TECHNICAL SPECIFICATIONS

FOR

SANITARY/PLUMBING WORKS

PROPOSED MULTI-PURPOSE CENTER
CITY OF BORONGAN, EASTERN SAMAR

SEPTEMBER 2015

RNFA
RN FERRER & ASSOCIATES, Inc.

PROPOSED MULTI-PURPOSE CENTER
City of Borongan, Eastern Samar

DIVISION 15A PLUMBING WORKS

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SECTION 15400 - GENERAL PROVISIONS

1.0 GENERAL CONDITIONS:

All sections under this Division shall be subject to the requirements of the Architect's General Conditions - UAP Doc. 301 and Section 15400 of these specifications.

2.0 GENERAL DESCRIPTION:

The work to be done under this Division of the Specifications consist of the fabrication, complete in all details, of the Plumbing Works, at the subject premises, and all work and materials incidental to the proper completion of the installation, except those portions of the work which are expressly stated to be done by Others. All work shall be in accordance with the governing Codes and Regulations and with the Specifications, except where same shall conflict with such Codes, etc., which the latter shall then govern. The requirements in regard to materials and workmanship specify the required standards for the furnishing of all labor, materials and appliances necessary for the complete installation of the work specified herein and indicated on the drawings. These specifications are intended to provide a broad outline of the required installation, but are not intended to include all details of design and construction.

3.0 WORK INCLUDED:

Under this Division of the Specifications, provide all materials and equipment and perform all the work necessary for the complete execution of all the Plumbing Works as shown on the Plumbing Drawings, and on the General Construction Drawings, as herein specified, or both, except as otherwise excluded, and which without excluding the generality of the foregoing, shall include but not be limited to the following principal items of work:

A. Roof and second floor drainage piping.

B. Soil, waste, drain and vent pipe systems within the building.

C. Septic tank, sanitary piping and connections to the septic tank and leaching pit.

D. Cistern, elevated tank, transfer pump and cold water supply and distribution pipes to fixtures, equipment and hosebibbs including all valves.

E. Deepwell system: bored hole, submersible pumps, controls and transmission pipes (including valves) to the cistern tank.

F. Supply and installation of all floor drains.

G. Pipe supports and hangers.

H. Leakage test for drains, waste and venting system.

I. Testing for pressure and leakage of all water pipelines.

J. Disinfection of all cold water distribution systems.

K. Painting of exposed piping and equipment.

L. Securing of and payment for all permits and licenses as required.

M. Preparation and submittal of as-built drawings.

If anything has been omitted in any item of work or materials usually furnished, which are necessary for the completion of the Plumbing Work as outlined herein before, then such items must be and are hereby included in this Division of the Work.

4.0 WORK NOT INCLUDED:

The following principal items of work will be done under other Divisions of these specifications or will be supplied and installed by others:

A. Pumping, shoring, general excavation and backfilling (General Contractor).

B. Painting, except as required by the Plumbing Code and these Specifications under Section 15410.

5.0 CODES, INSPECTION, PERMITS AND FEES:

A. The work under this contract is to be installed according to the latest codes, ordinances and requirements of the following:

Uniform Plumbing Code
Fire Code of the Philippines
Requirements of Local Code

Nothing contained in these specifications or shown on the drawings shall be construed as to conflict with National and Local Ordinances or Laws governing the installation of Plumbing Work, and all such laws and ordinances are hereby made part of these specifications. The CONTRACTOR is required to meet the requirements thereof.

B. Codes and standards of following organizations other than mentioned above are referenced in this Division:

1. American Society for Testing and Materials (ASTM)
2. American Water Works Association (AWWA)
3. U.S. Federal Specifications (FS)
4. National Fire Protection Association (NFPA)
5. National Electrical Manufacturers Association (NEMA)
6. Underwriters' Laboratories (UL)
7. International Organization for Standardization (ISO)
8. American National Standards Institute (ANSI)
9. Uniform Plumbing Code by IAPMO

C. All construction permits and fees required for this work shall be obtained by and at the expense of the CONTRACTOR. The CONTRACTOR shall furnish the CONSULTANT and the Owner final certificates of inspection and approval from the proper government authorities after the completion of the work.

D. Approval from authorities of all plans for construction shall be secured by the CONTRACTOR.

6.0 AS-BUILT DRAWINGS:

A. The CONTRACTOR shall have an available set of contract plans and specifications at the site for the accurate recording of works as actually installed during the progress of the work.

B. The CONSULTANT will furnish the CONTRACTOR at cost a complete set of electronic files on which he shall indicate all changes and revisions. Copies of these electronic files, indicating such changes and revisions, shall be submitted to the CONSULTANT together with the requests for progress billings.

C. Upon completion of work, the CONTRACTOR shall submit three (3) copies of the as-built drawings, signed and dry-sealed by the Contractor's registered Professional Sanitary Engineer, indicating the work as actually and finally installed, including new information not originally shown in Contract Drawings, to the CONSULTANT for approval as to conformance with the design concepts and compliance with pertinent Code provisions. The CONTRACTOR shall also submit three (3) sets of operating and maintenance instructions, equipment and parts lists for approval.

After such approvals, the CONTRACTOR shall submit the CADD-generated as-built originals, three (3) sets of prints and two (2) sets of electronic files to the CONSULTANT, as well as three (3) sets of operating and maintenance instructions, equipment and parts lists, including addresses of manufacturers or suppliers of major equipment and materials.

D. Approval of the as-built drawings by the CONSULTANT shall be a requirement for final acceptance of the completed works and of final payment.

7.0 <u>SHOP DRAWINGS, SAMPLES, AND OTHER SUBMITTALS</u>:

A. The CONTRACTOR shall submit to the CONSULTANT, for approval, detailed shop drawings of all equipment and all material required to complete the project, and no material or equipment may be delivered to the jobsite or installed until the CONTRACTOR has in his possession the approved shop drawings for the particular material or equipment. The shop drawings shall be complete as described herein. The CONTRACTOR shall furnish five (5) copies of the submittals.

B. Prior to the delivery of any material to jobsite, and sufficiently in advance of requirements to allow ample time for checking, submit for approval detailed, dimensioned drawings or cuts, showing construction, size, arrangement, operating clearances, performance characteristics and capacity. Each item of equipment proposed shall be a standard catalog product of an established manufacturer and of equal quality, finish, and durability to that specified.

C. Samples, drawings, specifications and catalogs, submitted for approval, shall be properly labeled indicating specific service for which material or equipment is to be used, section and article number of specifications governing, CONTRACTOR's name and name of job.

