ANNEX 1

REVISION

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TECHNICAL SPECIFICATION

LOT 1
CONSTRUCTION OF HEALTH FACILITIES

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CHAPTER I
GENERAL EXPLANATION

1.1. SCOPE OF WORK STATEMENT

The implementation of the work of the medical facilities will be carried out into the appropriate package of activities that will be listed in the contract document with details to be determined further. For each activity package to be listed in the contract, the contractor is obliged to fulfill the requirements listed earlier.

In order to support such activities, the Contractor shall supply all adequate and competent labour, supervision, tools and, equipment, installed and consumable materials, services, testing devices, and each and every item of expense necessary for:

- supply
- application
- handling & unloading
- warehousing
- testing
- fitting of material
- construction
- fabrication
- hauling
- field installation
- lay down areas
- evaluation
- receiving
- assembly
- quality assurance
- Material Sample
- Mock up

And specific requirements that stated in following chapters.

The Contractor shall perform all work as described this document and Owner's strategies, plans and procedures so as to provide all services required to construct, install, test and deliver a complete and operable facility. The Contractor shall provide all adequate and competent construction management, personnel, supervision, staff, labour, construction planning, scheduling, documentation, construction quality, HSE and testing devices in order to complete the Work in accordance with the Standard of Performance.

In this section will be elaborated in more detail regarding the construction of Pustu and Puskesmas Buildings that will be implemented by the contractor, among others:

1. 8 Pustu Buildings in North Lombok (Pustu, Doctor's House and Ramp)
   - Pustu Telaga Wareng
     Is situated in Jl. TGH. Abdul Gafur, Village of Pemenang Barat, Sub District of Pemenang, North Lombok Regency, West Nusa Tenggara 83352. Site contour considerably flat and surrounding area is plantation and village housing.

   - Pustu Tegal Maja
     Is situated in Village of Tegal Maja, Sub District of Tanjung, North Lombok Regency, West Nusa Tenggara 83352. Site contour considerably flat and surrounding area is plantation and village housing.

   - Pustu Rangsot
     Is situated in Village of Sigar Penjalin, Tanjung, North Lombok Regency, West Nusa Tenggara 83352. Site contour considerably flat and surrounding area is plantation and village housing.

- Pustu Sesait
  Is sitated in Village of Sesait, Sub District of Kayangan, North Lombok Regency, West Nusa Tenggara 83353. Site contour considerably flat and surrounding area is plantation and village housing.

- Pustu Pendue
  Is sitated in Village of Pendue, Sub District of Kayangan, North Lombok Regency, West Nusa Tenggara 83353. Site contour considerably flat and surrounding area is plantation and village housing.

- Pustu Gangga
  Is sitated Village of Genggelang, Sub District of Gangga, North Lombok Regency, West Nusa Tenggara 83353. Site contour considerably flat and surrounding area is plantation and village housing.

- Pustu Selengan
  Is sitated Village of Selengen, Sub District of Kayangan, North Lombok Regency, West Nusa Tenggara 83353. Site contour considerably flat and surrounding area is plantation and village housing.

- Pustu Loloan
  Is Situated in Jl. Raya Bayan, Village of Loloan, Sub District Bayan, North Lombok Regency, West Nusa Tenggara 83354. Site contour considerably flat and surrounding area is plantation and village housing.

Detailed building area in 8 pustu locations to be built among others:

No	FLOOR AREA SCHEDULE	AREA (m^2)	AMOUNT	TOTAL AREA (m^2)
1	Pustu			
	- Terrace	4,6	1	4,6
	- Administration Room	15,4	1	15,4
	- Examination Room	10,5	1	10,5
	- Drug Warehouse	6	1	6
	- RKIA	12	1	12
	- Difabled Toilet	5	1	5
	- Lactation Room	4	1	4
	- Terrace	4	1	4
	- Staff House	10	1	10
	- Bedroom	7,5	1	7,5
	- Toilet Staff	3	1	3
	- Corridor	11	1	11
2	Doctor's Houses			
	- Terrace	3,25	1	3,25
	- Living Room	6,25	1	6,25
	- Kitchen Room	5,25	1	5,25
	- Bedroom	9	1	9
	- Doctor's Toilet	3	1	3

No	FLOOR AREA SCHEDULE	AREA (m^2)	AMOUNT	TOTAL AREA (m^2)
3	Ramp	4,2	1	4,2
			TOTAL	**123,95**

2. Pustu Gapuk

Is Situated in Jl. Raya Gapuk, Village of Gapuk, Sub District Gerung, West Lombok Regency, West Nusa Tenggara 83363. Site contour considerably flat and surrounding area is village housing and plantation. Detailed building area in locations to be built among others:

No	FLOOR AREA SCHEDULE	AREA (m^2)	AMOUNT	TOTAL AREA (m^2)
1	waitting room	12,00	1	6,00
2	counter	5,00	1	5,00
3	observation room	9,00	1	9,00
4	breast feeding room	6,00	1	6,00
5	service area	4,37	1	4,37
6	medicine storage room	6,25	1	6,25
7	living room	5,00	1	5,00
8	family room	17,21	1	17,21
9	kitchen	5,98	1	5,98
10	bedroom 1	9,00	1	9,00
11	bedroom 2	10,50	1	10,50
12	terrace 1& 2	29,00	1	29,00
13	toilet	3,06	1	3,06
14	disabled toilet	4,38	1	4,38
15	ramp	11,81	1	11,81
			TOTAL	**132,57**

3. Public Health Centre (Puskesmas) in Lombok Timur

Is situated in Jl raya Sambelia, Pringgabaya, East Lombok Regency, West Nusa Tenggara. The site has moderate contour and surrounding by plantation area. Detailed building area in locations to be built among others:

No	FLOOR AREA SCHEDULE	AREA (m^2)	QUANTITY	TOTAL AREA (m^2)
1	1st Floor			
	- Drug Warehouse	23.63	1	23.63
	-Cold Chain	14.00	1	14.00
	- Pharmasi	7.50	1	7.50
	- Pediatrician	14.00	1	14.00
	- Mother's & KB	14.00	1	14.00
	- MTBS	14.00	1	14.00
	- Dentist & Oral	28.00	1	28.00
	- HIV	13.50	1	13.50
	- Male Toilet	6.70	1	6.70

No	FLOOR AREA SCHEDULE	AREA (m^2)	QUANTITY	TOTAL AREA (m^2)
	- Female Toilet	6.80	1	6.80
	- Disable Toilet	4.55	1	4.55
	- TBC	14.00	1	14.00
	- Laundry	12.42	1	12.42
	- Kitchen	12.61	1	12.61
	- Toilet	3.84	3	11.52
	- Storage	22.55	1	22.55
	- Nurse Room	9.36	1	9.36
	- Laboratorium	19.07	1	19.07
	- Nurse Station	11.16	1	11.16
	- Patient Room	35.25	5	176.25
	- Linen	5.50	1	5.50
	- Toilet Paska Bersalin	3.50	1	3.50
	- Maternity Ward	24.75	1	24.75
	- Children Room	16.50	1	16.50
	- Toilet	4.50	1	4.50
	- Medical Record	13.50	1	13.50
	- Delivery Room	22.50	1	22.50
	- Sterilization	8.00	1	8.00
	- Baby Bath	5.00	1	5.00
	- Toilet	5.00	1	5.00
	- Spoel Hoek	6.25	1	6.25
	- Toilet	5.00	1	5.00
	- Emergency Room	56.00	1	56.00
	- Registration & Waiting Room	68.25	1	68.25
	- Corridor	249.38	1	249.38
	- Terrace	42.75	1	42.75
2	2nd Floor			
	- Multifunction Room	73.50	1	73.50
	- Meeting Room	28.00	1	28.00
	- Head of Puskesmas Room	14.00	1	14.00
	- Administration Room	28.00	1	28.00
	- Small Meeting Room	13.70	1	13.70
	- Toilet	6.50	2	13.00
	- Pantry	4.16	1	4.16
	- Corridor	83.88	1	83.88
	- MEP & Storage	23.73	1	23.73
3	TPS 3R	46.50	1	46.50
4	Ramp	6.25	1	6.25
			TOTAL	**1.306,69**

Note:
The area listed in the above table may change according to the policies / approvals of the employer and the supervisory consultant.

1.2. HEALTH AND SAFETY ENVIRONMENT (HSE)

1.2.1. Scope Of Work

1. Provide labor, materials, equipment and other assistive devices to carry out work as stated in this technical specifications with good and perfect results.
2. The price of this work is included in the preparatory work scope, if it is not listed on the work item then this work remains an obligation that must be carried out.
3. Indicators of success are the implementation of the project in an orderly, safe and no work accidents that occur in the project environment.
4. The Construction Contract must provide for implementation of the following plans:
   - Occupational Health and Safety
   - Air Quality
   - Noise and Vibration
   - Traffic Management
   - Waste Management
   - Monitoring Social Impacts, and
   - Stakeholder Engagement
5. Environmental quality monitoring is carried out at the location that have the potential to cause pollution impacts on environmental components such as: air quality, noise, vibration, surface water, as well as social economic and public health.
   The scope of work includes the following matters:
   a) Doing work preparations
   b) Collecting data in the field both primary and secondary
   c) Analyze the data obtained and provide recommendations for follow up to environmental management.

   Monitoring of environmental quality with the parameters above for ambient air, water and vibration is done in 2 points each for the Puskesmas area and 1 point each for the Pustu area. The following is a monitoring table related to environmental impacts that must be monitored and managed by when pre construction, during contruction and operation phase, including:

Table 1 : Occupational Health and Safety Management Measures

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
OHS1: Health and safety issue of the construction workers	OHS1.1 Establishment of an OHS organisation with clear roles, responsibilities, authority and resources.	Project start	Project manager	Annual review of compliance with key regulations.
	OHS1.2 Conduct safety induction before work start. PPE	Construction and operation phases	Project manager	Monthly or as directed by UNDP

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
	utilization for workers. Conduct regular site inspections, submit reports and oversee corrective action.			

Table 2 : Air Quality Management Measures

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
AQ1: Increase in dust levels at sensitive receptors.	AQ1.1 Implement effective dust management measures in all areas during design, construction and operation.	Pre and during construction	All personnel	Daily and maintain records
	AQ1.2: Source sufficient water of a suitable quality for dust suppression activities complying with any water restrictions.	During construction	Project manager	Daily and maintain records

Table 3 : Traffic Management Measures

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
TM1: Disruption due to Project vehicular traffic.	TM1.1: Consultation with the local communities concerning measures to minimise adverse environmental and social impacts due to project traffic.	Pre and during construction phase	Project manager	Maintain records
	TM1.2: Ensure project vehicles are properly serviced and maintained especially with regard to noise and engine emissions.	Construction phase	Project manager	Maintain records

Table 4 : Waste Management Measures

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
WM1: Production of waste and excessive use of resources	WM1.1: Preference shall be given to materials that can be used to construct the project that would reduce the direct and indirect waste generated.	Pre and during construction	Contractor	Maintain records
	WM1.2: Daily waste management practices shall be carried out.	Pre-construction	Contractor	Maintain records
	WM1.3: The use of construction materials shall be optimised and where possible a recycling policy adopted.	Entire construction and operation phase	Contractor	Maintain records
	WM1.4: Separate waste streams shall be maintained i.e. general domestic waste, construction and contaminated waste. Specific areas on site shall be designated for the temporary management of the various waste streams.	During construction	Contractor	Daily and maintain records
	WM1.5: Any contaminated waste shall be disposed of at an approved facility.	During construction	Contractor	Maintain records
	WM1.6: Fuel and lubricant leakages from vehicles and plant shall be immediately rectified.	Entire construction and operation phase	Contractor	Maintain records
	WM1.7: Disposal of waste shall be carried out in accordance with	During construction	Contractor	Maintain records

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
	the Government of Indonesia requirements.			

Table 5 : Noise and Vibration Management Measures

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
N1: Increased noise levels	N1.1 Select plant and equipment and specific design work practices to ensure that noise emissions are minimized during construction and operation.	Pre and during construction	Contractor	Maintain records
	N1.2: Specific noise reduction devices such as silencers and mufflers shall be installed as appropriate to site plant and equipment.	Pre and during construction	Contractor	Maintain records
	N1.3 Consultation with nearby residents in advance of construction if noise generating construction activities are to be carried out.	Construction phase	All personnel	Daily and maintain records
	N1.4 All incidents, complaints and non-compliances related to noise shall be reported in accordance with the site incident reporting procedures and summarized in the register.	Construction phase	Project manager	Maintain records
N2. Vibration due to construction	N2.1 Identify properties and structures that will be sensitive to vibration impacts	Pre and during construction	Contractor	Maintain records

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
	resulting from construction and operation of the project.			
	N2.2 Design to give due regard to temporary and permanent mitigation measures for noise and vibration from construction and operational vibration impacts.	Pre-construction	Contractor	Maintain records
	N1.4 All incidents, complaints and non-compliances related to vibration shall be reported in accordance with the site incident reporting procedures and summarized in the register.	Construction phase	Project manager	Maintain records

Table 6 : Social Impact Management Measures

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
D1: Negative perception and/or social tension related to the change of land use or GBVH incident	D1.1: Carry out community consultation on the purpose and benefits of making changes to land use.	Pre-construction	Project manager	Maintain records
	D1.2: Get community buy-in on any change of land use.	Pre-construction	Project manager	Maintain records
	D1.3: Ensure compliance with gender-sensitive Grievance Redress Mechanism process.	Entire construction and operation phase	Project manager	Maintain records
D2: Public nuisance caused by construction/ operation activities	D2.1: Carry out community consultation prior to undertaking activities.	Pre-construction	Project manager	Maintain records

Issue	Control activity (and source)	Action timing	Responsibility	Monitoring & reporting
(e.g. noise, dust etc)	D2.2: Implement appropriate management plans (groundwater, air, EDSCP).	Construction and operation	Site supervisor	Daily and maintain records
	D2.3: Ensure compliance with Grievance Redress Mechanism process.	Entire construction and operation phase	Project manager	Maintain records

6. Standards and Requirements
   Applicable standards and requirements follow:
   1. Undang-undang Nomor 1 tahun 1970 tentang Keselamatan Kerja;
   2. Peraturan Pemerintah Nomor 41 tahun 1999 Tentang Pengendalian Pencemaran Udara;
   3. Peraturan Pemerintah Nomor 82 tahun 2001 Tentang Pengendalian Pencemaran Air;
   4. Peraturan Menteri Kesehatan Nomor 13/MEN/X/2011 Tentang Nilai Ambang Batas Fator Fisika dan Faktor Kimia Di Tempat Kerja;
   5. Peraturan Menteri Kesehatan Nomor 416/Menkes/Per/IX/1990 Tentang Syarat dan Pengawasan Kualitas Air;
   6. Peraturan Menteri Lingkungan Hidup Republik Indonesia Nomor 5 Tahun 2014 Tentang Baku Mutu Air Limbah Sebagaimana Diubah Dalam Peraturan Menteri Negara Lingkungan Hidup dan Kehutanan Republik Indonesia No.P.68/Menlhk/Setjen/Kum.1/8/2016 Tentang Baku Mutu Air Limbah Domestik;
   7. Peraturan Menteri Tenaga Kerja RI Nomor 01/MEN/1980 tentang Keselamatan dan Kesehatan Kerja Pada Konstruksi Bangunan;
   8. Peraturan Menteri Pekerjaan Umum Nomor 09/PRT/M/2008 tentang Pedoman SMK3 Konstruksi Bidang Pekerjaan Umum;
   9. Keputusan Menteri Pekerjaan Umum No. 441/ KPTS/1998 tentang Persyaratan Teknis Bangunan Gedung; dan
   10. Surat Keputusan Bersama Menteri Tenaga Kerja dan Menteri Pekerjaan Umum No. Kep. 174/MEN/1986, dan No. 104/KPTS/1986 tentang K3 Pada Tempat Kegiatan Konstruksi;
   11. Instruksi Menteri PUPR Nomor: 02/IN/M/2020 tentang Protokol Pencegahan Penyebaran Corona Virus Desease 2019 (COVID 19) dalam Penyelenggaraan Jasa Konstruksi;
   12. Peraturan Pemerintah RI Nomor 50 Tahun 2012 Tentang Penerapan Sistem Manajemen Keselamatan dan Kesehatan Kerja.

1.2.2. Access Entrances And Exits

a. Work access is the area of the project office, manufacturing area, work area and access / path connecting all three. Planned and prepared before use.

b. There are entrances and exits, both for routine and emergency in the project office and well maintained.
c. There are boundaries or warning signs or fences that give marks to the work area of the project office, fabrication of the field work area and lane / access links to the public areas of the community.
d. Roads and trajectories for workers are given borders and safety and clear warning signs, especially those that intersect with Construction Workers and or the general public.

1.2.3. Project Safety Fence, Barrier, Barricades

Falling from height is the main cause of cases killed in construction. Contractor must make every effort / work done away from the incident.

As a general requirement, when working at locations higher than 2 meters, protection from falls must be provided. Open sides or edges of workplaces or roads must be barricaded with materials that can withstand the physical strength of 100 kg, foot boards and safety nets must also be provided.

Tubular pipe is the only material that is allowed to be used as a barricade and fence. The perimeter is closed with a warning signage on it. barricade and fence was made before the construction activities were carried out. barricade and fence was built with the aim of ensuring work security within the project environment, including the safety of building materials and work tools contained in it.

1.2.4. Protection of existing buildings and the surrounding environment

Contractor is responsible for carrying out the protection of third parties and security oversight in relation to work.

Contractor will provide the necessary protection to prevent damage or loss from:
a. All work and people who may have an interest in work.
b. All work and materials and equipment must be placed safely under the supervision of Contractor or one of the Sub-Contractor.
c. Work property or that borders with work.
d. All property belonging to other people or third parties around the work location.

Contractor must comply with all applicable laws, regulations and provisions concerning the safety of people, property and protect against damage, injury or loss. Contractor is required to repair and compensate for losses, if it turns out to be negligent with the obligations stated above.

1.2.5. Daily cleaning, Cleaning of the project site, disposal of remaining material out of the Project site.

Contractor must, guarantee that full attention will be paid to the cleanliness of the project from day to day, control of environmental cleanliness and

environmental impact and that all provision of facilities and infrastructure for prevention related to environmental pollution and protection of land and surrounding waterways by taking into account:

1. Materials, scattered materials must be tidied up well before, during work and after working hours.
2. Work tools, other tools used must not obstruct and endanger work access and are stored after working hours are finished.
3. Trash can according to the type of waste and volume that occurs, always cleaned and collected and ready to be transported out of the project.
4. Trash should not be allowed to accumulate, there must be a schedule and routine cleaning
5. Workplaces that are slippery because water, oil, or other substances must be cleaned immediately
6. Everyone must remove the scattered nails, protruding steel / wire, sharp pieces of metal, all of which can be dangerous.
7. To prevent dust pollution during the dry season, Contractor must regularly water the land or gravel haul road and must cover the transport truck with tarpaulin.
8. The amount of material / material available in the field for use today is not excessive, so as not to disturb and endanger work access (the rest is returned to the public warehouse).
9. Waste material, dismantled materials and waste are routinely taken out of the project site with the approval of the Supervisory Board of Directors.

1.2.6. Occupational Health and Safety (OHS)

1.2.6.1. Protocol Prevention Covid-19 In Construction Project

A. Introduction

1. This protocol is intended as a general guide for owner/user/organizer with consultant, contractor, Subcontractor, Vendor/Supplier and Fabrisor, foreman and workers in preventing COVID-19 outbreak in construction project.
2. This protocol is part of the overall policy to realize the safety of construction. Safety of construction is occupational safety and health; Public safety; and safety of the environment in every phase of construction (life cycle of building and infrastructure development).
3. This protocol is valid in construction projects organized by the Government and/or local governments and/or Indonesian State Owned Enterprises (BUMN), as well as private and/or joint investments. Each stakeholder in a construction project can follow up on the implementation of this Protocol in accordance with their respective company policies.

B. Establishment Preventive Task Force Covid-19

1. The owner/user/organizer with consultant Supervisor and/or contractor shall form the COVlD-19 preventive Task force.

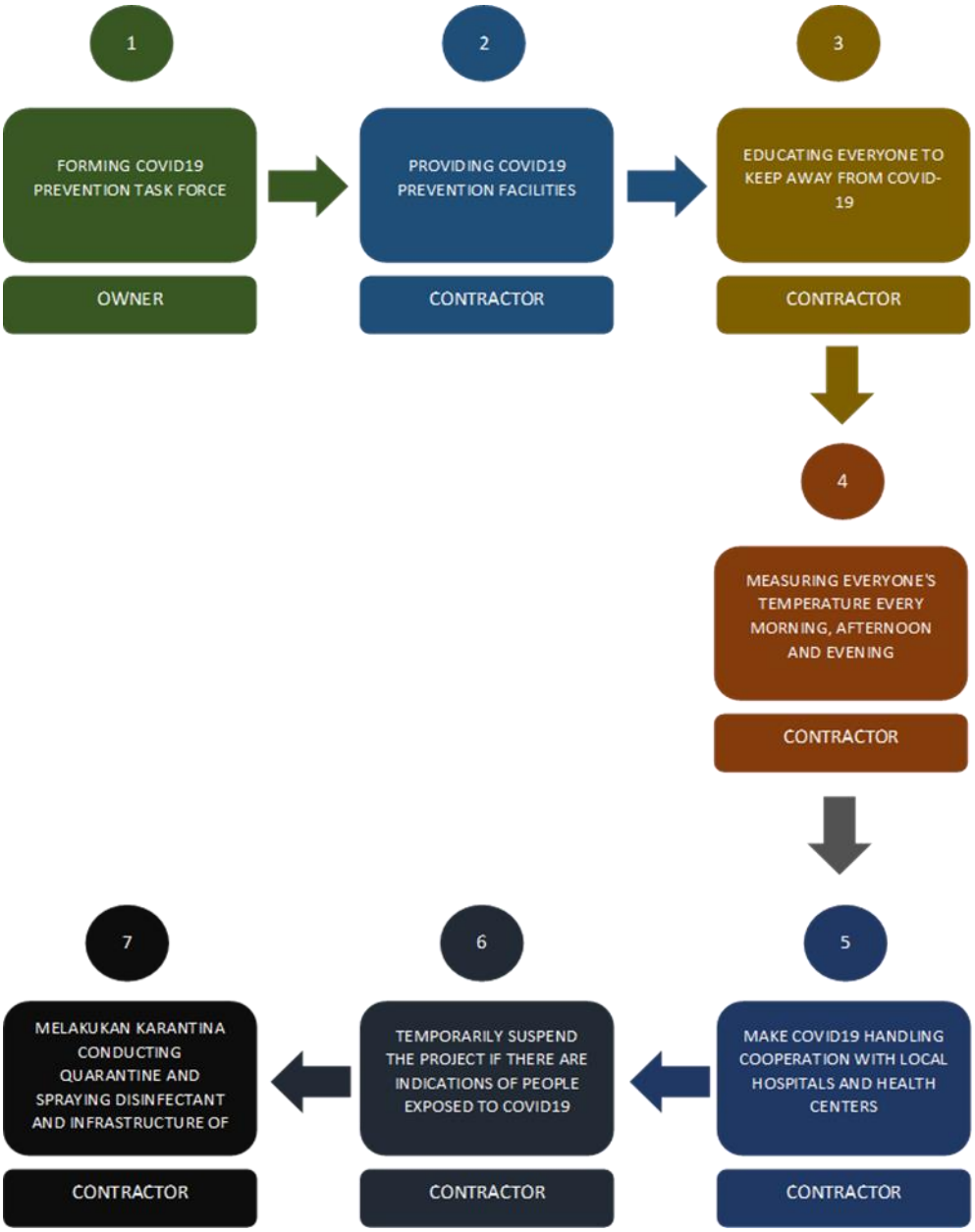
2. The Task force is at least 5 (five) persons consisting of Chairman concurrently member and 4 (four) members representing owner/user/organizer, consultant, contractor, subcontractor, Supplier Vendor.
3. The Task Force shall have the duties, responsibilities and authorities to conduct: (i) socialization, (ii) education, (iii) promotion of techniques and (iv) the method of prevention of COVID19 and (v) examination of potential infected to all persons, whether managers, engineers, architects, employees/staff, foreman, workers and project guests.(vi) identify potential COVID 19 hazards in the site. (vii) Health checks related to the potential for COVID 19 infection of all workers and projet guests monitoring the health conditions of workers and controlling mobilization/demobilization of workers, and (ix) procurement of health facilities in the field.

C. Provision Of Health Facilities In The Site
1. Contractors must provide a clinic room in the site equipped with adequate health facilities, such as: oxygen cylinders, body temperature meters (Thermoscan), blood pressure gauges, medicines, and medical personnel.
2. The contractor shall have the operational cooperation of health protection and Prevention of COVID19 with the hospital and/or public health center with the project site for emergency measures (emergency).
3. Contractors must provide body temperature measuring facilities (thermoscan), handwashing with soap disinfectant (hand sanitizer), tissue, masks in the Office and site projects for managers, engineers, architects, employees/staff, foreman, workers and project guests.

D. Implementation Of Covid19 Prevention In The Site
1. Task Force to install the poster (flyers) both digital and physical about the appeal/COVID19 prevention recommendations, such as handwashing, wearing masks, to be deployed or installed in strategic places on the Project site.
2. The Joint Task force of the Medical officer shall provide explanation, recommendation, campaign, promotion of COVID19 prevention technique in each morning (Safety morning talk).
3. 3. Task Force prohibits an ill person with a temperature indication of > 38 degrees Celsius (all managers, engineers, architects, employees/staff, foreman, worker and project guests) come to the project location.
4. The medical officer performs measuring the body temperature to all workers, and employees with the Security Staff and the security personnel every morning, afternoon and afternoon.
5. If found managers, engineers, architects, employees / staff, foremen and workers in the project site are exposed to the COVID19 virus, the Medical Officer assisted by the Project Safety Officer conducts

evacuation and disinfecting spraying at the site, facilities, handles and work equipment.

COVID19 PREVENTION PROTOCOL SCHEME IN CONSTRUCTION PROJECT



1.2.6.2. Risk Control

Potential Danger is something that has the potential for an incident to result in a loss. Risk is combination of possible hazard and likelihood of occurrences The types of accidents that often occur in construction projects are as follows:

a. Fall down
b. Falling object hit
c. Step on, stumble, and bump
d. Pinched and trapped
e. High temperature / flammable contacts

f. Mains contact
g. Contact with hazardous materials (Chemical / Radiation)

For this reason, Contractor is required to carry out a Safety Monitoring Plan by doing the following:

a. Prepare a work plan with work methods and work plan plans that pay attention to:
   - Risks that may arise from each type of work to be performed.
   - Pay attention to the types of accidents that often occur in these activities.
   - The existence of construction equipment that moves.
   - For critical locations or actions that would pose a hazard to workers, Contractor is required to provide an officer who helps alert Workers when doing their work.
b. Contractor is required to provide safety equipment in accordance with the type and location of work to be carried out.
c. If there is work that will cause a spark or source of fire, Contractor is required to provide a standby officer with a Portable Fire Extinguisher.
d. The Safety Monitoring Plan Form must be submitted and signed by the Supervisory Board before the work concerned is carried out.

Jobs that require a Safety Monitoring Plan and a work permit from the Supervisory Board:

a. Working in a confined area, narrow, sewer
b. Work related to maintenance, cleaning, direct contact with the highway that is being used
c. Use dangerous chemicals
d. Use flammable material
e. Use explosive material
f. Work related to electricity
g. Work by diving
h. Install, dismantle, move scaffolding (scaffolding)
i. Move heavy items / objects
j. Demolition work
k. Work outside normal working hours without Supervisor
l. Excavation of more than 2 (two) meters
m. Working at height

1.2.6.3. Worker Facilities

a. Worker beds
   Contractor is required to provide worker beds outside the project site for beds, breaks, changing clothes and safe clothing storage. The size of the beds is quite comfortable for workers equipped with toilets and safe cooking places.
b. Drinking water
   Drinking water is available for workers who meet health standards.
c. Clean water and Toilet

There is a clean water tub of sufficient size to wash hands to maintain cleanliness and an adequate number of toilets for the number of workers available.

d. Cooking place, Worker Canteen.
   Workers' cooking places and canteens are outside the project site. No cooking is permitted at the Construction Project site.
e. First aid.
   Every activity / process of work carried out in the workplace carries the risk of work accidents (mild to severe), various preventive measures are taken so that accidents do not occur. In addition, the skills to perform first aid measures are still needed to deal with the possibility of an accident. Therefore, in every workplace must have a First Aid officer (First Aid), or at least every employee has the skills to do first aid when a work accident or MEDICAL emergencies occur.

1.2.6.4. Personal Protective Equipment (PPE)

Contractor is required to provide Personal Protective Equipment (PPE) for Workers and Guests who come to the project site by providing work safety equipment that serves to prevent and protect Workers and project visitors from possible work accidents. The main PPE that must be provided is protective helmets and safety shoes while other PPE is provided according to the type of work performed. Various types and types of PPE can be:

a. Helmet: Cap / Head protection Protects from falling objects, hard objects colliding, hit by heat and rain;
b. Safety Shoes: Protective feet Protects feet from sharp objects, tripping on hard objects, pressure and punches, wet, slippery and muddy floors, adjusted for the type of danger;
c. Safety Glasses: Glasses / Las Shield Protects from welding rays, glare, flying particles, bounced powder, radiation, dangerous liquid splashes;
d. Earplug: Ear protection / Earmuff Protect from painful sounds for too long, with noise limits above 85 db;
e. Mouth / nose / oxygen masks: Protects against work that uses chemical materials / powders, contaminated air, dust, smoke, insufficient oxygen levels;
f. Gloves / rubber / leather / fabric / plastic: Protect hands from corrosive chemicals, sharp / rough objects, keep materials clean, get electrocuted;
g. Safety belt / harness: Protect from the danger of falling from working height above 2 meters and around the building;
h. Protective Vest with Scotchlight: to help the user visibility at night or in dark places;
i. Life jacket Protect from the danger of falling into the water, drowning, unable to swim

All PPE equipment used meets SNI standards. During work, workers must use suitable work clothes, shirts with sleeves and long pants.

1.2.6.5. Signs and Alerts

Safety Sign / OHS Sign is a visual media in the form of pictogram to be placed in the project area that contains messages so that every Worker always pays attention to aspects of work health and safety.

The function of Safety Sign / OHS Sign is.

a. To find out restrictions or fulfill orders / requests, warnings or to provide information
b. Prevent accidents (signal to danger)
c. Indicates the location of safety and fire fighting equipment
d. Give directions and instructions on emergency procedures.

Contractor is required to provide sufficient Safety Sign / OHS Sign for the above matters

1.2.6.6. Heavy Equipment / Mechanical Operation

General mechanical heavy equipment such as: excavators, motor graders, bulldozers, wheel loaders, vibro rollers, pneumatic tire rollers, dump trucks, Concrete Molen, Concrete Pump etc.

Contractor shall provide and pay attention to the following matters:

a. Feasibility of Mechanical Heavy Equipment, there is an inspection and is declared by a competent Mechanic / officer and the equipment operated by the operator has competence (SIO) that is still valid;
b. Every preparation for operation of the equipment must be carried out without a load test first, which involves safety: brakes, gears, steering, rearview mirror, arm movements, alarms and backward signs, turn signal if everything is good then it can operate;
c. If working on a crossing road where there are other road users, the Operator must work / move in the same direction (not opposite) so as not to be surprised, shocked, unable to suspect the movement;
d. If working in a location where there are other activities, the operator must be assisted by 2 officers who give the signal of assistance and observers of the surrounding activities;
e. When operation is complete, the tool position must be safe: neutral gear, bucket lowered, cab and panel compartments closed, engine off, parked at the designated location. (within a safe distance from road users and activities in the environment);
f. Installed a warning sign not to rest in and around the equipment for the operator or other workers;
g. Contractor must not use vehicles that emit very loud noise (noise), and in residential areas a noise disturbance must be installed and maintained always in good condition on all equipment with motorcycles, under Contractor's control;
h. Contractor must also avoid using noisy heavy equipment in certain areas until late at night or in vulnerable areas such as near Settlements, Offices and others.

1.2.6.7. Fire Prevention

Fire is an event that can cause loss to life, production equipment, production processes and work environment pollution.

Especially in the event of a large fire that can paralyze or even stop the construction process, so this gives a very big loss.

To prevent this contractor is obliged to make efforts to extinguish the fire, such as:

a. Control of every form of energy;
b. Provision of detection facilities, alarms, fire extinguishers and evacuation facilities
c. Control of the spread of smoke, heat and gas;
d. Establishment of fire suppression units at workplaces;
e. Conducting regular fire fighting exercises and drills;
f. Have a fire emergency management plan book, for workplaces employing more than 50 (fifty) workers and or workplaces with the potential for moderate and severe fire hazards.

