MP – 2616 – SEPTIC TANK AND ABSORPTION

1.0 DESCRIPTION OF WORK

The work shall cover the supply of materials, tools, equipment, labour and construction of septic tank and absorption in order to fully complete the work in accordance to the lines, grades, location and dimensions shown in the Drawings and in conformance to the requirements of this Specification.

It shall include but not be limited to the following :

- Surveying works
- Excavation, backfilling and compaction
- Installation of piping and fitting systems

2.0 REFERENCE STANDARDS

a. Pedoman Plambing Indonesia

b. Persyaratan Umum Bahan Bangunan di Indonesia (PUBI)

c. Japanese Industrial Standard (JIS)

d. Standar Industri Indonesia (SII)

e. TS 2

f. TS 3

3.0 GENERAL PROCEDURES

The Contractor shall stake and locate properly the site of the septic tank and absorption well as shown in the Drawings.

The Contractor shall submit the following for the Engineer's approval :

- Samples and technical data of all materials which shall be used.
- Detailed Shop Drawings.

4.0 MATERIALS

4.1 Septic Tank

Septic tank shall be fabricated and made of concrete, in capacity, size and form as specified in the Drawings.

Concrete shall be as specified in Technical Specification TS 3.

4.2 Piping

Pipes and fittings shall be of PVC and shall have a working pressure of 5 kg/cm² which shall comply with JIS 6741 specification in thickness, diameter and its properties, such as Pralon product or equal.

Diameter required shall be as indicated by the Drawings.

4.3 Absorption Well

Septic tank shall be completed with absorption well in size as indicated by the Drawings.

4.4 Cement Mortar

Cement mortar, if needed, shall be in accordance with the requirements of Technical Specification AR-0404.

5.0 CONSTRUCTION REQUIREMENTS

5.1 General

Septic tank and absorption well shall be installed, constructed and placed in accordance with the Drawings, the approved Shop Drawings and this Specification.

All concrete works shall be carried out in accordance with Technical Specification TS 3.

All piping works shall be carried out in accordance with the manufacturer's recommendation.

Excavation, backfill and compaction work shall be in accordance with the requirements of Technical Specification TS 2.

5.2 Installation and Construction

Septic Tank shall have air space of not less than 0.20 metre from the top slab and under-part of tank cover.

The septic vault of tank shall be watertight concrete. The inside walls shall be applied 2 mm thick of finish plaster with cement mortar mix of 1 : 3.

All outside walls directly in contact with earth shall not be plastered and this includes the absorption pit system.

Cement mortar shall be in accordance with the requirement of Technical Specification AR-0404.

TS – 02900 – LANDSCAPE WORK

1.0 DESCRIPTION OF WORK

The work shall cover all labour, materials, equipment and other required tools which are needed to complete the work as required in this Specification.

The work shall be as indicated by the Drawings and as directed by the Engineer, but not be limited to the following works :

- Soil preparation such as clearing unwanted vegetation and establishing levels required.
- Planting or shrubs, trees, ground cover and grass.
- Maintenance of plants.

2.0 REFERENCE STANDARDS

a. Work shall conform Local Standards and shall be in conformance with "Balai Pengawasan dan Sertifikasi Benih" Horticultural Standards for Nursery and Good Horticultural Practice.

b. TS 1.

c. Technical Specification TS 0215 – Unit Pavement.

d. Technical Specification TS 0509 – Ornamental Metals.

e. Technical Specification TS16500 – Lighting.

3.0 GENERAL PROCEDURES

3.1 Drawing and other Data Requirements

The Contractor shall prepare a landscaping sketch plan showing strip sodding, sprigging centre to centre, contours, planting sequence and details or fertiliser application.

The area involved shall be properly labelled and dimensioned.

3.2 Other Requirements

In the event of any discrepancy between Drawings and location on site, the Contractor shall bring such discrepancy to the attention of the Engineer for resolution.

Any plant position on site is changed or differed from the specified Drawings caused by site condition, shall have and approval from the Engineer.

3.3 Expert Labour

The Contractor shall employ a trained landscape expert who majors in plant breeding and who implement the requirements of this Specification, and shall be approved by the Engineer.

4.0 MATERIALS

4.1 Plants

All kinds of plants, whether shrubs, trees, grounds cover or grass to be planted, shall be approved by the Engineer and shall be in accordance with the specified Drawings and Technical Specification.

List of plants and distance of planting shall be as indicated in the table on the following page.

Type grass to be planted shall be in accordance with the specified Drawings or as determined by the Engineer.

Type of grass sod to fill grass block shall be Korean grass and napier grass shall be planted on other area as indicated in the Drawings.

Grass shall be planted in a cluster.

4.2 Fertilisers

Well rotted animal manure which comes from cow or horse shall be used for raising micro and macro element. Animal manure shall be clean from grass root and wild plant and shall be in a fine texture.

Chemical fertiliser which shall consist of NPK elements such as Rustica Yellow (15 – 15 – 15) shall be used to develop the growth of root, flowers and fruits.

Chemical fertilisers such as ZA (Zwavelzure Amoniak) or Urea shall be used for grass.

PLANT SCHEDULE

NO.	PLANT NAME	LOCAL NAME	HEIGHT (cm)	CANOPY DIA. (cm)	DISTANCE (CM)	SHADE	SORT OF PLANTS	PLANTING PATTERN	HABITUS
1	Oredaxe regia	Palem Botol	250-300	300	400	-	Greenery	One row	Trees
2	Felicium decipines	Kerai Payung	150-200	200	300	-	Shade	One row	Trees
3	Cassuarina montana	Cemara Angin	-	-	-	-	Shade	Existing	Trees
4	Manilkara kauki	Sawo Kecik	-	-	-	-	Shade	Existing	Trees
5	Ficus benjamina	Beringin	-	-	-	-	Shade	Existing	Trees
6	Cyrtotachys lakka	Palem Merah	200-250	200	-	-	Greenery	Solitaire	Trees
7	Duranta repens	Pangkas Kuning	20	5	5	-	Greenery	Cluster	Shrubs
8	Terminalia catappa L.	Ketapang	300-400	400	-	-	Greenery	Solitaire	Trees
9	Ixora Javanica	Soka	20	30	30	Yellow/red	Flowery	Cluster	Shrubs
10	Allamanda cathartica	Alamanda	50	50		Yellow	Flowery	Solitaire	Shrubs
11	Malphigia coccigerati	The-the-and	30	5	5-10	-	Greenery	Cluster	Shrubs
12	Agave americana	Agave	50	50	-	-	Greenery	Solitaire	Shrubs
13	Blue eyes	Blue eyes	5-10	5	-	Blue	Flowery	Cluster	Ground Cover
14	Cyas revoluta thumb	Sikas Halus	50-100	100	-	-	Greenery	Solitaire	Trees
15	Axonopus compressus	Rumput Pahitan	-	-	-	-	Greenery	Cluster	Ground Cover

4.3 Backfill Material

Backfill to be used shall be a healthy soil that is clean and free from unused building materials, grass, or plants.

This healthy soil shall consist of a mixture between fine soil and well rotted animal manure in proportion of 1 : 1.

4.4 Absorption Plane

Absorption plane along the drip line of the roof shall consist of gravel 2-3 cm in diameter and 5 cm deep, bristle 10 cm thick and sand 10 cm thick.

4.5 Miscellaneous Landscape Materials

4.5.1 Gravel

Water-worn, hard, durable gravel, washed free from loam, sand, clay and other foreign substances, and the following size and colour:

- Size : 50 mm maximum, 25 mm minimum.
- Colour : submit samples prior to start work.

4.5.2 Unit Pavement

Unit pavement, such as paving block, grass block, pebble stone p[aver and others, shall be in accordance with the requirements of Technical Specification 0215.

4.5.3 Boulders

Shall be in natural state to from a harmonious stone composition in height, magnitude and colour, half embedded in soil, expressing scenery intermingled with different sizes of gravel.

4.5.4 Lamp

Lamps to brighten certain eye-catching spots worth to expose at night, shall be in accordance with Technical Specification 16500.

4.5.5 Retaining Wall and Outdoor Treads

Due to difference in level, provide treads in masonry with some retaining walls to accentuate the walkways in the garden courtyard.

4.5.6 Seating Bench

Provide seating benches along the walkways, walking bay's, of concrete cast-in-place, enhancing courtyard's creative and comfort.