D. Catalogs, pamphlets, or other documents submitted to describe items in which approval is being requested, shall be specific and identification in catalog, pamphlet, etc. of item submitted shall be clearly made in ink. Data of general nature will not be accepted. Approval rendered on shop drawings shall not be considered as a guarantee of measurements of building conditions. Where drawings approved, said approval does not mean that drawings have been checked in detail; said approval does not in any way relieve the CONTRACTOR from his responsibility or necessity of furnishing material or performing work as required by the contract drawings and specifications.

E. All drawings, etc. shall be submitted sufficiently in advance of field requirements to allow ample time for checking. Failure of the CONTRACTOR to submit shop drawings in ample time for checking shall not entitle him to an extension of contract time and no claim for extension by reason of such default will be allowed.

F. The CONTRACTOR shall prepare and submit for approval the following:

1. Dimensional layout drawings of all pumping systems and tapping to existing systems.

2. Plan and profile of storm drainage lines at the outside facilities showing the invert elevations of pipes and manholes and connection to existing utilities.

3. Dimensional drawings of any deviations of plumbing layout from the plans.

4. Manufacturer's catalog sheets, marked as necessary to indicate materials or equipment being furnished for the following items:

a. Pipe supports and sleeves
b. Plumbing fixtures, trims and accessories
c. Valves, all types supplied for the project
d. Drains: deck, roof and floor
e. Controls, magnetic starters, pressure switches, etc.
f. Flexible couplings
g. All pumps including accessories complete with technical data

6. List of miscellaneous materials proposed, including pipe, fittings, valves, etc., identifying manufacturer and type.

7. Field test reports

8. Such other similar information as the CONSULTANT may require.

8.0 <u>COORDINATION</u>:

A. Coordinate timing of installation with work of other trades.

B. Systems provided shall be complete and operable, and shall include required accessories, fastenings, and supports. Provide one coat of red lead primer for all fastenings and supports.

C. Determine required location, arrangement and quantities of equipment and materials from drawings, schedules and specifications.

D. All equipment shall be installed in strict accordance with manufacturers' recommendation.

E. Certain items of equipment specified in other contracts require plumbing connections. CONTRACTOR shall provide such connections as required.

9.0 MINOR MODIFICATIONS:

The plans as drawn are based upon architectural plans and details and show conditions as accurately as it is possible to indicate them in scale. The plans are diagrammatic and do not necessarily show all fittings, etc., necessary to fit the building conditions. The locations of valves, fittings and fixtures shown on the plans are approximate. The CONTRACTOR shall be responsible for the proper location in order to make them fit with architectural details and instructions.

10.0 GUARANTEE:

A. The CONTRACTOR shall guarantee that the Plumbing System is free from all defective workmanship and materials and will remain so for a period of one (1) year from date of acceptance of the work. Any defects, appearing within one (1) year shall be remedied by the CONTRACTOR at his own expense.

B. The CONTRACTOR shall indemnify and save harmless the OWNER, the CONSULTANT from and against all liability for damages arising from injuries or disabilities to persons or damage to property occasioned by any act or omissions of the CONTRACTOR or any of his Subcontractors, including any and all expenses, legal or otherwise which may be incurred by the OWNER and the CONSULTANT, in the defense of any claim, action or suit.

11.0 APPROVAL, SUBSTITUTIONS, ETC.:

Wherever hereinafter the words "for approval", or "approved" (make, type size, arrangement, etc.) are used, especially in regard to manufactured specialties, etc., or wherever it is desired to substitute a different make or type of apparatus for that specified, all information pertinent to the adequacy and adaptability of the proposed apparatus, shall be submitted to the CONSULTANT, and their approval secured before the apparatus is ordered or installed.

12.0 ACCEPTANCE TESTS:

A. Test requirements laid out in Section 15410 shall be performed prior to approval of the work.

B. Isolated Leak Tests or partial pre-test of areas may be performed prior to installation of ceiling materials or storage of materials in the area to preclude any damage threat during total system final tests.

13.0 SUBCONTRACTS, ETC.:

The CONTRACTOR shall be held fully responsible for the work of any Subcontractor or manufacturer performing work for or supplying materials from, as it is intended that the entire Plumbing Work, when finally delivered to the Owner, shall be ready in every respect for satisfactory and efficient operation.

14.0 WORKMANSHIP:

The work throughout shall be executed in the best and most thorough manner to the satisfaction of the Architect and the CONSULTANT who will jointly interpret the meaning of the Drawings and Specifications and shall have power to reject any work and materials which in their judgment are not in full accordance therewith.

The CONTRACTOR shall assume responsibility and shall provide the services of a qualified Engineer to supervise the complete installation of equipment who shall be available for conducting the final acceptance tests as stated under Section 15410 of the specifications.

SECTION 15410 - BASIC MATERIALS AND METHODS

SECTION INDEX

1.0 REFERENCE:

Requirements of Section 15400 apply to all work under this Section.

2.0 GENERAL:

A. Coordinate exact location of piping and equipment with CONSULTANT before installation.

B. Requirements as to pipe chases, etc., are as indicated on the drawings. Any variation of these, request the other Contractors to notify the CONSULTANT in writing before work shall commence.

C. Where materials are not specifically described, they shall be of a kind best adapted to the purpose for which they are used and shall be subject to the approval of the CONSULTANT.

D. The materials required for construction work shall be stored where directed, adjacent to construction work, and in such manner as not to interfere with storage of materials of other Contractors.

E. The CONTRACTOR shall be responsible, before commencing work, for checking all drainage levels and gradient shown on drawings and for relating them to site conditions to ascertain that conditions on site permit execution of work as shown on drawings.

F. The CONTRACTOR shall locate all valves, traps, and similar items where they are easily accessible for operation, inspection, and repair.

G. The CONTRACTOR shall run all drain pipes with a minimum fall as indicated on drawings and shall give horizontal antisyphon and ventilating pipes at corresponding upward gradient toward mains.

3.0 EXCAVATION AND BACKFILL:

A. Trench Excavation:

1. Excavate trenches for all underground pipe lines to the required depth and grades.

2. Pipe Bedding Material:

   a. Clean gravel or crushed rock covered with sand cushion.

   b. Compact by slicing with shovel.

   c. Trench bottoms carried below required grade: backfill to proper elevation with pea gravel or crushed rod before covering with sand cushion at no additional expense to the Owner.

   d. Where rock is encountered, excavation shall extend to a depth 152mm below the pipe bottom and before pipe is laid, the space between the trench bottom and the pipe should be filled with the approved bedding materials.

