SECTION 15540

FIRE PUMPS

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

1.1.2 American National Standards Institute (ANSI) Publications:

B16.1 Cast-Iron Pipe Flanges and Flanged Fittings

B16.3 Malleable-Iron Threaded Fittings

B16.5 Steel Pipe Flanges and Flanged Fittings

B16.9 Factory-Made Wrought Steel Buttwelding Fittings

B16.11 Forged Steel Fittings, Socket-Welding and Threaded

B16.18 Cast Copper Alloy Solder-Joint Pressure Fittings

B16.21 Nonmetallic Flat Gaskets for Pipe Flanges

B16.39 Malleable-Iron Threaded Pipe Unions

B31.1 Power Piping
& Am 80
& Am 81

1.1.3 American Society for Testing and Materials (ASTM) Publications:

A 53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A 120 Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses

A 193 Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

A 194 Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service

B 32 Solder Metal

B 88 Seamless Copper Water Tube

C 533 Calcium Silicate Block and Pipe Thermal Insulation

1.1. 3 Factory Mutual System (FM) Publication:

Approval Guide

1.1.4 National Fire Protection Association (NFPA) Publications:

20 Centrifugal Fire Pumps

24 Outside Protection

37 Stationary Combustion Engines and Gas Turbines

70 National Electrical Code

1.1.4 Underwriters' Laboratories, Inc. (UL) Publications:

Fire Protection Equipment Directory

58 Steel Underground Tanks for Flammable and Combustible Liquids

80 Steel Inside Tanks for Oil Burner Fuel

142 Steel Aboveground Tanks for Flammable and Combustible Liquids

262 Gate Valves for Fire Protection Service

1.2 GENERAL REQUIREMENTS: Section 15011B "Fire Protection General Requirements," applies to this section, with the additions and modifications specified herein.

1.3 DESCRIPTION OF WORK: The work includes providing diesel engine driven centrifugal horizontal split case type fire pumps, pressure maintenance (jockey) pump, and related work. Each system shall be complete and ready for operation. Equipment, materials, installation, and workmanship shall be in accordance with NFPA 20 and NFPA 70, except as modified herein. Devices and equipment for fire protection service shall be listed by Underwriters' Laboratories, Inc., or approved by the Factory Mutual System. In the NFPA publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears.

1.4 SUBMITTALS: Partial submittals will not be acceptable. Annotate descriptive data to show the specific model, type, and size of each item the Contractor proposes to furnish. Prepare shop drawings on sheets not smaller than 20 cm by 75 cm , and include data essential to the proper installation of each system.

1.4.1 Manufacturer's Data:

a. Pumps; drivers, and controllers
b. Pipe and fittings
c. Valves including gate, check, and relief valves
d. Gages
e. Hose valve manifold test header
f. Devices and associated equipment

1.4.2 Shop Drawings:

a. Pumps, drivers, and controllers
b. Complete circuit diagrams
c. Interior wiring diagrams of each controller

1.4.3 Certificates of Compliance:

a. Pumps, drivers, and controllers

1.4.4 Certified Data:

a. Manufacturer's pump discharge curves

1.4.5 Operation and Maintenance Manuals:

a. Pumps, drivers, and controllers

1.4.6 Posted Operating Instructions:

a. Pumps, drivers, and controllers

1.5 ELECTRICAL MOTORS, CONTROLLERS, CONTACTORS, AND DISCONNECTS: Furnish motors, controllers, contactors, and disconnects with their respective pieces of equipment. Motors, controllers, contactors, and disconnects shall conform to and shall have electrical connections provided by the electrical specifications. Controllers and contactors shall have a maximum of 120-volt control circuits, and auxiliary contacts for use with the controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of providing additional electrical service and related work shall be included under this section.

1.6 ELECTRICAL WORK: Work associated with this section shall be provided by this contractor from the disconnects to the electrical driven equipment complying with the requirements of the electrical specifications. Fire alarm system is specified in Section 15340. Provide control and fire alarm wiring ,including connections to fire alarm systems, under this section in accordance with NFPA 70. Provide rigid metal conduit or intermediate metal conduit, except electrical metallic tubing conduit may be used in dry locations not enclosed in concrete or where not subject to mechanical damage.

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1.7 SEQUENCE OF OPERATION: The jockey pump shall be the lead pump which shall start automatically whenever the pressure in the main system is reduced to 115 psig, automatically upon tripping of the sprinkler system, or manually when the starter is operated. Fire Pump shall continue to run until shut down manually.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS:

2.1.1 Fire Pumps: Pumps shall be automatic start and manual stop. Each pump capacity at rated head shall be not less than that indicated 750 gpm at a discharge pressure of 120 psig. Each pump shall furnish not less than 150 percent of rated capacity at not less than 65 percent of total rated head. Pumps shall be of the centrifugal horizontal split case with automatic air released.

2.1.2 Alarm: Provide an audible or visible alarm with electrical power supplied as indicated, with alarm located at outside the pump room. Alarm signal shall be activated upon the following conditions: engine drive controller has operated into an engine running condition, engine drive controller main switch has been turned to OFF or to MANUAL position, trouble on engine driven controller or engine]. Exterior alarm devices shall be weatherproof type. Provide alarm silencing switch and red signal lamp, with signal lamp arranged to come on when switch is placed in OFF position.

2.1.3 Pressure Maintenance Pump: Provide pump to maintain a pressure of 160 psig on the system. Provide pump of the electrically driven, horizontal shaft, centrifugal type with a rated discharge of 30 gpm at 120 psig. Pump shutoff pressure shall not exceed the design working pressure of the system. Pump shall draft from the suction supply side of the suction pipe gate valve of the pump and shall discharge into the system on the downstream side of the pump discharge gate valve. Provide approved indicating gate valves of the outside screw and yoke type in the maintenance pump suction and discharge piping. Provide an approved check valve in the maintenance pump discharge outlet and the discharge gage valve. Provide a pressure switch in the system supply main near the point where it leaves the pump room which shall cause the maintenance pump to start when the pressure drops to 110 psig and to stop when the pressure reaches 125 psig.

2.1.4 Electric Motor Driver: Provide electrical motors, controllers, contactors, and disconnects as specified herein. Power supply to each motor and controller shall be as indicated.

2.1.4.1 Motors: Motor horsepower shall be not less than pump horsepower requirements at all points on the pump operating curve.

2.1.4.2 Controllers: Controllers shall be approved for fire pump service and arranged for automatic manual push button pump starting and manual pushbutton pump shutdown. Controller shall be completely terminally wired, ready for field connections, and mounted in a moisture resistant enclosure arranged so that controller current carrying parts will not be less than 300 mm above the floor.

2.1.5 Diesel Engine Driver: Engine shall be listed or approved for fire pump service and shall be of the make and horsepower rating recommended by the pump manufacturer for the pump being provided. Engine horsepower shall be adequate to drive the pump at all conditions of speed and load over the full range of the pump performance curve. Diesel engine shall be of the compression ignition type with electric starting device taking current from two battery units mounted not less than 20 mm above the floor. Provide lead-acid or lead-calcium type batteries.

2.1.5.1 Controller: Mount not less 300 mm above the floor. Controller shall be manual pushbutton and automatic starting, and manual pushbutton shutdown.

2.1.5.2 Battery Charger: Charger shall be an integral part of the controller or a separate wall-mounted unit. Provide voltmeter to indicate the state of the battery charge and provide ammeter to indicate rate of charge.

2.1.5.3 Fuel System External to Engine: Provide in accordance with NFPA 20 and NFPA 37. Provide vent piping with weatherproof vent cap. Provide flexible bronze or stainless steel piping connectors with single braid at each piping connection to diesel engine. Supply, return, vent, and fill piping shall be steel piping, except supply and return piping may be copper tubing.

2.1.5.3.1 Steel Pipe: ASTM A 53 or ASTM A 120, Schedule 40, black steel, threaded end connections. Provide ANSI B16.3 threaded fittings and ANSI B16.39 threaded unions.

2.1.5.3.2 Tanks: UL 80 for aboveground steel tanks. Provide minimum of 30-inch inside diameter flanged manhole on top of tank including extension tube, gasket, and bolted cover.

2.1.5.3.3 Valves: Valves shall have threaded end connections with a union on all but one side of the valve or solder end connections for connections between bronze valves and copper tubing. Ball and butterfly valves with two-position lever handles may be used in lieu of gate valves. Provide valves suitable for fuel oil service.