4.5.7 Trench, Grating, Grilles, and Plant Trellis

Trench, grating, grilles and plant trellis shall be composed of steel round and/or steel plates and other profiles as specified, in sizes as shown in the Drawings.

5.0 CONSTRUCTION REQUIREMENTS

5.1 General

All landscape works shall be carried out in accordance with the applicable landscape standards, the specified Drawings and as directed by the Engineer.

Prior to site work, the Contractor shall make co-ordination with other works of civil/structure, architecture, mechanical/piping and electrical, especially in doing soil preparation and finishing, so there is no mistake on demolition, unwanted excavation towards other works which have been finished or which are still ongoing.

Site preparation, establishing levels required and clearing unwanted vegetation shall carried out in accordance with the specified Drawings and the requirements of this Specification.

Placing of stakes labelled with co-ordinate of the position shall be carried out, especially for preliminary planting of each type of plant.

After establishing ground according to the shape/sloping/levels specified in the Drawings, digging holes shall carry on for planting preparation.

All planting shall take place at evening or after 3.30 p.m. so as not to allow the plants to dry out except if the planting take place under shelter, protected from the sun, where the planting can be carried out any time.

All plants shall be delivered in healthy and good condition which are to be as follows :

- All plants shall be free from disease, insect and fungi.
- Branches, roots and leaves shall have no broken and torn part.
- Plant's condition (height and width) shall be as required by this Specification.
- Removing of a plants shall be carried out according to the following requirements :
- Trees to be removed, shall be prepared previously by digging 1 week ahead before moving them, and the trees may require some cutting back prior to planting to improve their shape, then followed by wrapping the roots.
- Trees which are already in their container, shall immediately be brought to the shelter location at every area and stored there for a few days until the planting times comes
- Shrubs and ground covers shall be prepared with roots being wrapped.

5.2 Site Preparation

5.2.1 Staking

Staking shall be done to determine points of planting. Planting shall be proceed after all points to be planted have been approved by the Engineer.

5.2.2 Excavation

Soil preparation by excavation shall be carried out to separate soil from debris of wasted building materials such as nails, bricks, timber and left chemical materials, if any.

Excavation shall be carried out no less than 40 cm depth for shrubs and no less than 60 depth for trees, to make sure that layer having debris have been removed.

5.2.3 Fertilising

To raise micro and macro elements of the soil which have been prepared, well rotted animal manure shall be mixed with fine soil in proportion 1 : 1 as specified in section 4.3. of this Specification.

5.2.4 Planting of Trees and Shrubs

Plants shall be delivered according to the planting schedule, so as to prevent the plants stay too long in the shelter, and shall be carried out according to the following :

- Trees and shrubs to be planted shall be of the ones which come from the shelter or the ones which have been prepared for transplanting at their former digging place, with minimum height as specified.
- Firstly dig a large hole, several time larger than the size of the plant container, and retain the soil dug out.
- Into the hole place a mixture of well rotted animal manure and fine soil as specified in section 4.3. of this Specification, retaining a certain amount to mix into the soil that is to be returned to the hole.
- Carefully remove the tree of shrub from its container and place into the hole.
- Return the soil around the roots, firming it down carefully so that there are no air pockets.
- When the hole is two – thirds refilled, water well after stamping down gently with feet.
- Soil around the base of plants shall be form shallow to allow water to run naturally toward the trunk of the plants.
- Trees and shrubs shall be hold by hardwood stakes to keep them at their place.

5.2.5 Planting of Grass and Ground Cover

Grass and ground cover levels shall be as specified by the Drawings.

Soil for grass and ground cover shall be excavated/dug at the depth of 20 – 30 cm, then fill it with healthy soil as specified in section 4 . 3. of this Specification.

Every time after planting of grass and ground cover shall be followed by watering with water free from deadly matters.

5.2.6 Maintaining of Plants

Maintenance of plants shall include watering, weeding out, replacement of damaged plants, pruning, feeding and insect and weed control.

Maintenance of plants shall be carried out according to the following requirements :

- All works shall be carried out in accordance with the requirements of the Drawings, Technical Specification and as directed by the Engineer.
- Maintenance shall be done by the Contractor as soon after the planting work finished. Maintenance time shall be as decided in the Contract.
- All that time, the Contractor shall be obliged periodically to maintain all plants and to replace every damaged or dying plant.
- All plant replacement with the new ones shall be the Contractor's responsibility.
- Plant's maintenance shall be suited with the characteristic and kind of plants to be planted.
- Material and equipment to be used for every kind of maintenance shall be real good, comply with the working standard needed and not to damage plants.
- Fertilisers and insect killers to be used shall be as specified in this Specification.
- Plant replacement shall be in accordance with the plant type/shape/colour to be planted and approved by the Engineer.

5.2.7 Watering

Watering shall be with clean water free from any organic/chemical /other material which can damage the plants growth.

Watering shall be carried out in the following methods :

Using special tools for watering such as sprayer which has many holes at the outlet so as to spread the water uniformly to the surface of the plants to be watered.

Using water hose made of plastic which is connected to the closest water supply /tap. Watering shall be done by spraying the water using nozzle or sprinkler.

Watering shall be done periodically especially on dry season for plants and grass newly planted and also for the plants in shelter.

Watering schedule shall be as follows :

Twice a day periodically for all kinds of plant and grass newly planted and for all plants at the shelter, before 10.00 am at morning and after 3.30 p.m. at evening until all the plants grow healthy and strong.

All plants and grass which are looked well-grown and strong shall be watered once a day at evening time after 3.30 p.m.

Watering shall be done until each area gets a good soaking.

Plant area which still has wet soil at the evening, shall not be watered.

Over-watering shall not be allowed. Water shall be absorbed well by soil around plants.

5.2.8 Weeding Out

Weeding out shall be done periodically to loosen the ground, once every month for trees and grass, and once every two weeks for shrubs.

Weeding out for grass shall be done to remove weeds and other kind of grass which differs from the one to be planted.

Type of tools to be used for this work are hoe and small hand fork.

5.2.9 Plant Replacement

The Contractor shall be responsible to make any replacement of each tree, shrub of grass found damaged or dead.

All replacement with new plants shall be the responsibility of the Contractor until the maintenance period is ended.

Plant replacement shall be in accordance with the plant type/shape/colour to be planted and approved by the Engineer.

Plant replacement shall be carried out in such a manner so as not to damage the adjacent plant when taking the old one and placing the new one.

Plant replacement shall be carried out at evening time between 3.30 p.m. to 6.00 p.m., and followed subsequently by watering.

5.2.10 Pruning

Pruning shall be carried out to remove misplaced branches /stem or in order to maintain and to improve the shape growth as required.

Dead or dying branches and stem shall be removed by cutting.

All pruning work shall be carried out using cutting tool to cut branches and stems from underneath to make the cut sloping away (300 – 400) from the bud at the remaining branch/stem wherever possible so that the new growth can shoot from that bud.

Pruning without using sharp cutting tool which can cause damage upon branch/stem shall not be allowed.

The scar caused of cutting shall be completely sealed by painting with a plant wound dressing to prevent infestation by wood decay fungi or insects that can damage and kill the plant. Pruning shall be carried out periodically once every month.

5.2.11 Feeding

Well rotted animal manure shall be used to make healthy soil by mixing it with fine soil in proportion of 1 : 1, which shall be used for backfilling work.

NPK shall be used to feed trees after they are aged 3 (three) months from the time they were planted.

NPK shall be given as much as 25 gram per plant in order to push the growth of roots and fruits.

Feeding shall be carried out by placing the fertiliser at least 10 cm deep around the drip line of the trees, at every 60 cm in a circle around the trees.

Feeding shall be repeated after 3 (three) months.

ZA or Urea for feeding grass shall be given as much as 12 gram/m2. Feeding shall be carried out once in every month. Fertiliser shall be mixed with water and watered over the grass surfaces by sprayer.

5.2.12 Insect and Disease Control

Disease control shall be carried out before plants are being attacked.

Insect control shall be carried out by spraying all leaves, stem and branch surfaces.

Material to be used for insect control shall be a mixture of Basudin/Diazinon 60 EC and water in proportion of 2 ml for every 1 litre water.

For destroying fungous growth or similar, a mixture of fungicide of Dithane M-45 and water in proportion of 2 gr. : 1 litre shall be by spraying all surfaces of leaves, stem and branch.