Contractor shall train its workers in efforts to control each form of energy, such as:

a. Identifying all energy sources in the workplace / company in the form of equipment, materials, processes, work methods and the environment that can cause a fire process (heating, sparks, flames or explosions);
b. Conduct assessment and control of fire risk based on laws and regulations or applicable technical standards;
c. The project location is not allowed at all to smoke.

1.3. SUPERVISION

Supervision for this work will be carried out by a Supervisory Consultant (PT Arkonin EMP jv PT Dacrea Design and Engineering Consultant). This Supervisory Consultant is assigned by Project Owner which is held by PETRA UNDP. The Supervisory Consultant task are supervising the implementation of the work and the skills of Contractor who carry out the work. Duties and orders can be given in oral and written and its contained in a formal daily report. Supervisor does not have the authority to exempt Contractor from the obligations specified in the employment agreement (Contract). Supervisor has to refuse the execution of a job or the use of materials that do not meet the conditions in the contract documents, and reduce the power of the giver of the task not to order the demolition.

1.4. WORK PLAN

Within no later than 10 (ten) days after being appointed by Project Owner, Contractor must immediately send a work plan to be approved by Project Owner, including:

- The time schedule and sequence of work implementation and the methods that will be used in carrying out the work, to be discussed and agreed by Project Owner.

- Full details of the organizational structure and personnel list that will be assigned in the field, for being verified and approved by Project Owner accordance to personnel as specified in Contractor's bid.
- Personal schedule that is arranged in a table and in diagram form.
- Material procurement schedule
- Equipment procurement schedule
- Procedure for implementation both technically and administratively.

With the approval of the work plan or other information by Project Owner, it does not mean exempting Contractor from a duty of responsibility stated in the contract.

1.5. REPORTS

A. Contractor are required to make and submit periodically reports of the implementation of the work in writing to the Supervisory Consultant.

B. In the daily report, note the following:
   - Progress of work every day, materials and equipment that come, the number of workers who work, and weather conditions on that day.
   - Duties and orders given by the Supervisory Consultant.
   - Changes in the work carried out, either additional work or less work. Daily report has signatures from Contractor and Supervisor and the report will be used as the next report file.

C. In the weekly report, note the following:
   - Weekly reports are based on current field conditions. Contractor reports only physical progress. This weekly report format follows the bill of quantity format for the progress of work items. The contents of this report include
   - Bill of Quantity volume and progress in each job
   - Volume done (Last week, this week and total)
   - Progress/Weight in percent for each work item (Last week, current week and total)
   - Cumulative value of progress this week (in percent)
   - Complete a collection of daily reports in one week. Weekly reporting looks at the physical development of the building.

D. In the monthly report, note the following:
   It is the complete project report consisting of some important information which is summarized in one book. Following are the contents of the monthly report:
   - Project data, stating the name of the project, package name, project location, contract number, contract date, time of implementation, time of work handover, project location, and so on.
   - End of month progress report
   - Minutes of meetings
   - List of staff in the project
   - List of used and number of tools.
   - Photo / video documentation of the work

   The three types of reports commonly used on projects always contain the progress of the field can the owner can do the work done by Contractor. The

report must be completed with photos that are dated and made in 5 (five) copies.

1.6. RISK OF INCREASING MATERIAL PRICES AND WAGES

a. If during the implementation of the work there is a price increase, Contractor cannot submit a request for a review and calculation of the additional price or demand an additional fee. Contractor is deemed to have taken into account the factors mentioned above when submitting the bid price.
b. Price increases should not be a reason to degrade or reduce the quality of work, reduce the volume of work, and / or slow down the time to complete the work as specified in the contract.
c. If there is an increase in prices due to government policy in monetary or other fields, it will be determined later by Project Owner.

1.7. OTHER GENERAL REQUIREMENTS

The work that must be carried out by Contractor is:
a. Procurement, security and supervision of all kinds of equipment, tools and materials used in the implementation.
b. Installation, testing and maintenance of all materials and equipment within the specified time limit.
c. Workforce deployment according to needs, expertise and skills.
d. Willing to work overtime if working conditions require it.

1.8. SIZES AND NOTATIONS

a. All sizes in architectural, structural, mechanical and electrical drawings are finished sizes, unless there are other provisions that will be explained later.
b. If there are any differences or deviations in size and notation, it must be confirmed by Design Consultant
c. Complete medical Buildings CONSTRUCTION DRAWINGS (architecture, structure, mechanical and electrical, and technical specifications) can be obtained through Supervisor with the knowledge of Project Owner.
d. Contractor must examine and understand the entire process and technical work so that they can adjust the program and work in an integrated and simultaneous manner.
e. Contractor is required to make SHOP DRAWINGS made in 3 (three) copies; 1 (one) set for Contractor, 1 (one) set for Project Owner and 1 (one) set for Supervisor.
f. During the execution of the work, Contractor is obliged to put a mark of a certain color in the image of the parts of the building that have been carried out, including if there are changes from the original drawing.
g. Before each part of the work is carried out, Contractor is required to submit a SHOP DRAWING and must obtain the approval of Project Owner assisted by a Supervisory Consultant.

h. If there is a difference between SHOP DRAWINGS and technical requirements / specifications, then the technical requirements and specifications apply, unless specified otherwise by Project Owner/ Design Consultant / Supervisor.
i. If there are hesitance of the drawings, Contractor must submit to Project Owner/ Supervisor at least 1 (one) week before being implemented.
j. The difference cannot be used as an excuse by Contractor to make a claim on the execution time

1.9. WORK SITE FACILITIES

This work includes:
a. Provision of water and electricity for work.
b. Water for work must be provided by Contractor by making pump wells on the project site or supplied from outside.
c. Water must be clean, free of odors, mud, oil and other damaging chemicals.
d. The water supply must be in accordance with the instructions and approval of the service user.
e. The use of diesel power plants is only permitted temporarily with the approval of the service user.
f. Work on providing fire extinguishers.

1.10. PREPARATION WORKS

A. Scope or Work

The work in question includes:
1. Clearing work before implementation
2. Existing installation protection works
3. Work on making the Basic Pillar (Bench Mark)
4. Peil determination work P 0.00 e. Tread measurement
5. And / or as stated in the Working Image

B. Implementation Requirements

1. Clearing work before implementation
   This work includes clearing the project area of all impurities and rubbish both organic and inorganic waste which will later disrupt and / or reduce the quality of work on it.
2. Protection work against existing installations
   1) This work includes the protection of existing installations that are inside the Project Site and declared by Project Owner/ Design Consultant to still function. In this case Contractor must maintain it from interference / defects.
   2) If the existing installation path that is still functioning must be moved, Contractor must perform this work in accordance with the written decision of Project Owner/ Design Consultant.
3. Making Basic Stake (Bench Mark)
   1) The location of the stake is determined by Project Owner

2) Basic stake monument is made of reinforced concrete material with a 20 x 20 cm cross section, firmly embedded into the soil as deep as 1,00 m with the part that appears above the soil surface sufficiently to facilitate further measurement.
3) Basic stake is made permanent, irreversible, clearly marked and maintained intact until written instructions are provided from Project Owner to dismantle it

C. Work Determination of Basic Building Peil or P 0.00

a. P 0.00 Architectural finishing is the main floor leveling / peil with bench mark reference made by Design Consultant at the site measurement stage.
b. The measuring board / bouwplank is made of wood with a thickness of 3 cm and a width of 15 cm, straight and shaved flat on the top side. Benchmarks are mounted on wooden stakes 5/7 which are 1.50 m apart from each other so that they cannot be moved or changed.
c. The height of the top of the measuring board must be the same as the other and / or flat waterpass, unless otherwise desired by Project Owner/ Design Consultant.
d. After completing the installation of the benchmarks, Contractor must report to Project Owner for approval.

D. Site Survey

a. Contractor are required to carry out measurements and depictions of the construction site accompanied by information about peil elevation, the location of existing buildings, the location of land boundaries using optical devices and have been verified by the relevant parties.
b. Any discrepancies that might occur between the drawings and the actual situation on the ground must be reported immediately to Project Owner/ Supervisor to be asked for a decision.
c. Determination of altitude points and angles is only done with T2 type waterpass / theodolite devices.
d. Contractor must provide T2/Waterpass type Theodolites along with officers who serve them for the purpose of examining Project Owner / Supervisor.
e. Right angle measurements using prisms or threads in phytagorean triangles are only allowed for small parts that have been approved by Project Owner/ Supervisor.
f. Existing and still functioning installations must be clearly marked and protected from damage that might occur as a result of this project work, for that it must be included in the measurement drawings.
g. Contractor are responsible for any damage caused by work that has been done.
h. School Buildings site measurement images must obtain approval from Project Owner / Supervisor include:
   1) Coordinate system, according to the provisions of the picture.
   2) Peil each vertex coordinates and transition with a height interval of 25 cm.
   3) Planned Work Camp location, place to store open materials, place to store closed materials, water sources, and toilets.Planned Work Camp location, place to store open materials, place to store closed materials, water sources, and toilets.

1.11. TRAINING ON OPERATION AND MAINTENANCE

The Contractor shall provide Training on operation and maintenance to the Employer's personnel and the Employer's maintenance contractors in all aspects of the Equipment. These aspects shall include Hardware and Software operation and maintenance.

The Contractor shall submit (4) four sets of Operation and Maintenance Manual at the time of training. The Manual shall be compiled on paper of A4 size and bound in hard cover and appropriately labeled. Information shall be organized in a neat and concise manner. If the Operation and Maintenance Manual is found to be inaccurate or inadequate during the execution of the work or during defects liability period, the Contractor shall make the necessary corrections and furnish supplements. All amendments shall be made and amended copies resubmitted by the Contractor at no cost to the Owner.

The manual shall include the following:

a) A brief description of the project.
b) A general description of the operation of the project. The Instruction Manuals shall describe the equipment/system as a whole and shall give a step by step procedure for any operation likely to be carried out during the life of the equipment / system, including operation and maintenance.
c) A separate section of the Manual shall be devoted to each size and type of Plant and/or equipment/system. It shall contain a detailed description of its construction and operation and shall include all relevant pamphlets. Electrical Plant and/or equipment shall be described in operation step by step giving the complete sequence of operation. The detailed sections of the Manual, if necessary, shall contain further maintenance instructions and fault location charts.
d) Drawings of single line diagram of the electrical control circuits and all the relevant wiring diagrams shall be included. Every control circuit single line diagram must be accompanied by the circuit description.
e) Detailed description of all controls and display and their functional role in systems operations.
f) Procedures which affect system and personnel safety shall be specifically identified.
g) All emergency procedures related to Plant and/or equipment, power failure, alarm, rescue operation, etc.
h) Preventive maintenance schedule to indicate the inspection required at regular intervals, the inspection procedure, the routine cleaning and lubricating operations, the regular safety checks and similar steps.
i) General trouble-shooting guide to assist maintenance staff in rapid analysis band correction of malfunctions.
j) Plant and/or Equipment and Spare Part Schedule a complete list of materials, Plant and/or equipment and spare parts showing quantity, location, make, type, rating, addresses and telephone numbers of manufacturers, suppliers and local agents, etc.

1.12. TECHNICAL SUPPORT REQUIREMENTS

The Contractor shall provide technical support & advice with respect to the operation and maintenance of the Equipment in accordance with the Specifications during the Deffects Liability Period.

The Contractor shall replace any operational part of the Equipment with the latest equivalent product at no charge to the Employer if the operational part of the Equipment is made obsolete with absence of technical support and spare parts and the Contractor shall ensure that the replacement product shall inter-operate seamlessly with any existing equipment.

1.13. COMMISIONING TEST

The Contractor shall implement all quality control activities necessary to identify and correct deficiencies. It should be noted that although the installation activity will be under surveillance by the Employer, this surveillance is not intended to supplement the Contractor's quality control. Nevertheless, the Employer reserves the right to reject the Equipment and/or Works or performance deemed by the Employer to be in non-compliance with the Specifications.

The Contractor shall be responsible for all necessary materials, works, labour required to carry out the works including testing and commissioning of all newly installed systems.

The Contractor shall ensure that commissioning and Provisional Acceptance Test are effectively implemented so that prior to operation, the Equipment has been shown to be capable of meeting the requirements of the Contract including that for safety and reliability.

The Contractor shall set-up a systematic and safe procedure for progressive turning on of power supplies for testing and commissioning purposes before practical completion. They shall be jointly responsible of the whole electrical installation until it is handed over to the Employer.

The Contractor shall notify the Architect / M & E Engineer in writing of his programme to test and commission the equipment and systems at least seven (7) days before actual execution.

The Contractor shall prepare and provide printed testing and commissioning record forms of approved format. The Contractor shall submit two (2) copies of a written report on the results of test, etc within seven (7) days of completion of such test, irrespective of test results.

The Contractor shall deploy on a full time basis for two (2) months after the practical completion date, one supervisor or equal to attend to complaints relating to malfunctions, overloads, tripping, unbalance and to readjust where necessary to suit the requirements of space occupants.

1.14. WARRANTY

The Contractor shall provide a twelve (12) months defects liability period. The Works to be tendered shall also include supply, delivery, installation, testing, commissioning and thereafter a twelve (12) months Warranty & Maintenance

Period for the said system free of cost to the Employer. The Contractor must comply to the Response Time and Down Time during the maintenance of the system during Defects Liability Period. The cost of such maintenance is deemed to be included in the tender price.

The Contractor shall provide the following warranties and those specify in the Technical Specifications against all manufacturing faults, improper and poor design, defective materials, components or parts, poor workmanship and performance, etc. All warranties shall commence only after the defects liability period.

In every case where the Specifications require the Contractor's Specialist to co-warrant the works or materials to be executed or supplied under the Contract, such Specialist, subject to such other requirements as may be prescribed in the Specifications, may only be employed by the Contractor with Supervisor prior written approval, and the Supervisor will approve such employment if the Specialist gives his written undertaking to execute the Deed of Warranty. If such written undertaking is not given, then the Contractor shall appoint an alternative Specialist willing to give the written undertaking. The employment of any Specialist who refuses to give his written undertaking will not be recognised by the Supervisor, and no Specialist may commence any work or supply any materials before his written undertaking is given.

Any defective part shall be replaced free of charge during the warranty period. This warranty shall also apply to parts with life span of less than the warrant period under normal use. Replacement of such parts shall be made free of charge during the warranty, unless due to vandalism as determined by the supervisor.

The warranty is to be given by the Contractor to the Supervisor in writing on Supervisor format of Warranty and is to be executed under seal by the Contractor. All costs including stamp fee incurred therein shall be borne by the Contractor.

CHAPTER II
TECHNICAL REQUIREMENTS

2.1. GENERAL TECHNICAL REQUIREMENTS FOR IMPLEMENTATION

2.2.1. TECHNICAL REGULATIONS

1. some rules that are used for this work include:
   a. Indonesia Industrial Standard (SNI); All SNI related with the quality of building construction and Calculation & Construction Methode;
      - Persyaratan Beton struktural Untuk Bangunan Gedung SNI 03-2847-2013)
      - Peraturan Konstuksi Kayu Indonesia (SNI Kayu 2002)
      - Persyaratan Umum Instalasi Listrik 2011 (PUIL 2011)

   b. All Standards / Codes/ Guidelines that can be implemented on specific works which issued by Institutions / Professional Associations / Producers Associations / National Testing Institutions or from other countries, to the extent that these are deemed relevant;
      - Permenaker No. 12 tahun 2015 tentang Keselamatan Instalasi dalam Bangunan.
      - Peraturan Menteri Lingkungan Hidup No. 5 tahun 2014. About waste water quality standards
      - Standards and rules or conditions that apply specifically to Local Electric Providers Operators (PLN).

   c. Other standards such as: IEC, JIS, BS, VDE, AVE, AS, DIN, ASTM, ISO and others as long as they do not conflict with the standards and regulations that apply in Indonesia
      - American Society for Testing Materials (ASTM);
      - American Concrete Institute-ACI 318-89;
      - American International Steel Construction-AISC;
      - Japan International Standard (JIS).

2. If it turns out that in the work plan and these requirements there are contradictions/abnormalities/deviations from the regulations as stated in paragraph (1) above, then Contractor shall use requirements stated in those standards.

2.2.2. USAGE SIZE

1. Contractor is still responsible for keeping all the provisions contained in the work plan and the terms and working drawings with additions and changes.
2. Contractor is obliged to check the veracity of the overall measures and parts and immediately notify Supervisor of any discrepancies found in the work plan and the terms and working drawings as well as in the written approval of the supervisor.

3. Taking the wrong measurements in implementation, in any case the responsibility of Contractor, therefore Contractor is required to conduct a thorough inspection of the pictures and documents that exist.

2.2.3. SITE INFORMATION

1. Before starting the work, Contractor must really understand the conditions / conditions of the site or other things that might affect the implementation of the work and must have taken into account all the consequences.
2. Contractor must pay special attention to the regulations on the location of the workplace, material placement, security and continuity of operations during the work.
3. Contractor must study carefully all parts of the drawings, RKS and agenda in the bidding document, in order to adjust to the field conditions so that the work can be completed properly.

2.2.4. CLEANLINESS AND DICIPLINE

1. Hoarding of materials in warehouses or in the yards must be arranged in such a way as not to interfere safety of work / public and also to facilitate the inspection and research of materials by Supervisor and Project Owners.
2. Contractor are required to make urinals and toilets for workers in certain places approved by Supervisor to ensure cleanliness and health in the project.
3. Implementing workers are not permitted to:
   a. Stay overnight at a place of work except with the permission of a supervisor / Project Owner.
   b. Cook at work except with the permission of a supervisor.
   c. Bring in food, drink, cigarette vendors, etc. at work.
   d. Exiting the work location freely.
4. Other regulations regarding order will be issued by Supervisor / Project Owner at the time of implementation.

2.2.5. EXAMINATION AND PROVISION OF MATERIALS / GOODS

1. If the TECHNICAL SPECIFICATIONS mentions the name and manufacturer of a material and goods, then in this case it is intended to show the quality level of the materials and goods used.
2. Every change of name and manufacturer of a material and goods must be approved by Design Consultant / Project Owner and if not specified in the TECHNICAL SPECIFICATIONS and working drawings, the materials and goods are cultivated and provided by the contractor who must obtain prior approval from Supervisor Project Owner.
3. Examples of materials and goods to be used in the work must be immediately provided at Contractor's expense, after being approved by Supervisor Project Owner, it must be assumed that the materials and goods will be used in the execution of the work later.

4. Examples of said materials and goods are kept by Supervisor Project Owner to be used as a basis for rejection if it turns out that the materials and goods used are not suitable according to their quality or nature.
5. In submitting a bid price, Contractor must have entered all the necessary costs for testing various materials and goods. Without this, Contractor remains responsible for the costs of testing materials and goods that do not meet the requirements of Supervisor / Project Owner's order

2.2.6. DIFFERENCES IN DOCUMENTS

1. If there are differences between the construction drawings and TECHNICAL SPECIFICATIONS, Contractor must ask Supervisor in writing and Contractor must comply with the decision.
2. The measurements contained in the largest and final drawings are applicable and the size with numbers is what should be followed rather than the size with the scale of the drawings, but if possible this size should be taken from the finished work.
3. If there are things mentioned in construction drawings, technical specifications or documents, which are different or contradictory, then this must be interpreted not to eliminate one to another to emphasize the problem. If this happens then it will be taken as a benchmark that has a technical weight or has a high cost weight.
4. If there is a difference between:
    a. Architectural drawings with structural drawings, then what is used as a handle in functional measurements is architectural drawings, while for the type and quality of materials and goods are structural drawings.
    b. Structural drawings with mechanical drawings, then what is used as a handle in measuring the quality and type of material is mechanical drawings.
    c. Architectural drawings with electrical drawings, then what is used as a handle in functional measurements is architectural drawings, while for the size and quality of materials are electrical drawings.

2.2.7. SHOP DRAWING

1. If there are deficiencies in the explanation, in the construction drawing, or additional pictures / detailed drawings are needed or to enable Contractor to carry out and complete the work in accordance with the provisions, Contractor must make these shop drawings in 3 (three) copies and the cost of making the drawings becomes Implementing responsibilities. Work based on these shop drawings can only be carried out after obtaining approval from the supervisor.
2. Working drawings only change if instructed in writing by Project Owner, following Design Consultant’s explanation and consideration.
3. Changes to this plan must be drawn up in accordance with what was ordered by Project Owner, which clearly shows the difference between the shop drawings and the plan changes.

4. Shop drawing must be submitted to Supervisor for approval before being implemented.

2.2.8. ASBUILT DRAWING

1. All that is not yet included in the work drawings either due to irregularities, changes in the order of Project Owner / Supervisor, Contractor must make Asbuilt Drawings that are in accordance with what has been done, which clearly shows the difference between the work drawings and the work carried out.
2. Asbuilt Drawings must be submitted in the following 3 (three) copies (original image) for which the manufacturing costs are borne by Contractor.

CHAPTER III
TERMS OF PREPARATION WORKS

3.1. SCOPE OF WORK

1. This work includes the supply, utilization of labor, materials, equipment and tools needed to carry out the construction of this project.
2. This section covers cleaning up locations, installing bowplanks, making Keet Directors and Material Warehouses, supplying working water and work lighting, as well as mobilization and demobilization.

3.2. SITE CLEARING

Before starting the work of building a new building, Contractor must clean and clear the location from plants and other objects that are considered to be able to interfere with the construction.

3.3. WORK EQUIPMENT, MOBILIZATION, AND DEMOBILIZATION

1. Contractor must prepare and procure work equipment and auxiliary equipment that will be used at the project site in accordance with the scope of work and take into account all transportation costs.
2. Contractor must maintain order and smoothness during the journey of heavy equipment that uses public roads so as not to disturb traffic.
3. Supervisor / Project Owner has the right to order to add equipment or reject equipment that is not appropriate or does not meet the requirements.
4. When the work has been completed, Contractor is obliged to immediately demobilize all the equipment, repair the damage caused and clean up all the dirt/debris that caused by the process of mobilization/demobilization.
5. In addition to providing the necessary tools as intended in paragraph (1), Contractor must provide supporting tools so that they can work in any condition, such as: tents for working on rainy days, scaffolding on the sides outside buildings or other places that need it, as well as Occupational Health and Safety (OHS) equipment and others.
6. Contractor must demobilize after the contract is completed. As for the demobilisation activities carried out, including the dismantling of all installation and construction equipment, all the excess materials, all based on the approval of the supervision consultant.

3.4. SITE SURVEY

1. Contractor must have calculated the costs for site survey and researching the size of the building layout or height (Bouwplank), including the provision of Back Mark or Line Offset Mark, on each floor of the building.
2. The site survey results must be reported to Supervisor so that they can be determined as guidelines or references in carrying out the work in accordance with the design drawings and technical requirements.

3.5. WORKING WATER FACILITIES AND LIGHTING

1. For the sake of carrying out the work during the project, Contractor must calculate the cost of providing clean water for working water, drinking water for workers and bathroom water.
2. The water in question is clean, whether coming from **Drinking Water Company** or water sources, as well as the procurement and installation of water distribution pipes for the purpose of carrying out work and for the purposes of the keet directors, Contractor offices, bathrooms / toilets or other places deemed necessary.
3. Contractor must also provide a source of electricity for the purposes of carrying out the work, the needs of the Project Supervisor and lighting of the project at night as security during the project lasts 24 hours a day.
4. Procurement of lighting can be obtained from the **State Electricity Company** connection or by procuring a Generator Set, and all permits for such work are the responsibility of Contractor. The procurement of lighting facilities includes the procurement and installation of installations and armature, electrical sockets and switches / panels

3.6. WORK CAMP FOR WORKER

1. Contractor must make work camp and building a place for rest and place of prayer for Contractor workers.
2. Work station is a building with an area that is sufficient for a place to work for a worker / executive worker and has a fairly good condition, protected from the influence of weather that can hamper the smooth work.

3.7. PROJECT SECURITY

1. Contractor must guarantee the safety of the project, both for Contractor belongings, Supervisor project manager, as well as maintaining the integrity of the existing buildings from the disruption of the executing workers or damage due to work implementation.
2. Contractor must place security officers 24 hours a day, divided into 3 (three) shifts, and must always carry out security checks every day after finishing work.
3. To control and maintain the working order of its workers, each Contractor worker is required to wear a special identification that must be worn on the part of the body that is easily visible to security personnel.
4. Contractor Workers are not permitted to stay overnight on site unless security officers are on duty at night.

3.8. PROJECT OFFICE (KEET DIRECTORS) AND ITS EQUIPMENT

1. Contractor must provide a project management office complete with equipment / furniture and other work facilities needed for project implementation as follows:
   a. 3 (three) sets of work tables complete with chairs
   b. Meeting table for 10 people
   c. Computer and printer devices
   d. 2 pieces Calculator (Minimum 12 digits)
   e. 1 (one) metal file cabinet locked

2. Contractor must also provide the project manager's working tools in the field, as follows:
   a. Safety shoes that are resistant to nails, safety helmets and raincoats of 5 sets each
   b. 2 (two) 5 meters roll meter tape
   c. Caliper / schuifmaat and steel brackets

3. The Project Supervisor / Project Management Office, Implementing Office and Warehouse, the working water pump is a supporting facility in the implementation of the project and is used when finished work.

3.9. OFFICE AND IMPLEMENTATION OF WAREHOUSE

1. Contractor must establish an office on the project site where the executive representative works, equipped with the necessary office equipment.
2. Contractor must also provide a warehouse with an area sufficient to store building materials and equipment to avoid weather disturbances and theft.
3. Placement of offices and executive buildings must be arranged in such a way that they are easy to reach and do not hamper the implementation of work.

3.10. SUPPLYING FOR PROJECT FACILITIES

Contractor must also calculate the consumption costs for meetings with Project Owner or his representative and the guest assigners who are interested in the project.

3.11. FIRE EXTINGUISHERS

1. During the execution of the work, Contractor must provide a fire extinguisher in the form of a fire extinguisher that can be used to extinguish the fire caused by electricity, oil and gas with a capacity of 7 kg.
2. Fire extinguisher units must be placed on each floor of the building with a radius of approximately 50 meters, inside the Project Supervisor and other places that require them.
3. Fire extinguisher units must be inside the board of directors and other places that require them.

3.12. ENTRY, TEMPORARY ROAD

1. If deemed necessary, in accordance with the conditions and situation of the location, Contractor must have taken into account the construction of a temporary entrance and / or temporary work bridge approved by the supervisor.
2. The construction of a temporary entrance or bridge must follow the rules and all permits relating to the work are the responsibility of Contractor.
3. Contractor must avoid damage to existing access facilities by managing the vehicle routes used and limiting / dividing the load.
4. Damage to the road or other objects caused by the work of Contractor, the mobilization of equipment and the input of materials will be the responsibility of Contractor and must be repaired immediately.

3.13. CONTRUCTION - RELATED PERMITS

1. Contractor must take care of and calculate costs for making permits that are needed and related to the implementation of work, including: lighting permits, material removal permits, disposal permits, collection permits, route and road use permits, building use permits and building permits others that are required in accordance with local regulations / regulations.
2. Cost of Building Permit (IMB), is the responsibility of the local Regional Government.
3. Delay in the execution of work caused by the aforementioned paragraph (1) above becomes the responsibility of Contractor.

3.14. DOCUMENTATION

1. Contractor must calculate the cost of making the documentation and sending it to Project Owner and other parties as needed.
2. What is meant by work documentation is:
   Project photos/video from 0% to 100%, color, minimum postcard size, for the purpose of monthly reports made by a Supervisory Consultant, and 5 (five) sets of albums that must be submitted at the handover of the work for the first time.

CHAPTER IV
SOIL WORKS

4.1. GENERAL PROVISIONS

1. Before carrying out earthworks, Contractor must clear the area to be worked from the existing obstacles in the work area,
2. Contractor must guarantee the integrity of the goods / objects or buildings that have been completed from any kind of damage and take care not to disturb the measurement stake or other signs.
3. Repair damage to goods / objects or buildings that must be maintained due to the implementation of the work will be the responsibility of Contractor.
4. Contractor must carry out site survey in advance and report it to the supervisor, and ask for permission to start work.

4.2. SCOPE OF WORK

The scope of work includes excavation of land, excavation and compaction.

4.3. EXCAVATION

1. **Scope of Work**
   a. This work includes the provision of labor, materials / equipment and assistive devices needed to carry out this work properly.
   b. This work includes all foundation excavation work for sub-structural work, as stated / shown in the drawings or in accordance with the instructions of Project Owner/ Supervisor, including excavation work for septic tanks, channels and other works according to the drawings.

2. **Terms of Implementation**
   a. The soil excavation for septic tank, water channel, foundation and other excavations must be in accordance with the peil listed in the drawing.
   b. If it turns out that the multiplication exceeds a predetermined depth, Contractor must refill the area with similar material for the area concerned.
   c. Contractor must keep the foundation pits free from landslides to the left and right (if necessary protected by soil retaining equipment and free from standing water) so that foundation work can be carried out properly according to structural specifications. Pumping, if deemed necessary must be done carefully so as not to disturb the existing building structure.
   d. Reclamation / refilling of former excavation, carried out layer by layer, and pounded until solid as required in the "Fill and Compaction Work"

4.4. SOLID SAND FILL WORK

This work includes the supply of labor, materials, equipment and assistive devices needed in carrying out this work to obtain good work results.

1. Sand Material Requirements
   a. The sand used must consist of clean, sharp and hard grains, free of mud, clay, etc., and consistent with SNI 03-2847-2002.
   b. Clean water does not contain oil, alkaline acid and other organic materials for splash water, and meets the requirements specified in NI-3 article 10. If deemed necessary, Project Owner/ Supervisor can ask Contractor, so that the water used for this purpose is examined at an official and valid material inspection laboratory, at Contractor's expense.
   c. Control of all work must meet the conditions specified above and must be with the approval of Project Owner / Supervisor.

2. Terms of Implementation
   a. Fill sand layer is doing layer by layer maximum of each layer of 5 cm to reach the solid thickness required in the drawing.
   b. Each layer of filled sand must be leveled, doused with water and / or compacted by a compactor approved by Project Owner/ Supervisor. Compaction is carried out until it reaches no less than 95% of the optimum density of laboratory results.
   c. A minimum of 10 cm thick backfill sand is solid or as shown in the figure. drawing.
   d. The layer of work above it, can be done if it has been approved by Project Owner/ Supervisor.

4.5. FILL AND COMPACTION

1. Scope of Work
   This work includes the provision of labor, materials, equipment, and other assistive devices needed to carry out this work properly. This work includes all back-down work for sub-structural work shown in the drawings or as directed by Project Owner/ Supervisor.

2. Material Requirements
   The material for the stockpile uses used excavated material or is imported from other locations and must meet the following requirements:
   a. The type of soil is Silty Clay
   b. The soil must be clean and not contain roots, dirt and other organic material.
   c. Does not contain stones larger than 10 cm.
   d. The debris from the brick wall, concrete is not allowed to be used at all.
   e. Project Owner / Supervisor have the right to refuse material that does not meet the above requirements.

3. Terms of Implementation
   a. The filling should be checked before it is approved by the Supervisor.
   b. The filling must be done layer by layer with a max thickness of each layer of 20 cm and compacted until it reaches the Optimum Density, and reaches the planned ground level peil.
   c. At the location of the enclosed, pegs must be given, the height in accordance with the height of the plan.
   d. For areas with a certain height, pegs are made with a certain color. In wet / puddled areas, Contractor must construct temporary channels to drain these locations, for example with the help of a water pump.
   e. The location to be buried must be free of mud or dirt, garbage and so on. If there is no prior approval from Project Owner/ Supervisor, compaction should not be soaked in water. Fill compaction is done by using a stamper / compactor that is approved by Project Owner/ Supervisor.
   f. Excavated materials can be used again for containment if it meets the requirements as a landfill and if necessary a soil mechanics laboratory investigation can be approved by the Supervisor. All costs of the investigation are the responsibility of Contractor. Excavations that exceed the specified limit, must be restocked so that it reaches the leveling set with compacted fill material, except for the excavated foundation area must follow C.1. Regarding "Foundation Work".
   g. An acceptable implementation tolerance for excavation and retrieval is 50 mm against the specified flatness. All emergency drainage must be approved by Project Owner/ Supervisor The manner of work carried out by Contractor must be approved by Project Owner/ Supervisor.
   h. The surface part that has been declared dense must be maintained and protected from damage due to external influences such as wet by rain water and so on. Compaction work is considered sufficient, after obtaining written approval from Project Owner / Supervisor.
   i. If the material does not reach the desired density, the layer must be repeated by its work or replaced, by the specified methods of implementation, in order to obtain the required density. The test schedule will be determined / determined by Design Consultant / Project Owner/ Supervisor.
   j. After compaction is complete, the excess landfill must be moved to the place determined by the Supervisor. The height (peil) is adjusted to the drawing.
   k. Emergency Facilities: Contractor must hold perfect drainage at all times. He must build channels to install ditches, pump and / or drainage

4.6. COMPLETION WORK

1. All work areas including excavation and landfill must be areas that are completely uniform and free from uneven surfaces.
2. All final layers must completely meet the pile stated in the figure. If caused by a decrease, the pile requires an additional material of no more than 30

cm, then the top must be scratched before the additional pile material is spread out, then compacted until it reaches the elevation and in accordance with the requirements.

