CHAPTER-1
Introduction

Steel Building systems are an excellent solution to the numerous complications related to constructing in the traditional way. Pre-engineered steel buildings are the latest in the field of pre-fabricated building and they offer numerous benefits. Some of the benefits are.
These prefab buildings are very environment friendly since steel is a recyclable steel and can be used over and over again. Thus after pre-engineered steel buildings are demolished; the steel can be further utilized instead of lying in heaps and adding to environmental pollution.

Most of the pre-engineered buildings (PEB) built these days are based on the green concept, they are designed and built in such a way that they save maximum energy and have a minimal impact on the environment. Some of the features of a green building are energy efficiency, made up of an environment friendly material and offers a healthy and conducive indoor living environment.

Steel as a building material offers numerous benefits such as ease to build, easy to maintain, fire high durability and the ability to recycle. But it is important to choose a good quality steel building supplier so that the steel material used is of the best quality and offers all of the above mentioned benefits.

Pre-engineered buildings are built with extreme precision and dimensional accuracy due to the fact that they are manufactured in-house and then assembled at the construction site. This precision and dimensional accuracy ensure maximum efficiency and proper utilization of space.

Although steel is an expensive metal, yet when the overall savings due to a steel building are considered, then it comes out to be a very cheap and affordable building material. By applying a special coating on steel, it can be made rust proof. Moreover it is insect and termite resistant and the maintenance cost associated with steel is much lower as compared to other benefits. A properly built building from a reputed steel building supplier is very durable and is resistant to extreme weather conditions.

Pre-Engineered Building (PEB) is becoming more and more popular all over the world. With steel structural H beam as the main frame, the warehouse appears more beautiful in shape and it can satisfy the demand of several of shapes designed to meet different demands. Decorative curtain walls can be easily assembled on the steel structural members too. Meanwhile, steel structure have to better anti-seismic performance up to eight grade earthquakes.

1.1 Objectives

- To increase longevity of steel structure through galvanizing.
- To minimize construction budget with maximum stability.
- To make a lighter structure.

1.2 Why Steel Structure?

I. Saving of Construction Time.
II. Re-use of Steel Materials.
III. Reposition of the Structure.
IV. High Structure Strength, Better Uniformity.
V. Better Elasticity, Durability, Toughness of Structure.
VI. Easily Extendable To Existing Structure.
VII. Quick And Easy Installation.
VIII. Suitable for large span.
IX. High Re-sale Value.
X. Life-safety.

The size of buildings in the commercial, institutional, and industrial market segment ranges from a few hundred to as much as 45,000 square meters (500,000 square feet). All of these buildings have public access and exit requirements, although their populations may differ considerably in density.

Steel is a major structural material in these buildings. It is a strong and stiff material and yet relatively inexpensive, and it can be quickly fabricated and erected, which saves construction time. Although steel is noncombustible, it starts to lose strength when heated above 400° C (750° F), and building codes require it to be fireproofed in most multistory buildings.

1.3 Application of Steel building:

The most application of Pre Engineered Building(PEB) are as follows:

Industrial:
Factories, Workshops, Warehouses, Cold stores, Car parking sheds, Slaughter houses, Bulk product storage.
Commercial:
Showrooms, Distribution centers, Supermarkets, Fast food restaurants, Offices, Labor camps, Service station,
Shopping centers, Schools, Exhibition halls, Hospitals, Theatres/auditorium, Sports halls.
Institutional:
Schools, Exhibition halls, Hospitals, Theatres, Sport halls.
Recreational:
Gymnasium, swimming pool enclosures, Indoor tennis courts.
Aviation & Military:
Aircraft hangers, Administration buildings, Residential barracks.

1.4 Codes Maintains of Steel Building:

- Bangladesh National Building Code(BNBC)
- Metal Building System Manual –Metal Building Manufactures Association(MBMA)
- Manual of Steel Construction , Allowable Stress Design –American Institute of Steel Construction , Inc.(AISC)
- Cold-Formed Steel Design Manual – American Iron and Steel Institute(AISI)
- Structural Welding Code-Steel, American Welding Society(AWS) [1]

1.5Use of Software Designing & Detail:

All structures are design & detailed using the most advanced metal building software –

- AutoCAD
- Staad Pro
- TEKLA structures and others

CHAPTER-2

LITERATURE REVIEW

2.1 Length of Steel structure: Distance between the outside flanges of end wall columns or distance between the steel lines both end walls. The length of can be extendable in future. The dimensions is as per Customer required.

2.2 Height of steel structure: The distance from the bottom of main frame column base plate and the eave strut in the case of recessed or elevated columns, eave height is the distance from finished floor to top of the eave strut. The dimensions is as per Customer required.

2.3 Width of steel structure: The distance between the outside of eave struts of both side wall facing.

2.4 Roof Slope of Steel structure: Angle of the roof with respect the horizontal any practical roof slope is possible. The most common roof slopes are 1:10 & 1:20.any practical roof slope possible as per customers required.

2.5

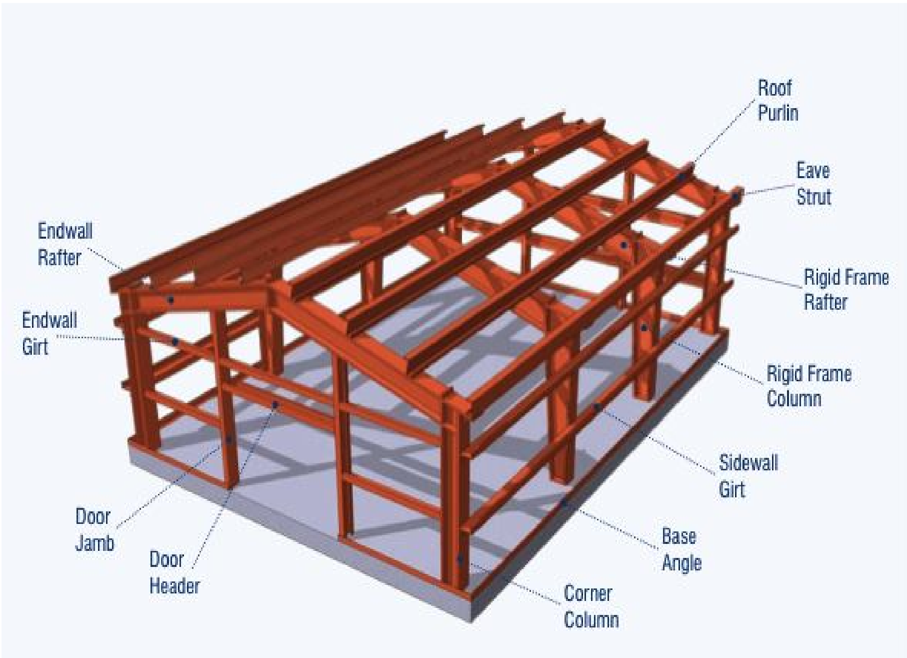

Figure 1.1: TEKLA Model

2.6 LOADS SYSTEMS OF STEEL BUILDING

2.6.1 Design of Loads: Unless otherwise specified per-engineered buildings are designed for the following minimum loads. The designed loads play a crucial role in case of steel Structural or PEB. The failure of the structures occurs if not properly designed for loads. The determination of the loads acting on a structure is a complex problem. The nature of the loads varies essentially with the architectural design, the materials, and the location of the structure.

2.6.2Live Load (LV): The second vertical load that is considered in design of a structure is imposed loads or live loads. Live loads are either movable or moving loads without any acceleration or impact. These loads are assumed to be produced by the intended use or occupancy of the building including weights of movable partitions or furniture etc. Usually Steel building are designed for live Load 0.57 Kn/m square.

2.6.3Dead Loads (DL): The first vertical load that is considered is dead load. Dead loads are permanent or stationary loads which are transferred to structure throughout the life span. Dead load is primarily due to self-weight of structural members, permanent partition walls, fixed permanent equipment and weight of different materials. It majorly consists of the weight of roofs, beams, walls and column etc. which are otherwise the permanent parts of the building. In estimating dead loads, the actual weights of materials and constructions shall be used, provided that in the absence of definite information, the unit weights calculate of dead load Steel=77.00kn/m3,CastIron=70.7kn/m3,Stone=24.00kn/m3,Concrete=24.00kn/m3,Tiles=26.4kn/m3,windowglass=25.50kn/m3,Brick wall=18.9kn/m3,aluminium=27.00kn/m3.