Metadex shall be used to destroy Achatina fulica by spreading it around the trees, and BHC shall be used to destroy penggerek batang.

Spraying for destroying insect and fungus shall be as follows :

- Twice in a month for grass
- Once a month for plants

Insect and fungus control shall be carried out by turns. Spraying of different disease control, shall not be done simultaneously, but shall be carried out in different time in two weeks lapse.

AR – 0401 – UNIT MASONRY

1.0 DESCRIPTION OF WORK

This work shall consist of unit masonry laid contiguously in mortar, including all related masonry work as indicated in the Drawings and/or herein specified.

2.0 REFERENCE STANDARDS

a. Persyaratan Umum Bahan Bangunan di Indonesia (PUBI-1982)

b. Peraturan Beton Bertulang Indonesia (NI-2, 1971)

c. Australian Standard (AS)

d. Standar Industri Indonesia (SII)

e. American Society for Testing and Materials (ASTM)

f. TS 3 Concrete Work

g. Technical Specification AR-0714 – Caulking and Sealing

3.0 GENERAL PROCEDURES

3.1 Samples

Samples of unit masonry shall be submitted for approval before deliveries are commended.
All subsequent deliveries shall generally be up to the standard of the approved samples.
Spot samples of representative batches may be ordered periodically by the Engineer.

3.2 Handling and Storage

Care shall be taken in unloading, stacking and handling of materials, and any damage incurred thereby shall cause the unit masonry to be affected. Therefore they shall be replaced by the Contractor at no cost.

Unit masonry shall be stacked under cover and off the ground. Cement materials shall be stored in a weatherproof, ventilated shed upon platforms above the ground and effectively protected from weather or moisture unit used. Logistically it shall be first in - first out.

All unit masonry shall be brought to the site and stored. Storage shall be arranged in a manner as to keep the blocks dry, either by tarpaulin or shed roof or combination of same.

Unit masonry shall be stored at secure place without giving disturbance at flow of work.

Blocks stored in contact with ground shall not be used. Storage shall be free from water (dried place).

4.0 MATERIALS

4.1 Brick Unit Masonry

Brick unit masonry shall be made from fine material and shall conform with PUBI and/or SII.

Minimum ultimate crushing strength over the gross area shall be 25 kg/cm².

Brick unit masonry shall have nominal dimension of 230 mm x 110 mm x 55 mm.

4.2 Cement Mortar

Cement mortar shall conform with Technical Specification AR-0404. Cement mortar for concrete block masonry unless otherwise specified shall be composed of three (3) parts of sand : one (1) part of Portland cement. Waterproofed mortar shall be made by adding to the base mixture, a waterproofing compound such as Calbond or approved equal which shall be mixed in accordance with the manufacturer's direction, and as approved by the Engineer. Contractor must submit the sample of mixing materials.

4.3 Rubble Stone Masonry

Rubble Stone Masonry, Stones shall be clean and wetted prior to pitching. And the masonry shall be in such a way that there shall be no small stones enclosed or stones of the same sizes grouped in a stretch. Employ big stone stones for the bottom layer and at corners.

Newly employed masonry shall be protected from outside disturbances and or weather conditions.

4.4 Caulking

A plastic, non-staining compound such as Dow Corning 790 or equal as specified in Technical Specification AR-0714, for exposed joints at the perimeters of door and window frames, window openings for equipment and others. Sample materials must be submitted for approval.

4.5 Anchor Ties

Anchor ties shall be of mild steel with dimensions as shown by the Drawings.

4.6 Reinforcement

Stiffening members and columns shall be made of reinforcing steel of 8 mm in diameter.
Reinforcing steel shall be in accordance with PBI (NI-2, 1971) and/or Technical Specification TS3.

5.0 CONSTRUCTION REQUIREMENTS

5.1 General

Wall shall be classified as 150 mm thickness of brick unit masonry, laid contiguously in mortar and bonded as specified herein.

All units shall be laid with full mortar joints and all head, bed and other joints shall be completely filled with mortar.

5.2 Brick Laying

All bricks shall be kept damp during construction and shall be laid in running bond pattern on a full bed of mortar. On one day, the brick unit masonry shall not exceed 100 cm in height. End of masonry shall be left in staggering steps and shall not clogged to prevent cracks in the future. Brick laying shall follow the proper regulation for which between one layer with the other shall have half length difference of brick length.

All joints between bricks shall be filled with mortar mix and joints shall be of the same spread and equal thickness. The average spread distance shall be 12.5 mm with a tolerance of 2.5 mm.

Brick unit masonry shall be dampened before laying, and before contact with mortar.

Vent block unit shall not be dampened before laying, however the surface shall be moistened before contact with mortar.

No damaged units shall be used.

Blockwork shall be built in a uniform manner in truly plumbed and level courses, shall be true to vertical or battered lines. Corners and other advanced work shall be rack back and not raised above the general level more than 100 cm. The maximum vertical tolerance for out of vertical is 10 cm in 400 cm.

Where so described or directed, reveals and piers shall be built, fixing and/or railing blocks and embedded items, for the work of other trades shall be incorporated as the work proceeds in location as shown by the Drawings.

Brick shall be required to chip and/or level wherever necessary to gain the required heights.

Reinforcement shall be used at least every 300 cm in length of walls and at all piers, corners, plates, beams and others.

On places or openings where wooden or metal frames shall be installed, the brick unit masonry shall be left until it is strong enough to proceed with anchors, dowels and fastening devices for the frame, and shall be covered with concrete or grout.

All brick unit masonry on which ends bear a steel or concrete beam, shall be grouted with concrete to the bearing course, and shall also be reinforced with 8 mm diameter bar.

All embedded items associated with the main or secondary structure, shall be set in said grout at time of pouring.

5.3 Parging and Jointing

The inner surface of all face block shall be fully parged. Bed and head joints shall have square profiles, which shall be accomplished with a tool suitable for the purpose, joints in masonry below grade and in pipe tunnels above ceilings, behind cabinets, shelving and others, shall be struck smooth, and pointed with waterproof mastic below grade or equal water proofing agent, as approved by the Engineer.

5.4 Interior Wall and Partitions

Jointing between brick wall and partition wall should be made carefully as shown in the Drawing or proposed and approved Shop Drawings.

5.5 Anchoring Doors and Windows

The adjustable steel fixing lugs supplied with metal window and door frames shall be anchored into suitable courses in the walls. Jambs in brick wall openings shall be plumbed true and any apertures between door/window frames and brick wall shall be mortared and neatly pointed. Wherever practicable, these items are to be built-in during wall construction.

Fischer or other type fasteners are permitted where concealed, or grouted in new opening.

Whenever needed, a Shop Drawing proposal must be submitted for approval by the Engineer.

5.6 Auxiliary Ancillary Items

5.6.1 Caulking

Exposed joints at the perimeters of door and window frames shall be filled solidly with a plastic, non-staining compound material as specified in Technical Specification AR-0714.

This shall be forced into place with a pressure gun in a neat workmanlike manner. All joints and spaces to be caulked shall be thoroughly clean and dry before the compound is installed.

5.6.2 Anchor Ties

Anchor ties shall be welded to structural steel members or embedded in concrete masonry at a maximum of 450 mm centres.

5.6.3 Reinforcements

Stiffening members shall be located at every 12 m² wall area and corner

Stiffening columns shall consist of 4 reinforcement bars of 8 mm in diameter

Reinforcement concrete stiffening members to masonry walls and reinforcement lintels shall be in accordance with Technical Specification TS3.

Stiffening columns shall consist of 4 reinforcement bar of 8 mm corner.

Walls higher than 300 cm shall have also horizontal reinforcement bars consisting of 4 reinforcement bars of 8 mm in diameter.

5.6.4 Chases

Chases in block work for conduits and others shall be accurately cut as required, in positions and dimensions as directed in the Drawings and by the Engineer.

5.6.5 Reinforced Concrete Stiffening Members

Reinforcement concrete stiffening members to masonry walls and reinforcement concrete lintels shall be in accordance with Technical Specification TS 3. Stiffening members shall be placed at every 12 m² of wall surface or as in this case there shall be one stiffening member between columns.

5.6.6 Protection and Cleaning

Architectural fixtures and finished surfaces shall be protected against damage during the progress of the works. Sills, jamb and heads shall be protected by casings as soon as built.

Newly laid block work shall be protected from the harmful effects of rapid drying, running or surface water and detrimental impact.

