PROJECT TITLE:

CONSTRUCTION OF 1000 CUBIC METER CYLINDRICAL GROUND STEEL TANK

LOCATION:

PURUK CABUAY, BARANGAY SINAWAL, GENERAL SANTOS CITY

OWNER:

GENERAL SANTOS CITY WATER DISTRICT

SPECIFICATIONS

I. SCOPE OF WORK

The work consists of furnishing of all the required labor, equipment, tools, scaffolding, services and materials up to the contract limit for the completion of the proposed project as specified herein:

1. The Contractor shall build 1,000 Cubic Meter Cylindrical Ground Steel Tank, where necessary piping and other appurtenances shall be in accordance with the approved plans and specification.
2. Perform excavation on any type of soil and backfilling using suitable materials and disposal of undesirable surplus materials where directed.
3. Installation of pipes, fittings, closure pieces, supports, bolts, nuts, gaskets, jointing materials and appurtenances as shown and specified, and as required for a complete and workable piping system.
4. Flushing, leak testing and disinfection of the Steel Tank and Pipelines.
5. All steel pipes and valves are supplied by the owner.
6. The Contractor shall fabricate needed fittings and other appurtenances such as steel flanges, rubber gasket and blind flange.

II. BIDDERS QUALIFICATION

A. Bidders'/Contractors' Qualification

Bidders/Contractors should be fully experienced and reputable in the field of construction. Contractor's minimum classification is Small B and shall be unexpired upon submission. Related projects shall be Water supply & Building or Industrial plant.

B. Bidders'/Contractors' Competence & Experience

Bidders/Contractors shall have experience in civil, structural steel works, piping and had completed at construction projects in any Government or

Private Institutions from the date of submission and receipt of bids within 5 years.

III. GENERAL CONDITIONS

A. DEFINITIONS

1. OWNER
   The word "Owner" refers to the General Santos City Water District.

2. ENGINEER
   The word "Engineer" refers to the authorized representative by the Owner to oversee the execution of the Contract.

3. CONTRACTOR
   The word "Contractor" refers to the party entering into the contract for the performance of the work required.

4. CONTRACT
   The word "Contract" refers to the contract documents and shall include the basic contract entered into by the owner and the contractor for the performance of the work.

5. SPECIFICATION
   The word "Specification" refers to the General Conditions, Special Provisions and Technical Specifications of the contract together with all addenda and change orders issued with respect thereto.

6. DRAWINGS
   The word "Drawing" or "Contract Drawing" refers to those drawings accompanying the Specification and subsequent approved drawings, which show the location, nature, extent and form of the work together with applicable detail.

7. WORK
   The word "Work" refers to the supply of labor, material, equipment, transportation and all incidental costs necessary to complete the Contract.

8. SITE
   The word "Site" refers to the location of the project where in the work is to be constructed provided by the Owner for the purpose of the Contract.

9. APPROVAL

The word "Approval" refers to concurrence in writing, including subsequent written confirmation of the previous verbal approval.

10. WORKING / CALENDAR DAY

The term "Working Day" refers to working days in the government service.
The term "Calendar Day" refers to the days in a week including Saturdays, Sundays and Holidays.
Whenever the word "Day" is issued, it shall refer to calendar day.

B. SPECIFICATION, DRAWING AND RELATED AREAS

1. SPECIFICATION, DRAWINGS AND DISCREPANCIES

The intent of the Specifications and Drawings is that the contractor shall furnish all the required shop, labor, materials, equipment and services, unless otherwise specifically provided.

The Specifications and Drawings are complementary and what is called for in one shall be as binding as if called for in both.

Any discrepancies, errors or omission found in the Specifications or Drawings shall be reported in writing within three (3) days from the discovery to the Engineer who will issue the correction in writing within the same period. The contractor shall not take advantage of any such discrepancies, errors or omissions but shall comply with the corrective measures regarding the same as prescribed by the Engineer.

In case of conflict between the Specifications and the Drawings, the Specifications shall govern over the Drawings.

2. SHOP DRAWINGS

Whenever called for in these Specifications or on the Drawings, or where required by the Engineer, the Contractor shall furnish the Owner for review two (2) prints of each shop drawing.

