

Republic of the Philippines
Philippine Atmospheric, Geophysical and
Astronomical Services Administration

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR
REHABILITATION OF METEOROLOGICAL RADAR SYSTEM
IN
GUIUAN
IN
THE REPUBLIC OF THE PHILIPPINES

May 2014

JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN WEATHER ASSOCIATION
INTERNATIONAL METEOROLOGICAL CONSULTANT INC.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to consist of Japan Weather Association (JWA), International Meteorological Consultant Inc. (IMC).

The survey team held a series of discussions with the officials concerned of the Government of the Republic of the Philippines, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the survey team.

May, 2014

Masami FUWA
Director General, Global Environment Department
Japan International Cooperation Agency

Summary

Summary

Typhoon Haiyan, known as Typhoon Yolanda in the Philippines, entered the Philippine Area of Responsibility (PAR) last November 6, 2013 moving west-northwest with significant strength and made landfall in Guiuan in the Province of Eastern Samar at 4:40 AM on November 8 with great intensity. According to the Joint Typhoon Warning Center (JTWC), it recorded a center pressure of 895 hPa with a maximum sustained wind speed of 87.5 m/s near the center and a maximum instantaneous wind speed of 105.5 m/s when landing. After Guiuan, it made five other landfalls in Tolosa (Province of Leyte), Daanbantayan and Bantayan Island (Province of Cebu), Concepcion (Province of Iloilo) to Busuanga (Province of Palawan) and finally left the PAR on November 9 while losing its strength.

According to the data on the damages left by Typhoon Yolanda which was issued by the National Disaster Risk Reduction and Management Council (NDRRMC), the number of confirmed deaths and missing persons are 6,201 and 1,785 respectively as of January 14, 2014. The death toll from Typhoon Yolanda is record high among the other typhoons which visited the Philippines exceeding 5,926 from Typhoon 25 in 1991 and 6,000 from the Moro Gulf Earthquake in 1976. The total cost of damages was estimated to be about 37 billion Php since Typhoon Yolanda inflicted catastrophic damages on infrastructure and agriculture, a key industry in the affected areas.

In particular, the worst affected area was Region 8 including the north-eastern coast of Leyte Island and the southern coast of Samar Island wherein a large number of inhabitants lost their lives. Region 8 suffered from extensive damages, such as damaged bridges and roads, the malfunction of the airport and harbor, vessels washed ashore on the land, the disconnection of the water and electrical supply and the malfunctioning of medical facilities. Region 8 has a high proportion of the poor population next to the Autonomous Region in Muslim Mindanao and Region 12. Since the cultivation of coconuts and fisheries, the main industries of Region 8, were seriously damaged, there is fear that livelihood security will be in a crisis situation over the next few years.

Under these circumstances, the meteorological radar system and radar tower building at Guiuan in Samar Island established last September 10, 2013 under Japan's Grant Aid and handed over to PAGASA were also heavily damaged. This Guiuan Meteorological Radar System served as an excellent monitoring tool during the approach of Typhoon Yolanda for PAGASA. The radar images are very useful in locating the eye of the typhoon, estimating its diameter or size, calculating the movement (direction and speed) and the estimates of associated rainfall and in preparing and publishing the series of the advisories, bulletins and warnings indicated above by the PAGASA. As a consequence, Typhoon Yolanda created unthinkable and unspeakable damages in the Philippines and Guiuan Meteorological Radar Tower Building Facility and Meteorological Radar system itself were severely damaged.

In response to this emergency situation, the Government of the Philippines has gone into action for the early rehabilitation of basic infrastructures and local government functions as well as rescuing the affected people. The country has also requested emergency aid from the international community. The national armies of friendly countries including the Japan Self-Defense Forces, the international organizations and various donors have provided emergency aid and response including the restoration of the supply of food and potable water, medical service and public sanitation, set-up of evacuation centers, debris disposal, etc. As the next step in restoration and rehabilitation, it is highly required to build and create a disaster-resistant society with the cooperation of foreign nations.

Given the situation indicated above, the Japan International Cooperation Agency (hereinafter referred to as "JICA") sent the Japan Disaster Relief Specialist Team to the Philippines in order to study the need for rehabilitation and reconstruction assistance and to collect information for project formulation as well as the emergency response required. As a result, the early restoration of the Guiuan Meteorological Radar System which had been completed and handed over to the Philippine side last September 10, 2013 under the Project for the Improvement of the Meteorological Radar System in the Philippines financed by Japan's Grant Aid, was confirmed as one of the priority issues.

In response to this finding, the Government of Japan decided to conduct a Preparatory Survey for the Restoration of the Meteorological Radar System in Guiuan (hereinafter referred to as the "Preparatory Survey"). JICA sent the Preparatory Survey Team to the Philippines to conduct the Preparatory Survey from February 16 to March 5, 2014 in order to collect the necessary information for the implementation of the Project, to design a restoration plan of the Guiuan Meteorological Radar System and Radar Tower Building, to estimate the cost of the Project and to prepare the reference materials for tender documents.

Japan has long provided assistance to the Philippines as its top donor and will continue to provide such assistance on both the economic and social aspects so that the Philippines can achieve a sustainable and more vigorous economic growth. Japan's basic aid policy is to render its support through economic cooperation in order for the Philippines to achieve "Inclusive Growth" as described in the "Philippine Development Plan 2011-2016" with a view to further strengthening the "Strategic Partnership" between the two countries. The Government of Japan focuses on the following three priority areas for the realization of this basic aid policy.

1. Achieving sustainable economic growth through the further promotion of investment
2. Overcoming vulnerability and stabilizing bases for human life and production activity
3. Peace and Development in Mindanao

Under the second priority area, the provision of aid for reducing risks and minimizing damages from natural disasters is indicated as well as the adoption of countermeasures against climate change.

The restitution of the typhoon detection and monitoring capability of PAGASA through the restoration of the Guiuan Meteorological Radar System installed and the Radar Tower Building constructed under the Japan's Grant Aid would substantially contribute to the mitigation of the adverse effects of meteorological disasters and effectively safeguard the basic human needs of the Filipino people. In conclusion, the implementation of the Project is considered to be an appropriately suitable and worthwhile endeavor as it is in congruence with Japanese priorities in terms of international cooperation.

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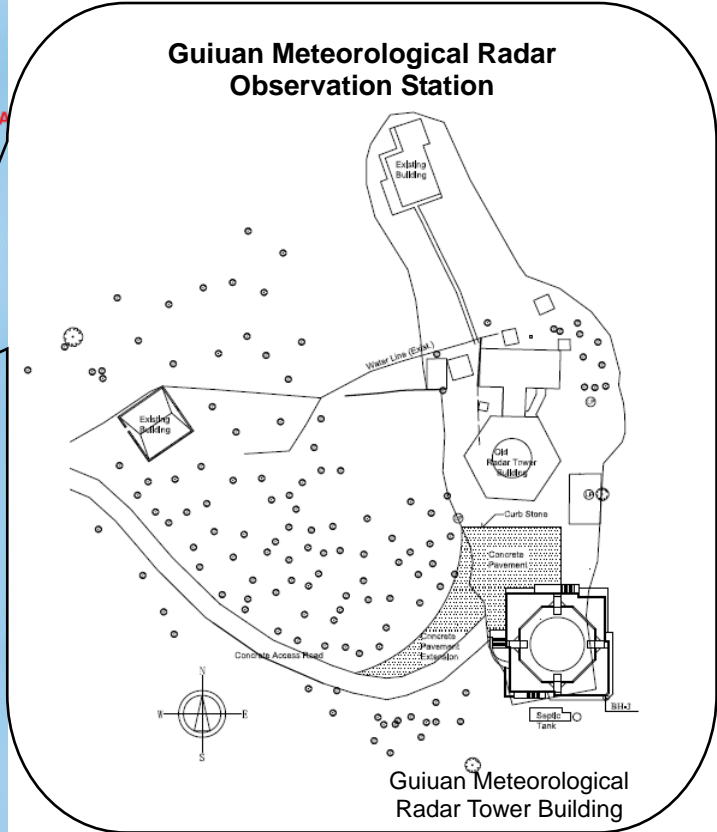
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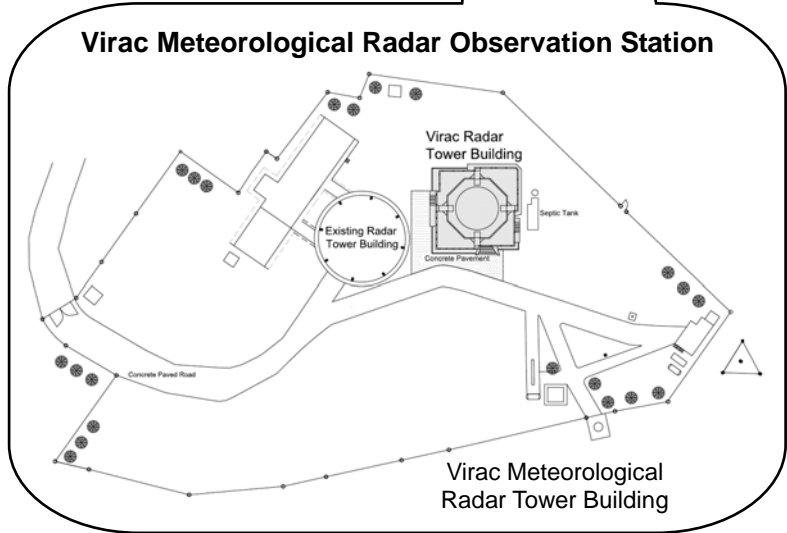
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■ Republic of the Philippines



Guiuan Meteorological Radar Tower Building



Virac Meteorological Radar Tower Building

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ABBREVIATIONS

- ASEAN : Association of Southeast Asian Nations
- ICC : Investment Coordinating Council
- JICA : Japan International Cooperation Agency
- JTWC : Joint Typhoon Warning Center
- LPA : Low Pressure Area
- NDRRMC : National Disaster Risk Reduction and Management Council
- NEDA : National Economic and Development Authority
- PAGASA : Philippine Atmospheric, Geophysical and Astronomical Services
Administration
- PAR : Philippine Area of Responsibility
- SWB : Severe Weather Bulletin
- VAT : Value Added Tax
- WFFC : Weather and Flood Forecasting Center
- WMO : World Meteorological Organization

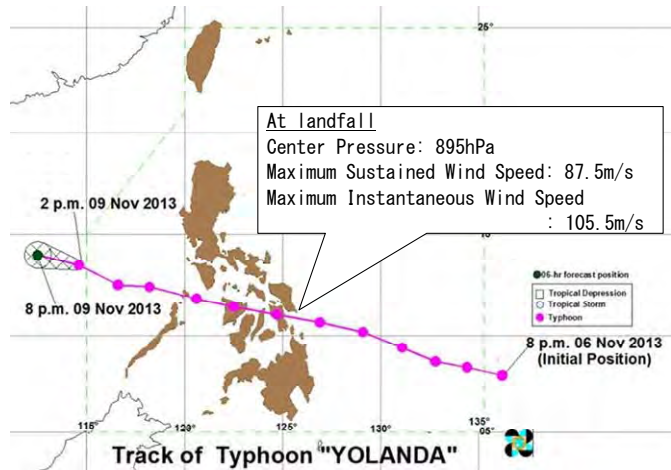
Chapter 1

Background of the Project

Chapter 1 Background of the Project

1-1 Background of the Project

Typhoon Haiyan, more commonly known as Typhoon Yolanda in the Philippines, entered the Philippine Area of Responsibility (PAR) last November 06, 2013 moving west-northwest with significant strength and made landfall in Guiuan in the Province of Eastern Samar at 4:40 AM on November 08 with great intensity. According to the Joint Typhoon Warning Center (JTWC), it recorded a center pressure of 895 hPa with a maximum sustained wind speed of 87.5 m/s near the center and a maximum instantaneous wind speed of 105.5 m/s when landing. After Guiuan, it made five other landfalls in Tolosa (Province of Leyte), Daanbantayan and Bantayan Island (Province of Cebu), Concepcion (Province of Iloilo) to Busuanga (Province of Palawan) and finally left the PAR on November 09 while losing its strength.



Source: PAGASA

Figure 1: Track of Typhoon Yolanda

The table on the right shows the data on the damages left by Typhoon Yolanda which was issued by the National Disaster Risk Reduction and Management Council (NDRRMC). The number of confirmed deaths and missing persons are 6,201 and 1,785 respectively as of January 14, 2014. The death toll from Typhoon Yolanda is record high among the other typhoons which

Table 1: Damages by Typhoon Yolanda in the Philippines (as of January 14, 2014)

Dead	6,201
Injured	28,626
Missing	1,785
Affected Area	Districts: 9, Cities: 57
Affected household/persons	3,424,593/16,078,181
Damaged houses	1,140,332
Estimated cost of damaged Infrastructures	18,336,576,627.39 PHP
Estimated cost of damaged Agriculture	18,354,305,869.88 PHP
Total Cost of Damages	36,690,882,497.27 PHP
Power Outage	The National Grid Corporation reported that 1,959 transmission facilities were damaged including backbone transmission lines, steel poles and converter station.

Source: Report of the National Disaster Risk Reduction and Management Council (NDRRMC) as of January 14, 2014

visited the Philippines exceeding 5,926 from Typhoon 25 in 1991 and 6,000 from the Moro Gulf Earthquake in 1976. The total cost of damages was estimated to be about 37 billion PHP since Typhoon

Yolanda inflicted catastrophic damages on infrastructure and agriculture, a key industry in the affected areas.

Under these circumstances, the meteorological radar system and radar tower building at Guiuan in Samar Island established last September 10, 2013 under Japan’s Grant Aid and handed over to Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) were also heavily damaged.

1-2 Typhoon Yolanda

■ Storm Surge

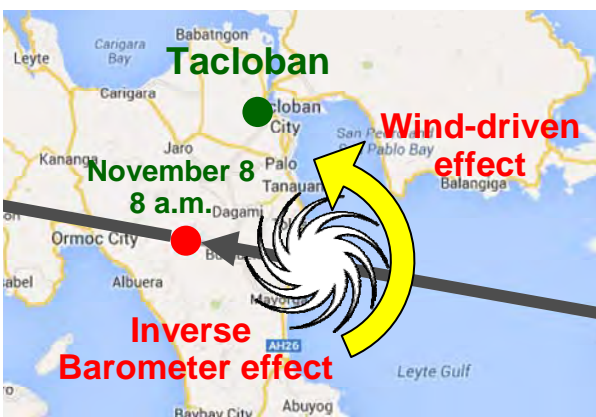


Figure 2: Map around Tacloban and Path of Typhoon Yolanda

The main factor among the fatal damages caused by Typhoon Yolanda is the storm surge. The reported height of the storm surge was around 5-7 m in Tacloban, Province of Leyte, which is comparable to the average height of a two-story building. There are two types of effects which can lead to a high storm surge: the “inverse barometer effect” and the “wind-driven effect.” The “inverse barometer effect” is the effect wherein the lower center pressure of a typhoon increases the height of the sea surface since the water level rises about 1 cm for every 1 hPa drop in pressure.

The center pressure of Typhoon Yolanda fell to 895 hPa while passing by Tacloban resulting in a large scale of inverse barometer effect. At the same time, sea water was directly collected in the Leyte Gulf by the very strong wind circling around the typhoon and this phenomenon is called the “wind-driven effect.” Since a wind is likely to be stronger in the right side of a typhoon path, a large amount of seawater was carried into the Leyte Gulf and brought about incredible storm surges in Tacloban which is located behind the Gulf.

■ Storm Wind

Numerous buildings collapsed due to the storm wind which accompanied Typhoon Yolanda. The maximum instantaneous wind speed of 105.5 m/s during landfall is equivalent to F4 (Devastating Damage) in the Fujita Scale which categorizes the strength of tornados. At the F4 level, well-constructed houses are supposed to be leveled

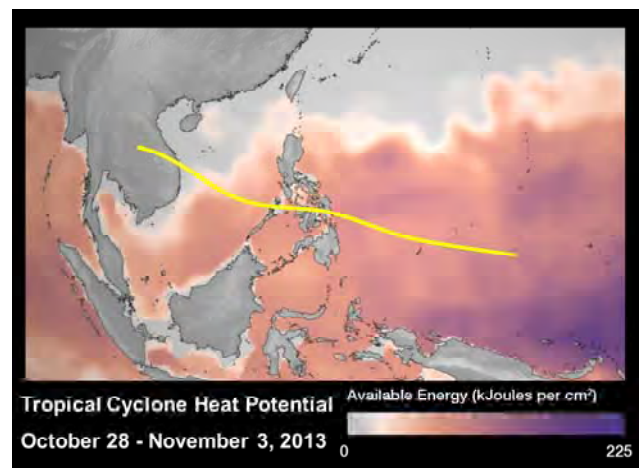


Figure 3: Heat Potential for Intensification of Tropical Cyclone estimated from Ocean Heat Content

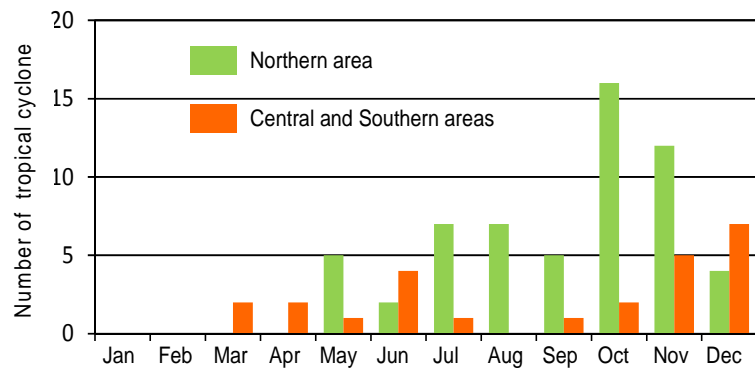
Source: NOAA

down and structures with weak foundations are expected to be blown away at some distance.

The figure on the lower right shows the “Heat Potential for the Intensification of a Tropical Cyclone estimated from an Ocean Heat Content.” It can be seen in the figure that Typhoon Yolanda moved over the portion of the sea where the heat potential for the development of a tropical storm is high. This is one of the main reasons for the significant strength and intensity of Typhoon Yolanda as well as the match in the directions of the upper wind and lower wind.

1-3 Recent Trend of Typhoon

As shown in the figure on the right, the number of typhoon landfalls in the Philippines is great in October and November normally concentrated on the northern area including the island of Luzon. While the number of landfalls in the central and southern areas are relatively small compared to the northern area, typhoons are likely to hit those areas in November and December, the end of the typhoon



Analyzed based on the Typhoon Track Data of JMA
Figure 4: Monthly Frequency of Tropical Cyclones Making Landfall in the Philippines (1981-2013)

season, since the waters with high temperature shift southward. Recently, the number of typhoon landfalls in the central and southern areas is increasing. As seen in the table below, six typhoons made landfalls in the central and southern areas from 2011 to 2013 and the average number of landfalls per year was two (2) while it was only one (1) from 1981 to 2000. Significantly, for the last two years, the intense typhoons such as Typhoon 24 in 2012 (Center pressure at landfall: 930 hPa) and Typhoon Yolanda successively hit the central and southern areas. One of the main reasons considered is that the sea surface temperature around the Philippines remained high until November to December, the end of the typhoon season, when a typhoon tends to come by the central and southern areas. If the tendency of warmer sea surface temperature continues in the future, it is predicted that intense typhoons may hit the central and southern areas more often.

Table 2: Landfall Typhoon in the Central and Southern Areas in the Philippines (2011-2013)

Year	Month	Date	Typhoon No.	Center Pressure at Landfall (hPa)	Killed/Missing	Total Cost of Damage (PHP)
2011	12	16	21	992	1,439	1,455,825,723.40
2012	10	24	23	996	36	55,338,547.50
2012	12	4	24	930	1,901	34,409,411,197.07
2012	12	25	25	1000	-	-
2013	6	29	6	1002	-	-
2013	11	8	30 (Yolanda)	895	7,890	36,690,882,497.27

Source: NDRRMC

1-4 Influence of Climate Change induced by Global Warming

Due to climate change induced by global warming, sea temperature is predicted to rise and typhoons are expected to intensify. Sea temperature has increased by 0.5 °C on a global average and by 0.4-0.6 °C in the sea around the Philippines over the past 100 years. According to the data issued by the World Meteorological Organization (WMO), sea-level rise this year was 3.2 mm on a global average, of which the Philippines experienced a 12 mm rise in sea-level, about 4 times as high as the global average. Since both sea temperatures and sea levels are predicted to keep rising if global warming continues, the scale of damages caused by strong winds, storm surges and high waves induced by typhoons will potentially be more extensive.

1-5 Brief Summary on the Request for the Project by the Republic of the Philippines

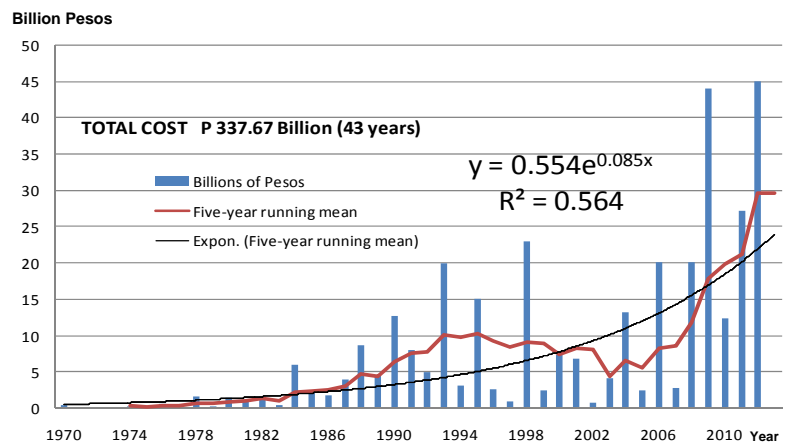
Typhoon Yolanda, which made landfall in November 08, 2013, directly ravaged the Philippines and inflicted tremendous damages in almost half of the country. In particular, the worst affected area was Region 8 including the north-eastern coast of Leyte Island and the southern coast of Samar Island wherein a large number of inhabitants lost their lives and where about 90 % of houses collapsed. Region 8 suffered from extensive damages, such as damaged bridges and roads, the malfunctioning of the airport and harbor, vessels washed ashore on the land, the disconnection of the water and electrical supply and the malfunctioning of medical facilities. Region 8 has a high proportion of the poor population next to the Autonomous Region in Muslim Mindanao and Region 12. Since the cultivation of coconuts and fisheries, the main industries of Region 8, were seriously damaged, there is fear that livelihood security will be in a crisis situation over the next few years. Under these circumstances, the Government of the Philippines has gone into action for the early rehabilitation of basic infrastructures and local government functions as well as rescuing the affected people. The country has also requested emergency aid from the international community. The national armies of friendly countries including the Japan Self-Defense Forces, other international organizations and various donors have provided emergency aid and response including the restoration of the supply of food and potable water, medical service and public sanitation, set-up of evacuation centers, debris disposal, etc. As the next step in restoration and rehabilitation, it is highly required to build and create a disaster-resistant society with the cooperation of foreign nations.

Given the situation indicated above, the Japan International Cooperation Agency (hereinafter referred to as "JICA") sent the Japan Disaster Relief Specialist Team to the Philippines in order to study the need for a rehabilitation and reconstruction assistance and to collect information for project formulation as well as the emergency response required. As a result, the early restoration of the Guiuan Meteorological Radar System, which had been completed and handed over to the Philippine side last September 10, 2013 under the grant aid of Japan, was confirmed as one of the priority issues.

In response to this finding, the Government of Japan decided to conduct a Preparatory Survey for the Restoration of the Meteorological Radar System in Guiuan (hereinafter referred to as the “Preparatory Survey”). JICA sent the Preparatory Survey Team to the Philippines to conduct the Preparatory Survey from February 16 to March 05, 2014 in order to collect the necessary information for the implementation of the Project, to design a restoration plan of the Guiuan Meteorological Radar System and Radar Tower Building, to estimate the cost of the Project and to prepare the reference materials for tender documents.

1-6 Negative Impact on the Development of the Philippine Economy

The figure on the right presents the actual total cost of damages due to destructive typhoons from 1970 to 2012. It clearly shows that the total cost of damages is on a rising trend and has rapidly increased in the past five years. The enormous amount of damages due to typhoons and its increasing trend have had serious negative impacts on the economic development of the whole country.



Source: Office of Civil Defense

Figure 5: Actual Total Cost of Damages due to Destructive Typhoons (1970-2012)

1-7 Natural Conditions in the Philippines

■ Temperature & Rainfall

The figure on the lower left shows the monthly mean rainfall in Guiuan. Guiuan receives much rain from November to March and about 600 mm of rainfall in January and February. As shown in the table on the lower right, the temperature in Guiuan remains high throughout the year.

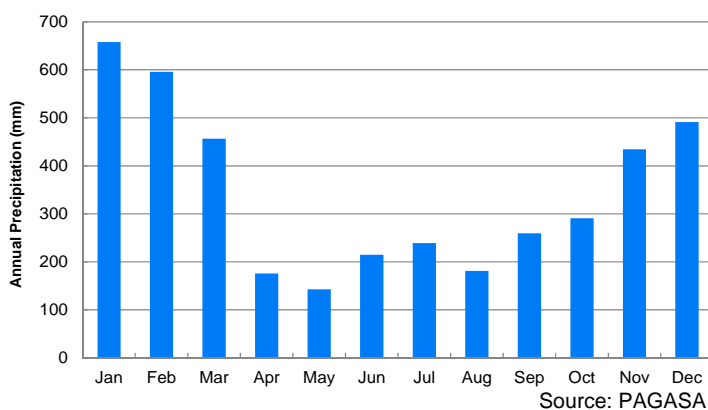


Figure 6: Monthly Mean Rainfall at Guiuan (2008-2012)

Table 3: Temperature Normal Values in Guiuan (1981–2010)

Month	Max	Min	Mean
January	28.5	23.5	26.0
February	28.9	23.6	26.2
March	29.7	24.0	26.8
April	31.1	24.7	27.9
May	32.2	25.3	28.8
June	31.8	25.0	28.4
July	31.2	24.8	28.0
August	31.5	25.0	28.3
September	31.5	24.8	28.2
October	30.8	24.7	27.7
November	29.9	24.3	27.1
December	29.0	23.9	26.4
Annual	30.5	24.5	27.5

Source: PAGASA

■ Typhoon

The table below shows the monthly number of typhoons entering the Philippine Area of Responsibility (PAR) from 1948 to 2013. It can be clearly seen that the number of typhoons entering the PAR is overwhelmingly great during the months of July and September and more than three typhoons invade the PAR on average. On the other hand, the number of typhoons which make landfall in the Philippines is great in October and November, which accounts for more than half of the typhoons entering the PAR.

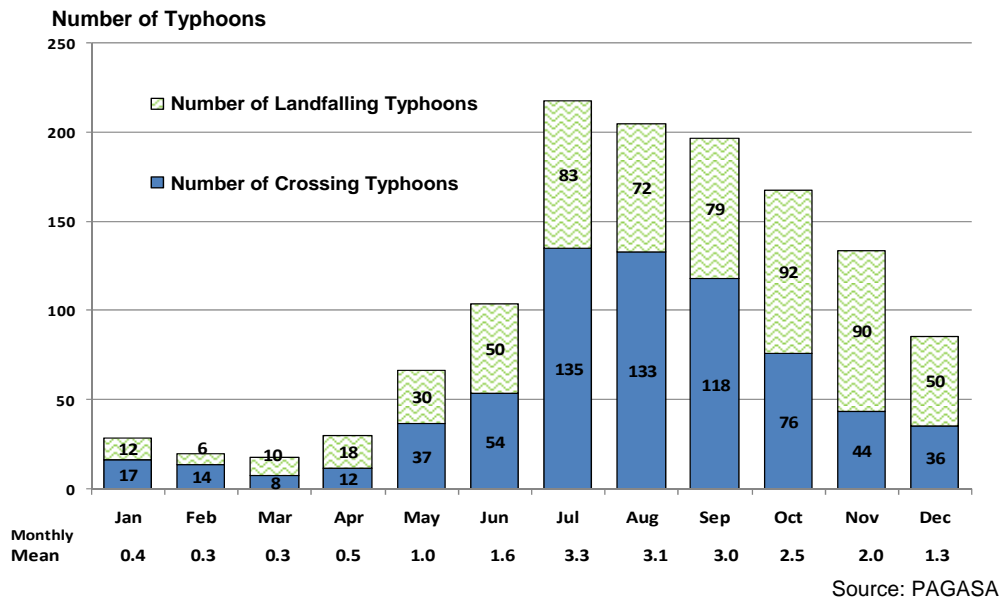
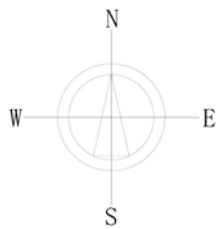


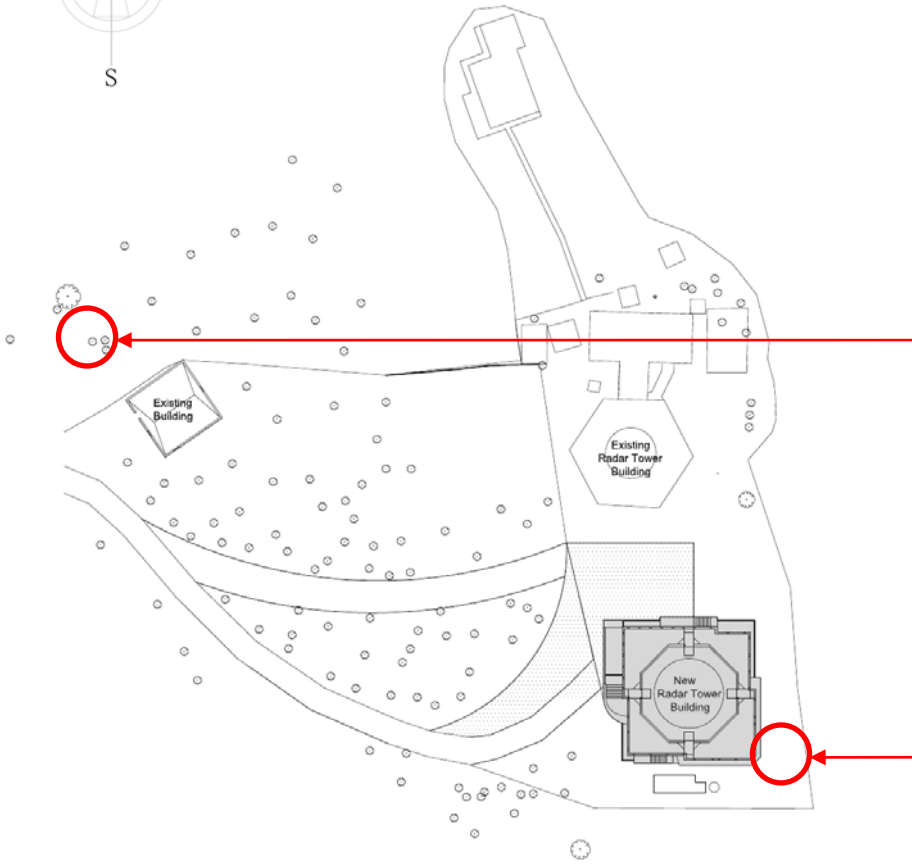
Figure 7: Monthly Number of Typhoons entering the Philippines
Period: 1948-2013 (66 years)

1-8 Current Condition of the Existing Facilities and Equipment

<Current Condition of the Guiuan Meteorological Radar Tower Facility>



Explanatory Notes	
○	Damaged Place/Area



Water-Supply Pipe
The Water-Supply pipe of the facility from the water well is damaged by the displacement of the ground due to heavy rain.

Manhole
Cover of the concrete manhole for the sewage connected to the septic tank was damaged.

SITE PLAN

Maintenance Room

- Ceiling board collapsed due to rainwater coming through the vent cap for the exhaust fan.
- Ceiling board collapsed due to the strong wind and rain coming through the pipe space of the 2F air conditioning refrigerant pipe.

Data Analysis Room

- Cyclone screen and aluminum window glass were damaged by small stones.
- Wooden door was destroyed.
- Ceiling board, air conditioning indoor units and lighting equipment collapsed due to the strong wind and heavy rain.

Observation Room

- Cyclone screen and aluminum window glass were damaged by small stones.
- Wooden door was destroyed.
- Ceiling board, air conditioning indoor units and lighting equipment collapsed due to the strong wind and heavy rain.

Entrance Hall

- Ceiling board collapsed due to the strong wind and heavy rain coming through the vent cap for exhaust fan.
- Ceiling board collapsed due to the water leaking from the upper cable duct.

Electricity Room

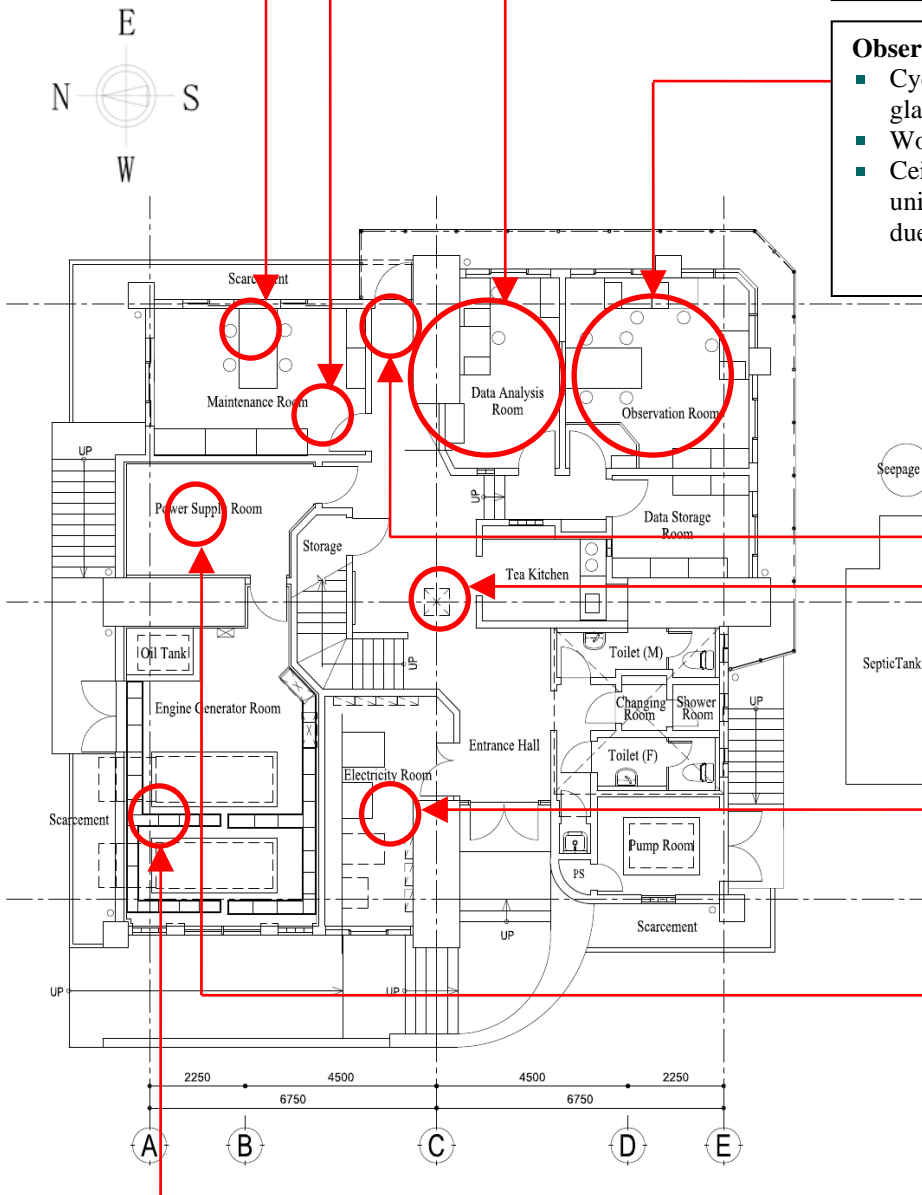
- Isolation transformer and AVR got hit by strong wind and rain.

Power Supply Room

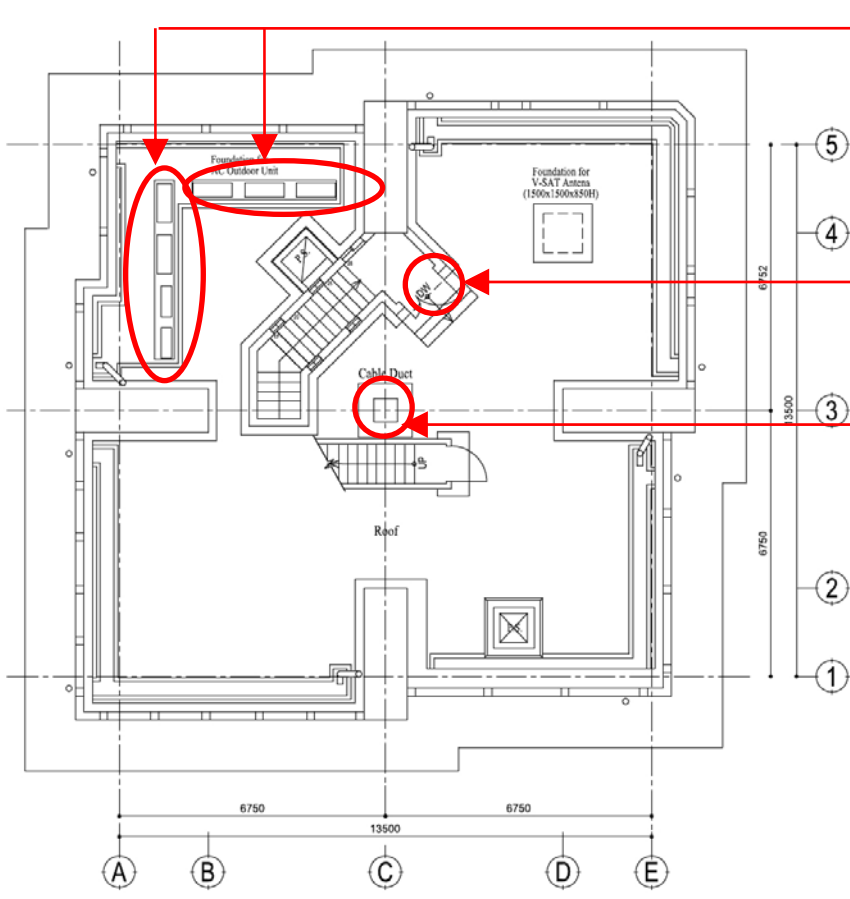
- Exhaust fan was damaged due to the rain water brought by the strong winds coming through the vent cap for the exhaust fan.