3. All remaining excavations that do not meet the requirements for fill, all debris, rubble and rubbish must be removed from the location immediately.

CHAPTER V
TERMITE RESISTANT WORKS

5.1. SCOPE OF WORK

1. Provide labor, materials, equipment and other aids to carry out work as stated in this specification with good results and accepted by the Supervisor.
2. This work includes soil maintenance for termites for the entire building area.
   a. Land around the building
   b. Other parts deemed necessary

5.2. MATERIAL REQUIREMENTS

1. Use a termite-resistant material that is concentrated (concentrate) can be dissolved or can be diluted with water specially formulated to eradicate the spread of termites. Oil fuels are not justified as diluents, provide solutions containing Chlordane / Drildrin / Gama BHC chemicals or approved by the authorities.
2. Dilute with water to the concentration recommended by the manufacturer.
3. Other solutions may be used if recommended by the manufacturer approved by local regulations, for this use a solution that is not harmful to plants.

5.3. TERMS OF IMPLEMENTATION

1. Anti-termite for soil.
   a. Prepare the surface of the area to be carried out work of anti-termites. Get rid of foreign objects that can reduce the effectiveness of treatment. Loosen and level the soil surface that will be given an anti-termite, except for areas that have been compacted, under the slab and foundation if recommended by the manufacturer of anti-termite work can be done before soil compaction is carried out.
   b. This work must be carried out by pest control companies that have received permission from the authorities.
   c. Put a warning sign on the area that has been given termites and get rid of the warning sign if other construction work can continue.
   d. Repeat the termite work if the area replaced by termites is disturbed by further work, excavation, landscape, site grading or other construction work.
   e. Anti-termite work is guaranteed by vendor/applicator for at least 5 (five) years.

CHAPTER VI
STRUCTURAL WORKS

6.1. GENERAL DESCRIPTION

1. The work plan and the structural work requirements (structural specifications) for this project, are made with the intention that the Structural Construction to be worked out meets the quality / requirements set forth in this structural specification, as planned / desired by Design Consultant.
2. Contractor is obliged to carry out structural works in accordance with these structural specifications and the attached structural drawings.
3. On the other hand, Project Owner/ Supervisor are obliged to supervise the work of Contractor to comply with the specifications of this structure and the attached structural drawings.
4. Changes to the structural specifications and structural drawings without the approval of Design Consultant are not permitted at all.
5. Planning Regulations and Standards based on:
1. Procedures for Making and Maintenance of Concrete Test in the Field (SNI 03 -4010-2013).
2. Earthquake Resilience Planning Procedures for Building and Non-Building Structure in 2012 (SNI 1726-2012) & Earthquake Resilience Planning Procedures for Building Buildings (SNI-03-1726-2002).
3. The Procedure for Calculating Concrete Structures for Buildings (SNI 03-2847-2002).

6.2. FOUNDATION WORK

Material Requirements

1. Pedestal is made in accordance with the drawing plan where the pile is reinforced concrete whose work is further explained in the Reinforced Concrete Work description.
2. For foundation stone work, a mixture of 1 Pc: 4 sand is used to stone masonry / mountain / split stone so that there are no more cavities between the stone / mountain / split junction.

Operating procedure

1. Before the foundation is installed, measurements are made for the foundations according to the construction drawings and Supervisorapproval regarding excavation excellence is requested.
2. Before the foundation of the site is worked on, Contractor must ensure that the foundation excavation is 100% complete.
3. Contractor must dispose of all the groundwater that exists in the foundation excavation before starting the site foundation work.
4. Tread foundations should not be carried out in waterlogged foundation excavation conditions. At the very bottom the foundation is coated with a

lean concrete. with a minimum thickness of 5 cm from a mixture of 1 Pc: 3 sand: 5 Cr, and a layer of sand-filled sand with a thickness of at least 10 cm. Work flooring should not be carried out in conditions of excavation of flooded foundations.

5. Contractor must ensure that the foundation excavation will not be inundated by groundwater or rainwater until all foundation structure work has been completed.
6. All parts of the site foundation, made of reinforced concrete with K-250 quality for medical buildings.
7. For foundation work done in accordance with the provisions of reinforced concrete work.
8. After the site foundation is completed, the stone masonry foundation work can be done before installing the building sloof this work is done in the bathroom work. On top of the stone masonry, anchor bar is installed with a minimum diameter of 12 "with a minimum distance of 1.5 - 2 m as a sloof binder.
9. The results of foundation work must be approved by the supervision consultant.

6.3. LEAN CONCRETE

1. Scope of work
   a. Providing labor, materials, equipment and tools to carry out this work so that good and perfect work results are obtained.
   b. This sub-floor work includes all the details mentioned / shown in the Working Drawings as the finishing floor mat.

2. Material Requirements
   a. Control of all work must be in accordance with the requirements for the Calculation of Concrete Structures for Buildings (SNI 03-2847-2002).
   b. Materials used before being installed must first be given examples to Supervisorfor approval.

3. Implementation Requirements
   a. For works that are directly above the ground, the land to be installed sub-floor must be compacted to get a flat and solid surface so that maximum soil carrying capacity is obtained, compaction is used by timbres.
   b. The required under-fill sand must be a hard, clean and free of alkaline, acid or other organic material that can reduce the quality of a partner. Fill sand layer thickness required at least 5 cm for pustu and 10 cm for puskesmas or according to the Working Drawing.
   c. Above the sand is carried out sub-floor work as thick as min 5 cm or as shown in the Detail Image with a mixture of 1 PC: 3 Sand: 5 Coral.
   d. For couples on concrete slabs (upper floors), concrete slabs are given a 1 PC mixture of screeds: 3 Sand is at least 3 cm thick with due regard to the slope of the floor, especially in wet areas and terraces.

e. Mashed concrete sub floors above the ground floor must be made completely flat, taking into account the slope of the floor in wet areas and terraces.

6.4. CONCRETE CONSTRUCTION WORK

1. General
   a. Concrete is a mixture of cement, sand, split and water will get the least possible use of cement at work completion. The concrete produced must be of good quality, solid, durable and have strength in accordance with the provisions and have other special characteristics as required.
   b. The ratio between sand and split depends on the gradation (level) of the material itself, but the final result that must be achieved is that the sand must always be in the least amount possible so that when mixed or mixed with cement will produce enough stir to fill the void that exists and is between split, and there are still some advantages for the final completion of the concrete.
   c. To maintain optimal concrete strength and durability than the concrete, the amount of water used in the concrete mix must be as little as possible which will provide good quality concrete in the implementation and easy to do.
   d. All materials, inspection of concrete and others included in this specification will always be based on the Calculation of Concrete Structures for Buildings (SNI 03-2847-2002).
   e. Concrete mixtures of a certain quality must use the required job mix or concrete mixes produced by ready mix concrete companies that meet the requirements and in accordance with these specifications can also be accepted with prior approval from Project Owner/ Supervisor.

2. General Provisions of Concrete Materials
   a. All concrete materials that will be used must be materials that really have the best quality among all available concrete materials, and must always meet the requirements of Concrete Structure Calculation for Buildings (SNI 03-2847-2002).
   b. Before starting concrete work, Contractor must first provide an example of concrete materials that will be used to obtain prior approval from Project Owner / Supervisor.
   c. Contractor are prohibited and not allowed to order concrete materials or bring concrete materials in large quantities before Project Owner / Supervisor give prior approval for each type or type of material to be used.
   d. Project Owner/ Supervisor will keep the examples of concrete materials that have been approved as a standard (benchmark), where the samples will be used as inspection material when receiving concrete materials.
   e. Contractor are prohibited from making deviations from the delivery of material that is not in accordance with the agreed sample, unless there is prior approval from Project Owner/ Supervisor.

f. Any type of concrete material that is not approved and not accepted by Project Owner/ Supervisor, immediately Contractor must remove or move the concrete material from the project location at his own expense or expense.

3. Cement
   a. What is meant from cement is Portland cement as mentioned in the Calculation of Concrete Structures for Buildings (SNI 03-2847-2002).
   b. The cement to be used must be obtained from the factory that has been approved by Project Owner/ Supervisor, and sent to the project site by good packaging, or in a bag that is still tightly closed, or can also be sent using containers from the factory has been approved by Project Owner / Supervisor.
   c. If desired by Project Owner/ Supervisor, Contractor should send Project Owner/ Supervisor a copy of the cement consignment stating the name of the cement plant, a certificate of test results from the plant stating that the consignment has been tested and analyzed and is in accordance with everything which has been mentioned in standardization.
   d. Cement must be stored in a closed place free from possible water leakage, and protected from moisture until the time of use. Anything that causes damage to the cement such as becoming solid or clumping or damage to the cement bag, then the cement can not be accepted and may not be used anymore.
   e. Cement will also be subject to additional inspections in accordance with standardization that is expected / deemed necessary by Project Owner/ Supervisor, and Project Owner/ Supervisor has the right to refuse or not to use cement that does not meet the requirements by ignoring the certificate given by the manufacturer.
   f. All cement that is refused or may not be used must be removed from the project site immediately at Contractor's expense without any reason.
   g. Contractor must send the test results and conduct as desired by Project Owner/ Supervisor in matters relating to the results of the examination.
   h. Every time Contractor must maintain the supply of cement at the work site, or in other words the supply of cement must always be sufficient according to the needs and allow for inspection to be held when needed.
   i. Organizers must complete and establish a suitable place for cement storage, which must be completely dry, well ventilated, protected from the effects of the weather and sufficient to store and store large amounts of cement. The floor of the cement storage shed must be at least 30 cm above the ground, or at least on a puddle of water that might occur on the ground. Transporting cement to the project site by truck or other vehicle must be completely protected with tarpaulin or other waterproof cover material.
   j. Cement must be used as soon as possible after delivery, and if there is cement that has been damp or lumpy, which according to Project Owner / Supervisor can no longer be used due to the influence of air humidity

or other things, will be rejected and must be removed from the project site at Contractor's expense.

4. Split
   a. Split must be in accordance with the Calculation of Concrete Structures for Buildings (SNI 03-2847-2002). Coral is not allowed to be used.
   b. For top structure or concrete that has a large volume, the split used must be 5 mm to 30 mm in size. The use of other stone which are mixed in nature is not permitted.

5. Water
   Contractor must plan for the delivery / procurement of working water in sufficient quantities for all kinds of needs rather than work, and this water must be in accordance with the Calculation of Concrete Structures for Buildings (SNI 03-2847-2002).

6. Additional Materials
   Any additional materials that will be mixed in the concrete mix are not permitted, unless there are provisions or written decisions from Project Owner/ Supervisor for each type of additional material and in certain cases as well.

7. Concrete Quality
   Unless stated otherwise, the quality of concrete is as follows:
   a. At the age of 28 days, the strength characteristic of concrete is (K-250) applies to site foundations, sloof, columns, beams, floor plates, ring beams in structural medical buildings, while for non-structural concrete with K-175 quality.
   b. For work floors whose thickness is shown in the drawing, the ratio of the mixture is 1: 3: 5 equivalent to the K-100 quality, or stated in the working drawings.

8. Determination / Decision of Concrete Comparison
   a. The comparison of the concrete mixes given above is based on estimates, which after 28 days after casting; the concrete has the desired strength, good quality and good control.
   b. Concrete will be explained in the list of volumes as well as a list of budget plans according to the concrete quality of each structure, if the quality of the concrete varies.
   c. If the required concrete strength is found not meet the requirements, Supervisorwill hold or provide certain conditions regarding the proportion (comparison) of the concrete mixture at Contractor's own cost, which is the planning and strength of the concrete will be achieved.

9. Planning of Concrete Mixtures
   a. At least within five weeks before the first concrete casting work is carried out, at its own expense Contractor must carry out some planning rather than work procedures and preliminary examinations / tests needed to determine each concrete level with a very suitable comparison between cement, sand, split and water for each concrete quality, as well as the size of the stone that has been determined.
   b. Sufficient time will be given to obtain the results rather than checking the concrete from the proposed mixes, and the results of the concrete inspection must be obtained before the concreting work begins. The batching plant used during the trial mix must be a batching plant which will be used during the contract, and the concrete mixture must be worked out in full from the batching plant used.
   c. It is not permitted to conduct casting until the cube inspection results reach the age of 28 days made from a trial mixture which has obtained satisfactory results, and the mixture is made from an arrangement approved by Project Owner/ Supervisor.

10. Experimental Mixtures
   a. Concrete mixture must be made from the same three mixes, and from each mixture will be taken 6 (six) concrete cubes. 3 (three) of them will be tested at the age of 7 (seven) days, and the remaining 3 (three) at the age of 28 days.
   b. The point is that a 7-day test will be used to determine the strength of concrete between the ages of 7 days to 28 days to ascertain the possibility of concrete that has been worked on. The compaction factor and slump of each of the three mixtures will also be used as a comparison.
   c. The target strength of the cube for the age of 28 days made from the experimental mixture, which is made for the quality of certain concrete must reach 1.45 of the strength of concrete characteristics. The average yield of the three cubes that are 28 days old from each mixture must not be smaller than 1.15 of the characteristic concrete strength.
   d. If the experimental mixes give very minimum results, Contractor in connection with the above must provide complete information, including the results of the strength of the concrete, the level of each type of stone, the level mixed, slump and compaction factor to the User Services / Supervisor for approval.
   e. Contractor are required to make plans regarding the preservation and examination of the trial cubes at their own expense.
   f. If there is a change in the type of cement or the type of stone used, or if for some reason, a change in concrete mixture or composition is forced, a preliminary inspection of the cubes must be repeated again, and must obtain a decision and approval from Supervisorbefore the mixture / the new concrete composition is used.

11. Concrete Inspection and Concrete Materials
    a. Contractor must also provide workers and services for all tests or examinations regarding concrete and concrete materials requested or desired by Project Owner/ Supervisor.
    b. During the execution of the contract or the execution of work, Contractor must also provide the following tools and equipment: slump test concrete inspection place (concrete inspection laboratory) mold cube test maker which is sufficient to remember the requirements of Concrete Structure Calculation for Buildings (SNI 03- 2847-2002). Where every 5 m3 of concrete is made 1 sample specimen.
    c. Contractor must also provide tools to check the moisture contained in fine stone material (sand), the weighing scale, the cylinder gauge and the equipment and other equipment needed in the inspection matters to be determined.
    d. All inspection equipment and workers or business ventures for all inspections are borne by Contractor and must be authorized by Project Owner/ Supervisor.
    e. Contractor must bear the costs for maintenance and transportation of all samples to be carried out to the inspection site / laboratory, which have been approved by Project Owner/ Supervisor to conduct an examination of the strength of the cube at ages 7 and 28 days.
    f. Each cube that will be examined in the laboratory must be given certain clear and permanent codes, such as cube numbers, date of casting along with the mark or location code of the work. The system of the size of the marking on the cube and so on will be determined later by Project Owner/ Supervisor.
    g. Contractor must send all samples of the materials and bear all costs associated with the inspection or testing relating to this specification, unless there are other provisions.
    h. Complete records of all inspection / testing results must also be kept by Contractor, if at any time it is desired to meet the interests of Project Owner / Supervisor.
    i. Concrete casting will not be permitted until all required matters in this Chapter have been fulfilled. (Concrete casting will not be permitted / will not proceed until appropriate arrangements are made to meet the needs of this Chapter).

12. Concrete Quality Control / Inspection in the Field
    a. Contractor must take full responsibility for being able to make the same quality of concrete, which means those that have the strength of concrete as specified or other properties. For this, Contractor must bear all costs for completing and using careful scales of the batching plant, the right size for measuring water volume, the proper placement of equipment, and all checks needed or deemed necessary and facilities - facilities as instructed / requested by Project Owner / Supervisor. Cement and all stone material must be measured and weighed according

to the ratio. Mixing using anything other than cement wrapped in cement bags is not permitted.

b. In terms of age, the thickness of the concrete must be checked with a "slump test" for all levels of concrete. Slump or checking for concrete settlement must be done at all times during casting, as well as some additional experiments that must be carried out if this is deemed necessary by Project Owner/ Supervisor.
c. Throughout the implementation of this contract, the inspection of the concrete cube must always be made as and whenever desired or ordered by Project Owner/ Supervisor.
d. Concrete cubes must be provided and maintained in accordance with the provisions of the Calculation of Concrete Structures for Buildings (SNI 03-2847-2002) except: the temperature during the first two weeks of maintaining immersion at any time ranges between 24 and 29 degrees.
e. Six cubes that will be used for inspection materials can be taken from any foundry, three pieces must be examined at the age of 7 (seven) days and the rest at the age of 28 (twenty eight) days.
f. Acceptance of concrete works will only be based on 28 (twenty eight) day inspection tests, which means that the average strength of the age of the 28 (twenty eight) day cube must not be smaller than the minimum requirement in point 7, and none all of which have less than 90% strength than the minimum required strength. If the average strength of the cube at the age of 7 (seven) days from the time of casting turns out to be below the provisions mentioned in the trial mix of Project Owner / Supervisor have the authority to stop all activities related to the above, until the concrete cube test results are found after 28 (twenty eight) days.

13. Concrete Rejection
    a. If the compressive strength produced from several groups of cubes turns out not to meet the standards or conditions required above, Project Owner/ Supervisorhas the right to order to refuse or dismantle all concrete work where the cubes are taken.
    b. Project Owner / Supervisor are also authorized to refuse or order to dismantle concrete work, if it turns out to be like a beehive, perforated holes, or unfavorable surfaces produced, and for every reason of the refusal, Contractor at his own expense to dismantle and dispose of concrete that is rejected and replace it with what is new as required by Design Consultant consultant and meet the requirement of Project Owner/ Supervisor.

14. Concrete Materials
    a. All concrete materials must be measured by weight, except water measured by volume. Each dose of fine or coarse stone will be measured separately with an approved weighing machine, has good accuracy with

a coefficient of less than 1% (one percent). The volume of dosing is permitted after approval from Project Owner/ Supervisor.

b. The tools used to weigh all materials and measure the addition of water, as well as the methods of determination or moisture decisions contained must be approved in advance by Project Owner/ Supervisor before the concrete mortar is casted in one place.
c. The provisions of the weighers used must be checked or examined a week or as required / ordered by Project Owner/ Supervisor to be calibrated. The inspection must be known by Project Owner/ Supervisor.
d. The tool must always be provided by Contractor and must always be available at the work location throughout the project.
e. A known amount of cement can be used as the basis for measurement in the mixture balance. The size must be balanced on the basis of one or more good cement.
f. The amount of water that must be added to the mixture must be adjusted to the water contained in each type of stone.

15. Mixing Concrete
    a. Concrete should be mixed as close as possible to the landfill in the type and capacity of the mixing machine approved by Project Owner/ Supervisor, and used according to the speed recommended by the manufacturer.
    b. The implementation of the procurement of transportation for mixing and mixing of concrete materials must obtain prior approval from Project Owner/ Supervisor and if or where possible the implementation of the whole will only be checked and supervised by a supervisor.
    c. Concrete mixing done by hand is absolutely not allowed, except before Project Owner/ Supervisor gives prior approval, and only in concrete grading for 1: 3: 5 work floors.
    d. The mixing will determine the equality of distribution of the material ensuring its density; each grain will be coated with spaces or mortar, and must be able to produce homogeneous and solid concrete without excess water.
    e. The mixer must be equipped with a water transfer and pouring device, and an adequate water tank and a device to measure accurately and automatically control the amount of water used in a measuring machine.
    f. This tool must be able to provide the required amount of water with a coefficient of less than 1% with the same delivery, and the tool must be able to adjust quickly due to the presence of water content in each type of stone or to correct variations rather than concrete slumps.
    g. The filling in the mixing machine must also be regulated, that all elements including water will enter the machine in accordance with the comparison and no one is separate.
    h. The first mixture of concrete material that is put into the mixing machine will consist of cement, sand, split and water where it is intended for the first coating rather than the inside of the mixer, so that

it will not reduce the amount of stirring or space in the concrete mixture later.

i. All mixing machines must be properly maintained during the implementation period of the contract, and if any of them are damaged or cannot be used at all in order to be removed from the location as soon as possible.
j. The mixing machines must be completely empty before receiving concrete mix materials so that the concrete mix gets good results. and if the mixing machine is no longer used for more than 30 minutes, or has been in work, or after working time, it must also be cleaned and washed.
k. The concrete carrier, picker and mixer must be thoroughly cleaned before mixing of quality or other quality concrete is carried out.
l. Mixing must be carried out continuously in less than 2 minutes after all the material including water are put into the mixer before the mixture is removed.
m. Mixing or stirring up concrete or spaces / mortar that has partially or completely hardened is not allowed at all. Where is caused by a delay outside the resident machine, then the mixture is still better still in the mixing machine and stirring is continued up to a maximum limit of 10 minutes.

16. Delivery and Concrete Casting
    a. Casting from concrete is not yet permitted to begin, prior to the inspection and approval of Project Owner/ Supervisor regarding formwork, reinforcement, holding the tap and so on, where the concrete will be poured.
    b. The concrete mix / mixture in the mixer should be removed continuously, and transported to the casting site without separating the elements.
    c. The concrete must be transported by means of a clean, non-leaking carrier, or by wheelbarrow. Other concrete methods or methods of transportation can only be done if there is an agreement from Project Owner/ Supervisor. The place for transporting and storing concrete must be cleaned and washed at the end of work or after work time, and if the casting is delayed / interrupted for more than 30 minutes.
    d. For concrete mixes that are stirred in the field, all concrete mix / mortar must be cast in place within a maximum of 30 minutes after the mortar is complete.
    e. Concrete should not be poured from a height of more than 1.50 meters, but in certain positions needed in the work, concrete must be leveled from the highest pile, and it must be done to prevent the separation of concrete elements and to ensure the absence of current from concrete disconnected. The entire work system must obtain prior approval of Project Owner/ Supervisor.
    f. Concrete casting in a part or unit of work must be done continuously or after the achievement of the permissible structural part.

g. Concrete, formwork or reinforcement that is not allowed to be disturbed in any situation, for approximately 48 hours after casting is done, without permission from Project Owner/ Supervisor.
h. Concrete casting must be done during the day, and casting of part of the work should not be started if it cannot be completed during the daytime unless permission to work night (overtime) has been permitted by a Project Owner/ Supervisor. And such permission will not be granted if Contractor does not or has not provided an adequate lighting system that has been approved by Project Owner/ Supervisor.
i. Detailed records of the date, time and condition of the casting of each part of the work must be made and signed by Project Owner/ Supervisor and kept, and this must always be available at any time when there is an inspection of the User.
j. Before the casting job is carried out Contractor must make a check list of jobs that must be signed or approved by a Supervisory Consultant.

6.5. REINFORCED CONCRETE

6.5.1. General Provisions

1. Concrete construction requirements, technical terms and general concrete implementation requirements are incorporated in this technical specification book. Unless otherwise specified in this technical specification book, all concrete works must comply with the standards below:
   Regulations and Standards based on:
   a. Tata Cara Persyaratan Beton Struktural untuk Bangunan Gedung (SNI 2847-2013
   b. Tata Cara Perencanaan Pembebanan Untuk Rumah dan Gedung (SNI 03 - 727-1989-F
   c. Tata Cara Perencanaan Ketahanan Gempa untuk Struktur Bangunan Gedung dan Non-Gedung tahun 2012 (SNI 1726-2012) & Tata Cara Perencanaan Ketahanan Gempa untuk Bangunan Gedung (SNI-03-1726-2002
   d. Tata Cara Perhitungan Struktur Beton Untuk Bangunan Gedung (SNI 03-2847-2002
2. Contractor must carry out this work with high accuracy and suitability according to this technical requirement, drawing plans and instructions that do not meet the requirements must be dismantled and replaced at Contractor own expense.
3. All materials must be new with the best quality in accordance with the requirements and approved by the supervisor, and Supervisorhas the right to ask for testing of these materials and Contractor is responsible for all costs. All material not approved by Supervisormust be immediately removed from the project site.

6.5.2. Scope Of Work

1. This work includes the supply and use of all labor, materials, wages and equipment for all reinforced concrete / concrete work contained in the plan drawings.
2. Procurement, detail, fabrication and installation of all reinforcement and other parts of work embedded in concrete.
3. Design, implementation and dismantling of concrete references, completion and maintenance of concrete and all types of work that support concrete work.

6.5.3. Work Control

1. The quality control of the implementation of any project is basically carried out at all stages. This is done continuously and systematically to avoid construction failure (failure). The regulations that govern this besides SNI-03-1734-1989 concerning concrete construction, also SNI-03-1737-1989
2. Contractor must be responsible for the installation of all installed equipment, sheaths and so on embedded in concrete.
3. Control of this work is stated in the conditions in the Indonesian National Standard Regulation (SNI 03-2847-2002)
4. The dimensions (dimensions) of the reinforced concrete parts listed in the architectural plan implementation drawings are the dimensions in outline. The exact measurements, as well as the reinforcement steel are specified in the drawings of reinforced concrete construction structures. If there is a difference in the size between the two types of images, the applicable size must be consulted in advance with Supervisorto get the actual size.
5. If due to the market situation, the reinforcement needs to be replaced for the continuity of implementation, the total area of the cross-section may not be reduced by taking into account other conditions contained in SNI 03-2847-2002. In this case, approval from Supervisormust be obtained.

6.5.4. Materials

1. Portland Cement
   a. SNI 15-2049-2004, Portland Cement
   b. Portland cement must meet the requirements of the Indonesian National Standard or SNI 03-2847-2002 for initial binder grains, conservation of form, compressive strength and chemical composition. Cement that hardens quickly can only be used if directed by the Supervisor. The cement used for all foundation and concrete works must be of one brand approved by the Supervisor.
   c. Contractor must send a factory statement stating the type, quality of cement used.
   d. Cement storage must be carried out in a storage area and kept so that the cement is not damp, with the floor raised free from the ground and stacked in accordance with the conditions of the cement pile and in the order of delivery. Cement that has been damaged due to being stored

for too long so it hardens or is mixed with other materials, must not be used and must be removed from the work site. Cement must be in full and well protected from weather influences, with adequate ventilation and used in the order of delivery.

2. Aggregate
   a. Aggregates for concrete must meet one of the following conditions:
      - Aggregate specifications for concrete "(ASTM C 33).
      - SNI 03-2461-1991, Light aggregate specifications for concrete structures.
   b. The maximum nominal size of the gross aggregate must not exceed:
      - 1/5 smallest distance between the sides of the mold, or
      - 1/3 thickness of the floor plate, or
      - 3/4 minimum net distance between Reinforcement bars or wires, reinforcement bundles, or prestressed tendons or casings

      1) Fine Aggregate (Sand)
         a) Types and conditions of aggregate mix must meet the requirements in SNI 03-4804-1998.
         b) Sand Quality
            The points are sharp, hard, clean and do not contain mud and organic materials.
         c) Size
            Remaining above a 4 mm sieve must be at least 2% by weight;
            Remaining above 2 mm sieve must be at least 10% by weight;
            The remainder above the 0.25 mm sieve must range between 80% -90% by weight.

      2) Rough Aggregate (Coral / Broken Stone)
         a) Types and conditions of aggregate mix must meet the requirements in SNI 03-4804-1998
         b) Quality
            Hard, clean, non-porous beads, maximum number of flat grains 20% by weight; not broken or destroyed and does not contain alkaline reactive substances.
         c) Size
            Remaining above the sieve 31.5 mm, must be 0% by weight; remaining above 4 mm sieves, must range between 90% - 98% by weight, aligning between cumulative remnants on two consecutive sieves, is a maximum of 60% and a minimum of 10% by weight.
         d) Storage
            Sand and gravel or broken stone must be stored in such a way that it is protected from contamination by other materials.

      3) Water
         a. Water for the manufacture and maintenance of concrete must not contain oil, acids, alkalis, salts, organic materials

or other materials that can damage concrete and steel reinforcement or steel wire networks. In this case, clean water that can be drunk should be used.

b. Mixing water used in prestressed concrete or in concrete in which aluminum metal is embedded, including free water contained in the aggregate, may not contain harmful amounts of chloride ions.

c. The inspector may order testing of water samples at an inspection body for recognized materials if there is any doubt about the quality of the water. The cost of testing the water samples for the purposes of implementing this project is entirely borne by Contractor.

4) Reinforcement Steel Bar

a. Reinforcement steel must meet the requirements of SNI 2847-2002 article 9.

b. Concrete reinforcement must be stored in such a way that it is free from direct contact with moist or wet soils.

c. The steel to be used must be free of rust and other impurities. If there is rust on the surface of the steel, then the steel must be cleaned by brushing or rubbing without reducing the diameter of the steel cross section, or using a liquid material similar to "Vikaoxy off" production that meets SNI or is equivalent and approved by the Supervisor.

d. Supervisor can order a concrete test to be held at the place to be used; and materials that are recognized as well as those approved by the Supervisor. All costs related to the above mentioned tests are fully borne by Contractor.

e. If the steel reinforcement used has been adjusted at the factory and requires a different connection between reinforcement in the field with the provisions of the manufacturer, then it must be approved by the Supervisor.

5) Reinforcement steel

a. The reinforcement steel used must be threaded reinforcement, except plain steel. Permissible for spiral or tendon reinforcement. Reinforcement consisting of structural steel profiles, steel pipes, can be used in accordance with the requirements of this procedure.

b. Reinforcement steel must meet ANSI / AWS D1.4 ANSI / AWS D1.4 reinforcement structural welding requirements. The type and location of the pile welding connection and other welding requirements must be indicated in the plan drawings or specifications.

1) Reinforcement steel whorl (BJTD) Threaded steel must meet one of the following conditions:

a) Specifications for threaded and plain billet steel bars for Reinforcement concrete ASTM A 615M).
b) Specifications for threaded and plain axle steel bars for concrete reinforcement (ASTM A 617M).
c) Specifications for low-alloy plain and flat steel steels for concrete reinforcement ASTM A 706M).

2) Steel reinforcement with fy melting strength specifications exceeding 400 MPa may be used, as long as fy is a stress value at a strain of 0.35%.
3) Woven steel rods for Reinforcement concrete must meet "Specifications for woven steel rods fabricated for reinforced concrete reinforcement" (ASTM A 184M).
4) The Reinforcement steel used in webbing must meet one of the requirements.
   Threaded wire for concrete reinforcement must meet "Specifications for screwed steel wire for concrete reinforcement" (ASTM A 496), except that the wire must not be smaller than D4 in size and for wires with fy melting strength specifications exceeding 400 MPa, then fy must be taken equal to the stress value at 0.35% strain if the melting strength required in the planning exceeds 400 MPa.
5) Welded plain wire mesh for Reinforcement concrete must meet "Specifications for plain steel wire mesh for reinforced concrete" (ASTM A 185), except that for reinforcement with melting strength specifications exceed 400 MPa, then fy is taken equal to the stress value at strain 0 , 35%, if the melting strength required in planning exceeds 400 MPa. The distance between the crossing points that are welded must not be more than 300 mm in the direction of the observed voltage, except for wire mesh used as a cross link.

6) Binding Wire
   The binding wire must be at least 1 mm in diameter as required in SNI 2847-2002.
   Plain wire for reinforcement must meet "Specifications for plain reinforcement wire for concrete reinforcement" (ASTM A 82), except that for wire with a yield strength of fy that exceeds 400 MPa, fy must be taken equal to the stress value at 0.35% strain, when the melting strength required in planning exceeds 400 MPa.

7) Additive Materials
   a) Use of the Additive is not permitted without the written consent of the supervisor.
   b) If necessary to accelerate the hardening of concrete or if the required slump is high, concrete can be used as

an additive approved by the Superintendent. Additive material used in the production of CEMENT-AIDS or similar. All changes to the design mix or the addition of additive materials are entirely borne by Contractor and there are no additional costs for this.

6.5.5. Mix Concrete

1. Previously, a trial mix of "Trial Mix" experiments which was suitable for each part of the construction must be held. Work must not commence before inspection and approval by the Trustee regarding its strength / cleanliness. All costs of these tests are borne by Contractor.
2. The quality of the concrete used in all this work must be in accordance with the structural plan.
3. Mixing the basic material of concrete must use a calibrated dose. The combustion of basic material must meet the accuracy for 1% cement and water, 2% aggregate and 3% additives. There are two ways of mixing basic materials, which are based on volume and weight, for concrete quality less than FC 25
   MPa, mixing can be done based on the volume of the base material. High quality concrete base material are measured based on weight. Mixing must be done with a mechanical mixing device to obtain a homogeneous mortal. Modification of the mixture in the field in the form of the need for adding water to improve the consistency of the mixture must always be accompanied by the addition of cement equivalent to the predetermined cement water factor.

6.5.6. Implementation

1. Slump
   The allowable value for concrete in normal mix conditions is 7.5–10 cm and adjusted to the required concrete quality. Slumps that occur outside these limits must obtain Supervisory approval.
2. Concrete and Grouting Connection
   Before continuing casting on hardened concrete, the surface must be cleaned and ground first. The mold must be re-tightened and the connection surface doused with "Bonding Agent" material for this purpose with the approval of the Supervisor.
3. Stirring Equipment
   In the implementation of making concrete, a mixer must be used "Mixer Concrete".