The term "Shop Drawing" as used herein shall be understood to include detailed design calculations, fabrications and installations, drawings, lists, graphs, operating instructions. Shop drawing shall be submitted to the Engineer for review and approval within fifteen (15) calendar days from receipt of the Notice of Award.

All shop drawings shall be accompanied by transmittal form.

C. OWNER – ENGINEER – CONTRACTOR RELATIONS

1. ENGINEER AUTHORITY

The Engineer, acting as the authorized representative of the Owner, will decide such questions which may arise as to the quality and acceptability of materials and equipment furnished, work performed, rate of progress of work, interpretation of Specifications and Drawings, and those relating to the acceptability in fulfillment of the Contract by the Contractor.

The Engineer will, subject to verification and / or approval by the Owner, certify the estimates of the value of the work completed and the materials utilized.

2. CONTRACTOR'S EMPLOYEES

The employees of the Contractor are not employees of the Owner. Hence, the Owner shall not be liable or responsible for any personal injury or damage including death caused by any of the employees of the contractor during the lawful performances of their duties.

The contractor shall, at all times, stand solely liable and/or responsible for the enforcement of and compliance with all existing laws, rules and regulations applicable, and the contractor hereby agrees and binds itself to save and hold the Owner free and harmless from any or all liabilities in respect thereto and/or arising therefrom.

The organizational structure chart shall be submitted together with the contractor's bid, subject to checking during post qualification.

3. CONTRACTOR'S SUPERINTENDENCE

A qualified superintendent shall be present in the work and shall provide competent supervision until its completion. The superintendent shall have full authority to act in behalf of the contractor, and all directions given by the Owner to the superintendent shall be considered given to the contractor.

D. PROJECT MONITORING

1. MONTHLY PROGRESS REPORT

The Contractor is required to submit to the Owner a Monthly Progress Report which shall include the following;

a. Items of work accomplished for the month;
a) Cumulative summary of work accomplished to date; and

b) Project photos for the month.

The first Monthly Progress Report will cover the time from the date when the Notice to Proceed is issued until the end of the following month. Subsequently, monthly reports shall be submitted monthly thereafter until provisional acceptance of the project.

If the Contractor fails to submit Monthly Progress Report, the Owner may withhold approval of progress payment until the reports are received.

2. MONTHLY COORDINATION MEETING

There will be a regular coordination meeting be conducted twice a month to discuss issues and concerns of the project.

E. CONTRACT DURATION

The Contract duration is **TWO HUNDRED TEN (210) Calendar Days and shall commence** Five (5) Days after the receipt of Notice to proceed.

F. BONDS, INSURANCE, LEGAL RESPONSIBILITY AND PUBLIC SAFETY

1. PERMIT AND LICENSES

The processing and payment of all necessary permits shall be the responsibility of the Owner.

However, during the project implementation any coordination or compliance required to the concerned agencies shall be the sole responsibility of the Contractor. The Owner shall provide all assistance whenever necessary.

2. CONTRACTOR'S RESPONSIBILITY

The Contractor shall comply with safe work practices and all health and safety regulations of the state and the locality. Furnish protective and lifesaving equipment for persons working at the site and provide a **Contractor's All Risk Insurance** for all his workers.

The Contractor shall provide and maintain such sanitary accommodation for the use of its employees as may be necessary to comply with all applicable national and local laws and ordinances, regulations, customs and practices.

Coordination with the local police department and agencies concerned with traffic problems shall be the responsibility of the contractor. Whenever the Contractor's operation create a condition hazardous to traffic or to the public, it shall furnish at its own expense such as flagmen and guards necessary to give adequate warning of any dangerous condition that may be encountered by the public. It shall furnish, erect and maintain such fences,

barricades, lights, signs and other devices as are necessary to prevent accidents and avoid damage or injury to the public.

The Contractor shall be liable to all claims and/or liabilities arising during the public implementation.

Should the Contractor fail to faithfully observe the Safety Provisions herein specified, the Owner may exercise remedial rights as stipulated under this Contract.

3. LAWS AND REGULATIONS

The Contractor shall observe and comply with all National, Provincial and Local laws, ordinances, and regulations, which on the manner affect those engaged or employed in the work, the material used in the work, or in the conduct of the work.