Engine Generator Room

- Trench in the engine generator room was submerged under the rain water brought by the strong winds coming through the steel door frame gap.



1FL PLAN



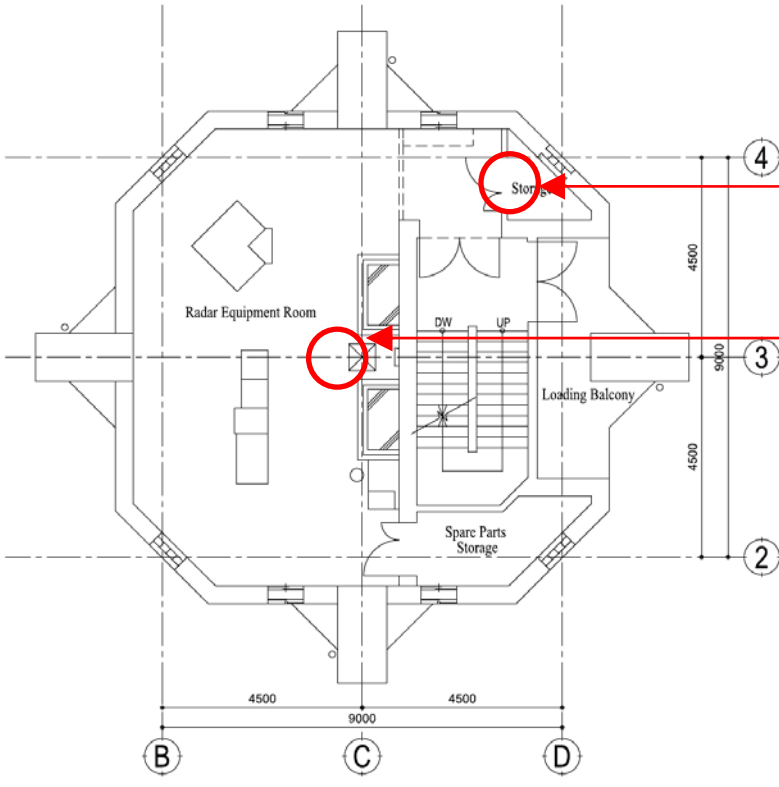
2FL PLAN

Roof
 Three of the seven air conditioning outdoor units disappeared due to the strong winds while four were damaged.

Staircase
 Steel door was broken due to the strong winds.

2-4F Cable Duct

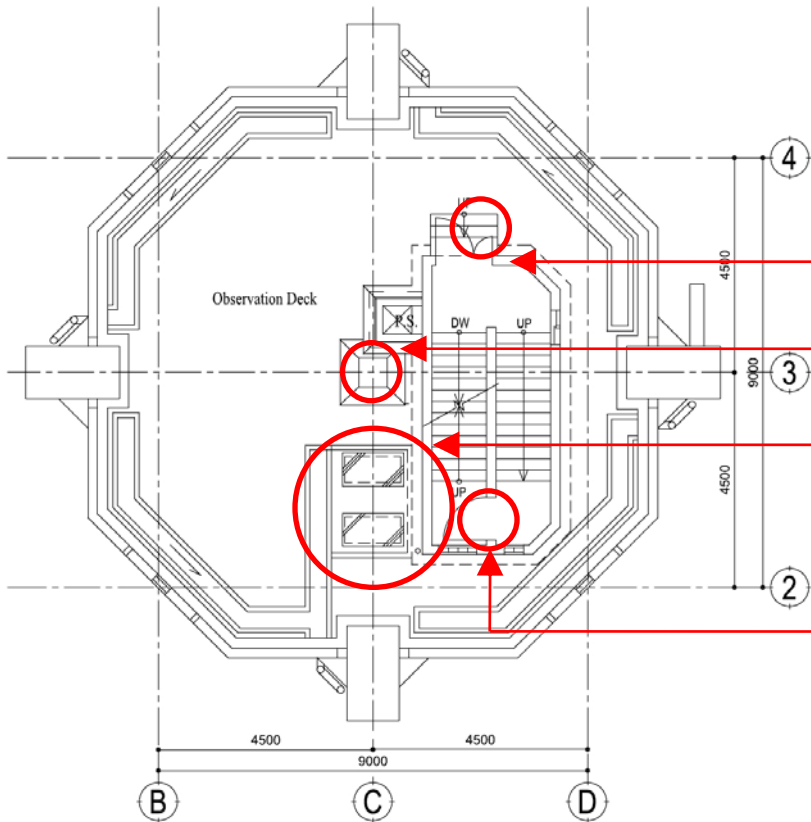
- The cable duct cracked.
- Lighting equipment was blown off and disappeared due to the strong winds.



M4FL PLAN

Radar Equipment Room

- Bent cap for the exhaust outlet of the total heat exchanger disappeared.
- Ceiling board collapsed due to the strong wind and rain.
- Access floor was submerged under water.

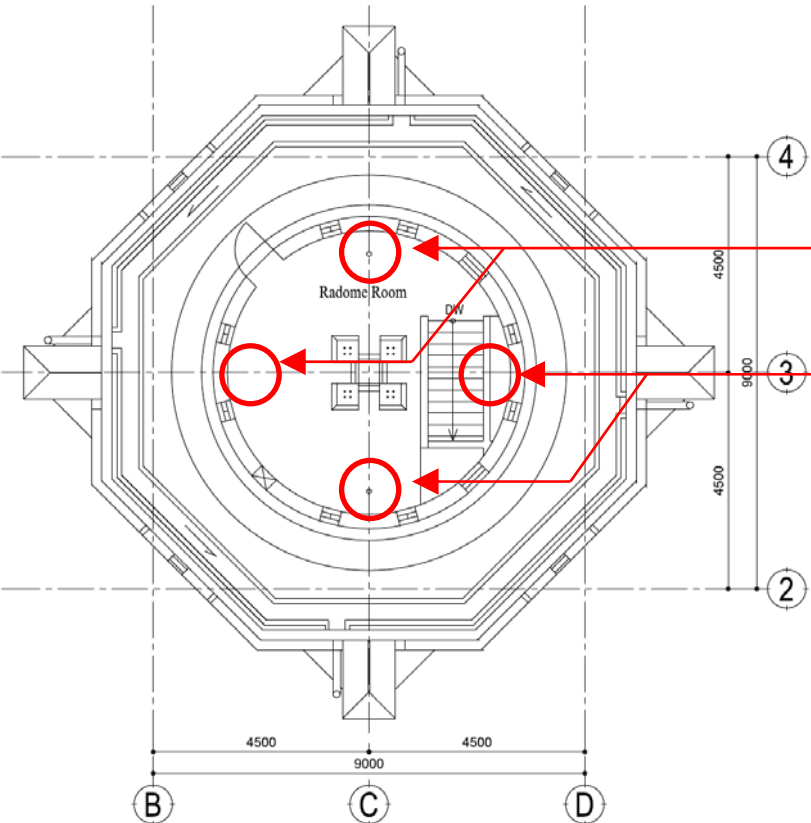


5FL PLAN

Observation Deck

- Steel door was broken due to the strong winds.
- Door and lighting equipment of the cable duct were blown off and disappeared.
- Two air conditioning outdoor units were blown off and disappeared.

Aluminum Door (Staircase)
 Damaged due to the strong wind blowing in the inside room.

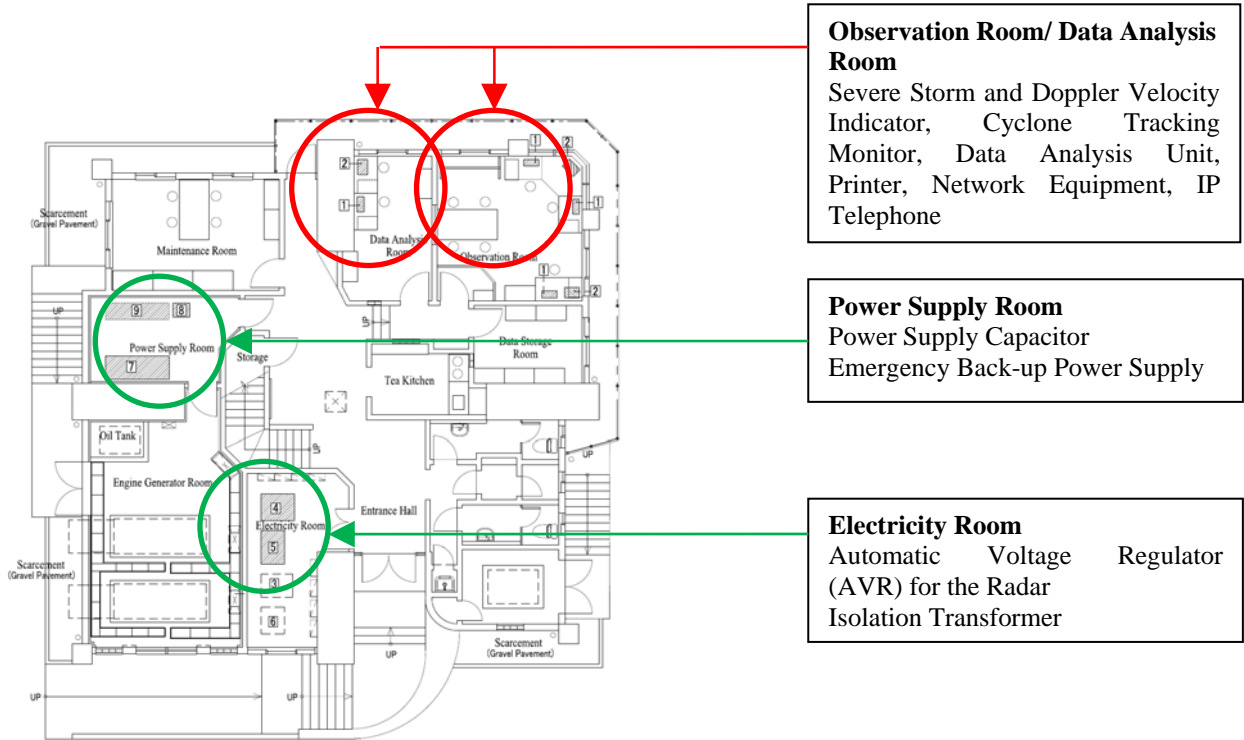


6FL PLAN

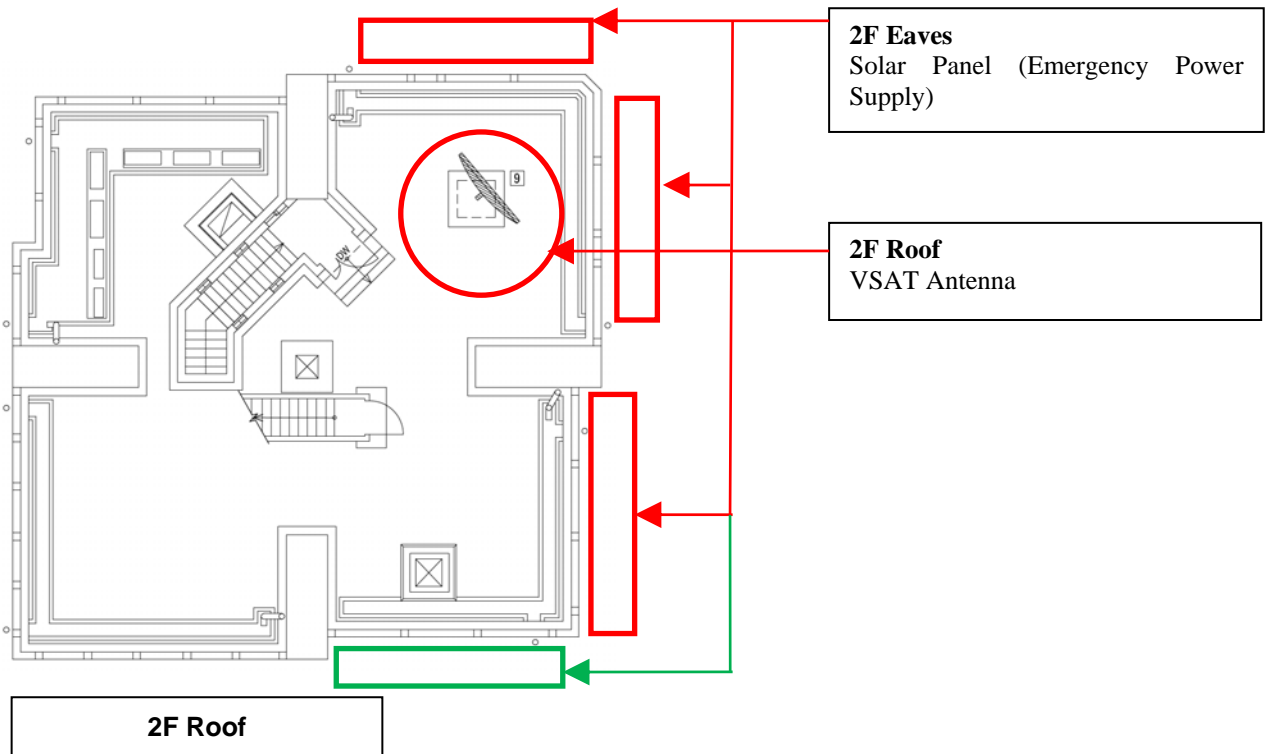
Radome Room
 Rainwater entered the lighting equipment and the entry phone since the Radome Panel was blown off and disappeared.

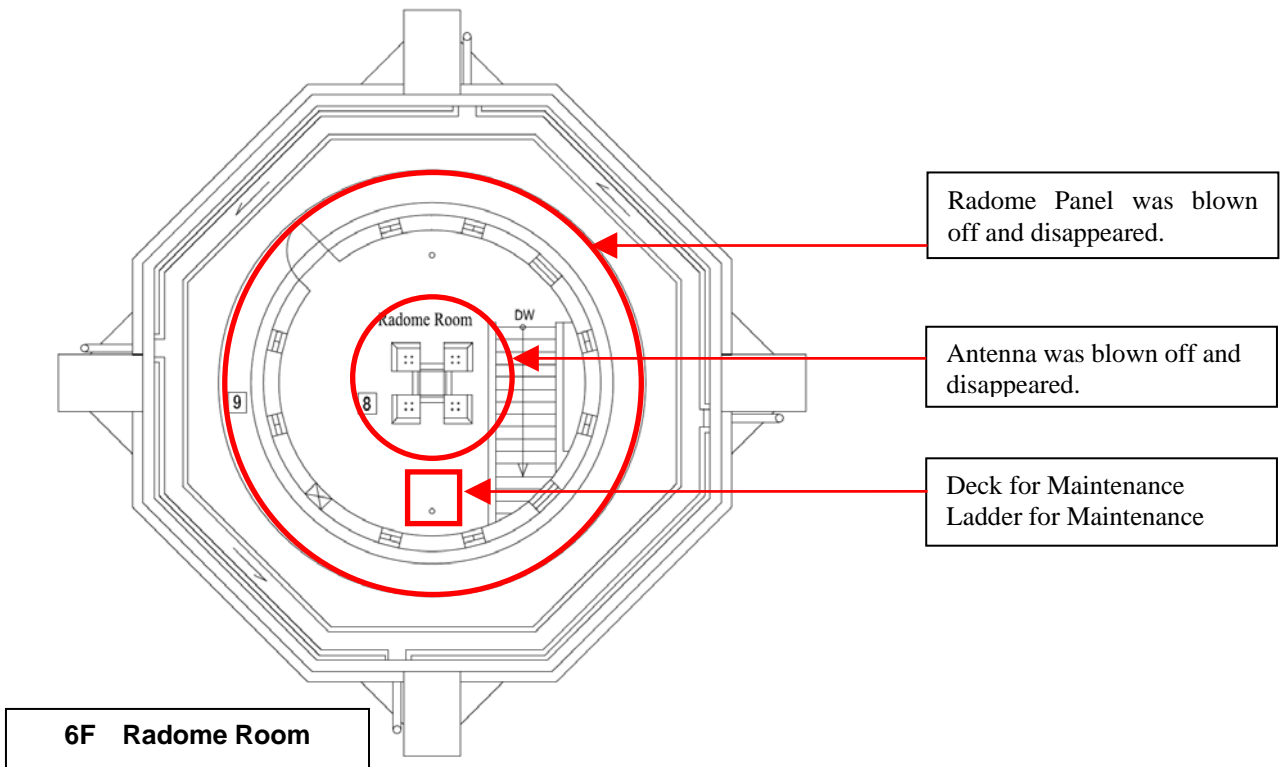
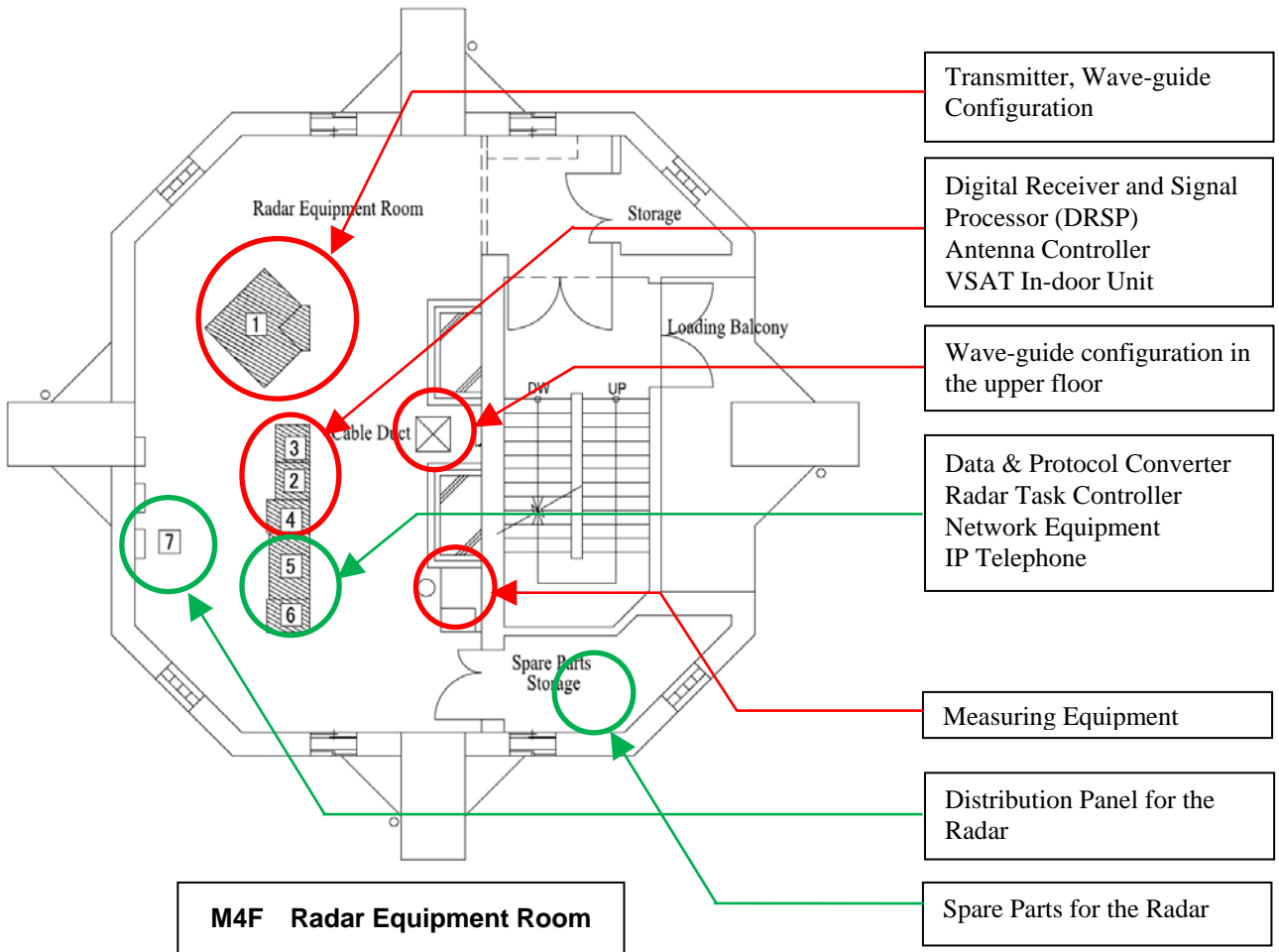
<Current Condition of the Guiuan Meteorological Radar System Equipment>

Abbreviations	
○	Equipment which received serious damage or blown off by severe storm (No longer reusable)
○	Equipment which received no damage or minor damage (Reusable)



1F Observation Room / Data Analysis Room / Electricity Room / Power Supply Room







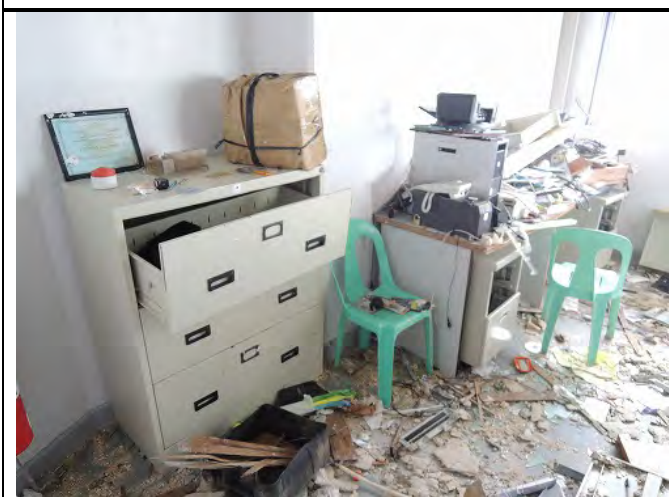
Panoramic View of the Meteorological Radar Tower Facility



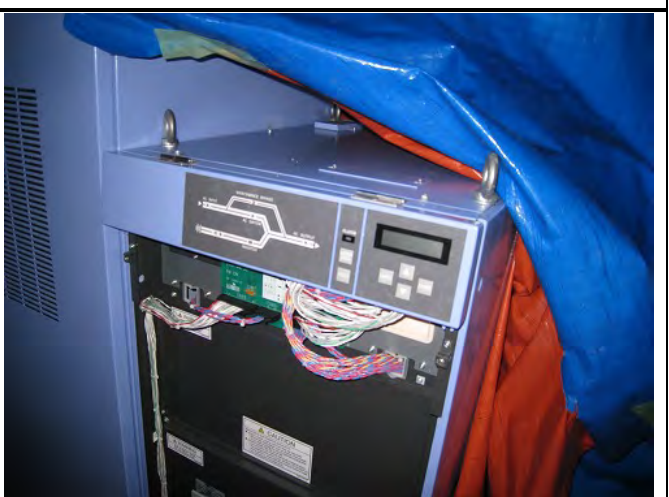
1F Observation Room



1F Observation Room



1F Data Analysis Room



1F Power Supply Room (Power Supply Capacitor)



1F Electronic Room (Isolation Transformer and Automatic Voltage Regulator (AVR))



1F Electronic Room (Isolation Transformer)



2F Roof (VSAT Antenna)



2F Roof (VSAT Antenna)



2F Eaves (Solar Panel Frame on the South Side)



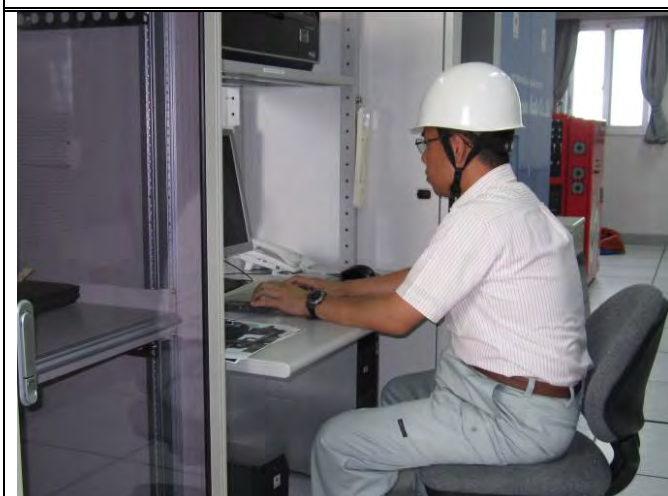
2F Eaves (Solar Panel Frame on the West Side)



M4F Radar Equipment Room (Transmitter)



M4F Radar Equipment Room (Transmitter)



M4F Radar Equipment Room (Radar Task Controller)



M4F Radar Equipment Room (Data & Protocol Converter)



M4F Radar Equipment Room
(Digital Receiver and Signal Processor)



M4F Radar Equipment Room
(Under the Access Floor)



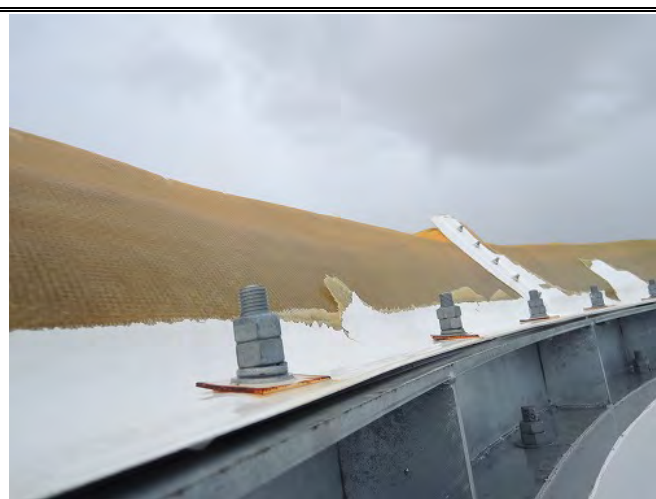
M4F Radar Equipment Room (Distribution Panel for the Radar)



M4F Radar Equipment Room (Measurement Equipment)



6F Radome Room (Antenna Pedestal)



6F Radome Room (Anchor Bolts to Fasten the Panel)



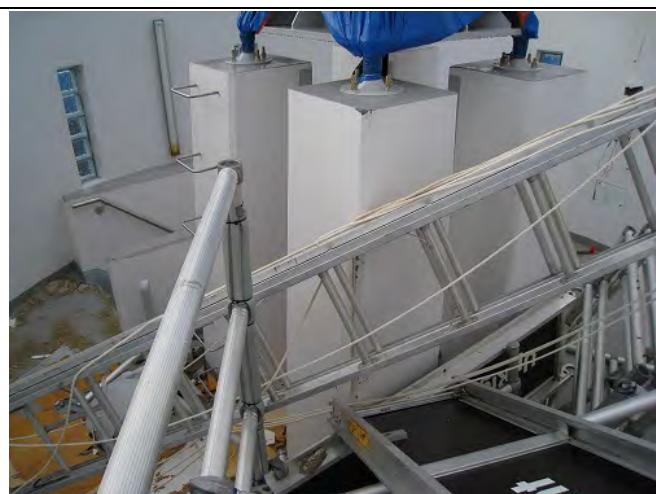
6F Radome Room
(Cover of the Cable Duct)



6F Radome Room
(Wave-Guide Configuration of the Pedestal Bottom)



6F Radome Room



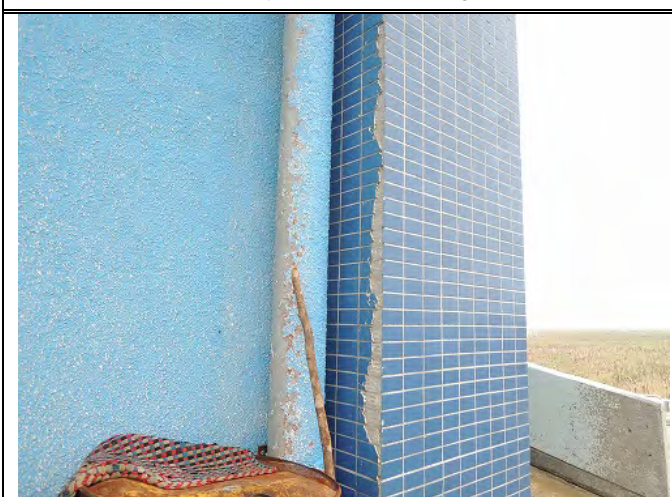
6F Radome Room



Water Supply Line of the Damaged Well



Manhole for Water Discharge (Concrete Cover is damaged)



Exterior Wall, Gutter and Pillar with Peeling Finishing Materials
(By Stepping Stones of the Strong Wind)



Exterior Stainless Hood
(By Stepping Stones of the Strong Wind)



Observation Room from the Southeast Side of the Facility



Observation Room from the South Side of the Facility



Observation Room (Left), Data Analysis Room (Right) on the East Side of the Facility



1F Observation Room
(Window Glass Broken by Stepping Stones)



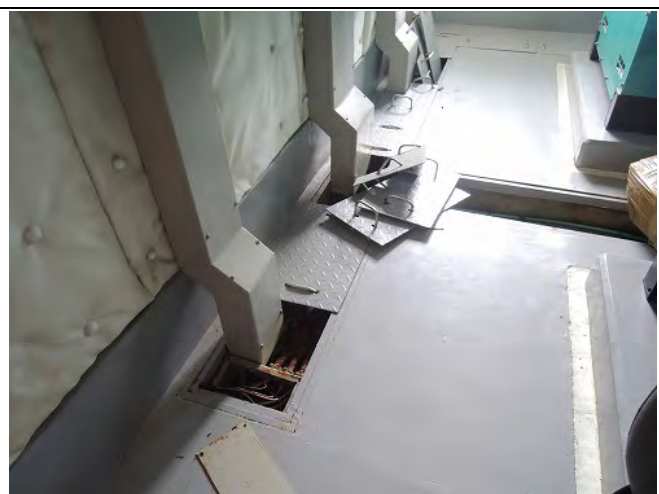
1F Observation Room (Air Conditioning Indoor Unit)



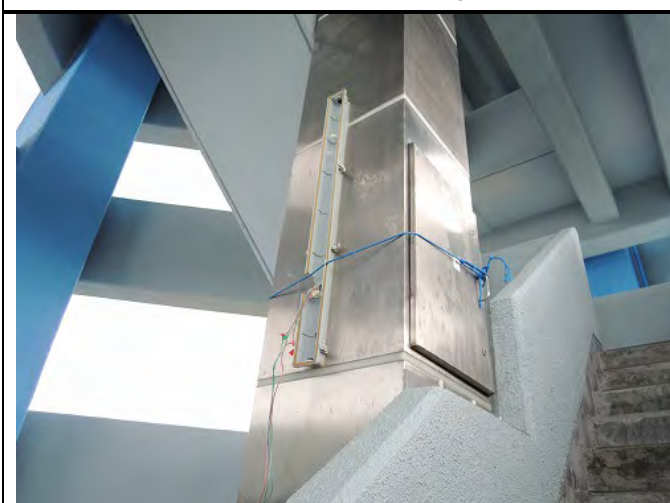
1F Data Analysis Room (Ceiling Exhaust Fan)



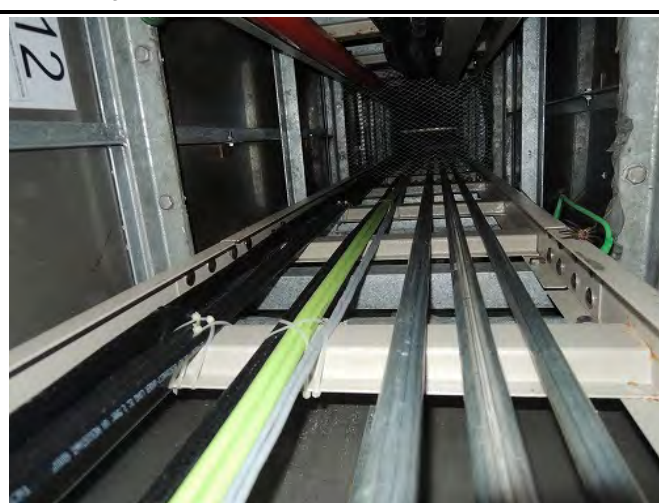
1F Entrance Hall (Ceiling)



1F Engine Generator Room (Electronic Cable in Trench)



2F to 4F Staircase (Cable Duct)



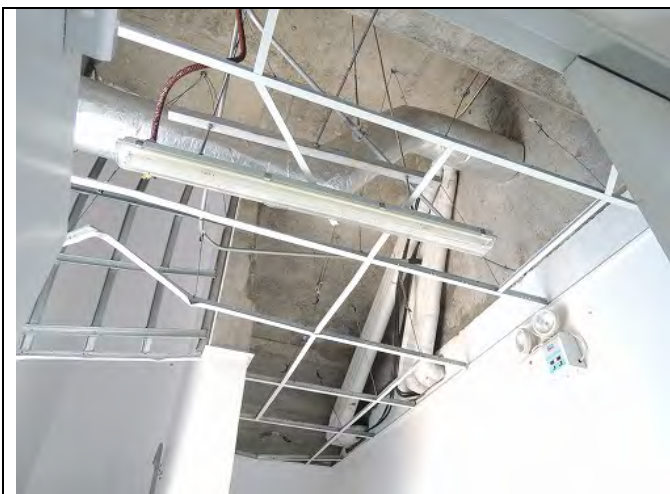
2F to 4F Staircase (Inside of the Cable Duct)



2F Roof (Air Conditioning Outdoor Unit Yard)



2F Roof (Air Conditioning Outdoor Unit Yard)



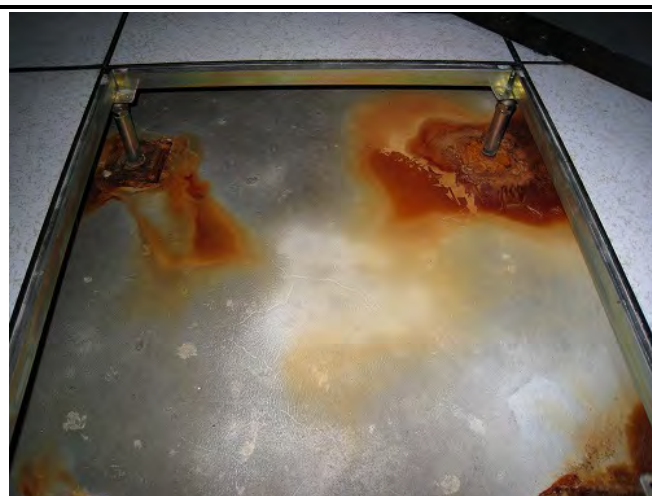
M4F Staircase (Ceiling)



M4F Staircase



M4F Radar Equipment Room
(Southeastern Exterior Wall)



M4F Radar Equipment Room
(Under the Floor of the Access Floor)



M4F Radar Equipment Room
(Ceiling which is located immediately below the 5F Cable Duct)



M4F Radar Equipment Room
(Ceiling of the 5F Cable Duct Bottom)



5F Observation Deck



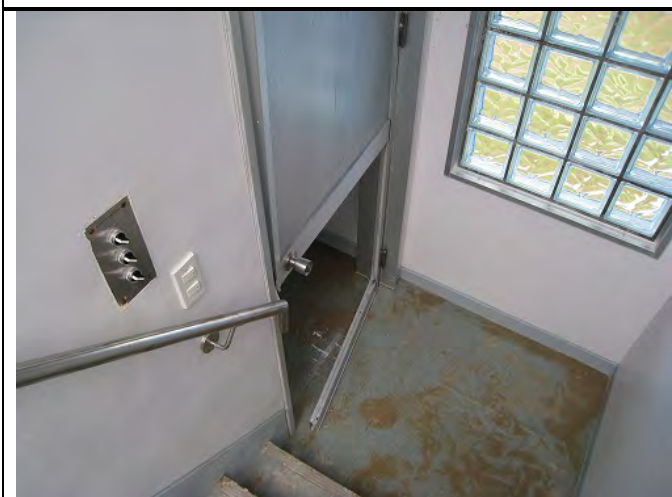
5F Observation Deck



5F Observation Deck
(Collision Mark of the Air Conditioning Outdoor Unit)



5F Observation Deck
(Steel Door)



6F Radome Room (Aluminum Door of the M5F Entrance)



6F Radome Room (Staircase)

1-9 Consideration for Environmental Conservation

Since the Project site (Guiuan Meteorological Radar Observation Station) is an existing observation station of PAGASA and a Certificate of Non-Coverage (CNC) was already obtained from the Environmental Management Bureau (EMB) on May 26, 2009 for the purpose of implementing the former project “the Project for Improvement of the Meteorological Radar System,” it was confirmed that the application for an Environmental Compliance Certificate (ECC) for this Project is not required.

Chapter 2

Contents of the Project

Chapter 2 Contents of the Project

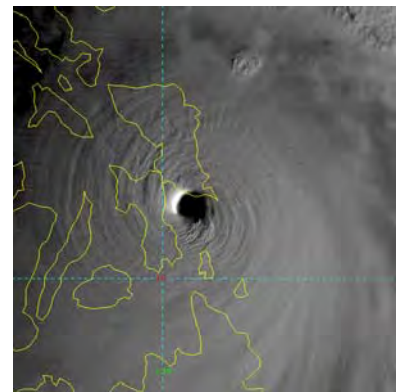
2-1 Basic Concept of the Project

Typhoon Yolanda, which made landfall last November 08, 2013, directly ravaged the Philippines and inflicted tremendous damages in almost half of the country. The details of Typhoon Yolanda are as follows.

