the second hanger half underneath the busway on the other side of the hanger channels and secure it to the hanger channels with the supplied 1/2 in. Grade 5 fastening hardware as shown in Figure 3.
5. Fasten two hanger clamps to the busway ductside flanges and tighten the 1/2 in. nuts to 125–150 lb-in (14–17 N-m).
6. Fully constrain and mount the entire hanger assembly with the busway to a seismic restraint support structure as detailed by the seismic/structural engineer of record in accordance with ASCE 7.

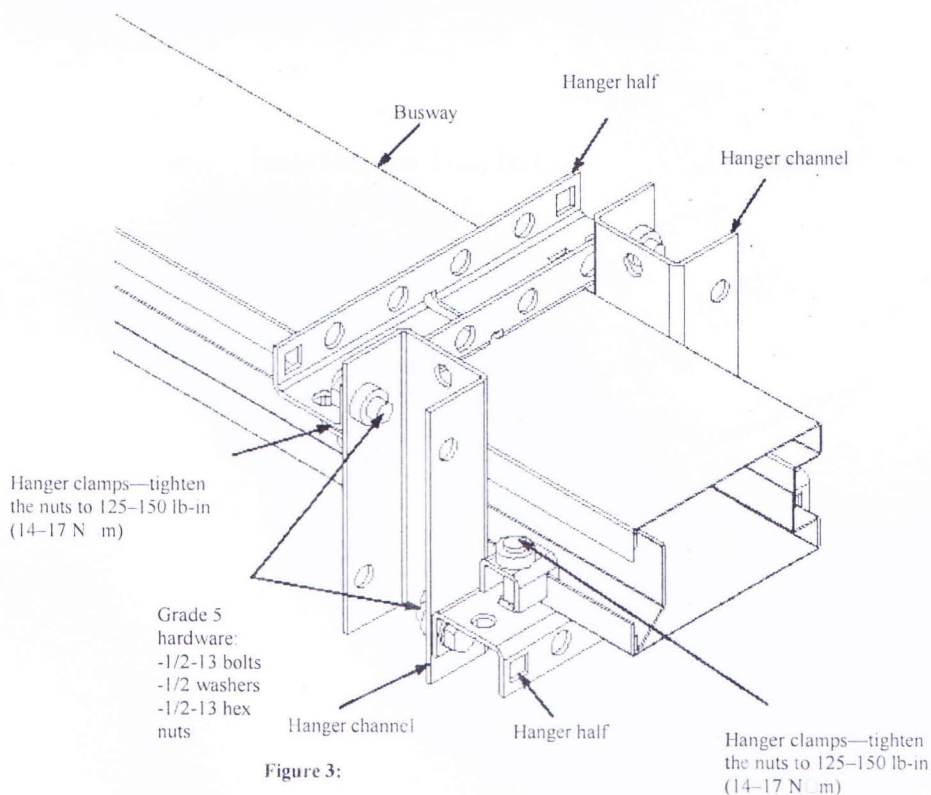


Figure 3:

Edgewise Hanger Assembly Mounting



### Installing the Plug-In Unit onto the Busway

Follow these instructions to install the plug-in unit onto the busway:

1. Insert a flat blade screwdriver into the slot of the busway door and release the hook-latch fastener (Figure 2a on page 10).
2. Swing the busway door completely open to expose the busway plug-in opening (Figure 2b).

Figure 2: Opening the Busway Door and Locating the Mounting Notch

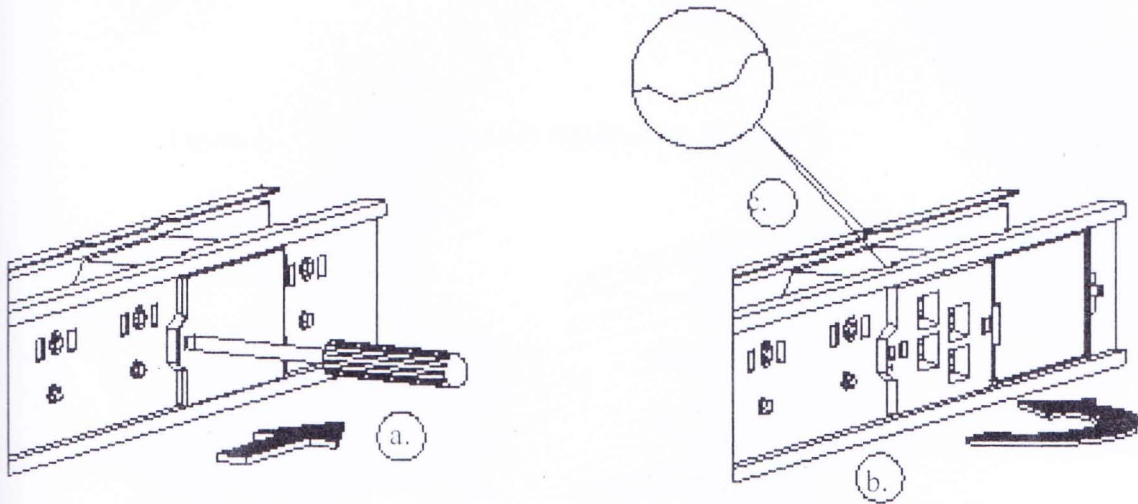
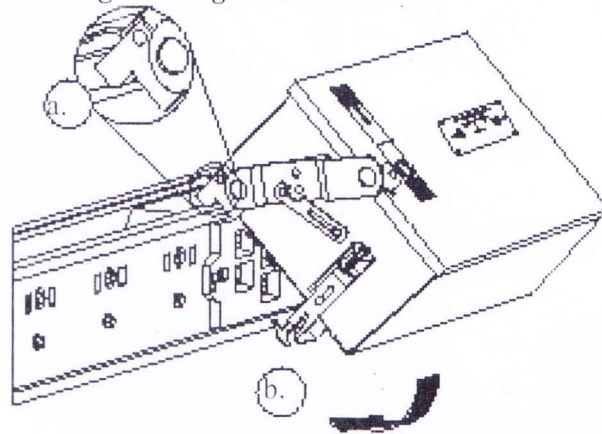