2.1.5.4 Exhaust System External to Engine: Provide in accordance with NFPA 20 and NFPA 37.

2.1.5.4.1 Steel Pipe: ASTM A 53 or ASTM A 120, Schedule 80,

black steel, welding end pipe. Provide ANSI B16.9 or ANSI B16.11 welding fittings of the same material and weight as the piping. Insulate with 100 mm thick calcium sislicate isulatio.

2.1.5.4.2 Flanges: ANSI B16.5, Class 150. Provide flanges for connections to diesel engines, exhaust mufflers, and flexible connections. Gaskets shall be ANSI B16.21, composition ring, 1.5 mm thick. Provide ASTM A 193, Grade B7 bolts and ASTM A 194, Grade 7 nuts.

2.2 3 Valves: Provide valves of types listed or approved for fire protection service with flanged or threaded end connections.

2.2.3.1 Gate Valves: Provide outside screw and yoke type which open by counterclockwise rotation.

2.2.3.2 Check Valves: Provide flanged clear opening swing check type valve with flanged inspection and access cover plate for sizes 4 inches and larger.

2.2.3.3 Relief Valve: Provide each pump with an approved relief valve conforming to NFPA 20.

2.2.4 Hose Valve Manifold Test Header: Construct header of steel pipe conforming to ASTM A 53 or ASTM A 120, Schedule 40, black steel, with buttwelding end connections. Provide buttwelding fittings conforming to ANSI B16.9 of the same material and weight as the piping. Provide ANSI B16.5, Class 150 flanged inlet connection to hose valve manifold assembly. Each test header outlet shall have approved bronze hose gate valve with 2.5-inch National Standard male hose threads with cap and chain; locate 3 feet above grade. Welding shall be metallic arc process in accordance with ANSI B31.1, including qualifications of welders.

2.2.5 Pipe Sleeves: Provide where piping passes through walls, floors, roofs, and partitions. Secure sleeves in proper position and location. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions.

PART 3 - EXECUTION

3.1 INSTALLATION: Equipment, materials, installation, and workmanship shall be in accordance with NFPA 20, except as modified herein. Install piping straight and true to bear evenly on supports.

3.1.1 Cleaning of Piping: Keep the interior and ends of new piping thoroughly cleaned of water and foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping and fittings so that water and foreign matter will not enter the pipes or fittings. Inspect piping

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before placing into position.

3.2 PIPE AND FITTINGS: Inspect, test, and approve piping before burying, covering, or concealing. Provide fittings for changes in direction of piping and for all connections. Make changes in piping sizes through tapered reducing pipe fittings; do not use bushings.

3.2.1 Threaded Connections: Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread tape, pipe cement and oil, or PTFE powder and oil; apply only on male threads. Provide exposed ferrous pipe threads with one coat primer applied to a minimum dry film thickness of one mil.

3.2.2 Pipe Hangers (Supports): Provide additional hangers to support the concentrated loads in piping between hangers, such as for flanged valves.

3.2.2.1 Piping to Receive Insulation: Provide temporary wood spacers between the insulation protection shield and the pipe in order to properly slope the piping and to establish final elevations. Temporary wood spacers shall be of the same thickness as the insulation to be provided.

3.2.2.2 Maximum Spacing Between Hangers:

3.2.2.2.1 Vertical Piping: Support metal piping at each floor, but at not more than 3 meter intervals.

3.2.2.2.2 Horizontal Piping: Support ductile iron piping at 1.5 meter intervals, except that for pipe exceeding 1.5 meters length, provide supports at intervals equal to the pipe length but not exceeding 3.0 meters. Support steel piping as follows:

MAXIMUM SPACING (METERS)

Nominal Pipe Size (MM)	25 and under	32	40	50	65	75	90	100	150
Steel Pipe	2.1	2.1	2.7	3.0	3.0	3.6	3.6	3.6	3.6

3.3 NAMEPLATES: Provide laminated plastic nameplates for equipment, gages, thermometers, and valves; stop valves in supplies to fixtures will not require nameplates. Laminated plastic shall be 3mm thick Melamine plastic, black with white center core. Surface shall be a matte finish. All corners shall be square. Accurately align letteringand engrave into the white core. Minimum size of nameplates shall be 25 mm by 65 mm. Lettering shall be minimum of 6 mm high normal block lettering. Key the nameplates to a chart and schedule for each system. Frame charts and schedules under glass and place where directed near each system.

Furnish two copies of each chart and schedule. Each inscription shall identify its function. Equipment nameplates shall show the following information:

a. Manufacturer, type, and model number
b. Contract number and accepted date
c. Capacity or size
d. System in which installed
e. System which it controls

3.4 DISINFECTION: Disinfect the new water piping. Fill the piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush the solution from the systems with clean water until maximum residual chlorine content is not greater than 0.2 parts per million.

3.5 INSTRUCTING OPERATING PERSONNEL: Upon completion of the work and at a time designated by the Owners, provide for a period of not less than one 8-hour working day the services of experienced technicians regularly employed by the manufacturer of the pumps and the drivers to instruct operating personnel in the proper operation and maintenance of the equipment.

3.6 FLUSHING: Flush all new pump suction and discharge piping at 150 percent of rated pump capacity. Where the pump installation involves more than one pump, the flushing volume shall be the total quantity of water flowing when all pumps are discharging at 150 percent of their rated capacities. The new pumps may be used to attain the required flushing volume. Continue flushing operations until water is clear, but for not less than 10 minutes. Submit a signed and dated flushing certificate with a request for field testing.

3.7 FIELD TESTING:

3.7.1 Preliminary Tests: Hydrostatically test each piping system at 200 psig for a period of 2 hours. Perform tests on pumps, drivers, and equipment, including visual equipment checks to insure compliance with approved shop drawings; pump start-run to insure proper operation and to detect any leakage of piping, valves, and fittings; sequence of operation check; verification that all required pump accessories have been provided; test of pump alarm devices; and additional inspections and tests necessary to insure that the entire pump installation is correct, complete, and ready for operation. When preliminary tests have been completed and corrections made, submit a signed and dated certificate with a request for a formal inspection and tests.

3.7.2 Formal Inspection and Tests: The Fire Protection Consultant will witness formal tests and approve all systems before they are accepted. Submit the request for formal inspection at least 10 working days days prior to the date the inspection is to take place. An experienced technician regularly employed by the pump installer shall be present during the

inspection. Where pumps are engine driven, an experienced technician regularly employed by the engine manufacturer capable of demonstrating that all engine trouble alarms and operating features perform as required shall be present. Tests shall include 100 and 150 percent capacity flows and pressures, and no-flow pressures for conformance with manufacturer's characteristic curves. At this inspection repeat any or all of the required tests as directed. Correct defects in the work provided by the Contractor, and make additional tests until it has been demonstrated that the system complies with all contract requirements. Manufacturer's certified shop test characteristic curves for each pump being tested must be furnished by the Contractor at the time of the pump acceptance test. Furnish appliances, equipment, water, electricity, instruments, connecting devices, and personnel for the tests.

*** END OF SECTION ***

PLUMBING / SANITARY Technical Specification

SANDIGANBAYAN BUILDING

Section 15400
PLUMBING SYSTEMS
PART I GENERAL

1.01 DESCRIPTION

1.01.1 The Contractor shall provide all items, articles, materials, operation or methods listed, mentioned or scheduled on the drawings and/or herein, including all labor, materials, equipment and incidentals necessary and required for their completion.

1.01.2 The contract drawings and specifications are complementary to each other, and any labor or materials called for by either, whether or not called for by both, if necessary, for the successful operation of any of the particular type of equipment furnished and installed will be without additional cost to the owner.

All dimensional locations of fixtures, drains, riser and pipe chase shall be verified on the architectural drawings and manufacturers catalogue.

In cases where there are conflicts between the drawings and the specifications, the contractor shall within three (3) days, inform the Engineer of such conflicts.

1.01.3 INTENT: It is not intended that the drawings shall show every pipe, fitting, valve and appliance. All such items whether specifically mentioned or not, or indicated on the drawings shall be furnished and installed, if necessary, to complete the system in accordance with the best practice of the plumbing trade and to the satisfaction of the Engineer and the Owner.

1.01.4 The Plumbing Contractor is required to refer to all architectural, structural, mechanical and electrical plans and specifications, and shall investigate all possible interferences and conditions affecting his work.

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1.01.5 Electrical system are not included in this division, but the Plumbing Contractor will provide all facilities and make provisions for the installation of the work as construction progresses.