<Typhoon 30 (International Name “Haiyan”, Philippine Name “Yolanda”)>

Typhoon Yolanda is the 24th tropical cyclone that entered the Philippine Area of Responsibility (PAR) in 2013 (Duration within the PAR: November 06-09, 2013).

- Typhoon Yolanda was first spotted as a Low Pressure Area (LPA) on November 01, 2013 over Caroline Island.
- The LPA developed into a Tropical Depression (winds between 45-63 kph) on November 02, 2013.
- The Tropical Depression intensified into a Tropical Storm (winds 64-117kph) on November 04, 2013 and was given an International Name of “Haiyan.”



MTSAT (Japan) Picture of Typhoon Yolanda

- A Weather Advisory was issued at 11AM of November 05, 2013 that Typhoon Haiyan, with maximum winds of 26.3m/s near the center and gustiness of 33.3m/s moving west at 25 km/h, is expected to enter the PAR on November 07, 2014.

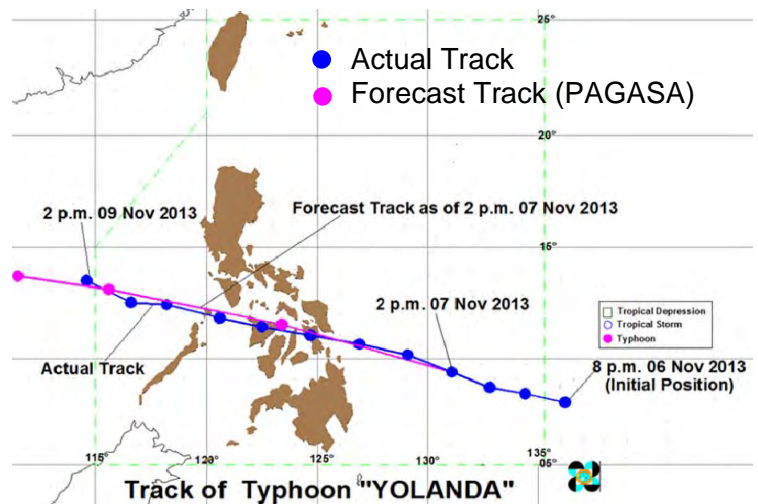


Figure 8: Actual Track vs. Forecast Track of Typhoon Yolanda (2PM, November 07, 2013)

- Typhoon Haiyan moved closer to the eastern border of the PAR at 5AM of November 06, 2013.
- Weather Advisory No. 2 was issued at 11AM, November 06, 2013 (Information on Typhoon Haiyan was included in the Weather synopsis having maximum sustained winds of 33.3m/s near the center and gustiness of up to 41.6m/s with a forecasted movement speed of 30km/h westward).

- Severe Weather Bulletin (SWB) No. 1 was issued although Typhoon Haiyan was still outside the PAR at 11PM on November 06, 2013.
- Typhoon Yolanda made its first landfall over Guiuan, Eastern Samar at 4:40AM on November 08, 2013.
- Due to the presence of several islands in Visayas, TY Yolanda made a total of six landfalls: 1) Guiuan, Eastern Samar, 2) Tolosa, Leyte, 3)Daanbantayan, Cebu, 4) Bantayan Island, Cebu, 5) Concepcion, Iloilo, and 6) Busuanga, Palawan.

<Role of the Guiuan Meteorological Radar System in forecasting and tracking Typhoon Yolanda before it entered and while in the PAR>

The Guiuan Meteorological Radar System served as an excellent monitoring tool during the approach of Typhoon Yolanda for the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). The radar images were very useful in locating the eye of the typhoon, estimating its diameter or size, calculating the movement (direction and speed) and making estimates of the associated rainfall and in preparing and publishing the series of advisories, bulletins and warnings indicated above by PAGASA.



Figure 9: Radar image from the Guiuan Meteorological Radar System capturing Typhoon Yolanda at 7:30PM, November 07, 2013

The Radar image in Figure 9 shows that the Guiuan Meteorological Radar System captured Typhoon Yolanda during its approach at 7:30 PM, November 07, 2013. From then onwards, the Guiuan Meteorological Radar System served as one of the basis of monitoring the hourly position of the typhoon until its last image (Figure 10) at 4:16AM, November 08, 2013.

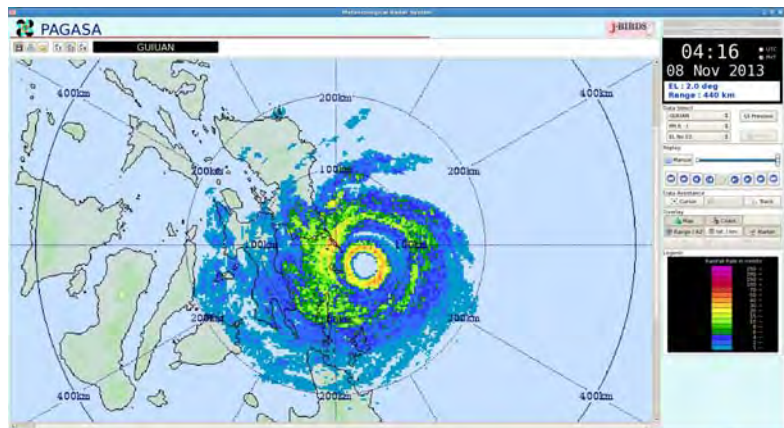


Figure10: Radar image from the Guiuan Meteorological Radar System showing the eye of Typhoon Yolanda as it approaches to make landfall over the area at 4:16AM, November 08, 2013

and stressed the possible occurrence of storm surges particularly in the areas along its path. Since Typhoon Yolanda accelerated on November 07, PAGASA held a Special Press Conference and provided hourly updates on the location and intensity of Typhoon Yolanda and press conferences/press briefings every 6 hours until November 09, 2013. However, Typhoon Yolanda created unthinkable and unspeakable damages in the Philippines, including on the Guiuan Meteorological Radar System which had contributed to monitoring Typhoon Yolanda.

Given the situation indicated above, the key objectives of the Project are to reconstitute the typhoon detection and monitoring capability of PAGASA through the restoration of the Guiuan Meteorological Radar System installed and the Radar Tower Building constructed under the Project for the Improvement of the Meteorological Radar System in the Philippines financed by Japan's Grant Aid.

2-2 Outline Design of Japanese Assistance

2-2-1 Design Policy

(1) Basic Design Policy of the Project

To recover the typhoon monitoring capability of the PAGASA by restoring the Guiuan Meteorological Radar Observation Station which was established and handed over to PAGASA on September 10, 2013 under the "Project for Improvement of the Meteorological Radar System" of Japan's Grant Aid.

[1] Design Policy of the Equipment

- a) To install a new radome strengthened with a honeycomb structured core-mat in the interlayer which can withstand a maximum wind speed of 125 m/s.
- b) To replace the disappeared, broken and damaged equipment with a new one.
- c) To utilize all the existing software associated with the Meteorological Radar System and Meteorological Data Satellite Communication System (VSAT) except Windows and others which had been pre-installed into the procured PCs since PAGASA has all the back-ups.

[2] Design Policy of the Radar Tower Building

- a) To firmly fix the exterior facility equipment with reinforced steel bars to the concrete base and to replace the exterior door with a reinforced one according to the consequences of the study on the damages created by Typhoon Yolanda.
- b) To replace the disappeared, broken and damaged facility equipment (lightings, air conditioning systems, etc.) with a new one.

c) To use locally procurable building materials.

(2) Design Policy on Environmental Conditions

To design the restoration of the Guiuan Radar Tower Building to endure typhoons as strong as Typhoon Yolanda.

(3) Design Policy on Construction Work

Most of the construction materials can be procured from the local market. For the Project, durable maintenance materials not containing asbestos will be selected from locally available materials.

Laborers are classified by their skills and the skill level is variable in the Philippines. In order to utilize local laborers, as much as possible, local construction methods with which local workers are familiar with will be used.

(4) Policy on the Use of Local Construction Companies

1) Construction Work of the Radar Tower Building

Generally, the technical skills and competence of the major local construction companies are adequate enough. Thus, they will be utilized for the restoration work of the radar tower building.

2) Equipment Installation Work

Under the supervision of a Japanese engineer, a local electrical installation work contractor will be utilized in the installation work of the equipment.

(5) Design Policy regarding Construction/Procurement Method and Schedule







Prior to the commencement of the restoration work of the Guiuan Radar Tower Building, strong and appropriate temporary enclosures will be constructed to prevent further damages from future heavy rains.









2-2-2 Basic Plan









(1) Equipment Plan

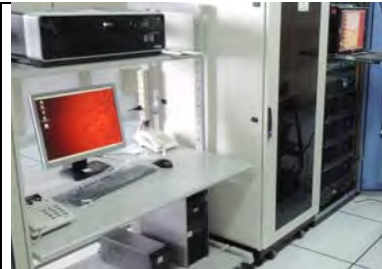






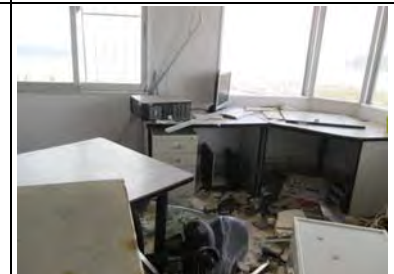
The finalized components in the restoration work of the Guiuan Radar Tower Building are as follows.

Table 4: Reinforcement and Renovation Items and Methods

Item/Equipment	Missing/Destroyed/ Damaged	Countermeasures	Details	Pictures of the Item/Equipment upon the Completion of the Project for Improvement of the Meteorological Radar System	Post-Disaster Pictures
Meteorological Radar System					
Radome	Missing	Reinforcement	To install a new radome strengthened with a honeycomb structured core-mat in the interlayer which can withstand a maximum wind speed of 125m/s.		
Radome (Base Ring)	Damaged	Replacement	Equivalent to the existing one		
Radar Antenna (Meteorological Radar Antenna)	Missing	Replacement	Equivalent to the existing one		
Radar Antenna (Pedestal)	Destroyed	Replacement	Equivalent to the existing one		









Antenna Controller	Damaged	Replacement	Equivalent to the existing one (Replaced one to be utilized as spare parts)		
Transmitter	Damaged	Replacement	Equivalent to the existing one (Replaced one to be utilized as spare parts)		
Digital Receiver and Signal Processor (DRSP)	Damaged	Replacement	Equivalent to the existing one (Replaced one to be utilized as spare parts)		
Wave-guide Configuration	Damaged	Replacement	Equivalent to the existing one		





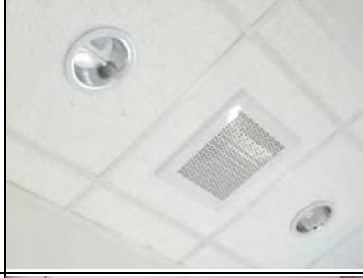
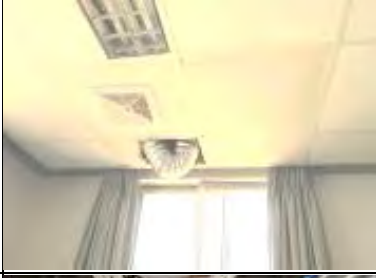


Power Supply Capacitor	Damaged	Replacement	Equivalent to the existing one (Replaced one to be utilized as spare parts)		
Measurement Equipment, etc.	Damaged	Replacement	Equivalent to the existing one		
Dehydrator	Reuse (Confirmed that this is still operational)				
Data & Protocol Converter	Reuse (Confirmed that this is still operational)				









Radar Task Controller	Reuse (Confirmed that this is still operational)				
Isolation Transformer and Automatic Voltage Regulator (AVR) for Radar Equipment	Reuse (Confirmed that this is still operational)				
Meteorological Radar Data Display System					
Severe Storm and Doppler Velocity Indicator, Cyclone Tracking Monitor, Data Analysis Unit and Off-line Maintenance Computer	Destroyed	Replacement	Equivalent to the existing one		
Compact UPS, Printer and Peripherals	Destroyed/ Damaged	Replacement	Equivalent to the existing one		









SIP IP Telephone	Destroyed/ Damaged	Replacement	Equivalent to the existing one		
Meteorological Data Satellite Communication System					
VSAT Out-door Unit (ODU/Transmitter), VSAT Out-door Unit (ODU/LNB), VSAT Antenna, Arrester Box	Damaged	Replacement	Equivalent to the existing one		
VSAT In-door Unit (IDU)	Damaged	Replacement	Equivalent to the existing one (Replaced one to be utilized as spare parts)		
Emergency Power Back-up Unit	Damaged	Replacement	Equivalent to the existing one (Replaced one to be utilized as spare parts)		

Emergency Power Back-up Unit (Solar Panels)	Missing/ Damaged	Reinforcement	<ul style="list-style-type: none"> ■ Missing and damaged solar panels and frames will be replaced with new ones ■ To attach and install modified panels which are created in Japan 		
Meteorological Radar Tower Building					
Aluminum Window (1F Observation Room and Data Analysis Room)	Destroyed	Replacement/ Reinforcement/ Repair	<ul style="list-style-type: none"> ■ Replace the damaged glass window ■ To install cyclone screens constructed with a punching-metal plate which will protect glass windows from stones and other small objects which accompany gusty winds. 		
Cyclone Screen	Missing/Destroyed	Replacement/ Reinforcement	<ul style="list-style-type: none"> ■ So as not to be broken by stepping stones which hit the glass, the punching metal which has a finer mesh will be used. ■ Replace with a new one ■ To attach a tough screen which is created in Japan. 		
Wooden Door (1F Observation Room and Data Analysis Room)	Destroyed/ Damaged	Replacement/ Reinforcement	Equivalent to the existing one with a bigger removable louver		









Access Floor (1F Observation Room)	Damaged	Replacement	Equivalent to the existing one		
Carpet Tiles (1F Observation Room)	Damaged	Replacement	Equivalent to the existing one		
Electricity Cable in Trench (1F Engine Generator Room)	Damaged	Replacement	Equivalent to the existing one		
Isolation Transformer (1F Electricity Room)	Reuse (Confirmed that this is still operational)				
Automatic Voltage Regulator (AVR) (1F Electricity Room)	Reuse (Confirmed that this is still operational)				





Air Conditioning Indoor Unit (1F Observation Room and Data Analysis Room)	Destroyed/ Damaged	Replacement	Equivalent to the existing one		
Bent Cap for Exhaust of Fan (1F and M4F)	Missing/Destroyed	Replacement/ Reinforcement	<ul style="list-style-type: none"> ■ Missing and destroyed bent cap will be replaced with a new one. ■ Reinforcement fixing with bolt. 		
Exhaust Fan (1F)	Destroyed/ Damaged	Replacement/ Reinforcement	Equivalent to the existing one		
Alarm Panel (1F)	Destroyed/ Damaged	Replacement	Equivalent to the existing one		

Fire Alarm Panel (1F)	Destroyed/ Damaged	Replacement	Equivalent to the existing one		
Furniture (1F)	Destroyed/ Damaged	Replacement	Equivalent to the existing one		
Telephone (1F)	Destroyed/ Damaged	Replacement/ Reinforcement	Equivalent to the existing one		
Cable Duct	Damaged	Replacement/ Reinforcement/ Repair	<ul style="list-style-type: none"> ■ Attach the tough cable duct inspection door which is created in Japan. ■ Reinforce with the Stainless angle ■ To install 3 water leakage protection at the top of the cable duct in the radome room and inside duct. 		

<p>Interior Lighting Fixtures (1F Observation Room, Data Analysis Room, Maintenance Room, Entrance Hall, M4F Radar Equipment Room, 6F Radome Room and Staircase from 4F to 6F)</p>	<p>Missing/Destroyed</p>	<p>Replacement</p>	<p>Equivalent to the existing one</p>		
<p>Exterior Lighting Fixtures (from 2F to 4F and 5F Observation Deck)</p>	<p>Missing/Destroyed</p>	<p>Replacement/ Reinforcement</p>	<ul style="list-style-type: none"> ■ Missing and destroyed exterior lighting fixtures will be replaced with new ones ■ Reinforcement fixing with a metal strap 		
<p>Interior Finishing (1F Observation Room, Data Analysis Room, Maintenance Room, Entrance Hall, M4F Radar Equipment Room and staircase from 4F to 6F)</p>	<p>Destroyed/ Damaged</p>	<p>Replacement</p>	<p>Equivalent to the existing one</p>		
<p>Air Conditioning Outdoor Unit (2F)</p>	<p>Missing/Destroyed</p>	<p>Replacement/ Reinforcement</p>	<ul style="list-style-type: none"> ■ Missing and destroyed air conditioning outdoor unit will be replaced with a new one. ■ Air conditioning outdoor unit will be firmly fixed with reinforced steel bars made by stainless angle to the concrete base. 		

Air Conditioning Outdoor Unit (5F)	Missing/Destroyed	Replacement/Reinforcement	<ul style="list-style-type: none"> ■ Missing and destroyed air conditioning outdoor unit will be replaced with a new one. ■ Air conditioning outdoor unit will be firmly fixed with reinforced steel bars made by stainless angle to the concrete base. 		
Air Conditioning and Refrigerant Pipe Cover (2F)	Missing/Destroyed	Replacement/Reinforcement	<ul style="list-style-type: none"> ■ Missing and destroyed refrigerant pipe will be replaced with a new one ■ Manufacturing the refrigerant pipe cover with the stainless checker plate material and firmly fix to the concrete base. 		
Air Conditioning and Refrigerant Pipe Cover (5F)	Missing/Destroyed	Replacement/Reinforcement	<ul style="list-style-type: none"> ■ Missing and destroyed refrigerant pipe will be replaced with a new one ■ Manufacturing the refrigerant pipe cover with the stainless checker plate material and firmly fix to the concrete base. 		
Exterior Door (2F)	Destroyed	Replacement/Reinforcement	<ul style="list-style-type: none"> ■ To allow for a wider cover width between the door and the door frame to be strengthened by steel angles in the indoor side. ■ To add internal reinforcement and replace with a steel door which has a thick surface panel. 		

Exterior Door (5F)	Destroyed	Replacement/ Reinforcement	<ul style="list-style-type: none"> ■ To allow for a wider cover width between the door and the door frame to be strengthened by steel angles in the indoor side. ■ To add internal reinforcement and replace with a steel door which has a thick surface panel. 		
Access Floor in Radar Equipment Room (M4F)	Damaged	Replacement	Equivalent to the existing one		
Elevated Water Tank Cover (M2F)	Missing	Replacement/ Reinforcement	<ul style="list-style-type: none"> ■ Missing cover will be replaced with a new one ■ Reinforcement fixing with bolt 		
Heat Exchanger (M4F)	Destroyed/ Damaged	Replacement	Equivalent to the existing one		

Aluminum Door (M5F)	Destroyed	Replacement	Replacement with a reinforced steel door		
Exterior Finishing (Wall Tile and Spray Tile)	Damaged	Repair	Equivalent to the existing one		

<Reinforcement work to be done in the Virac Meteorological Radar Tower Building >

Three meteorological radar tower buildings were established one each in Virac, Aparri and Guiuan under the Project for the Improvement of the Meteorological Radar System financed by Japan’s Grant Aid. Originally, it was only the Guiuan radar tower building which was considered as the target of this Project as it was the only building damaged by Typhoon Yolanda. However, in response to a strong request made by the Government of the Philippines for the inclusion of the reinforcement work of Virac and Aparri in this Project, only the Virac radar tower building is included as the results of the study done on all the information provided by PAGASA as indicated below. The components of the reinforcement work to be done in the Virac radar tower building are as follows.

- 1) Virac is at the typhoon approaching area of Catanduanes Island.
- 2) There is a high possibility that a similar size of Typhoon Yolanda may approach Virac.
- 3) Virac is located on the hill top facing the Pacific Ocean like that of Guiuan.
- 4) Aparri is located on a flat land at the sea coast of the city in Northern Luzon.

Table5: Methods of Reinforcement Points at Virac Meteorological Radar Tower Building Facilities

Item/Equipment	Details
Aluminum Window (1F Observation Room and Data Analysis Room)	<ul style="list-style-type: none"> ■ To install cyclone screens constructed with a punching-metal plate which will protect glass windows from stones and other small objects which accompany gusty winds.
Cyclone Screen	<ul style="list-style-type: none"> ■ So as not to be broken by stepping stones which hit the glass, the punching metal which has more fine mesh will be used. ■ Replace with a new one ■ To attach a tough screen which is created in Japan.
Cable Duct	<ul style="list-style-type: none"> ■ Attach the tough cable duct inspection door created in Japan. ■ Reinforce with the Stainless angle ■ To install 3 water leakage protections at the top of the cable duct in the radome room and inside duct. It is recommended that PAGASA should implement this for Aparri
Exterior Lighting Fixtures (from 2F to 4F and 5F Observation Deck)	<ul style="list-style-type: none"> ■ Reinforcement fixing with a metal strap
Air Conditioning Outdoor Unit (2F)	<ul style="list-style-type: none"> ■ Air conditioning outdoor unit will be firmly fixed with reinforced steel bars made by stainless angle to the concrete base.
Air Conditioning Outdoor Unit (5F)	<ul style="list-style-type: none"> ■ Air conditioning outdoor unit will be firmly fixed with reinforced steel bars made by stainless angle to the concrete base.
Refrigerant Pipe Cover (2F)	<ul style="list-style-type: none"> ■ Manufacturing the refrigerant pipe cover with the stainless checker plate material and firmly fix to the concrete base.
Refrigerant Pipe Cover (5F)	<ul style="list-style-type: none"> ■ Manufacturing the refrigerant pipe cover with the stainless checker plate material and firmly fix to the concrete base.
Exterior Door (2F)	<ul style="list-style-type: none"> ■ To allow for a wider cover width between the door and the door frame to be strengthened by steel angles in the indoor side.
Exterior Door (5F)	<ul style="list-style-type: none"> ■ To allow for a wider cover width between the door and the door frame to be strengthened by steel angles in the indoor side.

(2) Major Equipment List

As a consequence of the basic design study, the major components of the Project are described below.

Meteorological Radar System

Name of Site: Guiuan Meteorological Radar Tower Building			
Equipment	Quantity	Purpose	
Radome	1 set	To protect the radar antenna assembly (a parabolic dish reflector) and maintenance personnel from severe weather conditions and lightning attacks.	
Antenna	1 set	To radiate radar beam into the atmosphere and receive scatter waves while rotating the parabola antenna according to azimuth and elevation direction.	
Antenna Controller	1 set	To rotate the parabolic dish reflector and control the antenna in azimuth and elevation by both horizontal and vertical drive motor units.	
Transmitter	1 set	To amplify the pulse- modulated power with stable frequency and transmitting the power to the antenna.	
Digital Receiver and Signal Processor (DRSP)	1 set	To receive pulse compression and processing echo signal from the Antenna. To suppress unnecessary echo such as clutter signals reflected from the ground. To send ingest data to radar task controller.	
Wave-guide Configuration	1 set	To feed the line propagation wave traveling between the antenna and TX/RX.	
Compact UPS	2 sets	To supply back-up AC power to computer equipment in order to enable proper shutdown procedure of the system in case of power failure.	
Power Supply Capacitor	1 set	To supply uninterrupted power by Electric Dual Layer Capacitor energy to the radar system when power failure occurred.	
Measurement Equipment, etc.	Test signal Generator	1 set	To measure receiving signal.
	Power Meter	1 set	To measure electric power.
	Power Sensor	1 set	To measure electric power.
	Frequency Counter	1 set	To measure frequency.
	Oscilloscope	1 set	To measure electrical signal waveform.
	Digital Multimeter	1 set	To measure voltage and power current.
	Step Ladder	1 set	For maintenance of the radome and obstruction light.
Radar Antenna Maintenance Deck	1 set	For maintenance of the antenna.	

Meteorological Radar Data Display System

Name of Site: Guiuan Meteorological Radar Tower Building		
Equipment	Quantity	Purpose
Severe Storm and Doppler Velocity Indicator	1 set	To monitor and alert severe storm condition by various doppler radar products.
Cyclone Tracking Monitor	1 set	To track and predict cyclone course and time.
Color Printer (Observation room)	1 set	To print radar image.
Dual Switch	1 set	To connect all the computer equipment with LAN.
Dual Optical Repeater	1 set	To convert electrical signal and optical signal on LAN for surge protection.
Compact UPS (Observation room)	4 sets	To supply back-up AC power to computer equipment in order to enable proper shutdown procedure of the system in case of power failure.
Off-Line Maintenance Computer	1 set	For weather service, record of daily operation and maintenance. In case of emergency, data communication to PAGASA Head Office by connecting GPRS/EDGE modem.
Color Printer (for Off-line Maintenance)	1 set	To print the record of daily operation and maintenance
GPRS/EDGE Modem	1 set	For Data Communication to PAGASA Head Office by connecting Off-line Maintenance Computer in case of emergency
Data Analyzing Unit	1 set	To analyze weather phenomena by observed radar data.
Color Printer (Data Analysis Room)	1 set	To print radar image.

Compact UPS (Data Analysis Room)	1 set	To supply back-up AC power to computer equipment in order to enable proper shutdown procedure of the system in case of power failure.
SIP IP Telephone (Observation room)	1 set	To convert voice packet signal, and voice communication.
SIP IP Telephone (Data Analysis Room)	1 set	To convert voice packet signal, and voice communication.

Meteorological Data Satellite Communication System

Name of Site: Guiuan Meteorological Radar Tower Building		
Equipment	Quantity	Purpose
VSAT Out-door Unit (ODU/Transmitter)	1 set	Transmitter for radar data transmission via satellite.
VSAT Out-door Unit (ODU/LNB)	1 set	Receiver for radar data transmission via satellite.
VSAT Antenna	1 set	Antenna for radar data transmission via satellite.
VSAT In-door Unit (IDU)	1 set	Modulator/Demodulator for radar data transmission via satellite.
Arrester Box	1 set	To protect VSAT equipment from lightning.
Emergency Power Backup Unit	1 set	To supply back-up AC power to VSAT equipment for uninterrupted or continued VoIP communication to Head Office in case of power failure.

2-2-3 Outline Design Drawing

The following outline design drawings for the Project are attached hereunder.

<Guiuan Meteorological Radar Tower Building Restoration Work>

Door and Window

- Door and Window Layout Plan 1 : A-01
- Door and Window Layout Plan 2 : A-02
- Door and Window Layout Plan 3 : A-03
- Door and Window List : A-04
- Steel Door Detail 1 : A-05
- Steel Door Detail 2 : A-06
- Steel Door Detail 3 : A-07
- Cyclone Screen Detail 1 : A-08
- Cyclone Screen Detail 2 : A-09
- Cyclone Screen Detail 3 : A-10

Cable Duct

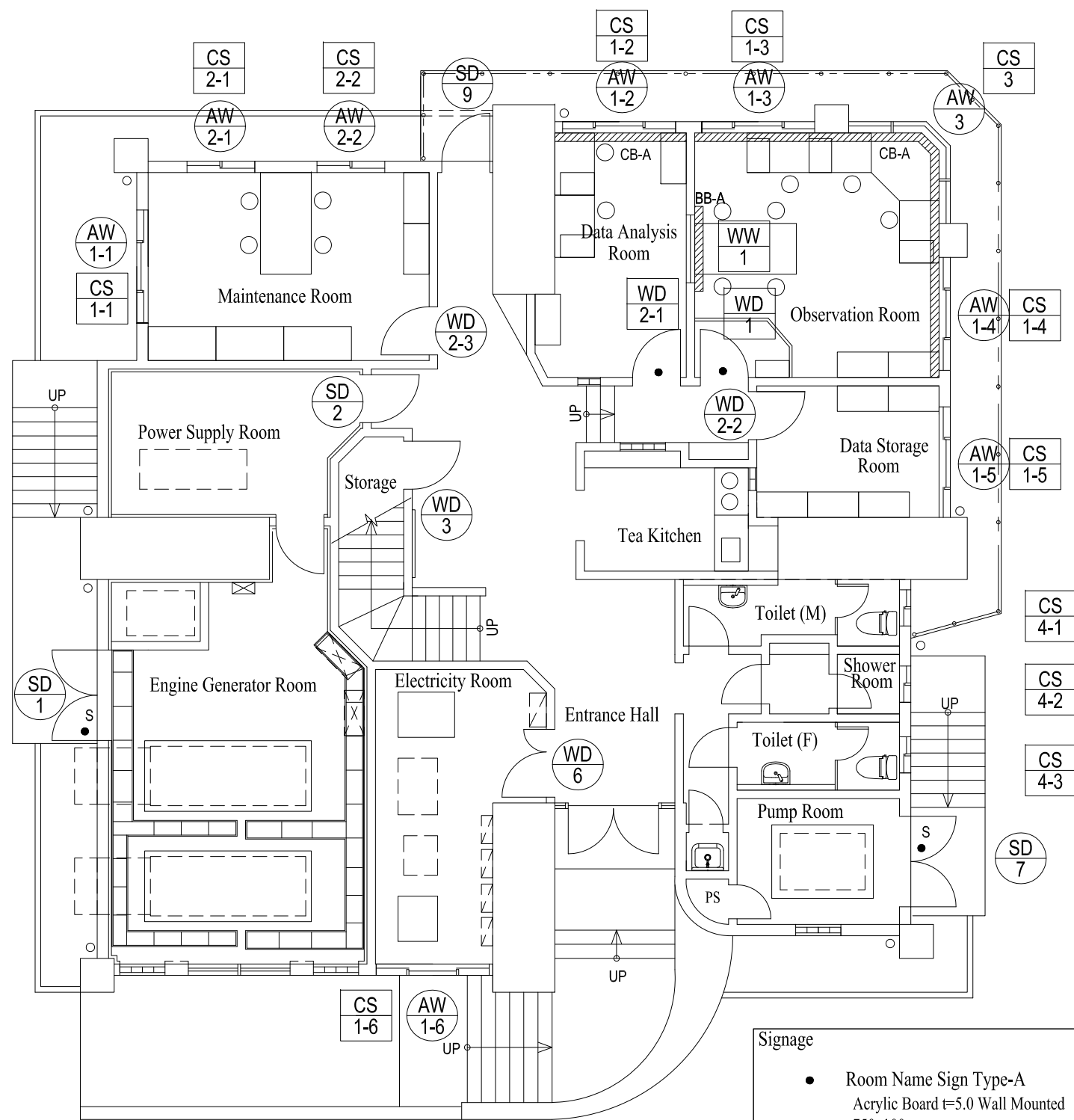
- Cable Duct Detail 1 : A-11
- Cable Duct Detail 2 : A-12
- Cable Duct Detail 3 : A-13

Air-conditioning Outdoor Unit

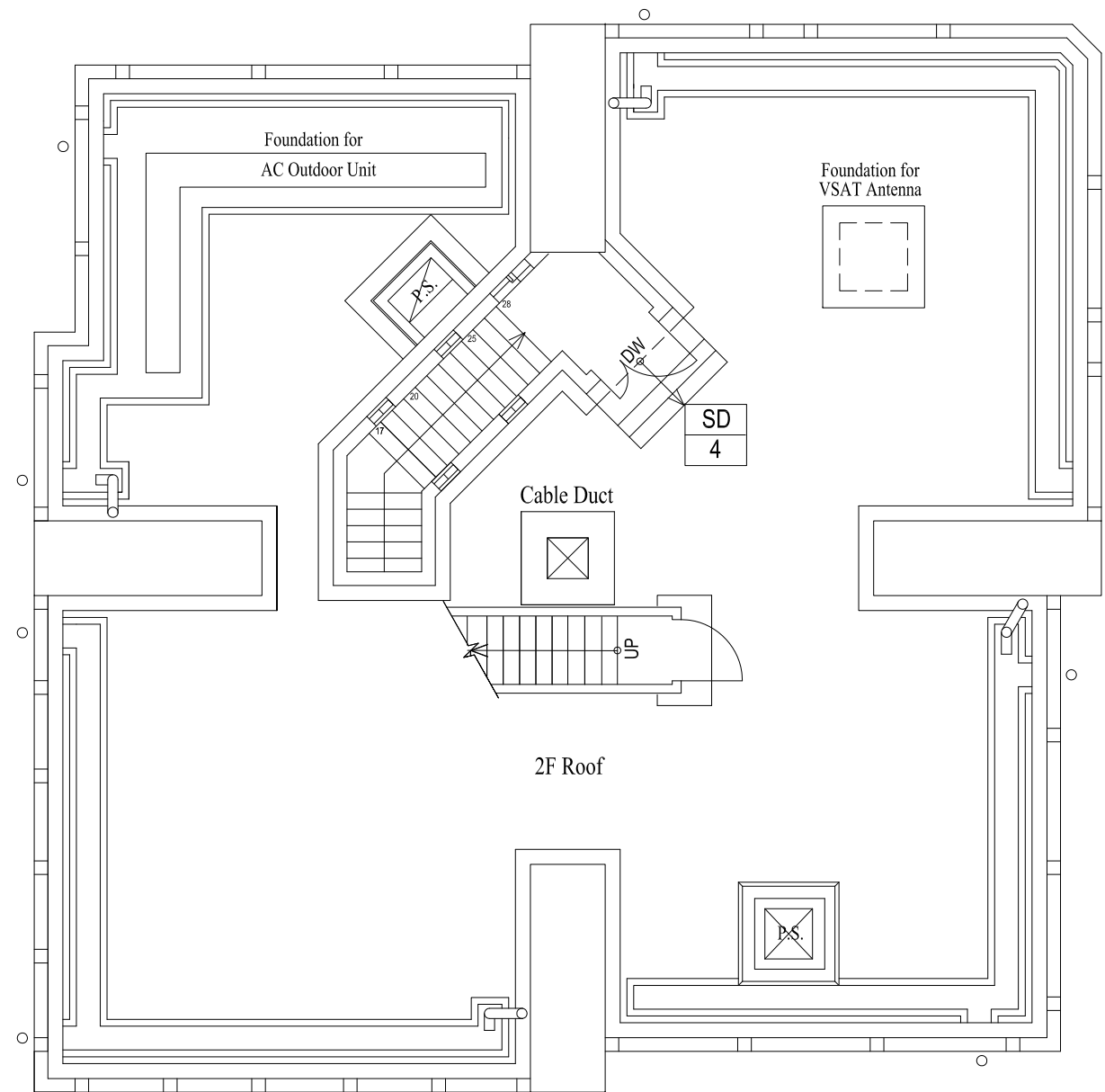
- Air-conditioning Outdoor Unit Detail 1 : A-14
- Air-conditioning Outdoor Unit Detail 2 : A-15
- Air-conditioning Outdoor Unit Detail 3 : A-16

<Guiuan Meteorological Radar System Restoration Work>

- Equipment Layout Plan 1 : EQ-01
- Equipment Layout Plan 2 : EQ-02
- Equipment Layout Plan 3 : EQ-03