2.6.4Wind Load (WL): Wind load is primarily horizontal load caused by the movement of air relative to earth. Wind load is required to be considered in structural design especially when the heath of the building exceeds two times the dimensions transverse to the exposed wind surface. The structural systems of tall buildings must carry vertical gravity loads, but lateral loads, such as those due to wind and earthquakes, are also a major consideration. Maximum 100-year-interval wind forces differ considerably with location; in the interiors of continents they are typically about 100 kilograms per square meter (20 pounds per square foot) at ground level. In coastal areas, where cyclonic storms such as hurricanes and typhoons occur, maximum forces are higher, ranging upward from about 250 kilograms per square meter (32kg per square foot). Wind forces also increase with building height to a constant or gradient value as the effect of ground friction diminishes. The maximum design wind forces in tall buildings are about 840 kilograms per square meter (170 pounds per square foot) in typhoon areas.

2.6.5Earthquake Loads (EL): Earthquake or seismic forces, unlike wind forces, are generally confined to relatively small areas, primarily along the edges of the slowly moving continental plates that form the Earth's crust. When abrupt movements of the edges of these plates occur, the energy released propagates waves through the crust; this wave motion of the Earth is imparted to buildings resting on it. Steel buildings are light and flexible and are usually little damaged by earthquakes; masonry buildings are heavy and brittle and are susceptible to severe damage. Continuous frames of steel or reinforced concrete fall between these extremes in their seismic response, and they can be designed to survive with relatively little damage.

2.6.6RoofSnow Load (SL): Snow loads constitute to the vertical loads in the building. But these types of loads are considered only in the snow fall places.[6]

2.7 Description of Foundations systems:

The foundations in these buildings support considerably heavier loads than those of RCC buildings. Floor loadings range from 450 to 1,500 kilograms per square meter (100 to 300 pounds per square foot), and the full range of foundation types is used for them. Spread footings are used, as are pile foundations, which are of two types, bearing and friction. A bearing pile is a device to transmit the load of the building through a layer of soil too weak to take the load to a stronger layer of soil some distance underground; the pile acts as a column to carry the load down to the bearing stratum. Solid bearing piles were originally made of timber, which is rare today; more commonly they are made of precast concrete, and sometimes steel H-piles are used. The pile length may be a maximum of about 60 meters (200 feet) but is usually much less. The piles are put in place by driving them into the ground with large mechanical hammers. Hollow steel pipes are also driven, and the interiors are excavated and filled with concrete to form bearing piles; sometimes the pipe is withdrawn as the concrete is poured. An alternative to the bearing pile is the caisson. A round hole is dug to a bearing stratum with a drilling machine and temporarily supported by a steel cylindrical shell. The hole is then filled with concrete poured around a cage of reinforcing bars; and the steel shell may or may not be left in place, depending on the surrounding soil. The diameter of caissons varies from one to three meters (three to 10 feet). The friction pile of wood or concrete is driven into soft soil where there is no harder stratum for bearing beneath the site. The building load is supported by the surface friction between the pile and the soil.

2.8 PRIMARY FRAMING SYSTEMS OF STEEL STRUCTURE

2.8.1 Define of primary framing systems:

Primary farming systems is a welded formed produce, this fabrication process. Commonly used framing systems are symmetrical about the ridge. Unsymmetrical framing about the ridge and multi -framing systems with unequal width modules are possible also as per client requirement. Generally frames members are assumed to be joined together so as to transfer only the axial forces and not moments and shears from one member to the adjacent members. The loads are assumed to be acting only at the nodes of the Frames. The frames may be provided over a single span, simply supported over the two end supports, in which case they are usually statically determinate. Such trusses can be analyzed manually by the method of joints or by the method of sections. Computer programs are also available for the analysis of steel building Frames.

2.8.2Description of Various Framing:

A. Clear Span (CP)
B. Single Span (SP):
C. Single Slope (SSL)
D. Multi Span (MS)
E. Multi Gable (MG)

2.8.2A Clear span (CP): The Clear Span Steel Building is one of the most versatile structures on the market, and with design-build and stock options, there is a Steel Building for any building need. These sturdy steel buildings have a clear span design with no support posts, maximizing the amount of usable space and ensuring that there is plenty of room to maneuver and operate machinery. No matter where this structure is built, the Clear Span Steel Building can be designed to meet local building codes and snow or wind loads. Clear span framing is preferred for garments factory building, warehouses workshops & railway station. This building width: 16' to 60' height: 8' to 40' and over.

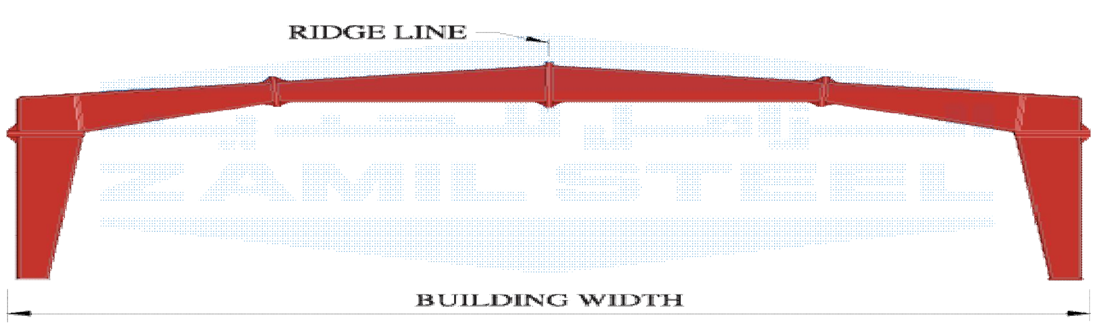

Figure 1.2: Clear Span (CP)

2.8.2B Single Span (SP): The primary benefit of single span construction is unobstructed covered space without interior columns. Single-span Steel Building can reach widths over 200 feet for extended flexibility of design and function. Single-span steel building frames is preferred for auditoriums, gymnasiums, aircraft hangars, warehouses and recreational facilities, where unobstructed space is desired.

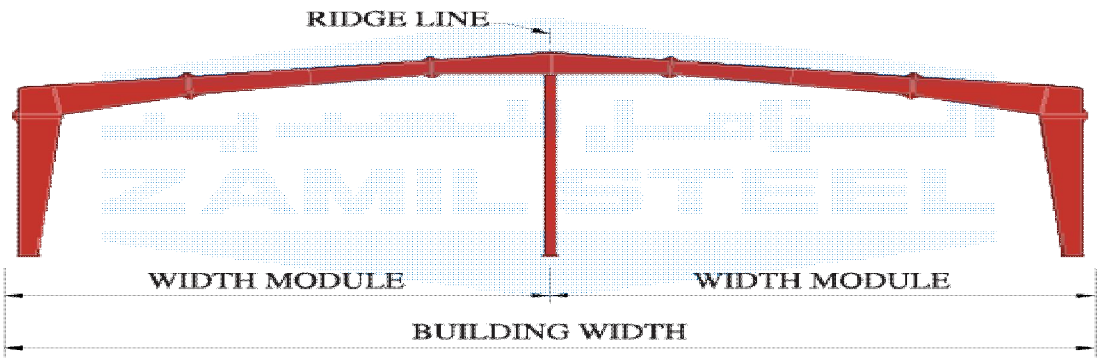

Figure 1.3 Single Span (SP)

2.8.2C Single Slope (SS): Single sloped building designs are used for a multitude of building types, from shopping centers, cur parking, sports ground, and storage facilities. They are a great choice when interior columns do not impair the function of the building and where it is advantageous to have one-way roof drainage.

