



Republic of the Philippines
Department of Education
Division of Digos City

PROGRAM OF WORKS

PROJECT: DIVISION WIDE AREA NETWORK CONNECTIVITY PROJECT

Fabrication and Installation of Towers and Establishment of Network/ Internet Connectivity to Selected Schools using 5GHZ Point to Point (PTP) and Point to Multi Point (PTMP) Radio, Fiber and STP/UTP Cables for several Schools.

Scope of Work:

- A.** Fabrication and Installation of Mast Towers.
- B.** Installation and Configuration of Point to Point (PtP) and Point to Multi Point Radio (PtMP) Radios.
- C.** Installations and Termination Internet FTP/UTP/STP Ethernet Cables and Fibers.
- D.** Installations of Data Cabinets Routers and Switches.
- E.** Configurations of PTP and PTMP radios with minimum throughput Internet speed of at least 50 Mbps per schools through fast.com and other viable speed test sites.
- F.** Obtain National Telecommunication Commission (NTC) Permits for each radios.
- G.** Trouble Shoot and conduct Preventive Maintenance within 1 year from the date of acceptance.
- H.** Provide as built plan and shop drawings

Special Note:

All radio, router and other equipment configurations must be turned over to the Division Information Technology Officer.



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Estimates:

No	DESCRIPTION	UNIT	QTY	UNIT COST		TOTAL COST		GRAND TOTAL
				MATERIAL	LABOR	MATERIAL	LABOR	
	GENERAL REQUIREMENTS							
1	Mobilization and Demobilization	lot	1					
2	Temporary Facilities	lot	1					
3	NTC Permits for 5GHz Radios	radio	62					
4	Safety signs, Nets & PPES	lot	1					
5	Testing and Commissioning	lot	1					
6	Plans and Shop Drawings	lot	1					
RADIO, ROUTER, CABINET, CABLES, ETC.								
4	Point to Point (PTP) Backhaul Radio	pc/set	10					
5	Point to Point/Point to Multipoint (PtP/PtMP) Radio	pc/set	52					
6	STP/FTP/UTP Cat6 Outdoor Cable	meters	6,200					
7	Cat 6 UTP Indoor Cable	meters	600					
8	Shielded RJ45 Cat6 Passthrough Type	pcs	250					
9	Gigabit Router AC1200 dual band 2.4G/5.0GHz WiFi with 1WAN & 4 LAN Port	pcs	42					



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10	Enterprise Gigabit Router with at least 4G Memory and with Level 6 License Router OS or with PfSense Firewall	pcs	7					
11	Layer 2 Gigabit Manage Switch	pcs	5					
12	16-Port Gigabit Switch	pcs	40					
13	6U- Data Cabinet with bolts and nuts	pcs	8					
14	RJ45 to Fiber Media Converter	pair	10					
15	1-km Fiber Drop Single/Dual core Cable	roll	2					
16	Fiber Connectors compatible with Media Converter	pcs	20					
17	S-Clamp for Fiber Drop Cable	pcs	30					
MONO POLE MAST TOWER								
18	80-100 ft Tower (Fabrication and Installation)	pc	14					
19	46-79 ft Tower (Fabrication and Installation)	pc	12					
20	21-45 ft Tower (Fabrication and Installation)	pc	6					
21	10-20 ft Tower (Fabrication and Installation)	pc	2					
							TOTAL	5,000,000.00



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Detailed Technical Specifications

A. Point to Point (PTP) Backhaul Radio (Item No. 4)

Technical Specifications:

- Frequency operation: 5.0 to 5.8 GHz or 4.9–6.4 GHz
- Long-Range Point-to-Point (PtP) Link Mode (50km+)
- Maximum Throughput 1.0 Ghz
- Automatic Channel Selection •
- Network interface at least one(1) - 10/100/1000 Ethernet Port
- Automatic Distance Selection
- 30 dBi or Higher Antena
- with Gigabit POE injector
- with Surge Protector
- with Pole Mounting Kit
- 1 Year Warranty of equipment and parts