6.6. TRANSPORT MIX AND CONCRETING

1. Contractor must notify Supervisornot later than 2 (two) days before the concrete casting is carried out. Approval for carrying out concrete casting is related to the implementation of mold work and installation of

Reinforcement steel as well as evidence that Contractor will be able to carry out casting without interruption.

2. Concrete must be casted in accordance with the requirements in SNI 03-2847-2002. If not stated otherwise or by the Supervisory Agreement, the height of the concrete that is cast should not exceed 1.5 m.
3. Before casting begins, all parts to be casted must be clean and free of dirt and loose concrete parts. Parts to be planted in concrete must be installed (pipes for electrical installation, plumbing and other work as well as steel sticks and their connection).
4. Molds or wall pairs that will be in contact with concrete must be soaked with water until it is saturated and the reinforcement must be installed properly. Fields of old concrete that will be cast must be made rough and then cleaned of any loose dirt.
5. The transportation time must be carefully calculated, so that the time between stirring and casting is not more than 1 (one) hour and there is no significant binding difference between the concrete that has been casted and will be casted.
6. If the time required for transportation exceeds the specified time, then the retarding material must be used with the approval of the supervisor.
7. Stirring should not be poured if the time since mixed with water in cement and aggregate has exceeded 1.5 hours; and this time can be reduced, if Supervisorconsiders it necessary based on certain conditions.
8. Casting must be done in such a way as to avoid the occurrence of separation of material (Segregation) and changes in the location of reinforcement. How to pour with tools such as gutters, pipes, chutes and so on must be approved by Supervisorand the tools must be clean and free of the remnants of hardened concrete.

6.7. CONCRETE COMPACTION

1. Contractor are responsible for providing equipment for the transportation and pouring of concrete with sufficient thickness to obtain solid concrete without excessive shaking.
2. Compaction of the concrete must be carried out entirely with a Mechanical Vibrator and operated by experienced people. Vibration is done sufficiently to prevent Over Vibration and vibration is not allowed to do with the intent to drain the concrete. The resulting concrete must be a mass of the whole, free of holes in porosity or porous.
3. In dense reinforcement areas, vibration is carried out with a vibrator that has a high frequency to ensure the filling of concrete and solid concrete. Vibrators should not be touched on the reinforcement that has entered the concrete that has begun to harden.

If porous in a concrete structure can do a "Core Drill" and compressive strength test to the Concrete Technology Laboratory. For concrete repair methods that concern the size of the following there are some tips for repair:

1. Contractor must repair at their own expense and cannot be counted as additional porous-work that occurs in newly opened formwork concrete. Among other as follows.
2. Following the Division of Type Porous, porous types can be divided into 4 types:
   a. Type I: Porous only on concrete skins, concrete aggregates are still attached properly.
   b. Type II: When porous that occurs until the outside reinforcement bar has been seen with a depth of 3 to 5 cm.
   c. Type III: if porous that occurs until the Reinforcement steel inside has been seen with a depth of 5 to 7 cm.
   d. Type IV: When porous is bigger 7 cm half of the porous cast.
3. If this happens, Contractor must conduct a repair effort at his own expense. The improvements that must be made in overcoming the four types of porous are as follows:
   a. Type I: The porous area is cleaned, plastered back with mix 1 Pc: 2 Sand.
      Type II: Preparing concrete surfaces to be repaired, Porous concrete, porous with small and pointed chisels. Porous holes are formed so that the concrete mixture can enter properly into it and is not easily separated again. The concrete surface is cleaned of all dirt dust, loose sand and others using a steel wire brush, then cleaned / washed with water. The concrete surface is left until it is almost dry. Use epoxy, the surface of the concrete must be completely dry, and then sprinkled with epoxy well and evenly.
   b. Repair the existing cleaning is cleaned of all dirt, rust and others by using a steel brush.
   c. Supervision
   Before repairs / plastered / in the Cor, Contractor must ask for supervisory permission and ask that the work to be repaired be checked first.

6.8. OBJECTS PLANTED IN CONCRETE

1. It is not permissible to plant pipes and other parts of concrete structures if not shown in detail in the drawing. In concrete, shells need to be installed in places where the pipes pass.
2. If it is not specified in detail or shown in the drawing / instructions Supervisor is not justified to plant power lines in a concrete structure.
3. All parts or equipment planted in concrete such as anchors, hooks and other work related to concrete work, must be installed before concrete casting is carried out.
4. Parts or equipment must be installed correctly in its position and endeavored not to shift during concrete casting.
5. The main Contractor must notify and give an opportunity to other parties to install the parts / equipment before the concrete casting is carried out.
6. Empty cavities or parts that must remain empty on objects or equipment to be planted in concrete, which cavities must not be filled with concrete, must be covered with other materials that are easily removed later after the concrete casting is carried out.

6.9. EXAMINATION / TESTING OF CONCRETE QUALITY

1. Concrete test is determined through a number of test specimens according to SNI 03-1974-1990 standards.
2. Some specific conditions that must be followed as follows:
   a. For cube-shaped test pieces measuring 15 x 15 x 15 cm in size, the mold is filled with concrete mix in 2 layers, each layer is compacted with 32 times a prick; stick compactor diameter of 10 mm, length of 300 mm;
   b. Cube-shaped test specimens do not need to be coated;
3. If there are no other provisions for the conversion of compressive strength of concrete from the shape of a cube to a cylindrical shape, then use a compressive strength comparison number as follows: Conversion List
   Test specimens Comparison of cubes: 15 cm x 15 cm x 15 cm: Cylinders: 15 cm x 30 cm 1,00,950.83 15 cm = cylinder diameter 20 cm = cylinder height; 5) examination of concrete compressive strength usually at the age of 3 days, 7 days and 28 days; 6) examination results are taken an average value of a minimum of 2 pieces of test pieces; 7) If stirring is done by hand (only for concrete mix planning), the contents of the mixer tank are a maximum of 7 dm 3 and stirring should not be carried out for concrete slump mixtures. o.
4. Test results issued on:
   a. When the test object is 3-7 days old
   b. When the test object is 14 days old
   c. When the test specimen is 28 days old
5. Contractor are fully responsible for the cost of testing the concrete and the costs incurred due to unacceptability of the quality of the concrete.
6. Follow-up Examination supervisor can request further examinations carried out using a Hammer test to ensure an assessment of the quality of existing concrete. The cost of such work is fully borne by Contractor.

6.10. CONCRETE TREATMENT

1. In general, it must meet the requirements in SNI 4810-2013, SNI Concrete 2012, SNI Concrete 2010, SNI Concrete 2008, SNI Concrete 2002,
2. Concrete after casting must be protected against premature drying processes by maintaining conditions where humidity loss is minimal and a constant temperature within the time needed for cement hydration and hardening of the concrete.
3. Concrete treatment begins immediately after the concrete casting has been completed and must continue for at least 2 (two) weeks if not otherwise specified. The concrete temperature at the beginning of the casting must be maintained so as not to exceed 30ºC
4. Within this time the mold and concrete reference must also remain wet. If concrete molds and references are opened before the end of the treatment period, the remaining time for maintenance is carried out by continuously wetting the concrete surface by covering it with wet sacks or in other ways approved by the Supervisor.
5. The way the treatment is carried out and the tools used must get prior approval from the Supervisor.

6.11. DEFECT

1. If the completion of work, materials used or expertise in the work of each part of the work does not meet the requirements listed in the Technical Requirements, then the work part must be classified as work defects.
2. All work classified as such must be dismantled and replaced as desired by the Supervisor. All demolition and restoration of work classified as defective and all costs arising from it. All of them are borne by Contractor.

6.12. CONCRETE BLANKETS

The concrete blanket is the minimum distance that exists between the surface of each concrete steel including beugel to the concrete surface that is the smallest or closest specification for each part of each concrete work. In certain situations and conditions Project Owner/ supervisor has the right to change the thickness of the existing concrete blanket. The minimum concrete blanket thickness required in table is:

Table Concrete cover requirements

CONDITION	MINIMAL (mm)
2. **All concrete which is directly related to the soil**	50
3. **Beams of foundations, plates, foundations, poles**	50
4. **Beams, columns related to or directly affected by the weather**	50
5. **Beams, columns that are not related or not directly affected by the weather**	40
6. **Plates, concrete walls / walls that are directly related to the weather**	40
7. **Plates, concrete walls / walls that are not related or not directly affected by the weather**	25

6.13. FORMWORK

1. General

a. All parts of formwork or concrete molds or references must be planned and implemented as well as possible and in accordance with the provisions of the Project Owner / Supervisor. Contractor must provide an example in advance to obtain the approval of Project Owner/ Supervisor in a fairly loose time before the casting job is carried out.

b. All parts of formwork or concrete forming molds must be really strong and sturdy, and must also be equipped with cross-bonds and other reinforcement. This is intended so that there will be no change in shape during the work of casting, compaction and vibrating concrete. Formwork made from wood or class III plywood must be really made as well as possible from weather resistant wood.

c. All connections must be properly bonded and tight enough to avoid concrete leaks. To avoid sticking concrete to formwork, a very thin layer of oil or other materials that have been approved by Project Owner/ Supervisor can be used to be added to the inner surface of the formwork before the formwork is installed and casting work is carried out.

d. In this case, it must also be maintained, that the concrete reinforcement can not be completely exposed to the oil layer before, or other cover layers that can affect the adhesion of concrete to steel.
e. It is also permissible to use steel or interlocking binder on the inside of concrete, but this must be approved in advance by Project Owner/ Supervisor. Every part of the steel binder or steel filler that will be embedded in the concrete must be at least 50 mm from the outside face of the concrete. Any holes on the concrete surface caused by this must be filled promptly well and cleanly when dismantling formwork, with cement spacing or the same stir as the existing mortar.

2. Dismantling Formwork

a. Demolition of concrete formwork or molding can be done so far that it will not cause and cause damage to existing concrete.
b. At least 3 (three) days after casting can be demolished, but this is not required. Contractor can postpone the dismantling of the formwork until it reaches a sufficient strength of concrete. In this case Contractor must be fully responsible if there is damage or defects in concrete caused by dismantling the formwork when the concrete is not old enough, or dismantling the formwork too quickly before its time.
c. Concrete formwork or molding used on the concrete floor must be left in place for at least 14 days after the casting time. The suspended concrete floor must be fully supported for at least 14 days after casting the concrete floor on the floor being refuted.
d. If there is a hole or occurs such as porous or other things on the concrete after formwork is dismantled, then Project Owner/ Supervisor must immediately be notified of that in advance. It is not allowed to repair or do other things unless it has received approval and permission from Project Owner/ Supervisor in advance.
e. After the completion of all structural work, all formwork or concrete-forming molds and other supports must be all dismantled keeping in mind all the requirements specified previously. However, this must get direction, as well as prior approval from the Project Owner / Supervisor.

CHAPTER VII
WALL MASONRY WORKS

7.1. WALL WORK

7.1.1. Scope Of Work

This work includes the supply of labor, materials, equipment and tools needed to carry out the work of masonry on the walls and others according to detailed drawings and Supervisor instructions.

7.1.2. Materials

Material requirements used are as follows:

a. Stone masonry/ mountain / split, the size is the same flat, one thing and another according to SNI 03-2461-1991.
b. Cement which can be used in this work must fulfill the requirements stated in SNI 15-2049-1994 and one thing is the same as what is required for concrete work with masonry.
c. Sand used in this work is tidal sand type, which fulfills the requirements specified in SNI 03-2461-1991
d. The water to stir the sand cement mentioned above must be clean, one thing and another according to SNI 03-2847-2002.

7.2. SPECIFICATION OF MATERIALS

7.2.1. Bricks

The combustion must be cooked, if immersed in water will remain intact, not broken or destroyed. The size of the brick 200 x 100 x 50 mm or adjusted to the wall thickness requirements required in the Working Drawings. Therefore the Contractor must provide an example to the Supervisor to be able to check its quality. If the material that arrives, is considered by Supervisorto be ineligible, Supervisorhas the right to refuse the material and Contractor must transport it outside the construction site.

7.2.2. Autoclaved Aerated Concrete (AAC)

a. All blocks shall be square, true and have sharp arises. They shall be dimensionally stable in regard to height, width and length.
b. Lightweight concrete blocks shall be required to satisfy the following specification.
   - Size : 600x200x100mm thk
   - Dimensional tolerance : ± 2 mm
   - Dry Density : 500 kg/m3
   - Minimum compressive strength : 4.0 N/mm2
   - Thermal conductivity : ≤ 0.14 W/mK

- Water absorption : ≤ 0.10 kg/m2s0.5
- Drying shrinkage : ≤ 0.03%
- Fire resistance : 4 hours

c. All blocks shall be produced by one manufacturer : HEBEL, CELCON, GRAND ELEPHANT or equal.

d. All units shall be free of organic impurities that will cause rusting, staining or pop-outs and shall contain no combustible matter.

e. Adhesive
Production: MU-382 / AM-48
Form: Powder
- Color: light gray
- Adhesives: Mortar Portland
- Filler: Filling material to increase density & reduce the level of porosity of a light brick mortar.
- Aggregate: Selected sand with a maximum of 0.6mm granules
- Additives: Additives which are soluble in water to increase workability and adhesion
- Water requirements: 9.5 - 10.5 liters per bag of 40 kg
- Scattering: ALC 10 cm: + 10m2 / sack 40Kg / 3 mm thick application ALC 7.5 cm: + 16m2 / sack 40 Kg / 3 mm application thickness
- Specific Gravity (wet): 1.75 Kg / Liter
- Pot Life: @ 35O C: 1 Hour
- Application thickness: 3 mm
- Adhesive strength: 0.4 - 0.6 N / mm2 @ 28 days (EN 1015: 2)
- Compressive strength: 10-15 N / mm2 @ 28 days (DIN 18555 Part 3)

7.2.3. Cement / Portland Cement (PC)

The cement material used is the same as cement / PC for concrete construction. Cement that arrives at the work site and waits for its use must be stored in a warehouse whose floors are dry and 30 cm higher than the surrounding soil surface. If at each opening of the bag, the cement turns out to be petrified, then the cement must be removed outside the construction site and may not be used. Suppliers / traders who send cement for this work should be able to show certification from the factory. Cement that is already moist or has symptoms of petrifaction will be rejected. Immediately rejected cement must be removed from the construction site to avoid things that are not desirable.

7.2.4. Sand

The material used is the same as the sand used for concrete construction. The sand in question must be clean, original sand that is free from all kinds of impurities and chemicals, one thing and another according to NI-3 article 14 paragraph 2. If the sand used does not meet the above conditions, Supervisoris entitled ordered to wash the sand, see the results until approval is obtained. Especially for plaster, finer sand must be found.

7.3. REQUIREMENTS FOR IMPLEMENTATION

7.3.1. Bricks

1. Before starting the installation, the bricks must first be immersed in water for half an hour or until they are saturated and the surface to be installed must also be wet.
2. Stirring the pair must be made carefully, stirring in a wooden tub the size meets the requirements. In mixing cement and sand must be in a dry state which is then given water until a plastic mixture is obtained. A dry mixture should not be mixed with a new mixture.
3. In one day the pair must not be higher than 1 (one meter). From the termination of the one-day pair must be made in steps and not standing upright to avoid cracking in the future. Brick thickness should not be less than 1 (one) cm or 10 mm and the broadcast must be completely in the mix.
4. All new work result must not be exposed to direct sunlight by closing them using wet sacks.
5. The place where the hole must be made must be prepared first by clogging it using a banana trunk for a large diameter, whereas for smaller diameters a piece of bamboo is used.
6. All pairs of bricks must be flat (horizontal) and each time measured from the floor, using thread. Threading should not be more than 30 cm above the pair below. In all half-stone masonry pairs, there must be a perfect binder. It is not permissible to use half-length broken bricks, except according to the rules (in the corner). The one layer with the one above must be half the length of the brick. In one stone pair and a thicker pair must be arranged in accordance with the instructions / regulations should be.
7. At each intersection of masonry walls, perpendicular to, above each door hole and window or other hole and where the wall area is not more than 12 m2, whether drawn or not, a concrete column / beam is installed which is a frame, except for one and other things adjusted to the picture. The size for the beam / column is as thick as a brick wall with a 4 Ø10 stirring Ø8 - 150. All perpendicular meetings must be completely 90º.
8. As a preparation for plastering, the broadcast must be tapped 0.5 cm deep so that the mixture will be sufficient to bind the plaster to be installed.
9. If the installation turns out to have a defective or imperfect brick, this brick must be replaced with a good condition at Contractor's expense.
10. In the place where there will be doors, windows, ventilation holes etc., the pair of bricks should be left until the frame sill is finished and installed in the right place.
11. Holes for power tools:
    a. Where pipes and / or implements will be installed in the wall, then sufficient sculpture must be made in the masonry before plastering.
    b. The sculpture after being installed pipe / tool must be covered with a plastering mortar that is carried out perfectly, done together with plastering entirely in the field of the wall.

7.3.2. Autoclave Aerated Concrete (ACC)

1. Wall masonry use Instant Mortar (ex-Main Mortar MU-382) to mix pairs (species). All pairs start from sloof up to 20 cm above the floor surface of 0.00 and the walls around the toilet and wet areas to +215 cm above the floor surface of 0.00
2. Steger footing should not close to the walls.
3. For all outside walls, all ground floor walls starting from the surface of sloof to a height of +30 cm above the surface of the ground floor, walls in wet areas to a height of +200 cm from the surface of the floor and all walls that use symbols / stir trassram / watertight use mix Trassram Instant Mortar (ex. Main Mortar MU-101) or cement based waterproofing (coating) Main Mortar MU-600
4. Estimate the height of the wall to be made, avoid as much as possible light brick cuts.guara
5. As an anticipation, leveling the screed using a mixture of Pre mixed mortar Patchcrete (ex. Mortar Utama MU-830) / Plaster AM-85
6. AAC wall masonry must be cleaned before the plaster from dust, oil, grease, wax, paint and other harmful particles that stick to the surface to be fitted with adhesive (species)
   - Installation of AAC walls is done in stages, each stage consisting of a maximum of 24 layers each day, followed by a practical cast column.
   - Walls that are larger than 12 m2 add columns and reinforcement beams (practical columns) with a size of 12x12 cm, with reinforcement 4-10 mm, 6 mm stirrups 20 cm apart.
   - Making holes in the installation for scaffolding / steger is not at all justified.
   - Making holes in the AAC pair associated with each part of concrete work (column) must be reinforced concrete cuttings 6 mm distance of 60 cm, which are first planted well in the concrete work section and parts planted in pairs of brick at least - at least 30 cm unless otherwise specified with the approval of the Construction Management Consultant (MK).
   - It is not allowed to install a broken AAC in excess of 5% broken AAC from 2 parts which are not permitted to be used.
   - Work can begin only if the horizontal or vertical alignment of the foundation has an error not exceeding 2.5 cm when added together, if more ways to improve the foundation surface must be submitted for approval from the Constitutional Court.
   - Each unit must be properly and neatly cut, if holes are used for plumbing, electrical and other channels, these holes must be neatly closed later.
   - In the foundry area, mix AAC pairs must be arranged alternately from bottom to top so as not to form a vertical line.
   - Thick walls. The final result is AAC wall pair with a thickness of 15 cm, flat and not wavy, with angles that form elbows.

7.4. PLASTERING WORK

7.4.1. Scope of Work

a. Providing labor, materials, equipment and tools to carry out this work so that good and perfect work results are obtained.
b. The scope of this work includes the provision of plastering material, preparation of the walls / places to be plastered, as well as the implementation of the plastering work itself on the wall to be finished with paint, one thing and another according to what is stated in the floor plan drawing and wall completion notation.

7.4.2. Material Specifications

1. Cement that can be used in this work must meet the requirements such as cement for concrete construction, one thing and another according to NI-8. The branding / production output of cement for this work will be determined later.
2. The sand that must be used must be smooth with original color. One thing and another is in accordance with the requirements mentioned in NI-3 article 14 and after obtaining approval from Project Owner/ Supervisor.
3. Water for stirring the two material above one thing and another with article 10 of NI-3.

7.4.3. Implementation Requirements

1. The intended stucco mixture is a mixture in volume. How to make it using a mixer for 3 minutes.
2. Beraben is rough plastering with a mixture of watertight mortar that is 1 PC: 2 Sand. Used to cover the surface of a masonry wall that is embedded in the ground up to the ground surface and / or floor.
3. Ordinary plastering is a mixture of 1 PC: 4 Sand. Stir this plaster to cover all the walls of the masonry inside the building unless it is declared waterproof.
4. Watertight plastering is a mixture of 1 PC: 2 Sand. Mix this plaster to cover all the surface walls of the masonry walls outside / the edge of the building, all parts and the whole surface of the masonry walls as listed in the Working Drawings.
5. Smooth plaster is a mixture of PC with water that is made in such a way that it gets a homogeneous mixture. This fine plastering is finishing work carried out after stirring the plaster as a base layer of 7 (seven) days / it is completely dry.
6. All types of plastering stir mentioned above must be prepared in such a way that it is always fresh, not dry at the time of installation.
7. Except for beraben, the surfaces of all the plastering stirs must be leveled. The surface of the plastering, especially smooth plastering, must be flat, not bumpy, full and solid, not hollow and hollow, do not contain gravel or other objects that create defects.

8. Before plastering on the surface of a pair of bricks and concrete, the surface of the concrete must be cleaned of the remnants of formwork then scratched. All formwork or form tie binding holes must be covered with mortar.
9. Fine plastering work is for all surfaces of masonry and concrete to be finished with paint.
10. All surfaces that will receive finishing materials, such as ceramic tiles and others, then the surface of the plaster must be given horizontal line grooves to provide a better bond to the finishing materials / materials. This work does not apply if the finishing material is paint.
11. The thickness of the plastering must reach the wall / column / floor surface thickness stated in the Working Drawings and / or according to the peels requested in the Work Drawings. Plastering thickness of at least 10 mm, a maximum of 25 mm. If the thickness exceeds 30 mm, it is required to use a strimin wire which is attached to the surface of the relevant brick or concrete pair to strengthen the adhesive strength of the plastering.
12. For flat surfaces, the curvature or curvature tolerance limit must not exceed 2 mm for any 2 m distance.
13. Moisture plaster must be maintained so that the drying takes place properly, not suddenly. This is done by wetting the plastered surface whenever it looks dry and protecting it from direct sunlight with a covering material that can prevent rapid evaporation of water. The wetting is for 7 (seven) days after the compilation is complete, Contractor must always flush with water at least 2 (two) times a day until it is saturated. In the event of a rift, Contractor must dismantle and repair it until the result is declared accepted by Project Owner/ Supervisor.
14. Plastering surface finishing is not justified before plastering is more than 2 (two) weeks.

7.5. IMPLEMENTATION

7.5.1. Preparation of Plastering

1. Clean the base surface until it is completely ready for plastering.
2. For large areas, a basic plastering pattern (plastering head) is made with a distance of 1 meter in the vertical direction as a plastering base to ensure the same thickness, a flat / flat surface, contour and accurate profiles.
3. Wet the entire surface of the area to be plastered for absorption. Plastering can begin after the field is dry.
4. Performing plastering shows unsatisfactory results such as uneven, not perpendicular or wavy, any broken or cracked, porous, then the part must be dismantled again to be repaired at Contractor's expense.

7.5.2. Implementation of Plastering Work

1. Clean the surface of a brick wall or concrete surface from dust, oil paint, other materials that can reduce the bonding capacity of the plastering.

2. To get a flat surface and thickness as required, in starting plastering work, a "plastering head" must be made first.
3. Attach the required thick stucco layer (+ 20 mm) and flatten it with a wooden / steel trowel of fine wood and its surface flat or with an aluminum profile with a minimum length of 1.5 m. Then keep it wet for 3 (three) days to avoid cracking due to sudden shrinkage.
4. For plastering on the concrete surface, the concrete surface must first be roughened with an steel chisel to get a strong bond between the concrete surface and the plastering. If necessary the surface of the concrete that has been roughened is given additive material, for example "Calbond".
5. Wet the concrete surface for the water until it is saturated, wait until the water flow stops.
6. In the implementation of concrete surface plastering with a minimum thickness of 2 cm, it is not permissible to do plastering at once, but it must be done in stages by attaching a mortar on the part to be plastered, then after drying, do the next plastering with mortar to reach the thickness as desired.
7. If there is a plastered part on the concrete surface with a thickness of more than 3 cm, as a result of an error at the time of casting or others, then the plastering must be coated with chicken wire affixed to the concrete surface to be plastered. The cost of adding the chicken wire is borne by Contractor.
8. Avoid objects or other materials that can damage the surface of the shelf.
9. If there is plastering work that must be dismantled or repaired, the final result (finishing) of the work must be able to match the work that has been approved by the Supervisor.

CHAPTER VIII
METALS WORKS

8.1. GENERAL REQUIREMENTS

Work of this section, as shown or specified, shall be in accordance with the requirements of the whole set of the Contract Documents.

8.2. SCOPE OF WORK

This section cover the prevision, fabrication as shown on drawings, including but not limited to the following:

1. Access door
2. Gratings
3. Railling
4. Steel framing, bracing, support, anchor, bolts, shims, fastenings, and all other supplementary parts indicated on drawings or as required to complete each item of work of this section
5. Cutting, fitting, drilling and tapping work of this section to accommodate work of other section and of concrete, masonry or other material as required for attaching and installing work of this section.

8.3. REFERENCES

1. **SII Standard :**
   1. SII 0163 - 79 - Hot-rolled and Plate
   2. SII 0233 - 79
   3. SII 0234 - 79
   4. SII 0589 - 81 - Steel
   5. SII 0780 - 83 - Bolts
   6. SII 0589 - 81 - Nuts

2. **JIS Standard :**
   1. JIS G 3101 - Grade SS 41 - Heavy Weight Hot-Rolled and Plate
   2. JIS B 1190 - Nuts & Bolts
   3. JIS G 3459 - 5 SUS 304 Stainless Steel pipe and fittings

3. **ASTM Standard :**
   1. ASTM A 53 - 86 - Seamless and welded Black and Hot-Dipped Zinc-Coated Steel pipe.
   2. ASTM A 123 - 84 - Zinc (Hot-Dip) Galvanized Coating on Steel and Steel Product.
   3. ASTM A - 48 - Cast Steel
   4. ASTM A - 36 - Heavy Weight Hot Rolled and Plates
   5. ASTM A - 307 - Steel Anchor Bolts
   6. ASTM A - 563 - M - Nuts
   7. ASTM E - 935 - Structure for Railing

8.4. QUALITY ASSURANCE

1. Field Measurements: The field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress, allow for trimming and fitting where taking field measurements before fabrication might delay work.
2. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordination installation.

8.5. SUBMITTALS

1. Product Data: Manufacturer's Literature for manufactured components indicating type, finish, size accessories, and anchorage details.
2. Shop Drawings: Indicate profiles, dimensions, fabrication and installation details, size and type of fasteners, welds, accessory items, shop finish and method of anchorage.
3. Certification: Fabricator's Engineer's statement indicating fabrications are designed, fabricated and installed to comply with code and Contract Document loading.

8.6. MATERIALS

1. Stainless Steel
   a. Stainless Steel grade shall be 1.4401/316 for external and grade 1.4301/304 unless otherwise indicated.
   b. Finishes: Bead blast indicated for coarse brushed smooth with low reflectivity. Hairline indicated for directional brushed smooth with low reflectivity. Mirror indicated for mirror like polished with high degree of reflectivity.

2. Steel
   a. Steel Plates, Shape and bars : ASTM A36
   b. Steel Tubing: Hot-rolled. ASTM A501
   c. Steel Pipe: ASTM A53; Type and grade (if applicable) as selected by fabricator and as required for design loading; shop prime finish unless otherwise indicated.
   d. Brackets, Flanges and Anchors: Formed metal of the same type material and finish as supported elements, unless otherwise indicated.

3. Aluminium: Extruded aluminium, alloy 6061.

4. Cast Steel: Grey Cast Steel.

5. Grout : Factory – packaged, non metallic, non corrosive, non-shrink, non-gaseous.Standard : CE CRD-621

6. Fasteners :
   a. General: Provide zinc-coated fastener for exterior use or where built into exterior walls. Select fastener for the type, grade and class required
   b. Bolts and Nuts: Regular hexagon head type, ASTM A307.
   c. Leg Bolts : Square head type, FS FF-B-561
   d. Machine Screws : Cadmium plated steel, FS FF-S-92
   e. Wood Screw : Flat head carbon steel FS FF-S-111
   f. Plain Washers : Round, carbon steel, FS FF-W-92
   g. Expansion Anchorage Devices : Expansion shields, FS FF-S-325
   h. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
   i. Lock Washers : Helical spring type carbon steel, FS FF-S-84

7. Shop Paint: Shop prime all non – galvanized miscellaneous metal items (except aluminium and stainless steel) using serious 88 Azeron Primer made by Themec or equal approved of type available locally.

8. Railling
   Steel pipe of size shown on Drawings. Fittings shall be flush type, malleable or cast steel. Brackets shall be malleable steel, design as selected by The Architect.
   a. Balustrade: Stainless Stell Black and Galvanized Steel Cable as drawing specified.
   b. Metal Material: Extruded 304 or 316 stainless steel to size and shape indicated.
   c. Handrail: Composite Handrail 40x40mm, Waggut Finish ex: GRM #HH04040.

8.7. PRIME / FINISH

1. Universal Primer :

   a. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.
   b. Standard : FS TT-P-645
   c. Maximum Allowable Dry Time : 4 hours to touch; 24 hours to re-coat
   d. Compatible with finish paint system specified in 09 91 00

2. Zinc-Rich Primer :

   a. Inorganic, zinc-rich, capable of providing sound foundation for field applied top coats despite prolonged exposure, cathodic protection and corrosion resistance. Similar to galvanizing.
   b. Pigment Content: Minimum 80% zinc in dry film by weight.
   c. Maximum Allowable Dry Time : 1 hours to touch; 12 hours to top coat
   d. Compatible with finish paint system specified in 09 91 00.

3. Galvanizing :

a. Provide hot-dip galvanized coating in accordance with:
   - ASTM A 153 - Steel and Steel hardware
   - ASTM A 123 - Rolled, pressed and forged steel shapes, plates bars and strips 3 mm thick and heavier.

b. Galvanizing Repair Paint:
   - Standard : MIL-P-21035 for SSPC-Paint-20

4. Finish: Spray Painted, Powder Coated.

8.8. ADJUST AND CLEAN

1. Touch-Up Painting: Immediately after erection, clean field welds, bolters connections, and areas and paint with same material used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
2. For Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint complying with ASTM A780.

CHAPTER IX
GLASS WORKS

9.1. SCOPE OF WORK

1. Provide labor, materials, equipment and other tools to carry out the work so as to achieve good quality work and perfect product.
2. Glass work covers all the details mentioned / shown in detail drawings.

9.2. MATERIAL REQUIREMENTS

1. Glass is a material made of glass materials are flat in general has translucent properties, can be obtained from the process of tensile, Gilas and floundering (Float glass).
2. Width and length tolerance must not exceed the tolerances specified by the manufacturer.
3. The faceted glass sheet shaped rectangular should have an angle as well as the edges of the cut flat and straight, the maximum tolerance is allowed is 1.5 mm per meter.
4. Defects:
   - Translucent sheet defects that are allowed to be in accordance with plant
   - The glass used should be free of bubbles (spaces containing the gas contained in the glass).
   - The glass used should be free of the chemical composition that can interfere with vision.
   - The glass must be free from cracks (lines broken glass either part or all of thick glass).
   - The glass must be free of crack in the edge (protrusion on the side of length and width towards the outside / in).
   - Must be free from yarn (string) and wave (wave) line defects arising yarn is translucent view, the glass surface wave is changed, and interfere with vision.
   - Must be free of spots, cloud and scratches.
   - Free curvature (curved glass sheet).
   - Quality flat glass used AA quality.
   - The thickness of the glass sheets used must not exceed the tolerances specified by the manufacturer. Glass thickness of 5 mm to about 0.3 mm.
5. Glass Material
   - Glass and mirrors, must correspond SII PBVI 0189/78 and 1982.
     Used ASAHIMAS, MAGI GLASS, TAMINDO or equal.
   - Materials for interior glass using: * Color (tinted) Float Glass, reflective glass 40% thicker corresponding to the drawing.
   - Materials for interior glass using: * Color Float Glass corresponding drawing.

- Materials for use mirrors: Clear Float Glass, 8 mm thick on one surface is coated (Chemical Deposited Silver). The surface should be free of stains and blemishes, free sulfide and other spots.

6. All glass and mirrors before and after attached to approval Supervisor
7. The edge of the glass that looks and does not shor due to cutting, must be formulated/smoothed.