3. Remove all loose stones or other foreign materials from trench bottom.

4. Maximum trench width at top of pipe: Outside diameter of pipe plus 609mm Keep entire trench width as narrow as possible.

5. Provide bell holes at each pipe joint so that pipe will rest on well tamped solid ground for its entire length.

6. Provide suitable access completely around circumference of pipe for proper jointing operations as required; excavate sides of trench, if necessary, to provide satisfactory access.

B. Underground Obstructions:

1. The CONTRACTOR shall verify and take cautions on known underground piping, foundations, or other underground obstructions in the vicinity of construction.

2. If objects not shown on plans are encountered in area of new construction, remove, relocate or perform extra work as directed by the CONSULTANT.

C. Dewatering:

1. Furnish, install, operate and move dewatering equipment necessary to drain and keep excavation free of water under all circumstances.

2. Obtain CONSULTANT's approval on proposed method of dewatering.

3. Prevent surface water from flowing into excavations; promptly remove any water accumulated.

D. Shoring and Bracing:

1. Provide shoring and bracing where required to hold walls of excavation.

2. Remove shoring and bracing in manner to avoid damage or disturbance to work.

E. Backfill:

1. Material:

a. Backfill trench with selected material obtained from the excavation after completion of work therein. Use best earth fill materials obtained from excavations approved by the CONSULTANT; provide additional fill material as required for construction; match existing acceptance fill material.

b. Exclude debris, large stones, rock, roots or organic material, and other deleterious material.

2. Placing:

a. Place approved backfill material in successive horizontal layers not more than 152mm in loose depth.

b. Place cohesive material at proper moisture content for obtaining density as specified hereinafter.

c. Place sandy material in completely dry or completely saturated condition to prevent bulking.

3. Compaction:

a. Compact backfill from trench bottom up to pipe centerline and all backfill within building outlines.

b. Use appropriate compaction methods as necessary to obtain required compaction desired. Generally, compact cohesive material by rolling and/or mechanically tamping and granular material by flooding and/or mechanically vibrating. Obtain CONSULTANT's approval of proposed methods.

4. Backfilling Trenches:

a. Do not backfill until piping has been tested, inspected and approved by the CONSULTANT.

b. Backfill simultaneously on both sides of pipe to prevent displacement.

F. Disposal of Excess Material: Remove excess excavated material from site at CONTRACTOR's expense.

G. Surface Restorations:

1. Restore existing surface disturbed in performing work, including concrete/asphalt pavement, seal coat surfaces and gravel surfaces.

2. Restore surfaces to original condition using same type of materials.

4.0 PIPING, GENERAL:

A. Where American standards are not specified, other approved national or local standards may be acceptable, provided copies of these standard specifications are forwarded to the CONSULTANT for his written approval.

B. Deviation from Piping Specifications:

1. If pipe wall thickness specified is not available, use next heavier wall thickness.

2. General: Specific deviations from the requirements of the drawings may be requested by the CONTRACTOR. Such requests may be accompanied by a complete design analysis which demonstrates equivalent performance characteristics and compliance with the requirements of the plumbing or other applicable codes. All deviations shall be subject to review and approval by the CONSULTANT.

3. Submit to the CONSULTANT, for approval, design computations based upon design conditions for pipings as stated on drawings.

5.0 PIPING MATERIALS:

A. Soil, Waste and Vent Pipes:

1. Pipes: Unplastized Polyvinyl Chloride (uPVC) pipes conforming to ASTM D-2729 and/or ISO/DIS4435 and ISO/DIS3633.

2. Fittings: Moulded

3. Joints: Solvent cement conforming to ASTM D-2564 and/or elastomeric ring confirming to ASTM F477.

B. Storm Drainage Pipes:

1. Downspouts and Condensate Drain Pipes: As described in Sub-section 5.0.A.

2. Concrete Pipes:
    a. Re-inforced Pipes: ASTM C 76M, Class II, IV or ASTM c 655, D-Load
    b. Non-reinforced Pipes: ASTM C 14M, Class [1] [2] [3]
    c. Cast-in-Place Non-reinforced Pipes: ACI 346/346R, except that testing shall be the responsibility of and at the expense of the CONTRACTOR. In case of conflicts between ACI 346/346R and project specifications, requirements of ACI 346/346R shall govern.

C. Cold Water Pipes:

1. For pipes running outside the buildings and exposed to weather:
    a. Pipes: Galvanized iron pipes, Schedule 40, conforming to ASTM A120. When buried underground, apply two (2) coats of tar and wrap with jute cloth thoroughly soaked in tar or asphalt.
    b. Fittings: Malleable iron
    c. Joints:
        1) Flanged: 64mm and larger
        2) Screwed with Teflon tape: 51mm and smaller
    d. Pressure Rating: 1,034 kPa
    e. Valves:
        1) Screwed: Bronze ASTM B62, 862 kPa pressure class, screwed-in bonnet with bronze or composition internals.
        2) Flanged: Cast iron ASTM A126, 862 kPa pressure class, bolted bonnet, renewable bronze internals and trim.

2. For pipes running inside the buildings:
    a. Pipes: Unplasticized Polyvinyl Chloride (uPVC) pressure pipes, Class 150, conforming to ASTM D-2241 and/or ISO/DIS 4422.
    b Fittings: Moulded
    c. Joints: Solvent cement conforming to ASTM D-2564 and/or elastomeric ring conforming to ASTM F477.
    d. Pressure Rating: 1,034 kPa
    e. Valves: As described in Subsection 5.0.D.1.e

6.0 SOIL AND WASTE SYSTEM:

A. Furnish and install cleanouts in following locations:

1. At point where sewer enter the building.

2. Near base of each vertical stack, at each change in direction, and at intervals not greater than 15 meters in each horizontal run.

3. Where shown on drawings and where required to conform to applicable codes and to permit rodding or testing of the system.

B. Cleanouts: Soil and Waste Pipes

1. Drawing Designation: C. O.

2. Manufacture: Same manufacturer for soil and waste pipes.

C. Cleanout Cover: Furnish and install covers for all floor and wall cleanouts suitable for the floor and wall finishes.

7.0 FITTINGS - GENERAL:

Material, wall thickness and pressure class: As specified in "Piping Materials", this Section.

8.0 PIPE FLANGES:

Steel flanges mating with cast iron flanges or steel equipment flanges shall have same facing as mating flange.

9.0 UNIONS:

Unions shall be provided where required for disconnection. Unions shall be galvanized malleable iron zinc coated.