Figure 3: Installing the Plug-In Unit

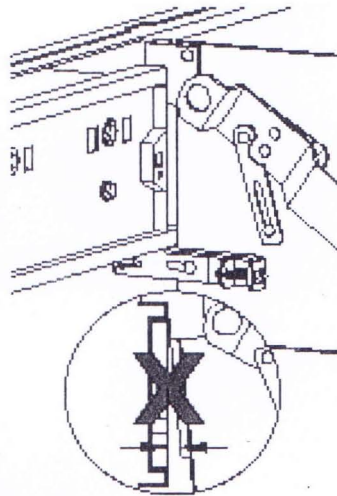




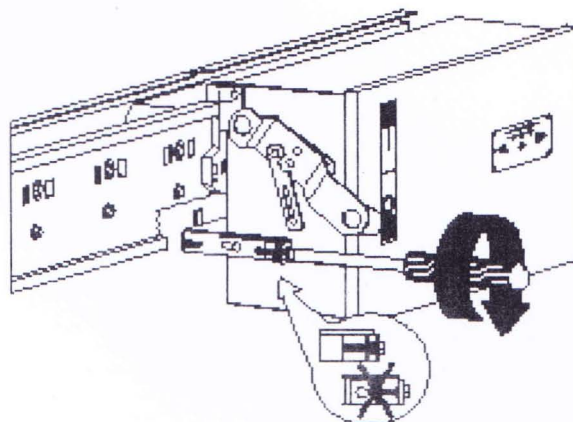
Before installing the plug-in unit, locate the mounting notch on top of the busway rail above the left side of the busway plug-in opening. This mounting notch allows the plug-in unit to be positioned correctly onto the busway (Figure 2c).

3. Tilt the top of the plug-in unit towards the busway housing at an angle that will allow the plug-in unit jaws to remain clear of the busway plug-in opening (Figure 3b).
4. Engage the left side mounting hook of the plug-in unit into the mounting notch (Figure 3a) of the busway as described in Step 3, and position the right side mounting hook over the busway rail.
5. Rotate the bottom of the plug-in unit towards the busway until the plug-in unit jaws enter the busway plug-in opening. Push the bottom of the plug-in unit toward the busway (Figure 3b) to ensure the plug-in unit is against the face of the busway plug-in opening (Figure 4).

**Figure 4: Plug-In Unit Against the Busway**



**Figure 5: Securing the Plug-In Unit**



6. Rotate the bottom of the plug-in unit towards the busway until the plug-in unit jaws enter the busway plug-in opening. Push the bottom of the plug-in unit toward the busway (Figure 3b) to ensure the plug-in unit is against the face of the busway plug-in opening (Figure 4).
7. Secure the plug-in unit to the busway by turning the bus-to-plug interlock screw fully clockwise (Figure 5).

## 2.3 Installation of EMT conduit and Cable

The power come from the 33KV substation (will be situated in basement-1, north-west corner of the building) to every floor through the BBT and then goes to every corner of floor through cables of different size. The cables laid through IMC (In our site it is INSTEEL company's EMT or Electric Metallic Tubing), cable tray or wire way (From BBT to panels of every floor) and u-PVC pipe which is gone through concrete of the building. The GPCHQ project has no fan installation, only lighting and power installations.

There is a drawing of level-4 Lighting drawing in Figure 2.3.1.

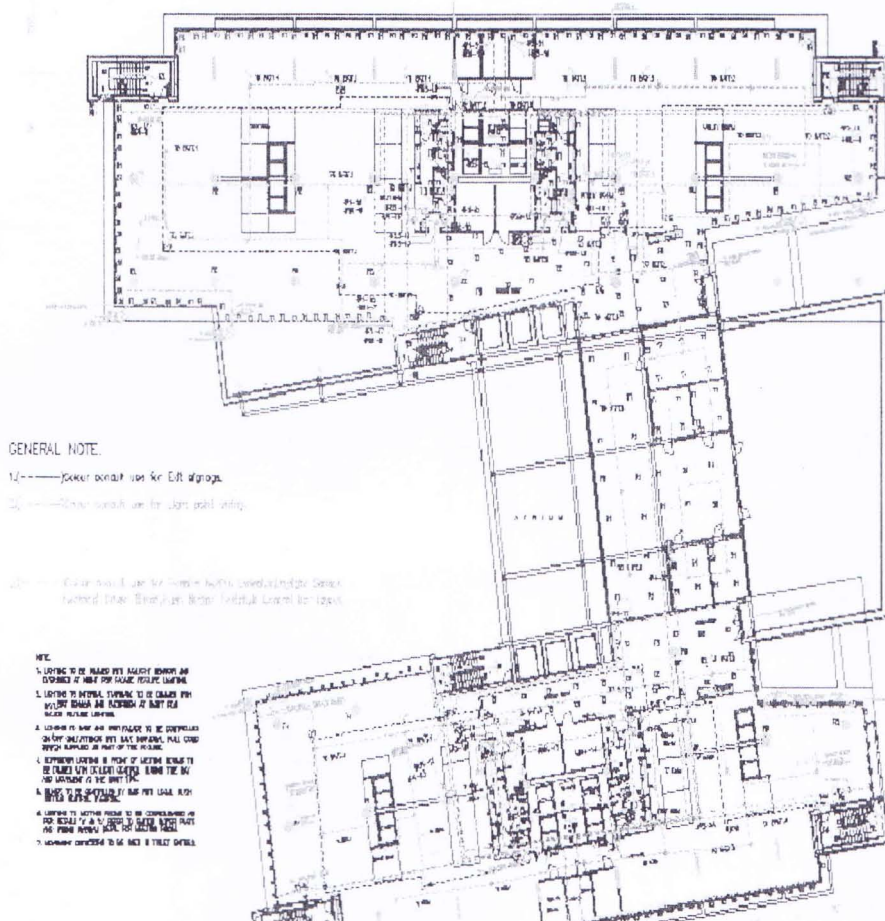


Figure 2.3.1: Lighting Drawing of Level-4

The lighting part has 4 kinds of light:

1. Emergency Light, run with battery or UPS (in drawing light blue color indicates line, circular icon indicates point of light).
2. Exit Light, goes through exits of office room's in every floor (in drawing dark blue color indicates line, circular icon written EXB indicates point of light).



## Undergraduate Internship

3. General Lighting (in drawing green color indicates the line).

4. Rope light & LED light (in drawing brown color)

And also there is circuit or power line from different panels for these lights (in drawing red color indicates the line)