A. SCOPE OF WORK

1. Work included under this section of the specifications consists in furnishing all labor, tools and equipment, appliances and materials necessary for complete installation, testing and operation of the plumbing system in accordance with the contract.

(a) Sanitary drains from the building and their connections to the point of discharge as shown in the plans as verified at jobsite.

(b) Roof, ground and basement storm drainage system and connections to storm drainage system as shown in the plans as verified at jobsite.

(c) Soil, waste and vent pipe system within the building

(d) Cold and hot water distribution and supply pipes to the equipment, fixtures and hose bibbs.

(e) Plumbing fixtures, trims and accessories.

(f) Water meter and MWSS connections as shown in the plans.

(g) Payments for all permit incidental to the completion of the project.

(h) The Contractor shall provide all necessary shop drawings and as-built plans.

(i) All other works described in other sections of this document necessary for the completion of this contract.

(g) All other itmes not mentioned in the specifications nor shown in the plans but are necessary to complete the system shall be included in this contract.

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B. WORK BY OTHERS

1. The following work or materials in conjunction with the work to be done or installed by others.

   a. Water for construction purposes other than required in this division and temporary toilet facilities.

   b. Pumping, shoring, general excavations and backfill.

   c. Painting, except as required by the Plumbing Code and these specifications.

   d. Conduits and electrical wires for electrode connections from 4th basement to elevated watertank.

1.02 SUBMITTALS

1.02.1 Within fifteen (15) days after award of contract, the Plumbing Contractor shall submit for the Engineers approval four (4) copies of all complete list of manufacturer name of all materials he proposes to use.

1.02.2 After approval of the above list and before purchase of any equipment or materials, the Plumbing Contractor shall submit to the Engineer for approval four (4) complete sets of detailed information consisting of manufacturers bulletins, shop drawings and part list of the materials to be provided under this contract.

1.02.3 The Plumbing Contractor shall assume the cost of and the entire responsibility of any change in the work as shown in the contract drawings which may be occassioned by approval of materials other than those specified.

1.03 APPLICABLE CODE AND STANDARDS

1.03.1 All plumbing works to be done and sizes of pipes to be used shall be in accordance with the National Plumbing Code of the Philippines.

1.03.2 The Plumbing Contractor shall verify the above paragraphs with each section of the specifications and coordinate his work so that the General Contractor will understand clearly the intent of the work to be done.

PART 2- PRODUCTS

2.01 DESCRIPTION:

2.01.1 All materials to be used shall conform with the standards specified. All classes listed are not necessarily required for this project. Of classes listed, only those specifically called for under sections of this Division or shown shall be provided. Use of materials shall further be governed by other requirements imposed on other sections of this specification. Materials shall be subject to test necessary to ascertain their fitness if the Engineer so requires.

2.02 ALTERNATE MATERIALS: Use of any material not specified in these specifications may be allowed, provided such alternate has been approved by the Engineer, and provided further that a test, if required, shall be done by an approved agency in accordance with the generally accepted standards.

2.03 IDENTIFICATION OF MATERIALS: Each length of pipe, fittings, traps, fixtures and devices used in the plumbing system shall have cast, stamped or indelibly marked on it the manufacturer's trademark or name, the weight, type and classes of products when so required by the standards mentioned.

All materials and equipment mentioned in this specification, including all incidental items not specifically indicated but required to complete the contract shall be new and free from defects. If damaged during the course of construction, it shall be repaired or replaced as directed by the Project Manager at no additional cost to the Owner.

2.04 STANDARD SPECIFICATION FOR MATERIALS AND EQUIPMENT

(A)	ASTM C-76-74	Concrete Storm Sewer Pipes
(B)	ASTM A74-75, CS-188-66 U.S. Federal Specs.	Cast Iron Soil Pipes and Fittings ASA Metals or Equivalent

(e)	ASTM A-120-76 ANSI Standard B-36 10-70 Grade B Sche. 40	Galvanized Iron Pipes and Fittings
(f)	Federal Specs. WW-V-58 (for sizes 2 1/2" and smaller)	Bronze Gate Valves
(g)	Federal Specs. QQ-L-201	Lead Sheet
(h)	AWWA C500-58 (for sizes 3" and larger)	Gate Valves
(i)	AWWA C700-64, Positive Displacement Type, shall be Rockwell or Badger	Water Meter
(j)	U.S. Federal Specs. WW-U-531, Type B Zinc-Coated	Union Patents (Malleable Iron for ferrous pipes)
(k)	ISO 161/L, SDR 13.5	Polybutylene Pipe for Irrigators
(l)	ASTM 2729-71	PVC Pipes and Fittings
(m)	ASTM D2564	Solvent Cement for jointing of uPVC pipes

2.05 GALVANIZED IRON PIPES

2.05.1 PIPES AND FITTINGS FOR COLD WATER SYSTEM

a. All cold water pipings inside the building shall be galvanized iron pipe schedule 40 with malleable iron fittings as manufactured by Super and goodyear pipes.

b. Galvanized sheet metal 18 U.S. gage for steel penetration thru non-water proofed walls and floors above ground.

c. Pipe material to ASTM or ANSI A-120-76 seamless or electric resistance welded (ERW) hot dipped zinc coated.

2.05.2 FITTINGS, PIPE SIZES AND WEIGHTS

a. Cold water service up to 3 in., 125 lbs. screwed malleable iron.

b. For pipe sizes above 3 in., 200 lbs. slip on flange.

2.06 CAST IRON PIPES AND FITTINGS

2.06.1 Cast iron soil pipes and fittings for drainage shall be in accordance with Standard Federal Specification. (see item 2.04 of page 15400-4).

2.06.2 All stacks of cast iron soil pipes shall be extra heavy weight including its horizontal building drain.

2.06.3 All cast iron soil and drainage pipe shall be pitched 1/4" per foot but in no case flatter than 1/8" per foot.

2.06.4 Caulking to conform with the Federal Specification QQ-L-156. Chemicaulk A & B may be used as a substitute.

2.07 POLYVINYL CHLORIDE PIPE (PVC)

2.07.1 Pipe material and fittings equivalent to Series 1000 or Series 600 of Neltex . Rigid (UPVC) pipe and drainage pattern fittings or equal.

2.07.2 Solvent cement joint to ASTM D2564.

2.07.3 Series 1000 for all downspouts and main vents.

2.07.4 Series 600 for all branch vent pipes and fittings.

2.08 FLANGES, BOLTING, GASKETS AND UNIONS

2.08.1 Provide flanges at flange connection to equipment, and valves, welding neck, slip on or threaded as required.

a) Welded Steel Pipe.

1. Class 300 black forged steel welding flanges 1/16 in. raised face to ASTM or ANSI/ASME A-181 Grade 1.

2. Class 150 black forged steel welding flanges 1/16 in. raised face to ASTM or ANSI/ASME A-181 Grade 1.

3. Bolts to ASTM A-193 regular hexagonal head unfinished, heavy semi-finished hexagonal nuts to ASTM A-194.

4. Gasket flat ring or fullface impregnated asbestos or "Cranite" or equal.

b) Screwed Galvanized Steel Pipe.

1. A-120 pipe use Class 150 galvanized cast iron flanges and ASTM A-307 Grade B bolts and nuts hexagonal semi-finished finish. Threaded to ANSI B2.1.

2. Full flat face non-metallic impregnated asbestos gaskets.

2.08.2 Provide unions at each threaded or soldered connec - tions to equipment, and valves for pipe sizes up to 2 in.

a. Black steel Class 250 screwed black malleable iron, ground joint, brass-to-iron seat.

b. Galvanized steel Class 250 screwed galvanized malleable iron, ground joint, brass-to-iron seat.

c. Copper tubing Class 150 cast bronze or cast brass ground joint, non-ferrous seat with solder ends. Manufactured by Nibco or equal.

d. Unions on ferrous pipes two inches in diameter and smaller shall be malleable iron and zinc-coated.

e. Unions on water piping two and one-half inches in diameter and larger shall be flanged pattern.

2.08.3 Provide Dielectric unions for dissimilar metal pipe connection (copper to steel) to prevent galvanic action and corrosion. Manufactured by EPCO Sales Inc., Model FX or GX as applicable or equal.

2.09 VALVES

2.09.1 Gate valves of branches to supply fixtures shall be crane 125#.

2.09.2 Valves up to and including two inches shall be threaded ends, rough bodies, and finished trimmings.

2.09.3 Valves 2 1/2 in. diameter and larger shall have iron bodies, brass mounted and shall have either screws or flanged ends.