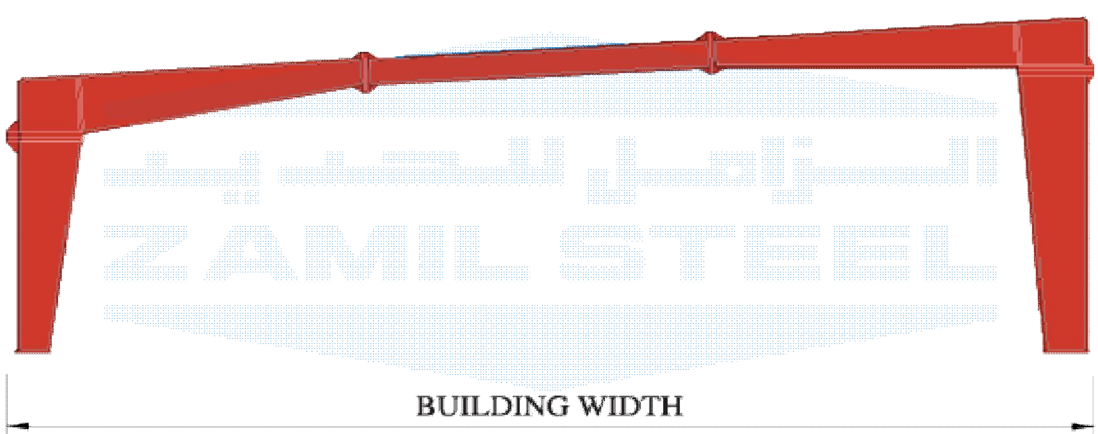

Figure 1.4 Single Slope (SS)

2.8.2D Multi Span (MS): Similar to single span construction, multi-span steel buildings use beams and pillars for support functions. Multi-span construction is also called column and beam, post and beam or modular frame. A minor disadvantage to multi-span construction is the need for expansion joints every 300 feet for stability. Additional beams interrupt the space and the columns, once set, cannot be moved if you wish to remodel later. Also, there may be uneven ground movement underneath the continuous framing that is more obvious with a longer, wider structure.

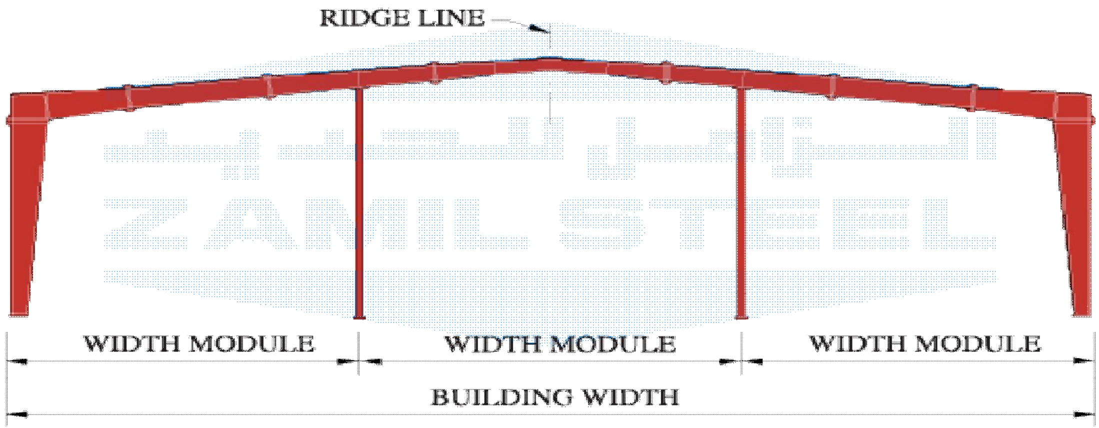

Figure 1.5Multi Span (MS)

2.8.2E Multi Gable (MG): Multi gabled rigid steel building frame with variable depth columns and uniform or variable depth rafter sections supported by intermediate columns, with ridge at center of frame. Multigable Width 10M to 180M and over, Height: 6M to 18M and over, Standard roof slope: 1: 24. Uses of warehouses, Distribution Centers, Manufacturing building, Industrial building, or other facilities where high eave height or large square footage is required

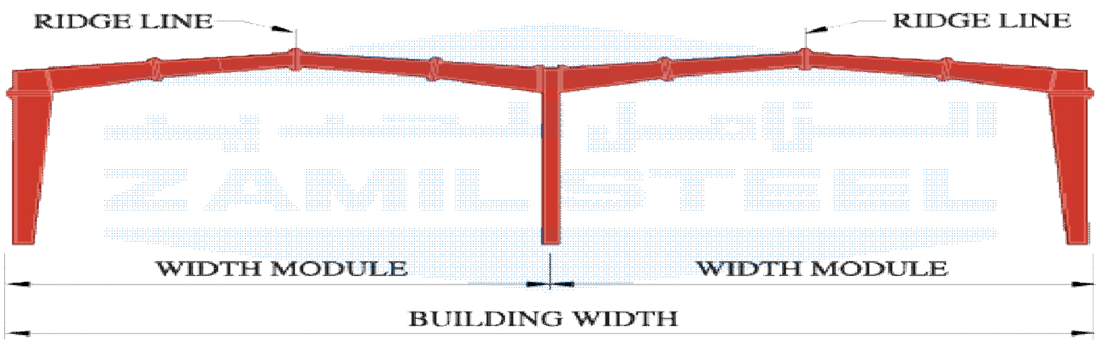

Figure 1.6Multi Gable (MG) **[5]**

2.9 COMPONENT OF PRIMARY FRAMING SYSTEMS (Steel Column):

A Steel Columns may also a fabricated by welding formed, a Structural Steel Member of rolled shapes Like H or I Type, this vertically loaded carry to the foundations. However a part of the horizontal actions is also transferred through the columns. Steel Column transfer different types of load: tension forces and shear forces. A connection between others structural elements.

Figure 1.7 Steel Column [2]

2.10 SECONDARY FRAMING SYSTEMS OF STEEL STRUCTURE

2.10.1 Define of Secondary framing Systems: Secondary framing is almost exclusively made from light gauge, roll-formed steel shapes such as C' and Z' Type. This part of the frame includes the purling & cable Bracing, Sag Rod, which support the roof and grits used to support the wall panels. Eave struts define the transition from the sidewall to roof framing, and the rake angle defines the edge where the roof and end wall meet. Jambs, headers, and sills for framed openings are also typically included in this group.

2.10.2 C & Z Type Purling: C & Z Type purling is a cold formed manufacture product, supported by steel joists rafter to rafter or beams .Purling are generally lightweight, channel-shaped, z-shaped, or top hat-shaped, and are used to span roof trusses. Purling are the uppermost element of the erected structural

Steel and they support the roof panel & wall panel. If the purling are channel-shaped, they are installed with the legs of the channel facing outward or down the slope of the roof. The purling installed at the ridge of a gabled roof are referred to as ridge struts. The purling units are placed back-to-back at the ridge and tied together with steel plates

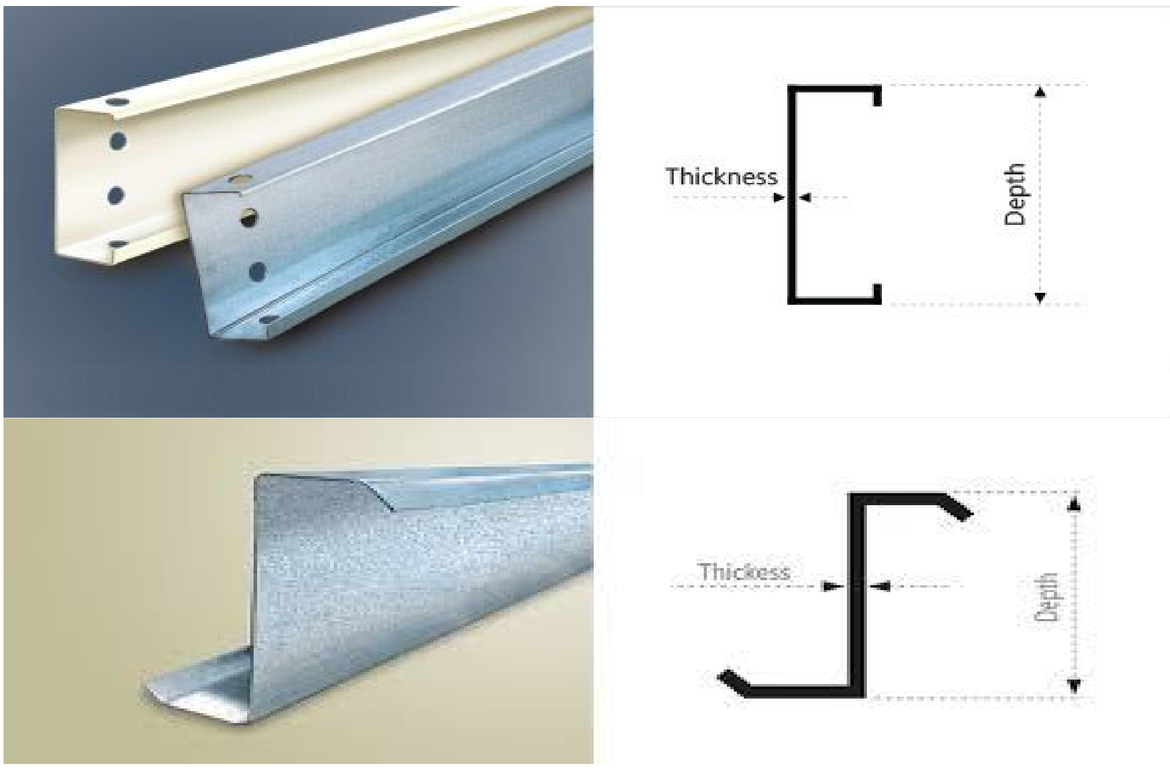

Figure 1.8 C & Z Type Purling [3]