This drawing is divided into 4 parts. First one is north-east corner of floor

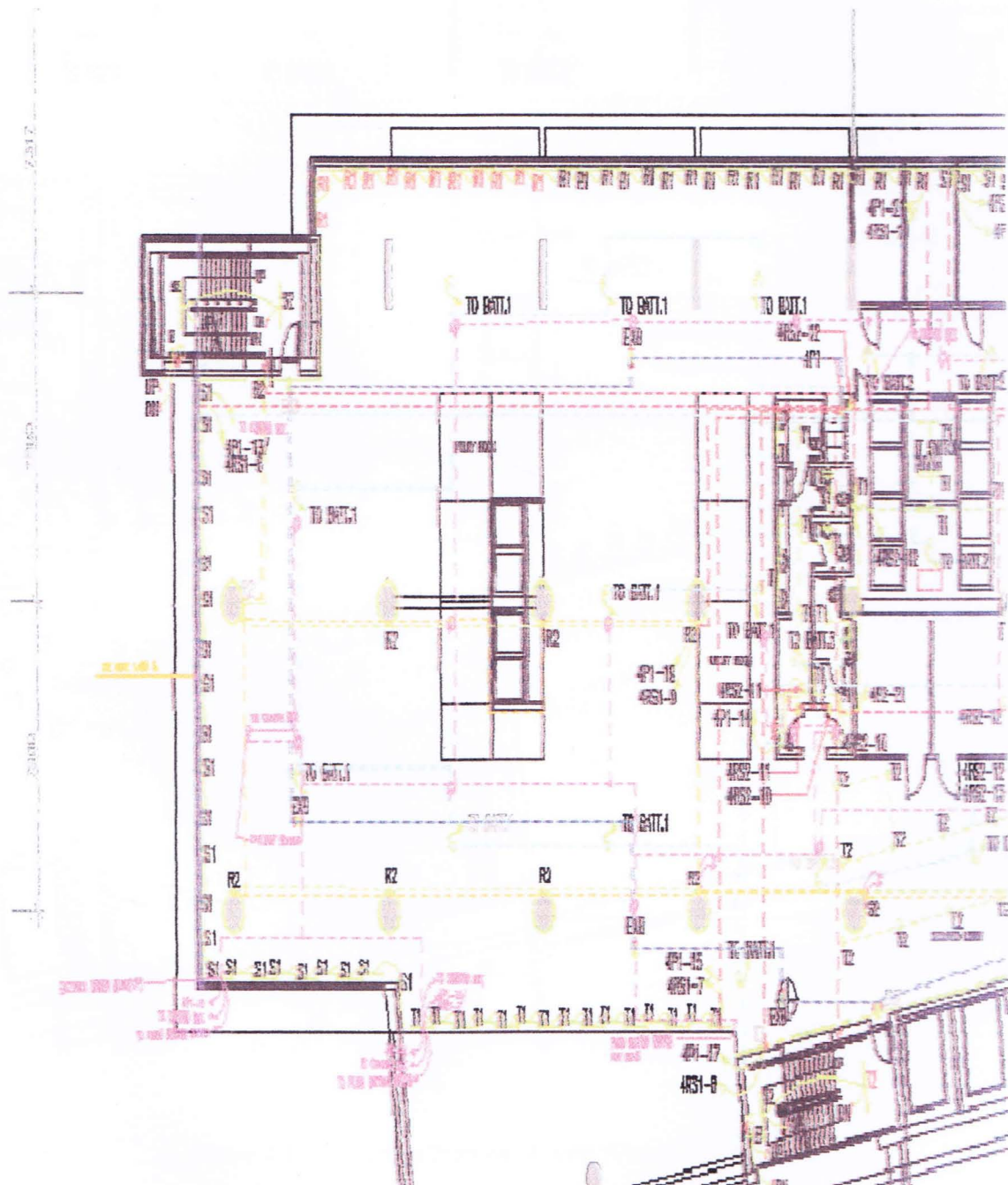


Figure 2.3.1.1: Lighting Drawing of Level-4(north-east corner)



# Undergraduate Internship

This is the drawing of Lighting Drawing of Level-4(South –east corner).

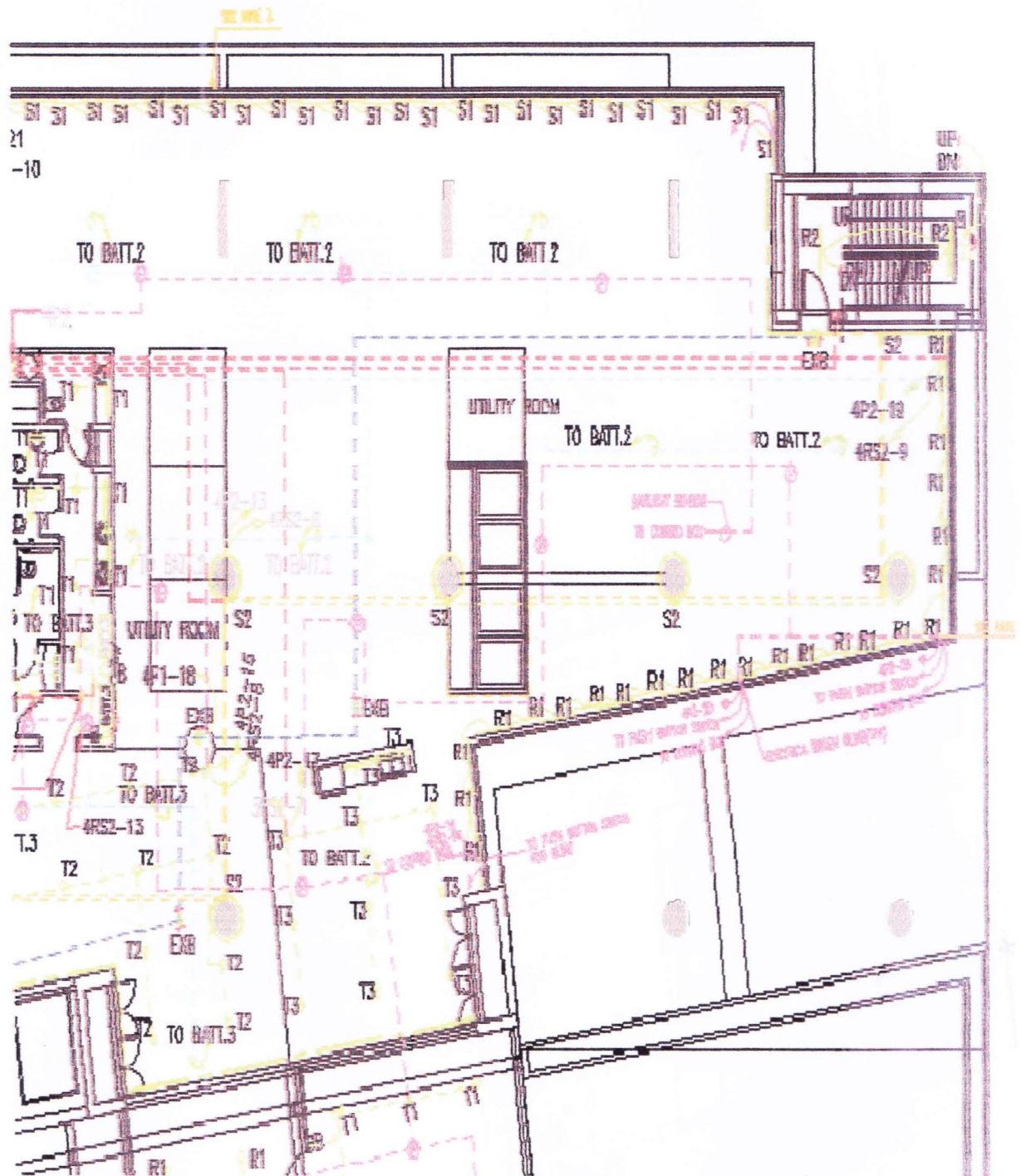


Figure 2.3.1.2: Lighting Drawing of Level-4(South –east corner)