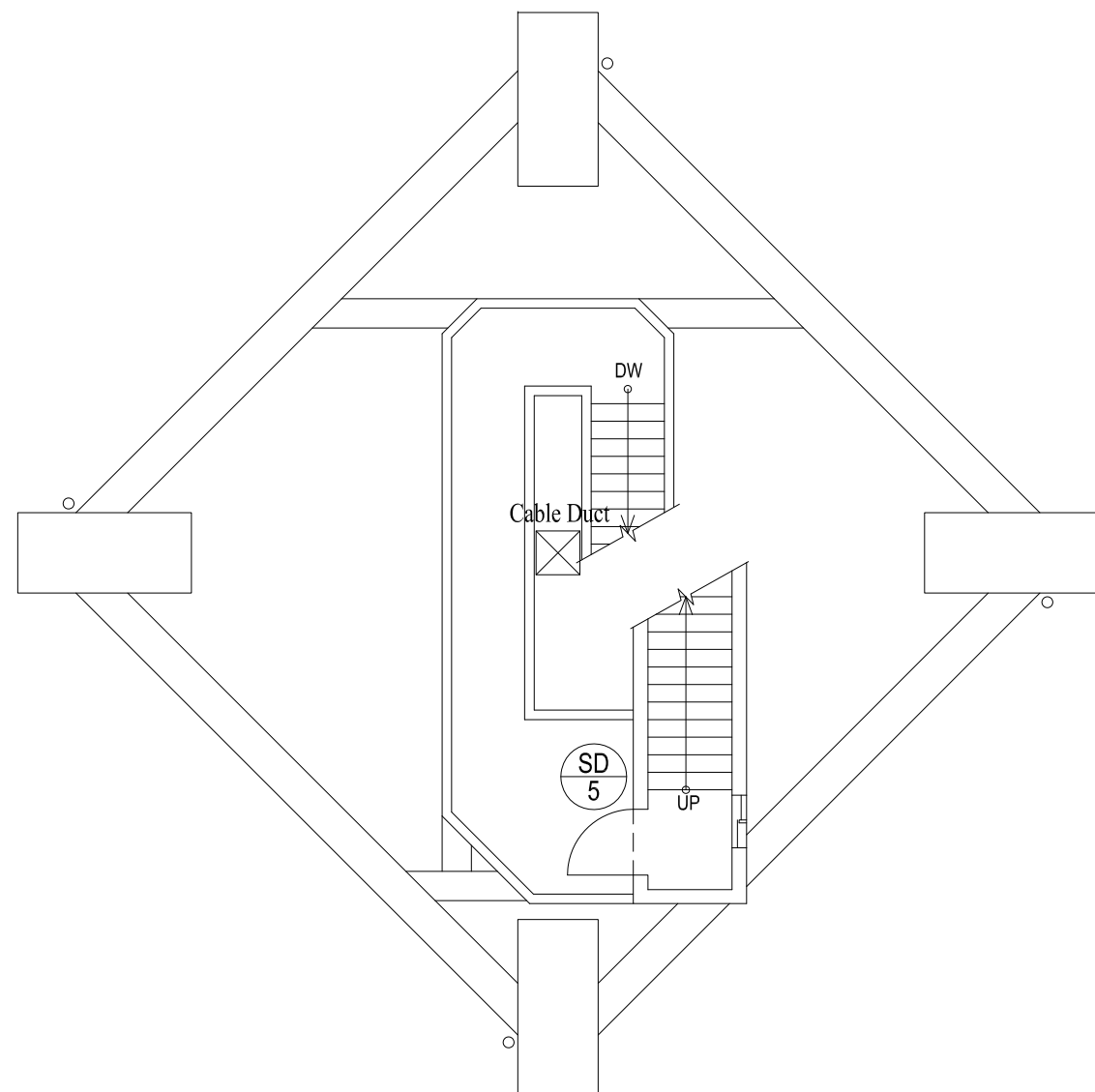


1FL PLAN

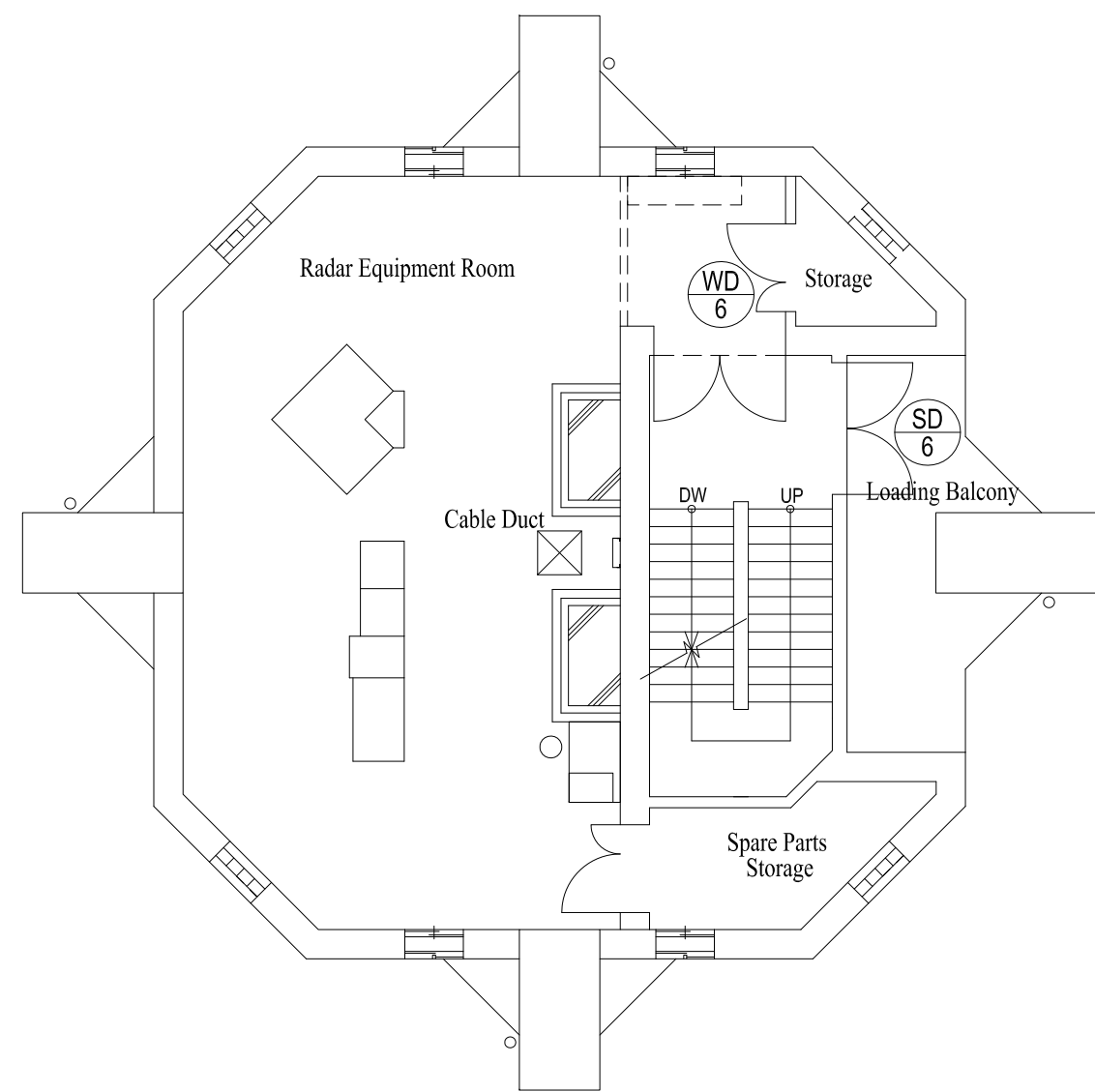


2FL PLAN

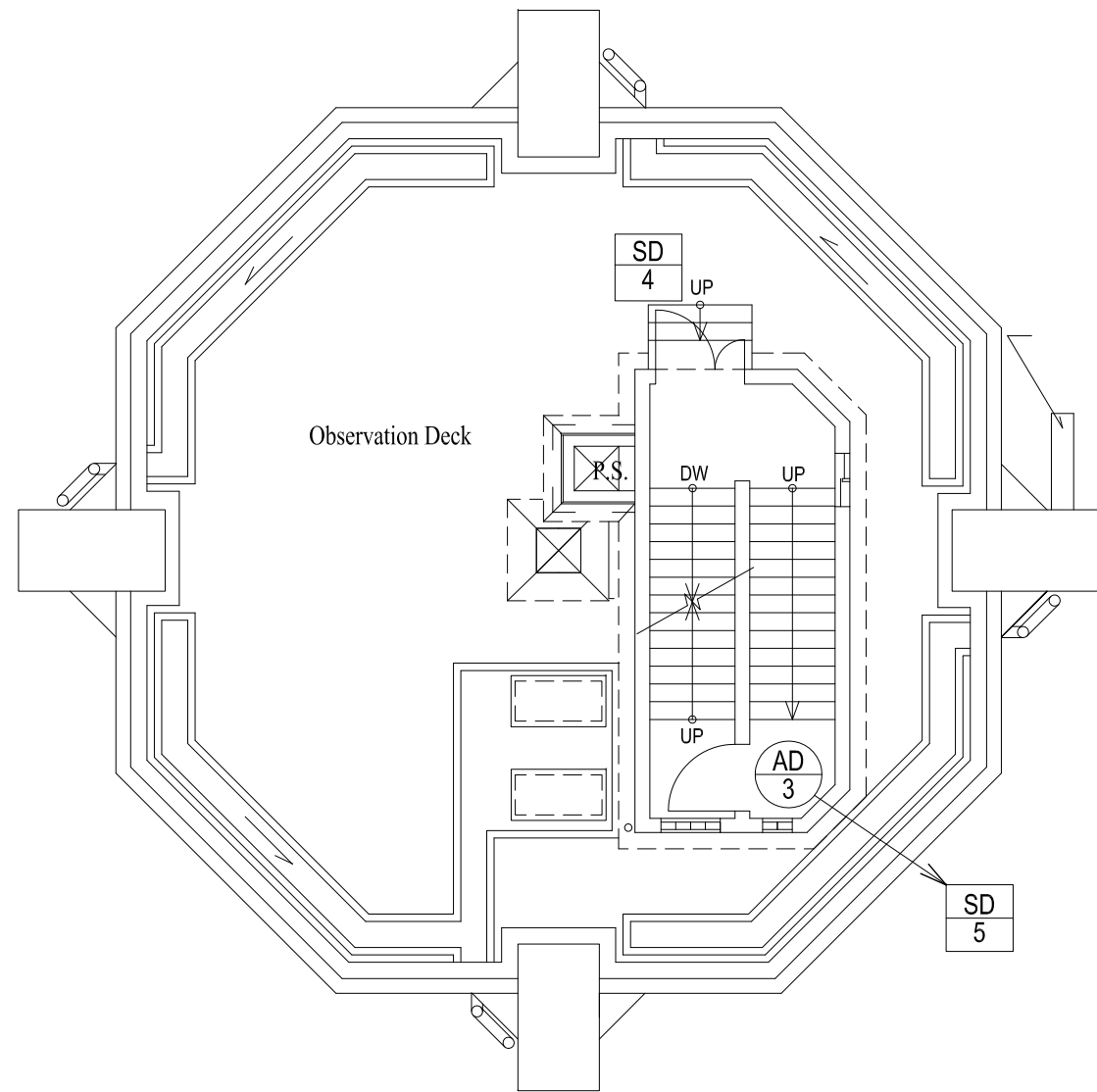
Signage	Curtain Box and Blind Box
<ul style="list-style-type: none"> ● Room Name Sign Type-A Acrylic Board t=5.0 Wall Mounted 750x100 Room Name: Color Film (in English) ● s Room Name Sign Type-S Stainless Steel t=3.0 Hair Line 750x100 Room Name: Color Film (in English) 	<p>CB-A Curtain Box Type-A Hard wood t=25, SOP Ceiling Conceal Type</p> <p>BB-A Blind Box Type-A Hard wood t=25, SOP Ceiling Conceal Type</p>



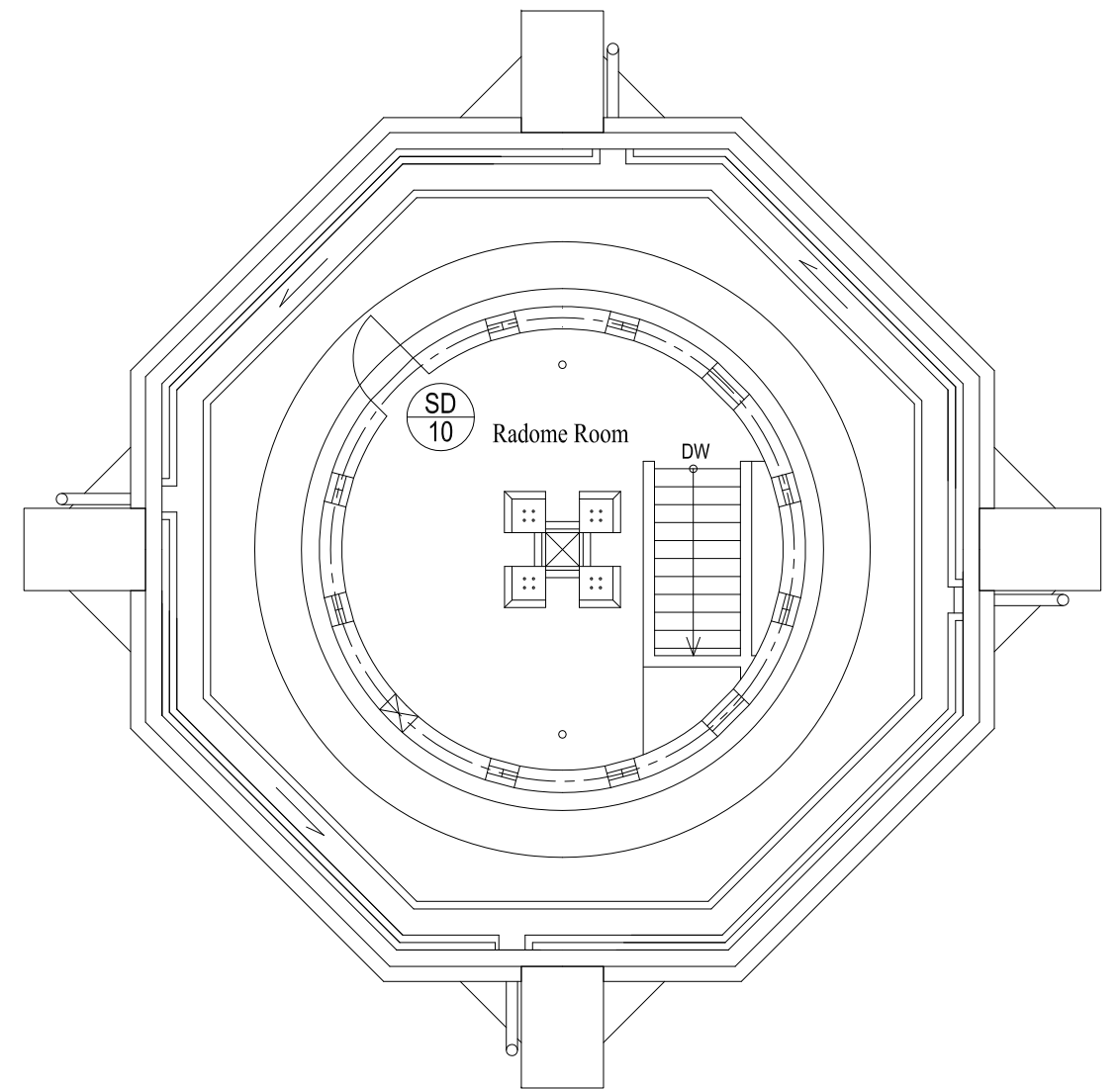
4FL PLAN



M4FL PLAN



5FL PLAN



6FL PLAN

REPLACE						
SD 4	AD 3 → SD 5	WD 1, WD 2-1	WW-1	AW 1-2,1-3,1-4	AW 3	
		Louver: Removal Type				

REPLACE						
SD-4	SD-5	WD-1, WD 2-1	WW-1	AW-1	AW-7	
1200 x 2100 2F, 5F Penthouse DOUBLE SWING DOOR (SEMI AIRTIGHT) 2 STEEL SOP MORTISE LOCK DOOR CHECK, DOOR STOP, KNOB, FLUSH BOLT (UPPER & UNDER), THUMB TURN	900 x 2100 4F Staircase SWING DOOR WITH LOUVER 1 STEEL SOP MORTISE LOCK DOOR CHECK, DOOR STOP, KNOB, THUMB TURN	850 x 2100 1F Observation Room 1F Data Analysis Room SWING FLUSH DOOR WITH LOUVER & HALF GLASS 2 WOOD SOP CLEAR SHEET GLASS t=5 MORTISE LOCK DOOR CHECK, THUMB TURN, KNOB, DOOR STOP.	1200 x 1700 1F Observation Room FIX WINDOW 1 WOOD SOP CLEAR SHEET GLASS t=5	2000 x 1500 1F Observation Room, Data Analysis Room SLIDE WITH FIXED WINDOW 2 ALUMINUM COLOR ANODIZING LAMINATED SAFETY CLEAR GLASS WITH SHATTERPROOF FILM t=6+6 CRESCENT WITH KEY LOCK	Ref. Drawing 1F Observation Room FIXED WINDOW 1 ALUMINUM COLOR ANODIZING LAMINATED SAFETY CLEAR GLASS WITH SHATTERPROOF FILM t=6+6	

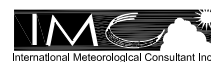
REPLACE (INSECT SCREEN)		REPLACE (GLASS)		REPLACE (CYCLONE SCREEN) (See Drawing No. A-08, A-09 and A-10)		
AW 1-1,1-2,1-3,1-4,1-5,1-6	AW 2-1, 2-2	AW 1-1	CS 1-1, 1-2, 1-3, 1-4, 1-5	CS 2-1, 2-2	CS-3	CS 4-1, 4-2, 4-3

REINFORCE AND REPAIR (See Drawing No. A-05, A-06 and A-07)						
SD-1	SD-5	SD 6	SD-7	SD-9	SD-10	

REPAINT						
WD 2-2, 2-3	WD-3	WD-6	SD-2			



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DRAWING TITLE
GUIUAN METEOROLOGICAL RADAR TOWER BUILDING RESTORATION WORK
DOOR AND WINDOW LIST

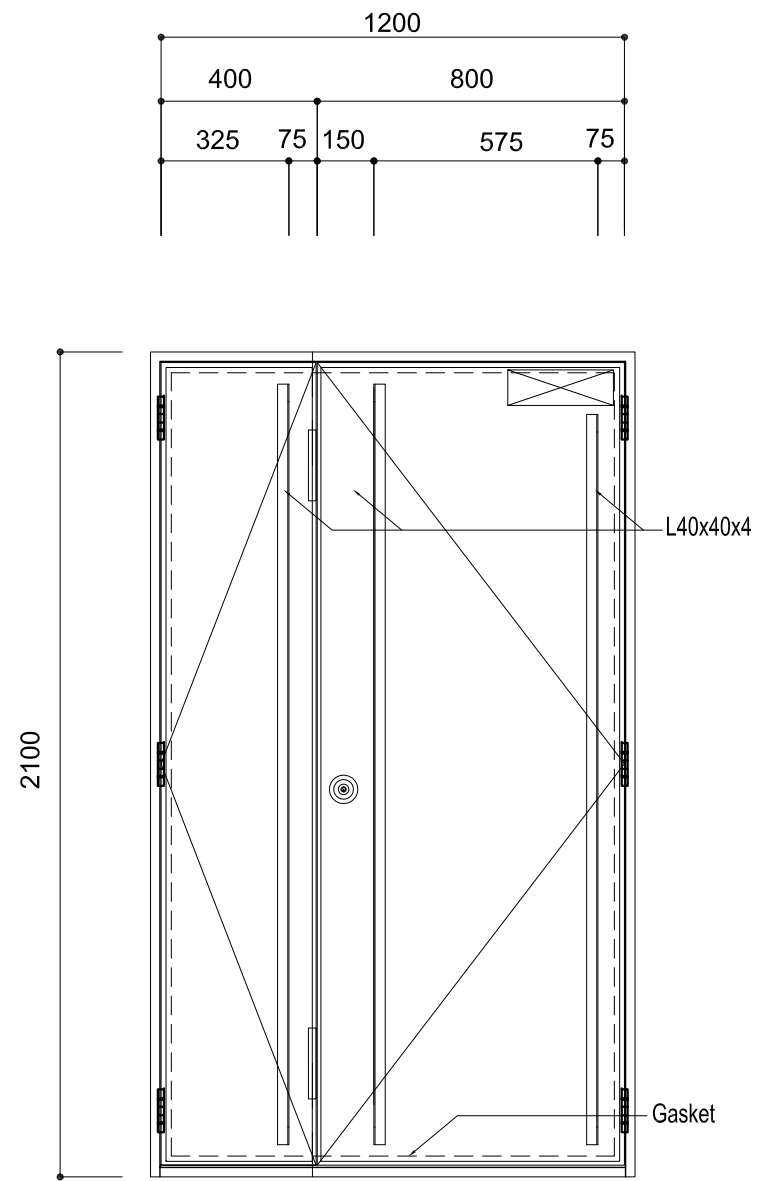
SCALE
1:100

DRAWING No.
A - 04

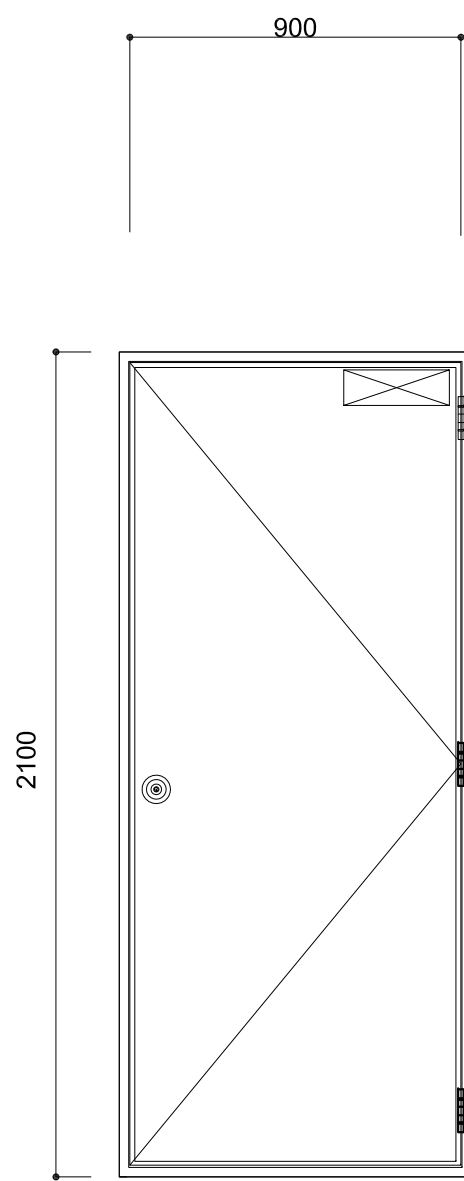
REPLACE

REPLACE

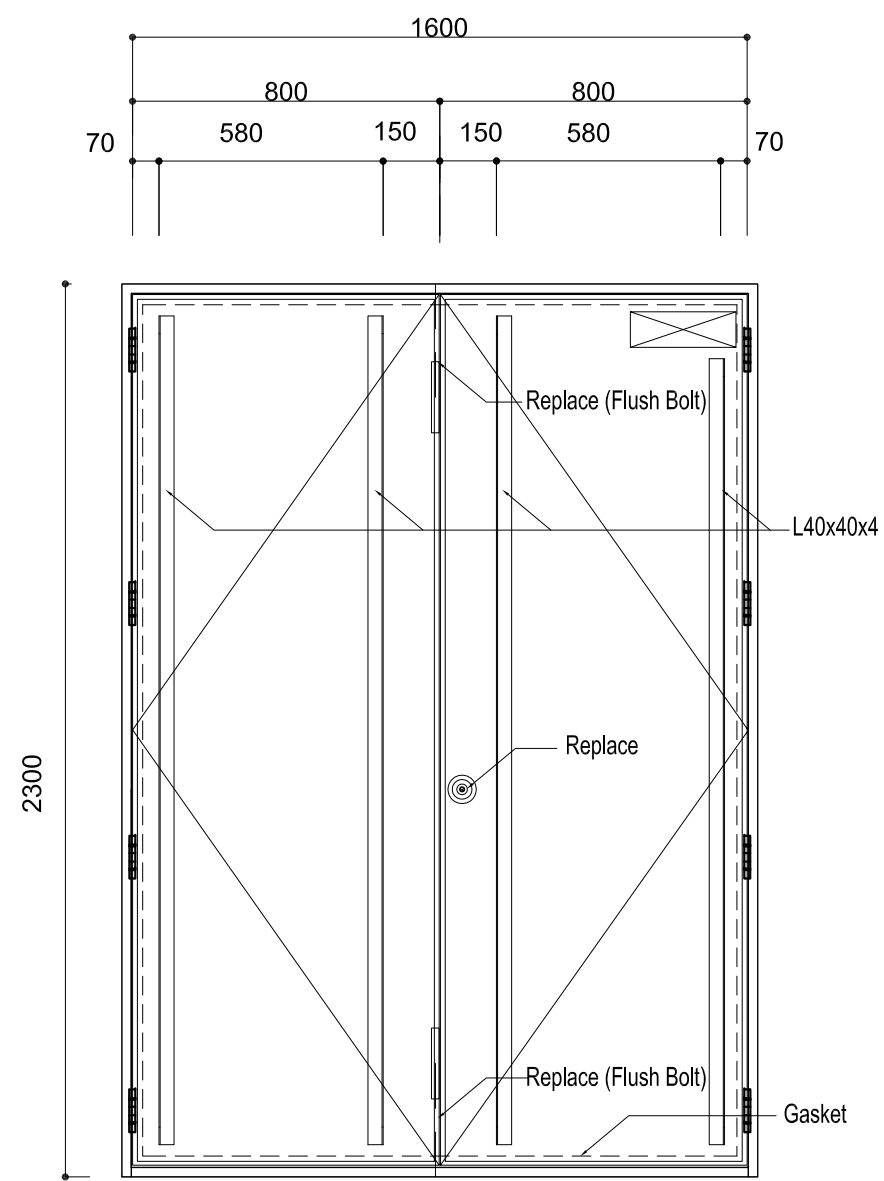
REINFORCE AND REPAIR



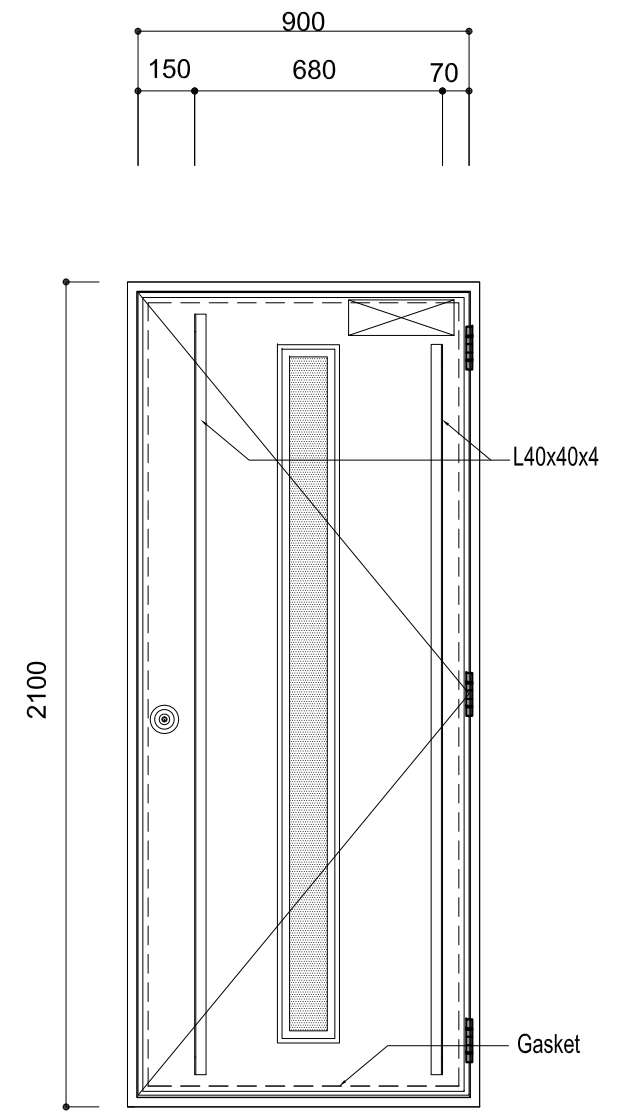
SD-4 (2F Stairs)
SD-4 (5F Stairs)



SD-5 (M5F Stairs)

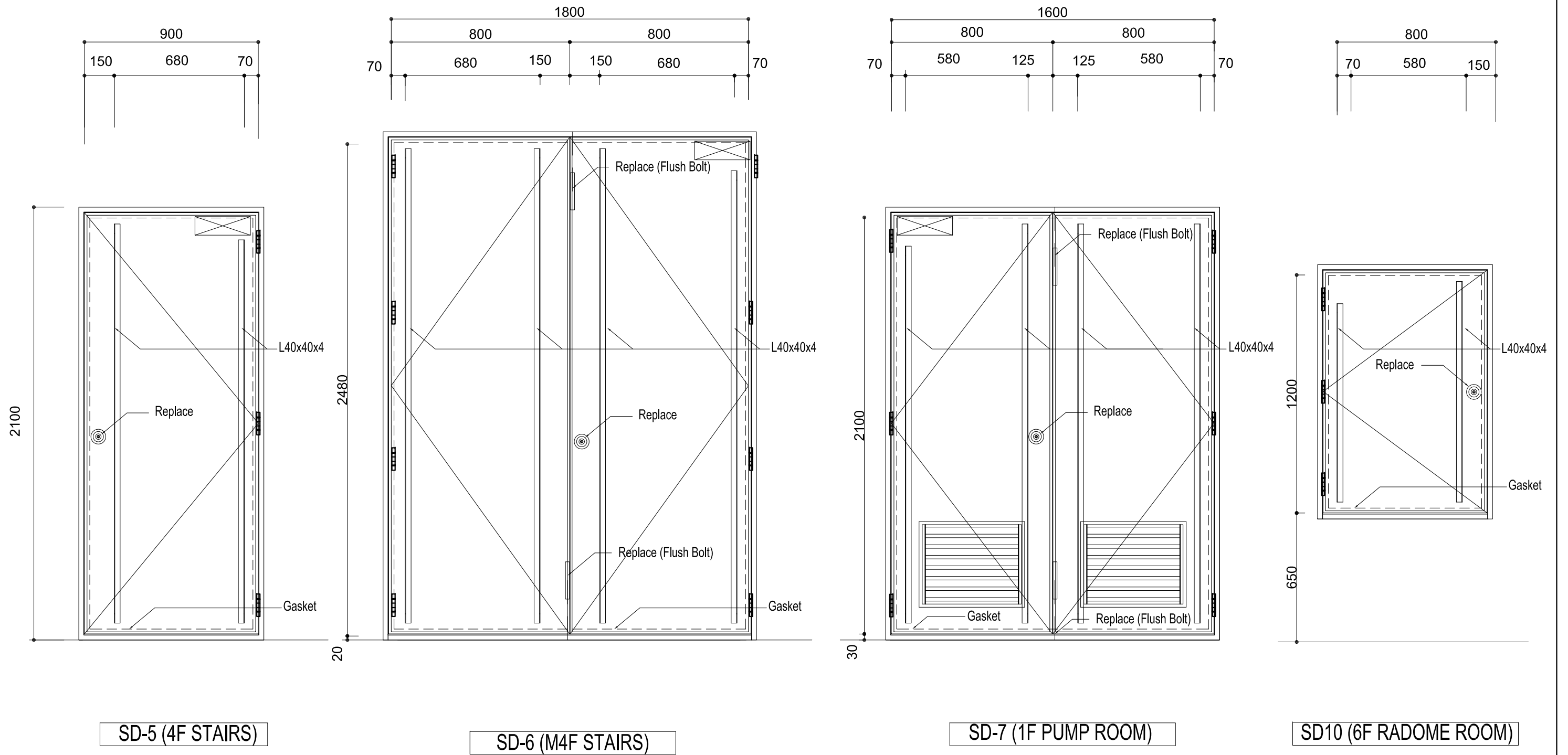


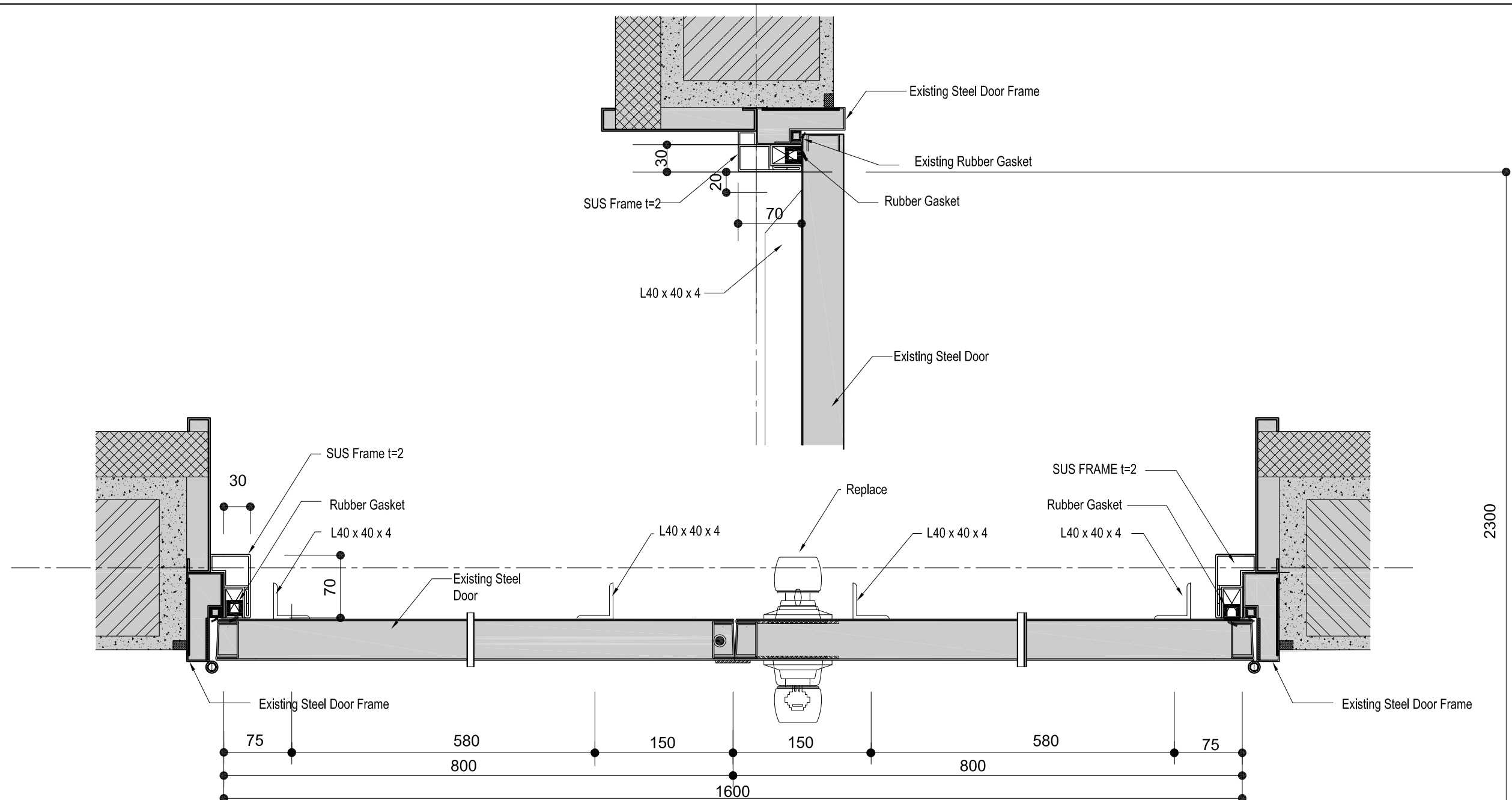
SD-1 (1F Generator Room)
SD-1 (M4F Stairs)



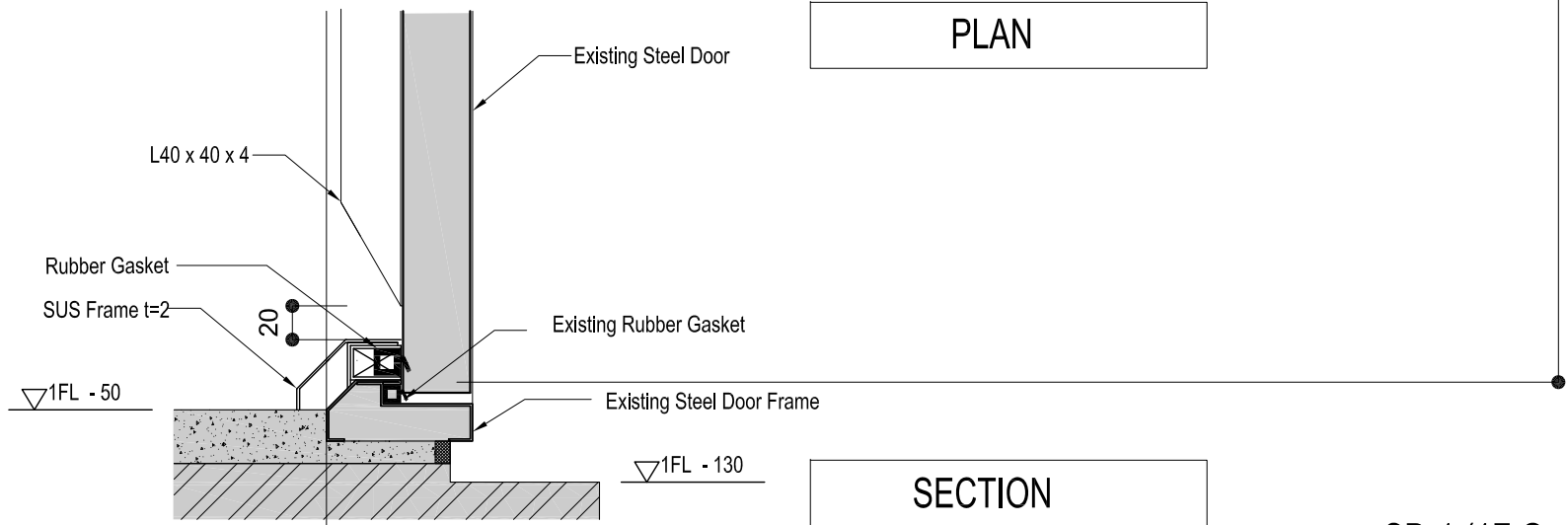
SD-9 (1F Entrance)