B. Point to Multipoint Radio (Item No.5)

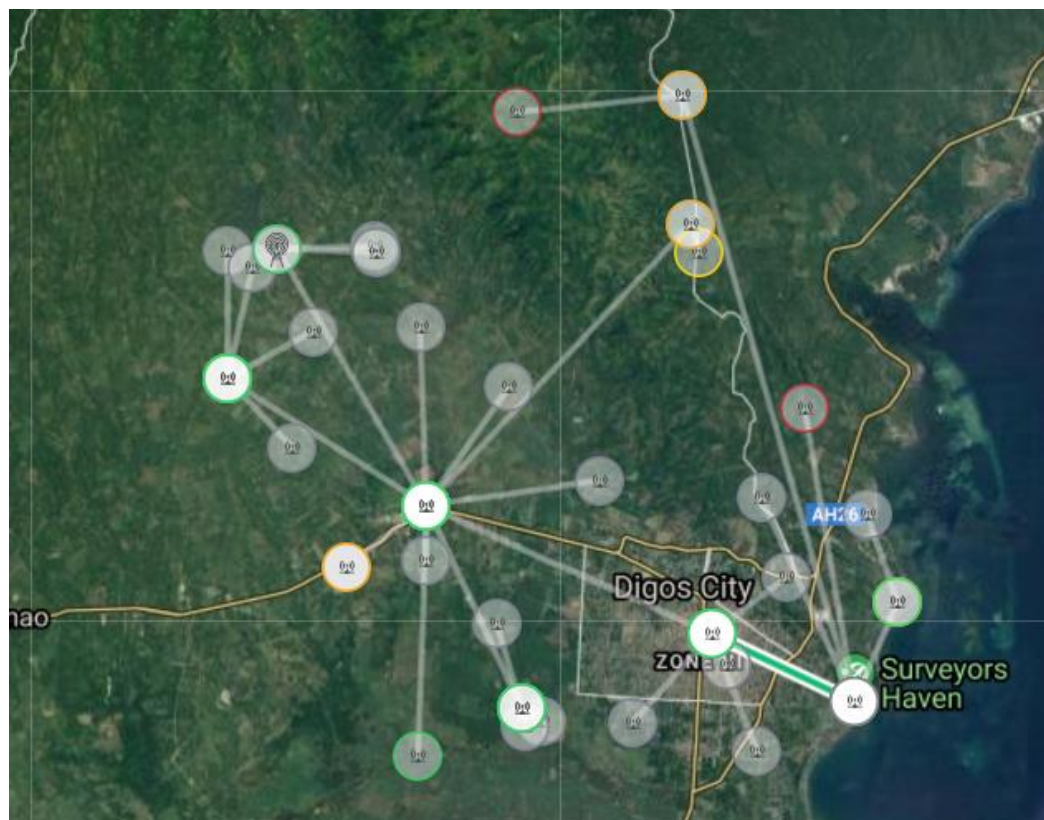
Technical Specifications:

- Frequency operation: 5.0 to 5.8 GHz or 4.9–6.4 GHz
- Long-Range Point-to-Point (PtP) Link Mode (25km+)
- Selectable Channel Width
 - PtP: 10/20/30/40/50/60/80 MHz
 - PtMP: 10/20/30/40 MHz
- Automatic Channel Selection •
- Transmit Power Control: Automatic/Manual
- 64 MB minimum memory
- Network interface at least one(1) - 10/100/1000 Ethernet Port
- Automatic Distance Selection
- Gain: **25 dBi or higher**
- with Gigabit POE injector, Surge Protector and Pole Mounting Kit
- 1 year Warrant of Equipment and Parts