The Contractor shall indemnify and save harmless the Owner against all claims or liabilities arising from violation of any such laws, ordinance, order, or regulation, whether by itself or by its employees.

4. THIRD PARTY LIABILITY

The Owner shall in no case be held civilly or criminally liable due to the act or omission of the Contractor during the contract period or during the implementation of the required work thereof. Any liability that may arise to the third party shall be the sole responsibility of the contractor.

GENERAL TECHNICAL SPECIFICATIONS

SITE PREPARATION

The location of the project shall be staked out and grade established as shown on drawings and in accordance with the National Building Code and National Structural Code of the Philippines. Contractor shall provide instrument for purposes of establishing, checking, and monitoring of the line and grade elevation.

TANK REQUIREMENTS

1. The materials, fabrication and erection of the welded steel tank shall conform to:

a. AWWA Standard D100, Standard for Welded Steel Tanks for Water Storage, latest edition.
b. AWWA D102, Standard for Coating Steel Water-Storage Tanks
c. AWWA C652, Disinfection of Water-Storage Facilities

d. ASTM 2005b, structural Steel
e. ASTM A36, Angles and Plates

2. The reservoir shall be furnished with piping and appurtenances as shown on the plans and as follows:

a. Inlet pipe
b. Overflow pipe
c. Outlet pipe w/ stainless steel strainer
d. Drain Box
e. Roof Man way with hinged cover
g. Outside ladder with handrails
h. Stainless screened roof vent
i. See attached drawing for Water level indicator
j. General Santos City Water District Logo

A. CONCRETE WORKS

This item shall consist of furnishing, placing and finishing of concrete in all structures in accordance with the specifications and conforming to the lines, grade and dimensions shown on the plan. Concrete shall consist of Portland cement, fine aggregates, coarse aggregates, admixture when specified and water mixed in the proportions specified or approved by the Engineer.

Concrete forms should be water tight, strong enough and rigid to sustain the weight of concrete. Forms should be oiled to make the wood water proof. Oiling of forms should not be done after the steel bars reinforcements have been set to its position.

Note: May opt to use Phenolic Board type of forms.

Pipes, conduits, dowels, and other items required to be embedded in the concrete construction shall be so positioned and supported prior to placement of concrete. As concrete is placed, it shall be thoroughly settled and compacted through-out the entire depth of the layer. The Concrete shall be carefully worked by tamping, rodding and vibrating to make sure that all air and rock pockets have been eliminated. All concrete shall be cured for not less than fourteen (14) days after placing in accordance with standards.

Concrete shall not have a free fall of more than 1.5 meters and shall be placed so that the aggregates do not separate or segregate.

Portland Cement

Portland Cement shall conform to the "Standard specifications for Portland Cement "(ASTM C-150-Latest Revision) and shall be type I. The cement shall be in accordance with DPWH standards e.g. "Holcim" and shall not be more than three (3) months from date of manufacture.

An admixture may be added to the concrete to control the set, effect water reduction, and increase workability. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions.

Fine Aggregates

It shall consist of natural sand, stones, screenings or other inert materials with similar characteristics or combination thereof, having hard, strong and durable particles. It shall not contain more than three (3) mass percent of materials passing the no. 200 sieve by washing not more than one (1) mass percent each of clay lumps or shale. The use of beach sand shall not be allowed.

Coarse Aggregates

It shall consist of crushed stone, gravel, blast furnished slag or approved inert materials with similar characteristics or combination thereof, having hard, strong and durable particles and free from any adherent coatings. It shall not contain more than one (1) mass percent of materials passing the no. 200 sieve, not more than 0.25 mass percent each of clay lumps, nor more than 3.5 mass percent of soft fragments.

Reinforcing Steel

All reinforcing steel bars used shall be of deformed type, new, free from rust, oil, defects, greases or kinks. They shall conform to AASHTO M31 and the latest edition of National Structural Code for Buildings with a minimum grade equal to **275 Mpa** (Grade 40) unless otherwise shown on the plans. Test of these materials, to determine its suitability shall be in accordance with the standards of the American Society for Testing and Materials (ASTM).