Newly laid block work shall be dampened continuously at least until 7 (seven) days after being laid.

5.6.7 Plaster

All plastering shall be carried out in accordance with the requirements of Technical Specification AR-0404.

5.6.8 Rubble Stone Masonry

Rubble Stone Foundation shall be employed under the walls or columns, or construction of ditches, drains, retaining walls etc. as shown on the Drawings.

The surface of the foundation pit shall be covered with tamped sand layer of 10 cm thick prior to lay the first stone layer. The dry riprap shall be employed with one stone vertical with the diameter shown on the drawings.

CS – 0402 – STONE MASONRY

1.0 DESCRIPTION OF WORK

This work shall consist of the construction of those structures as shown in the Drawings or as determined by the Engineer to be made in stone masonry, such as boulder foundation, ditches, headwalls and the like.

The work shall include but not necessary be limited to supplying all materials, labour and all work required to complete the structures in conformity with the lines, grades, sections and dimensions as shown in the Drawings.

2.0 REFERENCE STANDARDS

a. Peraturan Beton Bertulang Indonesia (NI-2,1971)

b. Technical Specification AR-0404 – Cement Mortar

3.0 GENERAL PROCEDURES

3.1 Samples

Representative samples of stone of 20 kg shall be submitted to the Engineer and approved by the Engineer.

3.2 Inspection and Testing

Inspection and testing shall be done, upon particular jobs as follow :

- Lay out,
- Excavation,
- Material on site includes tools and equipment,
- Sand bed placing,
- For every 1.20 m in height installed.

During the testing, the Contractor shall provide qualified Quality Assurance personnel and facilities to the Engineer without extra costs to the Client.

4.0 MATERIALS

4.1 Stones

All stones shall be river stone and shall have the maximum size of 15 cm.

Material shall be sound, durable, tough, dense and shall not break into pieces, due to excessive spalling or flaking.

4.2 Cement Mortar

Cement mortar for stone masonry work shall be in accordance with Technical Specification AR-0404.

5.0 CONSTRUCTION REQUIREMENTS

5.1 General

All equipment such as concrete mixers for this construction shall be approved by the Engineer prior to operation. It shall be new, with standby machine or available spare parts.

All operational equipment, tools and parts implicated therewith, shall be fairly new and good quality. They are subject to approval or rejection by the Engineer.

5.2 Selection and Placement of Material

When stone masonry is to be placed on a prepared foundation bed, the bed shall be firm and well compacted, and normal to the face of the wall, and shall be approved by the Engineer.

Care shall be taken to prevent bunching of small stone or stones of same size. Large stone shall be used for the bottom courses and large, selected stones shall be used in corners.

All stones shall be cleaned thoroughly and wetted before setting and the bed which is to receive them shall be cleaned, free of inorganic matter, and moistened before the mortar is placed. Stones shall be laid with the longest faces horizontal in full beds of mortar, and the joints shall be flushed with mortar.

The exposed faces of individual stones shall be set parallel to the faces of the walls in which the stones set.

During construction, the stones shall be handled in such manner which shall not disturb or displace the stones already set. Suitable equipment shall be provided for setting stones larger than those that can be handled by two (2) masons. Rolling or turning of stones already installed on the walls shall not be permitted. If a stone is loosened after the mortar has set initially it shall be removed, mortar cleaned off and re-laid in place with fresh mortar.

Tolerances of finished level of ditches shall vary not more than 1 cm above or below the design level at any point.

5.3 Beds and Joints

Bed for face stones shall vary from 2 to 5 cm in thickness. They shall not extend in an unbroken line through more than five (5) stones.

Joints may vary from 2 to 5 cm in thickness. They shall not extend in an unbroken line through more than two (2) stones.

It shall be at angles with the vertical from 0° to 45°. Face stone shall bond at least 15 cm longitudinally and 5 cm vertically. At no place, shall corners of four (4) stones be adjacent to each other.

Cross beds for vertical face shall be level, and for battered walls may vary from level to normal to the batter line of the face of the wall.

5.4 Headers

Headers shall be distributed uniformly throughout the walls of structures so as to form at least one fifth (1/5) of exposed faces.

They shall be of such lengths as to extend from the front face of the wall into the backing at least 30 cm. When a wall is 45 cm or less in thickness the headers shall extend entirely from front to back face.

5.5 Backing

The backing shall be built of larger stones and shall be installed in workmanlike manner. Stones composing the wall backing must be properly bonded with stones forming the wall facing. All cavities or small openings

shall be filled with mortar. Stones showing minimal spalling shall be consolidated by, and surrounded with mortar, tamped into spalls.

5.6 Pointing

Bed and vertical joints shall be filled with mortar and finishing must be flushed with the exposed stone faces.

5.7 Weathering

All stone masonry walls shall be weathered on top with the addition of 2 cm thick layer of mortar finished to an even surface as shown in the Drawings, and finished with chamfered edges.

The weathering shall be inside the dimensions of the walls.

5.8 Weep Holes

All retaining walls and abutments shall be provided with weep holes. Unless otherwise shown in the Drawings, weep holes shall be located at the lowest points where free outlets can be obtained and shall be spaced not more than 2 m of 5 cm in diameter maximum.

Aggregate suitable for filter shall be placed behind each weep hole.

5.9 Cleaning Exposed Faces

Immediately after the mortar is laid, all exposed stone faces shall be thoroughly cleaned of mortar stains and shall be kept until work completed.

5.10 Curing

The stone masonry described herein shall be protected from the sun and continuously wetted by any approved means within a period of not less than three (3) consecutive days after completion.

AR – 0404 – CEMENT MORTAR

1.0 DESCRIPTION OF WORK

This work shall comprise the supply of manpower, materials and machine mixers, and execution of all work for the cement mortar. It shall include but not limited to plastering of walls, grouting of stone masonry, jointing and waterproofing with the required quantity of admixtures. Such work shall be performed in accordance with the correct lines, grades and alignments as shown in the Drawings, or as determined by the Engineer.

2.0 REFERENCE STANDARDS

a. American Society for Testing and Materials (ASTM)

b. American Concrete Institute (ACI)

c. Peraturan Beton Bertulang Indonesia (NI-2, 1971)

d. Persyaratan Umum Bahan Bangunan di Indonesia (PUBI-1982)

e. TS 3 Concrete Work

3.0 GENERAL PROCEDURES

3.1 Samples

Prior to construction, the Contractor shall submit to the Engineer samples of all materials for cement mortar work, for approval.

3.2 Delivery and Storage

All cement in bag or bulk shall be delivered and stored according to Technical Specification TS 3.

Fine aggregates shall be stored in a clean ground area, free of surface water run-off, provided the area has sufficient drainage and is free from foreign materials. Height of stockpile shall not exceed 1.20 m in order to prevent segregation.

4.0 MATERIALS

4.1 Cement

Portland cement of type I shall conform to and be tested according to the requirement of ASTM and SII.

Portland cement shall be from one trade mark, unless otherwise specified by the Engineer.

4.2 Fine Aggregates

Fine aggregates shall be clean, hard, solid, rough edges and shall not contain harmful amounts of mud, clay or organic matters. Fine aggregate shall conform to and be tested according to ASTM C 33. Test shall start 30 days prior to the start of the work.

4.3 Water

Water for mixing shall be clean and free from harmful and deleterious substances such as alkali, acids, salt and other inorganic matters.

Water of known quality and suitable for human drinking consumption need not be tested. However, as the case may happen, all water except what as mentioned herein shall be tested and shall be approved by the Engineer.

4.4 Waterproof Admixture

Waterproof admixture for cement mortar shall be from approved product.

5.0 CONSTRUCTION REQUIREMENTS

5.1 Composition

Unless noted and/or shown on the drawings, cement mortar shall compose of Portland cement and sand or fine aggregate. The mortar shall have a compressive strength of at least 50 kg/cm² in 28 days. The proportions of Portland cement and sand for cement mortar shall be 1 cement and 3 sand, or as indicated on the Drawings.

Sample of mixture shall be tested and approved.

Waterproof admixture shall be applied in the cement mortar in accordance with the manufacturer's recommendations in order to provide effective waterproofing.

5.2 Mixing

All materials except water shall be properly mixed in a tight box or in an approved mortar mixer, until the mixture attained a uniform colour after which the correct amount of water shall be added and the mixing continued.