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C. NETWORK TOPOLOGY





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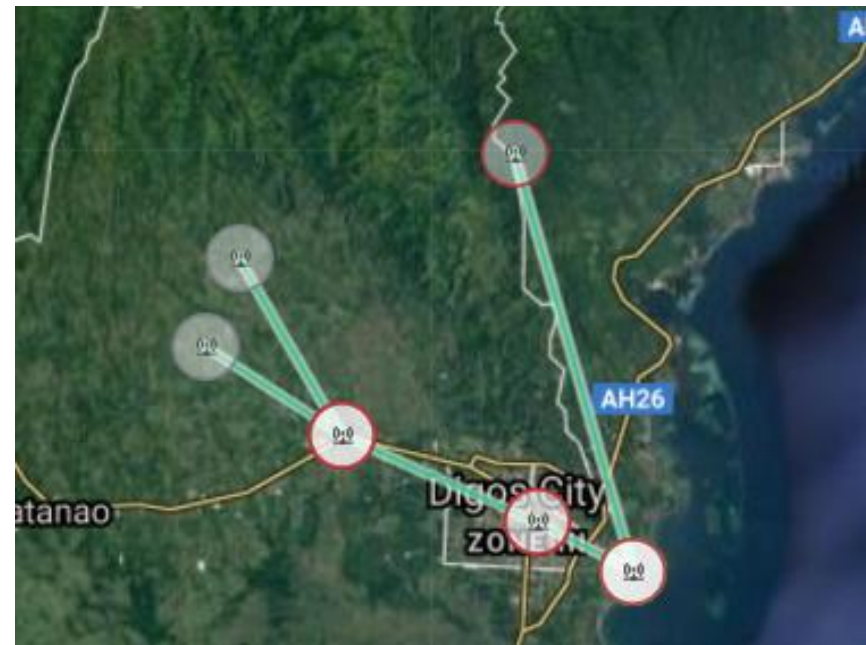
SOURCES OF INTERNET AND BACKHAUL CONNECTIONS

Main Sources of Internet Connections

- A. Division Office
- B. Remedios Saplala ES
- C. Aplaya ES

Backhaul Radios

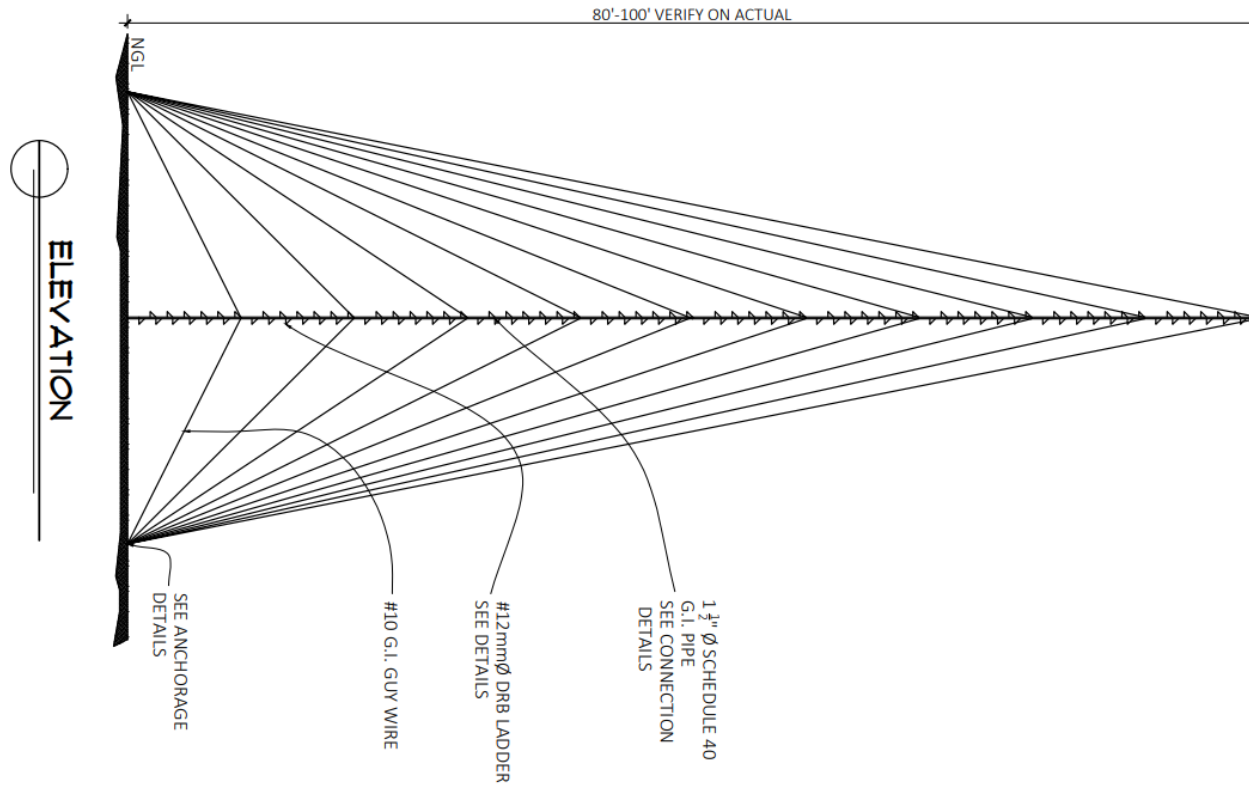
- A. Division Office to Remedios Saplala ES
- B. Remedios Saplala ES to Lungag ES
- C. Aplaya ES to Binaton ES