TYPE AND SIZE OF VALVE	STEM	BODY	END CONNECTION	APPLICABLE STANDARDS
1. 75 mm and larger gate valves, inside boxes (150 psi working pressure)	Non-Rising	Iron with Bronze trim	Flanged	AWWA C500-59
2. 75 mm and larger check valves (150 psi working pressure)		-do-	Flanged	AWWA C500-59
3. 67 mm and smaller gate valves inside boxes (150 psi working pressure)	Non-Rising	All bronze	Female Threaded	Federal Specs WW-V-58
4. 67 mm and smaller check valves (150 psi working pressure)	-	All bronze	Female Threaded	Federal Specs WW-V-58
5. 67 mm and smaller globe valves (150 psi working pressure)	Rising	-do-	Female Threaded	UL Approved
6. 75mm and larger gate valves exposed (150 psi working pressure)	Rising	Iron with bronze trim	Flanged	AWWA C500-59
7. 67 mm and smaller gate valves, (150 psi working pressure)	Rising	All bronze	Female Threaded	Federal Specs WW-V-58

2.09.4 Gate valves and check valves for transfer pump pipings shall be tested at 150 psi for a period of 2 hours.

2.10 TRAPS

2.10.1 Traps installed on hub-and-spigot pipe shall be extra heavy cast iron.

2.10.2 Traps installed on threaded pipe shall be recessed drainage pattern.

2.10.3 No trap which depends for its seal on the action of movable parts shall be used, full S-traps, bell traps and crown vented traps are prohibited.

2.10.4 Trap Cleanouts: Each fixture trap except those cast integral or in combination with fixtures in which the trap seal is readily accessible or if the trap is removable shall have an accessible brass trap screw of ample size.

2.10.5 Underground traps except P-traps on floor drains shall be provided with removable cleanouts.

2.11 VACUUM BREAKERS :

2.11.1 Provide vacuum breaker on the supply side or discharge side of each, hose bibb, fixture and equipment as indicated or required.

2.12 SHOCK ABSORBERS (Water Hammer Arrestors) :

2.12.1 Provide air capped chamber where shown on the drawings, on all individual branch water lines to equipment or fixtures.

2.13 CLEANOUT AND CLEANOUT ACCESS COVERS

2.13.1 CLEANOUTS

a. Cleanout shall be of the same size as the pipe, but cleanout larger than four inches will not be required, except as shown in the drawings.

b. Cleanouts installed in connection with cast iron bell and spigot pipes shall consist of a long sweep quarter bends extended to an easily accessible place or where indicated on the drawings.

c. An extra heavy cast-brass ferrule with countersunk tap screw cover shall be caulked into the hub of the fitting and shall be extended using the Zurn cleanout access covers until flushed with the floor or wall.

d. Cleanouts shall be provided in all soil, storm or waste lines at every change in direction greater than 45 degrees.

e. Cleanouts shall be not more than 50 feet apart in horizontal drainage lines of 4 inch nominal diameter or less and not more than 100 feet apart for larger pipes.

2.13.2 Cleanout and cleanout access cover shall be Zurn or approved equal as indicated below.

APPLICATION	TYPE	PRODUCT NO.
Concealed Drainage Lines	Horizontal Cleanouts with Access Covers	Z-1440-5
Exposed Drainage Lines	Horizontal and Vertical Cleanouts	Z-1440
Finished Floor Area	Floor Level Access Cleanouts	Z-1425-6
	Tile Floors	Z-1400-1
Finished Walls	With Round Plate Access Covers	Z-1440-1

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2.14 DRAINS

(a)	Floor Drains at Toilets	ASA 40-9A, Pipe Size 2" by ASA Metals or approved equal.
(b)	Floor Drains at Machine & Genset Room/ Transformer Vault/	ASA 40-9F, Pipe Size 3" & 4" by Metals or approved equal.
(c)	Balcony Drains	ASA 40-9A, Pipe Size 3" by ASA Metals or approved equal.
(d)	Tank Drain	ASA 40-9N, Pipe Size 4" by ASA Metals or approved equal.
(e)	Grating Cover	ASA Grates X H - 12" x 24" by ASA Metals or approved equal.
(f)	Deck Drains	ASA 10-12, Pipe Size 4" by ASA Metals or approved equal.
(g)	Parking Area Drains	ASA 40-9J, Pipe Size 4" by ASA Metals or approved equal.
(h)	Ledge & Planter Box Drains	ASA 20-5.4, Pipe Size 3" by ASA Metals or approved equal.
(i)	Roof and Canopy Drains	ASA 10-8, Pipe Size 4" by ASA Metals or approved equal.
(j)	Overflow Drains (planters)	ASA OV-2, Pipe Size 2" by ASA Metals or approved equal.

2.15 HOSE BIBBS

2.15.1 Hose bibbs shall be Crane 125# made of male inlet threads, hexagon shoulder and three quarter inch hose connections.

2.16 PIPE SLEEVES

2.16.1 Pipe sleeves shall be installed and properly secured in place at all points where pipes pass through masonry or concrete, except unframed floors on earth.

2.16.2 Pipe sleeves shall be of sufficient diameter to provide approximately one-quarter inch clearance around the pipe or insulation.

2.16.3 Pipes sleeves in walls and partitions shall be of wrought iron or steel pipe. Pipe sleeves in concrete beams or concrete fireproofing shall be wrought iron or steel pipe.

2.16.4 Pipe sleeves thru floors shall be galvanized steel pipe schedule 26. Sleeve in floor shall extend not less than one inch and not more than two inches above, and the space around the pipe shall be packed with plastic materials and made water tight.

2.16.5 Pipe sleeves in footings shall be or steel pipe and shall be not less than four inches larger in diameter than the pipe to be installed.

2.16.6 Flashing sleeves shall be installed where pipe pass through waterproofing membrane. The sleeves shall be provided with an integral flashing flange or clamping device to which a flashing shield shall be of sixteen ounce, soft sheet copper, shall extend not less than eight inches from the sleeves and flashing flanges and should be thoroughly mopped into the membrane.

2.16.7 The space between the pipes and sleeves shall be made water tight by inserting a picked Oakum gasket and filling the remaining space with poured lead caulking thoroughly.

2.16.8 All pipe penetration sleeves shall be galvanized schedule 40 steel pipe with anchor plate or collar for waterproofed exterior or interior concrete walls (watertanks), waterproofed exterior or interior concrete beams and girders.

2.17 HANGERS AND SUPPORTS

2.17.1 PIPE HANGERS, INSERTS AND SUPPORTS

a. Horizontal runs of pipe shall be hung with adjustable wrought iron or malleable iron pipe hangers spaced not over 10 feet apart, except hub-and-spigot soil pipes which shall have hangers spaced not over five feet apart and located near the hub.

b. Trapeze hangers may be used in lieu of separate hangers on pipes running parallel to and close to each other.

c. Chains, straps, perforated turnbuckles or other approved means of adjustment, except that turnbuckles may be omitted for hangers on soil or wastepipes from individual toilet rooms to maintain stacks when space does not permit their use.

d. Inserts shall be of cast steel and shall be of type to receive a machine bolt or nut after installation. Inserts shall be permitted adjustment of the bolt in one horizontal direction and shall be installed before the concrete is poured.

e. Vertical runs of pipe shall be supported by wrought iron clamps or collar spaced not more than 20 feet apart or as shown in the plans.

f. Chromium plated pipe shall have a clearance of not less than three-quarter inch nor more than one inch when run on the face of marble or plaster, and the pipe shall be supported where required by cast brass supports finished to match the pipes.

g. Provide clamps and sway braces for all risers and downfeeds (at every floor).

h. Provide sway braces or clamps at every 10 feet for lines running along beams and at every beam for lines running accross beams.

2.18 FLOOR, WALLS, AND CEILING PLATES

2.18.1 Where uncovered exposed pipes pass through floors, finished walls or ceilings, they shall be fitted with chromium plated cast brass plates or chromium plated pipe or steel plates on ferrous pipes.

2.18.2 Plates shall be large enough to completely close the hole around the pipes and shall be octagonal or round with the least dimension not less than one and one-half inches larger than the diameter of the pipe. Plates shall be well secured.

2.19 PUMP SPECIFICATIONS FOR WATER DISTRIBUTION

2.19.1 HYDROPNEUMATIC PUMPS

Furnish and install where shown on plans a unitized factory assembled two-pump hydropneumatic system, package type, capable of supplying 100 GPM against 100 FT.TDH. Each pump shall be driven by a 3 HP electric motor, 3500 RPM, 220 volts, 3 phase, 60 hertz equipped with suitable starters, control panel, pressure switches and pressure gauges, 220 gallons capacity bladder surge tank, set at 20/40 psi, cut-in and cut-off pressure setting and all necessary accessories.