CHAPTER-3

DESIGN AND FABRICATION METHODS

3.1 Materials Specification Table:

S/L	Components	Specifications	M. Yield Strength	Applicable Design Code
1	Hot Rolled	ASTM A-572 or ASTM A36	Fy=34.5kn/cm2	American Institute of Steel Construction (AISC)
2	Cold Formed (Z275)	Galvanized (Z275)	Fy = 34.5 kN/cm^2	American Institute of Steel Construction (AISC)
3	MS Plate (Column, Beam, Rafter)	ASTM A-572 or ASTM A36	Fy=34.5kn/cm^2	American Institute of Steel Construction (AISC)
4	Anchor bolt	ASTM A36	Fy = 40.0 kN/cm^2	American Institute of Steel Construction (AISC)
5	Mezzanine Deck	Galvanized (Z275) or ASTM A-653	Fy = 34.5 kN/cm^2	American Institute of Steel Construction (AISC)
6	Purlin	Galvanized (Z275) or ASTM A-653	Fy = 34.5 kN/cm^2	American Institute of Steel Construction (AISC)
7	X-Bracing	Galvanized Cable bracing	DIN 3066	American Institute of Steel Construction (AISC)
8	High strength Bolts (Galvanized)	ASTM A325	Ft = 30.3 kN/cm^2 Fu = 72 to 83 kN/cm^2	American Institute of Steel Construction (AISC)
9	Color Coating Sheet	Galvanized (Z275) or ASTM A-653	Fy = 34.5 kN/cm^2	American Institute of Steel Construction (AISC)
10	Angle	ASTM A-36	Fy=23.5kn/cm2	American Institute of Steel Construction (AISC)

3.2

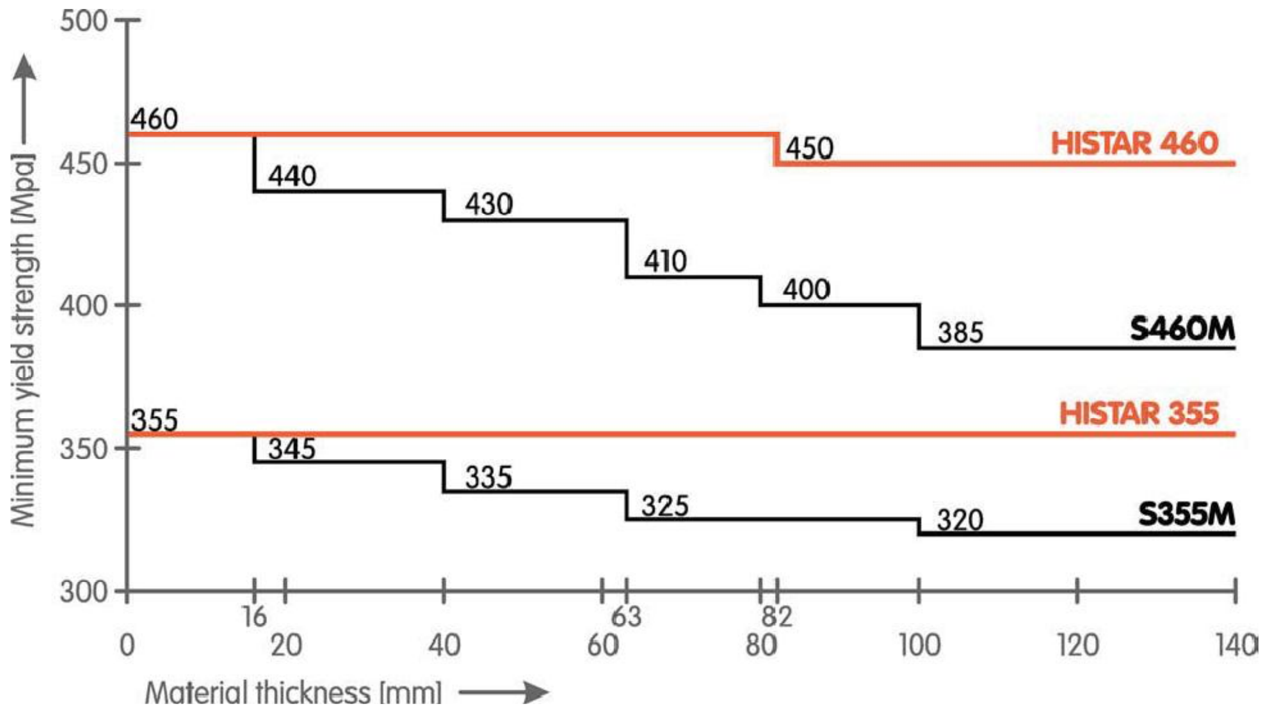

Figure 1.9 Curve of Steel Materials Design [5]

3.3 Description on Fabrication: Steel Building fabrication is the creation of metal structures by cutting, bending, and assembling processes. It is a value-added process involving the creation of machines, parts, and structures from various raw materials. Typically, a fabrication shop bids on a job, usually based on engineering drawings, and if awarded the contract, builds the product. Large fabrication shops employ a multitude of value-added processes, including welding, cutting, forming and machining.

3.3.1 Cutting: In this process rolled metal plates are cut into the desired dimensions for the preparation of flanges and web. It is done by CNC profile cutting plasma ox fuel/ shearing YSD.

3.3.2 Detailing: In this process, punching, drilling, flange splicing and flange punching processes take place the flange & web

3.4 Welding & Grinding and Drilling Processes:

3.4.1 Gas Metal Arc Welding (GMAW)

The Gas Metal Arc Welding (GMAW) is a class of welding which uses an electrical welding arc and a covering gas. The arc is produced by a metal electrode which serves also as filler material. The function of the gas is to cover the melting pool for either protect it completely from oxidation or supply the process with active gas components to control the metallurgy process.

3.4.2 Metal Inert Gas Welding (MIG)

The Metal Inert Gas (MIG) process uses mostly argon, helium or a mixture of both. The purpose of the inert gases is to cover the welding process against reactions with oxidizing atmospheric gases. One of the most utilized materials for MIG welding is aluminum. It is sensitive to oxidation and aluminum-oxide is a hard and resistant shell which melt at high temperature. Its melting point is at about 2050◦C while pure aluminum melts at 660◦C. This is one reason why aluminum welding is more complicated, as the for high temperature resistant aluminum-oxide skin must be breached, while the pure aluminum body is already melting some thousand grades Celsius below

3.4.3 Metal Active Gas Welding (MAG):

Adding an active gas like oxygen or carbon oxide gives the Metal Active Gas (MAG) welding the effect of improving the arc stability due to better ionization in the arc track. For carbon steel and low alloy steels carbon dioxide deepens the penetration of the material but increases the sputter loss. Adding oxygen grows the weld pool, the penetration and arc stability but a higher oxidation of the welding material occurs, with a loss of silicon and manganese, which can change the metallurgy of alloyed steel.

3.4.4 Manual welding: Special joints are taken care in this section and the welding is done by manual procedure. Also, proper inspection of welding is done in this section. It is also commonly termed as final welding.

3.4.5 Drilling: Drilling is a process that uses a drill bit to cut a hole of circular cross-section in web, flange &, joint cleat, base plate, the drilling hole are connected by two parts and connected to Nut & Bolt.