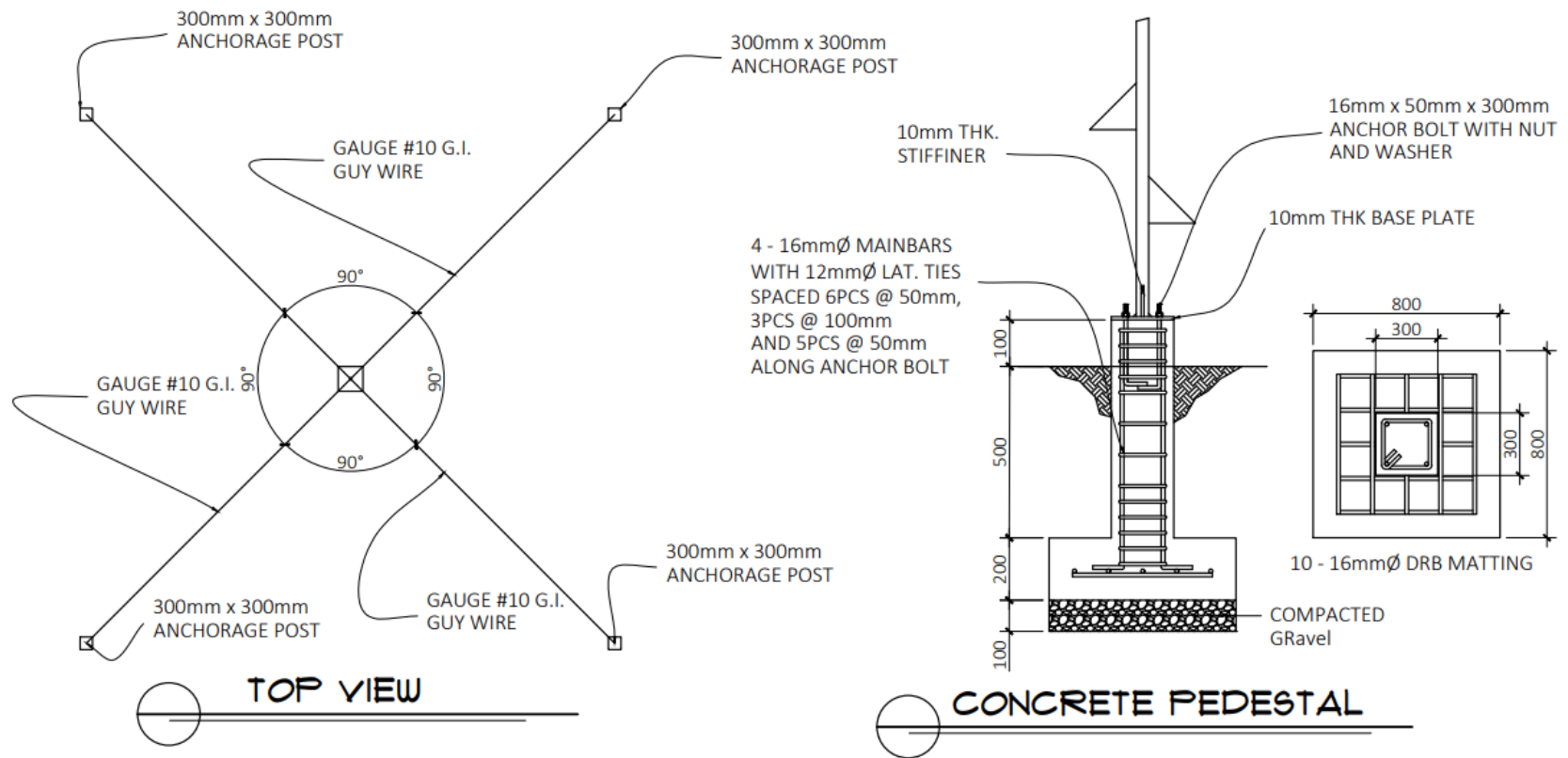
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D. Monopole Mast Tower Design and Specifications (For Longer Towers 80 to 100 ft)