# Undergraduate Internship

This is the drawing of Lighting Drawing of Level-4(North-west corner)

- 1. Colour conduit use for Exit signage.
- 2. Colour conduit use for Light point wiring.
- 3. Colour conduit use for Remote to LDR.
- 4. Colour conduit use for Emergency light.
- 5. Colour conduit use for Passive Motion Detector, Daylight Sensor, Electrical Driven Blind, Push Button Switch, & Control box layout.
- 6. Colour conduit use for Rope Light & LED light layout.

### NOTE.

1. LIGHTING TO BE DIMMED WITH DAYLIGHT SENSOR AND OVERRIDDEN AT NIGHT FOR FACADE FEATURE LIGHTING.
2. LIGHTING TO INTERNAL SURFACE TO BE DIMMED WITH DAYLIGHT SENSOR AND OVERRIDDEN AT NIGHT FOR FACADE FEATURE LIGHTING.
3. LIGHTING TO EAST AND WEST FACADE TO BE CONTROLLED ON/OFF ONLY, FITTINGS WITH HMC INDIVIDUAL PULL CORD SWITCH SUPPLIED AS PART OF THE FIXTURE.
4. CORRIDOR LIGHTING IN FRONT OF MEETING ROOMS TO BE DIMMED WITH DAYLIGHT CONTROL DURING THE DAY AND DIMMENT AT THE NIGHT TIME.
5. BLINDS TO BE CONTROLLED BY RMS WITH LOCAL PUSH BUTTON CONTROL OVERRIDE.
6. LIGHTING TO MEETING ROOMS TO BE CONFIGURED AS PER DETAILS '8' & '9' REFER TO SWITCH COVER PLATE AND WIRING OVERHEAD DETAIL FOR MEETING ROOM.
7. DIMMENT DETECTORS TO BE USED IN TOILET ENTRANCES.

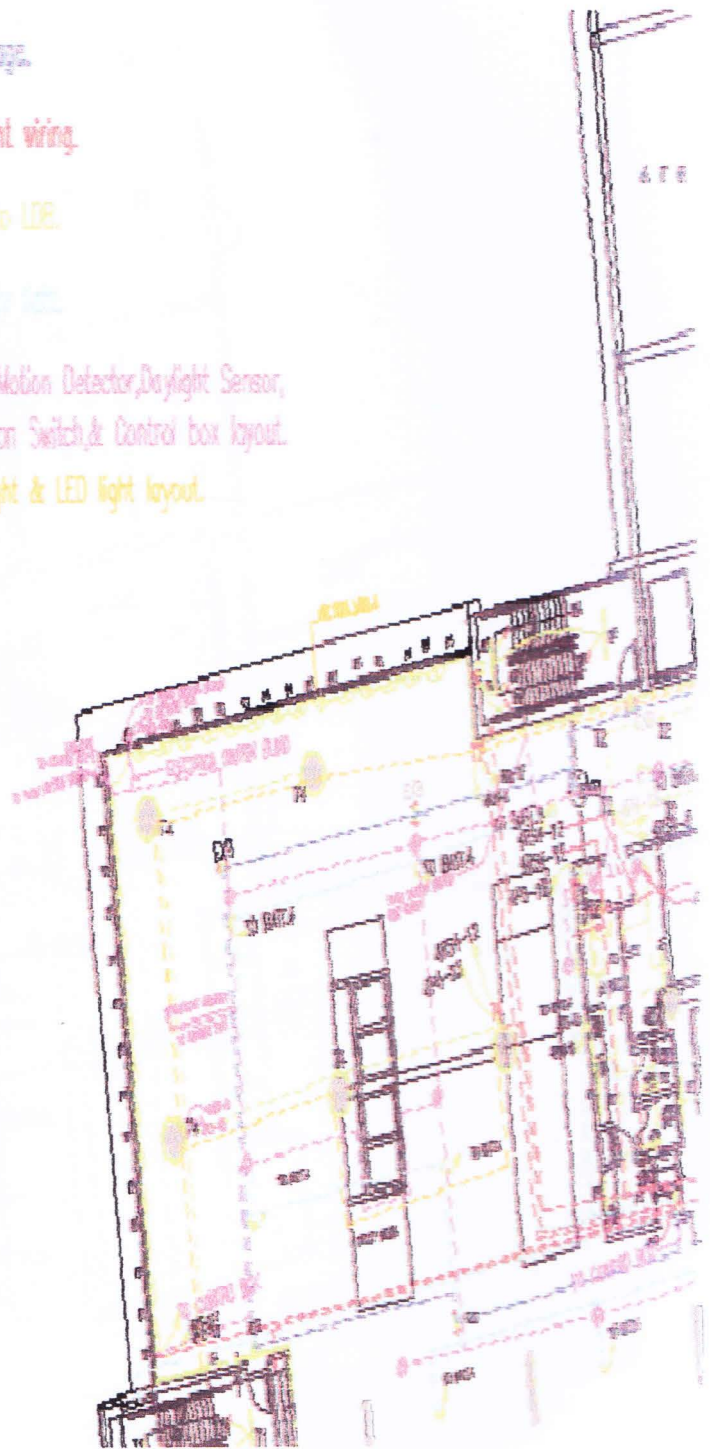


Figure 2.3.1.3: Lighting Drawing of Level-4(North-west corner)





Figure 2.3.1.4: Lighting Drawing of Level-4(South-west corner)

There is also some power line needed for various needs like water heater, water purifier, power outlets, circuit breaker, motor etc. For this purpose the following design installations are done. This is the power design of Level-4.