10.0 VALVES - GENERAL:

A. All valves shall be of same manufacture for each class of piping and insofar as possible for the entire project. Valves shall be of Crane, Kitz, Keystone or Nibco. Adopt PPR valces for PPR piping system.

B. Gate, globe and angle valves: Type permitting repacking under pressure when wide open.

C. Provide special tools required for repacking and disassembling valves provided.

D. Globe valves may be used in place of gate valves where approved by CONSULTANT.

E. Valves shall bear manufacturer's permanently affixed stamp or tag indicating manufacturer, catalog number, pressure and temperature rating.

F. Valve ends:

1. Steel Valves: Welded, except where flanges are shown on drawings. Butt-welded for sizes 64mm and larger; socket weld for 51mm and smaller.

2. Cast Iron Valves: Flanged for sizes 64mm and larger; screwed for sizes 51mm and smaller.

3. Bronze Valves: Screwed

G. Furnish all valves and accessory materials necessary for piping not shown on drawings as follows:

1. Vents and drains for equipment to which piping connections are made and to equipment installed under this contract.

2. Connections to metering instruments and controls including pressure gages, thermometers, controllers, traps and appurtenances required for proper functioning of instruments and controls.

3. Temporary valves and accessories required for placing equipment into initial service.

4. Piping 51mm and smaller required for proper operation of piping system and equipment, including drain valves required to drain all low points in piping; no additional compensation will be allowed for drain valves 51mm and smaller and not exceeding 2,067 kPa, 136.36 kg. pressure classification.

H. Stem Arrangements:

1. Steel valves and cast-iron valves: Outside screw and yoke with rising stem, except as noted otherwise in "Pipe Materials", this Section.

2. Bronze valves 51mm and smaller: Inside screw and rising stem, screwed bonnets.

3. Non-corrosive stem finish on all valves handling steam or water.

I. Gate Valve Discs: Solid or flexible single disc wedge type.

J. Valve Seats:

1. Globe valves: Renewable all sizes except forged steel and high pressure cast steel valves where manufacturer's standard is integral seats.

2. Gate valves: Renewable seats all valves 64mm and larger.

11.0 <u>VALVE OPERATORS AND VALVE ACCESSORIES</u>:

A. Provide (standard wheel) operators for globe and gate valves.

B. Provide floor stands and other special devices where specified or noted on drawings for proper operation. Floor stands shall have flanged faces for bolting to floor or platforms.

C. Provide extension stems, universal joints, stem guide bearings, and other accessories required to locate floor stands in convenient location without interference with other equipment, piping or building parts.

D. Provide supports as necessary to support floor stands mounted on grating platforms.

E. Where floor stand operates valve through reducing gears, floor stand indicator shall be coordinated with valve position for full valve travel.

12.0 <u>VENT AND DRAIN VALVES</u>:

A. Provide vents at high points and drains at low points of all water piping.

B. Vent valves: 6mm globe

C. Drain valves:

1. Concealed piping and exposed piping in finished spaces: 13mm hose bibb

2. Piping 51mmand smaller: 13mm globe

3. Piping 64mm through 127mm : 19mm globe

4. Piping 152mm and larger: 32mm globe

D. Route discharge from vent and drain valves, except hose bibbs, to nearest floor or equipment drain.

13.0 PLUG VALVES:

A. Type: Gun-lubricated, tapered plug with wrench-operated shanks.

B. Provide one operating wrench for each valve.

C. Valves shall have visual indication of valve position.

D. Valve shall have cast-iron body, bronze plug with waterproof housing for buried service.

14.0 CHECK VALVES:

A. For Cold and Hot Water Distribution Systems:

1. 76mm and larger:
   a. General: Guided spring, silent check, bronze mounted iron body.
   b. 76mm to 254mm: Wafer type

2. Smaller than 76mm: Swing check with hinged disc; bronze body and composition.

B. For Discharge Pipes of All Pumps:

1. Type: Ball check valve (Flygt HDL Type 2016 or approved equal).

2. Body: Cast-iron ASTM A159, Class 35

3. Flange Drilling: ANSI B16.1, Class 125 flat-faced bolt holes straddle centerline.

4. Ball: Hollow steel with vulcanized nitril rubber.

5. Sinking Type: SP.GR. greater than 1

6. Working Pressure: 1034 KPa (150 psig) maximum.

7. Temperature: 85°C (185°F) maximum

15.0 FLOAT VALVES:

A. Type: Non-modulating similar to Clayton Model 124-01.

B. Float Control Assembly: Brass housing and linkage with stainless steel and mobile working parts. Steel bracket and counterweight.

C. Float: Non-corroding plastic, 136mm diameter.

D. Float Rod: Two (2) 305mm sections of stainless steel.

E. Main Valve:

1. Size: Globe or angle, 102mm dia. flanged
2. End Details: Flanged, cast-iron 125, ANSI B-16.1
3. Pressure Ratings: 125 Class, 1,207 kPa
4. Temperature Range: Water to 82°C maximum
5. Materials:
   a. Main valve body and cover: Cast-iron ASTM A48
   b. Main valve trim: Stainless steel 303
   c. Pilot control system: Bronze ASTM B62 with stainless steel 303 trim.
   d. Rubber Parts: Buna N Synthetic rubber.

16.0 BALL VALVES:

A. May be used in place of gate or globe valves 76m and smaller indicated on services with design pressures of 1,034 kPa or less and design temperatures of 104°C or less.

B. Bronze, brass or cast iron body with Buna-n seat or seal.

C. Bronze or stainless steel ball with full size port.

D. Provide lever operator with position dial indicator.

17.0 DRAINS:

A. Floor Drains:

1. Designation on Drawings: F. D.
2. Manufacturer: Metma or approved equal
3. Model: M-200 with Type D Strainer
4. Type: Cast-iron body with chrome or brass- plated strainers for AHU, Machine and Pump Rooms. Cast-iron body with stainless steel or nickel plated strainer for toilets, corridors and other areas.
5. Size: Noted on drawings; same size as connecting pipe.
6. Provide floor drains at toilets and pump rooms.

B. Roof Drains:

1. Drawing Designation: RD
2. Manufacturer: Metma or approved equal.
3. Model: Similar to Metma M-319-58

4. Type: Prefabricated stainless steel wire basket strainer. Strainer shall have an available inlet area above roof level of not less than 1-1/2 times the area of the connecting pipe.
5. Size of Pipe: Drain size same as connecting pipe.