REINFORCE AND REPAIR





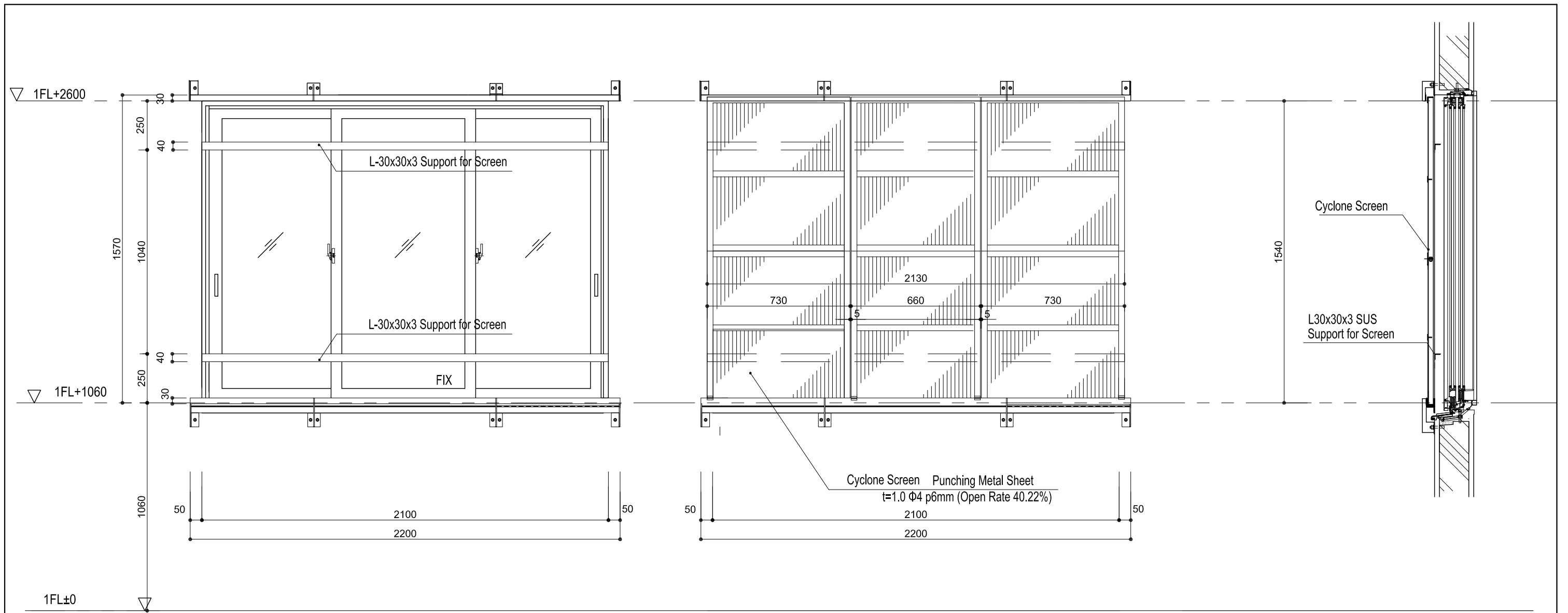
PLAN



SECTION

Attention:
Gray Area means Existing Portion

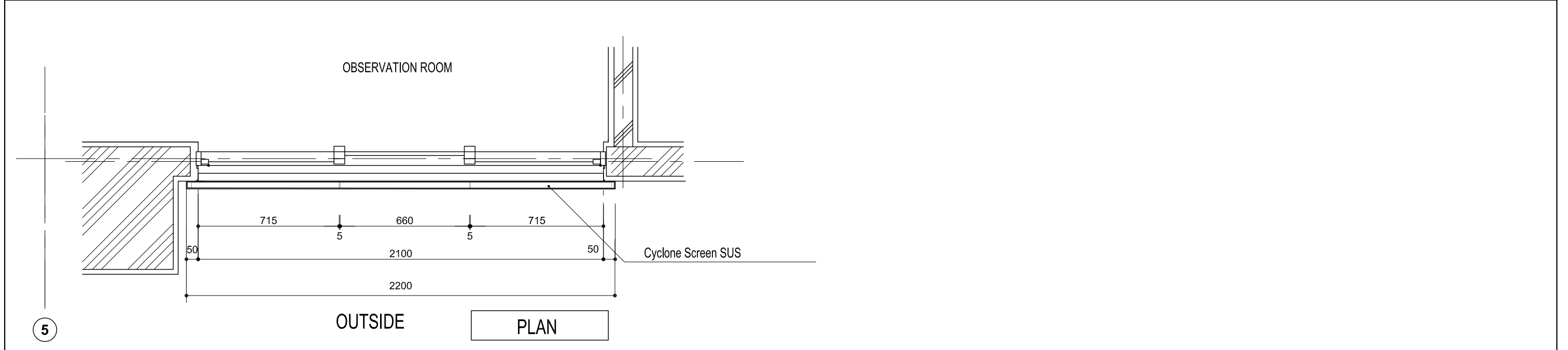
SD-1 (1F Generator Room)



ELEVATION (WITHOUT SCREEN)

ELEVATION (WITH SCREEN)

SECTION



OUTSIDE PLAN



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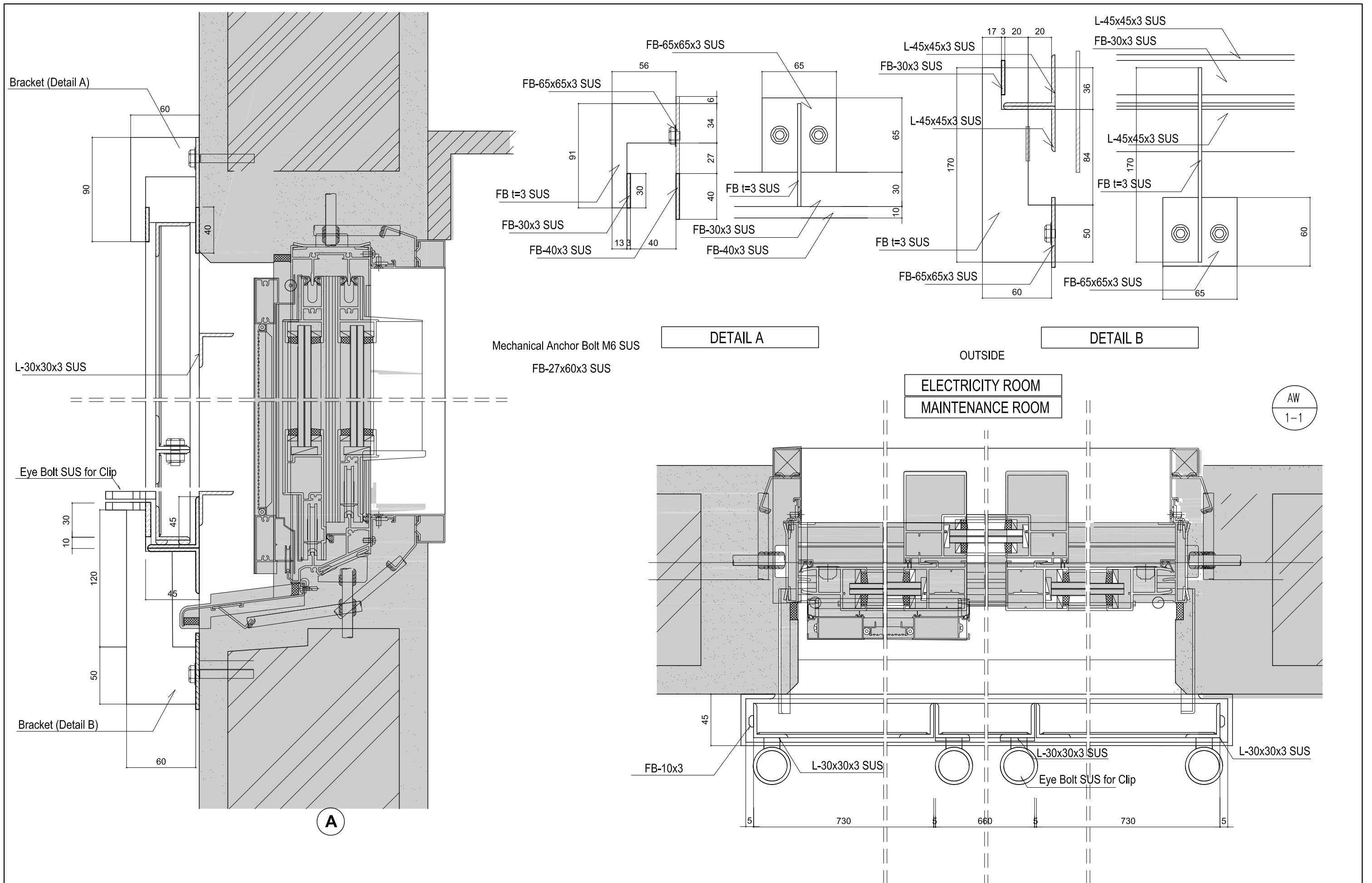


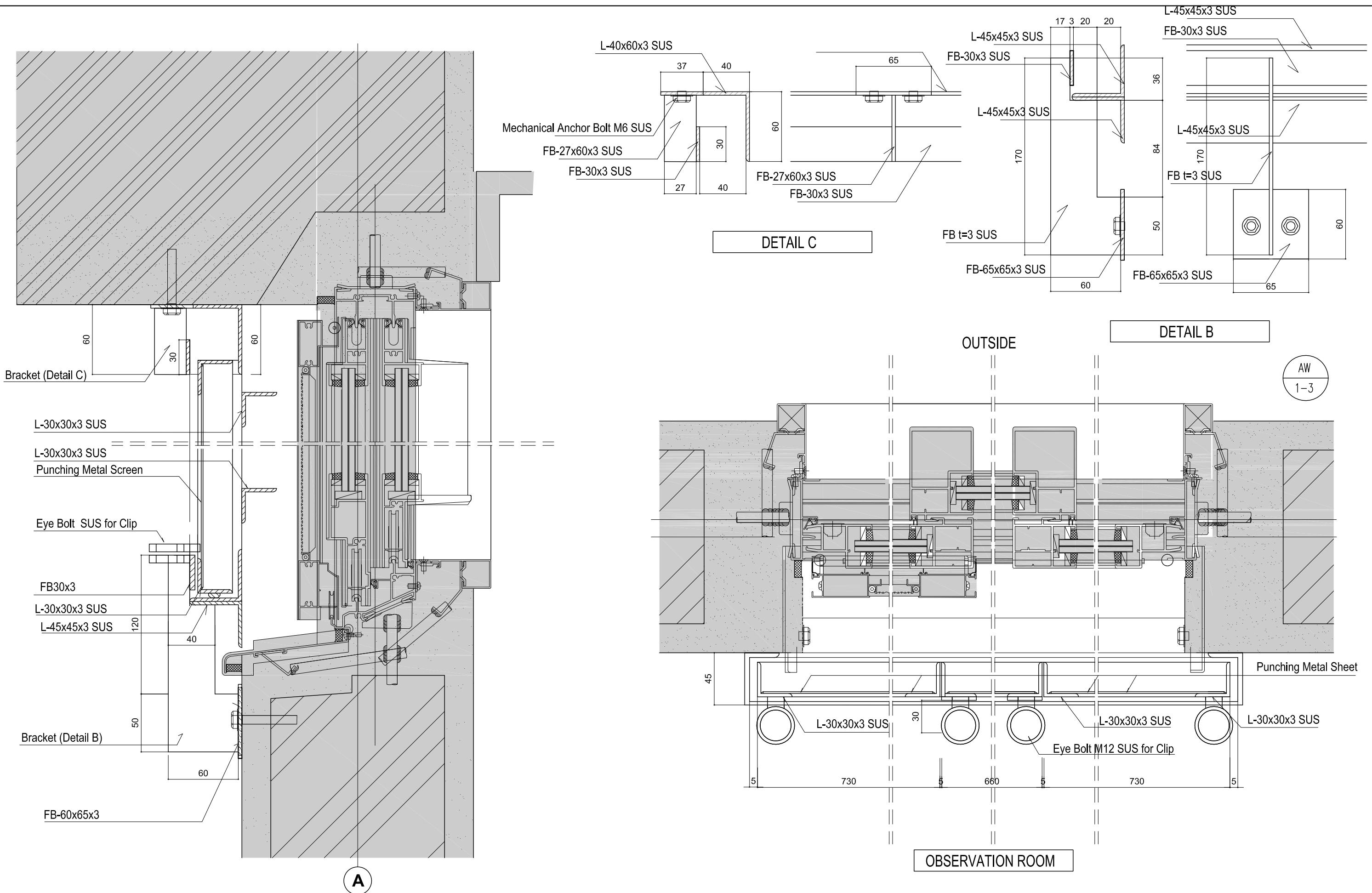
THE PROJECT FOR REHABILITATION OF
METEOROLOGICAL RADAR SYSTEM IN GUIUAN
IN THE REPUBLIC OF THE PHILIPPINES

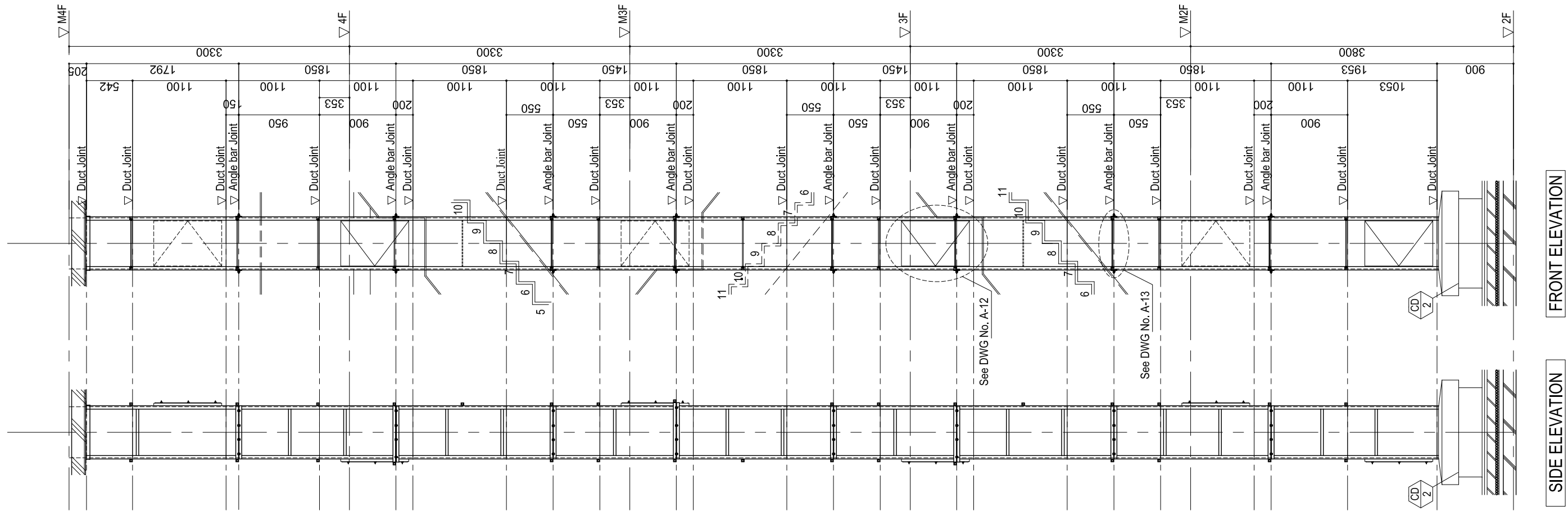
DRAWING TITLE
GUIUAN METEOROLOGICAL RADAR TOWER BUILDING RESTORATION WORK
CYCLONE SCREEN DETAIL 1

SCALE
1:20

DRAWING No.
A - 08







FRONT ELEVATION

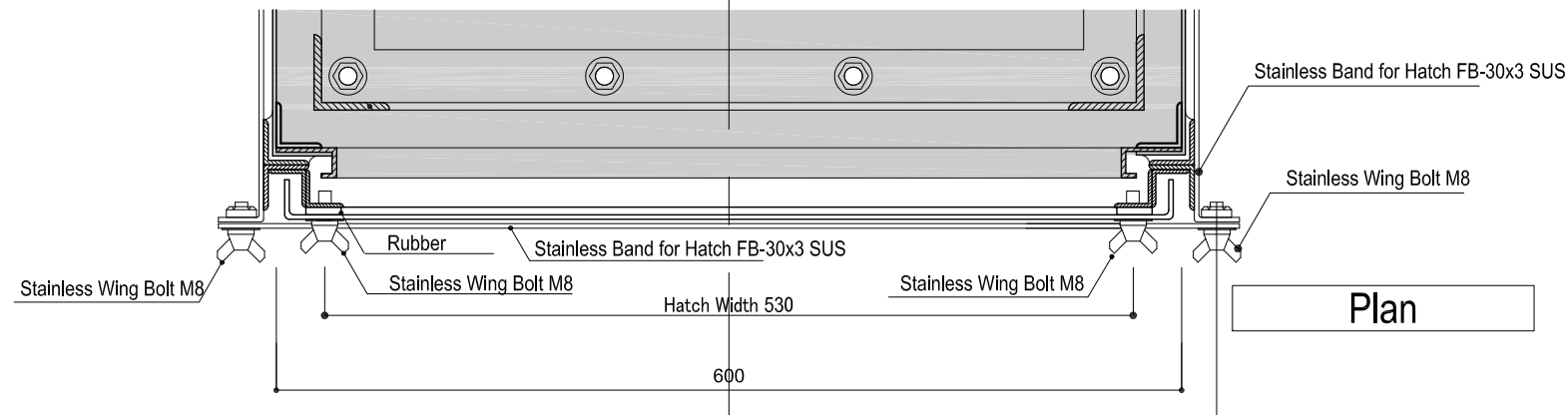
SIDE ELEVATION

FRONT ELEVATION

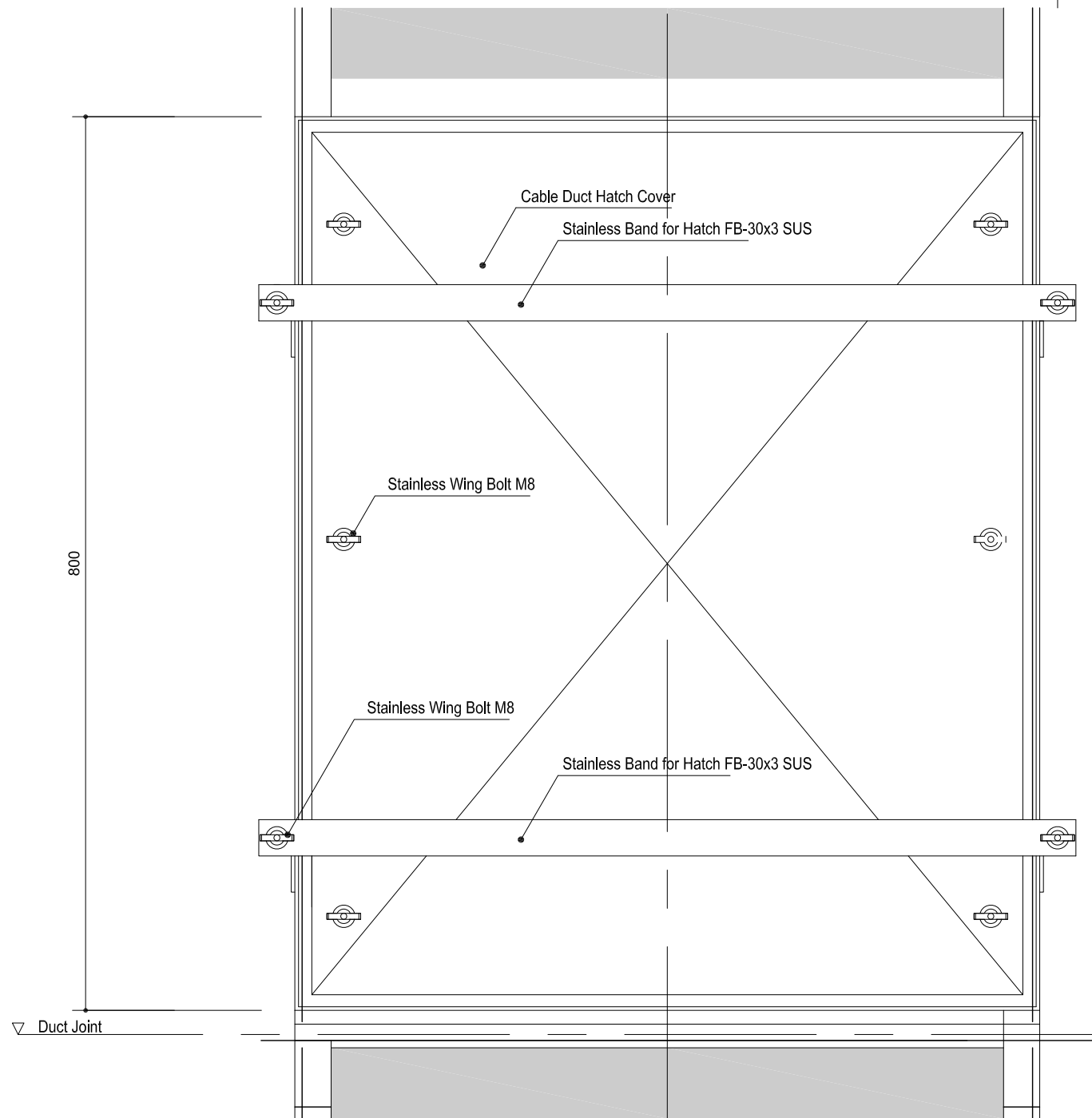
SIDE ELEVATION

5F - 6F

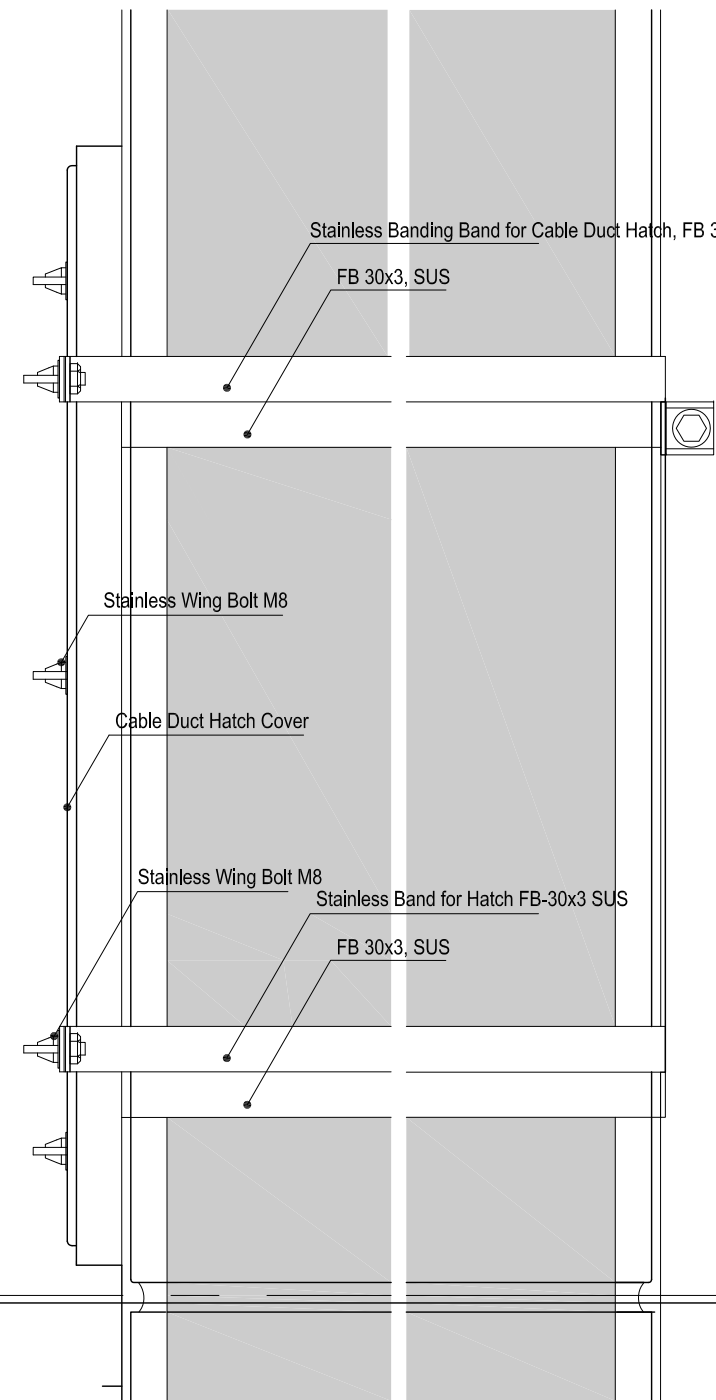
2F - M4F



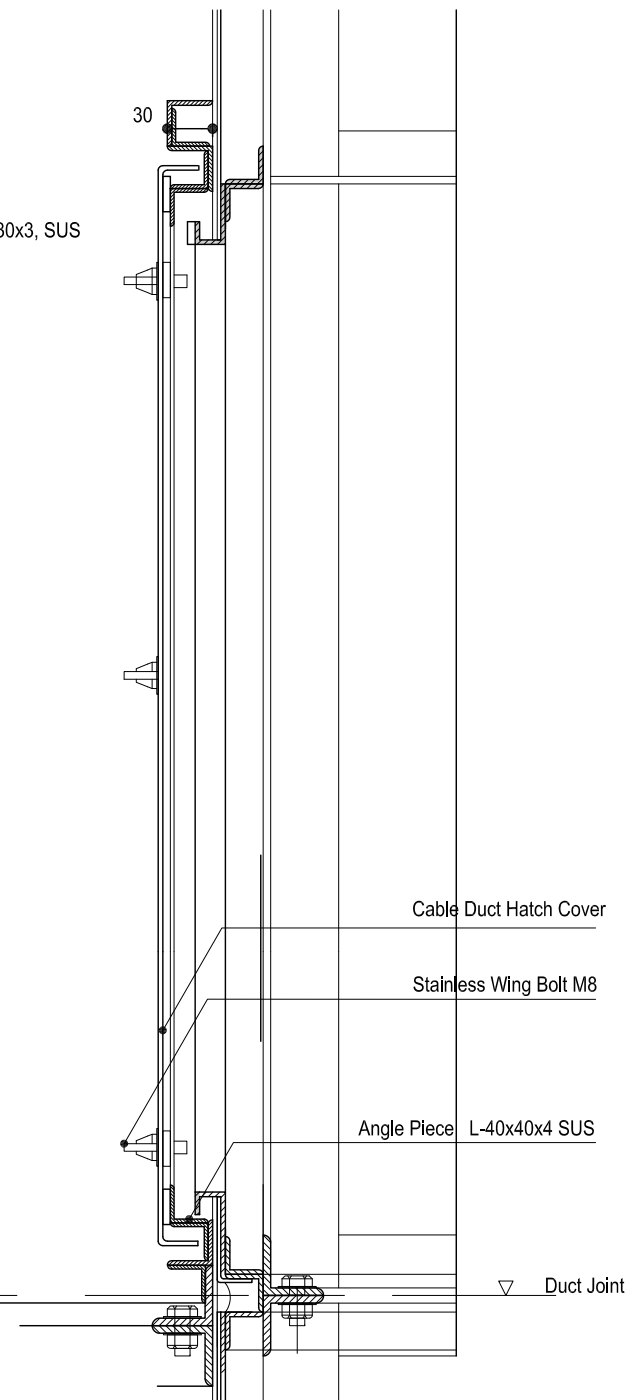
Plan



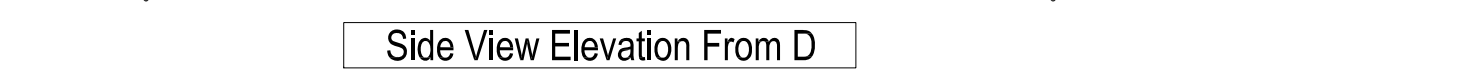
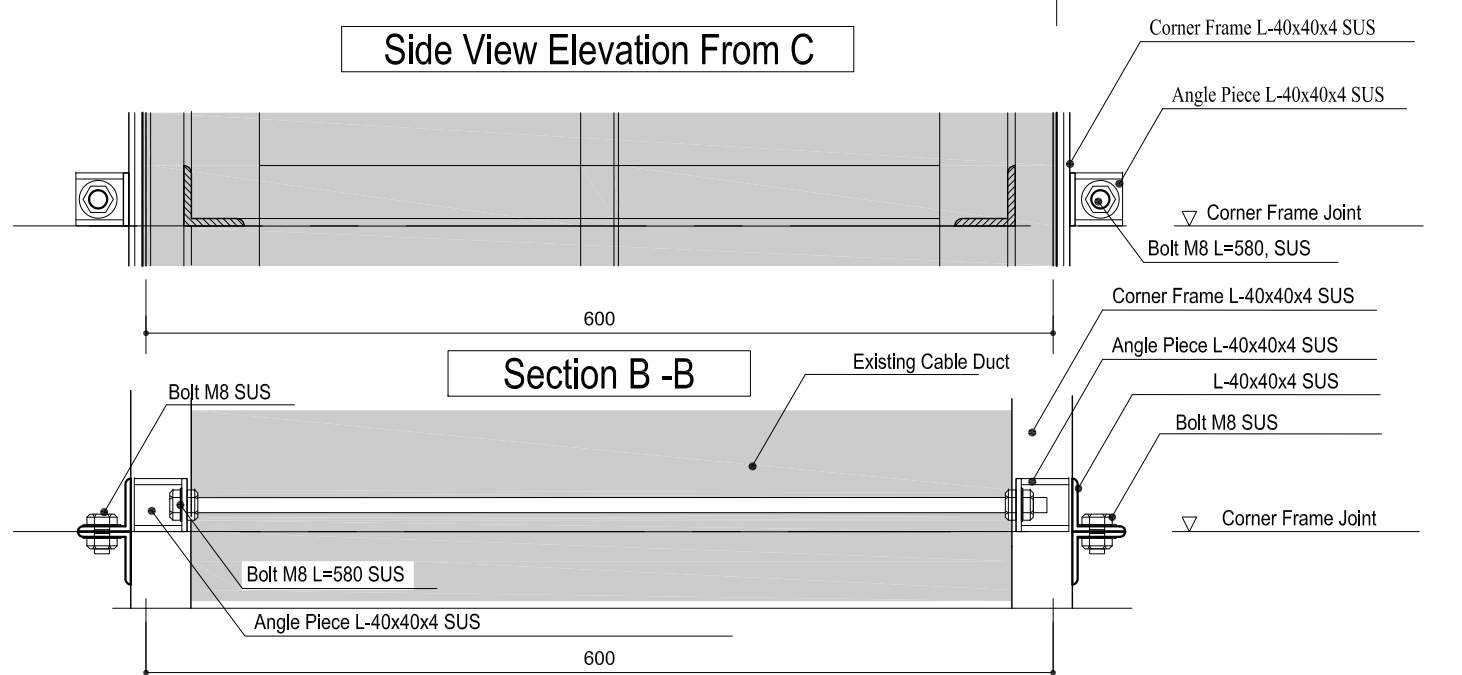
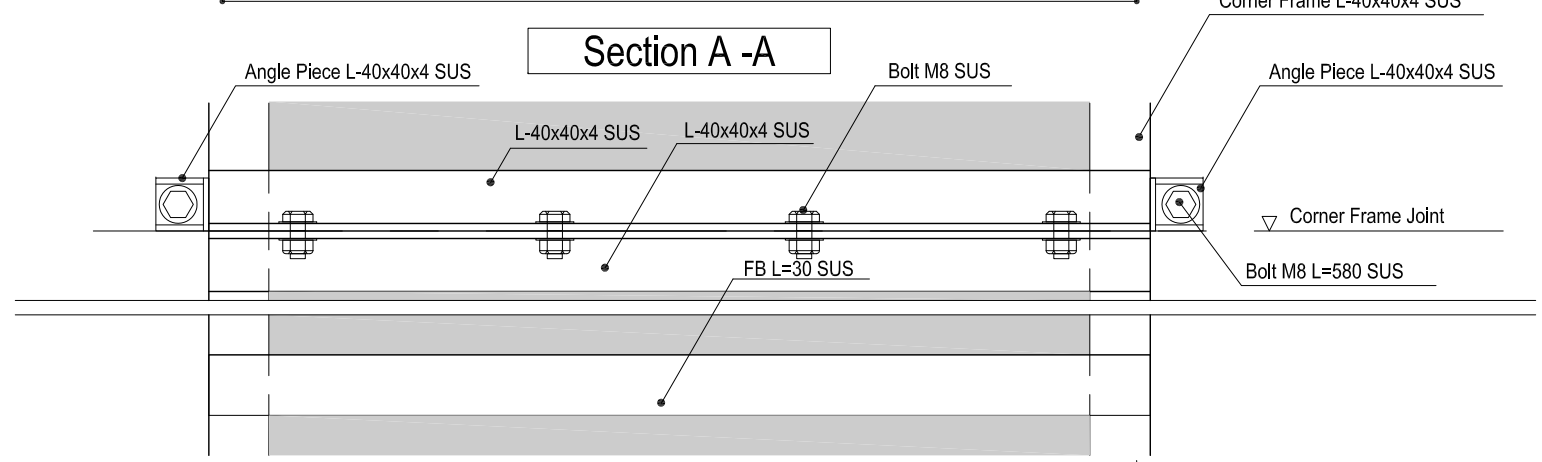
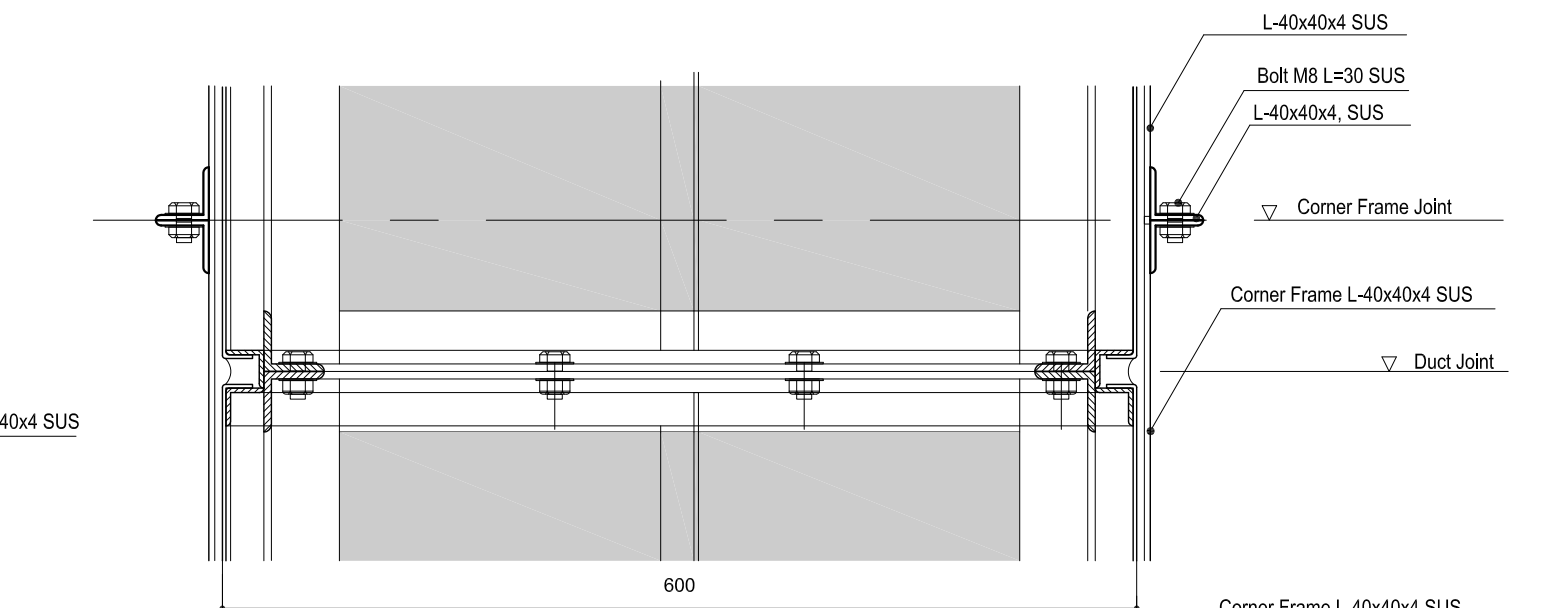
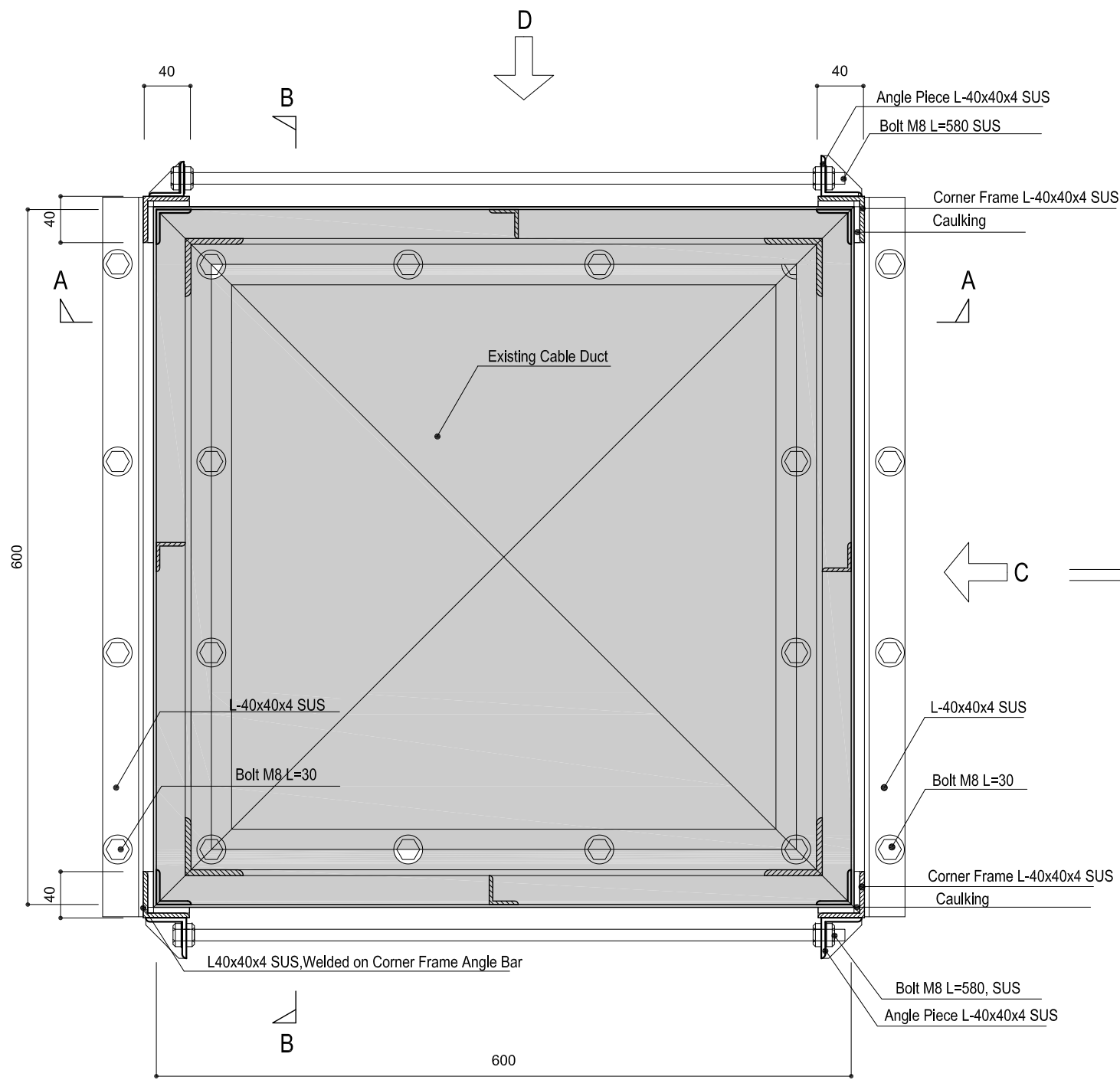
FRONT ELEVATION