Reinforcement shall be accurately placed and adequately secured by using annealed iron wire ties at intersection and shall be supported by concrete or metal supports, spacers or metal hangers. In concrete columns, footing, beams and cylindrical concrete walls, splices or reinforcement at point of maximum stress shall be generally avoided. Hooks and bends shall be 300mm and must conform to the Standard Engineering practice.

Test specimen for steel reinforcement shall be Three (3) pieces, 1 meter long of steel bar sample should be secured of each size of reinforcing steel. There should be 3 tests - Tension, Bend and Variation in weight.

Cutting, bending and fabrication of steel reinforcement shall not be allowed without test results.

RESERVOIR BASE

Reservoir base shall consist of 100mm thick asphalt pad resting on ¾ inch coarse/round aggregate with a concrete ring wall. The base shall be placed on a material Item 201 compacted to 95% relative minimum degree of compaction. All specified earthwork shall be performed in strict accordance under earthwork section.

REINFORCED CONCRETE RINGWALL

The reinforced concrete ring wall shall be constructed in accordance with the drawings provided.

1. Concrete

All concrete work shall comply with the Reinforced Concrete Specifications. Ring wall shall be constructed of structural concrete placed against soil or rock below sub-grade and against forms above sub-grade. It shall be of the size specified on the Construction Drawings. Top surface finish shall be smooth troweled free from blemishes, ripples, and trowel marks. Sidewall above sub-grade shall have a smooth sacked finish.

2. Anchor Bolts

Anchor bolts, when required, shall be placed prior to placing the ring wall. Anchor bolt positions are critical and must be set in the exact locations called for to avoid interfering with the tank shell or bottom plate. Contractor shall verify anchor bolt locations before the pouring of concrete.

Unless otherwise shown, all bolts, anchor bolts, and nuts which are buried, submerged, or inside a covered hydraulic structure shall be Hot-Dip galvanized and coated.

3. Impregnated Expansion Joint Material

Impregnated expansion joint material shall be 1/2 inch thick conforming to the requirements of ASTM Standard D1751, applied to top of ring wall from the inside edge to the outside of the bottom plate. Contractor shall apply a mastic adhesive compatible with the expansion joint material to top of concrete ring wall and thereafter apply expansion joint material. Said adhesive shall be applied only to interior 8 inches of the ring wall. Said material shall be applied around entire ring wall circumference and shall be trimmed flush with bearing plate exterior. Contractor shall apply expansion joint material to ring wall during the week prior to reservoir construction (placement of bearing plate). Contractor shall not damage the expansion joint material during reservoir construction.

Concrete Strength

Concrete strength shall be **3,000 psi (20.68Mpa)** at 28 days to be used for footing, beams and cylindrical concrete wall. The concrete strength shall reach 85% at seven (7) days. No hand mixing shall be allowed during concreting operations.

Test on Concrete

The Contractor shall provide minimum of **Six (6) samples** per concrete pouring. Two (2) samples shall be tested on the 7th, 14th, 28th days respectively.

Samples must be cured at the jobsite and the contractor shall provide the necessary pond or drum. Samples shall be secured and molded in accordance with the "Standard Method of Sampling Fresh Concrete" (ASTM C-172-Latest Revision) and "Standard Method of Making and Curing Test Specimen in the field" (ASTM C-31-Latest Revision). Strength test shall be made in accordance with the "Standard Method of Test for Compressive strength of Cylindrical Concrete Specimens" (ASTM C-39-Latest Revision).

B. EARTHWORKS

SOIL INVESTIGATION

The contractor shall conduct soil investigation 1 bore hole 20 meters depth for the proposed reservoir site to determine the actual soil bearing capacity.

COMPACTION TEST

Where the backfill is required to be compacted to a specific density, tests for compliance may be made by and at the expense of the Contractor, using test procedure specified in Method of Tests for Moisture-Density Relation in Soils using a 10-lb hammer and 18-in. drop (ASTM D1557), modified to use three (3) layers. All field density tests shall be performed in accordance with the test procedure specified in "Method of Test for Density of Soil in Place by the Sand Cone Method" (ASTM D1556).