18.0 MANHOLE COVER:

A. Sewer Manhole:

1. Drawing Designation: S
2. Manufacturer: Metma
3. Model: M-469

B. Water Tank Manhole:

1. Drawing Designation: M
2. Manufacturer: Metma
3. Model: M-440

19.0 FLEXIBLE CONNECTORS:

A. Flexible couplings with flange ends shall be provided for riser pipes passing across seismic gap and pumps suction and discharge lines as indicated on the plans.

B. Flexible pipe grooved coupling shall have a rated working pressure of 1,207 kPa

C. Material:

1. Steel Piping: T321 stainless steel or high grade reinforced rubber construction with steel ring reinforced.

2. Copper Piping: Grade E phosphor bronze hose and signal bronze braid.

D. Pressure and temperature rating: Same as connecting pipe unless otherwise noted on drawings.

E. Location: Where shown on drawings.

F. Flanges: Same as connecting pipe; use split metal retaining rings between pipe flange and rubber.

G. Manufacturer: Mercer Rubber Company, Flexonics Division of Calumet and Hecla or approved equal.

H. Submit brochure or sample and installation drawing for approval.

20.0 SHOCK ABSORBERS:

Shock absorbers shall be air chambers, one size bigger than the size of supply pipe and not be less than 305m long; install at fixture connections and other points necessary to eliminate water hammer.

21.0 PLUMBING WORK SUPPORTS:

A. Types required or acceptable:

1. As applicable for the service.

2. All parts in contact with copper piping shall be copper plated; parts in contact with galvanized piping shall be galvanized or cadmium plated.

3. Hanger for all piping shall be selected and located by pipe hanger manufacturer except as detailed on drawings.

B. Maximum working loads: Not greater than manufacturer's ratings, based on safety factor of 5.

C. Spacing:

1. Limit sag of pipe between supports to permit draining.

2. Limit bending stress in pipe to maximum values allowed by ANSI "Code for Pressure Piping"; provide additional supports at valves and other concentrated loads.

3. Horizontal runs of pipe shall be hung with adjustable hangers spaced not over 3 meters apart, except hub-and-spigot pipes which shall have hangers spaced not over 152 meters apart and located near the hub. For polyvinyl chloride pipes, hangers shall be provided not over 152 meters apart.

D. Adjustment:

1. All hangers shall be arranged for adjustment of load and pipe elevation after installation.

2. All adjustable member shall be provided with suitable locking features.

E. Auxiliary Members:

1. Provide all auxiliary structural steel members required for supporting and anchoring pipe and accessories.

2. Perform all work required to fasten auxiliary members to building structure.

F. Provide dielectric isolation for copper piping hangers. Electric tape isolation will not be allowed.

G. Hangers for piping to receive anti-sweat insulation shall be arranged to support piping at outer surface of insulation.

1. Provide insulation shields at hanger points to distribute load on insulation: loading shall be not greater than 345 kPa on insulation, based on horizontal projected area of shielded under pipe.

2. Install hangers with shields in place, with pipe held in position by temporary blocking which will be removed by insulation trades.

H. Sway bracing:

1. Provide for all vertical runs of piping longer than 10 meters.
2. Provide at other locations as required to prevent excessive movement or vibration.
3. Bracing shall not interfere with thermal movement of piping.

I. Anchors:

1. Location, magnitude and direction of primary loads as shown.
2. Design to totally restrain piping; allow for lateral forces and cooling below installation temperature.
3. Minimum safety factor of 5.
4. Arrangement and attachments subject to approval.

J. Submit marked set of piping drawing showing mark number and exact location of spring hangers, anchors, guides and sway braces, and approximate location of random hangers. Contractor shall submit copies of these drawings with individual hanger drawings for CONSULTANT's review. Each drawing, when complete, shall show locations of all pipe hangers in that area. Contractor shall be supplied with one set of transparencies for this purpose.

K. Design hangers for as near zero reaction on equipment as possible.

L. Provide details or all anchors, guides, and sway braces required.

22.0 <u>PIPING INSTALLATION</u>:

A. General:

1. Parallel to building lines and other piping.
2. Install essentially as shown; modify as required to clear building structure and openings, lights, ducts, and other services.
3. Piping, including instrument tubing, shall not be run exposed in finished spaces except where shown otherwise.
4. Provide sufficient unions and flanged connections to permit dismantling and removing equipment for maintenance, whether or not so shown on drawings.

B. Spacing: adequate to permit installing insulation, servicing valves and specialties, and replacing sections of pipe.

C. Pipe Grade:

1. As shown on drawings.
2. Where not shown:
   a. Soil and waste pipes 102mm and larger: 1% minimum.
   b. Soil and waste pipes smaller than 102mm: 2% minimum.
   c. Storm drainage pipes: 0.5% minimum.

23.0 PIPE SLEEVES:

A. Provide sleeves for all piping passing through building structure, except where otherwise shown on drawings.

B. Materials: Above grade: steel pipe, sheet steel not lighter than 16 US Standard gage, or fiber with 6mm minimum wall thickness.

C. Installation:

1. Clearance: sleeves through footings shall provide 13mm clearance between pipe and sleeve. Sleeves for other piping shall provide a minimum of 13mm clearance between sleeve and pipe or outer surface of insulated pipe. Sleeve sizes shall, in all cases, be adequate to accommodate pipe movement caused by thermal expansion.

2. Install sleeves 6mm above finished floors, flush with walls and ceiling.

3. Coordinate sleeve installation with the works of other trades.

D. Sleeve closures and covers:

1. Exterior walls below grade and slabs on grade: caulked joint; oakum and minimum 25mm pipe jointing epoxy A and B compound.

2. Roofs and exterior walls above grade: flash in accordance with drawings.

3. Sleeve ends in finished spaces:
   a. Escutcheon, split type with concealed hinge, chromium plated.
   b. Size: completely cover sleeve.
   c. Fit closely to building surface; allow for raised end of floor sleeves.
   d. Allow free thermal movement of pipe.

4. Finished spaces are considered to be any space not concealed by a ceiling or within a machine room space.

24.0 VALVE INSTALLATION:

A. Install all valves with stems horizontal or above.

B. Where possible, locate valves for convenient operation from floors.

C. Install as recommended by manufacturer to prevent distortion of body.

D. Remove bonnets from solder end valves during installation.

E. Tighten all valve glands as work is erected and again as required after placing in service.

F. Replace any gland packing which is determined to be in deteriorated or unsatisfactory condition.

25.0 PIPE JOINTS AND JOINING METHODS:

A. Welding:

1. Metallic arc process, in accordance with codes for pressure piping.

2. Shielded arc or coated electrodes specifically designed for pipe materials; standard ASTM A233 on carbon steel pipe.

3. Use only one welding operator on each joint.

4. Thoroughly grind or wire brush each weld pass and remove all welding slab and defective material before next pass is applied.