3.4.6Finishing (Grinding): The Steel structural members coming out of manual welding whose surfaces are not suited for painting or galvanizing as well as an aesthetic point of view. Members have gone through a thorough welding process, the surface needs to polish/finished well. The members after finishing are also treated with sandblasting process which helps in providing a firm base for coating purpose.

3.4.7 Galvanizing: Well finished Steel structural members are brought to the galvanizing zone. Galvanizing is done to prevent the corrosion of steel from atmospheric actions and to achieve long-lasting durability. The proper dry environment is maintained in painting section and the required coat thickness of paint is achieved in DFT (dry finished thickness) and inspected by DFT meter. The galvanizing coat thickness requirement varies from customer to customer as per the climatic conditions in which the structure is to be sustained .The galvanizing coat applied as per the customer's requirements

3.5 ACCESSORIES

3.5.1 Connection Fastener: This is Cold Formed produce, a fastener is a hardware device that mechanically joins or affixes two or more objects together. In general, fasteners are used to create non-permanent joints that is joints that can be removed or dismantled without damaging the joining components. Welding is an example of creating permanent joints. Steel fasteners are usually made of stainless steel, carbon steel, or alloy steel. Fasteners can also be used t such as a Column to beam, rafter to purling & roof & wall sheeting may involve keeping non-permanent joint together.

Figure 2.1 Nut & Bolt

Figure 2.2: Roof & Wall Screw.

3.5.2 All Accessories of PEB

Figure 2.3 All Accessories of PEB [6]