Mortar shall be mixed for the required quantity to be used and minimum mixing time shall be 1 to 2 minutes prior to application. Mixed mortar that is not used within the period of 45 minutes after mixing shall be discarded or rejected. Retempering will be strictly prohibited.

5.3 Application

All surfaces to receive cement mortar shall be free of laitance, loose carbonate scale and other objectionable matter.

5.4 Inspection and Testing

All works shall be free of access for inspection and testing. The Contractor shall provide assistance to the Engineer at all times necessary to get samples on completed finishes. Any portion found out unsatisfactory shall be repaired and worked out in same manner of what was previously done without any additional expense to the Owner.

CS – 0501 – STRUCTURAL STEEL FABRICATION

1.0 DESCRIPTION OF WORK

This work shall include the transportation, furnishing, fabrication and inspection of structural steel in shop or field, as indicated in the Drawings or as described in this Specification.

2.0 REFERENCE STANDARDS

a. Pedoman Perencanaan Bangunan Baja untuk Gedung (SNI.1729.1989-F)

b. Standar Industri Indonesia (SII)

c. Japanese Architectural Standard Specification for Steel Work (JASS 6, 1982)

d. Japanese Industrial Standards (JIS, 1993)

e. American Institute of Steel Construction (AISC) :

- AISC M013-83 Detailing for Steel Construction
- AISC M013-84 Engineering for Steel Construction
- AISC M016-89 Manual of Steel Construction ASD

f. American Welding Society, Inc. (AWS) :

- AWS D1.1-90 Structural Welding Code Steel

g. American Society for Testing and Materials (ASTM, 1993)

h. Technical Specification AR-0914 - Paintings

i. Technical Specification CS-0502 - Structural Steel Erection

3.0 GENERAL PROCEDURES

3.1 Mill Certificates and Other Information

3.1.1 Mill certificates covering the dimension, microstructure and chemical, physical, charpy V-notch properties, the heat treatment data (as applicable) and dimension of all steel to be used shall be submitted to the Engineer for approval prior to fabrication.

3.1.2 Prior to ordering of material, all the order lists shall be properly prepared by the Contractor and submitted to the Engineer for approval.

3.1.3 Prior to starting shop work, the Contractor shall furnish the Engineer with the following information :

- Job management personnel and organisation.
- Fabricator's facilities.
- Materials intended for use and material manufacturers and suppliers.
- Certificate and test report
- Mill certificate.
- Report of tensile properties and bend tests for steel shapes, bars and plates.
- Shop drawings procedures and schedule.

- Measuring tapes intended for use.
- Quality control methods and procedures.
- Product procedures and schedule.
- Marking, cutting, bending, drilling, milling and treating of frictional surface for bolt connection, etc.
- Shop assembly facilities and procedure.
- Welding : Proposed welding details. Proposed manufacturer for flux, gas, welding rod and wire together with manufacturers recommendations for storage. Temporary welding, welding sequence and procedure, pre-heating, welding equipment and accessories, arc-air gauging/chipping.
- Method of embedding anchor bolts and setting base plates. Installation procedures and allowable tolerance of anchor bolt location.
- Inspection :
- Organisation of fabricator shop inspection.
- Type of inspection including : Full-size drawing inspection, marking drawing inspection, assembly inspection, welding inspection, material inspection, product inspection.
- Criteria for accept.
- A copy of the Contractors inspection record form shall be submitted. The proposed inspection record form shall be attached.
- Proposed method of correction of faulty work.
- Method of paint application.
- Storage at plant yard and at site.
- Transporting facilities and route from shop to site.
- Qualifications of welders and other specialists.
- As the work progresses, maintain the following records of the structural steel assembly and erection prepared separately for the following items : (indicate the methods and results of tests and inspections)
- Material test.
- Test method of welders skills.
- Test of welding work.
- Inspection for shop made products (welds, shape, dimension, appearance and others).
- Inspection of work performed in the field. (tightening of high strength bolts, erecting tolerance and others).
- Tolerance of anchor bolts.
- Records of test, inspection and corrections required by the Engineer.
- Photographs of each section of the work. Submit the completed records to the Engineer.

3.2 Shop Drawings

Contractor shall submit Shop Drawings to the Engineer for approval prior to fabrication.

The following items shall be included in the Shop Drawings as applicable :

- Material specification.
- Piece mark numbers.
- List of material parts.
- Fabrication details.
- Welding details.
- Painting requirements.
- Shop splice details and locations.
- The approval of Shop Drawings by the Engineer does not relieve the Contractor of his responsibility for errors and omissions.
- No alterations shall be made in the finally accepted Shop Drawings by the Contractor without written consent of the Engineer.
- Changes initiated by Contractor for his convenience shall be subject to the Engineer's approval and made at Contractor's expense.

3.3 Inspection and Testing

Materials, connections and workmanship generally shall be subject to tests or inspection in the mill, shop and field.

Tests and inspections shall be conducted by a qualified person or testing laboratory retained by the Contractor and approved by the Engineer. The Contractor shall furnish all materials for testing and any access to, or handling of materials required to perform material tests.

Chemical composition and mechanical properties of materials shall be tested and inspected prior to shop work.

Inspect shop assemblies and welding for conformance with the specified requirements.

Clean, grind and prepare all areas as required for ultrasonic and radiographic tests.

The Engineer shall have the right to carry out and/or order the carrying out of test and inspections at any time.

The Engineer shall have the right, at all reasonable times, to enter the Contractor's fabrication plant for the purpose of testing and inspecting the work. All labour and tools required for testing and inspecting in the fabricator shop shall be provided by the Contractor.

The Engineer reserves the right to reject materials and/or workmanship not conforming to the design drawings at any time before final acceptance. The Engineer's acceptance of material of workmanship shall not prevent its subsequent rejection if defects are discovered later. The Contractor shall remove installed materials which are rejected by the Engineer and replace them at no additional cost to the Employer.

3.4 Weather

Work shall not be performed when, in the opinion of the Engineer, the weather does not permit satisfactory workmanship, or conditions prevent adequate inspection.

3.5 Welding

All welders shall have valid current licenses. If required by the Engineer, the Contractor shall perform tests of welder's skill. Tests, when required, shall be conducted at no additional expense to the Employer.

3.6 Steel Measuring Tape

The Contractor shall provide the number of precise tapes required for the carrying out of the work (minimum of 3 tapes).

At all times, the ambient temperature shall be recorded and thermal adjustments made to all measurements. Measuring tape used in the fabricator shop of the steel work shall be compatible with those used for site erection of the steel work. The Contractor shall arrange such test as necessary to allow the Engineer to approve the tolerance between the tapes used on either location as negligible. All measurements shall be the Contractors Responsibility.

3.7 Handling and Storage

All steel materials shall be delivered complete with original mill certificates.

All steel materials shall be handled with extreme care, in such a manner so as not to cause excessive scratches or dents, as determined by the Engineer.

Material shall be stored out of contact with the ground in such manner and location as will minimise rusting and corrosion.

4.0 MATERIALS

4.1 General Requirement

All material values shall be in accordance with and as stated in this Specification, unless otherwise noted.

Chemical composition, mechanical properties, dimensions and other qualities of materials are specified in each standard. These material qualities shall be confirmed by a testing prior to shop works whether it is equivalent with the manufacture certificates.

4.2 Structural Steel

4.2.1 All steel material shall be new and be free from defects impairing strength, durability or appearance and shall be of the best commercial quality, and shall comply with the relative standard.

4.2.2 Structural steel shall be standardised products as listed below or their equivalents approved by the Engineer :

a. Pedoman Perencanaan Bangunan Baja untuk Gedung (SNI.1729.1989-F), 2.2.Tegangan-tegangan Baja Tabel 1. Harga Tegangan Dasar.

Steel grade	Tension test requirements		
	Yield Strength kg/mm2	Tensile Strength kg/mm2	Relative Elongation %
St 37 (Bi 37)	24.0	> 37	-

b. JIS G 3101-87 Rolled steel for general structure (SS 400).

c. JIS G 3350-87 Light gauge steels for general structure (SSC 400).

d. JIS G 3444-88 Carbon steel tubes for general structure purposes (STK 400).

e. JIS G 3466-88 Carbon steel square pipes for general structure purposes (STKR 400).