5. Welds shall be neat; remove excessive spatter by chipping or grinding.

6. Welding operator shall stamp pipe adjacent to weld with his identifying symbol; submit list of symbols used on job with corresponding operator names.

B. Threaded Joints:

1. Thread type: ANSI B2.1 or applicable British Standard, where required, taper pipe thread.

2. Clean-out threads; ream pipe ends and remove all burrs.

3. Apply suitable lubricating, non-corrosive, flexible pipe joint compound to male threads only.

C. Other joints and jointing methods: In connection with piping materials specified herein.

D. Flanged joints:

1. Make up all flanges prior to completing last weld in connecting piping; alignment of piping shall be correct without forcing or drifting except for cut short indicated on drawings.

2. Coat all bolt threads with a suitable lubricant, Crand "Anti-Sieze" thread compound, or approved equal.

3. Make-up joints having "Flexitallic" type gaskets by raking up bolts until flange faces touch gage rings; re-tighten to same position after piping warm-up.

4. After piping has been heated to operating temperature for 48 hours, recheck bolting to restore initial bolt tension.

5. Flange gaskets: 1.7mm

26.0 PAINTING AND EQUIPMENT IDENTIFICATION:

A. Pipe painting shall be required after installation and test. Before the installations of ceiling fixtures or boards, all piping shall be painted with two coats of gloss quick drying enamel. Color code shall comply with ANSI standards A13.1 or as required in this Section or by the CONSULTANT.

B. Identify all piping and equipment as herein specified.

C. Contractor shall submit list of proposed wording for identifying pipe connections and equipment unless wording is specified herein. Add identification of nominal conditions (pressure, temperature, etc.).

D. Apply only after all insulating and painting is complete.

E. Markers:

1. Type: self-sticking markers indicating contents of pipe, or signboards which shall be made of GA14 B.I. sheet with baked enamel finish paint and letter instructions as shown on the plans. Additional signboards as may be required and not specified herewith shall be furnished at no extra costs. Signboards shall be mounted on the equipment or wall nearest the equipment unobstructed for easy identification and reading.

2. Lettering:

   a. Size: use 51mm high letters for pipes with outer covering 76mm diameter or larger; use 25mm high letters for pipes with outer covering smaller than 76mm diameter.

   b. Lettering subject to approval.

3. Color code: yellow with black lettering.

F. Directional arrows:

1. Same color as identification markers.
2. Locate at each identification marker.
3. Point away from identification marker and in direction of flow.

G. Banding:

1. Type: self-sticking tape, 38mm wide.
2. Same color as background of identification markers when used.
3. Apply completely around pipe to anchor each end of each marker.

H. Location:

1. Use markers and directional flow arrows within equipment rooms and tunnels.
2. Use color coded banding on pipe concealed within ceiling.
3. Each 15m interval on long continuous lines.
4. Intersections with chases and shafts.

I. Banding color code:

Service	Color Code
Cold Water Pipes	Blue with white band at 1.00 O.C.
Sewage Pipes	Black with red band
Vent Pipes	Green
Storm Sewer Pipes	Black with green band

J. Chart: provide chart of banding code listed above in frame and mounted under suitable plastic cover. Chart shall be mounted where directed by the Engineer.

27.0 VALVE IDENTIFICATION:

A. Tag all valves with brass tags attached in a permanent and neat manner.

B. Tags shall not be less than 25mm in diameter, with black etched numbers 12mm high.

1. Valve numbers shall be in sequential order.

2. Do not duplicate valve numbers.

C. Provide printed valve directory for piping systems; list the following:

1. Each valve number.

2. The associated manufacturer names.

3. Manufacturer's figure or model number.

28.0 PLUMBING WORK TESTING:

A. Field pressure test all pipe lines listed below, except refrigerant lines, at pressure specified by pneumatic or hydrostatic means. The pipe ends may be valved or blanked off and the test pressure shall be maintained a sufficient length of time to permit an inspection of all joints and connections for any leaks or failures.

B. Provision must be made for completely draining a pipe line after hydrostatic testing is completed.

C. Testing of nonferrous piping, plastics, fiberglass reinforced resin and other materials shall be made within the recommended limits of the manufacturer.

D. Test pressures as follows:

Service	Test Pressure	Test Type
Domestic Water	1034KPa	Hydrostatic

E. Provide all pumps, meters, gages, piping, fittings, and accessories, and all labor required to conduct tests.

F. Isolate all equipment which may be damaged by test pressure.

G. Conduct tests prior to insulating, painting and concealing underground or within structure.

H. Replace with new material all pipe, fittings, and equipment which do not pass test, except as specifically approved.

I. All systems shall be subject to inspection while under the test.

J. Test for Storm and Sanitary Drainage and Vent Systems:

1. Water test:

a. The water test shall be applied to the storm and sanitary drainage and vent systems either in its entirety or in sections after rough piping has been installed. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system filled with water to point of overflow.

b. If the system is tested in sections, each opening shall be tightly plugged except the highest opening of the section under test, each section shall be tested with less than 3 meters head of water. In testing the successive sections at least the upper 3 meters of the next preceding section shall be tested, so that no joints or pipe in the building (except the uppermost 3 meters of the system) shall have been submitted to a test of less than a 3 meters) head of water.

c. The water shall be kept in the system or in the portion under test for at least 30 minutes during which time there shall be no drop greater than 102mm.

2. Air Test: The air test shall be made of attaching an air compressor testing apparatus to any suitable opening and after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of 5 pounds per square inch or sufficient to balance a column of mercury 250mm height. This pressure shall be held without introduction of additional air for a period of at least 15 minutes.

3. Finished Plumbing: After the plumbing fixtures have been set and their traps filled with water, the entire drainage system shall be tested and proved gastight. The following test method shall be employed:

a. Final test for gastightness: The final test of the completed drainage and vent system may be either a smoke test or a peppermint test. Where the smoke test is preferred, it shall be made by filling all traps with water and then introducing into entire system a pungent thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof, they shall be closed and pressure, equivalent to 25mm water column, shall be built and maintained for the period of the inspection.

b. Where the peppermint test is preferred, two (2) ounces of oil of peppermint shall be introduced into the roof vent terminal or stack to be tested. The oil peppermint shall be followed at once by ten quartz of hot 71°C or higher water whereupon all roof vent terminals shall be sealed. A positive test, which reveal leakage, shall be the detection of the odor or peppermint at any trap or other point on the system. Oil of peppermint or persons whose clothes have come in contact with oil of peppermint shall be excluded from the test area.