2.19.2 TRANSFER PUMPS

Furnish and install vertical - in line bronze fitted, single stage, centrifugal pump. Each pump shall be rated to deliver 250 GPM against 400 FT.TDH. Each pump shall be driven vertically thru a 50 HP electric motor, 3500 RPM,230 volts, 3 Phase, 60 Hertz. The pump assembly shall be mounted on a heavy duty cast iron support stand for floor - mounting, complete with the following accessories :

a) Magnetic reduced voltage starter for each pumps

b) Automatic pump alternator

c) LH \BW liquid level controllers for pumping up and high/ low water level cut-off

2.19.3 ELEVATOR PIT PUMPS

Furnish and install where shown on plans, two (2) units non-clog submersible pumps to deliver 20 GPM against 20 FT. TDH. driven by a 1/2 HP submersible motor, 1800 RPM, 220 volts, 1 phase, 60 hertz equipped with suitable starters and all necessary accessories.

2.19.4 Approved Brand : Aurora pump or equivalent.

2.19.5 DRAINAGE SUMP PUMPS

Furnish and install where shown on plans Duplex type non-clog submersible sump pumps. Each pump shall be capable of delivering 300 GPM against 40 FT. TDH. Each pump shall be driven by a 5 HP submersible motor, 1800 RPM, 220 VOLTS, 3-phase, 60 HERTZ complete with the following accessories :

a) Magnetic starter for specified pumps

b) Automatic pump alternator

c) Three (3) mercury type liquid level controllers

d) Access cover, guide rails and lifting chains for each pump

2.21.6 Sewage Ejectors

One (1) set, duplex type, non-clog submersible pumps capable of delivering 50 GPM against 30 Ft. TDH. Each pump shall be driven by a 2 HP submersible motor, 1800 RPM, 230 volts, 3-phase, 60 Hertz, complete with the following accessories :

a) Direct-on-line magnetic starter for each pump
b) Three (3) mercury type liquid level controller
c) Quick disconnect pump connector
d) Access cover
e) Guide rails with lift chain
f) Mechanical pump alternator

Note: Pumps shall operate alternately or simultaneously if required.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION :

3.01.1 General : Piping shall be installed as shown on the drawings, as recommended by the manufacturer and as directed during installation, straight and direct as possible, forming right angles or parallel lines with building walls and other pipes, and neatly spaced. Erect pipe risers plumb and true, parallel with walls and other pipes neatly spaced.

a. All piping shall be properly supported or suspended on stands, clamps, hangers, or equivalent of approved design. Supports shall be installed in such a manner to permit pipe free expansion and contraction while minimizing vibration.

b. Do not install pipes in a manner which interferes with other pipes, ducts, conduits, equipment and adjacent structures of the building.

c. The arrangement, positions and connections of pipes, fixtures, drains, valves and the like, indicated on the drawings shall be followed as closely as possible. The right is reserved by the Project Manager to change locations and elevations to accomodate conditions which may arise during the progress of the work, prior to installation, without additional compensation for such changes.

d. The responsibility for accurately laying out the work and coordination of installation with other contracts rests with this contractor. Any field layout interferences that occur shall be reported immediately to the Project Manager.

e. All pipes shall be cut accurately to measurements and shall be worked into place without springing or forcing. Changes in pipe sizes shall be made with reducing fittings.

f. Roughing-in for pipes and fixtures shall be carried along with the building construction. Correctly located openings of proper sizes shall be provided where required in the walls and floors for the passage of pipes. All items to be embedded in concrete shall be thoroughly cleaned and free from all rust, scale and paint.

g. Pipes shall not pass through columns, footings, beam of ribs, except where noted on the drawings.

3.01.2 COLD WATER SYSTEM

a. The piping shall be extended to all fixtures, outlets, and equipment from the gate valves installed in the branch near the riser.

b. All pipings above ground shall be run parallel with the lines of the building unless otherwise shown in the plans.

c. No water pipings shall be buried in floors unless specifically indicated on the drawings or approved by the Engineer.

d. All service pipes, valves and fittings shall be kept at sufficient distance from other work to permit finished covering not less than one-half inch from such work or from finished covering on the different service.

e. Changes in pipes shall be made with reducing fittings.

f. No valve shall be installed with its stem below the horizontal. All valves shall be gate valves unless otherwise specified or noted on the drawings.

g. Unions shall be concealed in walls, ceilings and partitions, except where they are enclosed in a metal frame box and cover.

h. All coldwater lines shall be tested at 150 psi for a period of two (2) hours before covering.

3.01.3 THREADED PIPE JOINTS :

a. All pipes shall be reamed before threading. All screw joints shall be made with graphite and oil or with an approved graphite compound applied to male threads only. Threads shall be full out, and not more than three threads on the pipe shall remain exposed

b. Caulking of threaded joints to stop or prevent leaks will not be permitted. Use 3M pipe thread sealant or equivalent on all G.I. or steel pipes screwed on threaded joints.

3.01.4 SOIL AND WASTE PIPING SYSTEMS

a. Fittings: All changes in pipe sizes on soil, waste and drain lines shall be made with reducing fittings.

b. Bell and Spigot Joints: Lead joints shall be made by centering the spigot within the bell after the spigot has been driven home, and the joints yarned with jute or hemp, closely compacted, so as to leave a depth of two inches for the lead. Each joint shall be filled with lead in one continous pouring from the laddle. Joints shall be poured full and the thoroughly caulked at least three times around with the proper caulking tools.

c. All changes in direction shall be made by the appropriate use of forty-five degrees wyes or long sweep bends, except that sanitary tees may be used on vertical stacks and short quarter bends or elbows may be used in soil and waste lines where the change in direction of flow is from the horizontal to the vertical and on the discharge from the water closet.

d. No trap which depends for its seal on the action of movable parts shall be used, full S-traps, bell traps and crown vented traps are prohibited.

3.01.5 VENT SYSTEM

a. All main vertical soil and waste stacks shall be extended full size to and above the roof line to act as vents, except where otherwise specifically indicated.

b. Vent pipes in roof spaces shall be run as close as possible to underside of roof with horizontal piping pitched down to stacks without forming traps. Vertical vent pipes may be connected into one main vent riser above the highest vented fixtures.

c. Where an end or circuit vent pipe from any fixtures or line of fixtures is connected to a vent line serving other fixtures, the connections shall be at least four feet (4') above the floor on which the fixtures are located to prevent the use of vent line as waste.

d. Horizontal waste receiving the discharge from two or more fixtures shall be provided with end vents unless separate venting of fixtures is noted.

e. All vents embedded in concrete shall be G.I. pipes, schedule 40.

f. All fixtures shall be individually vented.

3.01.6 PIPING GRADES AND SLOPES :

a. Keep all horizontal runs of piping, except where concealed in partitions, as high as possible and close to the wall.

b. Piping shall be properly graded or pitched to insure easy circulation, drainage and prevent water hammer and noise. Slopes as follows unless otherwise indicated.

c. Hot and cold water shall pitch, up in the direction of flow at 1 inch in 60 feet horizontal run.

d. Maintain a minimum of 1 percent or 1 inch in 8'4" horizontal run for all sanitary soil, wastes and leader lines.

3.02 CLEANING AND PAINTING

3.02.1 ALL EXPOSED METAL SURFACES

a. All exposed metal surfaces shall be rid of grease, dirt or other foreign materials.

b. Chrome or nickel plated pipings, fittings and trimmings shall be polished upon completion.

c. All equipment, fixtures, valves and fitiings shall be cleaned of grease and sludge which may have accumulated. Any stoppage or discoloration, or other damage to parts of the building, its finish or furnishings due to the system shall be repaired by the Contractor.

3.02.2 PAINTING

a. All exterior surfaces of pipings to be installed in or through concrete floor fill or tile floors and underground shall be given one coat of acid resisting paint having a bituminous base.

b. Pipe hanger supports and all other iron works in concealed spaces shall be thoroughly cleaned and painted with one coat of asphalt varnish.

c. Finish and all other iron works shall be as directed by the Architect.

d. Exposed C.I. pipes and fittings that are tar or asphalt coated shall be given two coats of shellac prior to application of two coats of oil paint as directed by the Architect.