EXCAVATION

a. *General*

Except when specifically provided to contrary, excavation shall include the removal of materials of whatever nature encountered, including all obstructions that would interfere with the proper execution and completion of work. The removal of said materials shall conform to the lines and grades shown or ordered. Unless otherwise provided, the entire construction site shall be stripped of all vegetation and debris, and such materials shall be removed from the site prior to performing any excavation or placing nay fill. The Contractor shall furnish, place and maintain all supports and shoring that may be required from the sides of the excavations, and all pumping, ditching, or

other approved measures for the removal or exclusion of water, including taking care of storm water and waste water reaching the site of the work from any source, as to prevent damage to the work or adjoining property.

The walls and faces of all excavations in which workers are exposed to danger from unstable ground shall be guarded against by a shoring system, sloping of the excavation, or some other acceptable method. The Contractor shall furnish, install, and maintain all supports and shoring that may be required for the sides of the excavations, and all pumping, ditching, or other approved measures for the removal or exclusion of water, including taking care of storm water and waste water reaching the site of the work from any source, so as to prevent damage to the work or adjoining property.

The walls and faces of all excavations in which workers are exposed to danger from unstable ground shall be guarded against by a shoring system, sloping of the excavation, or some other acceptable method. The Contractor shall furnish, install, and maintain such sheeting, bracing, etc., as may be necessary to protect the workers and to prevent any movement of earth which could injure or delay the work or endanger adjacent structures. In excavations where workers may be required to enter, excavated or other materials shall be effectively stored and retained at least 600 mm or more from the edge of the excavation. All excavation and trenching operations shall conform to any and all national, provincial, and local safety requirements.

b. Excavation Beneath Areas to be Paved

Excavation under areas to be paved shall extend to the bottom of the aggregate base, if such base is called for otherwise, it shall extend to the bottom of paving. After the required excavation has been completed, the exposed surface shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to ninety percent (90%) of maximum density.

c. Pipeline Trench Excavation

1. General

Unless otherwise shown or ordered, excavation for pipelines shall be open-cut trenches. The bottom of the trench, including any shoring shall have a minimum width equal to the outside diameter of the pipe plus 300 mm (12 in.). Except when otherwise shown or ordered by the Engineer, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe. The trench bottom shall be given a final trim using a string line for establishing grade, such that each pipe section when first laid will be wholly in contact with the ground or bedding along the extreme bottom of the pipe. Rounding out the trench to form a cradle will not be required.

All newly laid pipes shall be backfilled at least 150 mm (6 in.) above the top of the pipe at the end of each day. The remainder of the trench shall be backfilled not later than the following day.

2. *Disposal of Excess Excavated Material*

The Contractor shall remove and dispose all excess excavated material at his own expense and in a manner approved by the Engineer.

3. *Excavation Beneath Proposed Concrete Reservoir*

After the reservoir area has been stripped of all vegetation and debris, as specified in Subsection (a) herein, loam and topsoil from the top 60 cm (24 in.) of excavated soil shall be removed and stockpiled for possible later use as fill on or around the reservoir and for miscellaneous topsoil. Excavation under the reservoir shall extend to the bottom of the drain rock layer. After such excavation has been completed, the exposed surface shall be rolled with heavy completion equipment to provide a reasonably smooth surface for placement of the drain rock. Areas under the reservoir upon which earth fills is to be placed shall be scarified to a depth of 15 cm (6 in.) brought to optimum moisture content, and compacted to ninety-five percent (95%) of maximum density.

BACKFILL

a. General

Backfill shall not be dropped directly upon any structure or pipe. Materials used for backfill shall be selected material, free from grass, roots, bush or other vegetation, or rocks having the maximum dimension larger than 150mm (6 in.). Materials placed within 150 mm (6 in.) of any structure or pipe shall be free of rocks or unbroken masses or earth materials having maximum dimension larger than 75 mm (3 in.). Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water-retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.

b. Backfill Around and Beneath Proposed Structures and Paved Areas

Except where otherwise specified for a particular structure or ordered by the Engineer, backfill placed around and beneath proposed structures and paved areas, shall be placed in horizontal layers not to exceed 200 mm (8 in.) in thickness, as measured before compaction, where compaction is attained by means of sheepsfoot rollers, pneumatic type rollers or any heavy compaction equipment approved by the Engineer. Where the use of heavy compaction equipment is impractical, the layers shall not exceed 150 mm (6 in.) in thickness before compaction, and compaction shall be attained by means of hand-operated power driven tampers.