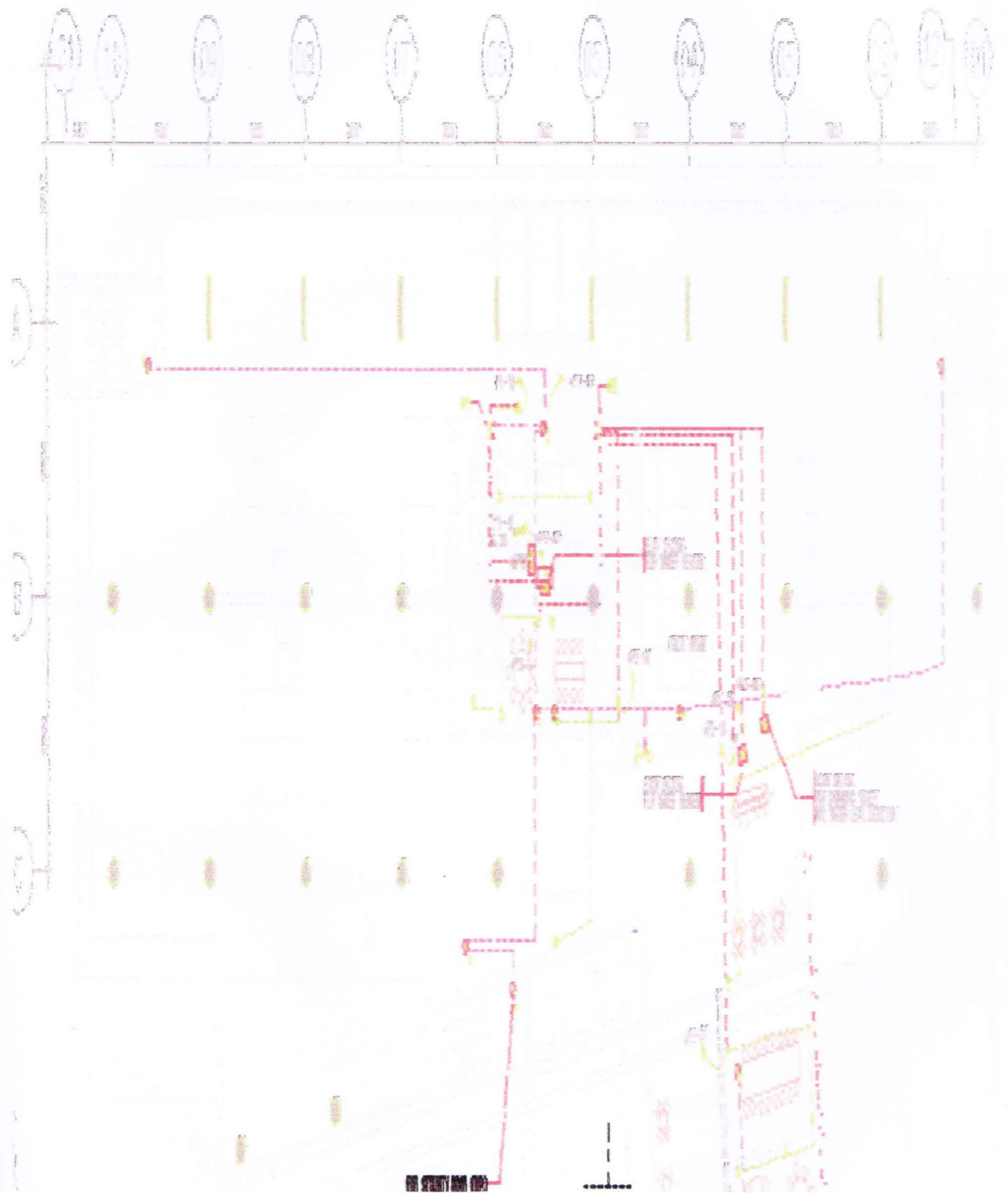


**Figure 2.3.2: Power Drawing of Level-4**



## Undergraduate Internship

This is the drawing of Power Drawing of Level-4(Upper portion). The previous design(figure-2.3.2) is divided into 2 portions. This is the first part (Upper portion)



**Figure 2.3.2.1: Power Drawing of Level-4(Upper portion)**

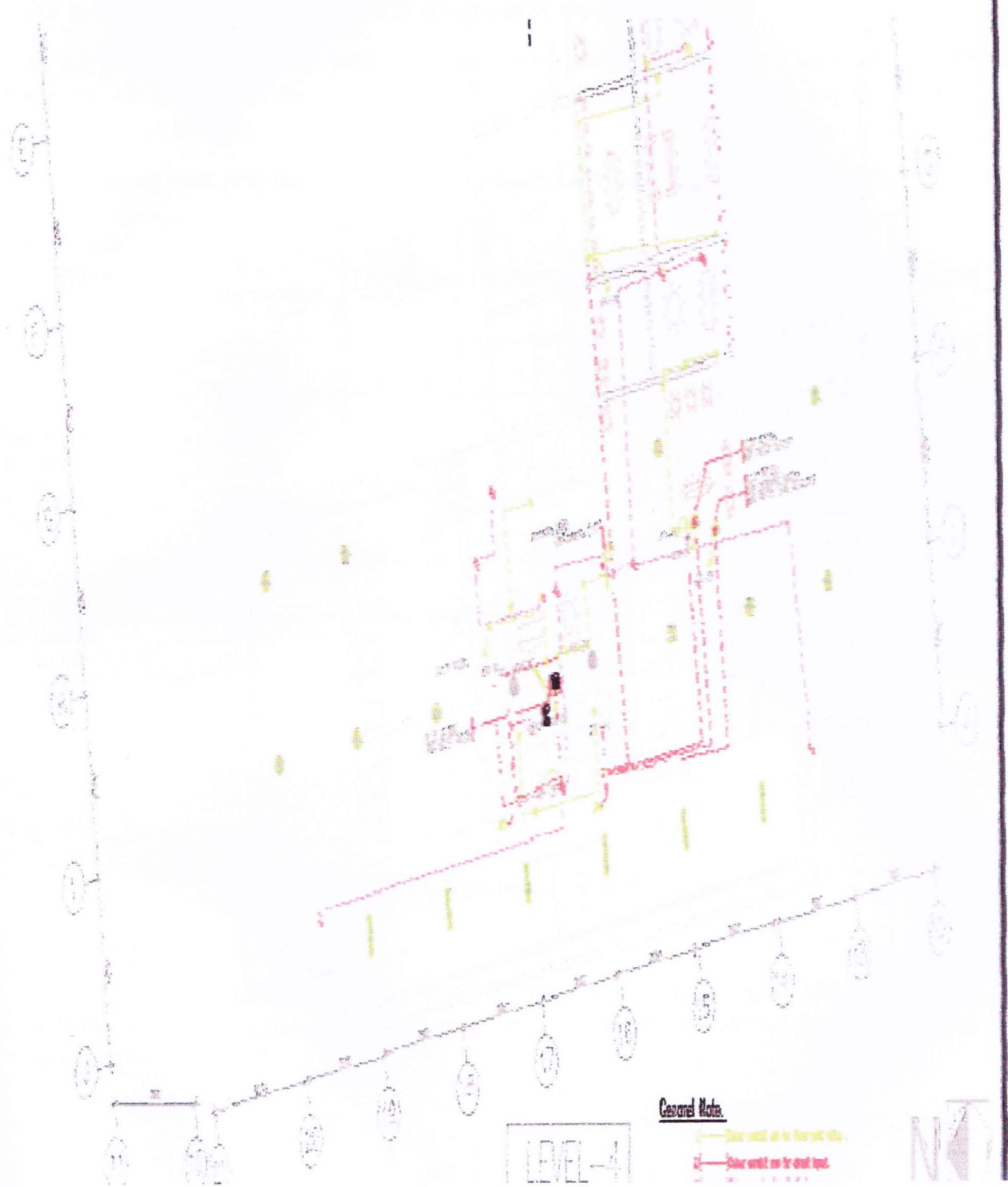


Figure 2.3.2.2: Power Drawing of Level-4(lower portion)



The lighting and power drawing of all floors are almost the same as Level-4.