3.6 PROJECT MODEL

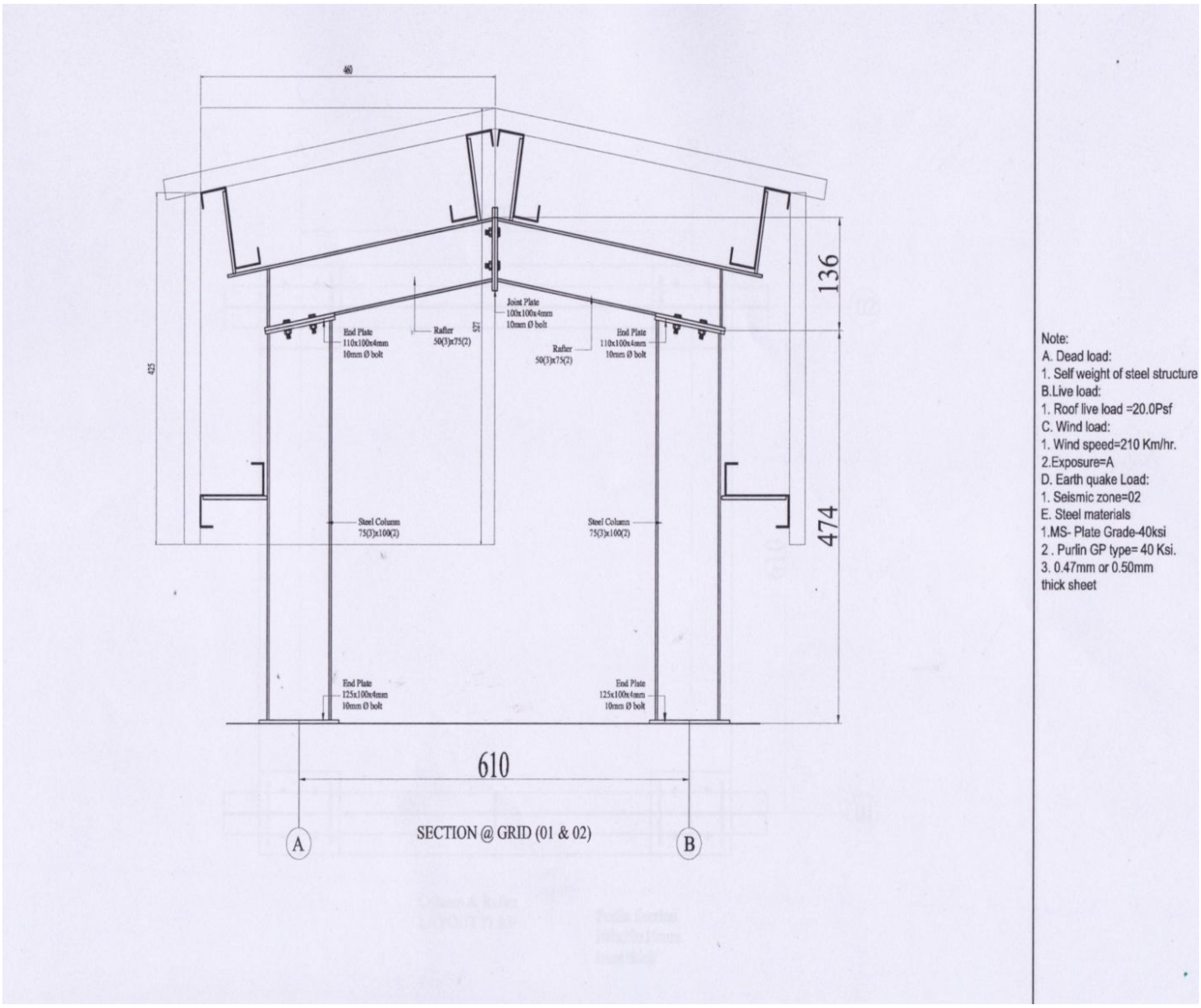

Figure 2.4 2D Drawing of Model

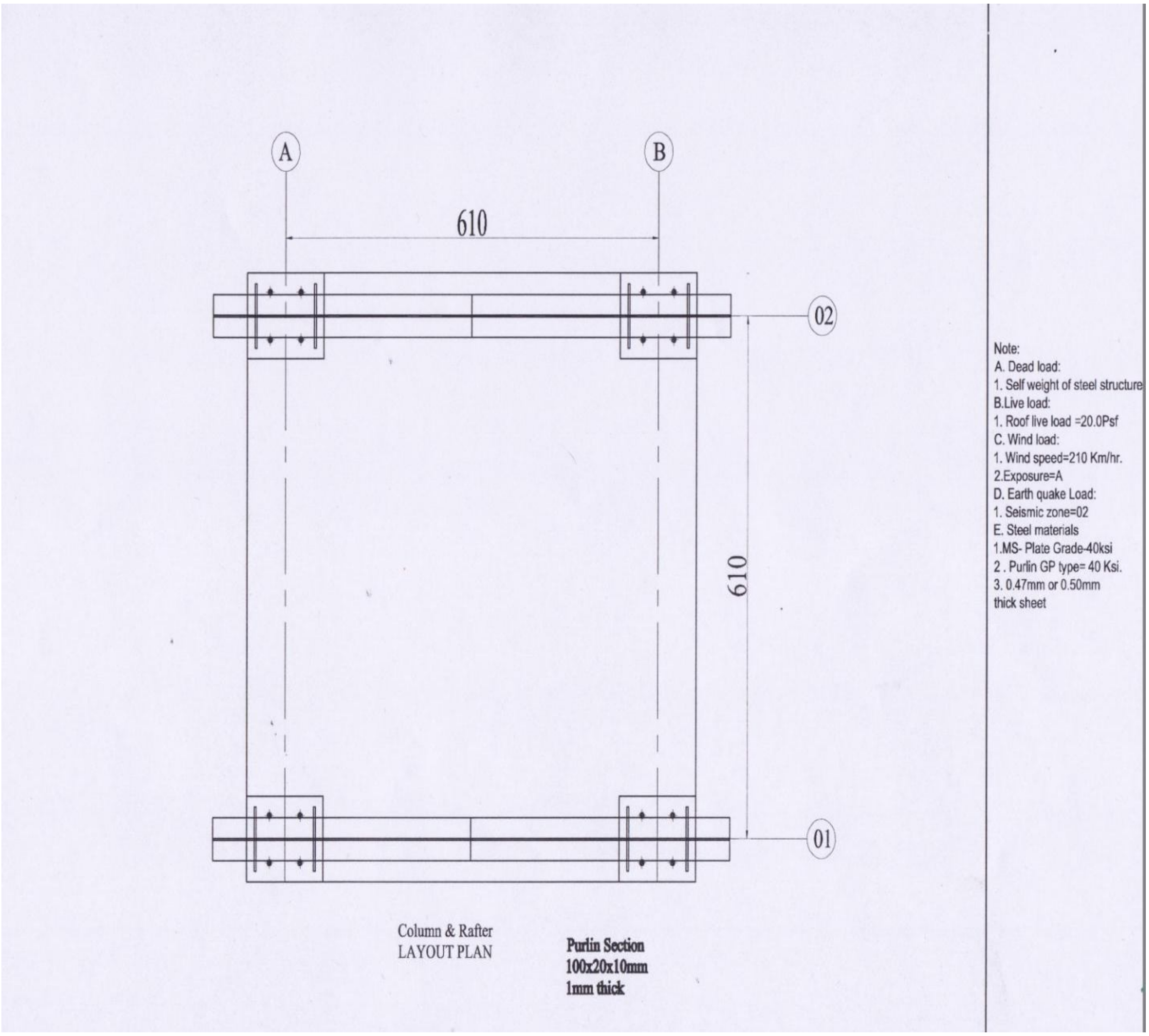

Figure 2.5 Column & Rafter Layout Plan of Model

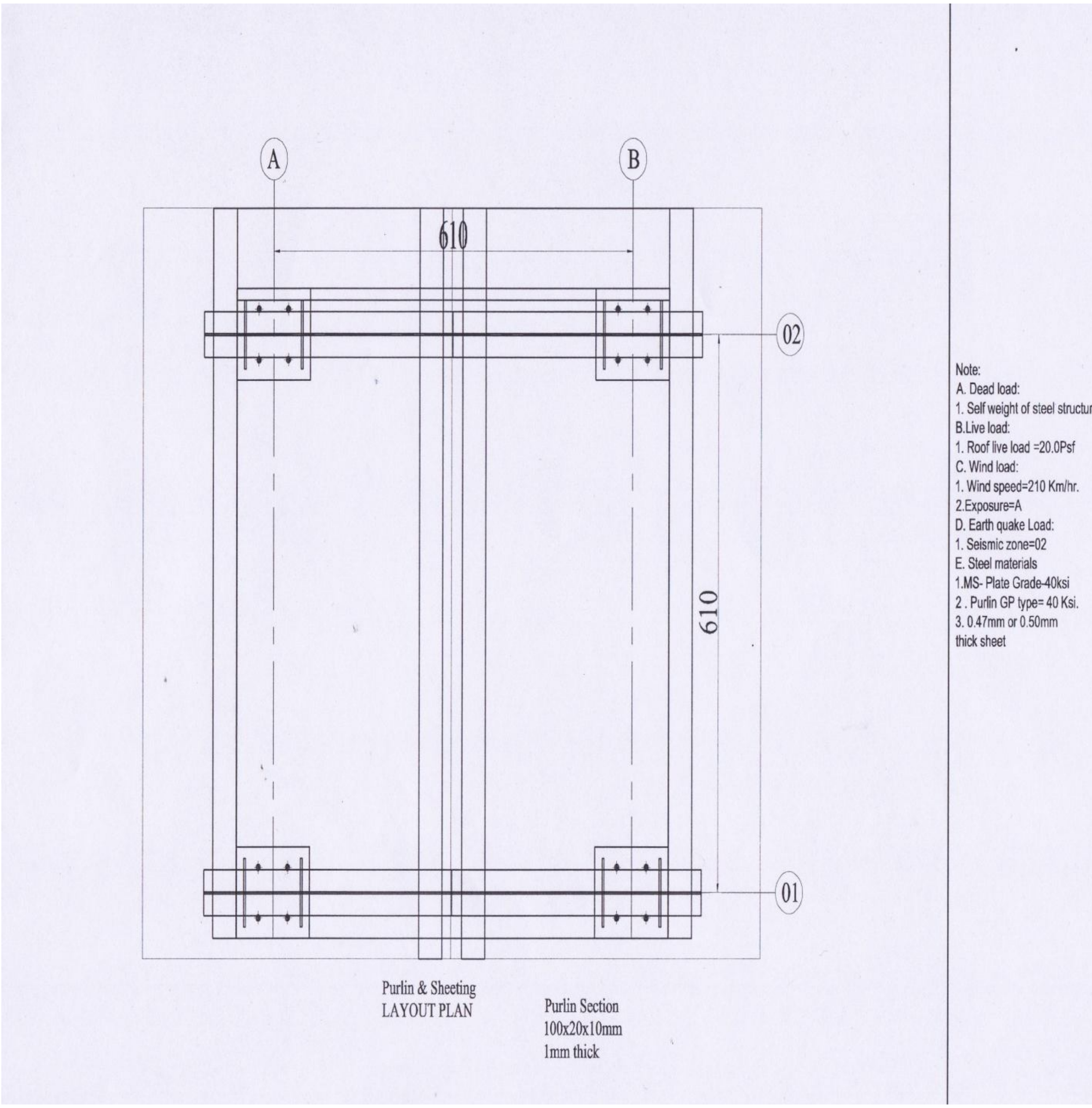

Figure 2.6Purling & Sheeting Layout Plan of Model

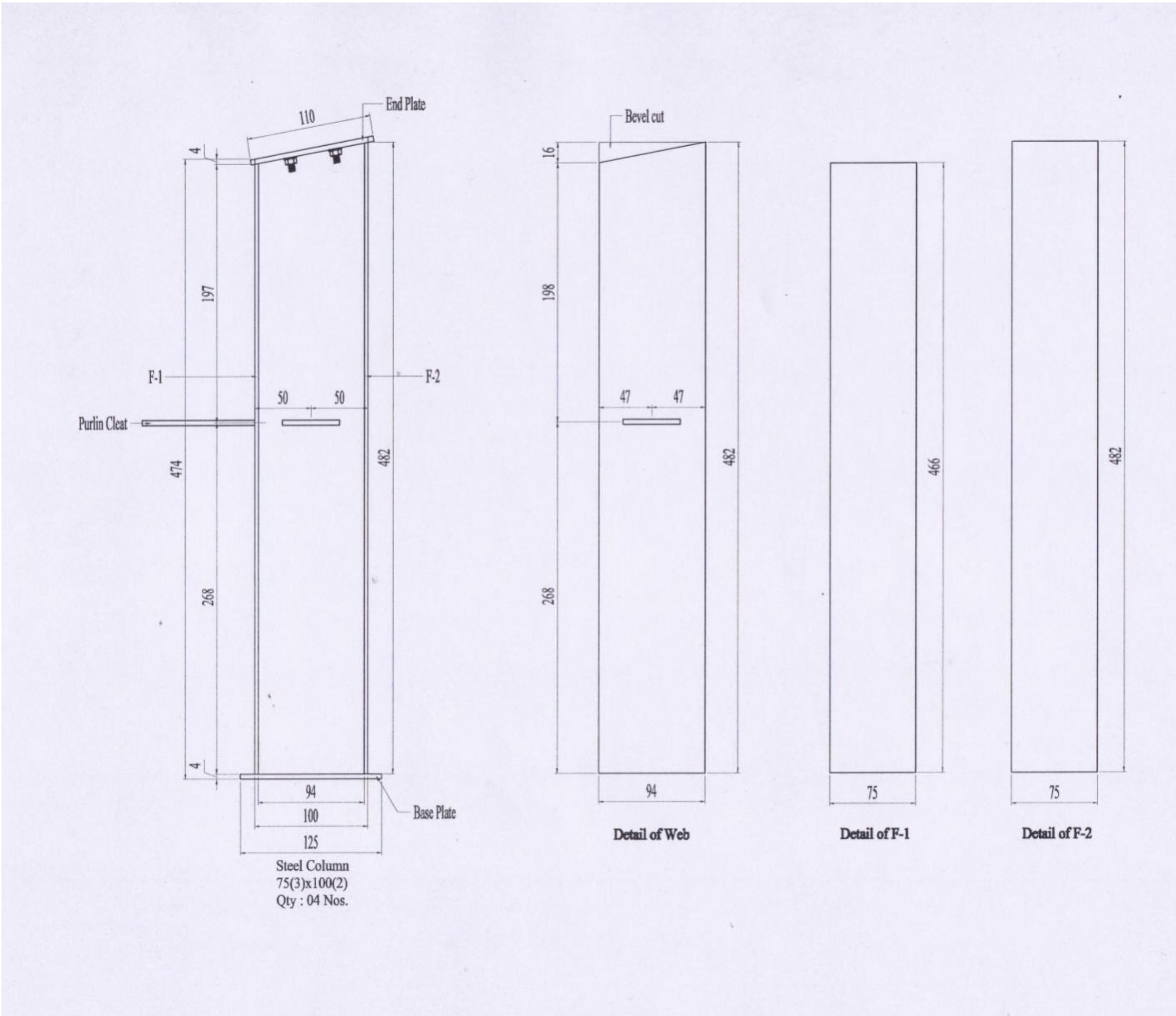

Figure 2.7 Column Fabrication Drawing of Model

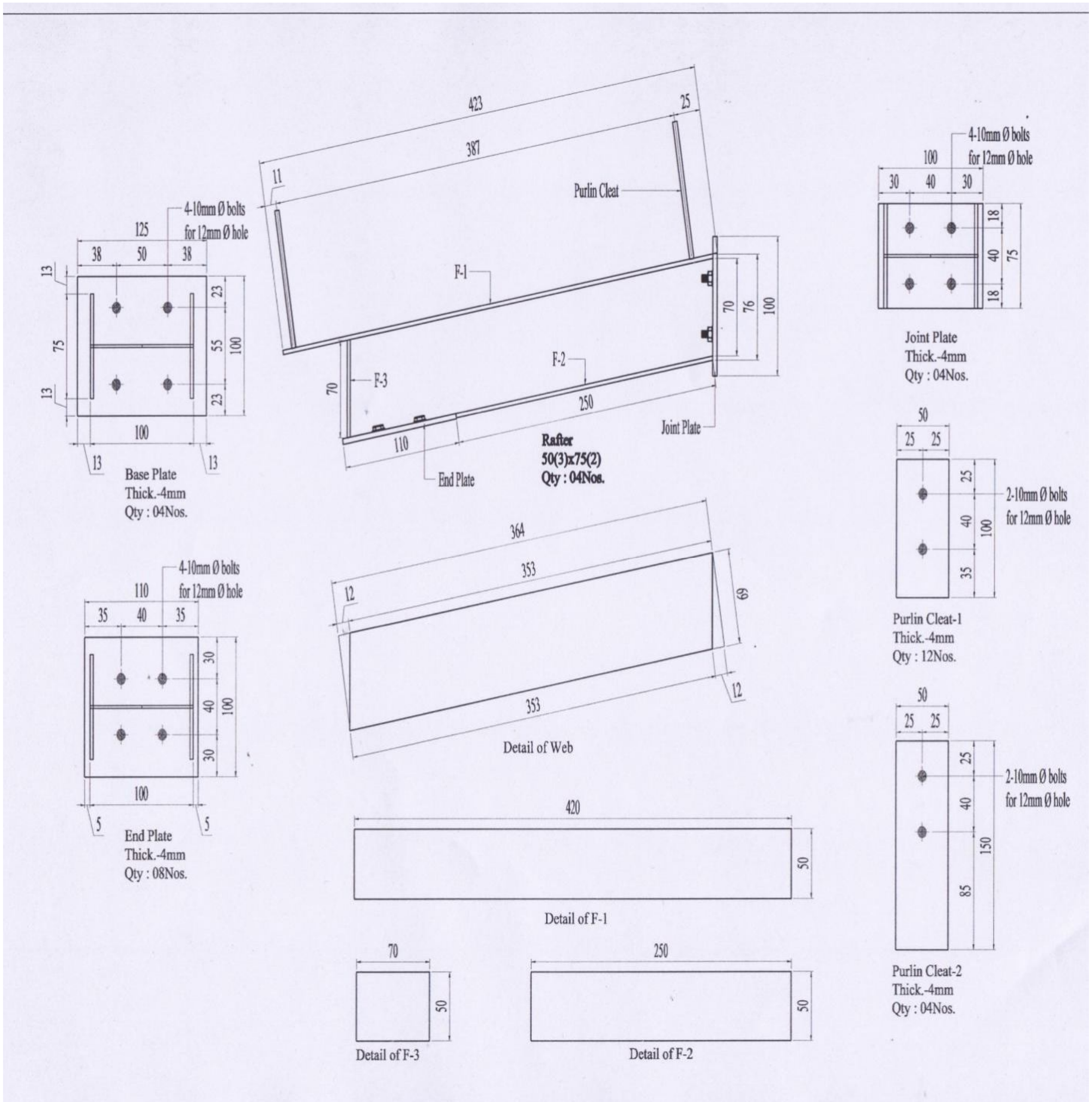

Figure 2.8 Rafter &Cleat Fabrication Drawing of Model

Figure 2.9 MS Cutting Plate for Model

Figure 3.1 Thesis Model on Fabrication

Figure 3.2 Thesis Model on Fabrication

3.7 Model Detailing Summery Sheet.

Job Name **Estimate of Roof & Wall Sheet of Model**

Section : **Estimate MS Plate of all Column, Rafter, Beam, Bracing & Joint Plate**

Sl	Piece Mark	Length (mm)	Width-1 (mm)	Width-2 (mm)	Average Width(mm)	Thickness (mm)	Quantity (nos)	Weight (kgs)
1	SC-1 (Web-1	482	94	94	94	2	4	2.8
2	SC-1 (Flange-1	466	75	75	75	3	4	3.3
3	SC-1 (Flange-2	482	75	75	75	3	4	3.4
8	R-201 (Web-1	364	69	69	69	2	4	1.6
10	R-201 (Flange-1	420	50	50	50	3	4	2.0
11	R-201 (Flange-2	250	50	50	50	3	4	1.2
12	R-201 (Flange-3	70	50	50	50	3	4	0.3
37	BP-1	125	100	100	100	4	4	1.6
38	EP-1	110	100	100	100	4	8	2.8
40	JP-1	100	75	75	75	4	4	0.9
42	Purling Cleat-1	100	50	50	50	4	12	1.9
43	Purling Cleat-2	150	50	50	50	4	4	0.9
							Total	**22.7**

Section : **Estimate of Wall & Roof Purling & Sag Rod**

Sl	Piece Mark	Length (mm)	Width (mm)	Thickness (mm)	Quantity (nos)	Weight (kgs)
1	RP-1	820	160	1.00	6	6
2	RP-2	724	160	1.00	2	2
					Total=	8

Section : **Estimate of Roof & Wall Sheet.**

SL	Price Mark	Length mm	Width mm	Thick mm	Quantity Nos	Area sft	Weight (kgs)
1	RS-1	526	820	0.47	2	9	5
2	WS-1	425	820	0.47	2	8	4
3	WS-2	470	820	0.47	4	17	9