The Backfill shall be brought up evenly, with each layer moistened and compacted by mechanical means to ninety-five percent (95%) of maximum density/degree of compaction beneath proposed structures, and ninety percent (90%) of maximum density around the sides of structures and beneath proposed paved areas.

c. Backfill Around Reservoir Walls

Backfill around reservoir walls shall consist of selected materials obtained from the excavation, and shall be placed in uniform layers not more than 200 mm (8 in.) in thickness before compaction where compaction is attained by means of approved compaction equipment. Where the use of this equipment is empirical, the layers shall not exceed 150 mm (6 in.) in thickness before compaction shall be attained by means of hand-operated power-driven tampers. The backfill shall be brought up evenly with each layer moistened and compacted by mechanical means to ninety percent (90%) of maximum density/degree of compaction.

Flooding, ponding, or jetting will not be permitted. Backfill around the reservoir walls shall not be placed until after the reservoir has been tested for leakage. The reservoir shall remain filled with water while said backfill is being placed. Loaded carryalls or vehicles weighing more than 4,500 kg (9,900 lb) when loaded shall not be permitted closer to the walls than a horizontal distance equal to the depth of the fill at that time.

C. STRUCTURAL STEEL

1. RESERVOIR MATERIALS

All materials shall comply with AWWA D-100 latest edition, new previously unused, and in first class condition.

Plate material shall be open-hearth, electric-furnace, or basic oxygen process steel conforming to the latest revision of ASTM specifications.

a. Floor Plates
Floor plates shall be 9mm in thickness fabricated to the dimensions shown on the approved plans. Floor plates shall be fabricated to match annular ring.

b. Shell Plates
Shell plates shall be 9mm in thickness fabricated to the dimensions shown on the approved plans. Shell plates shall be fabricated to match adjoining plates.

c. Roof Plates
Roof plates shall be 6 mm in thickness. Plates shall be fabricated as shown in the approved plans.

d. Framing and Truss
Shall be fabricated as shown in the approved plans.

2. ERECTION OF STEEL RESERVOIR STRUCTURE

Welding

All welding shall be the shielded arc method and shall conform to the AWS "Code for Arc and Gas Welding in Building Construction".

All welds in the tank and structural attachments shall be made in a manner to ensure complete fusion with the base material, within the limits specified for each joint, and in accordance with the qualified procedure.

1. For the installation of shell plate weld shall be at:
    a. Inside Joint – 1st Pass
    b. Outside Joint – 2 -3 Passes
2. Welding shall not be performed when the surfaces of the parts to be welded are wet from rain, or when rain is falling on such surfaces, or during periods of high winds, unless the welder or welding operator and work are protected properly.
3. Peening of weld layers may be used to prevent undue distortion. Surface layers shall not be peened. Peening shall be performed with light blows from a power hammer with a blunt-nosed tool.
4. The surface bends shall merge smoothly into each other in all welds.
5. The reinforcement of butt welds shall, as practicable, be preferably not more than 1.6mm (1/16 in). In no case shall the face of the weld lie below the surface of the plates being joined.
6. Gouging at the root of the welds and gouging of welds to remove defects may be performed with a round-nosed tool or by arc or oxygen gouging.
7. Each bead of multiple pass weld shall be cleared of slag and other loose deposits before the next bead is applied.

Preparation of Surface to be welded

Surfaces to be welded shall be free from loose scale, slag, heavy rust, grease, paint, and any other foreign material except tightly adherent mill scale. A light film of deoxaluminate or equivalent spatter film compound may be disregarded. Such surfaces shall be smooth, uniform, and free from fins, seams, and other defects that adversely affect proper welding. A fine film of rust adhering on cut or sheared edge after wire brushing need not be removed.

Tack Welds

Tack welds used in the assembly of joints subject to primary stress from the weight or pressure of the tank contents shall be thoroughly cleared of all welding slag, but need not be removed, provided they are visually inspected for soundness (no cracks, complete fusion, filled crafters, and acceptable profiles) and metal.