9.3. TERMS OF IMPLEMENTATION

1. All work is performed by following the instructions images, descriptions and terms of employment in this book.
2. This job requires skill and precision.
3. All materials that have been installed must be approved by supervisor.
4. Materials that have been attached must be protected from damage and impact, and are marked for easy note, the signs are not allowed to use chalk. Signs must be made of pieces of paper glued using glue shaft.
5. Cutting the glass should be neat and straight, are required to use the tools of special glass cutter.
6. Cutting the glass to be adjusted size of the frame, at least 10 mm into the groove on the glass frame.
7. Cleansing the end of the glass must use soft cotton cloth using liquid glass cleaner.
8. Connecting glass with glass or glass with other materials without going through the frame, should be filled with silicon glue, color transparent way of fitting and mounting arrangements should follow the instructions issued by the manufacturer.
9. Mirrors and glass should be installed neatly, side should be straight and flat, not allowed to crack and break the sealant / edges, free from stains and scratches.
10. The mirror in accordance with the submitted sample and all attached must be approved Supervisor, kind of mirror in accordance with the terms mentioned in the use of materials in a written job description and terms of this type of VVV polished, 5mm thick.
11. Cutting the mirrors must be neat and straight, are required to use a special glass cutting tool.

9.4. GLASS WORKS

1. Scope of work
   This description covers the technical requirements for the execution of the installation work on the glass door and window frames, as well as construction and installation for a wide variety of glass work.

2. Another job description is included / used in this work is; The technical requirements of implementation of the work the doors and windows.

3. Conditions:
   a. This work should be carried out by the experts who are experienced in the implementation of glass work.
   b. Cutting, removal and adjustment of glass had to use special equipment used for that purpose, among others, special glass cutting equipment, letterhead for a sheet of glass lifter etc., the equipment required for the execution of the work.
   c. The provision of material types refer to the work.

4. Material
   a. Glass
      All glass used in the execution of this work must generally be free of defects distortion or other physical defects. The glass used is a clear glass / min plain with a thickness of 8 mm or in accordance with the working drawings.
   b. Supplementary equipment Glazing
      All complementary equipment for the installation of the glass should be in accordance with the order of its place, the right size and of the best quality and must receive approval from the Supervisor.

5. Implementation
   a. Work state examination
      Before starting the installation, the Implementing Jobs was asked to check the location of the installation, both in terms of readiness and the precision and accuracy implementation of the work of its predecessor.
   b. Cutting, Appointment and Glazing
      Cutting the glass should be straight, neat and smooth, precise size, then mounted on a suitable location with a pin, is seated firmly and precisely in position, both in terms of erectness or slope according to shop drawing.
   c. Cleaning
      On completion, the work must be clean and installed in accordance with the quality of work that is required.

CHAPTER X
WATERPROOFING WORKS

10.1. SCOPE OF WORK

1. Provide labor, materials, equipment and tools to carry out this work in order to get a good result and a perfect job.
2. Work may include the installation work waterproofing
3. the treatment, the floor plate roof, wet areas, trench and other parts stated in the picture.

10.2. MATERIAL REQUIREMENTS

1. Material must meet the standards specified by the manufacturer and other standards, such as the NI-3, ASTM D, ASTM E, UNI, UEAtc.
2. Type waterproofing membrane material is made of Acrylic, Color and Filler Composition Substance use is 0.6 to 1.0 kg of material for 1 m2.
3. The type of material used BASF, BITUTHENE or other equivalent.
4. Protection of waterproofing using screed (ratio 1 Pc: 3 sand).
5. Concrete roof and concrete slab using waterproofing cap membrane type.
6. Waterproofing used must be guaranteed 10 years, with good quality, durable and does not leak.

10.3. IMPLEMENTATION REQUIREMENTS

1. Surface preparation
   a. Surface concrete plate that will be given a coating of waterproofing should be completely clean, free of oil, dust as well as the sharp protrusions that permanently from spills or splashes of stirring and in dry conditions (both in the sense of the word dry leveling screed and dry surfaces).
   b. All meetings 90 ° or sharper angles must be made blunt, which is the cover along the corner with 1 Pc water-proof: 3 PSR or as stated in the work image.
   c. In the leveling screed used Waterproof mix 1 Pc: 3 PSR, molded using the directional waterpass yarn of the direction (slope direction towards the gutter holes and floor drain ± 1%)
   d. Special layer screed on the roof and the concrete gutters should use the wire mesh shrinkage mounted in the center of the screed thickness and before installation should be brought in first so that it is not curved.
   e. Screed is installed following the predefined patterns and flatten the surface (smoothed) by using trowel, rubbed in such a way with the trowel so the air bubbles trapped inside the Screed can be Out.
   f. In the condition of half dry, the screed was directly sprinkled cement while rubbed again with steel trowel so evenly. After the dry screed layer should not be plastering with smooth surface.

g. After the dry air ± 24 hours, this new screed should be protected from the possibility of cracked hair with a road covering the surface topped with a burlap sack that has been dampened in the water first and maintained a wet condition.
h. The time required for the dry screed is at least 7 (seven) days in sunny weather conditions. For bad weather (rain) is not included in the calculation of the drying time of the screed.

2. Layers Waterproofing
   a. Concrete surface that will be installed waterproofing should be dry, free from dirt and dust.
   b. The work of the undercoat (coatings I) as the first layer with a composition of 0.2 kg / m2,
   c. The second coating work done after the grace period of ± 1 (one) hour of the first job with a composition of 0.3 kg / m2.
   d. The coating work to do after a grace period of three ± 1 (one) hour of work into two with a composition of 0.3 kg / m2.
   e. Implementation of the waterproofing in the gutter area (roof drain) into the gutter along the ± 10 cm.
   f. In the implementation of this waterproofing, must be protected from the sun by using tents.
   g. Waterproofing is mounted should not be trampled especially by shoes or footwear that is sharp. Contractor must protect and locate areas that have been installed this waterproofing. In the area list plank concrete, waterproofing must be installed following the shape list plank.
   h. Contractor have to stop work in case of rain and resumed after the location is really dry.

3. Protective Coating
   a. After waterproofing is installed, then on the surface is given a layer of protection screed (ratio 1 Pc and 3 sand), 2-4 cm thick by using wiremesh shrinkage that is located in the middle of the scene screed.
   b. To adjust the distance/thickness of the screed, concrete decking should be used as thick as 1.5 cm per distance of 0.5 m.
   c. The screed surface is smoothed with trowel when the screed condition is half dry by sprinkling cement and rubbing it until slippery.
   d. After all the installation of waterproofing coating and before the discharge of protective coating, Contractor must carry out leakage testing especially for horizontal surfaces of roofing plates. The testing way is to pour water into an area covered with waterproofing coating up to a minimum water height of 50 mm and left for 3 x 24 hours. Mark the parts that are not perfect or leak. For tilting roofing plates should be divided into several segments so that the puddle does not need to be high at the lowest plate point.
   e. Contractor shall hold security and protection against the installation that has been conducted, against possible shifts, surface abrasions or other damages. If there is damage caused by Contractor negligence,

either at the time of this work is carried out or when the work has been completed, then Contractor shall fix/replace the damaged part until it can be accepted by the service user/Design Consultant. The costs incurred for the work of this repair are the responsibilities of Contractor.

f. Concrete surface to be installed waterproofing should be dry, free from dirt and dust.
g. Undercoat work (coating I) as first layer with composition 0.2 Kg/m2,
h. The second coating work carried out after the grace period ± 1 (one) hour from the first job with the composition 0.3 Kg/m2.
i. The third coating work carried out after the grace period ± 1 (one) hour from work to two with composition 0.3 Kg/m2.
j. The implementation of waterproofing on the gutters (roof drain) entered into the gutters along ± 10 cm.
k. In the implementation of this waterproofing, it must be protected from sunburn using tents.
l. Waterproofing pre-installed should not be trampled especially by shoes or footwear that are sharp. Contractor must protect and localize these pre-installed waterproofing areas. On the concrete area, waterproofing should be installed following the form of List plank.
m. Contractor should stop the job in case of rain and resume after the location is completely dry.

CHAPTER XI
ROOF WORKS

11.1. GENERAL REQUIREMENTS

1. Requirements for steel construction and engineering terminology in general be a unity in the inside of the book's technical requirements. Unless otherwise specified in this technical book, then all the steel work should refer to the following standards:
   - Indonesia Steel Building Planning Regulations (PPBBI 1983)
   - General Requirements of the Indonesian National Standard (SNI 8399 – 2017, Light Steel Profiles Standard)
   - General Requirements of the Indonesian National Standard (SNI 2010)
   - General Requirements of the Indonesian National Standard (SNI 03-1729-2002)
2. Contractor must carry out this work with high accuracy and suitability according to these technical requirements, design drawings and instructions given by the supervisor.
3. Contractor must have experience in carrying out zincallum roofing work for a minimum of 10 years as a specialist / vendor / applicator that is fully responsible for but not limited to technical calculations of the roof truss, roof coverings, and all its accessories into one product unit.
4. Contractor/ vendor must be able to guarantee that the entire roof can function properly but is not limited, does not leak, does not change shape, and the paint finish does not change color for 5 years.
5. All materials used must be new with the best quality in accordance with the requirements and known by the supervisor. Supervisor reserves the right to request the testing conducted on these materials and Executing shall be liable for any costs for the purpose.
6. All measurements must use steel cords approved by Supervisor.

11.2. SCOPE OF WORK

1. This section includes the provision of labor, materials, equipment and tools needed to carry out steel work, aluminium foil and roofing mentioned / shown in the drawings or as directed Supervisor.
2. Erection, installation of steel construction until all of the components installed in accordance with the design.

11.3. MATERIALS

1. Material specifications
   a) Roof Cover: zincallum sheet t = 0.4 mm with clip-lock system
   b) S Size: According to the drawing
   c) Termal insulation: Aluminium foil foam t = 4 mm
   d) Purlins: Light Steel G550 (Minimum yield strength 550 MPa)
   e) Easel: Light Steel G 550 (Minimum yield strength 550 MPa)

2. Considering the availability of material, the Contractor hereby is permitted to change the shape of the light steel truss and the dimensions of the profile used by previously submitting the calculation of the light steel truss form and the specifications of the mild steel profile which will be used to obtain the agreement of the Supervisor. Changes made MUST NOT change the shape of the building's roof surface profile.
3. Contractor must submit a certification test from the steel manufacturer to be approved by the directors / Supervisor before ordering material by Contractor.
4. Contractor must submit two (2) copies of the operative provisions and technical requirements of the plant / manufacturer for the information of Supervisor.
5. Other materials that are not on the list above, but necessary in the completion / replacement work, must be new, the best quality and should be approved by the Controller.
6. All material must be clean steel from rust, holes and free of bending, torsion and other damage.
7. All material must be stored neatly and placed on boards / blocks of wood to avoid direct contact with the soil surface. In the buildup material, Contractor must ensure the integrity of the material from damage that may occur.
8. Supervisor the right to reject materials that do not meet the requirements of steel mentioned above and not be acceptable for fabricated.
9. Light steel used must be guaranteed 10 years, with good quality.

11.4. MATERIAL TESTING

1. If necessary, Supervisor may instruct Contractor to provide an example of the steel material in order to held the test material. All costs incurred for this purpose is the responsibility of Contractor.
2. Supervisor will conduct tests on welds. Type and amount of testing for welding tailored to the needs and carried out at the expense of Contractor.
3. If it turns out there is a material that does not qualify as clause 03 above, Supervisor is entitled to reject the use of these materials.

11.5. TERMS OF IMPLEMENTATION

1. Shop Drawing
   a. Before fabrication begins, Contractor must make images of the work needed and send a copy of 4 sets of working drawings for approval by Supervisor. Where When approved, two sets of working drawings will be returned to Contractor for the fabrication work can begin.
   b. Examination and approval of Supervisor on the working drawings are concerned in terms of the strength of steel structures such as: measurements / dimensions of the profile, the thickness of the plate, the size / number of bolts / welding, welding thick.

c. The accuracy of measurements, length, height of construction elements associated with the erection becomes the responsibility of Contractor. In other words, despite all the working drawings have been approved by the supervisor, it is not meant to reduce or exempt from responsibility Implementing inaccuracy and ease of erection of steel construction elements.
d. Measurements with the scale of the picture is not at all allowed.

2. Fabrication
   a. Implementing must provide Fabrication Procedures Manual including quality control procedures to Supervisor.
   b. Fabrication of steel construction elements must be carried out by experienced craftsmen and supervised by headmen who are experts in steel construction.
   c. Cuttings elements should be carried out neatly, and steel cutting must be done in a blender and grinding the edges until smooth and free from traces of dirt. Cutting the welding machine is not allowed.

3. Signs on Steel Construction
   a. Implementing should provide marking procedures that will be used to Supervisorfor approval.
   b. All steel construction has been completed fabricated to be distinguished and coded clearly appropriate that each part can be installed easily. These codes should be written with a paint that are not easily erased.
   c. Connection plates and other parts of the elements necessary for connections in the field, must be bolted / bonded while the first of each element with a fixed marked.

4. Bolt Connectors
   a. Connectors is using SDS Screw 10-16x16 with shear resistance minimum 5.1 kN
   b. Quality is HTB A.325 connecting bolt tensile stress minimum breaking 133 psi, a tensile stress permits 44 Psi and Psi 17.5 permits shear stress. Connecting bolts must be of good quality and new, the diameter of the bolt, screw length must comply with the necessary.
   c. Bolts must be equipped with two rings, each 1 piece on both sides. Quality plate ring bolt in accordance with the quality.
   d. Quality black and anchor bolts are ST.37 (Fe 360)
   e. Supervisor are entitled to ask Contractor to test bolts on laboratory approved by the supervisor, before Contractor ordered the bolts used.
   f. The number of bolts that were tested for each bolt is 3 pieces. Although the bolt test is qualified, Supervisorreserves the right to request another bolt-on test with the amount of 1 bolt of each 250-bolt used. The cost of testing the bolt is borne by Contractor.
   g. The position of bolt holes really appropriate to its diameter. Implementing may not modify or create new holes in the field without the permission of the supervisor.

h. Making the drill bolt holes should wear. For the construction of a thin (maximum 10 cm) may be used punch machine. Making the hole with the use of fire, absolutely not allowed. Bolt hole was made 2 mm wider than the diameter of the bolt.
i. Installation and bolts must be done in such a way so as not to cause excessive torsion torque on the bolts which will reduce the strength of the bolt itself.
j. The length of the bolts must be such that after tightened still be at least 4 screw protruding on the surface, without causing damage to the thread. Long bolts are not eligible should be replaced and should not be used.
k. To avoid the presence of unexplained bolts, then the bolt that has been tightened must be marked with paint.

11.6. ERECTION SCHEDULE / METHOD

1. Executing no later than two (2) weeks prior to the erection starts, must submit Erection Schedule / Method to be examined or approved by the regulatory Erection Schedule should include, among others:
   - Delivery plan of the workshop / factory
   - Storage steel elements who want to erection
   - The tools used
   - Erection sequence
   - Time schedule erection of steel construction elements
2. Contractor shall notify in advance each would be no delivery of factory / workshop to the field to check by the supervisor. Supervisor will reject any shipments of steel from the workshop / factory if the delivery has not been checked and approved by the Supervisor.
3. Placement of steel construction elements in the field should be in a dry / sheltered so it does not damage these elements. Supervisor reserves the right to reject elements of steel construction damaged due to misplaced or damaged due to other things.
4. Erection of steel construction elements can only be done after Contractor filed erection schedule / method and has received written approval from a supervisor.
5. Implementing responsible for the safety of the workers in the field. For this Contractor must provide belts, safety, safety helmet, gloves and a fire extinguisher.
6. Implementation of this erection should be headed by a truly expert and experienced in the erection of steel construction in order to prevent things that are not beneficial for the structure.
7. Failures in erection is the responsibility of the Implementing fully, therefore, Contractor was asked to give special attention to the problems of this erection.
8. All plates or elements that are damaged after fabrication, are not allowed to be used for the erection.

9. If approved by Supervisorthen the welding done in the field should be supervised exactly by Supervisorof Contractor so that the welding is carried out according to the image of the design of both length and thickness.

11.7. ROOF WORK

1. All the rafters, purlins, trekstang and wind before the closed roof bond must first be painted and the paint finish zinchromate entirely.
2. Roof coverings using zincallum sheet material t = 0.4 mm. Swimming, capping, flashing and other accessories of the same material from one factory.
3. Installation and completion of details of zincallum roof coverings according to the specifications issued by the manufacturer

CHAPTER XII
FLOOR & WALL FINISHES

12.1. LEAN CONCRETE WORK

12.1.1. Scope Of Work

This section includes the provision of labor, materials, equipment and assistive devices are needed in the implementation of the entire work floor concrete rebates in accordance with the details mentioned in the drawing or user of Supervisor.

12.1.2. Control Of Work

All works will be adjusted according to standard
- Compressive Strenght (ASTM C 109) : 1 > 4 N/mm2 @ 28 day
- Water Retention (BS 4551) : 1- > 95
- Drying Shrinkage (ASTM C 531) : i < 0,1

12.1.3. Implementation

1. For direct mounting on the ground, which will be installed rebate must be solidified to obtain a flat and solid surface in order to obtain the maximum carrying capacity of the land.
2. Nevertheless, sand bottom floor that required a hard surface clean and free of alkalis, acids and other organic materials which can reduce the quality of the couple. Thick layer of sand at least 7 cm or landfill in accordance with the drawings, doused with water in order to obtain the maximum density.
3. Casted concrete floors 8 cm minimum rebate or according to drawing with mortar 1: 3 sand: 5 Cr.
4. Rebates concrete floor surface should be flat, with due regard to the slope of a wet area and a terrace.

12.2. FLOOR HARDENER

12.2.1. General

Provision of material, application of Floor Hardener systems for area :
- Warehouse
- Workshop
- Garage
- Service Area

All tools and accessories required for application.

12.2.2. References

ASTM D-4060 – Standard Test Method for Abrasion Resistance of Organic Coatings
JC/T 906-2002 – Concrete Floor Hardener

12.2.3. Delivery, Storage, And Handling

Store All of floor hardener package under a tarp to protect from oil, dirt, and sunlight.

12.2.4. Products

1. FLOOR HARDENER (POWDER)
   Floor hardener is a ready to use mixture of cement, pigments, additives and hard aggregates of mineral origin. The particles have been specially selected for their shape, grading, high physical quality and mechanical performance.
   Provide Sika®Chapdur ®as manufactured by Sika or equal.
   Performance requirements as follows:

Technical Data	
Form	Powder
Colors	Natural, Grey, Light Grey, Pebble Grey , Red, Green
Mohs Hardness	7 – 8
Bulk Density	~1.4 kg/l

   Floor Hardener should be applied with consumption as follows:
   a. Light duty : 3 kg/m2
   b. Medium Duty (Car Park) : 5 kg/m2
   c. Heavy duty (loading area, ramp area) : 6 - 7 kg/m2

2. EXAMINATION
   Examine surfaces for conditions that would adversely affect execution. Do not proceed until unsatisfactory conditions area corrected. Beginning of execution will constitute acceptable of existing conditions.

3. SUBSTRATE PREPARATION
   a. Concrete slab should be at least 15 cm thick, the concrete should contain an adequate proportion of cement.
   b. Level the fresh poured concrete by means of vibrating beam.
   c. As soon as the plasticity permits, smooth the concrete preferably by using mechanical trowel.

4. APPLICATION
   a. Apply products using skilled workmen in accordance with manufacturer's printed instructions. Use recommended techniques, procedures, and equipment.
   b. The concrete slabs is ready for the floor hardener broadcast only when a thumb pressed hard onto the surface only leaves a print of about 3-5 mm depth.
   c. Broadcast the mix evenly by hand or with suitable devices.

d. Wait until the Floor hardener has been evenly moistened by the water in the concrete, then compact it using a low RPM on mechanical trowel, and held perfectly flat.
e. As soon as the plasticity or initial set allows, perform preliminary smoothing with the same machine, running at low speed but equipped with the metal smoothing blades, set at minimum angle.
f. Any final smoothing required should be performed later with the machine running at high speed. The floor hardener must be protected to prevent early dry-out, crazing and bloom, therefore suitable curing system shall be applied on the concrete.
   Detail curing time as follows:
   - Foot Traffic: 1 – 2 days
   - For light vehicle traffic: 7 – 10 days
   - Fully cured: after 28 days
g. Upon completion of installation, Contractor must protect the floor hardener from any loading and pounding for a period of 7 x 24 hours to allow the adhesives to bond properly.
h. Construction joints, expansion joints and floor joints should be saw-cut only after 24 hours. When the slab has hardened, the joints can be filled with the appropriate sealant product in accordance with the floor requirements.

12.3. CERAMIC AND HOMOGENOUS TILE WORK

12.3.1. Scope Of Work

1. Provision and installation of ceramic tile, homogeneous tile of various required shapes and accessories shown on drawing, ceramic tile, homogeneous tile on floor and wall on location as shown on drawings, complete with required additive and grouting.
2. Accessories necessary to complete work.

12.3.2. References

1. PUBI - General Material
2. SII-0023-73 - Ceramic Tile
3. SII-0583-81 - Natural Stones
4. ASTM C1028-84 - Evaluating the Static Coefficient of Friction of Ceramic Tile, and Other Like Surfaces by the Horizontal Dynamo meter Pull Meter Method
5. ASTM C 241

12.3.3. General Requirements

1. Manufacturer's original containers, bundles, or packages shall be delivered to the Project Site unopened, with seals requiring wall tile shall not be started before wall installation is complete.
2. Tiles shall be installed with the respective surfaces in true and level plane

by use or shall be made with a straight

3. Positive beat-in of each tile is required to establish proper bond. Tiles that are out of true plane or misplace shall be replaced and reset. Tile shall be laid from the center lines pattern with no cuts less than one-half the tile width.
4. Joints between tiles shall be uniform width as specified for the installed and parallel over the entire area. Fractional changes in dimensions without varying the uniformly of joint width will be permitted.
5. Tiles shall be cut with a suitable cutting tool and rough edges shall be ground smooth. Cut-tile misfits shall be replaced with properly cut-tiles.
6. Installation of tiles shall be deferred until hinges, door locks and electrical and mechanical work that is to be in or behind tile have been installed and satisfactory protection of adjoining work has been provided.
7. Nose, returns, caps, trimmer, and special shapes shall be provided as required for sill, jambs, recesses, offsets, external corners, and other conditions to provide a complete and neatly finished installation.
8. Tile bases or cove shall be solidly backed with mortar.

12.3.4. Material Requirements

Specification Materials used are:

- Type : Ceramics and Homogenous Tile
- The sizes : As shown on drawings
- Production : Ceramic tile : ROMAN TILE, ESSENZA or equal.
  Homogeneous tile : NIRO GRANITE, GRANITO or equaL
- Color : To Be Defined

All ceramic and homogeneous tile are standard color and detail dimension. Location will be clarified on drawings. See also tile schedule attachment.

12.3.5. Examples

1. Prior to the installation, Contractor must give an example of the materials that will be used for approval of Supervisor.
2. Examples of materials that have been approved to be used as a guideline / standard Supervisor to accept or examine the material sent by Contractor to the field.

12.3.6. Preparation

1. Clean substrates.
2. Prepare surfaces in strict accordance with instructions of manufacturer whose setting materials or additives are being used.
3. Scarify concrete substrates with rotary grinder if necessary to completely remove curing compounds or other substances that would interfere with proper bond of setting materials. Rinse with water to remove grinding laitance and maintain substrate in condition required by setting material

manufacturer.

4. Prime substrate when recommended by manufacturer.
5. Waterproofing:
   - Required in areas where indicated on Drawings.
   - Refer to membrane sheet waterproofing section material and installation for cured cement mortar bed and concrete floors as applicable in strict compliance with manufacturer's recommendations.

12.3.7. Implementation

1. Before work begins, Contractor is required to create shop drawings tiled pattern that will be installed.
2. Ceramic is installed for the selected well, colors, patterns each tile must be the same, should not be cracked, chipped or other defects.
3. Tiles floor maximum gap width 3 mm. Gap filler / Naad / broadcasting are colored with appropriate color mounted Tiles or other colors on the approval of the Controller.
4. Tiles installation pattern should correspond to the image detail or according to the instructions of Supervisor.
5. Tiles cutting must use special cutting tools, per manufacturer's instructions makers.
6. Tiles that has been installed must be cleaned from all sorts of stains that are attached so that it is really clean (tiles colors are not dull/opaque).
7. Tiles mortar binder for mounting on the floor using a mixture of 1 PC: 4 sand, whereas for wet areas (toilets) mortar binder with a mixture of 1 PC: 2 sand.
8. Broadcasting-broadcasting width should be equal to a maximum depth of 3 mm in a straight line or in accordance with drawings or instructions of Supervisor. Broadcasting-broadcasting must be filled colored filling material (cement grout color) corresponding to the color of the floor.
9. Before tiles fitted, it must first be soaked in water until saturated.
10. Tiles have installed should be avoided from touch / expense during the 3 x 24 hours and protected from any possible defects due to other work.
11. The installation Ceramic floors should be of surface area completely flat, not corrugated with regard to skew the wet area and a terrace.
12. Ceramic base must be mounted elbow against the floor, with regard to broadcast it meets the elbow with the broadcast of the floor and with the same thickness of broadcast.

12.3.8. Quality Testing Work

1. Implemented before installation, Contractor is required to provide to Supervisor"Test Certificate" ceramic materials from manufacturers / factories.
2. If there is no such certificate, Contractor must conduct material testing in the laboratory, which will be designated later at a cost to be borne by Contractor.

12.4. FAÇADE LOUVER FINISH

12.4.1. Fiber Cement Board

1. Fiber cement board (Concrete Wood) is Cement Fiber made from 70% Cement combined with 30% Cellulose Fiber which is then processed into a composite board that has environmentally friendly properties without containing Asbestos.
2. Can be used as a wood ceiling in the semi-outdoor area, with the following technical characteristics:
   - Dimensional Tolerance
     - Length (ASTM C1185) = +/- 2.5 mm
     - Width (ASTM C1185) = +/- 5.0 mm
     - Thick (ASTM C1185) = +/- 1.0 mm
   - Density (ASTM C1185) = 1200 kg/m^3
   - Water Absorption (ASTM C1185) = 30 %
   - Moisture Content (ASTM 1185) = 5%
   - Stability Dimension (ASTM C 1185) = 0.27%
   - Ignitability (BS 476 Part 5) = Pass
   - Fire Index Propagation (BS 476 Part 6) = I = 0
   - Stretch of Frame Surface (BS 476 Part 7) = Class 1
   - Fire Resistance (BS 476 Part 22) = 30 – 60 minute
   - Thermal Conductivity (ASTM C177-97) = 0.184 W/m.K
   - Thermal resistance (ASTM C 177-97) = 0.082 m2.K/W
   - PH Value = 9 PH
   - Modulus of Elasticity (ASTM D638 : 2003) = 5.000-8.000 Mpa
   - Maximum Tensile Strength (ASTM C1185) = 11-15 Mpa

   The recommended material is a product of PT. Conwood Indonesia, Grand Elephant or equivalent.
3. Samples of the proposed material must be submitted to the Field Directors and approval of the material must be obtained before the intended material is brought to the workforce to be installed. Sampling of materials already in the field will be done at any time according to the needs of the Field Directors for testing purposes. Inappropriate material will be rejected and must be immediately removed from the field at Contractor's expense.
4. Materials to attach this Ceiling must be stored in a manner approved by the Field Directors to avoid anything that could cause damage to the material.

CHAPTER XIII
DOOR AND WINDOW WORKS

13.1. ENGINEERED DOOR

13.1.1. Scope Of Work

1. In this work includes the provision of labor, materials, costs, equipment and other assistive devices needed in this work so that good quality and perfect work results can be achieved.
2. This work includes the supply of goods and the implementation of the manufacture and installation of frames, door panels / frames and Solid Wood Window Engineering in all details mentioned / shown in the drawings and in accordance with the instructions of Construction Management.
3. The use of supporting materials such as Glass, Adhesives, Hardware and Applicator implementation must also be in accordance with the instructions of the factory concerned and obtain approval from Construction Management.

13.1.2. Work Control

1. This work is carried out in accordance with the provisions and standards in:
   - SNI 3 - 1970
   - SNI 5 - 1961
   - SII 0404 - 80
2. These technical requirements and drawings.

13.1.3. Materials And Product

1. Recommended Engineered Door Products are to use products from:
   - Timber Solution Indonesia (TSI), Hana Door, or equal
2. Solid Wood Doors is a type of doors and windows with Solid Construction, but does not use solid solid wood, but is made from processed wood that has undergone a process of dry kiln until the MC reaches up to 10 - 12% which are arranged and arranged then laminated or pressed. with a press at a certain temperature so that it becomes solid.
3. This special processing is intended to reduce the negative properties of natural wood which is to expand and shrink. The strength of System Engineering lies in the arrangement of wood that binds to one another, so that it becomes an unshakable force.
4. Because the Engineering Construction System makes the wood veins cut off, so Solid Wood Engineering Doors are much more stable, not easy to expand or shrink, not curved even though installed in areas that often experience weather or season changes. It is also not easy to crack at the connection panel.

5. To give a good appearance of doors, the surfaces of Solid Wood Doors are covered with the texture of natural wood veneer. Recommended Veneer choices are: Teak, Sungkai, or Nyatoh. Then given finishing PU Paint / Melamik with spray system.
6. Solid Wood Doors are not designed to be placed in a room that is moist and directly exposed to water.
7. Engineering door used must be guaranteed at least 3 years, with good quality.

13.1.4. Implementation

1. Contractor must take measurements as accurately as possible at the installation site and report any abnormalities that occur to the Field Directors in order to obtain approval before installation.
2. All elbow connections for door frames must be guaranteed strength and neatness.
3. If the door leaf is needed finishing with Paint / Melamic / PU, then the door leaf must be carried out with spray paint as described in the technical requirements of the paint job.
4. Doors after installation must be flat, not bumpy and all equipment can function properly and perfectly.

13.2. ALUMINIUM WORK

13.2.1. Scope Of Work

This section includes the provision of manpower, tools and procurement and installation of aluminum frames for doors, windows and vents are shown in the drawing.

13.2.2. Materials

1. Recommended Aluminum Products are to use products from:
   - YKK
   - ALEXINDO or equivalent
2. Profile:
   - Size: meet the technical calculation requirements
   - Thickness: minimum 1.35 mm and 1.5 mm
   - Depth: 4 "(as detailed drawing)
   - Finish: Powder Coating 60 - 80 micron
   - Color: To be determined later
3. Aluminum Extrusion (specifically for new DIES):
   - Fabrication of dies and profiles with special tolerance for architecture, the large diameter of hollow and solid profiles that can be done are:
   - Maximum diameter for hollow profile = 160 mm.
   - Maximum diameter for solid profile = 210 mm.
4. Billets used are from the Main Billets (primary) with standard A-6063 S-T5 with composition (%):

- Mg: 0.45 - 0.9
- Si: 0.2 - 0.6
- Ti: 0.1 max
- Mn: 0.1 max
- Zn: 0.1 max
- Fe: 0.35 max
- Cu: 0.1 max
- Cr: 0.1 max
- Al: The rest

5. Glass: See the Glass Work Chapter.
6. Back-Up material ex. DUNALON or equivalent.
   - Material = Polyethelene Foam
   - Material properties = Does not absorb water (closed cell)
   - Density = 65 - 96 kg / m3
   - Cross section size = 25% - 50% greater than the gap.
   - Standard = ASTM D.696 and D.1621 and ASTM E.96-53T
7. Gaskets:
   - Material = PVC, Neoprene, Santoprene, EPDM.
   - Material properties = Resistant to weather changes.
   - Hardness = 60 - 80 Durometer.
   - Type of material = Extrusion.
8. Block Settings for Glass:
   - Material = EPDM.
   - Hardness = 80 - 90 Durometer.
9. Wall Sealant + Joint Sealer:
   - Single component.
   - Type Silicone Sealant.
   - In accordance with the Caulking and Sealing Works Chapter.
   - Connections between horizontal and vertical profiles are provided with fibrous sealers to close the profile connection gaps, thus preventing air, water and sound leakage.
   - Material made from Butyl Sheet.
10. Screw
    Material made from Galvanized Steel.
11. Anchor & Anchor Planting
    Parts related to aluminum coated Galvanized to 18 microns. Other parts were given a zinc phosphate coating, phosphate type, Alkyd.
12. Powder Coating.
    The thickness of the entire aluminum surface layer is 60 - 80 microns, the color will be determined later (see Chapter Painting).
13. Guarantee.
    Must be given a written guarantee for 5 (five) years of mixed type ('alloy') and 10 (ten) years for gloss resistance & color fatness and corrosion resistance.
14. There must be a product (material) and assembly guarantee letter from the factory (not from the applicator).