						Total=	18

Section : Estimate of Anchor Bolt, Nut Bolt, Sag Rod

SL	Price Mark	Length	Dia	Quantity	Weight	Remarks
		mm	mm	Nos	(kgs)	
1	Anchor Bolt	200	10	16	2.2	Double Nut Double washer
2	Sag Rod	320	8	4	1	Double Nut Double washer
3	Nut-Bolt	25	8	20	1.5	Single Nut Single washer
4	Nut-Bolt	30	10	32	2	Single Nut Single washer
			Total		6.7	

Section : Estimate of Screw

SL	Price Mark	Length	Dia	Quantity
		mm	mm	Nos
1	Roofing Screw	50	5.5	16
2	Wall screw	25	5.5	48

3.8 Summary Sheet of Model Cost

Job Name : Materials, Fabrication & Hot Dip Galvanizing Cos of Model

SL No	Name of Item	Qty	Unit	Unit Price(BD)	T. Amount (BD)
1	MS Plate 50 Grade	22.27	Kg	95.00	2,115.65
2	GP Purling	8	Kg	105.00	840.00
3	Roof & Wall Panel (Profile Sheet)	18	Sft	100.00	1,800.00
4	Hot Dip Galvanizing Anchor Bolt	2	Kg	150.00	300.00
5	Hot Dip Galvanizing Sag Rod	1	Kg	150.00	150.00
6	Hot Dip Galvanizing Nut-Bolt	2.5	Kg	170.00	425.00
7	All Fabrication Cost (Labor)		L/S	10000.00	10,000.00
8	Hot Dip Galvanizing Cost of Structural	40	L/S		2,500.00
9	Carrying Cost		L/S		2,000.00
			Total Amount		**20,130.65**

In Word: Twenty Thousand One Hundred Thirty Taka Only

CHAPTER-4

DISCUSSION

4.1 Information of Rusting Corrosion Blasted:

Corrosion and repair of corrosion damage are multi-billion taka at present, the investment amount in this industry is about Tk.100 billion of uses of Steel. Enter value of steel 1, 25,000 ton. Costs the approximately annually Tk 25-30 billion in Bangladesh or about 0.124% of each national GDP. However, failures, and many other indirect costs. Corrosion is a natural phenomenon which can never be completely eliminated; hot dip project, such as hot-dip galvanizing, can significantly reduce these annual costs.