Steel grade	Tension test requirements		
	Yield Strength kg/mm2	Tensile Strength kg/mm2	Relative Elongation %
SS 400	> 24	41 - 52	> 17
SSC.400	> 24	41 - 55	> 21
STK.400	> 24	> 41	> 23
STKR.400	>25	> 41	> 23

f. ASTM A36/A36M-89 Specification for Structural Steel.

Steel Type	Tension test requirements		
	Yield Strength kg/mm2	Tensile Strength kg/mm2	Relative Elongation %
Plates, Bars and shapes	25 - 31 (36 kei)	40-78-56-25 (58-80 kei)	21

4.2.3 Shape and Dimensions

a. The shape and dimension of steel plates, stainless steel plates and other related items shall meet the requirement of the following standards or their equivalents :

- JIS G 3101-87 SS400 Rolled steel for general structure.
- JIS G 4305-91 SUS304 Cold rolled stainless steel plates, sheets and strips.

b. The steel to be used shall not have any structural defects and not be obtrusively corroded. The shape and dimensions shall be according to the relative SII, JIS, ASTM, or equivalent.

c. The dimensional tolerance of structural steel members shall be according to :

- SII 0163-79 Mutu dan Cara Uji Baja Siku Sama Kaki Bertepi Bulat Canai Panas.

- SII 0233-79 Mutu dan Cara Uji Baja Kanal Bertepi Bulat Canai Panas.
- SII 0234-79 Mutu dan Cara Uji Baja Bentuk "I" Bertepi Bulat Canai Panas.
- SII 0999-84 Baja Kanal C Ringan.
- JASS 6-82 Standard of Structural steel tolerances.

4.2.4 Bolts, Nuts, Washers, Anchor Bolt and Plates

Ordinary bolts, nuts and washers shall meet the requirements of the following standards or their equivalents :

- SNI.1729.1989-F St 37 (Bj 37).
- JIS B 1180-85 Hexagon head bolts and hexagon head screws.
- JIS B 1181-93 Hexagon nuts and hexagon thin nuts.
- JIS B 0205-82 Metric coarse screw threads.
- JIS B 1251-84 Spring lock washers.
- JIS B 1256-78 Plain washers.
- ASTM A307-89 Specification for Carbon Steel Externally Threaded Standard Fasteners.
- JIS B 1180-85 and JIS B 1181-93, finishing grade shall be "Medium", precision grade shall be "3rd class" and mechanical properties shall be "4T".

Anchor bolts shall meet the requirements of the following standards or their equivalents :

- SNI.1729.1989-F St 37 (Bj 37).
- JIS G 3101-87 SS 400.
- ASTM A36/A36M-89.

Nuts, washers and screw threads shall be according to standards of ordinary bolt listed above.

Set of high strength bolt shall meet the requirement of the following standard or their equivalent.

- JIS B 1186-79 Set of high strength hexagon bolt, hexagon nut and plain washers for friction grip joint.

Steel grade	Tension test requirements		
	Yield Strength kg/mm	Tensile Strength kg/mm	Relative Elongation %
F10T A	> 90	100-120	14

If the Contractor intends to used torshear type high strength bolt, he shall submit the manufacturer's mechanical and chemical test certificates for approval of the Engineer.

- ASTM A490M-89 Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints [Metric].

4.2.5 Test of Materials

For standardised items the certificates proving the conformity of the products to the approved standards may be submitted in lieu of tests. However the Engineer may, when necessary, request the Contractor to carry out mechanical tests of the materials at the Contractor's expense.

4.3 Welding Materials

Electrodes to be used for welding shall be standard products conforming to "JIS Z 3211-91 Covered electrodes for mild steel" or equivalent. The appropriate electrodes shall be selected best fitting the type of steel to be welded.

Welding materials other than those stipulated above shall be selected according to the method of welding to be employed.

When base metals of two different yield stress are welded together, filler metal shall be selected based on the base metal which has the higher yield stress.

5.0 PAINTING

5.1 Surface preparation to be painted shall conform to :

- JIS K 3151-68 Phosphatizing compounds under painting.
- JIS K 5633-83 Etching primer.
- FS*1 TT-C-490 (Rev. C)(Amd.1) Cleaning methods for ferrous surfaces and pre-treatments for organic coatings.
- FS*1 TT-P-645 (Rev. A) Primer, paint, zinc-chromate, alkyd type. *1 FS : Federal Specification (America).

5.2 Rust preventive paint shall be conform to :

- JIS K 5627-84 Zinc chromate anticorrosive paint.
- SSPC*2 PS 8.01-82 One-Coat Rust Preventive Painting System with Thick-Film Compounds.
- *2 SSPC : Steel Structures Painting Council (America).

6.0 CONSTRUCTION REQUIREMENTS

6.1 General

The Contractor shall give the Engineer one (1) week's notice before commencing any major fabrication segment, such as enclosing the sides of any major structure.

Steel items shall be of the sizes, shapes and construction as indicated or specified.

Prior to the fabrication, all the necessary measurements shall be verified and checked in accordance with the quality control procedures of the AISC requirements.

Unless otherwise specified, the items shall be fabricated in accordance with an efficient shop method.

The Contractor shall be responsible for correction of all errors and omissions in detailing, layout and fabrication at his own cost.

6.2 Location of Fabrication

Structural steel shall be fabricated and assembled in the Contractor's shop or yard or in location as approved by the Engineer.

Basically welding at the field shall not be permitted.

6.3 Welding

6.3.1 Welder

The qualification of welder shall, in principle, conform to the respective stipulations of "JIS Z 3801-79 Standard qualification procedure for welding technique" according to a type of welding to be carried out. The welder shall have more than recent one year of continuous experience in structural welding and shall receive the approval of the Engineer.

If the Engineer has any doubts of the welder qualification although an approval has been given, the Engineer may direct to carry out examination tests in accordance with relevant JIS or other equivalent standards or may cancel the approval.

6.3.2 Preparation of materials

a. Edge Preparation

Groove angle shall be in accordance with the design and shop drawings. However it may be modified according to a type of welding to be carried out with the approval of the Engineer.

Grooves shall be made to the shape as stipulated above by automatic gas cutting or other mechanical methods. Manual gas cutting may be allowed under inevitable situations with the approval of the Engineer.

b. Welding Material

Electrodes shall be carefully handled and due precaution shall be taken so as not to use electrodes which have their covering materials peeled, contaminated, deteriorated and exposed to moisture.

Welding materials shall be stored dry, and shall be sufficiently dried before their use in case they have been exposed to moisture.

6.3.3 Assembly of Elements

Accurate assembly of elements shall be achieved by using proper jigs.

Where fillet welding shall be carried out the element shall be closely adhered to the base metal as possible.

Temporary welding shall be held at a minimum and shall avoid areas where it is structurally or erection wise impeding. Where it becomes part of the permanent welding the welding shall be without faults.

6.3.4 Welding Equipment and Ancillary Equipment

A welding equipment shall be of a type best meeting the requirements for a material and dimension of joints to be welded and be able to achieve and even welding.

Ancillary equipment shall have the required performance characteristics and shall be well maintained.

6.3.5 Cleaning of Base Metal

Welding surface of the base metal shall be sufficiently cleaned of slag, moisture, dirt, corrosion, oils, paints or other contaminants before welding.

6.3.6 Welding Works

Currents, voltage etc. :

Welding shall be done at proper speed, correct current and voltage according to a type and position of welding.

Jigs :

Shop welding shall, whenever possible, be done facing downwards using a rotating jig positioner.

Pre-heating :

Steel elements shall be pre-heated as required according to plate thickness and type of materials.

Welding :

Method and sequence of welding shall be planned so as not to cause any strain or to leave residual stress.

Before or during the permanent welding, temporary welding shall be removed, if the temporary welding has any damage.

Finished state :

The surface of welding shall have an uniform wave pattern, and size and length of welding shall not be less than a dimensions shown in the Drawings. The size of welding nay be larger than specified but shall not be overtly large or be irregular in pattern.

The welded part shall not have cracks, incomplete, fusion, lack of penetration, slag inclusion, pits, blowholes, undercutting, overlapping unevenness of legs or other faults.

Fillet welding :

In case of equal leg fillet welding, it shall not be overt difference between the two legs.

A dept of reinforcement of weld shall be less than 0.1S + 1 mm (S : the specified fillet size).

Arc :

Special care shall be taken to prevent lack of penetration and slag inclusion at the starting point of arc. An arc shall be moved along the base metal or the element to be welded whether it is the beginning of a weld or a continuation of a bead.