13.2.3. Implementation

1. Before installation, the Implementing should check / re-examine and propose working drawings for approval watchdog
2. Aluminum material used should be selected in advance, especially in terms of color, thus obtained uniformity tolerance difference as small as possible.
3. Fabrication job should use a good machine and all meeting details spiky, smooth and flat and free of scratches or defects that affect the surface of the aluminum.
4. During Fabrication, transportation and installation, propyl should be protected by layers of film that can protect from damage or defects propyl.
5. Installation must be performed by skilled craftsman and experienced.
6. Implementing must make Bench Mark and Line Offset Mark as a guide mounting frame.
7. After installation, propyl protector must be cleaned and Contractor shall safeguard and secure the frame and other equipment made from aluminum which has been attached to dirt or collision resulting in damage to these parts.
8. Damage or defects that occur will be the responsibility of Contractor and must be replaced / repaired.

CHAPTER XIV
CEILING WORKS

14.1. SCOPE OF WORK

1. This section includes the provision of labor, materials, equipment and the tools needed help in the implementation of ceiling work to get good results.
2. This section also covers the entire ceiling job details as mentioned / shown in the drawing or according to the instructions of Supervisor.

14.2. PRODUCTS AND MANUFACTURERS

14.2.1. Gypsum Board

1. Acceptable products and manufacturers – 9mm thick for standard gypsum board: Jayaboard, Elephant or equivalent.
2. Gypsum board:
   - Square cut ends, tapered edge, type X at fire rated assemblies, (see drawing) regular type at other location, 9mm thick except where indicated otherwise
3. Screw: Type S, self taping, flat head, power driven, non-corroding type, length as required by gypsum board manufacturer.
4. Tape: paper tape in roll form.
5. Jointing Compound: Types recommended by manufacturer of gypsum board products.
6. Casing bead and corner bead: 0.8mm (26 gauges) galvanized steel designed for embedment in Jointing Compound.
7. Control joints: Back to casing bead with sealant.

14.2.2. Fiber Cement Board

Acceptable products and manufacturers : GRC Board or equal

14.3. EXAMPLES

1. Before the implementation of the work, Contractor must provide samples of material to obtain the approval of Supervisor.
2. Examples that have been approved by Supervisorto be used as standards / guidelines for checking / receive material sent by Contractor to the field.

14.4. IMPLEMENTATION

14.4.1. Gypsum Board

1. Install gypsum board in accordance with manufacture’s requirements.
2. Use boards of maximum length to minimize end joints.

3. Abut boards without forcing; neatly fit ends and edges of board and do not place butt ends against tapered edge. Hold bottom of board 6mm above floor.
4. Support ends and edges of board on framing or furring members, except for face layer of double layer application.
5. Stagger end joints; stagger vertical joints on opposite side of partitions to occur on alternate framing members.
6. Do not locate vertical joint within 200mm of external corners of windows, doors, or other such openings, except at control joints.
7. Cut openings in board to fit electrical outlets, plumbing, light fixtures, piping and other similar items snugly and small enough to be covered by plates and escutcheons.
8. Do not install imperfect, damp or damage boards.
9. In concealed spaces above ceilings where designated partitions extend full coverage on both faces of framing systems or fire, sound and smoke rated partitions.
10. In concealed spaces above ceiling where designated non-rated partitions extend full height to structure above, install board in not less than 75% full coverage on each face of framing system and may be accomplished with scraps of not less than 2.5 sqm area.
11. In concealed spaces above ceiling where designated chase walls extend full height to structure above, install boards in full coverage on one face of framing system.
12. Install ceilings by placing with long edge at right angle to furring or framing members.

14.4.2. Fiber Cement Board

1. Material that can be used as a ceiling frame:
2. Metal frame (hollow), 40mm x 50mm. 2.3 mm thick.
3. Galvanized Metal Frame with 0.75 mm Thickness.
4. Standard use of several types of frames:
   a. For steel frames, anti-rust coating (Coating) after installation for long-term sustainability.
   b. For natural wood frames the wood must be completely dry and coated with termites after installation for long term survival.
5. When installing the ceiling frame, the frame is installed with a distance of 40 x 40 cm. and added one more frame specifically for the connection area.
6. Before installation, to avoid the entry of insects from under the roof it is recommended to install a net before installing the Fiber cement board Lath.
7. Equipment for installing Fiber cement board lath on different frames:
8. Metal Frame: use a 1.5 "screw
9. Galvanized Frame: use a 1.5 "screw
10. The distance of the screw on the Fiber cement board lath is 2.5 cm from the edge and installed in the middle every 40 cm. And given a gap / gap of about 5-10mm, in the meeting area (jointing) use PU (Polyurethene) type sealants.Do not use gypsum material as a coating on the connection area.

11. In the connection section, add a frame to make the surface easier to install. Without an additional frame, installation will be unsafe and will cause cracks.
12. For cutting can use a handsaw (manual) or by using a special cement saw.
13. Use protective devices such as masks when cutting to avoid dust.
14. Lift and move material in the right position with enough labor to avoid accidents.
15. When using nails, be sure to use nails using a T-shaped head (T head) to avoid damage to the installation.
16. For painting Fiber cement board, the surface must be coated with primary paint 1 to 2 layers, then paint 2 or 3 layers. The paint must be based on a water mixture.
17. If using a Fiber cement board product for other functions, consult the Fiber cement board technical team to avoid damage during installation.

14.5. QUALITY TESTING OF MATERIALS

1. Implemented before installation, Contractor shall provide the Supervisory "Test Certificate" ceiling materials from manufacturers.
2. If there is no such certificate, Contractor must conduct testing on materials in the laboratory to be designated later.
3. The test results from the lab submitted to the Supervisor.
4. All costs associated with materials testing is the responsibility of Contractor.

CHAPTER XV
PAINTING WORKS

15.1. GENERAL REQUIREMENTS

15.1.1. Scope Of Work

This section covers the procurement of energy, paint materials, equipment, and other equipment to carry out painting work on all the details mentioned in the drawing and according to the instructions of Supervisor.

15.1.2. Material

1. Painting the entire job should be in accordance with NI-NI-3 and 4, or in accordance with the specifications of the paint factory concerned.
2. Contractor shall verify the authenticity of the plant's paint about things that show the purity of paint used, among other things:
   - seal canned
   - Test laboratory
   - The final result of painting

   The results of this purity test must obtain a written recommendation from the manufacturer for known Supervisor. The test costs to be borne by Contractor.

15.1.3. Examples

Before you start painting, Contractor shall submit the first examples of materials that are still in cans, three examples of materials that have been painted trough the plywood surface measures 100 x 100 cm, complete brochure and warranty from the manufacturer.

15.1.4. Implementation

1. General
   a. Prior to the work, all materials must be presented to Supervisoralong with the conditions/requirements/warranties of the plant to obtain approval. Disapproved materials must be replaced at no additional charge
   b. If deemed necessary for redemption/replacement, substitute material must be approved by Supervisorbased on the example submitted by Contractor.
   c. For paint work in open area, do not be done in humid weather conditions and rain or dusty wind condition, which will reduce painting quality. When the time is urgent, please do the painting in a state protected from wet and moist or dust.
   d. The surface of the material to be painted should be completely prepared for painting, according to the requirements of the factory prepared for

painting, according to the requirements of the paint factory and the material in question. The surface to be painted should be completely dry, clean from dust, grease/oil and the stains are attached.

e. Any painting that will begin in a field, must be approved by the supervisor. Before beginning the painting, Contractor shall conduct an attempt to approve the supervisor.
f. Contractor is not allowed to start a job somewhere when there is a disorder/discrepancy in the place before the abnormality is resolved.
g. If there are any abnormalities in any matter between the picture and others, Contractor shall promptly report it to the supervisor.
h. Contractor shall repair/redo/replace damages incurred during the execution and warranty period, at the expense of Contractor, as long as the damages are not caused by the task of the Giver.

2. Technical
   a. Do the painting in the best way, which is common except for other specifications. The order of painting, the use of basic layers and thickness of the cover layer is minimal equal to the factory requirements. The painting should be flat, not stacked, not a slide or there are containers that show signs of strokes, sprays and rollers.
   b. Sweep all basic with paint using brush, spraying is only allowed when approved supervisor.
   c. Re-painting is done when there is a basic or final paint that is less covered, or loose. The repetition of the painting is done as shown by the supervisor, and must follow the instructions and specifications issued by the manufacturer in question.
   d. Cleaning of the surface should be approved, the job includes the use of cost, washing with water, or cleaning with dry cloth.
   e. The neatness of this paint job is required not to pollute and interfere with other finishing work, or other work that is already installed. Imperfect work is repeated and repaired at the responsibility of the Implementer.

15.1.5. Quality Testing Work

1. Before carrying out the work, Contractor shall perform the experiment for all the work to be carried out at his own expense. Painting unapproved Supervisor should be repeated / replaced, at the expense of Contractor.
2. At the time of delivery, the factory with Contractor must give a guarantee for a minimum of 2 years for all painting jobs, the possibility of defects due to the weather colors and other paint damage.
3. Supervisor shall examine all the results based on the terms that have been given either by the factory or on the instructions of the Controller. Equipment for testing provided by Contractor.
4. Supervisor is entitled to request duplicate testing if deemed necessary.
5. In terms of testing that has been done well or is not satisfactory, then the cost of testing / repeat testing is included the responsibility of Contractor.

15.1.6. Job Security

1. The areas that are being painted to be closed from the other jobs, and other activities as well as those areas are protected from dust and other contaminants until the paint is dry.
2. Protect this job and also a job or other material that is close to this job like Fittings, frame-frame and so by closing / protect the part during the painting work in progress.
3. Implementing responsible for repairing or replacing damaged materials due to the paint job.

15.2. PAINT WALL WORK

1. SCOPE OF WORK
   This work includes painting the walls (inside and outside), or as stated in the drawing and instructions Supervisor.

2. MATERIALS
   a. Paint materials used are brand ICI, JOTUN or equivalent and in accordance with the instructions of Supervisor.
   b. The use of paint on the outer walls using paint with type "Weather Shield" while the other part should be tailored to the specifics of a paint factory concerned.

3. IMPLEMENTATION
   a. Before painting on the wall surface, it should be noted plastering surface of:
      - Profile requested in accordance with the drawings have been done, based peil specified.
      - Plastering surface must be flat and perfectly in accordance with a predetermined pattern.
      - Stucco surface has been given a layer of leveling compound with a flat and smooth results.
      - The whole field of painting has been cleared of any stain or dirt / dust.
   b. When the painting is done on the surface of the walls are not plastered, then Contractor must check if the wall surface is clean of stains, as required.
   c. After the surface of the walls ready to be painted, the painting is done according to the paint manufacturer's instructions.
   d. Whenever a paint coating on the end do must be avoided occurrence of touches for 1.5 to 1 hour.
   e. Painting should be done the end of at least 2 (two) hours later.

15.3. OTHERS PAINTING WORK

15.3.1. Scope Of Work

1. Provide labor, materials, equipment and tools to carry out this work in order to get a good result and a perfect job.
2. Work may include:
   a. A painting wall / surface brick masonry, concrete surface.
   b. Work lightning painting on wood surfaces and list plank.
   c. A painting steel, and aluminum.
   d. And / or as specified in the working drawings.

15.3.2. General Requirements

1. The entire implementation and materials for this work must conform to the standards and / or specifications of the manufacturer.
2. The plant and Contractor must guarantee a minimum of 5 (five) years from the time of delivery to all this work to possible defects, color changes and other paint damage.
3. The work that is not approved Project Ownershould be repeated and replaced. Contractor must do the painting back if no primer or paint finish that is less cover or off as indicated by the User Services.
4. During the execution of the work, Contractor must be supervised Expert / Supervision from the manufacturer.
5. Materials imported directly from the factory, arrived at Construction Site must still sealed in both the packaging and not disabled. Contractor shall prove the authenticity of the paint of the product was about purity of paint to be used. Proof seal canned form, BD test, test laboratories and the final painting. The cost for this proof borne by Contractor. Purity test results must obtain a written recommendation from the manufacturer and submitted to the User Services to the approval of implementation.

15.3.3. Technical Requirements

1. Before the implementation of the work, Contractor shall perform painting studies (mock-up). Implementation costs are borne experiment. The experimental results shall be submitted to the User Services to obtain approval for the execution of work.
2. Painting should be flat, not overlapping, no pouring or no trace that shows a sign of strokes, roller or spray. The minimum thickness of each layer so / finish equal to the minimum specified requirements the manufacturer.
3. If paint is used there is a basic material containing toxic or endanger human safety, then Contractor shall provide safety equipment for example a mask, gloves and so on to be used at the time of execution of work.
4. Not allowed to carry out this work in humid weather conditions / rain, dusty. Especially for implementation in the room to paint with the basic materials of toxic or harmful to humans, then the room must have sufficient ventilation or air exchange takes place smoothly. In the particular

circumstances, for example to an enclosed space, Contractor must wear the fan / fan to expedite the turn / airflow.

5. Equipment such as brush, roller, wire brush, spatula, pump compressed air / vacuum cleaner, spray and so on should be available on the quality / excellence.
6. Especially for all the primer must be added to the brush. Spraying should only be done if approved User Services.
7. The use of sandpaper, washing with water or cleaning with a dry cloth must first obtain the written consent of Project Ownerunless otherwise specified in this specification.
8. Implementation of this work is the basis of painting especially for component / material metal, must be done before the component is installed.

15.3.4. Work Implementation

1. Brick Wall Painting Works and Concrete Surface.
   a. Preparatory work Prior to Painting
      Before the implementation, the entire surface should be cleaned from dust, grease, dirt or other stains, the scars of paints that are peeling off for the surface that has been painted and in dry conditions.
      - The use of the brush only to the surface where it is impossible to use a roller.
      - Works of painting all the walls / surfaces masonry and concrete surfaces that looked / exposure as shown in Figure Labor.
   b. Interior and Exterior Surfaces
      First layer
      - Base paint Sealer Alkalli from ICI Dulux acrylic.
      - Implementation of the work with a brush / roller.
      - Coating thickness 25-150 micron or the scatter 10 m2 / liter.
      - Wait for a minimum of 24 hours prior to the next coating.

      The following layers (the second and third layer) until the surface is flat
      - Vinyl Acrylic Emulsion paints for the interior, while the exterior of similar types of weather shield brand Dulux.
      - Implementation of the work with the roller.
      - The thickness of the layer of 25-40 micron or the scatter 11-17 m2 / liter per layer.
      - Coating the lag time between a minimum of 12 hours.
      - Color is determined later.

2. Paintwork Metal / Steel
   a. Metal Preparation Work Before Painting
      - Clean the surface of the skin milled (crust / mill), rust, oil, grease and other debris carefully and thoroughly so that the surface is meant to show visible metal is smooth and shiny. This work was carried out with mechanical wire brush. Finally, the surface is cleaned with a vacuum cleaner or a clean brush.

- All metal as stated in the working drawings with the following conditions:
  - All parts / surface looks / expose painted to the paint finish.
  - All parts / surface revealed / un-exposed, stick to other material, covered by another material, painted just up to the anti-rust paint primer or base paint.
- This work does not apply to stainless steel.

b. Paint Works Steel / Steel

First Coats

- Primer paint Metal Primer QD kind of similar ICI Red Lead Dulux QD Universal Primary Green.
- Implementation of the work with a brush. The thickness of 45 micron or the scatter 9-12 m2 / liter.
- Wait for a minimum of 6 hours before the next coating.

Second Coats

- Priming the similar kind of ICI Dulux Undercoat.
- Implementation of the work with a brush. The thickness of 35 micron or the scatter 17 m2 / liter.
- Wait for a minimum of 6 hours before the next coating.

Third Coats

- Final paint / finish kinds of synthetic Super Gloss, Super Gloss equivalent ICI Dulux.
- Implementation of the work with a brush. Thickness of 30 micron or the scatter 11-14 m2 / liter.
- Coating the lag time between a minimum of 16 hours. Color is determined later.

CHAPTER XVI
ALUMINIUM COMPOSITE PANEL WORKS

16.1. GENERAL REQUIREMENTS

Work of this section, as shown or specified, shall be in accordance with the requirements of the whole set of the Contract Documents.

16.2. SCOPE OF WORK

This section covers the provision, fabrication and installation of Aluminum Composite Panels with system, materials and on locations as shown on drawings.

1. Section Included :
   a. Aluminum composite panel system complete with related flashings closures, trim and accessories.
   b. Clips, anchoring, devices, fasteners and accessories required for installation of panel system.

2. Section Related :
   a. Section 05 10 00 – Structural Metal Framing
   b. Section 07 62 00 – Sheet Metal Flashing and Trim

3. References
   a. BS 476 – for fire behavior
   b. DIN 4109 – for vibration and noise dumping
   c. ASTM B 221 – for aluminum extrusion
   d. ASTM B 209 – 86 – aluminum alloy, sheet and plate

16.3. SYSTEM REQUIREMENTS

Prepare and install system to accommodate thermal contraction and building movement based on provided drawings.

16.4. SUBMITTALS

General: Submit following items in accordance with Section 01 33 00.

A. Product Data: Submit manufacturer's technical literature indicating properties of materials, finishes and performance capabilities.
B. Shop Drawings: Submit panel layout, dimensions, construction details, flashing details and method of anchorage.
C. Samples :
   1. Submit 670 X 670 mm section of panel system, complete with flashing and attachment devices.
   2. Upon selection of colors by Architect, submit 300 X 300 mm finish samples representing custom color and finish.

D. Qualification Data :
   1. Submit installer qualifications verifying years of experience; include list of complete projects having similar scope of work identified by name, location, date, reference name and phone number.
   2. Submit letter certifying manufacturer's approval for installation of system.

E. Manufacturer's Instructions: Submit written instruction indicating method and sequence of installation.

16.5. QUALITY ASSURANCE :

1. Installer Qualifications :
   a. Company specializing in installation of metal panel systems.
   b. Minimum 5 years documented experience in similar sized installations.
   c. Licensed or written approval of system manufacturer.

Upon approval of system and color of composite panel, install in place mock up sample, two full panels size as shown on drawing. In place mock up shall be subject to review for accuracy, finishes, lines and dimensions. The accepted mock up shall remain in place and become the standard of workmanship.

16.6. PRODUCT AND MANUFACTURER

Acceptable system manufacturer and product:
- Alubond, Seven or equal

16.7. COMPOSITE PANEL

1. Aluminum Sheet
   a. Thickness : 4mm thick composed of a Polyethylene Core sandwiched between two sheets of Aluminum of 0.5mm thickness
   b. Aluminium Alloy : Aluminium seri 5005
   c. Painted Surface : PVDF 70% Kynar 500

2. Core
   Cold applied, self-adhering membrane composed of high-strength polyethylene film coating and adhesive – consistentency rubberized asphalt.

16.8. MATERIALS AND COMPONENTS

1. Hot dip, galvanized steel for framing installation, refer to section 05120.
2. Sealant and Gaskets :
   Manufacturer's standard type suitable for use with installation of metal panel; non – staining; skinning; non – shrinking and non – sagging; ultra- violet and ozone resistance for exterior applications; refer to section 07 92 00. Color: will be selected by Architect from manufacturer's colorcast.

3. Trim, Closure Pieces, Caps, Fascias, Flashing and Accessories: Same material, gauge and finish as metal panels, formed to required profiles.

16.9. INSTALLATION

1. Install metal roofing and related components in accordance with manufacturer's printed instructions. Fasten panels with concealed metal clip at each side joint.
2. Install single layer of underpayment horizontally on surfaces to receive preformed aluminum roofing. Weather lap edges minimum 60 – 150 mm and laps 300 mm. Stagger vertical joints of each layer ad joints of one layer to next. Securely fasten in place.
3. Install trim, closures, caps and accessories as indicated or required for complete weather tight installation.
4. Protect surfaces in contact with cementitious materials and dissimilar metals with application of bituminous paint. Allow to dry prior to installation.
5. Permanently fasten system to structure at spacing required by panel manufacturer. Align, level and plumb, within specified tolerances. Use concealed fasteners unless approved otherwise by Architect. Provide expansion and control joints where indicated.
6. Seal and place gaskets to prevent weather penetration.
7. Tolerances :
    1. Maximum offset from true Alignment between adjacent members butting or In-Line indicated on drawings: 1.5 mm
    2. Maximum Variation from plan or location indicated on drawings: 3 mm.

CHAPTER XVII
PLUMBING AND SANITARY WORKS

17.1. SCOPE OF WORK

This section includes the supply of materials, labor and other services in connection with the installation of other bathroom/WC, urinor, piped water and sewerage pipes.

17.2. MATERIAL CONDITIONS

1. All material must meet the size, standard and easily available in the market, unless specified otherwise.
2. All the equipment in a complete state with all its equipment, in accordance with what has been provided by the manufacturer for each type selected.
3. Goods used is from products that have been required in the description and terms in this book, unless otherwise specified.

17.3. EXAMPLES

Contractor is asked to show examples of materials to be used to Supervisor for approval. Approved examples will be used as guidance for Supervisor to receive/inspect materials sent to the field by contractor.

17.4. INSTALLATION TERMS

1. Contractor must request permission to Supervisorabout the manner, time and location of installation of bathroom fixtures and others. Installation must be strong, neat and clean.
2. Pipe installation must be done according to the instructions from the manufacturer and approved by the supervisor.
3. Contractor must cut the pipe using a pipe cutter if necessary.
4. Plumbing fixtures such as valves and others must be placed in accordance with drawings or instructions of Supervisor.

17.5. LAVATORY WORK

1. The lavatory used is a brand Toto complete with all Accessories as stated in the brochures. The type will be determined later.
2. The lavatory and the equipment that is installed are well-selected, nothing, crack and other defects.
3. The mounting height must be adjusted to the image as well as the instructions of the manufacturer listed in the brochure. Installation must be good, tidy, water pass and cleaned of all dirt and stains and connection of plumbing installation there should be no leakage.

17.6. URINAL WORKS

1. Urinal and the accessories used are Toto brand, type and fittings are used to be determined later.
2. The urinal that is installed is well-selected, not present, crack and other defects.
3. Installation of urinal wall using Ficher bolts or stainless steel with sufficient size to withstand a load weighing 20 kg per bolt.
4. The mounting height must be adjusted with the image and according to the instructions of the manufacturer listed in the brochure. All gaps that may be present between the walls with urinal are closed with the same colored cement as the urinal. Connection of plumbing installation should not leak.

17.7. TOILET WORK

1. The closet cringe follows all its completeness are Toto, type, fixtures and colors will be determined later.
2. The installed closet is well-selected, not present, cracks and other defects.
3. Closet must be firmly mounted and altitude according to the picture, Water pass. All stains, must be cleaned, pipe joints should not leak.

17.8. FAUCET EQUIPMENT

1. All taps are worn, except wall faucets are brand Toto or equal, with chromed finish. The size is adjustable with plumbing drawings and a water sanitary brochure. Wall taps are used that are long-neck and have a mounting ring to be mounted sticking to the wall with the type (determined later).
2. Stop Tap/Faucet used is brand Toto or equal, brass material with a round of red/green color, diameter and placement according to the picture.
3. Faucets should be mounted on clean water pipes with strong, elbow placement must correspond to the picture.

17.9. FLOOR DRAIN AND CLEAN OUT

1. Floor drain and clean out used are brand Toto or equal, 2-inch hole is equipped with a siphon and a hinged cover for floor drain and dopverchroom with drat to clean out.
2. Floor drain installed in accordance with the drawings.
3. Floor drain installed properly selected, no defects and approved by the supervisor.
4. In a place that will be installed floor drain, the floor covering should be pierced with a neat, using a small chisel with shape and size according to the size of the floor drain.

17.10. ACCESSORIES BATHROOM AND WET AREA

a. Scope of work
   1. Included in the installation work sanitair is the provision of labor, materials equipment and other assistive devices that are used in this work to the achievement of quality work and impeccable in its use / operation.
   2. This sanitair installation work in accordance expressed / shown in detail drawings, descriptions and terms in this book.

b. Work Material
   1. All material must meet the size, standard and readily available on the market, unless specified otherwise.
   2. All the equipment in a complete state with all the equipment in accordance with what has been provided by the manufacturer for each type selected.
   3. Goods used is from products that have been hinted at in the description and the terms in the book.

c. Terms of Implementation
   1. All material before being installed must be presented to Supervisorand the requirements / conditions for approval plant. Materials that are not approved must be replaced at no extra cost.
   2. If deemed necessary to hold exchange / replacement of materials, a replacement must be approved by the Supervisory Field Contractor submitted sample.
   3. Before installation begins, Contractor shall examine the pictures there and the conditions in the field, including studying the shape, pattern, placement, installation sparing, how to install and details according to the drawings.
   4. If there is any discrepancy in this respect between images with specifications and so on, then Contractor shall immediately report to the Supervisor.
   5. Contractor are not justified starting the job in one place if there is a difference in that place before these abnormalities resolved.
   6. During the execution should always held testing / inspection for the perfection of the work and functions.
   7. Contractor is obliged to fix / repeat / replace if any damage occurred during the implementation and the warranty period, at the expense of Contractor, as long as the damage is not caused by the actions of owners

d. Terms installation
   1. Sample Material
      Before starting installation work, Contractor must submit samples sanitair equipment that will be installed complete with a certificate / affidavit of producers who explained that the quality of the product is completely in accordance with the above requirements.
   2. Power

Installation sanitair work must be performed by an experienced workforce and skilled in his work by showing the Certificate ever undertaken.

3. Preparation
   a. Before starting installation work, Contractor must first examine all the work that will be installed.
   b. Work to be examined include:
      - Installations
      - Waterproofing
      - And others deemed necessary
   c. Before installation work sanitair, surface is flat and smooth to be made in advance.
   d. After these jobs have been examined, Contractor must request approval Supervisor to continue his work.
   e. Contractor shall make drawing of work (shop drawings) for the implementation of which is based on the design. Measures based on the field conditions.
   f. Drawing this work must first obtain the approval of the Supervisory Field.

4. Implementation
   1. Each installation sanitair work on walls must be reinforced with anchors and supplies / accessories others suggested by the manufacturer.
   2. Each installation work must be carried out carefully sanitair, right at the position of sanitation pipes.

e. Maintenance Requirements
   1. Improvement
      a. Each of work sanitair damaged to be repaired in ways that recommended by the manufacturer.
      b. Repairs should be such that it does not interfere with other finishing work.
      c. If no finishing work damaged the tile floor repair work, it damages the work, the finishing must be fixed on Contractor's expense.

   2. Security
      a. For 3 x 24 after completion of sanitair work is installed, it must be allowed to dry and as long as it is not allowed to be used.
      b. After the discharge of the installed work must be maintained against the possibilities of exposure to liquids and other objects that may cause defects, stains and so on. If this is the case Contractor must correct the defect until it recovers the cost of Contractor.

f. Admission Requirements
   1. Every water sanitized work that is installed must be thorough in its position and meeting, not leaking and guaranteed fragility.
   2. Each sanitair work must be installed with its accessories and it can function perfectly, without defects.

g. Tools of Sanitair
   1. Lavatory Work
      a. Lavatory used is a Toto brand, complete with all Accessories as stated in its brochures. Type-type used is to: brand Toto (Include Faucets).
      b. Lavatory and its equipment installed is that has been selected either no part of, cracks or other defects and has been approved by the Supervisor.
      c. Height and mounting construction must be adjusted image for it as well as instructions from the manufacturer in the brochure. Installation must be good, tidy, water pass and cleaned of all impurities and stains and the installation connection Plumbing there should be no leak-leakage.

   2. Closet Work
      a. The monoblock along with all the accessories used are brand Toto, the colors will be determined later.
      b. Closet is installed along with the accessories that have been selected properly, no part of the chipped, cracks or other defects and has been approved by Supervisor.
      c. Closet should be attached securely appropriate location and height of the drawing, water pass. All the stains to be cleaned, conn tubing connection no leaks.
   3. Closet Equipment
      a. In public toilets, which are shown in the picture of the wall faucet fittings of Toto brand.
         Such equipment must be in good condition without any defects, has been approved Supervisor approval. The mounting layout adjusted shop drawing for it and the installation ways following instructions from the manufacturer as explained in the brochures in question.

CHAPTER XVIII
ELECTRICAL WORKS

18.1. GENERAL

1. The purpose and goal of this specification is an implementation guidance for electrical lighting installation works are completed and ready to use, including material supply, installation, testing, and maintenance during the maintenance period.
2. This short description is not describes in this specification and detail drawing, but will need to be implemented to perfection job under the national regulation.
3. Contractor should have Installation Approval Letter (SPI) and Work Permit Letter (SIKA) issued by PT. PLN (still valid), with minimum Grade A.
4. Contractor must provide the entire material and other necessary equipment as standard so the entire installation can operate perfectly.
5. Contractor should provide experts in the field who can be contacted at any time by the Supervisor.
6. Contractor must replace the defective material, or not approved material by Supervisor, as long the project has not been handed over.
7. Contractor should be able to cooperate with other Contractor working on this project.
8. Contractor must replace or repair the damaged caused by the installation work.
9. Everything doubts should ask Project Owner or Supervisor.

18.2. STANDARD SERVICE

Standard and references used to carry out this work are:

1. General Regulations 2011 Electrical Installation (PUIL).
2. Regulation of the Minister of Mines and Energy No. 02 / P / M / Pertamben / 1983 dated November 3, 1983; Electricity Standard neighbor Indonesia.
3. Regulation of the Minister of Public Works and Electric Power No. 023 /PRT/1978; concerning requirements Splicing Electric (SPL).
4. Indonesia National Standard (SNI 0225-2000)
5. Standard grip is also used, among others:
   - AVE Netherlands
   - VDE Germany
   - British Standard Associates
   - USA Standard
   - JIS

18.3. SCOPE OF WORK

1. Procurement and installation as well as testing the entire electrical material in accordance with the drawings and this specification.

18.4. TECHNICAL SPECIFICATIONS

1. CABLE POWER INSTALATION
   a. The power cable is wired between panels are installed underground or under the floor or on the ceiling.
   b. For installation under the ground should be planted at a depth of at least 80 cm with bottom construction excavation width at least 30 cm and above the cable should be backfilled sand thickness of 15 cm and continued coating with bricks and soil embankment. Laying bricks transverse or 10 pieces per meter run.
   c. In particular these should be marked CAUTION CABLE for security.
   d. For installation under the floor or the street, the cable must be inserted into the corresponding sparing pipe, while above the ceiling can be clamped to the ceiling or shelf frame.
   e. In the event of a cross with a water pipe or cable trench or the other, then the cable should also be incorporated into sparing the corresponding pipe.
   f. Radius of the bend in the cable at least 10 times the outer diameter of the cable and the connection is made as solid as possible.

2. PANEL AND COMPONENTS
   a. Panel mounted against the wall with a tower with a maximum height of the top of the panel is 200 cm from the floor.
   b. Output panels on the tower from the top and from the bottom panel input.
   c. Preparation of breakers and other components inside the panel should be easy to operate and easy to inspection as well as all components can be replaced from the front panel.
   d. Each breaker must be marked with a number or group to facilitate the operation.
   e. On each panel wiring diagram affixed to the panel and wiring diagrams related to the input power.

3. GROUNDING
   a. All equipment is made of metal or conductors that are to be connected earthing systems, as well as steel construction tower must be grounded united with earthing lightning rod.
   b. Armor cable must be connected to the grounding system.
   c. Round resistance for the electrical installation grounding system maximum of 5 ohms.
   d. The entire earthing system must be connected to each other.
   e. Grounding electrodes planted at least a depth of 6 M.

18.5. MATERIAL SPECIFICATION

1. LAMP
   a. Specifications and types of lamps used as shown in the drawing.
   b. Lamp and Ballast using Phillips brand, while using the brand Artolite or equivalent for housing or fixtures.

2. CABLE
   a. Cable types NYM light according to the drawing size or 2x1,5 mm2 minimum cross-sectional area for light and 3x2,5 mm2 socket, standard SII brand Supreme or Kabelindo or Tranka or Jembo or equivalent.
   b. The cables shall be run inside the high impact conduit 20 mm
   c. The ground's cable that separate the strands of the power cord must be green from ITS type.
   d. Cable tray using heavy duty type complete with support and other supporting accessories.
   e. NYY power cable types 4X25 mm2 from distribution panel to the main panel and 4x35 mm2 from the meter to the main panel, standard SII brand Suprime or Kabelindo or Tranka or equivalent.

3. PANEL AND COMPONENTS.
   a. Panel types indoor are installed in either inbow or outbow shall be equipped with locks and signboard.
   b. Circuit Breaker 1 pole or 3 poles types as shown on drawing shall be manufactured by the famous manufacturing in Indonesia such as GAE, AEG, ABB, Mitsubishi and Scheneider or equal

4. OTHER SUPPORTING MATERIAL.
   a. Junction box outlet has a diameter of at least 0.5 inches and comes with a lid.
   b. PVC insulation wear similar kind of 3M.
   c. Other consumable material adapted to the standards in this specification.

5. TESTING AND EXAMINATION
   Contractor must conduct testing and inspection of the entire work and guarantees will running perfectly, and supervised by Supervisor.

   Testing and inspection include:
   a. Insulation Resistance Testing
      Cable insulation resistance testing against the installation of at least 2 Mega ohms using megger 500 volts.
   b. Continuity Test
      After testing insulation resistance, it is meant to convince and ensure that the cable connections are correct.
   c. Power Receiving Test
      To ensure there are no abnormalities in equipment that has install so it is ready for operation.

d. Examination
The examination was conducted prior to implementation, while the implementation and after the implementation is done.