K. The entire cold water distribution system shall be tested one and one-half (1-1/2) times the expected rated pressure or not less than 1035 KPa. The test shall be conducted for a period of fifteen (15) minutes and no leaking will be allowed during and after the test.

L. Drainage and Vent System:

Rough Plumbing: Except for the perforated or open- jointed underdrain tile, the piping of storm and sanitary drainage and venting systems shall be tested upon completion of the rough piping installation by water test and proved watertight. The CONSULTANT may require the removal of any cleanout plug to ascertain if the pressure has reached all parts of the system.

M. After satisfactory completion of pressure tests, all traps, strainers, etc., shall be thoroughly cleansed and flushed before being permanently connected.

N. System shall be put into normal working condition after cleaning operation insofar as possible. All repairs, alterations, adjustments, and readjustments shall be made to meet specified test requirements and to obtain system approval by CONSULTANT.

O. CONTRACTOR shall furnish all tools, equipment, supplies, and labor necessary for making prescribed tests, at his own expense. CONTRACTOR shall also pay all costs of all subsequent tests, until entire system is approved and accepted in writing by the CONSULTANT.

29.0 CLEANING AND PROTECTION:

A. General:

1. Before erection, remove all foreign material from pipe.
2. During construction:
   a. Cap or otherwise protect all exposed finished pipe ends during storage and erection.
   b. Close ends of all partially erected systems.
   c. Remove all temporary preservative coatings from valves and accessories.

B. Upon completion of construction, clean the entire water system using the following procedure in sequence.

1. Hydraulically flush entire system to remove construction debris.
2. Remove and clean all strainers in the system.

C. CONTRACTOR shall be responsible for malfunctioning of equipment due to presence of foreign material in piping. CONTRACTOR shall clean, repair, or replace all malfunctioning of damaged equipment without additional compensation.

30.0 DISINFECTION:

A. The entire system shall be thoroughly flushed and disinfected with chlorine before it is placed in service.

B. Chlorine shall be liquid chlorine or hydrochloride (HTH) and shall be introduced into the water lines in a manner approved by the CONSULTANT.

C. Chlorine dosage shall be provided not less than fifty parts per million (50 ppm) of available chlorine and allowed to stand for 24 hours, after which the system shall be flushed with potable water until the residual chlorine content is about 0.2 parts per million. All valves in the system shall be opened and closed several times during the chlorinating period.

D. The interior of the elevated and underground water tanks shall be thoroughly washed and swabbed with chlorine or hydrochloride solution containing two hundred parts per million (200 ppm) available chlorine and allowed to stand for at least 16 hours, after which the tank shall be flushed with potable water before placing in service.

Before washing and swabbing with chlorine solution, the tank shall be thoroughly cleaned of debris, dirt or dust to the satisfaction of the CONSULTANT.

E. The CONTRACTOR shall furnish and pay for all devices, chlorine materials, labor and power required for disinfection purposes. Disinfection shall be made in the presence of the CONSULTANT.

SECTION INDEX

1.0 REFERENCE:

Requirements of Section 15400 apply to all works under this Section.

2.0 GENERAL:

A. Works included:

1. Supply, installation, testing, and commissioning of all water pumps including motor control centers and motor starters.

2. Supply and installation of power and control wires (including conduits and accessories) from the motor control center or motor starters to the pumps and other monitoring points.

3. Construction and sealing of all civil penetrations.

B. Work not included: Supply and installation of power wires and conduits from the source to the first disconnect, motor starters or motor control center.

3.0 PUMPS:

A. Transfer Pumps:

1. Designation on Drawings: TP-1and TP-2

2. Manufacturer: EIM, PACO or approved equal.

3. See Pump Schedule for details of units.

4. Type: Submersible, non-clog, simplex type.

5. Pump Construction:

a. The volute casing, impeller and motor enclosures shall be cast iron.

b. The motor shaft on which the impeller is mounted shall be stainless steel.

c. The impeller shall be slip-fit to the shaft, key-driven and attached with stainless steel fasteners.

d. All electrical parts shall be housed in an air-filled water-tight enclosure.

e. Tandem lapped-face seals shall be provided on the rotating motor shaft. The inner seal shall operate in a sealed, oil-filled chamber containing two moisture sensing probes, capable of detecting any influx of conductive liquid past the outer seal. The probes shall be connected to a relay and signal device in the pump control panel, providing the operator with an indication of impending seal failure.

f. The pump supplier, with the assistance of the CONTRACTOR, shall check, test and start each pump.

6. Accessories:

   a. Liquid level control, electrode type to be located inside the underground water tank respective to service.

   b. Alternator, electrically operated for sequencing alternate operation of the pumps.

   c. Combination circuit breaker and starter.

7. Mode of Operation: Two pumps shall be on duty operating alternately or one pump shall be a standby pump.

4.0 MOTOR:

A. General:

1. Motors shall be furnished with driven equipment to assure proper coordination of motor and control characteristics with requirements of driven equipment. Contractor is responsible for proper correlation of horsepower, starting torque, other characteristics of electrical equipment, with requirements of driven equipment.

2. Conform with NEMA Standard No. MG1 entitled "Motors and Generators, Induction Machines in General and Universal Motors".

3. Conform with the latest ANSI Standard for Alternating-Current Induction Motors, Induction Machines in General and Universal Motors".

4. All necessary accessories essential to the proper operation of the motor and the driven equipment shall be provided.

5. Torque and speed characteristics: Suited to requirements of driven equipment, including gear reducers if specified.

6. Maximum speed:

7. Horsepower:

   a. Motor hp rating specified shall be nameplate rating without consideration of motor service factor.

   b. Nameplate hp not less than hp required by driven equipment operated at maximum conditions specified.

8. Duty: Continuous

9. Service factor: 1.15

10. Accessories: Lifting lugs as required

11. Motors: Specified as 230V, single-phase may be designed for single or dual voltage in accordance with manufacturer's standard for horsepower and speed required.

12. Frequency: 60 Hz.

B. Enclosures and Insulation: Open drip-proof 40°C ambient, continuous duty, 1.15 service factor.

5.0 MOTOR CONTROLLERS:

A. Applications:

1. For motors above 20 hp: Combination circuit breaker, reduced-voltage, closed-circuit transition magnetic starter, NEMA 1A enclosure.