Care shall be taken so as not to cause cracks in the bead of the arc end.

Cleaning of welded surfaces :

Slag and spatters shall be removed from the welded surfaces and around surface of the welding.

6.3.7 Weather Conditions

Welding shall not be done when a welding surface is wet due to rain or other reasons or when strong winds are blowing. However if the position of weld

and the welder is adequately protected and proper curing of the base metal is carried out, welding may be carried out after confirmation of no remained moisture on the surface, and with the Engineer's approval.

6.3.8 Correction of Materials

Warping caused in the materials shall be corrected by mechanical means or by heating in such a way as not to cause any pernicious affect to the materials.

6.3.9 Inspection of Welding

During and after welding proper in-shop inspection shall be performed. Defective portions shall be corrected repeatedly to the satisfaction of Engineer. The charge shall be counted as Contractors Cost.

After welding and after the above mentioned in-shop inspection the weld shall be inspected by the Engineer's. However the above may be abbreviated with the Engineer's approval by submission of the result of the in-shop inspection.

6.4 Bolt Connections

Hole Diameter

All holes for bolted connections shall be of a diameter 0.25 mm larger than bolts used, unless otherwise indicated.

Hole Fabrication

All holes shall be drilled at right angles to the surface of the metal and shall not be enlarged by burning. Enlarging of holes shall be by reaming only with the approval of the Engineer.

Holes shall be clean-cut without torn or roughed edges

Outside burs resulting from drilling or reaming operations shall be removed with a tool making a 0.15875 cm bevel. All holes shall be drilled and reamed as necessary prior to application of protective coating.

Hole Reinforcement

Where holes are provided for the connection of equipment or for cable and piping access, and affect any major structural members, said members shall be reinforced adequately as designated by the Engineer.

6.5 Cutting, Shearing and Clipping

Shearing, flame cutting and clipping shall be done carefully and accurately by a mechanically guided tool. All edges shall be left free of slag. Any bevelled edge that has been damaged shall be restored to the minimum tolerances.

6.6 Fabrication Tolerances

The location of each member is essential to the design of the structure. Each member shall be accurately located as shown in the Drawings, within the fabrication tolerances given in AISC.

6.7 Product Inspection

In-shop inspection report of finished products shall be submitted to the Engineer for approval.

After the in-shop inspection, the products shall be inspected by the Engineer. The product shall be laid in a way not to hinder inspection and instruments necessary for inspection.

Faulty portions shall be promptly rectified.

6.8 Painting

6.9 Shop Painting

After fabrication and inspection structural steel shall receive two full shop coats of anti-corrosive paint per the relative stipulation.

Surfaces to be embedded or to come with concrete shall not be painted.

6.10 Finish Coating

Application of finish coating refer to Technical Specification AR-0914.

6.11 Galvanizing

Provide as indicated or specified. Galvanize after fabrication where practicable.

Method of galvanizing shall conform to JIS H 8641-82 Zinc Hot Dip Galvanizing, and the weight of zinc coating shall average not less than 275 g/m² (21 microns).

The testing of galvanizing shall conform to JIS H 0401-83 Methods of Test for Hot Dip Galvanized Coatings.

Use galvanizing repair paint for galvanizing damaged part caused by handling, transporting, cutting, welding or bolting. Do not heat surfaces where repair paint has been applied to.

6.12 Erection

Erection of structural steel shall be as specified in Technical Specification CS-0502.

CS – 0502 – STRUCTURAL STEEL ERECTION

1.0 DESCRIPTION OF WORK

This work shall consist of the erection of structural steel. This specification describes all work, materials and required performance for structural steel erection.

1.1 REFERENCE STANDARDS

a. Pedoman Perencanaan Bangunan Baja untuk Gedung (SNI.1729.1989-F)

b. Japanese Architectural Standard Specification for Steel Work (JASS 6, 1982)

c. American Institute of Steel Construction (AISC) :

- AISC M013-83 Detailing for Steel Construction
- AISC M013-84 Engineering for Steel Construction
- AISC M016-89 Manual of Steel Construction ASD

d. American Welding Society, Inc. (AWS) :

- AWS D1.1-90 Structural Welding Code Steel

e. American Society for Testing and Materials (ASTM, 1993)

f. Technical specification AR-0914 - Paintings

g. Technical specification AR-0501 - Structural Steel Fabrication

2.0 GENERAL PROCEDURES

2.1 Shop Drawing

Shop Drawings and other data requirements shall be submitted to the Engineer prior to erection and installation of all structural steel, for further review and approval.

2.2 Procedures and Sequence

Prior to scheduled erection of the structure, the Contractor shall submit to the Engineer an installation procedure and sequence with supporting calculations to verify that sufficient engineering has been done to ensure a successful erection, for approval.

Prior to starting field erection, the Contractor shall furnish the Engineer with the following information :

- Roof structure erection.
- Plant of erection equipment and scaffolding.
- Details of crane foundation, erection and removal.
- Temporary staying and bracing.
- Required erection accessories.
- Shipping and delivery (including schedule).
- Temporary storage yard and handling methods.
- Temporary electric supply.

- Erection sequence, procedures and methods.
- Erection tolerances and methods for maintaining.
- Equipment and procedures for tightening erection bolts.
- Setting anchor bolts and base plates.
- Painting.
- Field inspection.
- Safety measures proposed.

2.3 Pick-Up

Contractor shall be responsible for the structural adequacy of any structure or portion of structure which he lifts or moves. Contractor shall perform the structural analysis necessary to ensure that installation will be made without damage to the structure.

Contractor may submit pickup method for erection work for Engineer's approval. Any additional materials and fabrication cost required to withstand the loadings introduced by the alternate pickup method shall be furnished by Contractor at no additional cost to the Engineer.

2.4 Environmental Conditions

Do not erect roof structure during heavy or gusty wind conditions.

3.0 MATERIALS

3.1 Anchor Bolts, Bolts, Nuts and Fastening

Anchor bolts, bolts, nuts and fastenings shall comply with Technical Specification CS-0501.

Type and sizes shall be as indicated in the Drawings and the approved Shop Drawing.

3.2 Welding Electrodes

Type of welding electrodes shall be in accordance with Technical Specification CS-0501.

3.3 Grout

Grout for filling anchor's holes, baseplate's pad and others as indicated on the Drawings shall be made of cement material, of non-shrinkage and non-metallic type approved by the Engineer.

3.4 Finish Paint

Finish paint for steel surfaces shall be in accordance with Technical Specification AR-0914.

4.0 CONSTRUCTION REQUIREMENTS

4.1 Installation Tolerances

The Contractor shall install the structure on the designated erection site. Contractor shall verify condition of existing site prior to commencing

installation procedures and shall report to the Engineer any conditions which would preclude installation of structure to the AISC tolerances.

All structures shall be erected within tolerances set forth in the AISC specifications unless otherwise stated. Any erected member of structure shall be self supporting to any external forces likely to be exerted while erection is in progress. Any temporary bracing added to the structure for self support and alignment shall be designed to withstand all conditions of loading during erection.

4.2 Bolt Tightening

Prior to the erection, all bolts, connections, alignments, grades, materials and facilities shall be thoroughly worked out.

Bolt tightening shall be done by calibrated torque wrench in order to determine the necessary bolt tension.

Bolt holes shall be aligned so that bolts can be placed without damaging threads. Bolt heads and nuts shall rest squarely against the metal.

Unfinished bolts transmitting shear shall be threaded to such a length that no more than one thread will be within the grip of the structural members.

The bolts shall be of length that will extend entirely through but no more than 6.35 mm beyond the nuts. Bolts heads and nuts shall be drawn tight against the work surface with a suitable wrench not less than 38 cm.

Bolt heads shall not be tapped with a hammer while the nut is being tightened. After having been finally tightened, the nuts shall be brushed and painted.

4.3 Grouting

4.3.1 Moulds/formwork shall be designed so that the grout is surcharged throughout the grouting operation. Good access should be provided.

Moulds/formwork shall have been prepared and surfaces/parts to be grouted are clean, dry and free from oil, grease and other contaminants likely to impair bond. Dust has to be blown from pockets.

Anchors, fixing bolts and base plates shall have been elevated prior to grouting.

The weather at the time of grout application being held, shall be in accordance with the requirements of the grout manufacturer.

The mixing comparison between grout and water shall be in accordance with the manufacturer instruction.