3.03 UNION CONNECTIONS

3.03.1 Slip joints shall be permitted only in trap seals or on the inlet side of the traps.

3.03.2 Tuckers or hub drainage fittings shall be used for making union connections wherever practicable in connection with dry vents. Use of screws and (except fitting bushed in the sand).

3.04 PLUMBING SYSTEM TEST

3.04.1 The entire system of drains, waste and vent piping inside the building shall be tested. Water test shall be in accordance with the Plumbing Code. Every portion of the system shall be tested to a hydrostatic pressure equivalent to at least 10-foot head water. After filling, water supply shall be shut-off and allowed to stand 1/2 hour under test, during which time there shall be no drop greater than 4".

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3.04.2 Upon completion of the roughing-in and before setting fixtures, the entire cold water piping system shall be tested at 150 psi for a period of two hours before covering.

3.04.3 Where a portion of the water piping system is to be concealed before completion, this portion shall be tested in a manner similar to that described for the entire system.

3.04.4 The Contractor shall furnish and pay for all devices, materials, etc., labor and power required in connection with all tests. All tests shall be made in the presence and satisfaction of the Sanitary Engineer, Plumbing and other City Inspectors, and other public utilities having jurisdiction.

3.04.5 Defects disclosed by the test shall be repaired or if required by the Engineer or his representative, defective work shall be replaced without extra charge to the Owner. Test shall repeated as directed until all works are proven satisfactory.

3.04.6 The Contractor shall also be responsible for the other trades that may be damaged or distributed by the tests or the repair or replacement of his own work and shall restore the damage to its original condition without extra cost to the Owner.

3.04.7 The Contractor shall notify the Engineer, Plumbing Inspector and others having jurisdiction at least a week in advance of making the required tests so arrangements can be made for their presence to witness the test.

3.04.8 All repairs to pipings shall be made with new materials at the expense of the Contractor.

3.05 GUARANTEE FOR PLUMBING SYSTEM

3.05.1 The Plumbing Contractor shall furnish to the Owner a written guarantee covering the satisfactory operations of the plumbing installation in all its parts for a period of one (1) year after the date of acceptance. During this period, the Plumbing Contractor shall repair or replace any defective work and pay for any repair or replacement cost.

3.06 WARRANTY FOR EQUIPMENT

3.06.1 The following equipment if furnished by the Contractor in any section of the specifications shall be guaranteed against defective design, materials and workmanship for a period of one (1) year from the date of final acceptance.

a) Hydropneumatic Pump

b) Transfer Pump

c) Elevator Pit Pump

3.06.2 Upon receipt of a written complaint and during the period of the guarantee, all defective parts shall be replaced by the Contractor at his own expense.

3.07 COLOR CODING FOR PIPES

(a)	Cold Water Pipes - - - - -	Green with White Band at 1.00 o.c.
(b)	Hot Water Pipes - - - - -	Red with White Band at 1.00 o.c.
(c)	Sewage Pipes - - - - - -	Black with Red Band
(d)	Vent Pipes - - - - - - -	Green
(e)	Storm Sewer Pipes - - - -	Black with Green Band

3.08 DISINFECTION

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

3.08.2 Chlorine shall be liquid chlorine or hypochlorite (HTH) and shall be introduced into the water lines in a manner approved by the Sanitary Engineer.

3.08.3 Chlorine dosage shall be to provide no less than 50 parts per million (or mg/l) 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.

3.08.4 The interior of the underground reservoir and elevated water tank shall be thoroughly washed and swabbed with chlorine or hypochlorite solution containing 200 parts per million (mg/l) 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 all debris, dirt or dust to the satisfaction of the Engineer.

3.08.5 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 Sanitary Engineer.

3.09 UNDERGROUND DRAINAGE SYSTEM

3.09.1 EXCAVATING

a. Trenches for all underground pipelines shall be excavated to the required depths and grades.

b. Bell holes shall be provided so that pipe will rest on well tamped solid ground for its entire length.

c. Where rock is encountered, excavation shall extend to a depth six inches below the pipe bottom and before pipe is laid, the space between the bottom of pipe or other approved filling materials.

3.09.2 PIPE LAYING

a. Pipes in trenches shall be laid true to line and grade on a stable or suitably prepared foundation, each section of the pipe being bedded and bottom of the trench shaped to fit the lowest quadrant of the pipe circumference.

3.09.3 BACKFILLING

a. After pipe lines have been tested, inspected and approved by the Engineer, and prior to backfilling, all forms and bracings shall be removed and the excavation shall be cleaned from trash and debris.

b. Materials for backfilling shall consist of approved materials and shall be free of debris or big rocks.

c. Backfill shall be placed in horizontal layers, properly moistened and compacted to an optimum density that will prevent excessive settlement and shrinkage.

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SECTION 15450
PLUMBING FIXTURES AND TRIMS
PART 1 - GENERAL

1.01 DESCRIPTION OF WORK :

A. Work Included : Install complete, Owner furnished sanitary plumbing fixtures, trims and supply fittings, traps, valves, and supports in accordance with the contract documents.

B. Furnish and install adaptors, couplings and devices required for complete connections of all sanitary plumbing fixtures and trims other than those supplied by the owner.

C. All fixtures shall be completely new, free from defects, function efficiently and shall be cleaned, with trims polished and ready for use before acceptance.

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

1.02 TECHNICAL INFORMATION :

A. The Project Manager shall provide pertinent and related technical information to the Contractor for Owner furnished materials and equipment as required upon written request.

PART 2 - PRODUCTS

2.01 STANDARDS :

A. The products shall be as specified by the Architect.

B. Unless otherwise specified, all fittings, escutcheons, faucets, traps, exposed piping and trims, shall be brass chrome plated over nickel plate with polished finish. Any hanger not visible shall likewise be chrome plated over nickel plate.

C. Dimensional tolerances to ANSI Standards A112.19.2.

2.02 MATERIALS :

A. General for all sanitary plumbing fixtures unless otherwise specified.

1. Vitreous Ware : Fired vitreous china ware of the best quality, non-absorbent and burned so that the whole mass is thoroughly fused and vitrefied, producing a material while in color, which when fractured shall show a homogenous mass, close-grained and free from pores. Glazed finish thoroughly fused and united to the body, without discoloration, chips, or flaws, and free from craze. Warped or otherwise imperfect fixtures shall not be accepted.

2. Fixtures : Free from imperfections, true as to line, angles, curves, and color, smooth. watertight and quiet in operation.

3. Location, Type, Color and Finishes : See architectural drawings.

4. The Plumbing Contractor shall be responsible for the supply of the fixture fittings (or trims) which are not provided with the fixture, but required for a complete installation. All fixtures shall be carefully checked to determine the items which must be provided to complete the installation.

5. Air Chambers : All individual branches to fixtures and/or equipment shall be provided with air chambers shock absorbers as shown on the drawings (12" long for 1/2"0 vertical, 18" for 3/4"0 vertical).

2.03 SCHEDULE OF FIXTURES :

2.03.1 Refer to Architect's specifications and drawings.

PART 3 - EXECUTION

3.01 FIXTURE INSTALLATION :

A. Support all fixtures securely in a neat workman like manner on approved carriers or supports. The method of support for each fixture shall be approved type manufacturer's standard, except where fixture designations on the drawings indicate modifications.

B. Floor mounted water closets shall be installed with standard lead caulked cast bronze adaptor flange, wax gasket and hold down bolts with nuts, washers and bolt head cover on closet flange. Bolt head exposed cover shall match the color finish of the closet.

C. Lavatories shall be supported on concealed chair carriers, single or double as required, with block base foot support bolted to floor, and adjustable sleeve for arm adjustment, steel pipe upright and adjustable alignment truss. Concealed arms shall be provided with leveling screws and locking device and shall be designed to receive threaded escutcheons. Slab type lavatories (wall mounted) shall be furnished with extra-heavy, cast brass chrome plated threaded escutcheon between the fixture and the wall. The escutheon shall be screwed on the adjustable sleeve or arm. Countertop lavatories shall be built and anchored into architectural vanity countertops including trims as means of support.

D. Urinals shall be supported on concealed chair carrier with block base supports bolted to floor, top plate for supporting concealed fixture hanger and through bolts to keep lower part of fixture free of wall, steel pipe uprights, adjustable sleeves, and adjustable alignment truss.

E. Showerheads shall be wall mounted with supply pipe and fittings concealed. Height and spacing as shown on the drawings or as recommended by the manufacturer.

F. Bath tubs shall be floor mounted with pipe and fittings concealed except finish trims and accessories. Provisions for installation and maintenance access of concealed trims and accessories shall be coordinated with archtectural finishes.