SIDE ELEVATION



Section



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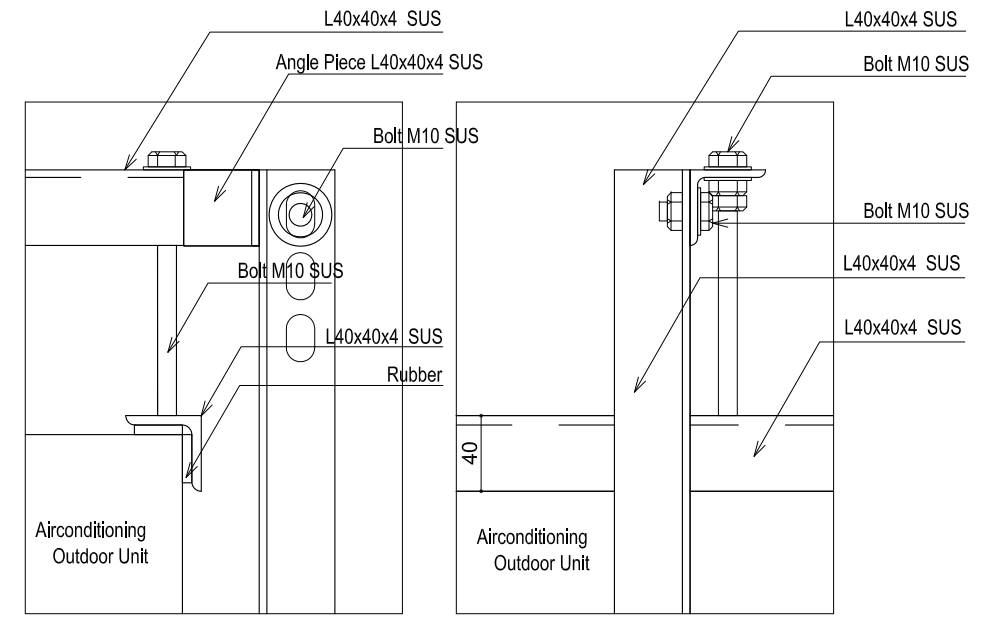
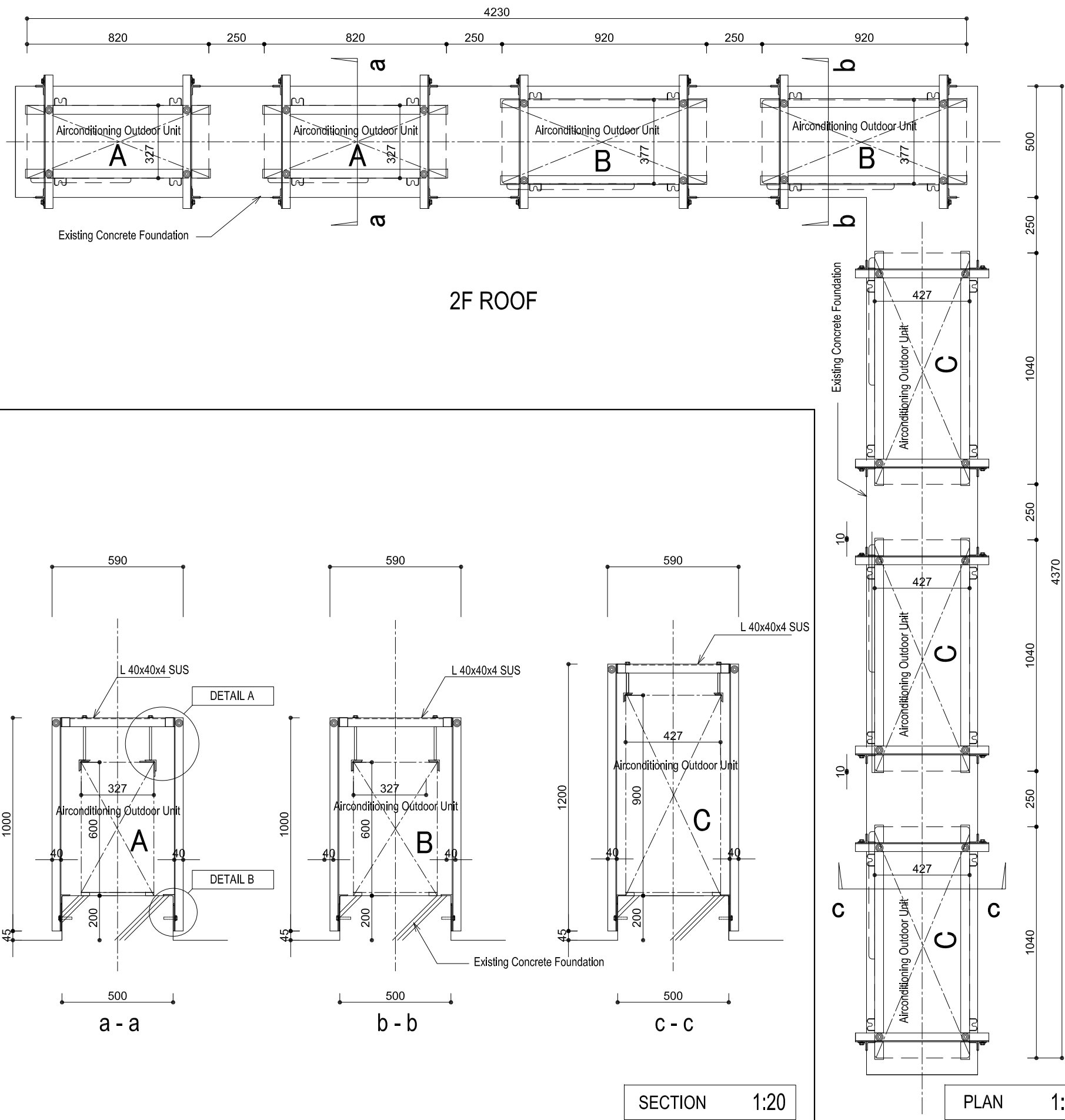


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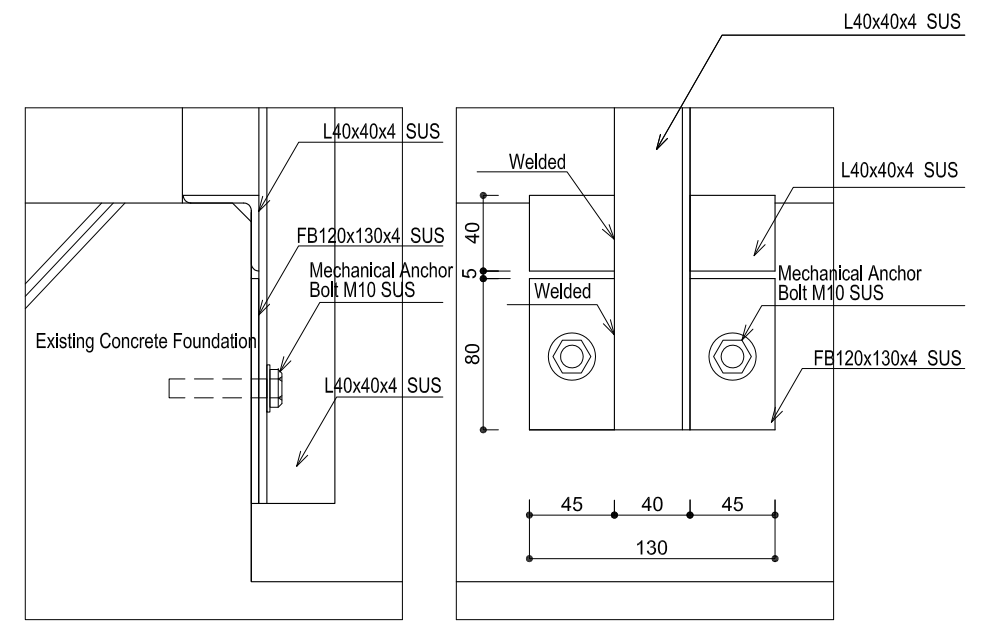
DRAWING TITLE
GUIUAN METEOROLOGICAL RADAR TOWER BUILDING RESTORATION WORK
CABLE DUCT DETAIL 3

SCALE
1:5

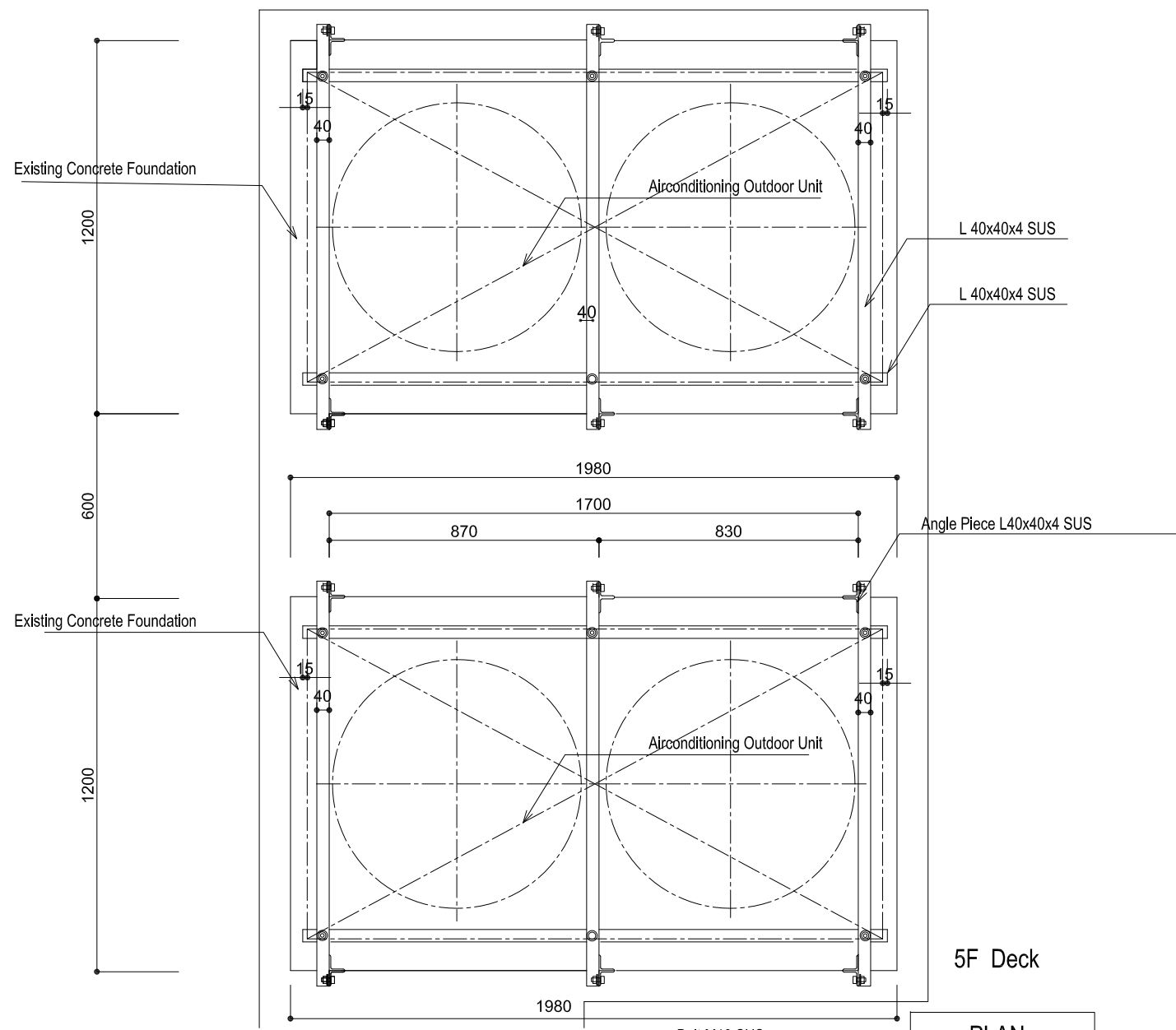
DRAWING No.
A - 13



DETAIL A 1:5

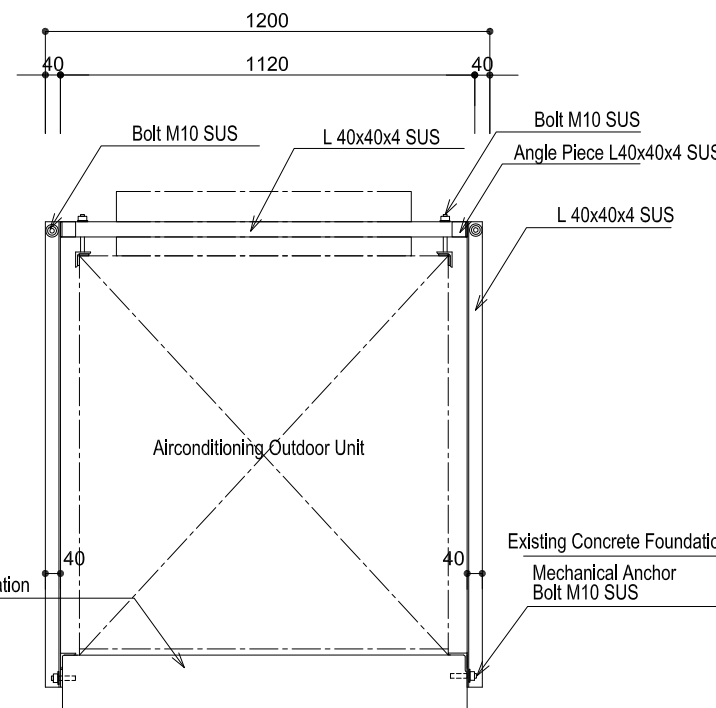


DETAIL B 1:5

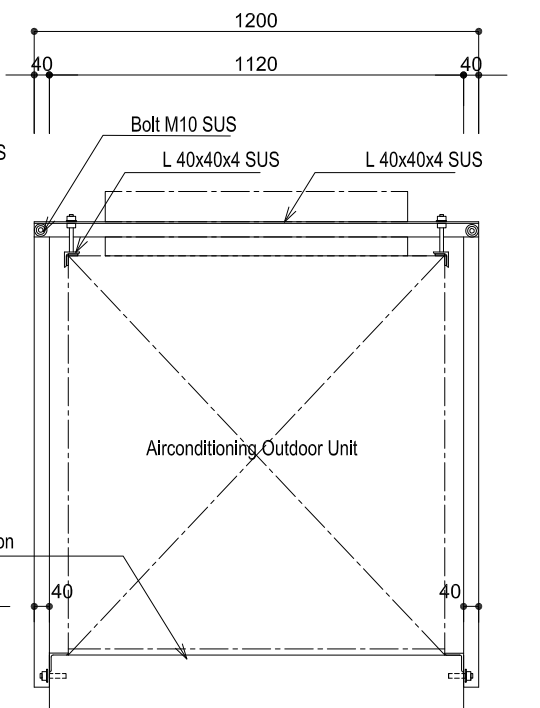


PLAN

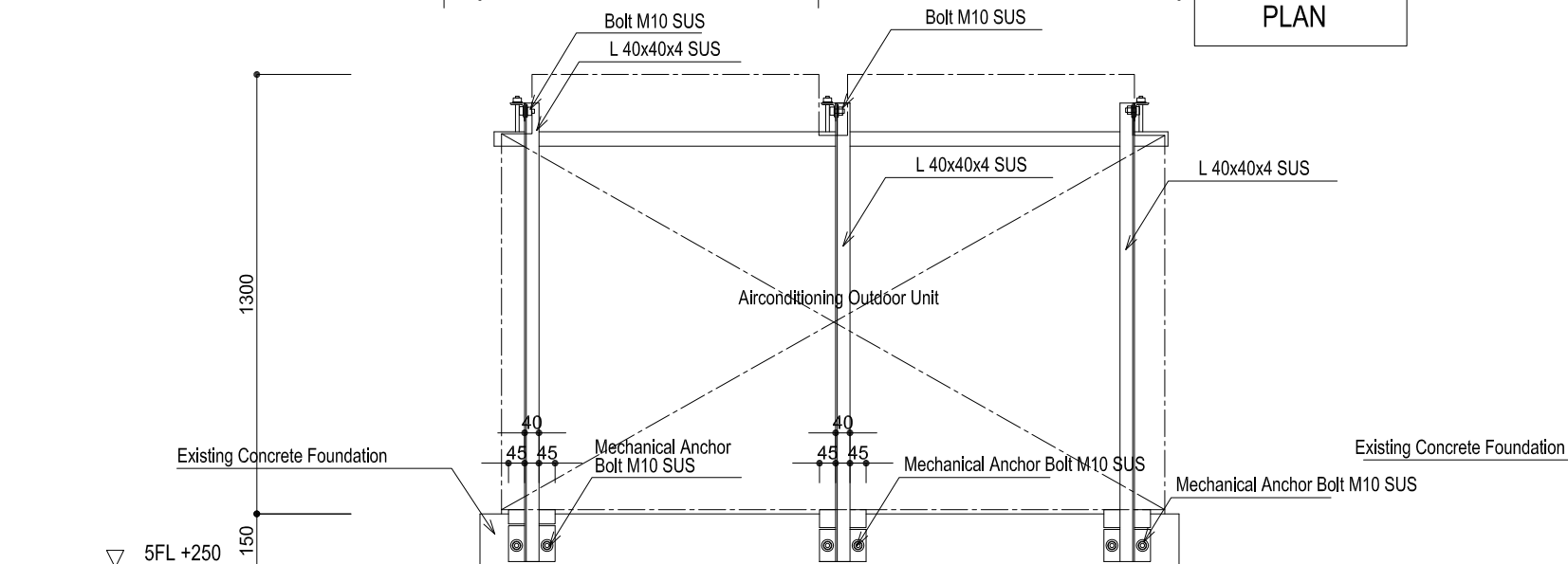
5F Deck



ELEVATION

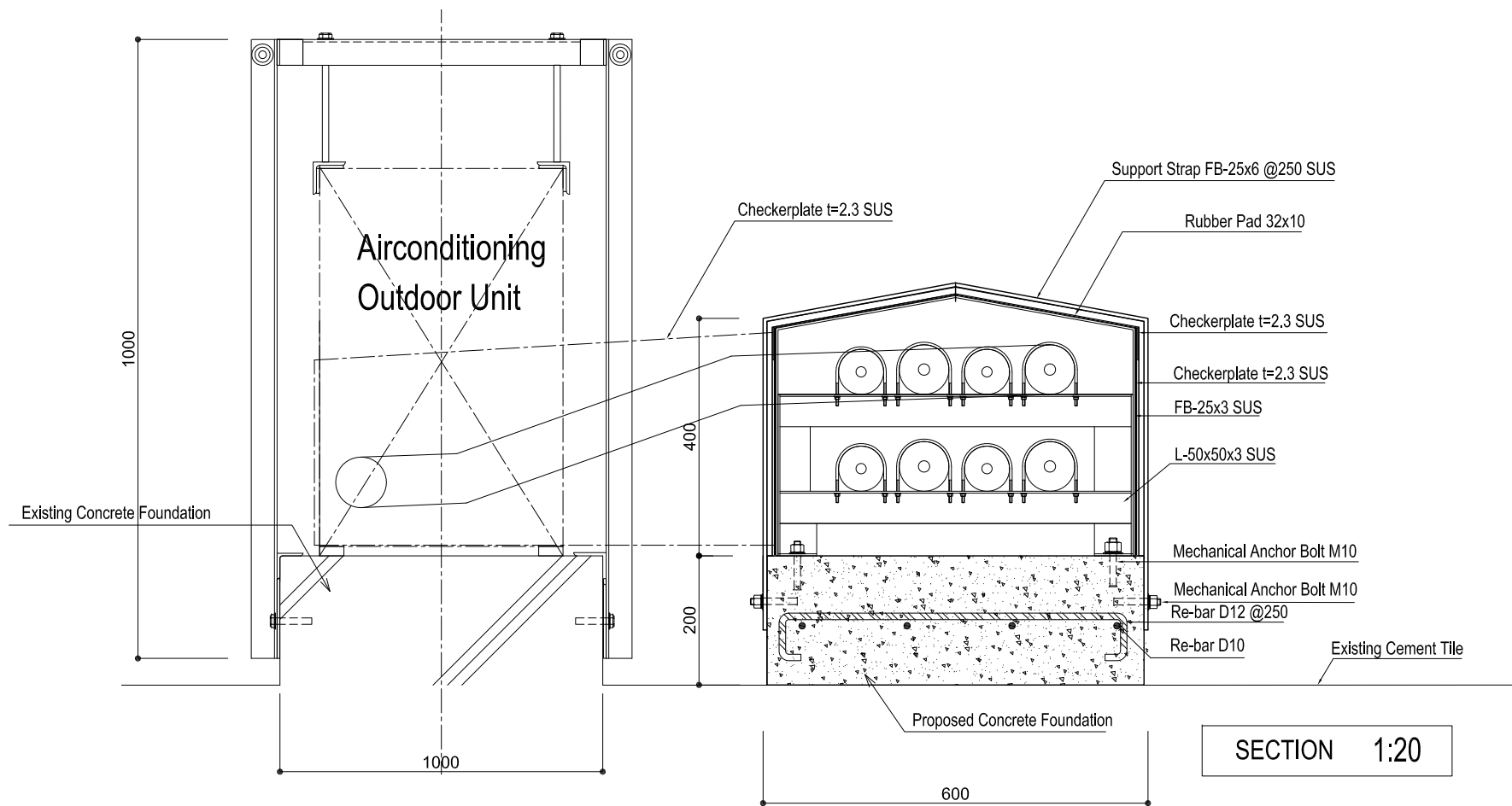


ELEVATION

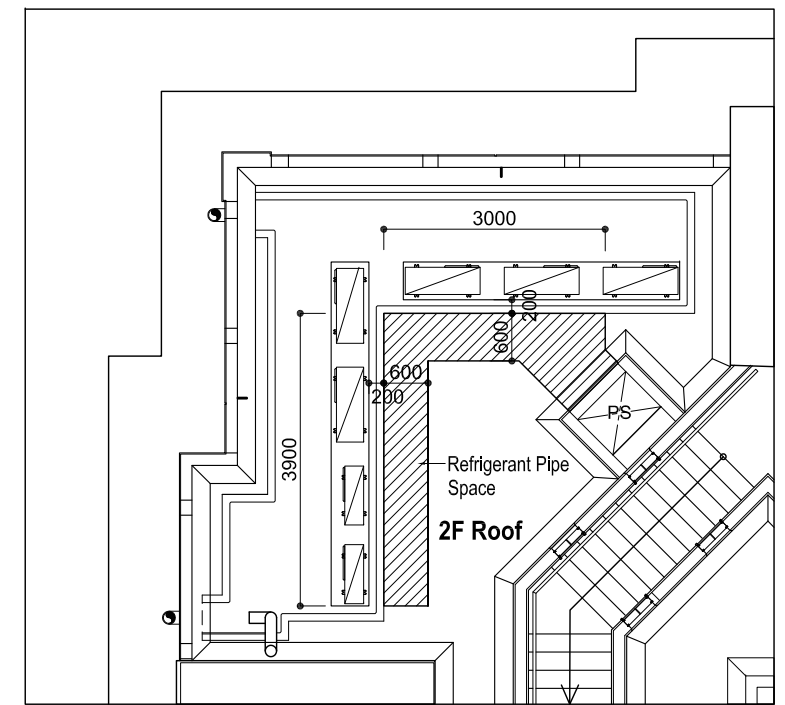
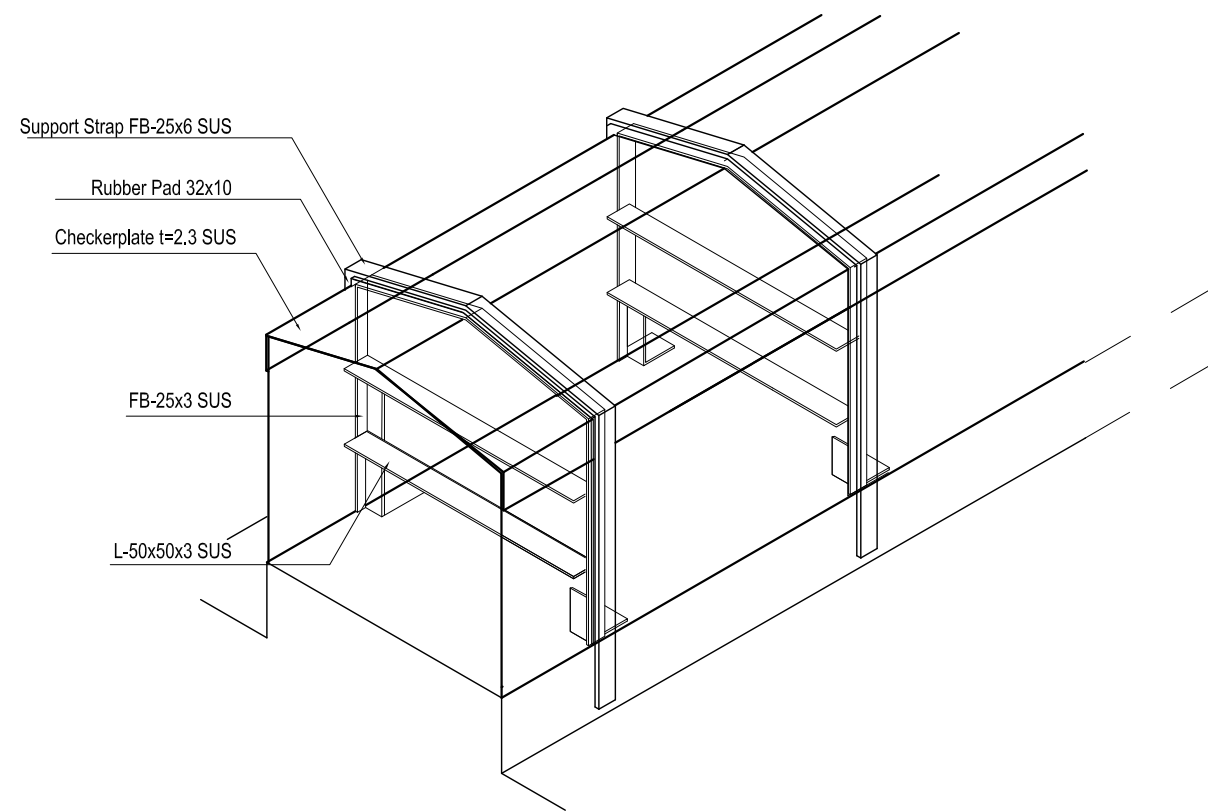


ELEVATION

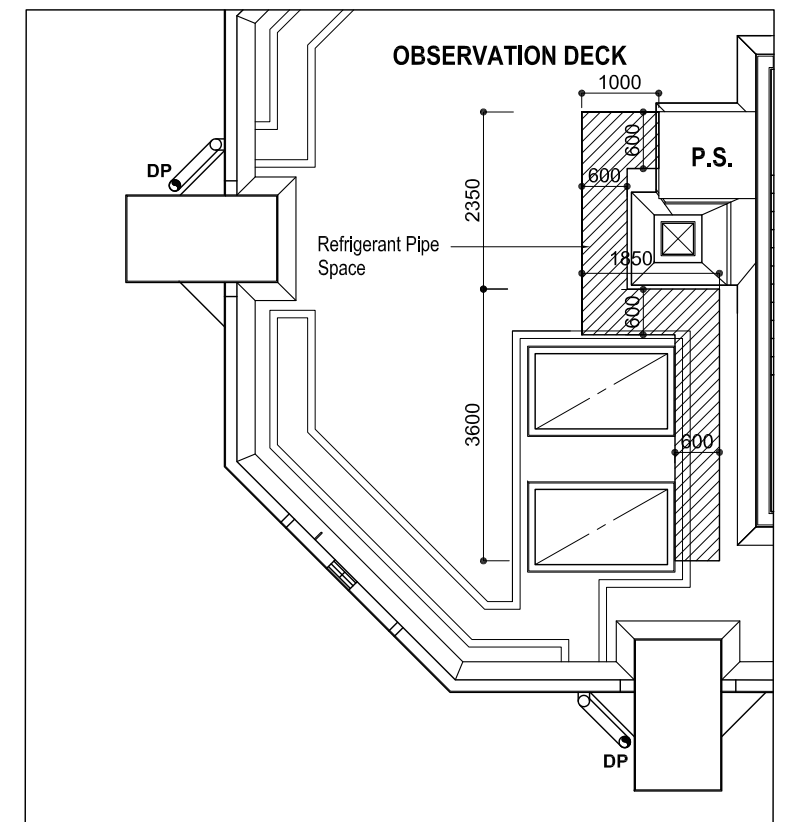
5FL +250



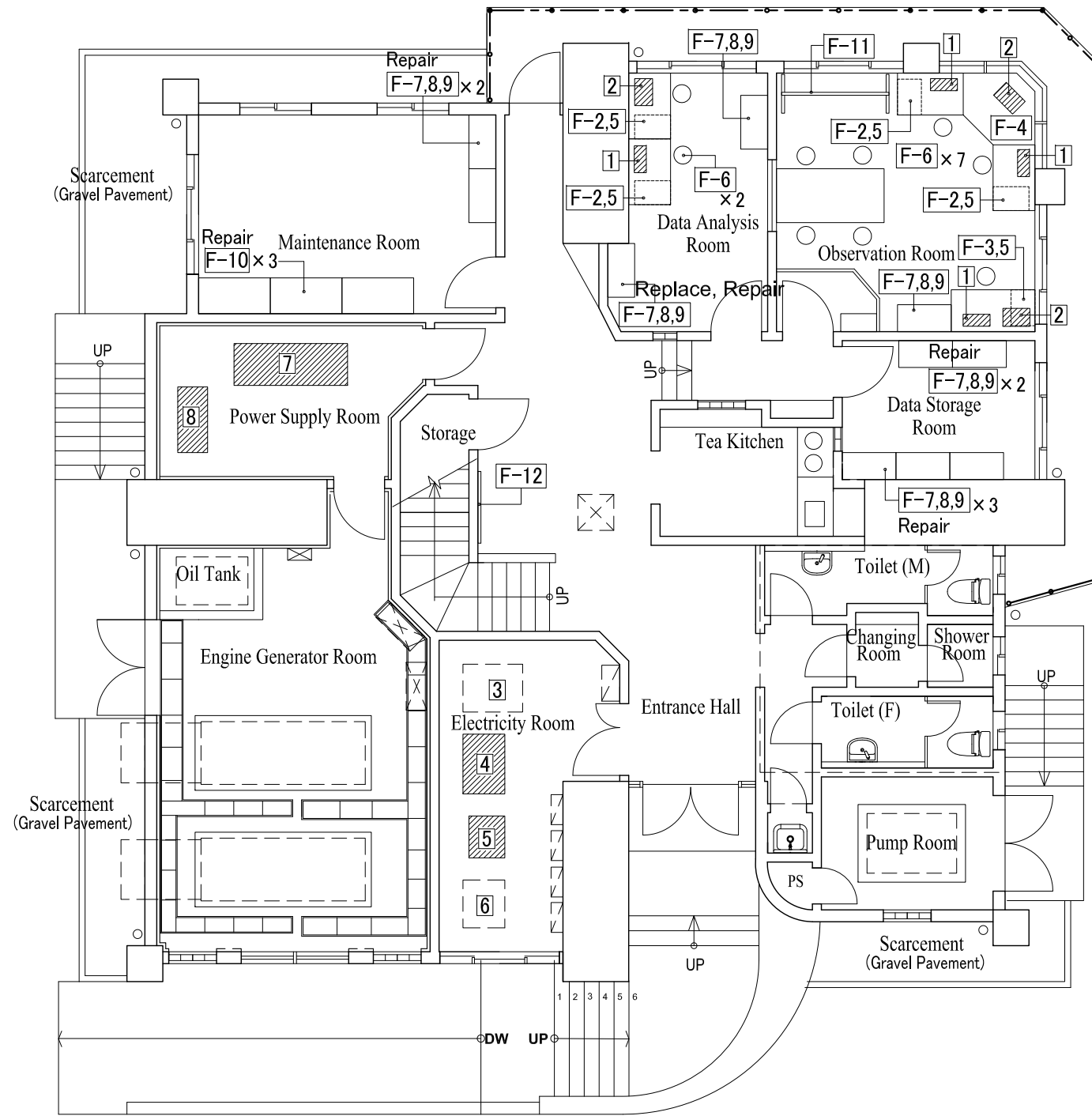
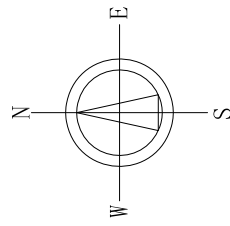
SECTION 1:20



2F REFRIGERANT PIPE LAYOUT PLAN 1:50

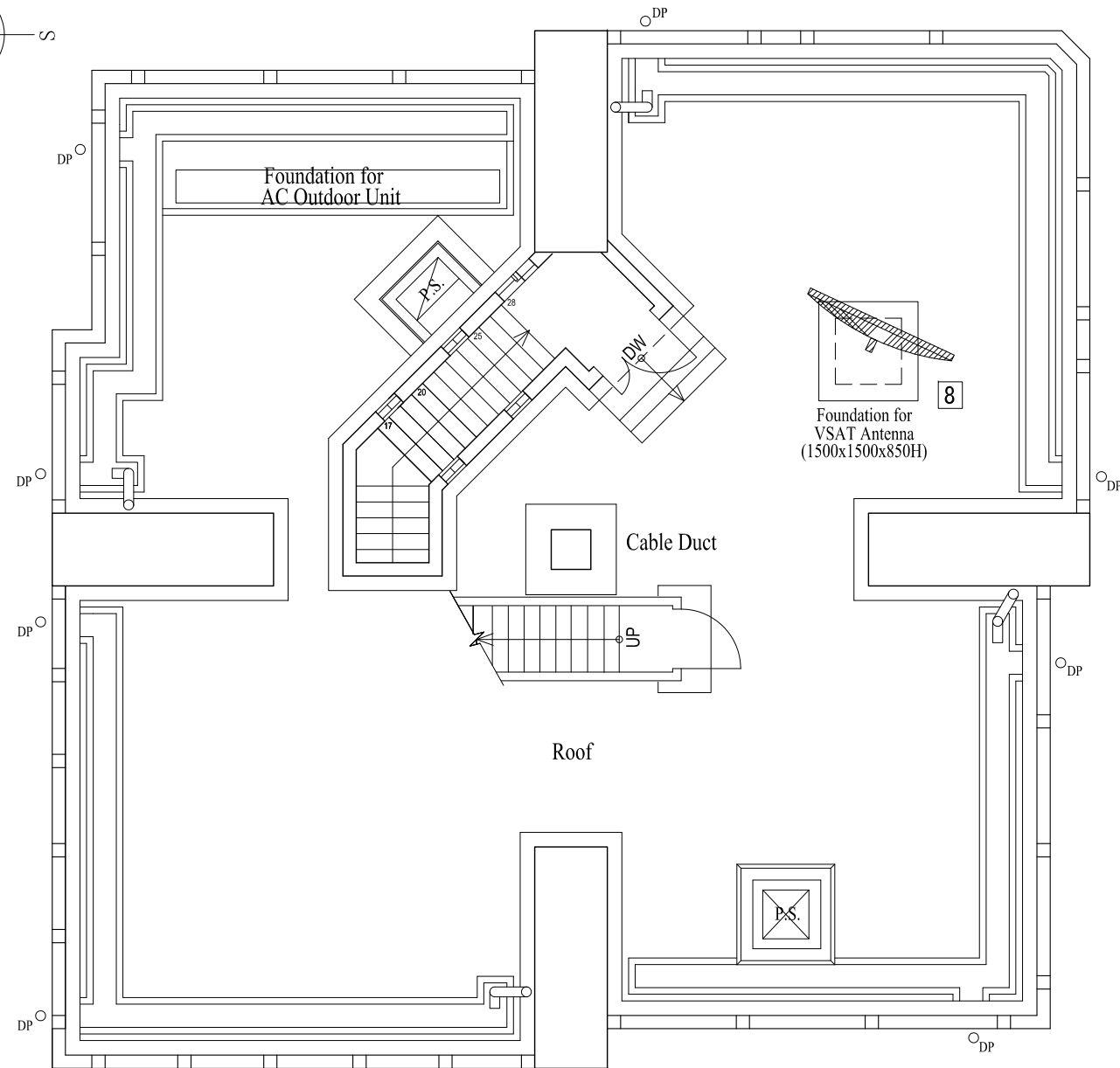
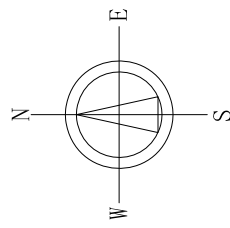