Mixing is carried out mechanically, by force action mixer or a suitable mixing paddle attachment to a slow speed drill.

Grout might be poured or pumped into the mould, or as specified by the manufacturer's instruction.

Gentle vibration will aid flow.

Use of straps or chains will aid flow where distances of over 1 m are involved (sawing action of the strap or chain promotes sympathetic flow of the grout-the technique must be used with discretion to avoid the creation of voids).

Flow of grout must be maintained until the grout has completely filled the void and has risen for the full length of the form on the opposite side. Grouting must take place from one side only.

4.4 In-site Painting

4.4.1 Where shop painting is damaged during transportation, the Engineer may instruct the Contractor that the structural steel shall be given 2 full coat of anti-corrosive paint in the Site. One coat immediately after off-loading and one coat prior to erection. The paint to be used shall be of the same make and type of the same manufacturer of the shop coat. Portion to be embedded in concrete shall not be painted.

4.4.2 Damage to the paint surface erection shall be mended immediately after completion of erection. In-site shall be painted as in above.

Spray painting shall not be carried out in the Site.

Finish coat shall be applied where shown in the Drawings per the stipulations of Technical Specification AR-0914.

The finish paint shall be of the same manufacturer of the shop coat.

4.5 Temporary Erection Braces

Contractor may use temporary erection braces, at his cost, during any phase of the work.

4.6 Inspection

Inspect field assemblies and bolted connections.

AR – 0509 – ORNAMENTAL METALS

1.0 DESCRIPTION OF WORK

The work under this Specification shall comprise the supply of labour, materials and the performance of all work necessary to install ornamental metals in relation to architectural works as indicated in the Drawings.

It shall include but not be limited to the following :

- Entrance Gate
- Handrails and railings
- Metal stairs and stair railings

2.0 REFERENCE STANDARDS

a. American Society for Testing and Materials (ASTM)

b. American Institute of Steel Construction (AISC)

c. American Welding Society (AWS)

d. Japanese Industrial Standard (JIS)

e. Standar Industri Indonesia (SII)

f. Technical Specification AR-0914 - Painting

g. Technical Specification CS-0501 - Structural Steel Fabrication

h. Technical Specification CS-0502 - Structural Steel Erection

3.0 GENERAL PROCEDURES

3.1 Samples and Mill Testing

Samples completed with mill certificates covering the chemical, physical, charpy v-notch properties and the heat treatment data of all metals to be used shall be submitted to the Engineer for approval prior to fabrication.

All testings shall be performed on a sample of the finished product.

3.2 Shop Drawings

A Shop Drawing and list of materials of pre-fabricated items falling into this category shall be submitted to the Engineer for approval prior to fabrication. After the approval, no deviations or alterations shall be made in the finally accepted shop drawings by the Contractor without written consent from the Engineer.

The following items shall be included on the shop drawings as applicable :

- Materials specification,
- Piece mark numbers,
- List of material parts,
- Dimensions (exact length and shape) and weight,
- Fabrication details,
- Welding details,
- Painting requirements,
- Shop splice details and locations.

3.3 Inspection and Testing

The material to be furnished under this Specification shall be subject to inspections and tests in the mill, shop and field by the Engineer. However, inspection in the mill or shop will not relieve the Contractor of the responsibility to furnish new and first quality of materials and workmanship.

The Contractor shall perform and pay the cost of all sampling and testing of materials and work required, including any product demonstration proposed by the Engineer.

The Engineer reserves the right to reject any material or fabricated item if at any time before final acceptance of the structure, the following condition occurs :

- The materials supplied does not conform to this Specification.
- The fabricated items does not conform to the drawings or Specification.
- Modification has been made without the written approval from the Engineer.

3.4 Handling and Storage of Material

Materials shall be stored out of contact with the ground in such manner and location as will minimise rusting and corrosion.

All metals shall be handled with extreme care, in such a manner as not to cause excessive scratches or dents, as determined by the Engineer.

All imperfections must be thoroughly inspected and any deep cuts or serious abrasions shall be repaired and ground smooth. Plate repair procedure shall be submitted to the Engineer for approval. No other grinding shall be permitted on base material to remove surface imperfections except as to prepare surface for welding.

Burning shall not be used to straighten or to bend material, except by written consent of the Engineer.

4.0 MATERIALS

4.1 General

All metals shall be new and be free from defects impairing strength, durability or appearance, and shall be of the best commercial quality.

4.2 Steel Profile

Unless otherwise specified, steel profile shall conform to ASTM A.36.

Items to be substituted shall be approved by the Engineer.

4.3 Steel Pipe

Steel pipe for handrails, railings and others as indicated in the Drawings shall conform to AISI 304. Diameter of pipes shall be as specified in the Drawings.

4.4 Perforated Aluminium Sheet

Perforated aluminium sheet for parapet and others as indicated in the drawings, shall have the following characteristic :

- Thickness of 3 mm
- Hole of 7 mm diameter
- Hole distance of 50 mm
- Hollow pattern indicated in the drawing
- Item to be substituted shall be approved by the Engineer

4.5 Stainless Steel Plate

Stainless steel plate for floor divider and corner protector should be made of bent stainless steel plate as shown on the drawings.

4.6 Expanded Metal

Expanded metal lath for catwalk and others as indicated on the drawings shall be used the product of expanded metal lath type GR 50080, nominal thickness 5 mm or approved equal.

4.7 Bolts, Nuts and Washers

Bolts, nuts and washers material shall conform to ASTM A-307-78, and shall be cadmium plated.

Bolts dimension shall be conform to ANSI B-18.2.1.-1972 and nuts dimension shall conform to ANSI B-18.2.2.-1972.

4.8 Anchor Bolts

Anchor bolts shall be made of steel round bar of Bj.40 grade, in diameter and length as indicated in the Drawings.

4.9 Hangers and Supports

Hangers and/or supports for ceiling frame shall be made of steel profile in sizes and forms as shown in the Drawings.

5.0 CONSTRUCTION REQUIREMENTS

5.1 General

Prior to the fabrication, all the necessary measurements shall be verified and checked in accordance with the quality control procedures of the AISC requirements.

Design and members and connections for any portion of the structures not indicated in the Drawings shall be completed by the Contractor and indicated in the Shop Drawings.

The Contractor shall be responsible for correction of all errors and omissions in detailing, layout and fabrication at his own cost.

5.2 Workmanship

Ornamental metal items shall be of the sizes, shapes and constructed of materials as indicated or specified in Drawings.

Unless otherwise specified, the items furnished shall be an approved product, fabricated in accordance with an efficient shop method.

Fabrication of ornamental metals shall be carried out in accordance with the Drawings, the approved Shop Drawings, this Specification and Technical Specification CS-0501.

For fabrication of work exposed-to-view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surfaces finishes.

5.3 Fabrication and Installation

5.3.1 General

Installation of ornamental metals in types, sizes and shapes as indicated in the Drawings and this Specification shall be in accordance with Technical Specification CS-0502.

Anchor bolts, anchor bolt assemblies and hook bolts shall be furnished and installed in conformity with the Drawings and as directed by the Engineer. All steel anchorage embedded to concrete shall be properly cleaned of rust, loose scales, oil and other objectionable matter in order to have a good bond to the concrete.

Provide and co-ordinate anchorage of the type indicated with the supporting structure. Fabricate and space anchoring devices to provide adequate support for the intended use of the work.

Exposed connections with hairline joints which are flush smooth shall be formed using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use cross-recessed flat head (countersunk) screws or bolts.

Handrails and Railings.

Adjust railings prior to securing in place to assure proper matching at butting joints and correct alignment throughout their length. Plum post in each direction. Secure posts and rail ends to building construction.

Post shall be welded to steel base with flange, angle types or floor types as required by conditions or by the Drawings. Then post with its base shall be bolted to the supporting members as described in the Drawings.

Aluminium perforated sheet shall be installed in accordance with the drawing.

5.4 Floor Divider

Adjust every floor divider so that the upper surface in the same plane with each respective finish floor level.

Scare every floor divider to its respective base with anchors as shown on the drawing before filing work started.

Metal floor divider should be covered with protective plastic coating before handling owner of the work.

5.5 Protective Coating/Painting

Unless otherwise noted, all ornamental metal works shall be anti-rust coated and finished in colours as specified in Colour Scheme which shall be issued later.

Paints and painting works shall be carried out in accordance with the requirements of Technical Specification AR-0914.