G. Wall mounted sinks shall be installed with manufacturer's standard concealed carrier or supports and otherwise supported by countertops as indicated on the drawings.

H. Install all fixtures level and flush with finish floors and partitions.

I. Drawings indicate fixtures layout dimensions. All rough-in dimensions shall be based on final finished dimensions. Deviations from the drawings due to actual site condition shall be approved by the Project Manager.

J. All fixtures shall be provided with individual shut-off valves for cold water supplies so that any fixture may be separately controlled without affecting other fixtures supplied with the same distribution line.

K. Fixture fittings, trims, faucets, traps, water supply pipes and waste pipes that are exposed to view in finished spaces shall be painted with one coat of red lead primer and two finish coats of enamel paint, the color to be disignated by the Architect unless otherwise specified.

L. Every plumbing fixture or equipment requiring connections to the sanitary drainage system shall be equipped with a trap.

M. Each trap shall be placed as near the fixture as possible. No fixture shall be double-trapped.

3.02 TESTING AND CLEANING :

A. The Project Manager or his authorized representatives shall conduct field inspection of all completed or partially completed installed plumbing fixtures prior to scheduled testing

B. All plumbing fixtures shall be properly protected from use and drainage during the construction period. At the end of the work and prior to approval, the fixtures shall be cleaned as per manufacturer's recommendations, to the satisfaction of the Architect.

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

D. Water running test shall be conducted for all fixtures in the presence of the Project Manager of his authorized representatives, in order to insure soundness, leakage-free and quiet operation.

ELECTRICAL Technical Specification

SANDIGANBAYAN BUILDING

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Section 16050
ELECTRICAL ENGINEERING WORKS
PART 1 GENERAL

1.0 DESCRIPTION

1.01 The work to be done under this division of the specification consist of the fabrication, furnishing, delivery and installation complete in all details of the electrical works at the subject premises and all work materials incedental to the proper completion of the installation, except those portion of the work which are expressly stated to be done by others. All works shall be done in accordance with the governing codes and regulations, except where same shall conflict with such codes etc., which later shall then govern. The requirements with 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. The specifications are intended to provide a broad outline of the required equipment and are not intended to include all details of design and construction.

1.02 Laws/Code and Regulations

The work under this DIVISION shall be executed in accordance with the latest requirements of the following:

- Building Code of the Philippines
- Philippine Electrical Code
- Laws, ordinances, and regulations of the locality having jurisdiction over the project.
- Power Utility Company
- Philippine Long Distance Company
- UAP Doc 301

The requirements of the above mentioned governing laws/codes and the requirements of the companies having involvement/participation are hereby made part of this specification and the ELECTRICAL CONTRACTOR is required to comply the same.

This does not relieve the ELECTRICAL CONTRACTOR from complying with requirements of specification or drawings in excess of above laws and ordinances of above codes and requirements which are not prohibited by the same.

1.03 Guarantee

The ELECTRICAL CONTRACTOR shall guarantee that the electrical system is free from all grounds and defective materials and workmanship for a period of one (1) year from the date of acceptance of the work. All defects arising within the guarantee period shall be remedied by the Electrical Contractor at his own expense.

The Electrical Contractor shall indemnify and save harmless the Owner from and against all claims, suits, actions, or liabilities for damage arising from inju - ries, disabilities or loss of life to persons or damage to public or private property resulting from fault or any act of Contractor or his representative in the representative in the execution of the work.

The partial acceptance of the work for the purpose of making partial payments, based on the estimated cost satisfactorily completed by the ELECTRICAL CONTRACTOR, shall not be considered as final acceptance of that portion of the work.

1.04 Drawings and Specifications

a) The electrical plans, which constitute an integral part of this specifications, shall serve as the working drawings. The plans indicate the general layout and arrangement of the complete electrical system and other works.

b) The drawings and specifications are meant specifically to be complementary to each other and where it is called for by one shall be binding as if called for by both. Anything which is basically required to complete the installation of the proper operation but not expressly mentioned on the drawings and/or specification shall be furnished and installed by the ELECTRICAL CONTRACTOR at no extra cost to the Owner as though specifically stipulated or shown in both.

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c) The Owner shall have the final decision on any apparent conflict between the drawings and specifications or on under the controversial point in either or both.

d) All dimensional and locations shown on the plans are approximate and shall be verified in the field as actual locations, distances and levels are governed by actual conditions.

2.0 SCOPE OF WORK

2.01 Work Included

The work to be done under this DIVISION shall include the furnishing of all tools, labor, equipment, fixtures and materials. Each complete and in proper working condition unless one or the other is specifically excluded or stated otherwise in these specifications. The scope of work shall include but not limited to the following items:

a) Incoming primary entrance conduits, cables, service entrance pedestal primary pole and accessories.

b) Transformer banks, primary protection, supports and accessories.

c) Transformer vaults accessories.

d) Low voltage switchboards, distribution panelboards, automatic transfer switches, power and lighting panelborads, circuit breakers, double throw switches supports and accessories.

e) Wiring system for branch circuits, signal circuits, feeder wires subfeeders including respective conduits, fittings, wire gutters, pullboxes, supports and accessories.

f) Wiring termination or connection to all equipments and wiring devices including necessary slices as indicated in the drawings.

g) Supply and installation of all lighting outlets and accessories including necessary supports.

h) Telephone systems including outlets, telephone cabinet, cable, conduit, jacketed wires, supports and accessories.

i) Complete grounding system.

j) Complete fire alarm system

k) Complete intercom system

l) Sub-meters / supply including metering equipment.

m) Meter centers for normal power supply.

n) Coordination with other trade of work/contractor.

o) Coordination with companies / offices including handling of all matters related to power service, telephone service and permits.

p) Preparation of necessary shop drawings that may be required by the Architect / Engineer, power company/telephone company.

q) Preparation of necessary as-built drawings.

r) Optional electrical work related to the project which the owner may decide to include/install.

t) Supply and installation of all materials not shown in the drawings nor mentioned in these specifications but are necessary to complete the project shall form part of this contract.

2.02 **Work not included**

a) Incoming telephone service entrance to Main Dis - tribution Frame (MDF).

b) Telephone equipment.

c) Termination/connection to motors including provision of control wires.

d) All concreting works including reinforced concrete encasement for service entrance and feeder conduits, manholes & concrete foundation of equipment.

e) All other items whose furnishing and/or installing are indicated as being specifically excluded from the electrical works in these specifications and drawings.

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3.0 PROCEDURE

3.01 Workmanship

The ELECTRICAL CONTRACTOR shall execute the work in the most thorough, prompt, and workmanlike manner and in accordance with the plans and specifications. The installation shall be done thru standard method and good engineering practice.

3.02 Materials

All materials to be installed shall be brand new except as otherwise noted in the plans or specifications. The materials shall be as specified. No substitution of materials shall be allowed. Should the ELECTRICAL CONTRACTOR find it necessary to use another type/brand of materials instead of the specified item, he shall first obtain from the Owner prior to the installation. Any substituted materials installed without the approval of the Owner shall be subject to replacement.

3.03 Coordination

It is the sole responsibility of the ELECTRICAL CONTRACTOR to conduct coordination of his activities with the following:

a) Other trades and suppliers
b) Owner
c) PLDT
d) Meralco
e) Local Government Authority

3.04 Deviations from the Plans

No deviations from the plans is to be made unless given notice or approval from the Owner or his duly authorized representative.

3.05 Records Drawings and 'AS-BUILT' Plans

The ELECTRICAL CONTRACTOR is required to keep an active record of the actual installation during the progress of the job. This shall be the reference in the preparation of the 'AS-BUILT' plans which shall include all pertinent information. Complete in all aspect of the actual information not originally shown in the contract drawings. The 'AS-BUILT' plans shall

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be prepared by the ELECTRICAL CONTRACTOR at his expense and shall be submitted to the Owner and the ENGINEER 'AS-BUILT' drawings shall be a pre-requisite for the final acceptance of the electrical works.

Submit two (2) copies of the 'AS-BUILT' signed and dry sealed by the ELECTRICAL CONTRACTOR'S Registered Professional Electrical Engineer. Original tracing reproduceable copy shall be submitted to the Owner.

3.06 Samples and shop Drawings

a) 30 days prior to the installation or fabrication of materials the ELECTRICAL CONTRACTOR shall submit to the Owner the following for approval.

1) Shop drawings of panelboards showing arrangements of circuit breakers, bus bar, sizes, lugs, etc.. Indicate all dimensions.