5F REFRIGERANT PIPE LAYOUT PLAN 1:50

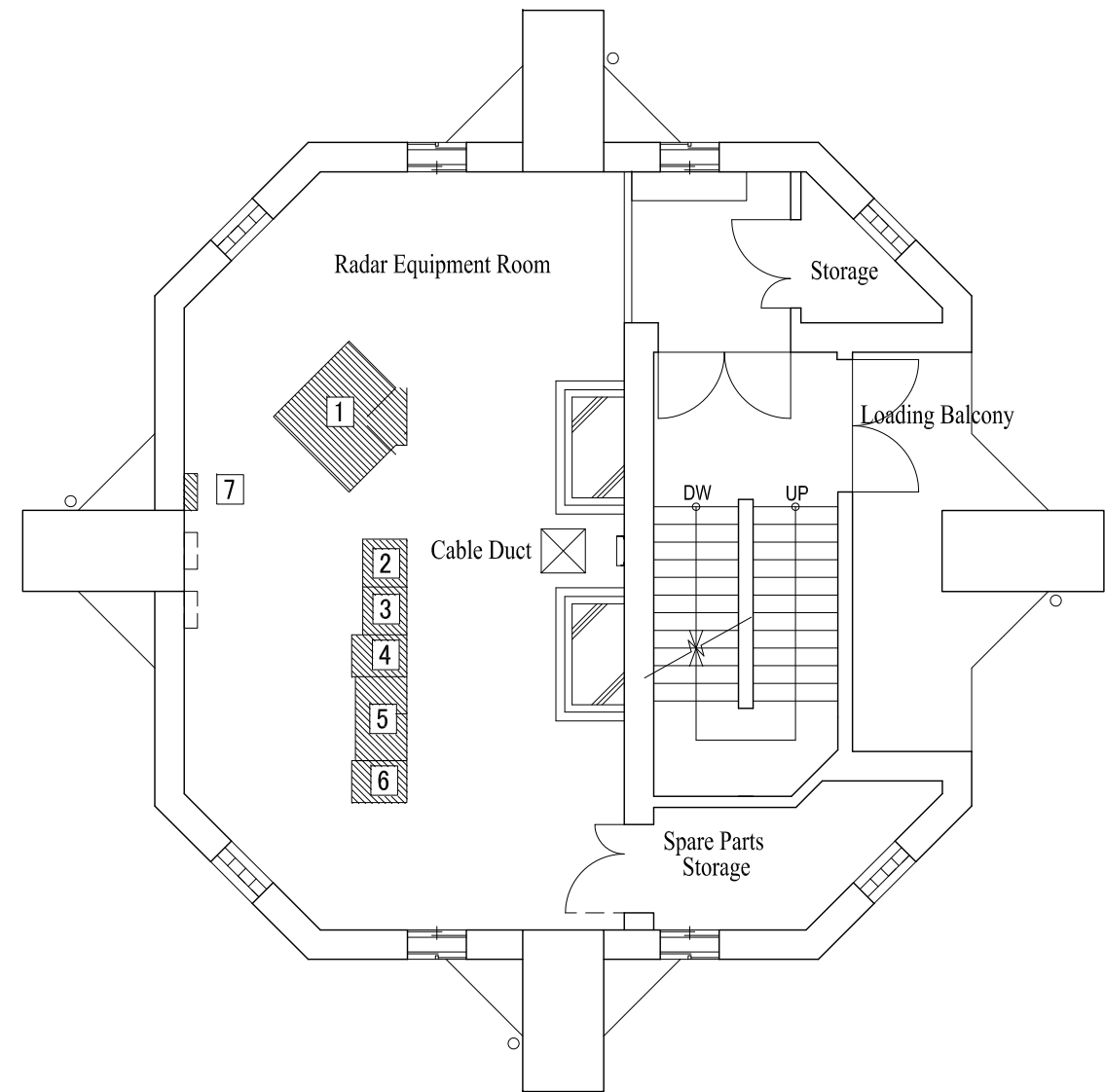


1FL PLAN

EQUIPMENT (EQUIPMENT WORK)		
1	Indicator	Replace
2	Color Printer	Replace
4	Radar AVR	Reuse
5	Isolation Transformer	Reuse
7	Power Supply Capacitor	Replace
8	Emergency Power Backup Unit	Replace
EQUIPMENT (CONSTRUCTION WORK)		
3	AVR	Reuse
6	Isolation Transformer	Reuse
FURNITURE (CONSTRUCTION WORK)		
F-1	Meeting Table	Replace
F-2	Pedestal Desk (D700×W1100)	Replace
F-3	Pedestal Desk (D700×W1400)	Replace
F-4	Five-sided Corner Desk	Replace
F-5	Drawer Unit with Casters	Replace
F-6	Chair	Replace
F-7	Lateral Filling Cabinet	Replace, Repair
F-8	Cabinet with Double Hinged Door	Replace, Repair
F-9	Top Panel	Replace, Repair
F-10	Shelf with Double Hinged Door	Repair
F-11	White Board (Movable Type)	Replace
F-12	Pin Board (Wall Mounted Type)	Replace



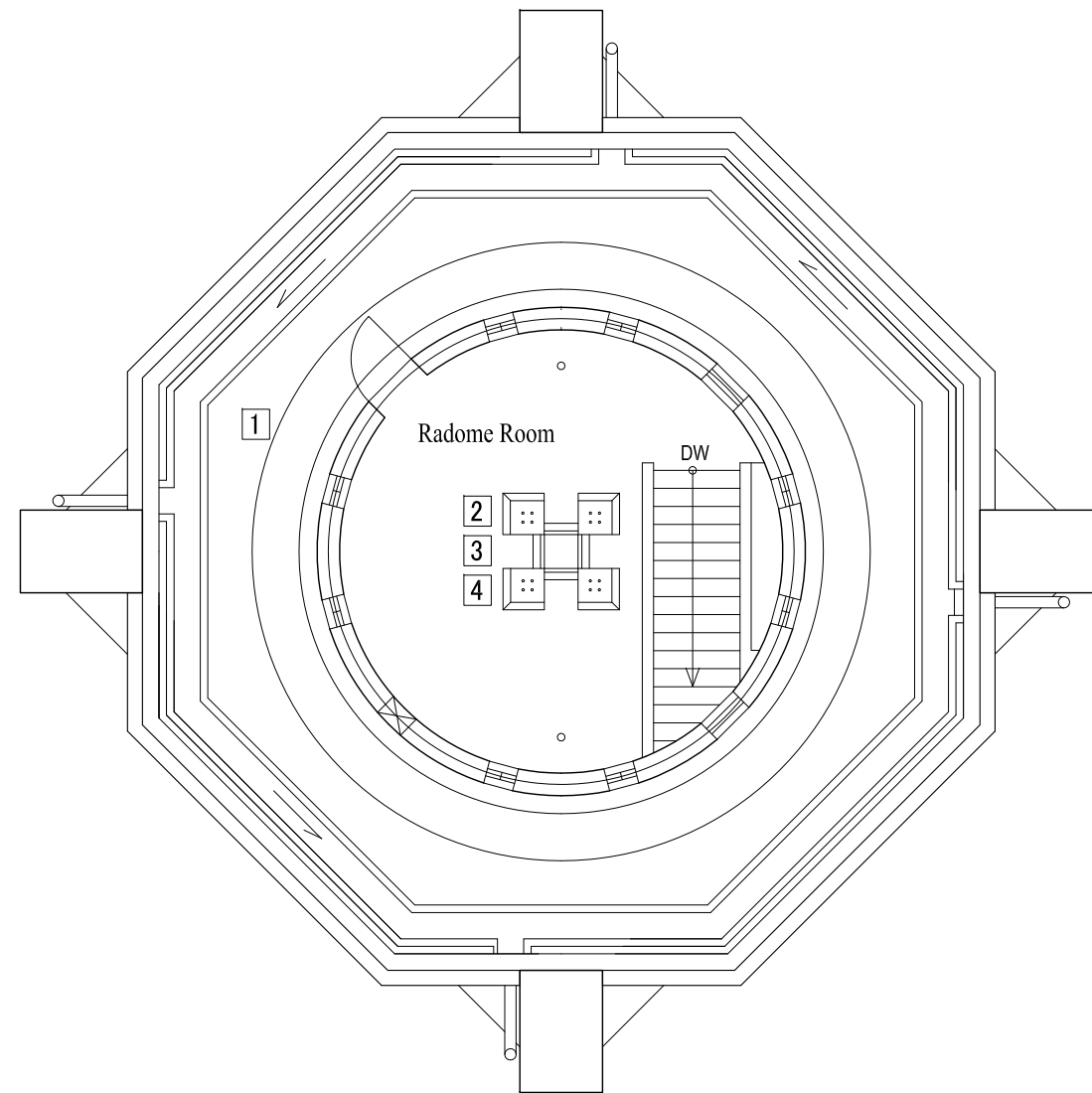
2FL PLAN



M4FL PLAN

■ EQUIPMENT (EQUIPMENT WORK)

1	Transmitter	Replace
2	DRSP	Replace
3	Antenna Controller & Dehydrator	Replace
4	Data & Protocol Converter	Reuse
5	Radar TASK Controller	Reuse
6	VSAT In-Door Unit (IDU)	Replace
7	Radar Power Maintenance Panel	Reuse
8	VSAT Antenna	Replace



EQUIPMENT (EQUIPMENT WORK)		
1	Radome	Replace & Upgrade
2	Radars Antenna	Replace
3	Pedestal	Replace
4	Wave -guide Configuration	Replace

6FL PLAN (RADOME FLOOR)

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

1) Implementing agency for the Project

The responsible government agency of the Philippines for the implementation of the Project is PAGASA under the supervision of the Department of Science and Technology. PAGASA, as the Client, will be a signatory to the Consultancy Agreement and to the Contract.

2) Consultant

After the signing of the Exchange of Notes (E/N) between the Government of the Philippines and the Government of Japan and the Grant Agreement (G/A) between the Government of the Philippines and JICA for the Project, it is important to finalize the Agreement of Consulting Services as early as possible. The Agreement of Consulting Services will be signed by PAGASA and a Japanese consulting firm, having its principal office in Japan and recommended by JICA.

After signing the Agreement, the Consultant instead of PAGASA will conduct a tender and supervise the Project implementation for the successful completion of the Project as a project of Japan's Grant Aid Assistance.

3) Contractor

A contractor with the required qualifications (an equipment supplier and a construction company) incorporated and registered in Japan, having its principal office in Japan, will be selected through an open public tender, in accordance with the tender documents prepared by the Consultant and JICA guidelines, and approved by PAGASA.

2-2-4-2 Implementation Conditions

< Conditions for the Installation of the Equipment >

In accordance with the restoration work schedule, the dispatch of an electrical engineer is required at the time of the installation, adjustment and wiring of the electric power supply and power back-up equipment. In addition, specialized skilled engineers are needed for the installation, adjustment and commissioning of the radar system, computing equipment and the sophisticated meteorological equipment. They are essential to ensure the quality of the installation work necessary for accurate meteorological observations.

2-2-4-3 Scope of Works

The scope of works to be undertaken by Japan's Grant Aid Assistance and the Philippine side for the implementation of the Project are as follows.

Table6: Major Undertakings to be done by PAGASA under the Implementation of the Project

No	Items	To be covered by Japan's Grant Aid	To be covered by the Philippines (PAGASA)
General Items			
1	To undertake all necessary institutional and juridical procedures in the Philippines.		●
2	To handle duty (Tax) exemption procedures and to take necessary measures as well as provide requisite legal and/or administrative documentations for customs clearance to the customs broker/forwarder to be employed by contractor at the port of disembarkation for the materials and equipment imported for the Project.		●
3	Marine (Air) transportation of the materials and equipment imported from overseas (Japan).	●	
4	In-land transportation from the port of disembarkation in the Philippines to each Project site.	●	
5	To accord Japanese and other foreign nationals including their dependent/s (if any), whose services may be required in connection with the supply of products and services under the signed contracts, such facilities as may be necessary for their entry into the Philippines and stay therein for the smooth and uninterrupted performance of their work (i.e. to secure the appropriate Visa including its extension/s required by the recipient country in connection thereof).		●
6	To exempt Japanese and other foreign nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the signed contracts.		●
7	To pay bank commission for the issuance of the Authorization to Pay (A/P) and amendments of A/P, if required, for the Consultant and the Contractor.		●
8	To bear all the expenses, other than those to be borne by the Japan's Grant Aid, necessary for the implementation of the Project		●
9	To ensure the security of the whole Project site/s and of the Japanese and other foreign nationals assigned to the Project prior to the commencement of and during Project implementation.		●
For the Restoration Work of the Radar Tower Building			
10	To secure sufficient spaces at the Guiuan and Virac Meteorological Radar Observation Stations for temporary facilities such as a contractor's office, workshop, building materials storage, etc. needed for the construction work.		●
11	To remove damaged facility equipment	●	
12	To provide the commercial power (240V, 3-phase, 3-wire, 60Hz) supply (capacity: 150kVA) for the Guiuan Meteorological Radar Tower Building.		●
13	To restore the required step-down transformers (capacity: 150kVA) as well as service entrance connections for the commercial power supply at the Guiuan Meteorological Radar Tower Building.		●
14	To provide temporary facilities for the availability or accessibility of electricity, water, etc. for the construction work.		●
15	To do the restoration work of the Radar Tower Building, including a) Architectural and civil works b) Electrical work including a lightning protection system c) Air-conditioning and Ventilation works d) Plumbing work	●	
16	To procure and install standard furniture for the damaged Radar Tower Building	●	

17	To undertake damaged incidental outdoor works such as gardening, fencing, constructing gates, boundary walls and exterior lighting in and around the sites, if necessary.		●
18	To provide the contractor's written guarantee to PAGASA for the Radar Tower Building restored under the Project for a period of twelve (12) months from the completion date of the equipment installation work.	●	
For Installation Work of the Equipment			
19	To remove and relocate the damaged facilities, if available, for the new installation of the equipment, if necessary.	●	
20	To provide and allocate secure temporary storage area/room for the materials, tools and equipment needed during the installation process.		●
21	To procure, install and adjust the required Equipment (including the lightning protection system) for the Project implementation.	●	
22	To procure and install furniture for the Equipment to be procured under the Project.	●	
23	To conduct the commissioning for the total system.	●	
24	To shift and adjust the existing computing equipment, if required.		●
25	To provide the contractor's written guarantee to PAGASA for the Equipment and Installation Work executed under the Project for a period of twelve (12) months from the completion date of the equipment installation work.	●	
After the completion of the Project			
26	To assign staff necessary for the smooth operation and maintenance of the Equipment.		●
27	To procure the required spare parts and consumables for the smooth operation and maintenance of the Equipment.		●
28	To provide adequate maintenance of the Radar Tower Building constructed under the Project so that they can function effectively.		●
29	To operate and maintain, and properly and effectively utilize the facilities constructed and the Equipment procured under the Project.		●
30	To allocate the necessary budget and personnel for the appropriate conduct of meteorological radar observation and forecasting works.		●
31	To periodically update all the operation/antivirus/application software.		●

2-2-4-4 Consultant Supervision

1) Principal Guidelines

- a) To take responsibility for expediting project implementation as well as providing smooth supervision in accordance with the guidelines of Japan's Grant Aid Assistance and the Outline Design.
- b) To communicate closely with the responsible organizations and personnel of both countries, and complete the Project in time and in accordance with the implementation schedule.
- c) To provide appropriate advice to the personnel of PAGASA and the contractor.
- d) To ensure the safety of project implementation as its top priority through the earlier/advance detection of severe weather phenomena.

2) Consultant Supervision

- a) The Consultant will dispatch at least one responsible and highly capable personnel to the Philippines during each implementation stage of the Project.
- b) Consultant technical specialists will be dispatched to the Philippines for installation guidance, inspection work, and etc. for the installation and configuration work of the major hardware, data communication equipment, computing equipment and system software.
- c) The Consultant will attend factory performance tests, configuration verifications and inspections of the equipment on behalf and instead of PAGASA.
- d) Qualified engineer(s) will be dispatched for data transmission tests in the Philippines.

3) Scope of Work for Supervision

- a) The Consultant, in coordination with PAGASA, will prepare the contract in accordance with JICA standards; select a Japanese primary contractor through tendering; and recommend the nominated contractor to the Government of the Philippines.
- b) The Consultant will inspect and approve shop-drawings, system drawings & the diagrams and material samples submitted by the contractor, and verify the performance and function of all the equipment.
- c) Based on a review of the implementation schedule, the Consultant will provide instructions to the contractor and submit progress reports on the implementation of the Project to PAGASA, the Embassy of Japan in the Philippines, the JICA Philippine office, etc.
- d) The Consultant will cooperate in the certification of payment, such as through the examination of notices of approval and invoices in connection with the implementation costs to be disbursed during the implementation period and upon completion of the Project.

2-2-4-5 Quality Control Plan

The quality control plan for the main work is described in the table below.

Table7: Quality Control Plan

Work	Work Type	Control Item	Method	Remarks
Finishing Work	Tile work	Workmanship	Visual inspection	
	Plastering work	Workmanship	Visual inspection	
	Door & Window work	Products, Installation accuracy	Factory inspection sheet check, visual inspection, dimension check	
	Painting work	Workmanship	Visual inspection	
	Interior work	Products, workmanship	Visual inspection	
Electrical Work	Power Receiving & Transforming	Performance, operation installation check	Factory inspection sheet check; withstand voltage, megar, operation, visual inspection	

	Conduit work	Bending, support check	Visual inspection, dimension check	
	Wiring and Cable work	Sheath damage, loose connection check	Performance sheet check, cleaning before laying, marking after bolt fixing	
	Lightning work	Resistance, conductor support pitch check	Resistance measuring, visual inspection, dimension check	
	Lighting work	Performance, operation, installation check	Performance sheet check, illumination measurement, visual inspection	

2-2-4-6 Procurement Plan

(1) Equipment Procurement

Maintenance requirements and the availability of the necessary parts and consumables in the Philippines are two of the most important factors in selecting the equipment. The equipment procurement process must provide for continuing maintenance after the completion of the Project. None of the meteorological equipment, such as the pulse compression solid state Doppler radar system, the meteorological radar data display system, and etc., to be supplied under the Project is produced in the Philippines. The pulse compression solid state Doppler radar system which has already been put into practical use for meteorological observation and has confirmed its reliability, durability, accuracy and performance is only available and made in Japan. In addition, since the Guiuan Meteorological Doppler Radar System damaged by the Typhoon Yolanda was a Japanese product, the procurement of all the required equipment for the restoration works will be from Japan in consideration of compatibility issues with the reusable units.

The activities of the private sector in the Philippines will be useful in support of the computer and other sophisticated systems. There are major computing equipment manufacturers and local agents/suppliers in the country. The procurement plan for the equipment is designed with a view to achieve a maximum possible degree of standardization as well as facilitating the acquisition of spare parts and maintenance services for the chosen computing equipment.

(2) Procurement of Construction Material

1) Procurement Policy of Construction Material

As the main construction materials can be procured locally, they will, in principle, be procured in the Philippines. Some construction materials imported from the Association of Southeast Asian Nations (ASEAN) are marketed throughout the Philippines. As these imported materials can be easily procured locally, they are considered as locally procurable products. In order to ensure the easy maintenance of the radar tower building, locally available materials will be utilized for its construction.

2) Procurement Plan of Construction Materials

[1] Building Exterior and Interior Work

Timber, tiles, paint, glass, aluminum window frames, and etc. used for the exterior and interior of a building are imported and, as such, are readily available in the local market. Steel doors & windows, reinforcing hardware and cyclone screen are to be procured in Japan.

Table8: Major Materials Procurement Plan (Architectural Work)

Materials	Local Market		Procurement Plan		
	Condition	Import	Philippines	Third Country	Japan
Portland cement	○		✓		
Sand, aggregate	○		✓		
Reinforcing bar	○		✓		
Form (plywood)	○		✓		
Wood	○		✓		
Aluminum door & window	○		✓		
Steel door & window and reinforcing hardware	△	Japan			✓
Cyclone Screen	△	Japan			✓
Wooden door & window	○		✓		
Door handle, lock	○		✓		
Floor hinge	○		✓		
Plane glass	○		✓		
Cyclone glass (Laminated safety glass)	○		✓		
Access floor panel (general type)	○		✓		
Access floor panel (heavy duty type)	○		✓		
Paint	○		✓		
Gypsum board	○		✓		
Cement board	○		✓		
Rockwool acoustic board (T-bar)	○		✓		
Glass wool, glass cloth	○		✓		
Carpet tile	○		✓		
PVC tile	○		✓		
Porcelain tile	○		✓		
Ceramic tile	○		✓		
Floor maintenance hatch	○		✓		
Steel drainage pipe (galvanized)	○		✓		
Spray tile	○		✓		
Caulking	○		✓		

○ : Easy to procure in the Philippines

△ : Available in the local market in the Philippines but model and quantity are limited

× : Difficult to procure in the Philippines

[2] Air-Conditioning and Plumbing Work

Ventilation equipment is available in the local market. Air-conditioning units will be procured in the third country.

[3] Electrical Work

Imported and local lighting fixtures, switches, lamps, electrical wires and cables, conduits and other items are available in the local market. They will be procured in the Philippines for the convenience of repair and maintenance. Obstruction light, Cable duct and Maintenance hatch will be procured in Japan.

Table9: Major Materials Procurement Plan (Mechanical and Electrical Work)

Work type	Materials	Local Market		Procurement Plan		
		Condition	Import	Philippines	Third Country	Japan
Air-conditioning work	Air conditioner	△		✓		
	Heat exchanger	△		✓		
	Exhaust fan	○		✓		
Electrical work	Lighting fixture (including LED)	○		✓		
	Obstruction light (LED)	△	Japan			✓
	Panel	△		✓		
	Wire, cable	○		✓		
	Conduit (PVC)	○		✓		
	Conduit (Steel)	○		✓		
	Cable-rack	○		✓		
	Cable duct and Maintenance hatch	△	Japan			✓
	Telephone system	○		✓		
	Fire alarm system	△		✓		
	Lightening protection	○		✓		

- : Easy to procure in the Philippines
- △ : Available in the local market in the Philippines but model and quantity are limited
- × : Difficult to procure in the Philippines

3) Transportation Plan

There are 2-3 scheduled trips per day from Japan (Yokohama seaport) to the Manila seaport. Marine transport from Japan to the Philippines takes approximately 15 days. The Manila seaport consists of the South port and the North port and only the South port can accept the duty exemption procedures for cargo from overseas. Therefore, containers of all the equipment must be loaded onto a cargo vessel which is bound for the Manila South port for the smooth implementation of the duty exemption procedures.

Guiuan: Cargo will be transported by way of Calamba, Lucena, Naga and Legazpi by truck from the South port to Matnog city (approx. 640km) for 3 days. From Matnog city to Allen city, the cargo will be transported by ferry for about 1.5 hours and by way of Tacloban from Allen city to Guiuan by truck for 2 days (390km). It is required that all the cargo must be transshipped from the containers to trucks in Manila for transportation by Ferry.



Figure11: Route Map of Transport

Virac: Cargo will be transported by way of Calamba, Lucena and Naga by truck from the South port to Tabaco city (approx. 530km) for 2 days. From Tabaco city to Virac city, the cargo will be transported by ferry for about 4 hours.

2-2-4-7 Implementation Schedule

Table10: Implementation Schedule

	Month	1	2
Detailed Design	Total:	2.0 months	
Tendering Procedures			

	Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Guiuan Radar Tower Building Restoration Work	Total:	11.0 months																
Building Equipment, Window & Door and Hardware Manufacturing		█																
Removal Work and Cleaning							█											
Temporary Work								█										
Finishing Work									█	█	█	█						
Building Equipment Work									█	█	█	█						
Guiuan Equipment Restoration Work	Total:	15.7 months																
Equipment Manufacturing		█																
Equipment Transportation												█						
Equipment Installation													█	█	█			
Adjustment / Commissioning																	█	

2-3 Obligations of the Recipient Country

In the implementation of the Project under Japan's Grant Aid Assistance, the Government of the Philippines (PAGASA) is responsible for the following tasks.

Table11: Major Undertakings to be done by PAGASA under the Implementation of the Project

No.	Items
General Items	
1	To undertake all necessary institutional and juridical procedures in the Philippines.
2	To handle duty (Tax) exemption procedures and to take necessary measures as well as provide requisite legal and/or administrative documentations for customs clearance to the customs broker/forwarder to be employed by Contractor at the port of disembarkation for the materials and equipment imported for the Project.
3	To accord Japanese and other foreign nationals including their dependent/s (if any), whose services may be required in connection with the supply of products and services under the signed contracts, such facilities as may be necessary for their entry into the Philippines and stay therein for the smooth and uninterrupted performance of their work (i.e. to secure the appropriate Visa including its extension/s required by the recipient country in connection thereof).
4	To exempt Japanese and other foreign nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the signed contracts.
5	To pay bank commission for the issuance of the Authorization to Pay (A/P) and amendments of A/P, if required, for the Consultant and the Contractor.
6	To bear all the expenses, other than those to be borne by the Japan's Grant Aid, necessary for the implementation of the Project
7	To ensure the security of the whole Project site/s and of the Japanese and other foreign nationals assigned to the Project prior to the commencement of and during Project implementation.
For the Restoration Work of the Radar Tower Building	
8	To secure sufficient spaces at the Guiuan and Virac Meteorological Radar Observation Stations for temporary facilities such as a contractor's office, workshop, building materials storage, etc. for the construction work.
9	To provide the commercial power (240V, 3-phase, 3-wire, 60Hz) supply (capacity: 150kVA) for the Guiuan Radar Tower Building.
10	To restore the required step-down transformers (capacity: 150kVA) as well as service entrance connections for the commercial power supply at the Guiuan Meteorological Radar Tower Building.
11	To provide temporary facilities for the availability or accessibility of electricity, water, etc. for the construction work.
12	To undertake damaged incidental outdoor works such as gardening, fencing, constructing gates, boundary walls and exterior lighting in and around the sites.
For Installation Work of the Equipment	
13	To provide and allocate secure temporary storage area/room for the materials, tools and equipment needed during the installation process.
14	To shift and adjust the existing computing equipment, if required.
After the completion of the Project	
15	To assign staff necessary for the smooth operation and maintenance of the Equipment.
16	To procure the required spare parts and consumables for the smooth operation and maintenance of the Equipment.
17	To provide adequate maintenance of the Radar Tower Building constructed under the Project, so that they can function effectively.
18	To operate and maintain, and properly and effectively utilize the facilities constructed and the Equipment procured under the Project.
19	To allocate the necessary budget and personnel for appropriate meteorological radar observation and forecasting works.
20	To periodically update all the operation/antivirus/application software.

2-4 Project Operation Plan

(1) Operational and Maintenance Plan for the Equipment

In connection with equipment maintenance, consideration must be given to the following.

- Technical training for PAGASA staff
- Establishment of appropriate measures against system failure
- A fully documented maintenance system with proper document control
- Scheduled replacement of parts and overhauls
- Strengthening of the operation and maintenance structure of PAGASA
- Institution of the technical and financial self-reliance of PAGASA

(2) Operational and Maintenance Plan for the Radar Tower Building

There are three key issues for the maintenance of the radar tower building to be implemented by the PAGASA: (i) daily cleaning; (ii) maintenance to cover wear and tear, damage and aging; and, (iii) security measures to ensure safety and to prevent crimes.

The implementation of the daily cleaning of the building leaves a good impression on the visitors/users and encourages people to respect the building and the equipment in it. Cleaning is also important to ensure the equipment continues to operate correctly. It helps in the rapid detection and repair of damaged equipment and prolongs the life of the building equipment. The main repair work will be refurbishing or replacing the exterior and interior materials protecting the building structure. The required inspections are outlined below.

Table12: Outline of Regular Inspection for the Building

	Items of Maintenance Work	Frequency
Exterior	Repair and repainting of external walls	Repair: every 5 years, Repaint: every 15 years
	Inspection and repair of roofs	Inspection: every year Repair: as required
	Regular cleaning of drain pipes and drainage systems	Monthly
	Inspection and repair of sealing of external windows and doors	Every year
	Regular inspection and cleaning of ditches and manholes	Every year
Interior	Renewal of interior finishing	As required
	Repair and repainting of partition walls	As required
	Adjustment of window and door fitting	Every year Others: as required

It is important that the regular preventive maintenance of the building equipment is carried out before the equipment fails or requires repair or before the replacement of part(s). The life of the building equipment can be significantly extended through proper operation and regular inspection, lubrication, adjustment and

cleaning. These regular inspections can prevent equipment failure and accidents. Regular inspection, the replacement of consumables and the cleaning/replacement of filters for ventilation and air-conditioning units should be carried out in accordance with the maintenance manual.

It is essential to establish a proper maintenance structure in PAGASA, involving the rigorous implementation of regular inspection and maintenance procedures. This work may be assigned to the private sector (local agents), if required. The general life expectancy of the major building equipment is shown below.

Table13: Life Expectancy of Building Equipment

	Building Equipment	Life Expectancy
Electrical System	<ul style="list-style-type: none"> • Distribution panels • LED lamps • Fluorescent lamps 	20 - 30 years 20,000 - 60,000 hours 5,000 - 10,000 hours
Water Supply and Drainage Systems	<ul style="list-style-type: none"> • Pipes and valves • Sanitary fixture 	15 years 25 - 30 years
Air-Conditioning System	<ul style="list-style-type: none"> • Pipes • Air-conditioning units and exhaust fans 	15 years 15 years

2-5 Project Cost Estimate

2-5-1 Estimate of the Project Capital Cost

The required project capital costs for the Project to be borne by the Government of the Philippines/PAGASA have been estimated and are shown in the following tables.

Estimated Total Project Capital Cost: 5,550,000 Peso (approx. 14 Million JP Yen)

Table14: Estimated Project Capital Cost to be borne by the Government of the Philippines/PAGASA

No.	Items	Capital Cost (in Thousand Peso)
1	To pay bank commission for the issuance of the Authorization to Pay (A/P) and amendments of A/P, if required, for the Consultant and the Contractor.	500
2	To bear all the expenses, other than those to be borne by the Japan's Grant Aid, necessary for the implementation of the Project	500
3	To provide the commercial power (240V, 3-phase, 3-wire, 60Hz) supply (capacity: 150kVA) for the Guiuan Radar Tower Building.	2,500
4	To restore the required step-down transformers as well as service entrance connections for the commercial power supply at the Guiuan Meteorological Radar Tower Building.	250
5	To provide temporary facilities for the availability or accessibility of electricity, water, etc. for the construction work.	300
6	To undertake damaged incidental outdoor works such as gardening, fencing, constructing gates, boundary walls and exterior lighting in and around the sites.	1,000
7	To provide and allocate secure temporary storage area/room for the materials, tools and equipment needed during the installation process.	500
	Total	5,550

Applied Exchange Rate: US\$ 1 = 104.18 JP Yen, 1 PH Peso= 2.472 JP Yen

2-5-2 Estimate of the Project Annual Recurrent Cost

(1) Project Annual Recurrent Cost to be borne by the Government of the Philippines/PAGASA

The estimated annual recurrent costs (considered 5% of the annual inflation rate) for all the systems procured under the Project to be borne by PAGASA for the first decade after the completion of the Project estimated under the "Project for Improvement of the Meteorological Radar System" of the Japan's Grant Aid is attached hereunder. The recurrent costs have been calculated in accordance with the following fundamental conditions.

- Operation and maintenance to be carried out by PAGASA
- Appropriate operation in accordance with the operations manuals
- Regular and proper maintenance according to the maintenance manuals

Table15: Recurrent Cost of Guiuan Meteorological Observation Station

Estimated Recurrent Cost

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1	Antenna												
	Grease (For AZ/EL)	1	0	0	0	0	10,000	0	0	0	0	14,000	10kg/can. Every 5 years
	Timing belt (For AZ/EL)	2	0	0	0	0	0	0	0	8,000	0	0	Every 8 years
2	Antenna controller	3	0	0	0	0	0	0	0	0	0	18,000	Every 10 years
3	Transmitter/Receiver	24	0	0	0	0	0	0	0	0	0	144,000	Every 10 years
4	Receiver	3	0	0	0	0	0	0	0	0	0	18,000	Every 10 years
5	Product Monitor(5sets)												
	Hard disk	5	0	0	0	65,000	0	0	0	65,000	0	0	Every 4 years
	CD for data storage (20sheets/1set)	1	820	820	820	820	820	820	820	820	820	820	
6	Printer												
	Printer ink cartridge	2	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	
	Paper (500sheets/1set)	1	200	200	200	200	200	200	200	200	200	200	
7	Compact UPS	5	0	0	19,000	0	0	19,000	0	0	19,000	0	Every 3 years
8	1kVA UPS	1	0	0	5,300	0	0	5,300	0	0	5,300	0	Every 3 years
9	Emergency Power Back-up Unit	1	0	0	0	0	0	400,000	0	0	0	0	Every 7 years
10	Electric Double Layer Capacitor type UPS												
	AC fan (3sets)	3	0	0	0	0	0	0	0	0	0	18,000	Every 10 years
	Arrester (6sets)	1	0	0	0	0	0	0	0	0	0	8,000	Every 10 years
11	Diesel Engine Generator												
	Oil seal and filter	2	8,600	8,600	8,600	8,600	8,600	8,600	8,600	8,600	8,600	8,600	Every 1 year
	Battery for Engine start	2	0	0	3,000	0	0	3,000	0	0	3,000	0	Every 3 years

Subtotal(Peso)	13,420	13,420	40,720	78,420	23,420	40,720	413,420	86,420	40,720	233,420	984,100
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Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1	Electricity Charge	1	0	0	0	0	0	0	0	0	0	0	? 1
2	Fuel cost												
	Fuel consumption of DEG	1	572,415	572,415	572,415	572,415	572,415	572,415	572,415	572,415	572,415	572,415	? 2
3	Special maintenance												
	System brush-up by manufacture's engineer	1	0	0	300,000	0	0	300,000	0	0	0	300,000	For 5 days at site
4	Radome												
	Caulking repair	1	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	
5	Pest-control												
	Exterminating vermination	1	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	
6	PC communication charge												
	Internet communication for Windows PC	1	1,000	1,000	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	

Subtotal(Peso)	586,415	586,415	886,915	586,915	586,915	886,915	586,915	586,915	586,915	586,915	886,915	886,915	6,768,151
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Total (Peso)	599,835	599,835	927,635	665,335	610,335	927,635	1,000,335	673,335	627,635	1,120,335	7,752,251
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Total(JPY)	¥1,439,604	¥1,439,604	¥2,226,324	¥1,596,804	¥1,464,804	¥2,226,324	¥2,400,804	¥1,616,004	¥1,506,324	¥2,688,804	¥18,605,401
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(2) Annual Budget Trends

<PAGASA Head Office >

The estimated recurrent cost for the PAGASA Head Office is about 0.3% of the total amount of PAGASA's budget excluding the item of the personnel expenses and others. Therefore, it has been assessed that there is no problem in this regard.

Table16: Movement of PAGASA Budget

(In Thousand Pesos)

Item	2010	2011	2012	2013	2014
Personnel Expenses	229,081	258,693	284,622	355,167	352,021
Consumable Cost	88,236	182,634	183,978	165,670	169,291
Electricity and Water Utilization Cost	21,897	23,147	25,777	28,081	34,981
Cost of Spare Parts	35,408	60,923	66,008	73,008	95,598
Telecommunication Cost/ VSAT Communication	32,472	44,972	47,489	47,459	47,459
Others	56,394	290,468	261,986	149,149	160,250
Total	463,488	860,837	869,860	818,534	859,600

< Virac, Aparri and Guiuan Meteorological Radar Observation Stations >

The estimated recurrent cost for the Meteorological Radar Observation Stations is less than the present budget indicated in the below table. Hence, it is assessed that there is no problem in its sustainability.

Table17: Operation and Maintenance of Meteorological Radar Observation Stations
(In Thousand Pesos)

Year	Item	Virac Meteorological Radar Observation Station	Aparri Meteorological Radar Observation Station	Guiuan Meteorological Radar Observation Station
2010	Personnel Expenses	1,425	1,108	1,130
	Consumable Cost	1,691	1,691	1,691
	Electricity and Water Utilization Cost	649	649	649
	Radar Maintenance Cost	156	156	156
	Total	3,921	3,604	3,626
2011	Personnel Expenses	1,950	1,481	1,494
	Consumable Cost	2,972	2,972	2,972
	Electricity and Water Utilization Cost	700	700	700
	Radar Maintenance Cost	2,200	2,200	2,200
	Total	7,822	7,353	7,366
2012	Personnel Expenses	2,325	1,686	1,817
	Consumable Cost	2,577	2,577	2,577
	Electricity and Water Utilization Cost	724	724	724
	Radar Maintenance Cost	2,095	2,095	2,095
	Total	7,721	7,082	7,213
2013	Personnel Expenses	3,350	2,013	2,195
	Consumable Cost	1,489	1,489	1,489
	Electricity and Water Utilization Cost	1,069	1,069	1,069
	Radar Maintenance Cost	1,336	1,336	1,336
	Total	7,244	5,907	6,089
2014	Personnel Expenses	3,685	2,200	2,400
	Consumable Cost	3,147	3,147	3,147
	Electricity and Water Utilization Cost	803	803	803
	Radar Maintenance Cost	2,416	2,416	2,416
	Total	10,051	8,566	8,766

Chapter 3

Project Evaluation

Chapter 3 Project Evaluation

3-1 Preconditions

The procedures required for the implementation of this Project are as follows.

Table18: Required Procedures for Duty Exemption

Required Procedures	Agency	Required Time	Required Documents	Applicant
Deferred Payment Statement of Account	Bureau of Customs (BOC), South Port	After the departure of the ship: 3 weeks	Import Entry: 1 original copy SDV(Supplemental Declaration on Valuation):1 original copy Certificate of Undertaking:1 original copy Certificate of Official Importation:1 original copy	Forwarder and PAGASA
Import Permit		After the arrival of the ship: 1 week	Request Letter to Customs:1 original copy Contract: 1 photocopy Shipping Documents:1 original copy Statement of Account: 1 photocopy Shipping Documents:1 original copy	

<Value Added Tax (VAT)>

Value added tax incorporated in payments for construction work and the installation of equipment under the Project as well as the procurement of instruments, construction materials, and etc. by a Japanese contractor(s) in the Philippines is not automatically exempted. In order to refund the value added tax to the contractor, the required procedures agreed between the Embassy of Japan and the Bureau of Internal Revenue (BIR) are as follows.