All the lighting and power line cable were enclosed within 1inch/25mm and 1.5inch/40mm EMT conduit. All this conduit lines needed clamp to attach the EMT to ceiling .4-way Boxes were installed where the light points are situated.

The following work progress has been done in conduit/EMT laying under my supervision.

DATE	Work Description	Location	1"/25mmEMT(meter)	1.5"/40mm EMT(meter)	Total(meter)
06.05.09-07.05.09	Conduit laying	L-4	250		250
09.05.09-14.05.09	Conduit laying	L-4	1250	33	1283
16.05.09-21.05.09	Conduit laying	L-5+L-4	1412	67	1479
23.05.09-28.05.09	Conduit laying	L-5	955		955
30.05.09-04.06.09	Conduit laying	L-6	1132	69	1201
06.06.09-11.06.09	Conduit laying	L-6	887		887
13.06.09-18.06.09	Conduit laying	L-7	987	65	1052
20.06.09-25.06.09	Conduit laying	L-7	1094		1094
26.06.09-30.06.09	Conduit laying	L-8	135	62	197
Total					8398

**Table 2.3.1:** Work Progress Description of conduit laying.

There was also cable laying progress from 23<sup>rd</sup> June. For cable laying in different floor we followed the approved panel board schedule. The panelboard schedules of some floor are as following---



Table 2.3.2.1: PANELBOARD SCHEDULE

PROJECT : GRAMEENPHONE ,BANGLADESH

DATE : 4 July 2007

PANEL NO. : 4P1		LOCATION : EE CUPBOARD 4 th FLOOR.										
CAPACITY : 225 A. 30 CIRCUITS AS 1-POLE		MOUNTING : WALL MOUNTED										
MAIN : CB		415 / 240 V PANELBOARD										
CKT No.	DESCRIPTION	RELAY No.	NOTE	CIRCUIT BREAKER			CONDUCTORS	RACEWAY	CONNECTED LOAD IN VA.			
				POLE	AT	IC			PHASE A	PHASE B	PHASE C	
1	Lighting (Office ,4 th fl.)	4RS1-1		1	63		2-25/6G THW	Dia. 32mm EMT	5,500			
3	Lighting (Office ,4 th fl.)	4RS1-2		1	63		2-25/6G THW	Dia. 32mm EMT		5,500		
5	Lighting (Office ,4 th fl.)	4RS1-3		1	63		2-25/6G THW	Dia. 32mm EMT			5,500	
7	Lighting (Office ,4 th fl.)	4RS1-4		1	63		2-25/6G THW	Dia. 32mm EMT	5,500			
9	Lighting (Office ,4 th fl.)	4RS1-5		1	63		2-25/6G THW	Dia. 32mm EMT		2,700		
11	Spare	-		1	63		-	-			-	
13	Lighting	4RS1-6		1	16		2-4/2.5G THW	Dia. 15mm EMT	1,380	0		
15	Lighting	4RS1-7		1	16		2-4/2.5G THW	Dia. 15mm EMT		900		
17	Lighting	4RS1-8		1	16		2-4/2.5G THW	Dia. 15mm EMT			1,320	
19	Lighting	4RS1-9		1	16		2-4/2.5G THW	Dia. 15mm EMT	1,680			
21	Lighting	4RS1-10		1	16		2-4/2.5G THW	Dia. 15mm EMT		1,800		
23	Spare	-		1	16		-	-			-	
25	Space											
27	Space											
29	Space											
31												
33												
35												
37												
39												
41												
2	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT	5,500			
4	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT		5,500		
6	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT			5,500	
8	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT	5,500			
10	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT		2,700		
12	Spare			1	63		-	-			-	
14	Emergency Light			1	20		2-4/4G THW	Dia. 15mm EMT	1,000			
16	Outlet			1	20		2-4/4G THW	Dia. 15mm EMT		540		
18	Exit Signage Light			1	20		2-4/4G THW	Dia. 15mm EMT			500	
20	CB For Water Heater		(a)	2	40		2-10/6G THW	Dia. 40mm EMT	6,000			
22	For Security System			1	20		2-4/4G THW	Dia. 15mm EMT		1,500		
24	Spare			1	20		-	-			-	
26												
28	A-4AP01			3	16		4-4/2.5G, THW	Dia. 20mm EMT	1,342	1,342	1,342	
30												
32												
34												
36												
38												
40												
42												
CONNECTED TO :				MAIN CB :			MAIN CABLE :					
PLUG IN UNIT				3P, 150A IC > 30 kA at 415 VAC 50 Hz			4-95/16G, THW			33,402	22,482	14,162
							RACEWAY :					
							100x100mm WIREWAY					70,046