For more than 100 years, hot-dip galvanizing after fabrication has been specified to combat steel corrosion in the harshest environments throughout various markets. However, the specification and use of hot-dip galvanized steel evolves constantly as new markets emerge. Once considered only as a means of corrosion protection, hot-dip galvanizing is now specified for an array of reasons including lower initial cost, durability, longevity, availability, versatility, sustainability, and even aesthetics. Understanding the characteristics and performance of hot-dip galvanized steel will facilitate and increase the specification of where galvanizing will enhance the project.

4.2 Problem of Rust Corrosion of Steel Structure:

The Rust Corrosion of Steel Structural is an epidemic disease, what is the way to be saved from the rust corrosion?

The experimental meaning of galvanic erosion depicts it as an electrochemical procedure in which two distinct metals or combinations come in electrical contact with each other within the sight of an electrolyte under the states of a destructive domain, which prompts relative consumption of both the materials in contact.

Rusting of iron is the most well-known case of galvanic consumption, in which the center steel of the iron sheet is assaulted and the defensive covering of zinc is obliterated. Zinc being less honorable is defenseless to the galvanic assault and once completely eliminated; it can bring about the base metal to consume rapidly. Then again, tin being more honorable than the center steel makes it harder to break, yet when it does, the basic steel endures the most exceedingly terrible.

4.3 The Mechanism Behind of Galvanizing Rust Corrosion:

The procedure of galvanic consumption is just conceivable when two unique metals and combinations having diverse anode possibilities interact with each other. The less honorable metals shape the anode, while nobler metals take the cathode position. The distinction in terminal potential quickens the assault on the anode, which later gets broke up into an electrolyte and stores are gathered on the cathode, which for this situation, is a metal.

The electrolytes trigger the movement of particle from the anode to the cathode, which causes the anode metal to erode rapidly while repressing the impact of erosion on the cathode metal. Accessibility of electrolyte guarantees that the particles continue relocating so as to permit the galvanic consumption to occur.

Despite the fact that it’s not an attractive procedure, it has a couple of uses. In essential batteries, carbon-zinc cells are purposefully given to encourage the special consumption of zinc which produces electrical voltage. Another application is the safeguarding of covered structures by catholic strategy, in which the anode materials experiences erosion to repress the eroding impact on the cathode metal.

Figure 3.3 Rust Corrosion [10]

4.4 Galvanizing Process: HDG (Hot dip galvanizing process)

View of Hot Dip Galvanizing Process

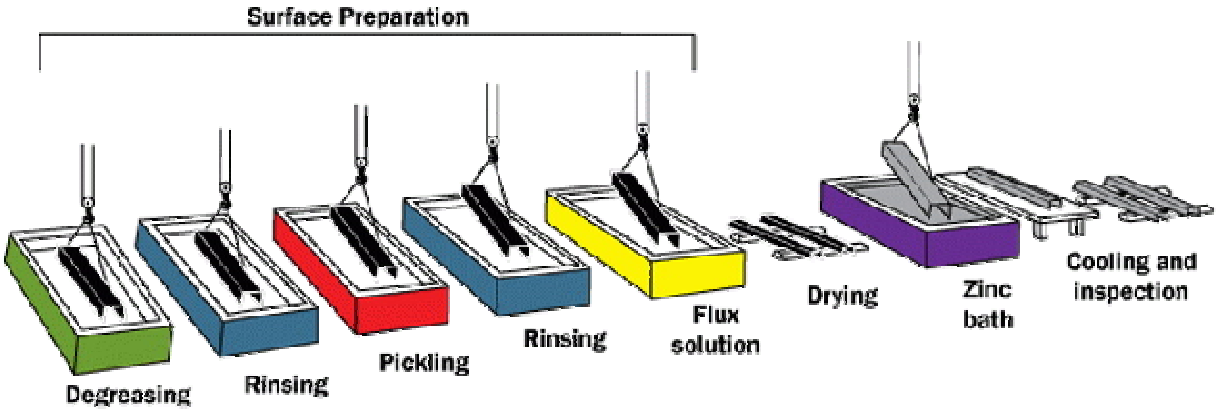

Figure 3.4Hot Dip Galvanizing Process[9]

4.4.1 Degreasing - A hot alkali solution, mild acidic bath, or biological cleaning bath removes organic contaminants such as dirt, paint markings, grease, and oil from the metal surface. Epoxies, vinyl's, asphalt, or welding slag, which cannot be removed by degreasing, must be removed before galvanizing by grit-blasting, sand-blasting, or other mechanical means.

4.4.2 Pickling – A dilute solution of heated sulfuric acid or ambient hydrochloric acid removes mill scale and iron oxides (rust) from the steel surface. As an alternative to or in conjunction with pickling, this step can also be accomplished using abrasive cleaning or air blasting sand, metallic shot, or grit onto the steel.

4.3.3 Fluxing – The final surface preparation step in the galvanizing process, a zinc ammonium chloride solution, serves two purposes. It removes any remaining oxides and deposits a protective layer on the steel to prevent any further oxides from forming on the surface prior to immersion in the molten zinc.

CHAPTER-5

CONCLUSION

5.1 Conclusion:

From the past advancement, the use of PEB is implemented and continuously increasing but its usage is not throughout the construction industry. It is reviewed that PEB structure can be easily designed by simple design procedures in accordance with country standards, it is energy efficient, speedy in construction, saves cost, sustainable and most important it's reliable as compared to conventional to conventional buildings.
Hence it is concluded that PEB has sector wide scope in Bangladesh.

From the last couple of years the use of PEB as industrial sheds is increasing continuously. It is sustainable and reliable that of conventional steel buildings

So it can also again be concluded that the PEB structures are flexible, lightweight and economical over long spans. Steel structure have to better anti-seismic performance up to eight grade earthquakes.

Some view of the most Important Steel structure in Bangladesh.

Figure 3.5Power Plant-ISO-LUX- Bangladesh. [8]

Figure 3.6Tosrifa at Gazipur, Garments Factory:

Some of view the most Important Steel structure in Bangladesh

Figure 3.7Head Office of British American Tobacco:

Figure 3.8Akij Table ware Warehouse, Mymensingh.

5.2 REFERENCES

1. KARIKA-Dhaka/ August-2018 Engr. Mohammad Rafiqul Islam (Sujon) BUET, Managing Director at Dominage Steel Building Systems Ltd. Topics-Bangladesh Steel Structural.

2. C. M. Meera, “Pre=Engineered Building Design of an Industrial Warehouse”, International journal of Engineering, Sciences and Engineering Technologies, Volume 5, Issue 2, June-2013, pp: 75-82.

3. Syed Firoz, Sarath Chandra Kumar B, S. Kankambara Rao, “Design concept of Pre Engineered Building”, International Journal of Engineering Research and Application, Volume 2, April 2012, pp.267-272.

4. Shrunkala V Bhagatkar, Farman Iqbal Shaikh, Bhanu Prakash Gupta and Deepak Kharta, “A study on Pre-Engineered Building- A Construction Technique”, International Journal of Engineering Research, Volume 4, Issue2, 2016, pp 802-805.

5. Prof. P. S. Lande, Vivek V. Kucheriya, “Comparative Study of Pre- Engineered Building with Conventional SteelBuilding”, International Journal of Pure and Applied Research in Engineering and Technology, Volume 3, April2015, pp 28-39.

6. Apruv Rajendra Thorat, Santosh K. Patil. “A study of performance of Pre-Engineered Building of an IndustrialWarehouse for Dynamic Load”, International Research Journal of Engineering and Technology, Volume 4, Issue 6, June -2017, pp 2240-2246.

7. Jinsha M. S., Linda Ann Mathew, “Analysis of Pre-Engineered Buildings”, International Journal of Science and Research, Volume 5, Issue 7, July 2016, pp 1049-1051.

8. BANGLA NEWS24-Buisness/Dhaka 17/04/2018 Topics of Bangladesh Steel Structure.

9. From Google - galvanizing-process

10.From Google- Rust Corrosion