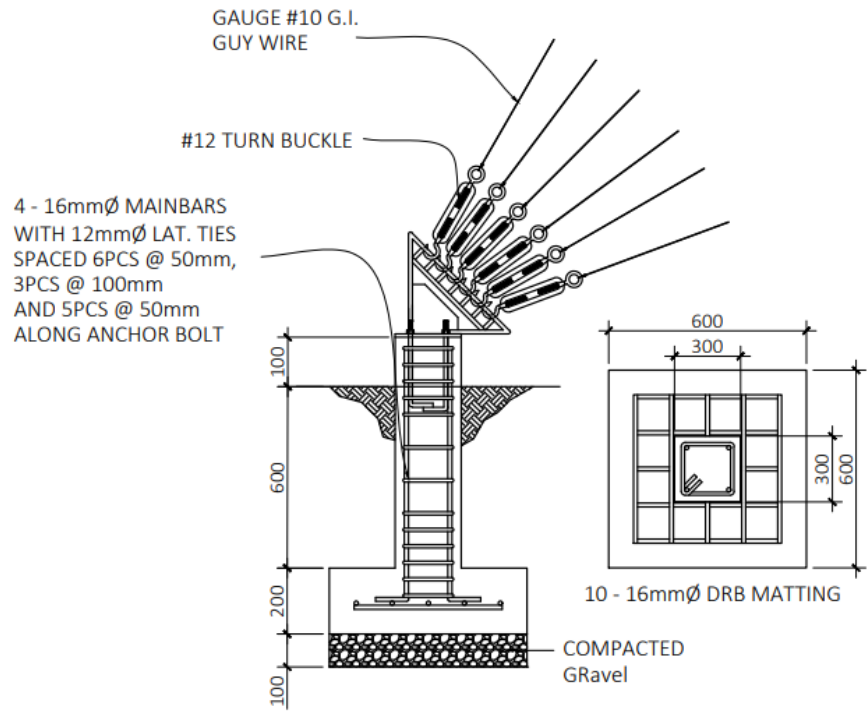


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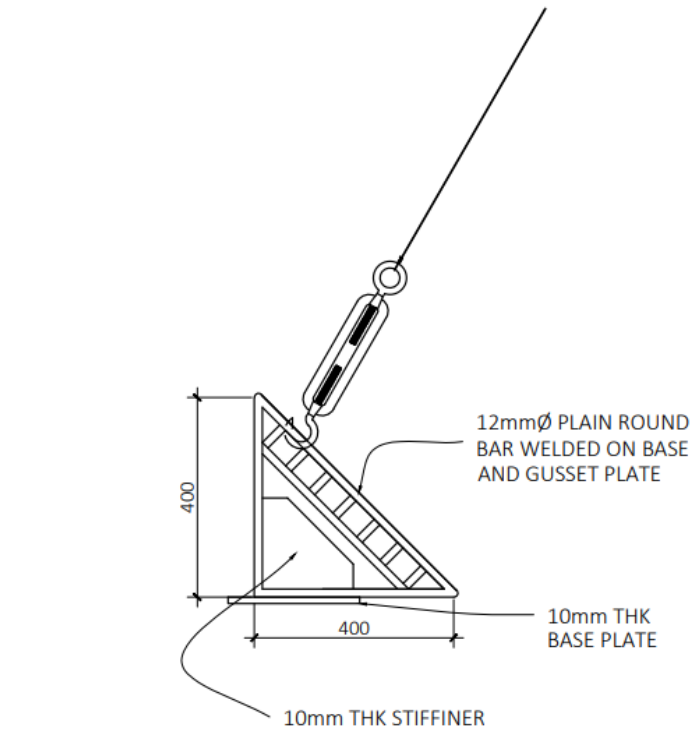