- The project implementing agency in the Philippines must take the necessary steps.
- Supplementary Agreement on VAT Payment shall be signed between the project implementing agency and the contractor.
- Refund of VAT must be in Philippine Peso and the reimbursement amount shall be 12% of the remaining amount of the contract price after deduction of the equipment procurement cost.
- The contractor shall pay the required VAT in accordance with Philippine law.
- According to the Supplementary Agreement on VAT Payment, the contractor shall claim the VAT refund from the project implementing agency.
- The project implementing agency shall directly refund the same amount of the VAT paid by the contractor to the contractor's bank account.
- The contractor should have a corporate status as a branch office in the Philippines with a TIN Number and a VAT Registration Number.
- The progress of the VAT refund shall be reported regularly to the relevant organizations such as the Embassy of Japan, JICA, etc.

<Approval by the Executive Committee of the National Economic Development Council>

According to the national regulations of the Philippines, since the total cost of the Project has exceeded 500 Hundred Million Pesos, obtaining an approval from the Investment Coordinating Council (ICC) is necessary. PAGASA has already obtained the confirmation of the National Economic and Development Authority (NEDA) that the ICC's approval for the implementation of the Project is not required anymore since the Project for the Improvement of the Meteorological Radar System in the Philippines under which the Guiuan Meteorological Radar Observation Station (construction of the radar tower building and installation of the meteorological radar system) was constructed was already previously approved by the ICC.

3-2 Necessary Inputs from the Recipient Country

In order to further enhance the benefits of this Project, the following recommendations are strongly encouraged and should be implemented accordingly.

- 1) Natural Disaster Prevention and Management
 - a) Setting up of redundancies in the announcement of warnings and other information dissemination methods through multiple channels to ensure reaching out to the general populace; and,
 - b) Continuing educational activities for the general public in coordination with various related disaster management agencies and the mass media for a more effective natural disaster prevention and management strategy.
- 2) Longer Life Span of the Equipment procured and the Radar Tower Buildings constructed under the Project
 - a) Regularly secure the necessary budget for the efficient operation and maintenance of the systems and building equipment, and the procurement of requisite spare parts and consumables for all the equipment to be supplied under the Project;
 - b) Ensure the protection of the buildings, equipment and facilities against theft and vandalism; and,
 - c) Regularly paint and caulk the caulking grooves of the Radar Tower Buildings.

3-3 Important Assumptions

- 1) Utilization of the meteorological information/data and forecasts/warnings by the mass media (TV, radio, newspaper), the agencies concerned with the reduction of natural disasters (Office of Civil

Defense, National Disaster Coordinating Council, Department of Social Welfare and Development, Philippine National Red Cross, etc.), civil aviation sector and other information users.

- 2) No change in global warming countermeasures, natural disaster countermeasures, and meteorological service policies as determined by the government of the Philippines.
- 3) Maintenance of a cooperative structure between the mass media (TV, radio, newspaper) and the government agencies concerned with the reduction of natural disasters.
- 4) Continuance of service by a PAGASA staff who has received on-the-job training under the Project for the Improvement of the Meteorological Radar System in the Philippines.

3-4 Project Evaluation

3-4-1 Relevance

- 1) Population to directly benefit from the Implementation of the Project

The Philippines is particularly affected by tropical cyclones that come from the Pacific Ocean. Tropical cyclones are extreme manifestations of nature that lead to immense distress and economic deprivation for countless lives. The extensive losses sustained from tropical cyclones are a significant set-back to the national economy and to the development of the Philippines. Meanwhile, there is also a real concern that the number of victims affected by tropical cyclones will proportionally increase due to the fact that the estimated population of the Philippines by 2020 will exceed 100 million as indicated by the National Statistics Office. Presently, the number of population to be benefited by the implementation of the Project is the whole nation of the Republic of the Philippines (the population of the Philippines in 2010: 92.34 million as published by the National Statistics Office).

- 2) Objectives of the Project

A key objective of this Project is to contribute to the effective mitigation of the devastation caused by natural disasters through the restoration of the typhoon detection and monitoring capability of PAGASA by restoring the Guiuan Meteorological Radar Observation which was seriously damaged by Typhoon Yolanda.

- 3) Development Plan of the Philippines

The “Medium Term Philippine Development Plan 2011-2016,” formulated under the leadership of the NEDA, has been the top-level plan for national socio-economic development. In the “Medium Term

Philippine Development Plan,” the strengthening of governance, investment promotion, infrastructure development and poverty reduction are the important issues which are key to the achievement of “Inclusive Growth.” In addition, countermeasures against natural disasters such as typhoons, earthquakes, etc. are also indispensable and the development of natural disaster-resistant infrastructures and the strengthening of the disaster prevention capabilities of the poor are considered as essential issues.

With regard to Typhoon Yolanda, NEDA announced the “Reconstruction Assistance on Yolanda: RAY” plan last December 2013. This plan aims to completely restore the economic and social standards in the affected areas and improve their capacity to adapt to natural disasters by 2017.

4) Aid Policy of Japan

The Philippines is an important partner in Southeast Asia for Japan especially in a context wherein the two countries share the same values including democracy and market economy as well as common strategic interests. In September 2011, Japan and the Philippines have jointly confirmed during the Japan-Philippines Joint Statement that the relations between the two countries have already developed into a "Strategic Partnership." Japan has long provided assistance to the Philippines as its top donor and will continue to provide such assistance on both the economic and social aspects so that the Philippines can achieve a sustainable and more vigorous type of economic growth.

Japan's basic aid policy is to render its support through economic cooperation in order for the Philippines to achieve "Inclusive Growth" as described in the "Philippine Development Plan 2011-2016" with a view to further strengthening the "Strategic Partnership" between the two countries. The Government of Japan focuses on the following three priority areas for the realization of this basic aid policy.

1. Achieving sustainable economic growth through the further promotion of investment
2. Overcoming vulnerability and stabilizing bases for human life and production activity
3. Peace and Development in Mindanao

Under the second priority area, the provision of aid for reducing risks and minimizing damages from natural disasters is indicated as well as the adoption of countermeasures against climate change. It is truly significant to re-establish the meteorological monitoring system and improve the disaster prevention capabilities of the entire Philippines through the restoration of the Guiuan Meteorological Radar System under the Project as it is in congruence with Japanese priorities in terms of international cooperation.

3-4-2 Effectiveness

As a result of extensive discussions with PAGASA, the following Achievement Targets and Expected Achievement Time have been set to satisfy the following Achievement Indicators of the Project for the Improvement of the Meteorological Radar System in the Philippines.

Table19: Achievement Indicator

Indicator	Target	Expected Achievement Time
Enhancement of the Cyclone Monitoring Capability of the PAGASA	Detection range of precipitation intensity 1mm/h or more: 450km radius	At the completion of the Project
	Monitoring capability of tropical cyclonic wind velocity: maximum 75m/s within a 200km radius	At the completion of the Project
	Capability to detect the direction of rainfall motion within a 200km radius	At the completion of the Project

The restitution of the typhoon detection and monitoring capability of the PAGASA due to the restoration of the Guiuan meteorological radar system installed and the radar tower building constructed under the Project for the Improvement of the Meteorological Radar System in the Philippines financed by Japan’s Grant Aid would substantially contribute to the mitigation of the adverse effects of meteorological disasters and effectively safeguard the basic human needs of the Filipino people. In conclusion, the implementation of the Project is considered to be an appropriately suitable and worthwhile endeavor.

Appendices

Appendix 1. Member List of the Study Team

Preparatory Survey Team

Mr. Masafumi NAGAISHI	Team Leader	Senior Adviser to the Director General, Global Environment Department, Japan International Cooperation Agency (JICA)
Mr. Kenji MORI	Chief Consultant/Meteorological Radar System Equipment Planning (Procurement Planning/ Cost Estimation)	Japan Weather Association (JWA)
Mr. Isao ICHINOSE	Meteorological Radar System Facility Planning (Procurement Planning/ Cost Estimation)	International Meteorological Consultant Inc. (IMC)

Appendix 2. Study Schedule

Preparatory Survey

Schedule			Governmental Member		Consultant Member	
			Mr. Masafumi NAGAISHI		Mr. Kenji MORI	Mr. Isao ICHINOSE
2014			Leader		Chief Consultant/Meteorological Radar System Equipment Planning (Procurement Planning/ Cost Estimation)	Meteorological Radar System Facility Planning (Procurement Planning/ Cost Estimation)
1	16 Feb	Sun	Tokyo → Manila		Tokyo → Manila	
2	17 Feb	Mon	Discussion with JICA Philippines Office, Discussion with PAGASA			
3	18 Feb	Tue	Discussion with PAGASA, Confirmation of Minutes of Discussions			Data Collection, Study for Unit Price of Construction Materials
4	19 Feb	Wed	Discussion with PAGASA, Signing on Minutes of Discussions			Manila → Tacloban Tacloban → Guiuan
5	20 Feb	Thu	Manila → Tacloban		Manila → Tacloban	Confirmation of Restoration Work of Temporary Electricity Supply, Site Survey
6	21 Feb	Fri	Tacloban → Guiuan Site Survey Courtesy call on Guiuan Municipality		Tacloban → Guiuan Site Survey Courtesy call on Guiuan Municipality	Confirmation of Restoration Work of Temporary Electricity Supply, Courtesy call on Guiuan Municipality
7	22 Feb	Sat	Guiuan → Tacloban Tacloban → Manila		Site Survey Discussion with Eastern Samar Electric Company	
8	23 Feb	Sun	Manila → Tokyo		Site Survey	
9	24 Feb	Mon			Site Survey	
10	25 Feb	Tue			Site Survey	
11	26 Feb	Wed			Site Survey	
12	27 Feb	Thu			Site Survey	
13	28 Feb	Fri			Site Survey Report to Guiuan Municipality	
14	1 Mar	Sat			Site Survey	
15	2 Mar	Sun			Guiuan → Tacloban Tacloban → Manila	
16	3 Mar	Mon	Discussion with PAGASA, Report to JICA Philippines Office, Study for Unit Price of Construction Materials			
17	4 Mar	Tue	Data Collection, Study for Unit Price of Construction Materials			
18	5 Mar	Wed	Manila → Tokyo			

Appendix 3. List of Members of Party Concerned in the Recipient Country

- **Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)**

PAGASA Central Office and Weather and Flood Forecasting Center (WFFC)

Dr. Vicente B. Malano	Acting Administrator
Mr. Catalino L. Davis	Acting Administrator for Administrative and Engineering Services
Dr. Flaviana D. Hilario	Acting Administrator for Research and Development
Engr. Fredolina D. Baldonado	Office-in-charge, Northern Luzon PAGASA Regional Services Division (PRSD)
Engr. Edwin F. Manresa	Office-in-charge, Engineering and Techniques Services Division (ETSD)
Ms. Lilibeth B. Gonzales	Chief, Finance, Planning and Management Division
Ms. Angelina S. Galang	Weather Specialist I, Administrator's Office

Guiuan Radar Observation Station

Mr. Mariano A. Macasa	Chief Meteorological Officer, Guiuan Radar Station
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- **National Economic and Development Authority (NEDA)**

Ms. Shella Marie D. Decena	Economic Development Specialist I
Ms. Nathania Rae Z. Cortes	Economic Development Specialist II
Ms. Reychiel L. Roxas	Economic Development Specialist I
Mr. Joseph Norley Y. Capistrano	Supervising Economic Development Specialist

- **Municipality of Guiuan**

Mr. Christopher Sheen P. Gonzales	Mayor
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- **Eastern Samar Electric Company (Guiuan)**

Mr. Francisco S. De Paz	Board of Director
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Appendix 4. Minutes of Discussions

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY
ON
THE PROJECT FOR REHABILITATION OF
METEOROLOGICAL RADAR SYSTEM IN GUIUAN
IN THE
REPUBLIC OF THE PHILIPPINES

In response to a request from the Government of the Republic of the Philippines (hereinafter referred to as "GOP"), the Government of Japan decided to conduct the Preparatory Survey (hereinafter referred to as "the Survey") on the Project for Rehabilitation of the Meteorological Radar System in Guiuan (hereinafter referred to as "the Project") and entrusted the Survey to Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Mr. Masafumi Nagaishi, Senior Advisor to the Director General, Global Environment Department, JICA, and was scheduled to stay in the country from February 16th to March 4th.

The Team held discussions with the officials concerned of the GOP and conducted a field survey at the Survey area.

In the course of the discussions and the field survey, both parties confirmed the main items described in the attached sheets. The Team will proceed for further works and prepare the Preparatory Survey Report.

Manila, 19th February, 2014



Masafumi NAGAISHI
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan



Vicente B. MALANO, PhD MNSA
Acting Administrator
Philippine Atmospheric, Geophysical, and
Astronomical Services Administration
Republic of the Philippines

Witness :



Raymund E. Liboro
Assistant Secretary
Department of Science and Technology (DOST)
Republic of the Philippines

ATTACHMENT

1. Background of the Project

In November 2013, Typhoon Yolanda attacked the Philippines and inflicted considerable damage on the Guiuan Meteorological Radar System established under Japan's Grant Aid.

JICA sent the Need Assessment Survey Team to the Philippines in order to study the need for recovery and reconstruction assistance and to collect information for the project formulation as well as emergency responses required. As a result, the rehabilitation of the Guiuan Meteorological Radar System has been confirmed as one of the priority issues.

In response to the official request of the GOP based on the Need Assessment Survey, the Japanese Government decided to conduct the Survey on the Project and entrusts the Survey to JICA.

2. Objective of the Project

Both sides agreed that the objective of the Project is to ensure the resumption of normal weather observation by rehabilitation of the meteorological radar system in Guiuan.

3. Contents of the Inception Report

The Team explained the Inception Report to the Philippine Atmospheric, Geophysical and Astronomical Service Administration (hereinafter referred to as "PAGASA"), the Department of Science and Technology (hereinafter referred to as "DOST"). PAGASA agreed and accepted the contents of the Inception Report.

4. Project Title

Both sides agreed to the Project Title as "the Project for Rehabilitation of the Meteorological Radar System in Guiuan."

5. Project Site

The site of the Project is located in Guiuan, Eastern Samar as shown in Annex 1.

6. Responsible and Implementing Agency

6-1 The responsible and implementing agencies for the Project are as follows.

- Responsible Agency : Department of Science and Technology (DOST)
- Implementing Agency : Philippine Atmospheric, Geophysical and Astronomical Service Administration (PAGASA)

The organization chart of PAGASA is shown in Annex 2.

6-2 The Project will be one of the sub-projects under the Grant Aid Program mentioned in the



below paragraph 7. In such case, the Department of Finance will play a role as the Supervising Agency aside from the Responsible and Implementation Agencies.

7. The Grant Aid Program

The Team explained that the Project is one of the candidate sub-projects under the Grant Aid Program for Rehabilitation and Recovery from Typhoon Yolanda (hereinafter referred to as “the Grant Aid Program”) requested by the GOP.

Also, the Team explained that the sub-projects to be implemented under the Grant Aid Program shall be determined by both sides based on the results of relevant surveys.

8. Items requested by PAGASA

8-1 Through discussions between the Team and PAGASA, the requested components were confirmed as follows.

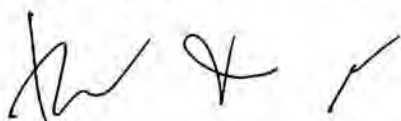
- Replacement of the Meteorological Radar, Meteorological Radar Data Display and Meteorological Data Satellite Communication Systems in Guiuan
- Reinforcement and/or replacement of the damaged radar tower building and facilities in Guiuan
- Upgrading and replacement of the radome of the Meteorological Radar System in Guiuan

8-2 The detailed project components and basic design are shown in Annex 3. The GOP side understood that the project components described in Annex 3 is a provisional one and could be subject to change according to further surveys, discussions and analyses in Japan as well as situational changes.

8-3 Basically, both sides agreed that the Project is focused on the rehabilitation of the Guiuan Meteorological Radar System.

However, PAGASA explained that the effects of global climate change on the intensity and frequency of tropical cyclones have become quite drastic very recently. In fact, PAGASA latest records show that a number of tropical cyclones categorized as “super typhoon” have entered the Philippine Area of Responsibility (PAR) for the past few years (such as Typhoon Juan, Labuyo, Vinta and Odette). Therefore, PAGASA requested as well for the reinforcement of both Aparri and Virac radar tower building facilities (such as Cyclone Screen and Cable Duct, etc.), which were also constructed under the Japan’s Grant Aid as similar to Guiuan.

In response, the Team requested PAGASA to prepare and provide some detailed information or records of super typhoon(s) after the completion of Aparri and Virac meteorological radar stations. Subsequently, the Team will examine the possibility of the Project to include the reinforcement of both radar tower building facilities, in consideration of the likelihood of similar typhoons hitting in the area such as Yolanda. On the other hand, the Team initially expressed that the reinforcement of Aparri radar tower building facilities may not be seriously



considered due to its geographical situation where it is mainly shielded by high mountain ranges and situated in the low land.

Based on the result of a further survey and examination, together with some detailed information provided by PAGASA, and giving consideration on the budget limitation, the Team will decide whether or not the reinforcement of the Aparri and/or Virac radar tower building facilities can be covered in the Project by the end of the Survey.

9. Indicative Budget Allocation of the Project

- 9-1 The Team explained the indicative budget allocation of the Project as described in Annex 4, and both sides agreed that this indicative budget allocation should never be duplicated or released to any third party before the signing of all the contract(s) for the Project.
- 9-2 The GOP side understood that this indicative budget allocation is a provisional one and could be subject to change according to further surveys, discussions and analyses in Japan as well as situational changes.

10. Japan's Grant Aid Scheme

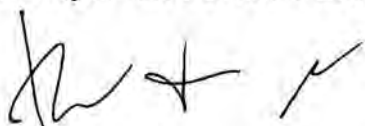
- 10-1 The GOP side understood the existing Japan's Grant Aid Scheme and its procedures as described in Annex 5 and 6 respectively.
- 10-2 The GOP side will take the necessary measures, as described in Annex 7, for smooth implementation of the Project, as the condition for the Japan's Grant Aid to be implemented.
- 10-3 The Team explained that the Project is planned as one of the sub-projects under the Grant Aid Program as mentioned in paragraph 6, and that further detailed information on the Grant Aid Program would be provided to the GOP side by the other JICA mission to be dispatched in March 2014.

11. Schedule of the Survey

- 11-1 The Team will proceed for further surveys in the Philippines until the 4th of March 2014.
- 11-2 Based on the Survey, the Team will conduct analysis in Japan such as designing, cost estimation, etc. until the end of April 2014.
- 11-3 Based on the result of the survey, the Team shall prepare the Preparatory Survey Report and send it to the GOP side around May 2014.

12. Technical Support by the JICA Technical Cooperation Project

The Project handover to the GOP side will not be in time for the next typhoon season. The



expected project completion is September 2015.

JICA has a plan to further support the weather monitoring/observation and forecast of upcoming typhoon(s) without the Guiuan Meteorological Radar System through the soon to be implemented Technical Cooperation Project named "Project for Enhancing Capacity on Weather Observation, Forecasting and Warning", which will start before the next typhoon season.

13. Undertakings to be taken by the GOP side

Both sides confirmed that the GOP side shall complete the following undertakings shown in accordance with the implementation schedule of the Project;

<General Items>

- (1) To provide the Team with available relevant data, information and materials necessary for the execution of the Study;
- (2) To prepare the answers for the Questionnaire presented by the Team;
- (3) To assign full-time counterparts to the Team during their stay in the Philippines, to play the following roles as the coordinator to the Team;
 - To make appointments, set up the meetings with the authorities, departments and all other organizations that the Team intends to visit.
 - To attend all the site surveys and any other place visits with the Team and to make any convenience on accommodation, working room, adequate transportation, getting the permissions if required, etc.
 - To assist and advise the Team in their collection of data and information as much as possible.
- (4) To take any measures deemed necessary to ensure the safety of the members of the Team;
- (5) To ensure necessary budget and staff to realize smooth implementation of the Project;

< For the Restoration Work of the Radar Tower Building>

- (6) To provide the commercial power (240V, 3-phase, 3-wire, 60Hz) supply (capacity: 150kVA) for the Guiuan Radar Tower Building by March 2015;
- (7) To restore the required step-down transformers as well as service entrance connections for the commercial power supply at the Guiuan Meteorological Radar Tower Building by February 2015;
- (8) To undertake repairs/restoration of damaged incidental outdoor works such as gardening, fencing, gates, boundary walls and exterior lighting in and around the sites as the case may be by September 2015 and
- (9) To install some temporary measures to protect existing facilities and equipment until commencement of the Project.

14. Other Relevant Issues

14-1 Environmental and Social Considerations

The GOP side promised to clear necessary procedures for environmental and social



considerations and obtain a necessary approval by relevant authorities before commencement of the procurement in accordance with the relevant guidelines in the Philippines, including Environmental Impact Assessment (EIA), if required.

Both sides agreed that this sub-project is categorized as C based on JICA Guidelines for Environmental and Social Considerations (April 2010) (hereinafter referred to as "Guidelines") because the project is likely to have minimal or no adverse social or environmental risks under the Guidelines.

Hence, PAGASA does not need to submit an Environmental and Social Management System (ESMS) Check List, which is usually necessary for the Implementing Agency under the Grant Aid Program based on the Guidelines as this sub-project is categorized as C as mentioned above, and it is a single sub-project to be implemented by PAGASA under the Grant Aid Program. Therefore, no further procedure is required.

14-2 Confidentiality of the Project

The Team explained that the preparatory survey report to be prepared at the end of the Survey shall be disclosed to the public in principle in Japan. However, the Team also explained that a confidential part which might affect bidding process such as cost estimation should be kept undisclosed until the bidding has been completed.

14-3 Tax Exemption

The tax exemption including Value Added Tax (VAT), custom duty, and any other taxes and fiscal levies in the Philippines which will arise from the Project activities shall be ensured by PAGASA. PAGASA shall take any procedure necessary for tax exemption with the Department of Finance of the Philippines at their responsibility.

- Annex 1: Project Site
- Annex 2: Organization Chart of PAGASA
- Annex 3: The Detailed Project Components and Basic Design
- Annex 4: Indicative Budget Allocation of the Project
- Annex 5: JAPAN'S GRANT AID
- Annex 6: Flow Chart of JAPAN'S GRANT AID Procedure
- Annex 7: Major Undertakings to be taken by Each Government

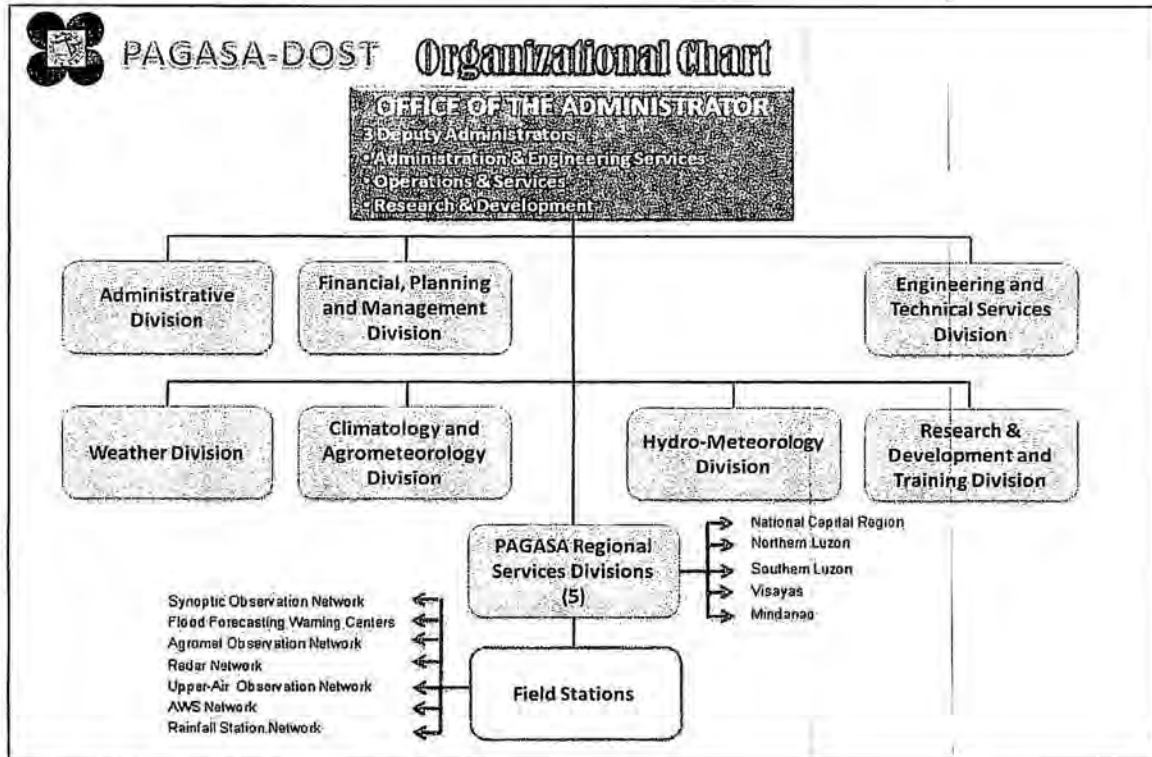


Project Site

■ Philippines



Organization Chart of PAGASA



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The Detailed Project Components and Basic Design

Item/Equipment	Missing/Destroyed/Damaged	Countermeasures	Details
Radome	Missing	Replacement	To install a new radome strengthened with a honeycomb structured core-mat in the interlayer which can withstand a maximum wind speed of 125m/s.
Radar Antenna (Meteorological Radar Antenna)	Missing	Replacement	Equivalent to the original one
Pedestal	Destroyed	Replacement	Equivalent to the original one
Wave-guide Configuration	Damaged	Replacement	Equivalent to the original one
Transmitter	Damaged	Replacement	Equivalent to the original one
Measurement Equipment	Damaged	Replacement	Equivalent to the original one
VSAT Antenna	Damaged	Replacement	Equivalent to the original one
Solar Panels	Destroyed/Damaged	Replacement	<ul style="list-style-type: none"> ■ Missing and damaged solar panels and frames will be replaced with new ones ■ To attach install modified panels which created in Japan
Severe Storm and Doppler Velocity Indicator. Cyclone Tracking Monitor and Data Analysis Unit	Destroyed	Replacement	Equivalent to the original one
Compact UPS, Printer and Peripherals	Destroyed/Damaged	Replacement	Equivalent to the original one
Power Supply Capacitor	Unclear		After checking in the field survey, will consider the appropriate action/method.
Digital Receiver and Signal Processor (DRSP)	Unclear		
Dehydrator	Unclear		
Data & Protocol Converter	Unclear		
Radar Task Controller	Unclear		
Isolation Transformer and Automatic Voltage Regulator (AVR) for Radar Equipment	Unclear		
IP Telephone	Destroyed/Damaged	Replacement	Equivalent to the original one
Base Ring	Damaged	Repair	Start over the caulking filling between the base ring and radome foundation
Aluminum Window (1F Observation Room and Data Analysis Room)	Destroyed	Replacement/Reinforcement/Repair	<ul style="list-style-type: none"> ■ Replace the damaged glass window ■ To install cyclone screens constructed with a punching-metal plate which will protect glass windows from stones and other small objects which accompany gusty winds. ■ To add internal reinforced mullion for a piece of large glass
Cyclone Screen	Missing/Destroyed	Replacement/Reinforcement	<ul style="list-style-type: none"> ■ So as not to be broken by stepping stones which hit the glass, the punching metal which has more fine mesh will be used. ■ Replace with a new one ■ To attach a tough screen which is

			made in Japan.
Wooden Door (1F Observation Room and Data Analysis Room)	Destroyed/Damaged	Replacement/Reinforcement	Equivalent to the existing one with bigger removable louver
Access Floor (1F Observation Room)	Damaged	Replacement	Equivalent to the original one
Carpet Tiles (1F Observation Room)	Damaged	Replacement	Equivalent to the original one
Electricity Cable in Trench (1F Engine Generator Room)	Damaged	Replacement	Equivalent to the original one
Isolation Transformer (1F Electricity Room)	Unclear		After checking in the field survey, will consider the appropriate action/method.
Automatic Voltage Regulator (AVR) (1F Electricity Room)	Unclear		After checking in the field survey, will consider the appropriate action/method.
Air Conditioning Indoor Unit (1F Observation Room and Data Analysis Room)	Destroyed/Damaged	Replacement	Equivalent to the original one
Bent Cap for Exhaust Fan (1F and M4F)	Missing/Destroyed	Replacement/Reinforcement	☑ Missing and destroyed bent cap will be replaced with a new one. ☑ Reinforcement fixing with bolt.
Exhaust Fan (1F)	Destroyed/Damaged	Replacement/Reinforcement	Equivalent to the original one
Alarm Panel (1F)	Destroyed/Damaged	Replacement	Equivalent to the original one
Fire Alarm Panel (1F)	Destroyed/Damaged	Replacement	Equivalent to the original one
Furniture (1F)	Destroyed/Damaged	Replacement	Equivalent to the original one
Telephone (1F)	Destroyed/Damaged	Replacement	Equivalent to the original one
Cable Duct	Damaged	Replacement/Reinforcement/Repair	☑ Attached the tough cable duct inspection door created in Japan. ☑ Reinforce with the Stainless angle ☑ To install several water leakage protection at the top of the cable duct in the radome room and inside duct.
Lighting Fixtures (1F Observation Room, Data Analysis Room, Maintenance Room, Entrance Hall, M4F Radar Equipment Room, 6F Radome Room, 5F Observation Deck and staircase from 4F to 6F)	Missing/Destroyed	Replacement	Equivalent to the original one
Exterior Lighting fixtures (from 2F to 4F)	Missing/Destroyed	Replacement/Reinforcement	☑ Missing and destroyed exterior lighting fixtures will be replaced with new ones ☑ Reinforcement fixing with a metal strap.
Interior Finishing (1F Observation Room, Data Analysis Room, Maintenance Room, Entrance Hall, M4F Radar Equipment Room and staircase from 4F to 6F)	Destroyed/Damaged	Replacement/Restoration	Equivalent to the original one
Air Conditioning Outdoor	Missing/Destroyed	Replacement/	☑ Missing and destroyed air

Unit (2F)		Reinforcement	conditioning outdoor unit will be replaced with a new one. <input checked="" type="checkbox"/> Air conditioning outdoor unit will be firmly fixed with reinforced steel bar made by stainless angle to the concrete base.
Air Conditioning Outdoor Unit (5F)	Missing/Destroyed	Replacement/Reinforcement	<input checked="" type="checkbox"/> Missing and destroyed air conditioning outdoor unit will be replaced with a new one. <input checked="" type="checkbox"/> Air conditioning outdoor unit will be firmly fixed with reinforced steel bar made by stainless angle to the concrete base.
Conditioning and Refrigerant Pipe Cover (2F)	Missing/Destroyed	Replacement/Reinforcement	<input checked="" type="checkbox"/> Missing and destroyed refrigerant pipe will be replaced with a new one <input checked="" type="checkbox"/> Manufacturing the refrigerant pipe cover with the stainless checker plate material and firmly fix to the concrete base.
Conditioning and Refrigerant Pipe Cover (5F)	Missing/Destroyed	Replacement/Reinforcement	<input checked="" type="checkbox"/> Missing and destroyed refrigerant pipe will be replaced with a new one <input checked="" type="checkbox"/> Manufacturing the refrigerant pipe cover with the stainless checker plate material and firmly fix to the concrete base.
Exterior Door (2F)	Destroyed	Replacement/Reinforcement	<input checked="" type="checkbox"/> To allow for a wider cover width between the door and the door frame to be strengthened by steel angles in the indoor side. <input checked="" type="checkbox"/> To add the internal reinforcement and replace with an iron door which has a thick surface panel.
Exterior Door (5F)	Destroyed	Replacement/Reinforcement	<input checked="" type="checkbox"/> To allow for a wider cover width between the door and the door frame to be strengthened by steel angles in the indoor side. <input checked="" type="checkbox"/> To add the internal reinforcement and replace with an iron door which has a thick surface panel.
Access Floor in Radar Equipment Room (M4F)	Damaged	Replacement	Equivalent to the original one
Elevated Water Tank Cover (M2F)	Missing	Replacement/Reinforcement	<input checked="" type="checkbox"/> Missing cover will be replaced with a new one <input checked="" type="checkbox"/> Reinforcement fixing with bolt
Heat Exchanger (M4F)	Destroyed/Damaged	Replacement	Equivalent to the original one
Aluminum Door (M5F)	Destroyed	Replacement	Replacement with a reinforced steel door
Exterior Finishing	Damaged	Restoration	Equivalent to the original one

Indicative Budget Allocation of the Project

<CONFIDENTIAL>

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JAPAN'S GRANT AID

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

The Japanese Grant Aid is supplied through the following procedures:

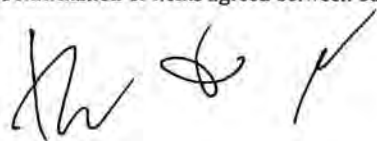
- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.



- Preparation of a outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

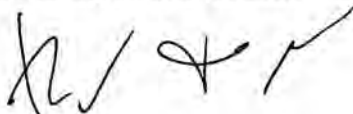
After the Project is approved by the Cabinet of Japan, the Exchange of Notes(hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated



authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfill accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Annex.

(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

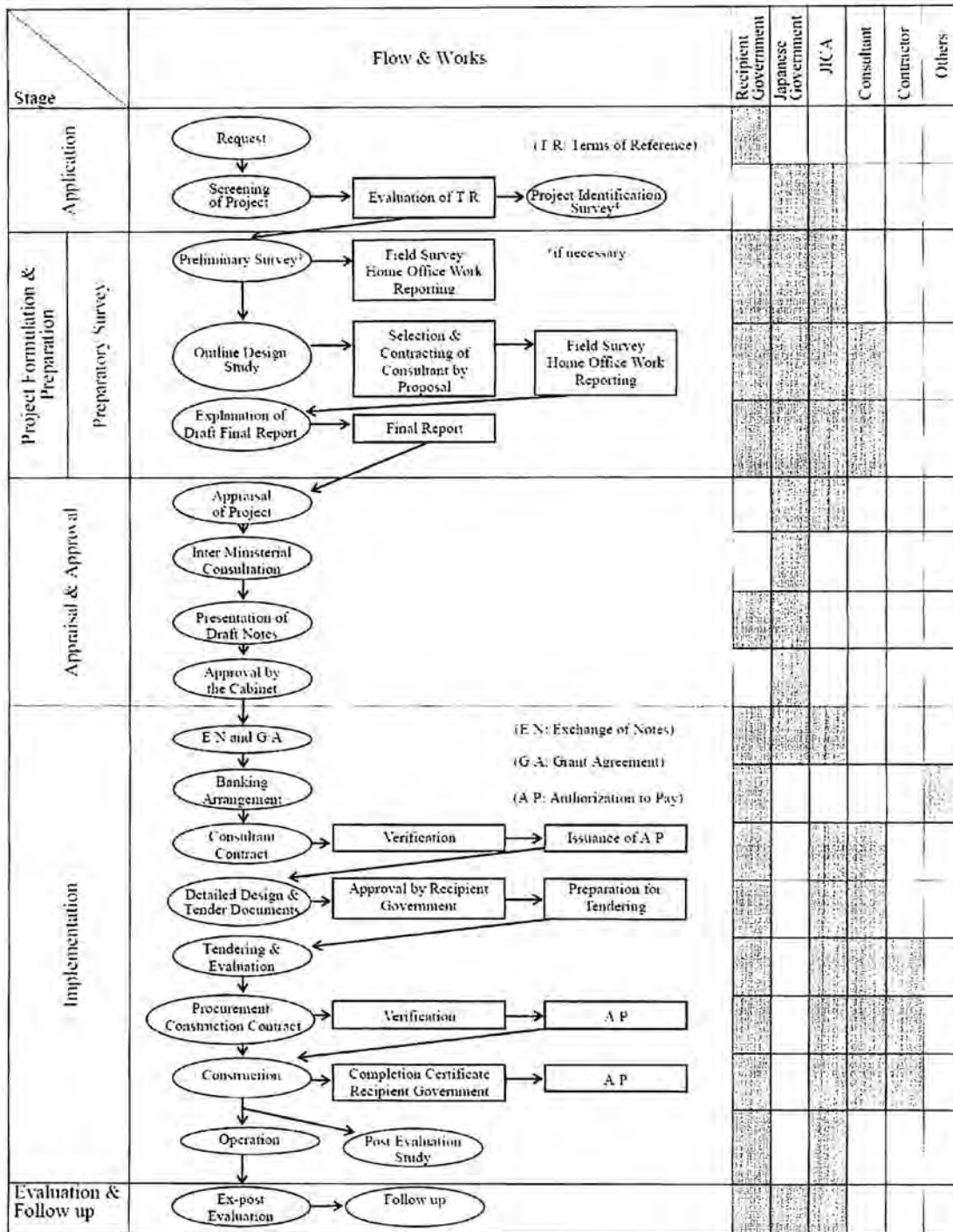
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.



Flow Chart of JAPAN'S GRANT AID Procedure



Major Undertakings to be taken by Each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure lots of land necessary for the implementation of the Project and to clear the sites		●
2	To construct the following facilities		
	1) The building	●	
	2) The gates and fences in and around the site		●
	3) The parking lot	●	
	4) The road within the site	●	
	5) The road outside the site		●
3	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the sites		
	1) Electricity		
	a. The distributing power line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer	●	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	3) Drainage		
	a. The city drainage main (for storm sewer and others to the site)		●
	b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site	●	
	4) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
4	To ensure prompt customs clearance of the products and to assist internal transportation of the products in the recipient country		
	1) Marine (Air) transportation of the Products from Japan to the recipient country	●	
	2) Internal transportation from the port of disembarkation to the project site	(●)	(●)*
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
6	To accord Japanese physical persons and / or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
7	To ensure that the Facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
9	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
10	To give due environmental and social consideration in the implementation of the Project.		●

(B/A : Banking Arrangement, A/P : Authorization to pay)

* Internal transportation to the sites where Japanese nationals cannot enter due to the security situation would be covered by the Philippine Side.