6. OTHER SUPPORT MATERIAL
   a. Junction box outlet has a diameter of at least 0.5 inches and comes with a lid.
   b. Isolation wear similar kind of PVC with 3M
   c. Other consumable material adapted to the standards in this specification.

18.6. OTHERS

Contractor should be careful in performing works well in order to avoid accidents to people, equipment and material. If at any time the equipment or material is placed in a temporary place, then the place to be away from traffic, away from sources which could cause a fire, damage and defects in equipment and materials.

CHAPTER XIX
AIR CONDITIONING (AC) INSTALLATION WORKS

19.1. GENERAL

1. The purpose and goal of this specification is an implementation guide installation work of air conditioning (AC) is complete and ready to use, including material supply, installation, testing and maintenance during the maintenance period.
2. Description small is not described in this specification and in the drawings but will need to be implemented to perfection job thoroughly under the rules in force, then it is considered to have been included in this specification.
3. Installation set forth in this specification should be conducted in accordance with applicable regulations currently in Indonesia and does not conflict with the provisions of safety.
4. Implementing must provide the entire material and other necessary equipment as standard so the entire installation can operate perfectly.
5. Implementing should provide experts in the field who can be contacted at any time by the Supervisor.
6. Implementing must replace the defective material or that are not approved by Project Owner/Supervisor, during the project have not been handed over.
7. Implementing must replace or repair the damaged caused by the installation work.
8. Everything doubts should ask Project Owner or Supervisor.

19.2. STANDARD

1. General rules of electrical installation (PUIL 2011)
2. Indonesia National Standard (SNI 0225-2000)
3. Standard ARI, ASHRAE, SMACNA, ASTM, NFPA, NEC and ASME with emphasis on regulatory / national standards.
4. A working voltage of 380 Volt, 3 phase, 4 wire or 220 Volt single phase two and three wire.
5. Regulations specified in the drawing and this specification.
6. Materials, equipment, and installation method performed according to the standards that others can do, as far as giving the same results or better with the first to be approved by Project Owner or Supervisor.
7. All the machinery and equipment installed on this system, apart from the above requirements also should not deviate from the requirements issued by the manufacturer.

19.3. SCOPE OF WORK

Procurement, installation and testing of the entire material, whether primary or support in accordance with the drawings and specifications have to be able to operate properly.

19.4. TECHNICAL SPECIFICATIONS

19.4.1. COORDINATION OF WORK

1. All work related to these workers and carried out by other parties, Contractor must provide the data size and image this work to that party.
2. Images of plans and specifications of this is a unity that bind together. If there is a picture and specifications are not the same, then the guideline is this specification.
3. Picture shows the layout plan in general, while the installation should pay attention to the field conditions.
4. Before work begins, Contractor must submit working drawings (shop drawings) to Project Owner and Supervisor for approval by first studying other work related to air conditioning work.
5. Contractor shall make images of implementation (as build drawings), handed over the operating instructions and maintenance instructions.

19.4.2. CONDITIONING UNIT

6. Conditioning units of "Water Cooled".
7. Conditioning unit is placed outside the building, on a solid foundation and piping systems as well as following the path of his cabling / shafts that have been determined.

19.5. MATERIAL SPECIFICATION

19.5.1. AC Split Unit

1. Split air conditioners consist of an indoor unit and outdoor unit. The indoor unit is attached to an indoor wall according to instructions and supervising consultants or plan drawings. The outdoor unit is attached to the outer wall according to the respective floors according to the plans.
2. The indoor unit consists of the evaporator coil, evaporator blowers, motors, capillatory cube, control panel, air filter, supply and return water supply.
3. The outdoor unit consists of a compressor, water cooled condenser, condenser fans and motors.
4. Other consumable material adapted to the standards in this specification.
5. AC unit is guaranteed by vendor/agent for at least 3 (three) years.

19.6. TESTING AND EXAMINATION

Contractor must carry out the inspection and testing of all equipment and electrical material used so that the system can operate perfectly, which include:

1. Inspection and Testing of Electrical
   Contractor must carry out the inspection and testing of all equipment and electrical material used so that the system can operate perfectly, which include:
   - Testing the insulation resistance of the cable and the motor
   - Continuing test of the connection system
   - Power receiving test of each equipment
2. Inspection and Testing Airflow Leakage
   These checks to ensure no leakage in the system ducting and insulation system checks so that no air distribution is not perfect.
3. Inspection and Testing Equipment AC
   The inspection and testing includes testing the characteristics of equipment in integration to obtain an ideal and perfect performance.

19.7. OTHERS

1. Contractor should be careful in performing works well in order to avoid accidents to people, equipment and material.
2. If at any time the equipment or material is placed in a temporary place, then the place to be away from traffic, away from sources that can cause fire, damage and defects in the equipment and the materials.

19.8. TECHNICAL SPECIFICATIONS INSTALLATION WORKS AIR CONDITIONING SPLIT

1. Scope of Works
   Electrical installations start from AC panel to the point of switch, the installation of refrigerant pipes and drain pipe installation is complete, so that the air conditioning units are ready to be installed, without causing any other job. AC installed must be cultivated using a product / brand that is only Daikin, Toshiba and LG.

2. Job description
   This specification describes the air conditioning unit split cooled. Contractor's job is to perform supply, installation, electrical installation, AC outlet, refrigerant pipe, pipe drain from the AC units.

3. Relations with other specifications
   - Piping specifications.
   - Specifications insulation and installation protection from damage.
   - Specifications vibration dampers.

4. Implementation of the field
   Air conditioning units are coming into the field to do an examination of:
   - No damage caused by shipping.
   - Refrigerant is not reduced.
   - Refrigerant piping inside the unit should not be leaking. If there is damage or deficiencies, Contractor must make improvements. If the damage incurred rather severe, then Contractor should replace them with new ones. The above costs are the responsibility of Contractor.

5. Each outdoor unit must be given neoprene pad mounted on the holder of the basic unit for damping vibrations. Neoprene pad size is determined by the weight of the unit. Neoprene pad must be accompanied by a catalog of factory production and characteristics.

6. Installation of indoor and outdoor units
   a. Installation of the indoor unit
      Must be strong enough to stick to the wall.
   b. Installation of the outdoor unit
      1. Installation of outdoor unit is positioned at a base elevation of the floor with a minimum of 20 cm from being exposed to rainwater.
      2. Outdoor laying should fulfill manufacturer's requirements for distance against the wall, anti-else and so on.
      3. Laying outdoor unit should allow people to freely move, easy to perform maintenance.
   c. Addition of the refrigerant
      Contractor must supply the addition of the refrigerant and fill in the refrigerant piping installation both indoors and on the outdoor units as well as in pipelines that connect them. Additional volume of refrigerant to be seen by the amount of the excess length of the pipe, the amount of refrigerant must be in accordance with the provisions of the plant.
   d. Piping Installation
      1. Refrigerant pipe connecting the indoor unit with the outdoor unit must be made of copper pipes complete with insulation class M 25 mm thick and with a density of 24 kg / m3. Insulating materials made of thermatex.
      2. Copper pipe products is Kembla, crane.
      3. AC indoor unit drain pipe must be made of PVC pipe, insulation class VP complete with 25mm thickness and density 16 kg / m3. Insulating materials made of thermatex.
      4. Drain pipe products is Wavin paralon.

CHAPTER XX
LIGHTNING PROTECTION INSTALLATION WORKS

20.1. GENERAL

1. The purpose and goal of this specification is an implementation guide lightning protection installation work is complete and ready to use, including material supply, installation, testing and maintenance during the maintenance period.
2. Description small is not described in this specification and in the drawings but will need to be implemented to perfection job thoroughly under the rules in force, then it is considered to have been included in this specification.
3. Contractor must have a Installation Approval Letter (SPI) and Work Permit Letter (SIKA) issued by PT. PLN is still valid, with minimum of class A.
4. Contractor must provide the entire material and other necessary equipment as standard so the entire installation can operate perfectly.
5. Contractor shall provide experts in the field who can be contacted at any time by the Supervisor.
6. Contractor must replace the defective material or that are not approved by Project Owner / Supervisor for the project has not handed over.
7. Contractor must replace or repair the damaged caused by the installation work.
8. Everything doubts should ask Project Owner or Supervisor.

20.2. STANDARD EXECUTION

Standard and references used to carry out this work are:

1. General Regulations 2011 Electrical Installation (PUIL, SNI 04-0225-2000),
2. Regulation of the Minister of Mines and Energy No. 02/P/M/ Pertamben / 1983 dated November 3, 1983; on Standard Electric Indonesia.
3. Regulation of the Minister of Public Works and Electric Power No. 023 / PRT / 1978; about Electrical Installation Regulations (PIL), and No. 024 / PRT / 1978; concerning requirements Splicing Electric (SPL).
4. National Indonesian Standard (SNI) 03-7015-2004, Lightning Protection System for building
5. National Indonesian Standard (SNI) 03-7014, Lightning Protection System for building, General)
6. Standard grip is also used, among others,
   - AVE Netherlands
   - VDE Germany
   - British Standard Associates
   - USA Standard
   - JIS

20.3. SCOPE OF WORK

1. Procurement and installation as well as testing the entire electrical material in accordance with the drawings and this specification.

20.4. TECHNICAL SPECIFICATIONS

1. CABLE WITHDRAWAL
   a. Installation of cables installed in the tower, where in places which are difficult to reach should be incorporated into sparing galvanized pipe 3/4 inch minimum.
   b. All branches (connecting) the cable must be in the connection box and fitted with a lid. The connection is not justified are inside the walls / concrete.
   c. Clamp installed cable at a maximum distance of 60 cm and no bare wires hung justified.
   d. The cable towards be protected / incorporated into sparing pipe with a minimum height of 3 meters from the ground.

2. SWITCHING
   a. Splicing can be used between the cable clamps with a screw diameter of 10 mm.
   b. Metal contact surfaces wherever possible more than 10 cm^2.
   c. Measuring box installed in an area accessible by hand and is easy to carry out inspection / measurement of soil custody.
   d. Splicing in the ground with at least two screws minimum diameter of 8 mm. Cross connection of at least four screws minimum diameter of 8 mm.
   e. Before grafting is done, the tangent surface to be cleaned and after grafting were given anti-corrosion coating.

3. LIGHTNING ROD
   a. Lightning catcher (Air Terminal) mounted in a position as shown on the drawing with regard not to place a roof leak at the mounting location of the catcher.
   b. Installation is done as solid as possible.

4. GROUNDING ELECTRODE
   a. Grounding electrode mounted plate type strip or a single bar at the location according to the drawing.
   b. Grounding electrode is planted with a minimum depth of 3 meters with a total result of land custody maximum 5 ohms.
   c. Grounding the entire system must be connected to each other.
   d. At each location of the grounding electrode must be made manholes (box control).

20.5. MATERIAL SPECIFICATION

1. Cable And Buffer
   a. This type of cable used is BC size 70 mm2
   b. Underscore cable under the roof can be made/fabricated according to field conditions with material from copper.

2. Capture Lightning And Electrode Grounding
   a. Lightning catcher (Air terminal) made of copper flat type of 3/4 inch diameter, 30 cm length are connected with galvanized pipe so that the total length of the lightning catcher (Air terminal) is 1 meter and can capture up to 60o angle (degrees).
   b. Grounding electrode made of a type of 3/4 inch diameter round copper, a length of 3 meters. If necessary increase in length can be connected with 3/4 inch galvanized pipe.

3. Measure Connect Box
   a. Made of corrosion-resistant types with dimensions as in the image and can be opened if needed.

20.6. TESTING AND EXAMINATION

Contractor must conduct testing and inspection of the entire work and guarantees will work perfectly witnessed by a designated Supervisor.

Testing and inspection include:

1. Measurement Of Resistance
   Measurements carried out on the ground inmates each grounding electrode location and do well at one point the state of the ground electrode in connected systems.

2. Continuity Test
   After the measurement of soil custody, it is meant to convince and ensure that the cable connection is correct and ready to operate.

3. Audit
   Inspection is conducted prior to implementation, implementation and after implementation.

20.7. OTHERS

Contractor should be careful in performing works well for avoiding accidents to people, equipment, and material. If at any time the equipment or material is placed in a temporary then place must be far away from the sources that can cause a fire, damage and defects in equipment or material.

CHAPTER XXI
DRAINAGE WORKS

21.1. SCOPE OF WORK

Work includes the implementation of the drains around the buildings, water pipelines in accordance with this specification and the corresponding other specifications for the job, and the limits of position, tilt and dimensions as listed in the design drawing and subsequent Board of Directors instructions.

21.2. UNDERDRAINS

1. Descriptions
   This work involves the installation of infiltration channels and coarse-grained material according to that referred to in this specification and within the limits of the approach included in the plans or as directed by the Board of Directors.

2. Material
   Pipes are required for impregnating channel perforated pipes must be eligible AASHO M 175. The coarse-grained material in question must be in accordance with the terms of the Class A modification sub base so that grains that passed a sieve No. 200 will not be more than 200%. When the location of large equipment enabling, tools such large will be checked periodically to meet the terms of manufacture, and each time can take a sample of the material produced for inspection in the laboratory to maintain the quality.

   All material should receive a thorough examination of the Board of Directors at the times deemed possible, before or during the work is performed.

3. Implementation
   The pit is made according to the dimensions and slope as stated in the plan image according to the terms and conditions of ARTICLE 3.06 of this specification. A minimum of 15 cm thick coating consists of a coarse-grained material placed and compacted at the base of the hole as wide as the pit.

   Pipe infiltration of the appropriate type and size then mounted firmly on this base layer. This impregnation pipe fitted with holes pointing downwards and subsequently connected pipes as strong as possible by strengthening connections as recommended by the Board of Directors. The end that leads to the top of the pipe should be covered with the impregnation proper filler material or to prevent an influx of land. After impregnation finished pipes attached, has been inspected and approved, coarse grained material placed on it to as high as listed in the plan drawing.

Accuracy must be considered, so as not to shift the pipeline or cover on the connection, so there occurs an open pit. The rest of the material was then placed and compacted layer by layer having a thickness of no more than 15 cm to the desired height.

The top of the pit is then filled with the kind of fine-grained soil (hint Directors) selected from the rest of the excavation.

Not provided special funding currency for hoarding the latter, which is considered a part of the excavation for the installation of pipes infiltration. All pile must be compacted.

4. Method of Measurement Work
The underdrains will be measured according to the length of the pipes by type and size in accordance with the conditions. Coarse grained Material will be measured in place with the cubication, installed well and approved by the Board of Directors. Cross-section measurements should not be more than the net dimensions as those in the plan drawings or instructions of the Board of.

CHAPTER XXII
BIO SEPTICTANK WORKS

22.1. SCOPE OF WORK

Covers the installation work as sewerage bio septictank to replace the function of a conventional septic tank.

22.2. EXAMPLE OF MATERIAL AND MATERIALS.

1. Contractor shall submit to Supervisora list of materials that will be used in this work and get approval in advance by Supervisor.
2. The exact location of the entire equipment should be revealed in shop drawings and adapted to the dimensions given by the manufacturer of such equipment.

22.3. IMPLEMENTATION OF INSTALLATION

1. BIO3 tank should be put in the hard ground and stable
   a. Digging in the size tank Bio-3
   b. Providing a layer of sand in the ground and around the tank with 20 cm thick
2. BIO3 tank is placed with high groundwater conditions or the ground is unstable, it is advisable created a foundation masonry at the base and around the tank. Then given a layer of sand in the ground and around the tank with 20 cm thick.
3. After laying BIO3 tank through a manhole to each bulkhead, soon half of the water filled tank at the same depth / balanced.
4. Hoarding is done with selected land fill (no gravel / rock).
5. If the top surface will be charged (stored under net / garage), the necessary cover and manhole of cast reinforced concrete.
6. Alternate installation method can be done with condition in point 2 with sump pump (collecting pit) as additional unit. BIO3 tank placed on a masonry or concrete foundation with 20 cm thickness. BIO3 tank must be installed properly and ensure it will not roll or shift.
7. BIO3 tank before it is operated should be given seed bacteria / hatchery, which can be obtained from the septic tank sludge. Seed bacteria and domestic waste water put into the tank through the inlet pipe and the outlet pipe left closed beforehand using hubcap pipe or the like. Let stand for 1 month until the bacteria acclimatization. After one month, the outlet pipe / effluent can be opened and BIO3 can be used.

CHAPTER XXIII
PIPING, TANK OF WWTP, FIBER GLASS AND PUMPS WORKS

23.1. SCOPE OF WORK

23.1.1. General

These specifications are complementary and should be read in conjunction with the drawings, both collectively describe the work to be carried out. The term work includes the supply and installation of all equipment and material that should be incorporated in the constructions required by the Contract Documents, as well as all the labor required to install and run the equipment and the material that the specifications for the work to be performed and the materials to be used, must be applied both at the sections where the specifications were found as well as other parts of the work where the work or the material encountered.

1. Type of work
   a. Construction of WWTP
      - Preparatory work
      - Earthworks and foundations
      - Concrete works
      - Supply and installation of WWTP Capacity of 5 m3
   b. Work piping, manhole and return path, comprising:
      - Soilworks
      - Supply and installation of pipes SNI 06 - 0162-1987 diameter 6 inch, 4 inch along its accessories
      - Work manhole
      - Work tank and pump house
      - Electric Installation Work
      - Road restoration

2. Work place
   This job is housed at health center located in Labuhan Lombok, East Lombok.

23.1.2. General Technical Terms

1. What is needed is a system for treatment of waste water piping in this case inseparable from the goods/material supporters include: pipes, accessories, Tanks WWTP fiberglass, Pumps, Electrical Installation and other materials, which will be provided and delivered according to the agreement contract;
2. Pipes, accessories, fiberglass wastewater tank, pump, Electrical Installation and other materials offered preferred domestic production;
3. These items must be in good condition and 100% (one hundred percent) of the new;
4. Technical specifications should be an explanation of the items offered are complete such as the type, class, thickness, material, ability to work and others;
5. It should be mentioned brands and or factory made on any goods / materials are offered and can be read clearly;

6. Must be attached a complete brochure of the goods offered, brochures must be genuine Latin-lettered, readable and understandable easily (if necessary, Contractor should be able to explain
7. Offered goods such as pipes, accessories, fiberglass wastewater tank, pump, Electrical Installation and other material should be equipped with a Letter of Support Factory (POA) Original; As for the POA can be issued by the Main Distributor / Top Agent or Distributor Branch / Agent Branch of a certain brand products are corroborated by a letter of appointment of agent / distributor of plant origin / principal agent
8. Pump engine is guaranteed by vendor/agent minimum of 3 (three) years

23.1.3. Work Preparatory

- Contractor must carry out all preparatory work as listed below so that the main work can be completed properly, where all preparatory work is included in the bidding
- Contractor must carry out the measurement, plan marking and cleaning work on the pipeline to be dug for pipe installation

23.1.4. Land And Foundation Work

1. General
   - Contractor must carry out the soil work required for the installation of pipes, valve chambers, crossing works and other works as required and shown in the design.
   - Contractor must maintain and be careful in using heavy construction equipment at the work site in the residential area so as not to disturb the surrounding environment (causing environmental damage).

2. Excavation
   a. General

      Unless otherwise specified, excavation includes removal of material (excavation) of whatever nature is encountered, obstacles which are of any nature that will interfere with their proper implementation and settlement.

      Disposal of material (excavated) follows the height line stated in the picture or ordered. If not specified otherwise, all work must be stripped (cleaned) of plants and debris, the object must be removed before excavation or measurements are made. Contractor must provide the necessary place and sheet for the remains of the quarry, as well as all pumping, quarrying or other actions that have been agreed to move or remove water, including attention to rainwater and building water entering the work site to avoid damage to the work and its surroundings. On-going excavation work where the workforce carries out activities, Contractor must protect the workforce with any approved means and equipment.

Excavation holes and other holes are not allowed to be open for more than 3 x 24 hours, so that they interfere with fluency and are dangerous for traffic and pedestrians. All holes must be given a strong protector and given a warning sign.

b. Excavation under the building
Unless otherwise specified for special buildings or ordered by, excavations must be carried out to specified peels, or hard soil layers. If ordered under the building area must be dug deeper, then the excess excavation or back up because the consequences will be paid at the bidder unit price if the bidder price has been determined, if not, payment will be made in accordance with the agreed value.

c. Excavation under the stiffening
If excavation under stiffening of the road, Contractor must disassemble the stiffening layer to the existing thickness.

d. Excavation near the Trees
Unless there are trees that must be removed as stated in the picture, all trees must be protected and not damaged during the course of the work and no trees are cut down without written permission. Disturbed trees must be supported during implementation as directed.

e. Stone Excavation
Stone excavation including transportation and disposal are as follows:
1. All stones with a content size of 0.25 m3 or more.
2. The stones must be dug 15 cm beyond the outer size of the pipe or connection, the intermediate space is then refilled with sand.

f. Lowering ground water level
If the excavation site is filled with high ground water levels, and results in disruption in the excavation and installation, Contractor must lowering the ground water level by pumping the existing water to dry where the depth of the excavation can be achieved and the pipe installation can be carried out properly, Contractor must dispose of pump water to a safe place, which does not interfere with work and the surrounding environment.

3. Sand Excavation
a. Excavation under the Foundation
The foundation must be given a sand base of 10 cm in advance, or according to the design drawings, previously installed floor of the lean concrete. The base of this sand should be compacted with a custom and moistened and must have a flat surface.

23.1.5. Concrete Work

1. General
   Concrete works include work floor, foundation Strousse, floor plates, walls and sloof. The material and implementation requirements must conform to the drawings of design and technical specifications for civil works. In general the specifications of the construction materials in this work are as follows:

2. Cement
   All elements used must be the usual Portland cement with the best quality. When asked for each shipment of cement to Contractor's work must submit a test certificate, stating the cement meets the conditions concerned. Cement should be stored in a way that prevents moisture or pollution by other substances. Gravel or stone fractions must be obtained from the approved place and must be hard from the layers and dust.

3. Sand and gravel/rubble stone
   Sand and gravel or rubble stone must be transported, handled and piled in such a way, so that the nominal size is separated from the other size, and not mixed with other objects.
   Gravel and rubble stone must be obtained from sources that have been approved and must be hard, durable, clean and free of layers that stick from dust.

4. Concrete
   Unless there are other provisions, then the concrete should have a mixture comparison of 1:2:3. A comparison of 1:2:3 is only a benchmark and depends on gravel and stone fragments used personalised.
   To get a good mix quality, it can be compacted well without too much water usage.
   For the mixing of cement should be used clean water. Concrete should be compacted not less than 30 minutes after mixed and allowed in wet state and protected from sunlight for not less than 7 days.

5. Prints and refinements
   Moulding for concrete cast must be made that are neat and reinforced for adequate concrete casting as shown in the picture.
   All connections must be tightly to ensure there is no leakage of wet concrete on the mold. Mold should not be disassembled for 24 hours after casting. The horizontal and visible concrete surfaces must be aligned until smooth with the steel spoon, after the first stiffening is done.

6. Concrete Steel
   Steel concrete should be bent and mounted as stated in the drawing and must be clean and free from dust.

7. Reinforcement Steel Bar.
   a. Scope of Work
      Convene, create and install all the listed reinforcement described in this requirement. The work includes the installation of all wire belts, supporting pins and other equipment needed to meet these requirements and will produce concrete buildings so that in accordance with the best practical techniques.
   b. Shop Drawing
      Before the manufacture of reinforcement, must prepare and convey to the board of Directors shop drawings, bending diagrams and mounting lists. Approval of the drawing is limited to generally follow the contract drawings.
      Shall be responsible for the accuracy of the size and details, the size and details shall be examined by the Board of Directors during installation.
      The Board of Directors ' approval of the working/shop drawing does not relieve mistakes of one of the images in the work.
   c. Standard
      If the local regulations do not have the requirements that can be used, break down and place the reinforcement must conform to the practical standard guidelines. (ACI-Designation 318).
   d. Materials
      The reinforcement is a plain or threaded concrete steel with a voltage of 2400 kg/cm2 and must comply with the requirements of SNI, concrete reinforcement steel reinforce or other acceptable International standards.
   e. Manufacture
      The reinforcement must be made to the size as shown in the drawing. Note that in particular, it does not use a flashed ring (Beugel) which is used to obtain a concrete deaking blanket.
      Reinforcement should not be bent or straightened by means of injuring the material. Reinforcement that is heated to bend is not allowed. Bending and reforming must be cooler, unless otherwise specified in the picture or ordered, bent over a pen diameter not less than 6 x the diameter of the stem, except the bar that is 25 mm more, however the pen diameter Not less than 8 x the diameter of the stem.
      The stem to the pulsed (Beugel) and the binder should be bent around the pen that is not less than 2.5 times the smallest rod thickness.
   f. Installation
      The reinforcement steel bar is seated precisely according to the drawing, reinforced with a concrete wire tied or a suitable clip, any distance, is supported or given between a concrete or metal bearing or with a metal hanger. Metal pinching or ganing should not be installed in relation to the reference. Tie wire is required to be bent to avoid reference in order to produce the required concrete blanket.

g. Member Connection
Unless otherwise stated specified pictured, the vertical reinforcement steel bar in the column and all other connection bars must have a minimum pass of 64 x the diameter of the stem. The length of the pass is for the stems that differ in diameter based on the largest diameters. Pass member can be welded according to local requirements.

h. Permission of the Board
It is not permissible to cover the reinforcement with concrete before being inspected by the Board of directors and the reinforcement and given permit to proceed with the casting. Before the board was given enough time to check.

i. Allignment
The reinforcement should not be straightened in this regard including the work of the rain drains, sewers and others as well as repair of the buildings/fences exposed to the project

23.2. PROCUREMENT AND INSTALLATION OF WWTP

23.2.1. Material Tank Of WWTP

1. Material specification;

Capacity	:	5 m^3 / day for Puskesmas Labuhan
Raw material	:	Fiber (maximum 450g / m2), Resin (Orthophthalic)
Thickness	:	7 mm (minimum)
Maximum Load Capacity	:	250 kg / m2
Effluent Quality	:	In accordance with the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.68 / Menlhk / Secretariat / Kum.1 / 8/2016 for LHK domestic sewage.

2. There is a recommendation to guarantee the proper functioning of WWTP system and effluent quality according to prevailing regulations.
3. The WWTP tanks have been tested with quality engineering materials (bending power, traction, etc.).
4. Tank material made of fiber (mat450g/m2) and resin (Orthophthalic) with a minimum thickness of 7 mm strong withstand the burden and secured its strength and manufactured by the manufacturer.
5. The tank of WWTP is equipped with a letter of guarantee that the goods offered will be shipped in new condition and either in accordance with the technical specifications set, and if there is an item that is not in accordance with the specifications, will be replaced with the participants risks and responsibilities and equipped with a minimum 1 (one) year warranty letter. Availibility of sparepart is guaranteed by vendor/agent for at least 10 (ten) years.
6. The provider of the WWTP tank must guarantee that the effluent produced from the WWTP tank can meet the standards in accordance with the

regulation of the Minister of Environment and Forestry Republic of Indonesia **number P. 68/MENLHK/Setjen/Kum. 1/8/2016** for domestic waste water by showing laboratory test results.

23.2.2. WWTP Tank Installation

- WWTP tank must be placed on the foundation that has been prepared.
- Ensure accessories equipment must have been installed before the tank is filled with water and wastewater installations run.
- WWTP is equipped with a wire fence in accordance with the drawings.

23.2.3. Testing WWTP

WWTP tank testing was conducted in order to ensure / guarantee and check all the functions of the WWTP tank installations and equipment in good condition, strong and does not leak and buildings able to withstand the pressure WWTP according to plan.

WWTP Tank Testing Conditions

1. The checking/Commissioning of the WWTP tank is done after the installation work of the WWTP tank is completed
2. Commissioning is implemented by the WWTP tank installer and witnessed by the implementing/contractor, consultant Supervisor and board of directors.
3. The WWTP tank provider should provide the WWTP tank checklist form, equipped with the event news.
4. Checking each component according to the order in the form
5. Visually checking the physical condition of the building (eg vessel condition, vessel cover, manhole cover, flow test, leak test, biogas utilization etc).
6. Test flow from inlet body to pipe outlet

After commissioning, if there is a technical shortage/error then Contractor has 1 month to complete the recommendation given.

23.3. PROCUREMENT PVC PIPE FITTING FOR WASTEWATER

23.3.1. General

Implementing Procurement must provide and include all pipes and fittings, valves, couplings, meter, nuts, bolts, gaskets, connecting material and supplementary material as defined in the Register of Quality and Materials or the picture / drawing.
Contractor shall provide the piping of all material as defined herein and quantity indicated in the list of material. All pipes, fittings, valves and other equipment must be in accordance with the use for tropics, temperate humid and the air temperature 32 ° C. Normal working pressure will not be more than 8 bar and pressure testing in the field is not more than 10 bar.
Implementing must provide an affidavit (Item Warranty Certificate) from the manufacturer stating that the goods in accordance with the requirements

specified in the technical specifications. Executing also should communicate the report chemical and physical test results that have been done in the factory and is applicable to all types of goods.

23.3.2. Reference Standard

References to standards in tender documents is intended to provide an overview of the type and quality of the material requested. All materials offered should be of domestic production with the Standar Nasional Indonesia (SNI). If it turns out there is no SNI for certain products or have not been created in the country, then offered to use another standard, with the proviso that the overall quality at least equal to what is set forth in this auction. All material submitted must be one hundred percent new (not used materials), in good condition and qualify the prescribed technical specifications. Goods or equipment produced in the country or from abroad and it is set in NFPA then goods / equipment is required to have the Standar Nasional Indonesia (SNI).

- *ISO* : *International Organization for Standardization*
- *JIS* : *Japanesse Industrial Standard*
- *BS* : *British Standard*
- *DIN* : *Deutsche Industrie Norm*
- *AWWA* : *American Water Works Association*
- *ASTM* : *American Society for Testing and Materials*
- *ANSI* : *American National Standards Institute.*

23.3.3. Pipe Materials and Fittings

For pipes and fittings that can be made domestically then the Procurement Contractor must attach a letter from the factory for the permission to use SLL/SNI issued by the Ministry of Industry and can demonstrate experience of at least 3 (three) years.

The offered pipe material can be different from the pipe material listed in this bidding document, provided that the offered pipe has a total quality that is at least the same as what is stated in this bidding document.

In the event that the pipe material offered is different from what is stated in bidding document, the participants of the bidding should include detailed pictures of the junction (the detail drawing of the pipe) accompanied by the number and specifications of each material offered.

All of the pipes and fittings offered must be usable in tropical areas with water temperature flowing between 15-35 degrees Celsius and pH between 6 & 8.
All pipes and pipe fittings will be planted in the ground except for special things that require other.

23.3.4. Class

If not mentioned in the Volume of Work (Bill of Quantity), which is used is a type of PVC pipe with a nominal pressure of 10 kg / cm2 according to the applicable ISO standards and has an effective length of 6 meters. The minimum thickness of the pipe wall and outside diameter follow the following table:

Table Pipe Outer Diameter Polyvinyl Chloride (PVC)

Nominal Diameter (Mm)	*Average Outer diameter (Mm)*
50	*63*
65	*75*
80	*90*
100	*110*
125	*140*
150	*160*
200	*200*
250	*250*
300	*315*

23.3.5. Connection

1. Push On Rubber Ring Joint
   Unless specified otherwise, the connection should be of a type of push-on rubber ring. The pipe should have a bell at one end and a plain on the other end below with an angle of approximately 15 degrees. Pipes must be marked with the mounting instructions on the outer surface.

   Fittings must be of the type specified and have the tip of the bell type.

2. Sleeve Coupling
   Coupling and adapter Sleeve must be specially designed for PVC pipe connection and matched with PVC pipe outer diameter.

3. Ring Rubber and Gasket
   Ring rubber used for push-on connections and gaskets for mechanical splicing fittings of steel or ductile steel castings and to the connection flange must of styrene butadiene rubber or other synthetic rubber is right for drinking water pipes.

4. Connection Solvent Cement
   Unless otherwise specified, the PVC pipe with a nominal diameter of 40 mm and smaller can be connected using a solvent adhesive in accordance with factory standards. When used in solvent cement this connection, the Procurement Contractor must provide solvent cement in accordance with the manufacturer's recommendations coupled with the augmentation of 10%.

The connection must be able to withstand the resultant movement of the elongate result of changes in pipe temperature of 50 ° C without interrupting leaktightness to water.

5. Adapter
   The adapter must be made of ductile steel or cast-steel and consists of a flange at one end and socket (or bell) on flexible connection either with mechanical or push-on.

6. Fitting
   Fitting the connection must be in accordance with ISO-0084-1987 standard and if it is not mentioned in the Bill of Quantity then the connection system uses rubber ring joint system.

   All fittings are planned to have the work pressure mpa 1:23 (12.4 kg / cm2) Unless otherwise specified, all fittings must be of injection molded or heat process (printing or hot process) and is designed with the same characteristics and the strength of the pipe to be joined.