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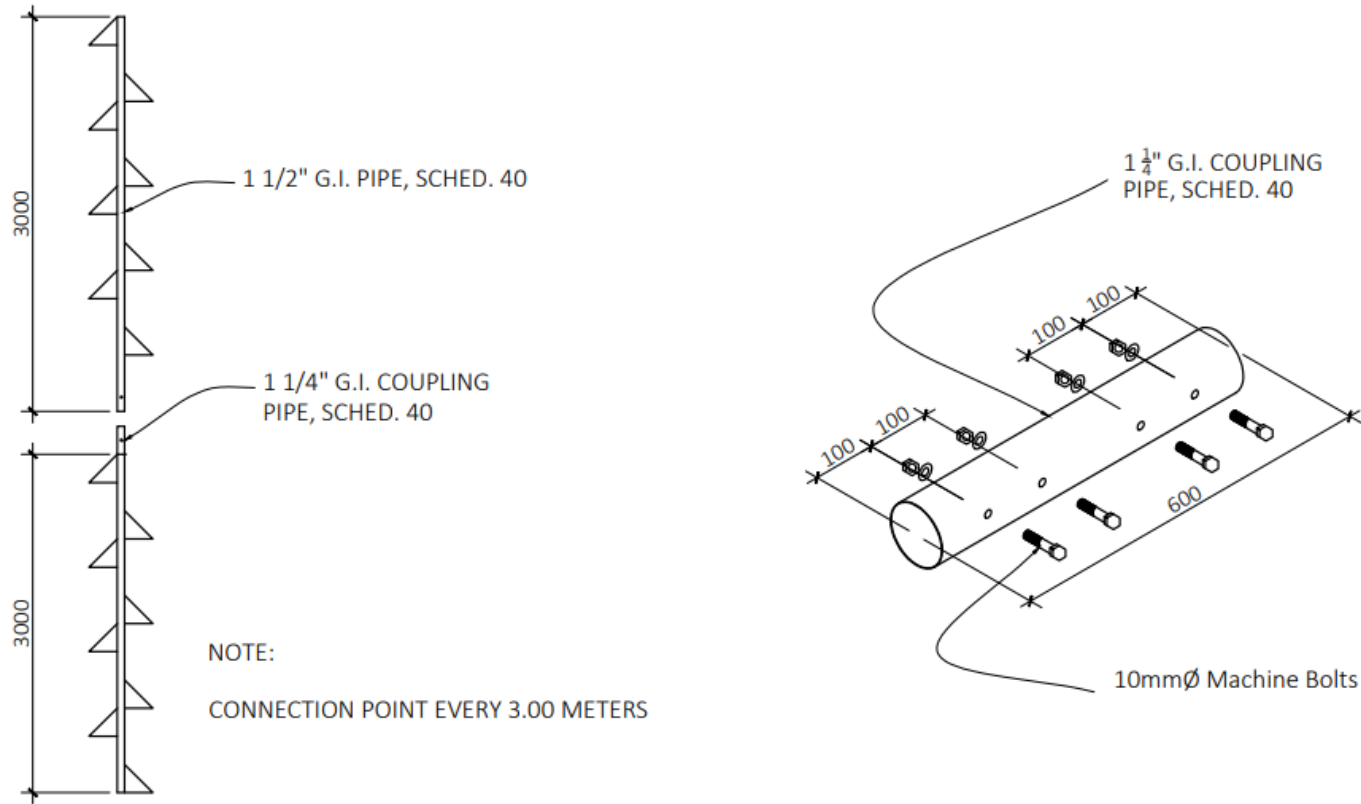
**300MM X 300 MM
ANCHORAGE POST DETAILS**