2. For 1/6 hp thru 20 hp motors: Combination circuit breaker and across-the-line magnetic starter, NEMA 1A enclosure.

3. Motors below 1/6 hp, 230V, 1 phase: Manual type with overload protection NEMA 1.

B. Starters:

1. Type:

a. Magnetic - 380V, 3-phase and 230V, 1 phase, provide separate control wiring at 24V.

b. Manual - 230V, 1 phase

2. All starters for separate mounting will be installed under Division 16 (by the Electrical Contractor).

3. Size and Rating: UL approved or listed and NEMA standards.

4. Overload Relays: One (1) per phase with heaters.

5. Auxiliary Contacts: Provide minimum of two (2) normally open contacts per starter. Provide additional contacts as required by controls.

6. Enclosure: NEMA 1A for indoor use with dust protecting gaskets. Rustproof metal with baked enamel finish, NEMA 3R for outdoor use.

C. Circuit Breakers: Provide each starter with molded case breaker complete with thermal magnetic trip and external operating handle.

D. Pushbutton and Auxiliary Controls:

1. Type: Heavy duty control stations, start-stop pilot lights.

2. Enclosure: NEMA type 1A for indoor use with dust protecting gaskets. Rustproof metal with baked enamel finish, NEMA Type 3R for outdoor use.

6.0 WARRANTY:

A. A warranty for a period of one (1) year shall be provided against failure of components resulting from normal use and/or factory defects.

B. The CONTRACTOR shall be able to furnish adequate replacement parts, service and engineering facilities to maintain satisfactory operation and maintenance at all times.

C. Complete operating, maintenance instructions, system components and layout in five (5) copies shall be furnished to the Owner at acceptance of the system.

7.0 CONTROL WIRING:

A. All wiring in connection with the control system shall be provided under this Section except as noted on the plans or specified otherwise.

B. The term "wiring" shall be construed to include furnishing of wires, conduits, miscellaneous materials, and labor as required for mounting and connecting the electrical control devices.

C. Control wiring shall be installed in accordance with applicable requirements of Philippine Electrical Code.

D. All wires between equipment or devices shall be installed in conduit or other approved raceway.

E. Conduit: UL approved or approved equivalent, mildsteel hot dipped with interior coat of enamel. Conduits shall conform to the requirements of Section 2151 of the Philippine Electrical Code.

F. Conductor:

1. Construction: Plain annealed copper strand #18 AWG minimum complying with IPCEA Standards. Shielded if required.

2. Insulation: Colored THHN, 600V complying with the NEC.

3. Establish consistent color code throughout building insofar as practicable. Identify conductor by means of tape or printed tags or equal markers at equipment and junction boxes.

4. Use no splices except as approved.

5. Pull wires into conduit using powdered soapstone or commercial wire lubrication; do not use soap solution.

G. Step-down transformers: Provide step-down transformers as required by control system. Power supplies from distribution boards to transformers shall be provided under Division 16 (by Electrical Contractor).

8.0 PUMP SCHEDULE:

The following "Pump Schedule" consisting of one (1) page comprises the entire requirement of this project for pumps.

TRANSFER PUMP SCHEDULE

1.	DESIGNATION	TP-1 / TP-2
2.	SERVICE	For transferring Potable Water from Cistern to Overhead Tank
3.	LOCATION	As shown on drawings
4.	TYPE	Submersible Non-clog Type
5.	MANUFACTURER	"Paco", "Aurora", or approved equal
6.	QUANTITY (UNIT)	Two (2)
7.	CAPACITY, LPS (GPM)	1.89 (30)
8.	TOTAL DYNAMIC HEAD, M (FT.)	15.24 (50)
9.	MOTOR DATA:	
	A. MAXIMUM RATING, kW (hp)	0.37 (1/2)
	B. MAXIMUM SPEED, rpm	3600
	C. VOLTS/PHASE/HERTZ	230/1/60
10.	REMARKS	Pump shall operate automatically. Automatic shifting for standby pump.

SECTION 15450 - PLUMBING FIXTURES AND TRIM

SECTION INDEX

SECTION 15450 - PLUMBING FIXTURES AND TRIM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

The Work specified under this Section shall be subject to Division 1 - General Requirements and Section 15400 - General provision of these Specifications.

1.02 WORK DESCRIPTION

A. The CONTRACTOR shall furnish and install plumbing fixtures and fittings indicated on the drawings complete with trimmings and accessories unless otherwise specified.

B. Generally, fixtures except water closets, shall have the water supply discharge below the rim, equipped with backflow preventors, angle stops, or straight stop. Stops integral with the faucets shall be furnished and installed with fixture. Exposed traps and supply pipes for all fixtures and equipment shall be connected to the rough piping system at the wall unless otherwise specified.

1.03 GUARANTEE

The Contract shall furnish guarantee to the Owner per requirement of the Contract for a period of one (1) year after date of Final Acceptance of the Work.

PART 2 - PRODUCTS

2.01 GENERAL

A. Except otherwise indicated, plumbing fixtures shall be vitreous china, brand and make to be Saniwares. Fittings and accessories for fixtures shall be American Standard or as approved by the CONSULTANT and/or Owner.

B. Exposed piping and fittings shall be chromium plated brass with polished finish.

C. Mounting height as directed by the CONSULTANT.

D. Provide suitable carriers where required.

2.02 PLUMBING FIXTURES

Refer to Architectural specifications.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All plumbing fixtures shall be installed free and open in a manner to afford access for cleaning, and shall be furnished with all brackets, cleats, plates, and anchors required to support the fixtures rigidly in place.

B. After the installation of any or all of the plumbing fixtures of the building, same shall be kept clean and in working order but shall not be used by anybody until the building has been turned over and accepted by the Owner.

C. Fixture trim, traps, faucets, escutcheons, and waste pipes that are exposed to view in finished spaces shall be brass with polished chromium plating or nickel finish, unless otherwise specified.

D. The CONTRACTOR shall be responsible for providing those portions of the fixture fittings (as trims) which are not provided with the fixture but are required for the complete installation. All fixtures shall be carefully checked to determine the portions which must be provided to complete the installation.

E. All fixtures requiring hot water shall be provided with separate stop valves for hot and cold water so that each fixture may be separately controlled without affecting any other fixture.

F. All flush valves shall be equipped with vacuum breaking devices.

3.02 PLUMBING FIXTURES SCHEDULE:

Refer to Architectural specifications.