   When fitting specified not made of PVC it must be of ductile cast steel (Cost Ductile Steel). Bell and Flange specified must have a flange at one end and a push-on connection type of mechanical bell at the other end. Tee with flange branch, if specified, must be ends with push-on and end with a branch pipe flange. The outer surface of the fitting must be covered with a protective layer of bituminous materials, namely coal tar or aspheltic base, which has a dry thickness not less than 0.3 mm. The inner surface of the fitting must be coated with epoxy or coal tar epoxy used for the lining must be of the right material for drinking water pipes and equipped certificate from the competent authority (public health authorities). Bolts and nuts that will be used for the flange and mechanical connections must be of galvanized steel.

23.3.6. Testing of "Quality Assurance" (Quality Assurance)

Quality assurance testing in accordance with the following requirements must adequately represent the unit is supplied under the contract. Users should be allowed to visit the place of manufacture to witness the test / tests.

23.3.7. Valve

- Provider of permissible procurement services completes the Valve as required and according to approved standards. The whole Valve corresponds to the size mentioned and when possible from the same example or model and is issued by one factory.
- All valves in the outer body are printed original from the factory and casted with a reduce arising which can be Products:
  - Project Owner Name

  - The author's name or trademark
  - Year of manufacture (97 means 1997)
  - Working pressure
  - Nominal Diameter
  - Direction of the Kong arrow if the Valve is used one Kong
- Valve with a smaller diameter of 50 mm from brass/brass, if not mentioned otherwise, except for the wheels of the hand steel or wrought steel or subitem material from the screw subitem.
- Screw valve permissible corresponds to ISO 7/1 "Pipe threads in which tight joints pressure is made in yarn "
- Valve with diameter 50 mm and above using a system Subitem with Flange and made of Cast Steel/pouring steel.
- The thickness of the permissible Flange is determined based on the working pressure specified and complies with recognized international standards. Procurement services providers submit design calculations at the request of user goods.
- If not mentioned in the volume is enough (Bill of Quantity) then the whole Valve permissible is made specifically to receive working pressure of at least 10 Bar and for permissible Flange has dimensions with ISO 2531 standard.
- All operating units are designed for counterclockwise opening and clockwise for closure. The permissible arrows are shown for the Products rotational direction to open or close the Valve.
- Removing the openings of subitem pipe permissible closed to prevent the inclusion of foreign objects,
- The offer of registered Valve is included equipment for connection such as Gasket, nut, Bolt and Ring for one side of Flange with 10% suffix.
- Large and the size of the equipment is adjusted to the cultural specifications of the Flange valve, nuts, bolts and Ring sent in a covered not used materials and registered galvanized evenly and well. Minimum Gasket thickness 3 mm made of synthetic rubber.
- Valve permissible operation manual included as maximum Force on Hard wheel, Crank, T-Bar and other equipment so that it does not pose any difficulties to the operator. Permissible Procurement services Provider includes the maximum amount of Torque needed for a Lot Valve shipped.
- Coating of the entire metal surface, i.e. the body Valve, Flange, Surface Box and others are contact with clean water or soil of the permissible coated with non-toxic coalter epoxy, enamel, asphalt or other materials of the same and approved by the Director of Supervisor.
- The surface of the permissible is clean, dry and not from dirt before use. Coating by spraying of permissible is done in the factory. Minimum coating thickness after dry + 400 micron (16 mils). Materials that are in contact with water are modified from non-toxic materials while soluble materials may not be used.
- The operating manual (Operation manuals) of the permissible are provided with 6 (six) sets for the lot and valve and its equipment and in Bahasa Indonesia.

- Procurement Contractor includes a certificate from a factory that explains that Lot valve meets the requirements requested in this specification.

1. Gate Valve
   - If not mentioned in the Bill of Quantity, then the gate valve offered is the gate valve of the type "Non Rising Stem ".
   - Valve must meet the standard "Gate Valve for Water and Other Liquids " (AWWA C 500) or other international standard or higher quality and specially designed for working pressure
   - Offer gate valve is the following hand wheel must be equipped with a key T (Tee Key) at least one fruit and maximum saw for the size of 20 pieces of fruit.
   - The Tee key is they come with a surface boxlstreet cover and is made of galvanized steel of ST 40.
   - If in the Bill of Quantity required extension spindle Then the material is made of the steel ST 40 that has been galvanized.
   - Extension offer price spindle is included PVC pipe piece to protect the spindle extension from the land backfill.
   - Body of gate valve, hand wheel/cap made of gray cast steel or material with higher quality.
   - Gate valve body must be made of steel body with a holder of a bronze metal, a stem valve type of non-rising and with a solid (solid wedge gate) valve. Valve must be suitable for mounting with an upright position (vertical mounting). Valve should be designed to be a barrier-free water channel that has a diameter not less than the nominal valve diameter when in an open position.
   - Stuffing box should be made of the same material as the valve body as specified above and must be in open position. Height of stuffing box should not be less than the diameter of valve. Packing on Stuffing box should be made of asbestos or other suitable materials and approved user goods. Packing of hemp or jute (hemp) should not be used. 0-Ring Stem seal can be used on the consent of the user of goods and the seal must consist of 2 (two) 0-ring seal and at least 1 (one) piece is placed on the stem-collar and can be done replacement in a state of full working pressure where the valve in a full open position.
   - Stem made of bronze or stainless steel.
   - Body seat ring and disc seat ring made of brass or bronze.
   - Planted valve Surface box is made of grey cast steel, flat and resistant to damage caused by heavy traffic load. The lid must be included on the surface box and is given a template On the top.
   - The Joint between the lid and the body is not a hinge but connected with bolt. Surface box size is adjusted to the respective valve dimensions and is coated with anti-rust.
   - All valves, unless otherwise specified, must be equipped with a wrench nuts).

2. Check Valve
   - The goods provider must provide check valve type Swing Check Valve/KlepTabok with flange connection.
   - The upper part is covered with a blank flange that can be opened at any time when necessary.
   - On the outside of the check valve body there must be a stamp (printed) that can indicate the brand, or from which manufacturer made it, the size of diameter, working pressure, and the direction of the water flow.
   - The body of the upper lid and the disc from the check valve body is made of cast steel.
   - The position for the disc is made of a good quality Neophrene Synthetic Rubber.
   - Working pressure from check valve able to withstand 10 kg/cm2.
   - Check valve should be designed in such a way that the disc, stand, ring mount and other inner parts that may be necessary for repair should be easy to pick up, easy to move and easy to replace without using any special equipment or have to move the valve from its path.
   - Valve should be suitable for operation in a horizontal or vertical position with the upward flow and when the full-open Valve must have a clean flow area (a net-flow area) No less than the area nominal diameter of the pipe and the flange end.

23.4. PIPE INSTALLATION

23.4.1. General

If not specified otherwise, Contractor must install all pipes, special objects, joints, covers, valves, bolt buffers, nuts, gasket, splicing materials and other equipment in accordance with the drawings and requirements to produce easy installation Complete and thorough. At the time of the pipe fitting job, all the pipes and the end of the pipe should be closed tightly to avoid being entered by animals or foreign objects. In the event of damage to the valve or other equipment in connection with the handling, the damage is displayed quickly to the board of directors. The Board of Directors will explain how to repair or reject completely damaged materials.

23.4.2. Excavation

Unless otherwise specified, the quarrying includes the removal of any material that is encountered, any obstacles that will somehow interfere with the appropriate implementation and settlement.
The disposal of such materials following the altitude line is listed in the image or ordered. If not specified, the entire field of work must be peeled (cleaned) of plants and debris, the object must be removed before the quarry or measurement is performed. Contractor shall provide the place and retaining wall required for the remnants of the excavation, as well as all pumping, digging or

other actions that have been approved to move or remove water, including attention to rainwater and water Building the job site to avoid damage to the work and surroundings. Ongoing employment work in which the workforce conducts activities, Contractor must protect the workforce with any approved means and tools.
Quarry holes and other holes are not allowed in open conditions more than 3 x 24 hours, thus interfering with the smooth and harmful traffic and pedestrians. All the holes must be given a strong protector and have a warning sign.

23.4.3. Excavation Under Construction

Unless otherwise specified for a special building or ordered by, a quarry must be performed up to a prescribed peil, or a layer of hard soil. If ordered the area under the building should be dug deeper, then the excess of the mines or backfill returns because the result will be paid at the price of the bidder unit if the price of the bidder is determined, otherwise the payment will be made accordance with the agreed value.

23.4.4. Excavation Under Stiffening Area

When performing a quarry under the paving, Contractor must dismantle the coating until the thickness of the loudspeaker is.

23.4.5. Excavation Near The Trees

Unless there are trees that have to be discarded as shown in the drawing, all trees must be protected and undamaged during the execution of the work and no tree is cut down without written permission. Disturbed trees must be supported during execution according to instructions.

23.4.6. Excavation Stone

The stones quarrying including transport and disposal are as follows:

- All stones are content measuring 0.25 m^3 or more.
- The rocks must be excavated 15 cm above the outer size of the pipe or the joints, the chamber between then replenished by sand.

23.4.7. Lowering The Groundwater

When the location is filled with high ground water, and caused by disruption in the implementation of the quarry and installation, then Contractor should degrade the groundwater by pumping the water that is there until dry where Depth of field can be achieved and installation of pipes can be carried out well, contractor should dispose of the pump water to safe place, which does not interfere with the work and surrounding environment.

23.4.8. Installation of Underground Pipeline

The pit should be dry when the pipe will be mounted. The pipes must be mounted according to the depth indicated in the image and connected form a flat line groove. Once the pipe will be mounted to its position for the connection, the pipe bearing should be reexamined for its power and equipment. Basic minerals include the lowering has a minimum width equal to the outer diameter of the pipe plus 30 cm and maximum equal to the outer diameter of the pipe plus 60 cm, unless otherwise specified by the image or ordered by the board of Directors. The excavation length at any place maximum 200 meters or as long as necessary to connect a number of pipes that can be carried out in a day. At the end of each weekday all newly installed pipes should be backfill at least 0.15 meters from the top of the pipe except on the connection, the rest of the backfill should be backfill again the next day, except the connection part or after completion of pressure testing. Adequate equipment, tools and facilities, which satisfy the board of Directors must be held and used by Contractor to secure and appropriately perform the work. All pipes, connection objects and valves lowered to the pit must be carefully, one by means of a crane, with a rope or with adequate tooling/tools in such a way that can avoid damage to pipes and other accessories. Under no circumstances should pipes be dropped or stacked in a pit.

23.4.9. Pipe Cutting

Cutting the pipes to be inserted into the branch (tee) or valve, must be done in a neat and proficient way without damaging the pipes and straightness, and the flat edges with the angle of the elbow to the pipe connection.

23.4.10. Unallowed Pipe Fitting State

Pipe trench holes inspected by the board of Directors, newly initiated the installation of pipes after the permission of the Board of Directors and no pipes should be installed if according to the opinion of the board of Directors.

23.5. BACKFILL

a. General
   Backfill should not be directly dropped on top of any structure or pipe. The material used for backfill return is a soil material, free from grass roots, bushes, organic materials and other plants or rocks that have a diameter of more than 15 cm. material backfill as thick as 15 cm from any structure or pipe shall be free from Rocks, a fragment of a soil blob of maximum size greater than 7.5 cm. Backfill is returned not placed around or above a structure until the concrete reaches enough strength to withstand the pressing load. Backfill around the water retaining building should be placed until the building is filled with water when the backfill returns without the supervisor's permission.

b. Backfill around the building, under the structure and under the stiffening area
Unless specified for a special building or ordered by, backfill around the building, under the structure and under the stiffening area should be horizontally spread no more 15 cm before it is solidified, and the compaction is done by compacted hand-powered motion. Backfill must be installed flat layer after layer, moistened and compacted mechanically.

c. Backfill Examination
The excavation and backfill must be inspected and approved, before starting the next building stage. Materials must also be approved.

23.5.1. Backfill under the pipe

The trenches must be given a sand base of 10 cm in advance, or according to the plan drawings, before the pipes are installed inside. The base of this sand should be compacted with a custom and moistened and must have a flat surface. Each sand base of each end of the pipe should be 5 cm lower for secured pipe to be based on the overall length and not withheld by the joints.
Once the pipes are installed in the trench, it should be piled with sand and fine gravel ranging from base to top of the pipe. The material of this fine sand and gravel is spread evenly to each corner of the room in the quarry around the sides of the pipe and its equipment and solidly compressed in a wet state.

23.5.2. Backfill on the pipe

From the top of the pipe and its equipment to as deep as about 10 cm above the pipe, the quarry should be piled with fine sand and gravel and compressed in wet state evenly. Contractor should work cautiously in the placement of this heap, to avoid damage or displacement.

The way or method of refilling should be done layer by layer, compacted around and above the pipes as shown in the plan image by way of not damaging the pipe. Compaction on the edges should be done interchangeably on both sides. The first 5 cm layer above the pipe should be compacted only on the pipe edges only. Only hand-driven equipment can be used. All damage to the pipes and the connecting tools should be repaired Contractor at own expense.

From a depth of 10 cm above the pipe to the surface, the quarry must be piled by hand or a mechanical method that is approved and compacted by a compactor, to prevent the surface from decreasing, after the completion of the hoarding work.

Regarding must be up to several centimeters above the ground to provide precipitation opportunities, the Board of Directors/experts can instruct Contractor, to add a heap on the top of the trench, where there is a sequence below the surface of the land concerned.

23.6. PVC PIPE TESTING

1. Purpose
   Hydrostatic pressure testing is carried out with the aim to convince/guarantee the discharge of the pipe and its equipment in good condition, strong and not leaking and retaining blocks (permanent) able to withstand the pressure according to the plan.
2. Pipe Testing Provisions
   a. Length of testing
      The length of the pipe to be tested should not be more than 500m. Pressure at the highest point should not be less than 0.8 times the pressure at the lowest point.

   b. Preparations for testing block retaining pads
      Pipe testing can be initiated if the block bearing (permanent) blocks have been installed in accordance with the specifications listed in the standard image and the quality of the concrete is fully qualified (already more than 7 days old). The temporary retaining block for the end cover of the pipe that is tested must correspond to the standard image.

   c. Backfill before testing
      The piping to be tested must be completely piled up. Water filling
      The piece of pipe to be tested should be filled with water, with a maximum charging speed of 200 meters/hour and guaranteed that the air in the pipe comes out.

   d. The water is filled with the lowest of the pipes to be tested.
      The air valve must be fully open during water filling until the air is completely discharged. The water used to fill the pipes and pressure testing should come from an approved source and qualify for the quality of clean water. Water procurement fee is the responsibility of Contractor.

   e. Equipment for testing
      Contractor should prepare all necessary equipment for testing. Equipment must be in good condition. The pump used should be able to produce the desired pressure. Water reservoir tanks must have a size/shape that can measure the volume of addition of water required in the test. Tank must have accuracy of water volume measurement of ± 0.5 liter. Calibrated pressure measurement device must be mounted at the lowest point of the part of the pipe tested with the accuracy of reading 0.5 bar.

   f. Test order
      1) Preliminary Test
         After the water is filled, the portion of the cement coated pipe should

be allowed at least 24 hours, with a static pressure of the pressure of its work. During the last 6 hours of the initial period, pressure should be raised according to the test pressure. If there is a decrease in water volume or not initial testing is based on the measurement of volume additions.

As for the other pipes are based on additional measurements of water volume according to the desired pressure drop tolerance. Contractor must find and dismantle the leakage caused by the volume of water according to the desired pressure drop tolerance. Contractor must find and dismantle the leakage resulting from the initial testing implementation. If there is a displacement shift and a pipe leak should be done retesting.

2) Pressure Test
The results of the pipe test will not be accepted, if the decrease in the volume of any part of the pipe tested is greater than the specified tolerance (calculated by liter unit per 100 m length of pipe). Standard form ("Pipe test Event News") should be used to record test results.

g. Warning
Not allowed to work in the testing area, during the pipeline testing.

h. Basis of calculation additional volume of steel pipe and HDPE
Calculation of additional volume of water to the type of steel pipe and HDPE are based on:
$q = 0.54 * 10 -4 * L * d * (1 - e (h / 4)) * P$

Where :

q	= Volume of water (liters)
L	= length of the test section (m)
d	= Internal diameter (mm)
h	= Duration test (hours)
Test P	= Pressure (bar)
0.54 * 10 -4	= Assumptions constants, which are based on;

- Water absorbing power of the material pipe
- Average length of pipe
- The connection methods
- methods backfill

i. Test completion
After the "News Events Testing Pipeline" signed that received successfully, Contractor is to be responsible for each stage of the pipeline until the entire pipeline system is complete. For that we need the most recent test as the completion of the work Contractor in order to piping can be operated in sequence includes:

- Static flow test: Gradually without any loss and signs of leakage for 1 hour.
- Dynamic flow test: Overall piping without any signs of leakage for 24 hours.

Each test above acceptable if managed well with the signing of "Minutes of Network Operation Testing Pipeline".

j. How to Work Results Measurement and Payment Basis

The amount to be paid will be calculated based on the items of work contained in the Bill of Quantities Price. In principle, the calculation of volume measures do not work regardless of the quantity of work and quantity of the work, with reference to the Terms of Contract. The units will be used as the basis for the measurement of employment are:

1) m1 = meter run, is the total length of the work completed
2) m^3 = cubic meters, is the sheer volume of work completed
3) unit = unit, is the number of unit installed / has been completed in accordance with BILL OF QUANTITY
4) ls = lump sum, the number of units of work presented in accordance with the level / stage work has been completed, according to the items contained in the list of quantity and price.

All work can be categorized as a work that was already paid, will be measured according to the provisions above. By looking at all of the terms of payment and the technical implementation and administrative rules as implied in the contract documents, the implementation of performance measures will be implemented in accordance with the guidance and approval / Expert.

The amounts measured in the manner as described above, regardless of the manner in which the excavated material will be removed and will only be paid by the unit price in accordance with the existing financing currency in quantity list price. The price should have included all the necessary and other things commonly done to complete the work with the best

23.7. WORK OF CONTAINER AND PUMP HOUSE

23.7.1. General

1. Job description

   The construction of the reservoir and pump house as well as the procurement of submersible wastewater pumps, installed or constructed according to the images and technical requirements.

2. Contractor providing materials / equipment

   Contractor are responsible for determining and providing the necessary equipment and additives for installation work as required and listed in the images. Finally, Contractor should consider the images and list of

equipment/materials, the task giver assigns the materials to be held, constructed and installed forming a complete arrangement. Contractor are responsible for the transport and handling of materials/equipment from the shelter.

3. Pump stations
   a. Components of Pump Station
      - Pump Room (including foundation)
      - Pump
      - Engine drive or motor pump
      - Pump room or dry well
      - Sump or wet well
      - Screen and Grit chamber
      - Piping
      - Power source and pump Controller (panel)

   b. Type of Pump
      Submersible wastewater pumps are a type used because they are not easily clogged. The use of a submersible pump is better, because it prevents cavitation, as it often occurs in the use of non submersible pumps with Head negative position (the pump position is above the water surface).

   c. Capacity (Debit)
      Capacity or discharge pump is the volume of liquid pumped in units of m^3 / sec, or L / sec. Discharge pump design is the peak hour flow of 120 m3 per day, or 5.0 m3 per hour, or 83.35 liters per minute.

   d. Total Pump and Power Source
      1. Has 2 units of pumps, one working one standby respectively made the same unit on the basis of the design discharge
      2. Have the resources of PLN.

   e. Panels and Components
      Panels and components should use waterproof kind. All Circuit Breaker, equipment protection, overload, relay protection and timer (timer) must exist at the pump panel. All cabinet control panel, power panel, Circuit Breaker, safety switches and other electrical equipment must be equipped or attached nameplates for easy recognition.

   f. Pumps Supplies
      1. Screen installed in front of the pump
      2. Grit chamber, when a lot of grit content
      3. Automated tools (floating switches) should be used so that pumping can be done 24 hours automatically

Specification Pump

- type : Submersible Pump
- Type Capacity : 85-100 liters per minute
- total head : 10 meters
- electrical output : 300-500 watt
- Material : Stainless

CHAPTER XXIV
SOLID WASTE TEMPORARY STORAGE WORKS

24.1. SCOPE OF WORK

These specifications are complementary and should be tailored to the drawings, an explanation of the term work includes the supply and installation of the equipment must be adapted to the construction.

Consideration of local materials, the specifications for the type of work performed and materials used be the primary consideration in SOLID WASTE TEMPORARY STORAGE activities.

1. Main Structural Building Specifications
   a. Foundation:
      1) Based on for the condition of land and existing buildings around it;
      2) Prioritize material is local materials;
   b. Wall:
      Prioritize local materials.
   c. Main Frame:
      1) Prioritize local materials;
      2) Calculated with the age of the building plans;
      3) Environmental conditions greatly affect (seafront, wind speed, etc.).
   d. Roof coverings:
      1) Prioritize local materials;
      2) Corrosion resistant, impact resistant, easy to replace.

24.2. WORK REQUIRING TECHNICAL SPECIFICATIONS

A detailed explanation of the scope of work for construction jobs 3R Waste Management, among others:

1. The preparation work / introduction:
   a. Measurement and peg

2. Earthworks:
   a. Soil excavation
   b. Sand backfill
   c. Arrow

3. Installation
   a. Lean Concreate 1: 3: 5
   b. Reinforcement concrete 1: 2: 3 Foundations Foot Plate
      1) Concrete 1: 2: 3

2) reinforcement
3) Formwork

c. Reinforcemenet concrete 1: 2: 3 Sloof 20x25
1) Concrete 1: 2: 3
2) Reinforcement
3) Formwork

d. Stone masonry foundation 1: 4
e. Masonry 1/2 brick 1: 4
f. Plastering
g. Neat Plaster
h. Cast concrete Floor 1: 3: 5
1) reinforcement
i. Paving Block
j. Tiling

4. Steel Construction Works and Roofing
a. Steel Construction for MRF (Moment resisting Frames)
b. Roof Work

5. Painting job
a. Procurement Painting Wall

6. Works Supplies
a. Motor Tricycle
b. Procurement thrasher machine
c. Procurement sieving machine

24.3. MATERIAL REQUIREMENTS

1. Portland Cement
a. The cement used is Portland Cement (PC) must meet the quality requirements as laid down in the Indonesian National standards (ISO 2049: 2015) or meet quality standards and test methods Pozolan Portland cement (ISO 0302: 2014) and is still in the bag intact
b. Semen quality should be good, not more than three (3) months in the reservoir at the warehouse
c. The cement used is Portland cement type I or PCC (Portland Composite Cement)
d. It is recommended that each contain 50 Kg bags of cement.
e. When used Portland Cement (PC) which has been stored longer have to be held prior testing by a competent laboratory
f. Portland Cement (PC) that has been petrified (become hard) should not be used.

2. *Aggregate* Smooth
   a. Sandfill.
      Sandfill, elevation, and other goals, should and hard or meet requirements specified implementation.
      In ISO 4141: 2015. (Method blob of clay and beads easily broken in the aggregate). The granules should be sharp and hard, can not be destroyed with a finger. Sludge levels must not exceed 5%.
      The grain must be through a perforated sieve 3 (three) square mm. Sea sand should not be used.
   b. Replace sand.
      Sand for mortar bricks, plastering mortar and bituminous concrete, must meet the requirements specified in the implementation of SNI 03-4141-1996. The granules should be sharp and hard, can not be destroyed with a finger. Sludge levels must not exceed 5%. Grain-the grain must be through a perforated sieve 3 (three) square mm. Sea sand should not be used
   c. Concrete sands.
      Smooth sand consists of grains that are clean and free from organic materials, sludge and so on. Sludge levels must not exceed 5%. Sea sand should not be used.

3. *Aggregate* Coarse (split)
   a. Granular material, such as sand, and gravel which is used together with a binder medium to form a hydraulic concrete or mortar. Gravel as a result of the disintegration of the 'natural' on the rocks or in the form of crushed stone obtained from stone-crushing industry and has a grain size between 2/3 -1/2 cm
   b. Coarse aggregate should not contain chemicals that damage to the following restrictions: the levels of organic matter in the aggregate did not show a darker color than standard colors, decreased strength of concrete more than 5%
   c. Aggregate materials should be stored in a manner to prevent damage to, or intrusion of materials that interfere.
   d. Coral Concrete / Split:
      1) Used coral clean, good quality, non-porous and have good hardness gradient.
      2) The split granules through a sieve square perforated 76 mm and left on 20 mm perforated sieve.
      3) Coral / Split shiny grayish black.

4. Water
   Water used to clean, fresh water and contains no oils, acids, alkalis and organic materials / other materials that can damage the concrete and must meet the NI-3 of Article 10. If necessary, Engineer may ask Contractor so that water used checked in laboratories examination formal, legal materials at the expense of Contractor.

5. Steel bar
   Steel concrete offer from this type of steel mild-steel with a yield stress minimum of 2,400 kg / cm2 (BJTP 24) and so on according to a specified, but they should be asked by test laboratory authorized and legitimate, free of dirt, a layer of grease / oil and no defects (cracks, peeling, cuts, etc.). Steel cross section should be round and fulfill the requirements of ISO 2052: 2014 Concrete Reinforcement Steel.

24.4. FOUNDATION

1. *Foot Plate* (Main Base)
   a. Foundation extent adjusted to the results of a calculation of building structures and the carrying capacity of the local soil. (TFL calculation technique);
   b. Concrete quality achieved in minimal concrete work is K-225 and must meet the requirements specified in ISO 1974: 2011 Test of Press Concrete Test Cylinder;
   c. Using concrete mix with comparison mix 1 Pc: 2 sand: 3 Cr. as the requirements of ISO 031974-1990;
   d. Steel concrete offer from the kind of mild-stainless steel with a minimum yield stress of 2,400 kg / cm2 (U24) and so on according to a specified, Steel cross-section should be round and fulfill the requirements of ISO 2052: 2014 Concrete Reinforcement Steel;
   e. If needed can be improved ground under the foundation.

2. *Stone Masonry foundation*
   a. The width of stone Masonry is as wide as the bottom line with the foundation structure of the matter is elongated with a bearing capacity of the soil at the site;
   b. Stones used must be of good quality, strong, clean, angular (not round), no cracks, no porous, having a specific gravity of not less than 2.6 ton / m2. Stone used is cleaved or river stone mountain rock hard;
   c. The mortar mix for stone masonry shall be using 1 PC: 4 sand (type 1);
   d. For watertight stone masonry the mortar mix shall be using 1 PC: 2 sand (type 2).

24.5. COLUMN

1. With reinforced concrete
   a. Analysis of reinforced concrete structure refers to the SNI 2847: 2013 requirements for structural concrete buildings, while the loading plan should be in accordance with ISO 1726: 2012 Planning Procedure for the earthquake resistance of buildings and non-building structures of buildings and ISO 1727: 2013. The minimum load for the design of buildings and other structures.

b. Using concrete mix itself with comparison mix 1 Pc: 2 sand: 3 Cr. and fulfill the requirements of ISO 1974: 2011 Test of Press Concrete Test Cylinder;
c. Concrete quality achieved in minimal concrete work is K-225 and must meet the requirements specified in the ISO 1974: 2011 Test of Press Concrete Test Cylinder;
d. Steel concrete offer from the kind of mild- steel with a minimum yield stress of 2,400 kg / cm2 (U24) and so on according to a specified, steel cross-section should be round and fulfill the requirements in 2052: 2014 Concrete Reinforcement Steel.

24.6. STRUCTURAL ANALYSIS

To analyze the structure of the main building can be done manually or using a mechanical engineering software structure analysis tools. For loading and design of structural elements should refer to the regulations / codes and regulations.

24.7. BUILDING DESIGN SUPPORT

Ancillary buildings are an integral part of the building SOLID WASTE TEMPORARY STORAGE, which is building support in the activities of SOLID WASTE TEMPORARY STORAGE. The ancillary buildings in question are as follows:

1. Supporting building security (security in the building SOLID WASTE TEMPORARY STORAGE and security machineries etc;
2. Leachate Treatment Support Building;

CHAPTER XXV
CLOSING

1. Job descriptions were not included in the terms and conditions of this but in its implementation should be there, then the work can be executed after the written order of a Team Leader and will be taken into account in the additional work.
2. If there is a kind of work that originally estimated by Design Consultant needs to be done and has been included in the list of Budget Plan, but according to considerations giver Tasks that can be accounted no longer need to be implemented, then upon written instruction from Project Owner Task work was not carried out and will be treated as a job shortfall. If there is a difference between the drawing, Technical Specifications, and the Budget Plan, before the work is performed should be discuss first with Consultant & Project Owner.

TECHNICAL SPECIFICATION SOURCE OF MATERIAL

No	ITEM OF WORKS	MATERIAL	TYPE	SYSTEM	PRODUCK/BRAND/ MANUFACTURE
1	SITE WORKS	Termite Control		Sprayed	Termicidin, Dragnet, Lantrek
		Brick Paving			Conblock, Karang Pilang or equal
		Paving Stone Curbing			Conblock, Karang Pilang or equal
		Wiremash		Galvanized	Lion Mesh BRC
2	CONCRETE WORKS	Reinforced			Krakatau Steel
		Portland Cement			Tiga Roda, Gresik
3	MASONRY WORKS	Brick Wall			Local
		AAC Block			Grand Elephant
4	STONE AND TILE	Ceramic Tile	Floor / Wall		Roman, Ezenza or Equal
	WORKS	Non Slip Ceramic Tile	Floor		Roman, Ezenza or Equal
		Homogenous Tile	Floor		Granito, Niro Granito
5	METAL WORKS	Structural Steel			Lyssaght, Bluescope or Equal
		Roof Gutter			Lyssaght, Bluescope or Equal
6	WATERPROOFING	Membrane			Fosroc, Sika or Equal
		Coating			Fosroc, Sika or Equal
7	TERMAL & MOISTURE	Glass Wool			Insulglass
	PROTECTION	Aluminium Foil			Poli Foil
		Rock Wool			Rock Wool
8	DOOR AND	Aluminium Door Frames	Standard	Anodized	YKK, Alexindo or Equal
	WINDOWS WORKS	Aluminium Window & Frames	Standard	Anodized	YKK, Alexindo or Equal
		Folding Doors & Frame			Poli Foil
		Engineering Door			Tulus Door, Anghauz Door
		Steel Door & Frame	Standard		Bostinco, Lion Metal
		Glass and Glazing			Asahimas
		Hardware			Dekson
9	ROOFING	Roof Facia			Seven, Alubond. Rhinobond
		(Aluminium Composite Panel)			
		Metal Roof	Standard	Clip & lock	Lysaght, Bluescope or

No	ITEM OF WORKS	MATERIAL	TYPE	SYSTEM	PRODUCK/BRAND/ MANUFACTURE
					Equal
10	CEILLING WORKS	Gypsumboard	Standard		Jayaboard, Grand Elephant
		GRC Board	Standard		Jayaboard, Grand Elephant
11	PAINTING WORKS	External Wall	Acyrilic		Dulux, Nippon Paint, Jotun
		Interior Wall / Ceilling	Acrylic		Dulux, Nippon Paint, Jotun
12	FASADE	Fiber cement Board			Seven, Alubond. Rhinobond
	(GRILLE / Louver)	Conwood			
13	SANITARY WORKS	Closet	Western	Monoblock	Toto
			Eastern	Sguatting	Toto
	`	Wash Basin			Toto
		Urinal			Toto
		Faucet			Toto
		Floor Drain			Toto
		Jet Spray			Toto
14	CLEAN WATER	Pipe	PVC (AW)		Rucika, Maspion, Unilon
		Transfer Pump (flow 5 m^3/hour, head 30 m, Sus 304/Bronze)	Centrifugal		Grunfos, Sanyo, Showfou
		Reservoir	Polyprohylene/		Exel, Pinquin or Equal
			poly ethylene		
15	WASTE WATER	Pipe	PVC (D)		Rucika, Maspion, Unilon
		Pipe Transfer	PVC (AW)		Rucika, Maspion, Unilon
		Tranfer Pump (flow 2 m^3/hour, head 14, power 0,75 kw m,Sus 304/Bronze)	Submersible		Grunfos, Ebara, Showfou
		Sewage Treatment Plan (STP)	Fiber Reinforced		Biofilm or Equal
			Plastic (FRP)		
16	AIR CONDITIONING				Mitsubishi, Daikin, Toshiba
17	ELECTRICAL	Cable	NYY, NYA, NYM		Supreme, Kabelindo, and
					Kabelmetal
		MCB			Schneider, ABB, Siemens
		Lighting			Philips, Osram or Equal
		Armature			Artolite or Equal
		Socket and Switch			Broco, Schneider or Equal

No	ITEM OF WORKS	MATERIAL	TYPE	SYSTEM	PRODUCK/BRAND/ MANUFACTURE
18	COLD STORAGE	Interior Stainless Steel 304	Upright Type	Cascade Refrigeration System	LabTech Ldf-9010U or Equal
		Exterior Epoxy Powder Coated EGI Steel	396 liter capacity		