Note : (a) ELCB or CB with RCD 30 mA sensitivity



PROJECT : GRAMEENPHONE , BANGLADESH

DATE : 4 July 2007

PANEL NO. : 4P2		LOCATION : EE CUPBOARD 4 th FLOOR.										
CAPACITY : 225 A 36 CIRCUITS AS 1-POLE		MOUNTING : WALL MOUNTED										
MAIN : CB		415 / 240 V PANELBOARD										
CKT No.	DESCRIPTION	RELAY No.	NOTE	CIRCUIT BREAKER			CONDUCTORS	RACEWAY	CONNECTED LOAD IN VA.			
				POLE	AT	IC			PHASE A	PHASE B	PHASE C	
1	Lighting (Office ,4 th fl.)	4RS2-1		1	63		2-25/6G THW	Dia. 32mm EMT	5,500			
3	Lighting (Office ,4 th fl.)	4RS2-2		1	63		2-25/6G THW	Dia. 32mm EMT		5,500		
5	Lighting (Office ,4 th fl.)	4RS2-3		1	63		2-25/6G THW	Dia. 32mm EMT			2,700	
7	Lighting (Office ,4 th fl.)	4RS2-4		1	63		2-25/6G THW	Dia. 32mm EMT	2,700			
9	Lighting (Office ,4 th fl.)	4RS2-5		1	63		2-25/6G THW	Dia. 32mm EMT		5,500		
11	Spare	-		1	63		-	-			-	
13	Lighting	4RS2-6		1	16		2-4/2.5G THW	Dia. 15mm EMT	1,360			
15	Lighting	4RS2-7		1	16		2-4/2.5G THW	Dia. 15mm EMT		1,200		
17	Lighting	4RS2-8		1	16		2-4/2.5G THW	Dia. 15mm EMT			660	
19	Lighting	4RS2-9		1	16		2-4/2.5G THW	Dia. 15mm EMT	1,440			
21	Lighting	4RS2-10		1	16		2-4/2.5G THW	Dia. 15mm EMT		1,740		
23	Spare	-		1	16		-	-			-	
25	Spare	-		1	16		-	-			-	
27	Space											
29	Space											
31	Space											
33	Space											
35	Space											
37	Space											
39	Space											
41	Space											
2	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT	5,500			
4	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT		5,500		
6	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT			2,700	
8	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT	2,700			
10	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT		2,700		
12	Spare			1	63		-	-			-	
14	Spare			1	20		-	-			-	
16	Outlet			1	20		2-4/4G THW	Dia. 15mm EMT		540		
18	Outlet			1	20		2-4/4G THW	Dia. 15mm EMT			720	
20	Spare			1	20		-	-			-	
22	Spare			1	20		-	-			-	
24	Spare			1	20		-	-			-	
26	CB For Water Heater		(a)	2	40		2-10/6G THW	Dia. 40mm EMT	6,000			
28	Spare			1	20		-	-			-	
30	CB For Dnning Water		(a)	2	16		2-4/4G THW	Dia. 15mm EMT			1,000	
32	Spare			1	20		-	-			-	
34	Spare			1	20		-	-			-	
36	Space											
38	Space											
40	Space											
42	Space											
CONNECTED TO :				MAIN CB :			MAIN CABLE :					
PLUG IN UNIT				3P, 125A IC > 30 kA at 415 VAC 50 Hz			4-70/16G, THW			25,200	22,680	7,780
							RACEWAY :			55,660		
							50x100mm WIREWAY					

Note (a) ELCB or CB with RCD 30 mA. sensitivity.



PROJECT : GRAMEENPHONE , BANGLADESH

DATE : 4 July 2007

PANEL NO. : 4P3		LOCATION : EE CUPBOARD 4 th FLOOR.										
CAPACITY : 225 A 36 CIRCUITS AS 1-POLE		MOUNTING : WALL MOUNTED										
MAIN : CB		415 / 240 V PANELBOARD										
CKT No	DESCRIPTION	RELAY No	NOTE	CIRCUIT BREAKER			CONDUCTORS	RACEWAY	CONNECTED LOAD IN VA			
				POLE	AT	IC			PHASE A	PHASE B	PHASE C	
1	Lighting (Office 4 th fl.)	4RS3-1		1	63		2-25/6G THW	Dia. 32mm EMT	5.500			
3	Lighting (Office 4 th fl.)	4RS3-2		1	63		2-25/6G THW	Dia. 32mm EMT		2.700		
5	Lighting (Office 4 th fl.)	4RS3-3		1	63		2-25/6G THW	Dia. 32mm EMT			2.700	
7	Lighting (Office 4 th fl.)	4RS3-4		1	63		2-25/6G THW	Dia. 32mm EMT	2.700			
9	Lighting (Office 4 th fl.)	4RS3-5		1	63		2-25/6G THW	Dia. 32mm EMT		2.700		
11	Lighting (Office 4 th fl.)	4RS3-6		1	63		2-25/6G THW	Dia. 32mm EMT			5.500	
13	Lighting (Office 4 th fl.)	4RS3-7		1	63		2-25/6G THW	Dia. 32mm EMT	2.700			
15	Spare	-		1	63		-	-				
17	Lighting	4RS3-8		1	16		2-4/2.5G THW	Dia. 15mm EMT			1.480	
19	Lighting	4RS3-9		1	16		2-4/2.5G THW	Dia. 15mm EMT	1.200			
21	Lighting	4RS3-10		1	16		2-4/2.5G THW	Dia. 15mm EMT		1.740		
23	Lighting	4RS3-11		1	16		2-4/2.5G THW	Dia. 15mm EMT			1.320	
25												
27	B-4AP01			3	16		4-4/2.5G THW	Dia. 20mm EMT	1.342	1.342	1.342	
29												
31	Space											
33	Space											
35	Space											
37												
39												
41												
2	Outlet (Office 4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT	5.500			
4	Outlet (Office 4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT		2.700		
6	Outlet (Office 4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT			2.700	
8	Outlet (Office 4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT	2.700			
10	Outlet (Office 4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT		2.700		
12	Outlet (Office 4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT			5.500	
14	Outlet (Office 4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT	2.700			
16	Spare			1	63		-	-				
18	Emergency Light			1	20		2-4/4G THW	Dia. 15mm EMT			1.000	
20	Outlet			1	20		2-4/4G THW	Dia. 15mm EMT	720			
22	Outlet			1	20		2-4/4G THW	Dia. 15mm EMT		540		
24	Exit Signage Light			1	20		2-4/4G THW	Dia. 15mm EMT			500	
26	CB For Water Heater		(a)	2	40		2-10/6G THW	Dia. 40mm EMT	6.000			
28	For Security System			1	20		2-4/4G THW	Dia. 15mm EMT		1.500		
30	Spare			1	20		-	-				
32	Spare			1	20		-	-				
34	Space											
36	Space											
38												
40												
42												
CONNECTED TO :				MAIN CB :			MAIN CABLE :					
PLUG IN UNIT				3P, 150A IC > 30 kA at 415 VAC 50 Hz			4-95/16G THW			31.082	15.922	22.042
							RACEWAY :			100x100mm WIREWAY		
										69.026		