ANCHORAGE DETAILS



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PIPE CONNECTION DETAILS



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E. SCHOOL LIST

	Name	Latitude/Longitude	Estimated Mast/Tower Heights (Ft)				E AC1200 Routers	F 16-port Gigabit Switch	G 16-Port L2 Manage Switch	H Enterprise Router	I Data cabinet	J PTP Backhaul Radio	K PTP/PTMP Radio	L with Fiber Connection
			A 20	B 21-45	C 46-79	D 80-100								
1	Aplaya ES	6.73809688411889, 125.380133373271			1		1	1	1	1				
2	Aplaya HS Ext.	6.737175,125.380198					1	1					1	
3	Arcaflor Maniapao ES	6.78386075221423, 125.31320836007			1		1	1				2		
4	Badiang ES	6.76975629043779, 125.382985082608				1	1	1				2		
5	Bagumbuhay ES	6.72995806665326, 125.308459748962				1	1	1				2		
6	Balabag ES	6.81012501093951, 125.280948169019		1			1	1				2		
7	Balabag NHS	6.81245163323974, 125.276582654469			1		1	1				2		
8	Binaton ES	6.83790871647384, 125.351373999017		1			2	2	1		1	2	1	
9	Casildo B. Nonol Sr. ES	6.78024653760049, 125.287589719335			1		1	1				2		
10	Cogon ES	6.75900572004886, 125.369455159901				1	1	1				2		
	SCHOOL	Latitude/Longitude	A	B	C	D	E	F	G	H	I	J	K	L



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11	Colorado ES	6.76090603757434, 125.295813202793				1	1	1				2		
12	Damñas ES	6.8129362245543, 125.285060933526				1	1	1		1	1	2		
13	Dawis ES	6.72973762478208, 125.364764529431					1	1					1	
14	Dawis NHS	6.73059310497446, 125.364724977674			1		1	1				2		
15	Division Office	6.749692, 125.358361			1		3	1	1	1	1	2	2	
16	Domingo V. Abawag Sr. ES	6.75158317464695, 125.321551791764			1		1	1				2		
17	Dulangan ES	6.80006192675889, 125.308682401346			1		1	1				2		
18	Federico J. Alferez ES	6.81276635755878, 125.301527327416			1		1	1				2		
19	Gaudioso M. Reusora CES and District Office	6.77207958788072, 125.365375436832					1	2	2			2	1	
20	Goma NHS	6.81277458861686, 125.30066102869		1				1	1			1		
21	Igpit ES	6.73459444818953, 125.326088337579			1			1	1			2		
22	Igpit NHS	6.73400372658387, 125.329091533108			1			1	1			2		
23	Igpit SHS in Digos City	6.73742595654092, 125.325065774441		1				1	1	1	1	2		
24	Jolencio R. Alberca ES	6.77489919931421, 125.338714322382					1	1	1			2		
	SCHOOL	Latitude/Longitude	A	B	C	D	E	F	G	H	I	J	K	L



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25	Kibanban ES	6.78727971571384, 125.372402339236				1	1	1					2	
26	Lungag ES	6.79180287506824, 125.276851500884				1	1	1		1	1	2		
27	Mahayahay ES	6.79965372025442, 125.290805489025		1			1	1					2	
28	Matti NHS	6.76141138439461, 125.309319431257			1		1	1					2	
29	Pedro S. Garcia ES	6.75510130193007, 125.388115289701				1	1	1					2	
30	Ranao ES	6.83560856188239, 125.324783479533				1	1	1					2	
31	Remedios N. Saplala ES & District Office	6.77063418134784, 125.310038164745				1	2	2	1	1	1			1
32	Ruparan ES	6.7918475496075, 125.323163110956	1				1	1					1	1
33	Ruparan NHS	6.79099429708703, 125.32384229396		1			1	1					2	
34	Soong ES	6.81257979090437, 125.355119199197				1	1	1					2	
35	Soong NHS	6.81690048529798, 125.354408241787	1			1	1	1			1		2	1
		Items for Contingency Purposes ->					2	2	1	1				3
		TOTAL	2	6	12	14	42	40	5	7	8	10	52	10

Prepared by:

 Contractor