Tank Assembly

All shell, bottom and roof plates subjected to stress by the weight or pressure of the contained liquid shall be assembled and welded in such a manner that the proper curvature of the plates in both directions is maintained.

1. Clips, jigs, or lugs welded to the shell plates for erection purposes shall be removed without damaging the plates, and any portion of the weld beads remaining shall be chipped or ground smooth.
2. For welding in the vertical position, the progression of welding shall be either upward or downward.
3. The shell plates shall be joined by welding the joints in a sequence that the Contractor has found to result in the least distortion due to shrinkage of the weld and that will avoid kinks at the longitudinal joints.

Matching Plates

a. Lap Joints
   The plates forming a lap joints shall be held in as close contact as possible during welding and in no case shall the separation be more than 1.6mm (1/16 in.)
b. Butt Joints subject to primary stress from weight or pressure of tank contents, the adjoining plates shall be aligned accurately and retained in position during welding.
c. Butt Joints under secondary stress, the adjoining plates shall be aligned accurately and retained in the position during welding so that in the finished joint, will not project beyond its adjoining plate.
d. Cleaning of Welds: The Contractor's crew shall remove weld scale or slag, spatter, burrs, and other sharp or rough projections in a manner that will leave the surface suitable for cleaning and painting operation.

GALVINIZING

All structural steel places, shapes, bars, and fabricated assemblies shall be galvanized after the steel has been thoroughly cleaned of rust and scale, in accordance with ASTM A123 – Specifications for Hot-Galvanized Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip.

D. PAINTING AND COATINGS

The following surfaces are to be painted but not limited to:

a. All submerged metal surfaces
b. All structural and miscellaneous steel
c. Steel Tank shell, roofing, exterior and interior surfaces
d. All above ground piping and other metal surfaces
e. All exposed concrete
f. All plain and corrugated G.I. Sheet

SURFACE PREPARATION

All structural steel and tank shell plate inside and outside shall be free from dirt, scale, and rust removed by scrapping, wire brushing and sandblasting. All welded joints should be cleared of slag and weld spatter. Before painting, ferrous metal surfaces, including galvanized ferrous metal surfaces, shall be pretreated with approved phosphoric acid etching cleaner in accordance with manufacturer's direction.

Steel Tank Shell

a. Exterior
First Coat: Epoxy Primer

Second and Third Coats: Blue finish paint

b. Interior
First Coat: Non-toxic epoxy primer and food grade with manufacturer's certification supplied

Second and Third Coats: Non-toxic epoxy white food grade enamel with manufacturer's certification

E. PIPING

This work shall consist of pipe installation, jointing, welding, fittings, pipe support, valves, bolts & nuts, gasket, steel flanges, interconnection, leak test, disinfection and other appurtenances as shown and specified, and as required for a complete and workable piping system.

The contractor shall take all necessary precautions to prevent the pipe for any damage due to this cause, and shall at his own expense restore and replace the pipe to its specified condition.

All steel pipes, gate valves and butterfly valves shall be provided by the Owner however, installation shall be executed by the Contractor. All other materials needed to complete the installation shall be provided by the Contractor.

All steel flanges shall have a minimum thickness of 19mm (3/4 inch) and bolts, nuts and washer must be hot dip galvanized.

The rubber gasket shall be the continuous ring type with ply, made of special composition rubber and the minimum thickness is 6mm (1/4 inch).

All gate and butterfly valves shall conform to the "Standard for Resilient Seated Gate Valve" (AWWA C509 and C504, respectively). Designed for a minimum water working pressure of 1 MPa (150psi). All valves must be manufactured by AVK with 10 years warranty.

a. **HYDROTESTING**

The reservoir shall be filled with water for hydro testing. Any leaks found after the reservoir is filled shall be repaired and the disinfection procedures repeated to the satisfaction of the Engineer.

b. **DISINFECTION**

Prior to putting the system to operation, the reservoir and connecting lines thereto shall be thoroughly disinfected with chlorine to eliminate impurities that possibly entered the pipeline during the construction process by means of chlorination. The chlorine dosage applied to the water shall be sufficient to give a chlorine residual of at least 50mg per liter upon completion.