Note (a) ELCB or CB with RCD 30 mA sensitivity



**Table 2.3.2.4: PANELBOARD SCHEDULE**

PROJECT : GRAMEENPHONE ,BANGLADESH

DATE : 4 July 2007

PANEL NO. : 4P4		LOCATION : EE CUPBOARD 4 th FLOOR.										
CAPACITY : 225 A 30 CIRCUITS AS 1-POLE		MOUNTING : WALL MOUNTED										
MAIN : CB		415 / 240 V PANELBOARD										
CKT No	DESCRIPTION	RELAY No.	NOTE	CIRCUIT BREAKER			CONDUCTORS	RACEWAY	CONNECTED LOAD IN VA.			
				POLE	AT	IC			PHASE A	PHASE B	PHASE C	
1	Lighting (Office ,4 th fl.)	4RS4-1		1	63		2-25/6G THW	Dia. 32mm EMT	5,500			
3	Lighting (Office ,4 th fl.)	4RS4-2		1	63		2-25/6G THW	Dia. 32mm EMT		2,700		
5	Lighting (Office ,4 th fl.)	4RS4-3		1	63		2-25/6G THW	Dia. 32mm EMT			2,700	
7	Lighting (Office ,4 th fl.)	4RS4-4		1	63		2-25/6G THW	Dia. 32mm EMT	2,700			
9	Spare	-		1	63		-	-				
11	Lighting	4RS4-5		1	16		2-4/2.5G THW	Dia. 15mm EMT			960	
13	Lighting	4RS4-6		1	16		2-4/2.5G THW	Dia. 15mm EMT	840			
15	Lighting	4RS4-7,8		1	16		2-4/2.5G THW	Dia. 15mm EMT		780		
17	Lighting	4RS4-9		1	16		2-4/2.5G THW	Dia. 15mm EMT			1,140	
19	Lighting	4RS4-10		1	16		2-4/2.5G THW	Dia. 15mm EMT	1,000			
21	Lighting	4RS4-11		1	16		2-4/2.5G THW	Dia. 15mm EMT		1,380		
23	Lighting	4RS4-12		1	16		2-4/2.5G THW	Dia. 15mm EMT			1,800	
25	Spare	4RS4-13,14,15,16		1	16		2-4/2.5G THW	Dia. 15mm EMT	1,800			
27	Spare	-		1	16		-	-				
29	Space	-		1	16		-	-				
31	Space	-										
33	Space	-										
35	Space	-										
37												
39												
41												
2	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT	5,500			
4	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT		2,700		
6	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT			5,500	
8	Outlet (Office ,4 th fl.)			1	63		2-25/6G THW	Dia. 32mm EMT	2,700			
10	Spare			1	63		-	-				
12	Spare			1	20		-	-				
14	Outlet			1	20		2-4/4G THW	Dia. 15mm EMT	540			
16	Outlet			1	20		2-4/4G THW	Dia. 15mm EMT		720		
18	Outlet			1	20		2-4/4G THW	Dia. 15mm EMT			720	
20	Spare			1	20		2-4/4G THW	Dia. 15mm EMT				
22	CB For Water Heater		(a)	2	40		2-10/6G THW	Dia. 40mm EMT		6,000		
24	Spare			1	20		-	-				
26	CB For Drinking Water		(a)	2	16		2-4/4G THW	Dia. 15mm EMT	1,000			
28	Spare			1	20		-	-				
30	Spare			1	20		-	-				
32	Space											
34	Space											
36	Space											
38												
40												
42												
CONNECTED TO :				MAIN CB :			MAIN CABLE :					
PLUG IN UNIT				3P, 125A			4-70/16G, THW			21,580	14,280	12,820
				IC > 30 kA			RACEWAY :					
				at 415 VAC 50 Hz			50x100mm WIREWAY			48,680		

Note : (a) ELCB or CB with RCD 30 mA sensitivity



### 2.3.1 Details of Cable installation

This panelboard schedule indicates the raceway of cable size, conduit size, wireway size. Like for panel-3p1, 42 circuit assigned line can be used for different light and power. The 32mm EMT indicates the outer diameter of 25mm EMT. The conductor size indicates the area of conductor in unit (mm)<sup>2</sup>, which is called rm in site. As Example for circuit no-(3p1-1), 2-2.5/6G means the conductor sizes are 2.5rm (line/phase& black in color), 2.5rm (neutral & Gray in Color), 6rm (Grounding/earthing & green in color)

In the site there has been some cable installation through the EMT conductor's in level-3. Cables are from BRB cable, BANGLADESH. All the cable came in are for general Lighting (Green colored in drawing (lighting)), Rope Light & LED Light (Brown colored in Drawing) and power line of power Design. The cable for emergency & Exit lighting and data cable of Passive Motion Line will be installed later..

Under my supervision the following cable installations is done-

Date	Work Description	Location	Raceway	2.5 rm Black(Line) (meter)	2.5 rm Gray(Neutral) (meter)	2.5 rm Green(Ground) meter	4 rm Black(Line) meter	4 rm Gray(Neutral) meter	4 rm Green(Ground) meter	25 mm Flexible Conduit (meter)
21.06.09	Cable Laying	L-3	General Lighting	50	50	50				40
22.06.09	Cable Laying	L-3	General Lighting	200	200	200				20
23.06.09	Cable Laying	L-3	General Lighting	300	300	300				30
24.06.09	Cable Laying	L-3	General Lighting	200	200	200				15
25.06.09	Cable Laying	L-3	General Lighting	130	130	130				60
26.06.09	Cable Laying	L-3	General Lighting	50	50	50				70
27.06.09	Cable Laying	L-3	General Lighting Circuit			250	250	250		13
28.06.09	Cable Laying	L-3	General Lighting Circuit				200	200	200	14
29.06.09	Cable Laying	L-3	General Lighting Circuit			70	150	150	80	
30.06.09	Cable Laying	L-3	General Lighting Circuit	50	50	60	80	80	70	50
Total				980	980	1310	680	680	350	312

Table 2.3.3: Cable installation Progress

## Chapter 03

### Problems and recommendations

problems in installation-

- Understanding manuals and the design of different installation materials in different locations of the site. The engineers of both Technological Aid and Adex Corporation Ltd. Helped in this regard.
- Controlling the labour and monitoring their work was difficult to handle. The labours were irregular in work. So, someone have to be strict in commanding and do some unethical things like delaying their salary to keep the work progress in good shape.
- Approval of design and getting permission of installations from client-GrameenPhone, and consultant-VIA (consortium of Vistara Architechcts & Icon Architechts) was also very delaying and problematic. By several meetings among the correspondents the problem was solved.
- Clashes with other contractor like –Haroon Engineering (AC installations), BTCL (Fire Extinguisher installations), also created lots of problem because all companies had to install their material in same area. By mutual understanding and cooperation, problems were solved.

## **Chapter 04**

### **Conclusion**

Design and implementation of bus bar, conduit, and cable plays an important role in construction engineering. The detailed description of step by step procedure of cable and BBT installations is included in this report. The BBT installation is very important in modern power engineering. It is the modern form of Bus-bar installation. The theoretical knowledge gathered regarding cable installation played an important role in practical implementation. Working in such an environment enhanced engineering Knowledge from a different perspective.



## Chapter 05

### References

1. Adex Corporation Ltd. Website-[www.adexbd.com](http://www.adexbd.com)
2. Technological Aid