After the chlorine-treated water has been retained for the required time of 24 hours, the chlorine residual in the reservoir and in the lines shall be at least 25mg per litre. All valves shall be operated while the lines are filled with the heavily chlorinated water

Chlorine test kit to measure the chlorine residual during the conduct of disinfection shall be provided by the Contractor.

c. **FLUSHING**

The newly constructed reservoir and pipeline shall be kept clean at all times. It should be done by flushing out clean water on the constructed provision or at the nearby flushing point.

OTHER REQUIREMENTS

A. RESIDENT ENGINEER'S OFFICE

The Contractor shall provide space as temporary office (Bamboo House or "Payag") in the field for use by the Resident Engineer.

B. TESTING FEE

All laboratory testing fee and transportation shall be shouldered by the contractor.

C. ORGANIZATIONAL STRUCTURE

The bidder shall submit its organizational structure for the project including unexpired licenses of professionals to be assigned and stipulate specific functions wherein One (1) professional can hold only up to Two (2) key

positions. Welders shall also submit unexpired corresponding National Competency (NC) certificate from TESDA.

D. EQUIPMENT

The Contractor shall provide the following **minimum** equipment intended for the project.

Quantity	Description
1	Boom Truck or Tadano Crane
1	Generator Set for transformer type welding machine
2	Engine Driven Welding Machine or Transformer Type
1	Bar Cutter
1	Transit Mixer
1	Water Truck
1	Pumpcrete
2	Concrete Vibrator
2	Tamping Rammer or Plate Compactor
2	Oxy-Acetylene cutting outfit
2	Power Brush/Grinder
8	Concrete Sample Cylinder
1	Asphalt Roller

The Contractor shall be required to include the list of their equipment in the technical documents and specify whether the same is leased or owned. If leased, the Contractor shall provide a Memorandum of Agreement.

During post-qualification, GSCWD shall conduct inspection to verify the availability of the listed equipment. Absence of any one of the required equipment is ground for disqualification.

E. PROJECT SIGNS / COA SIGNBOARD

The Contractor shall furnish, erect and maintain one (1) project sign and one (1) COA signboard in accordance with the Standard Drawings. The location for the erection of these signs by the Contractor shall be as directed by the Engineer.

F. LOGBOOK AND WEATHER CHART

A logbook and weather chart shall be maintained by the Contractor at all times in the project site reflecting the daily work activity, weather condition, manpower, equipment, visitors and circumstances affecting the program of work to be signed by both the Engineer and Contractor.

G. SITE INSPECTION

The Contractor must conduct ocular site visit of the proposed project as reference and submit certificate of site inspection upon submission of bid proposal.

H. OCCUPATIONAL SAFETY AND HEALTH

The Contractor shall comply with all applicable National and Local Laws and ordinances, regulations, customs and practices regarding safety and health.

SPECIAL CONDITIONS

LIQUIDATED DAMAGES

The Contractor shall pay liquidated damages to the Owner if he fails to complete the work within the time agreed upon. It is understood that said payment is not a penalty but a fixed sum representing the liquidated damages for each calendar day of delay.

Computation of the said liquidated damages shall conform to the provision of RA 9184.

PROJECT TURNOVER

During project's turn-over, Contractor is required to submit as-built plan. The contractor's deliverables are 100 percent accomplished either on each part and the site restored as is prior to construction. Submit logbook and other project documents.

VARIATION IN QUANTITIES

Bidders are reminded that the quantities are estimated and are for the purpose of comparing bids. The successful bidder shall complete all work items at the unit prices quoted in his bid, regardless of the variation between bid quantities and actual quantities required for completion of the work. Payment will be based on actual quantities furnished, installed or constructed.

Prepared by:

ROLLY A. GUNDAY, CE
TWG Member

MA. CELIA N. DANDAN, CE
TWG Member

JUDY A. LIM-PASMAN, LLB
TWG Member

MICHAEL G. GABALES, REE
TWG Head

Recommending Approval:

ROGELIO A. BESANA JR., CE, RMP
Manager A - Engineering and Construction Dept.

Approved:

ARN B. GELLANGARIN, PME
General Manager A