2) Shop drawings or samples required as noted in the drawings.

3) Samples and catalogs of materials intended to be installed.

- circuit breakers
- disconnect switches
- wiring devices (switches and c.o's)
- lighting fixtures
- lighting diffusers
- conduits
- wires
- other electrical materials

4) Shop drawings for the telephone system from the telephone terminal cabinet to the outlets.

5) Complete shop drawings for the fire alarm system.

6) Detailed shop drawings for wire gutters, conduit runs, pull boxes, etc..

7) Complete shop drawings of conduit runs.

b) The ELECTRICAL CONTRACTOR shall also submit to the Owner without delay shop drawings and other submittals which may be required by the Owner during the progress of the construction.

c) The above requirements shall be submitted to the Owner at the earliest possible time to give allowance for checking and verification. These shall be complete in all aspect.

d) Submit four (4) sets of each shop drawings.

3.07 Electric Power

The ELECTRICAL CONTRACTOR shall be responsible for his own electric power neede for the execution of the job.

3.08 Test

Conduits test on all electrical conductors installed in the presence of the Owner or his duly authorized representative.

a) check the grounds.
b) insulation resistance test
c) continuity test for all outlets
d) voltage level test
e) phase relationship
f) check circuit connection at panel boards, all single phase circuit shall be connected to phase as shown in the load schedule.

3.09 Submit Reports on Tests

All reports must be formal, typewritten and properly identified.

3.10 All defects found during the test shall be repaired immediately by the ELECTRICAL CONTRACTOR.

3.11 All tools, equipment and instruments needed to conduct test shall be on the account of the Contractor.

4.0 METHODS AND MATERIALS

4.01 Wiring Method

All wiring shall in general be installed inside standard conduits. All conduits shall be embedded in between double wall partitions, where the of concealed/embedded conduits is impractical or impossible, exposed conduits wiring may be used provided approval from the Owner have been secured.

4.02 Location of Outlets

All outlets shall be truly centered in panels and spaces provided thereof. Any discrepancy in the outlets location between the electrical plan shall be brought at once to the attention of the Owner before installation.

4.03 Grounding System

All metallic conduits, supports, cabinets and equipment shall be properly electrically grounded and/or bonded by means of copper straps. The conduits of each system shall be grounded by connecting to the water service pipe/ground rods.

Ground bars shall be bars, solid or stranded copper American wires or Phelps Dodge with sizes as shown on the plans. Ground wires shall be run at least 0.45m below natural grade line and without sharp kinks or bends.

Ground rods shall be 25mm x 3m unless otherwise indicated on the drawings. Hot dip galvanized steel vertically driven with head end 0.45m below natural grade line and provided with KSU BURNDY necessary to meet required ground resistance.

Ground resistance shall be as specified in Philippine Electrical Code article 4.2.8.3 and as required by the utility company.

PART II PRODUCTS

4.04 Conduits

a) Rigid steel conduits (RSC) and Intermediate metal conduits (IMC) :

1) Standard trade size hot diped galvanized with inside enamel or epoxy coating, Matsushita, or approved as equal.

2) Joints - threaded coupling for joints.

3) Use - service entrance, lighting and power, fire alarm system

b) Polyvinyl chloride conduits (PVC)

1) Standard trade sizes, schedule 40 "Neltex", "Powerguard"or approved as equal.

2) Auxilliary system

c) Flexible liquid - Tight Conduits

1) Standard trade sizes, UL approved or equivalent

2) Galvanized steel with outer liquid tight plastic jacket

4.05 Boxes

a) All boxes shall be GA 16 (min.) TIMCO or approved as equal.

4.06 Conduits/Fittings

a) Condulets shall be standard type 'TIMCO' brand.

4.07 Wires

a) Wires shall be concealed copper .98% or better conductivity, insulated singled, except as noted on the drawings.

b) Brand - Phelps Dodge 600 volts class type as indicated on the plans.

c) Wires greater than # 8 square mm shall be stranded.

d) Minimum size shall be #3.5 TW for power and lighting circuits.

e) Telephone wire shall be # 22 AWC jacketed type 4 wires.

4.08 Connectors (For Meter Centers)

Use solderless mechanical 1 pressure-type lugs, copper.

4.09 Insulation

All splices shall be properly insulated using 3m Brand electrical tape. Application of insulation shall be equivalent to the insulation of the wire concerned. Use filler compound. "Scotchfill" or approved equal at sharp edges to provide smooth surface before taping.

4.10 Panelboards and Circuit Breaker

a) Panelboards shall contain a single brand of circuit breakers as manufactured by "General Electric " or approved equal.

b) All circuit breakers used as main shall be "Bolt On" type molded case, thermal magnetic protective, quick make, quick break, number and size as shown in the schedule. Internal common trip for 2 and 3 pole breakers.

c) Breaker minimum interrupting capacities shall be based on NEMA and UL procedures.

d) All circuit breakers used as branches rated at 50AT and below and specifically installed in lighting panel boards shall be "Plug-in-type", otherwise it shall be "bolt-on-type", internal common trip for 2 and 3 pole breakers.

4.11 Kilowatt-hour Meters

Shall be of socket-type with rating as indicated in the drawings. Meter shall be capable of operating within 80%-130% of rated voltage. Meter shall be equipped with 4-dial pointer-type register with multiplier tabs. Meter shall be designed positive easy calibration. Meter shall be equipped with stainless cover ring and plastic base to provide corrosion and weather-resistant seal.

4.12 Safety Switches

a) All safety switches shall be rated as shown in the plans. Fusible type unless noted otherwise.
b) Brand shall be "Super".
c) All safety switches rated at 60A and above shall be spring assisted.

4.13 Wiring Devices

a) Lighting switches shall be of the quiet type, spring operated thumbler operation, minimum capacity of 10A at 230 volts. Switches shall be "NATIONAL" flush mounted type. Submit samples prior to the purchase of the switches. Mounting height will be 1.37 AFL.

b) Receptacle Outlet: All convenience outlets shall be "NATIONAL" standard type, duplex type, parallel slots, flush mounting type. Cover plates shall be subject to the approval of the Owner. Submit samples for approval. Weatherproof outlets shall have same type as the convenience outlets except that the cover shall be of weatherproof type. Mounting height will be 0.30m AFL.

c) Special purpose outlet - These shall be "Eagle" brand heavy duty, rated at no less than the full load ampere of the appliance to be served. Cover plate shall be subject to Owner's approval.

d) Only one (1) brand of wiring device shall be used for the project.

4.14 Lighting System

a) Furnish, install and wire all equipment and materials required for complete lighting system as specified and shown on the plans.
b) Lampholder shall be locking type, spring loaded bi-pin.
c) Flourescent lamps shall be cool white and rapid start or as shown on the plans.
d) Flouresecent fixtures ballast shall be 230V high power factor, rapid start premium close or as shown on the plans and as manufactured by "Philips".
e) Fixtures wiring shall comply with the manufacturer's recommendations and PEC requirements.

PART 3 EXECUTION

4.15 Installation of Conduits

a) Installation is in accordance with PEC and of good engineering practice.

b) Use standard trade size locknut and bushing at each end terminating in boxes/panelboards. Ensure electrically continuous conduit system.

c) Provide independent conduits supports using hangers supports or fastening spaced in accordance with good engineering practice and PEC.

d) Use adjustable trapeze hangers for horizontal parallel runs. Submit shop drawings for approval.

e) Conduits must be concealed except in impractical areas and in mechanical/electrical rooms. Exposed conduits must be parallel to or at right angles to contour of walls slabs, etc. Use condulets wherever necessary.

f) Conduits joints shall not be more than the equivalent of three (3) 90 degree bends between pulling points.

g) Cut ends of conduits square with hand or power saw and ream to remove burrs and sharp edges. Do not use wheel cutter. Conduit threads cut on job shall have the same effective length, dimensions and tapper as factory cut threads.

h) Provide hangers, supports or fastening at each elbow and at end of every straight run terminating in a box or cabinet. Rigid fastening shall be spaced in accordance with the PEC.

i) Clamps shall be galvanized maleable iron one hole strap, beam, clamps or other approved device with necessary bolts and expansion shields.

j) Trapeze, hangers must be used for parallel runs of conduits clamps at end run and at each elbow. Paint hangers one prime coat of red lead or zinc chromate, and one finish coat of an approved color. Hangers are not detailed but must be adequate to support combined weight of conduit conductors and hangers, submit shop drawings for approval.

4.16 Wireway/Pull Boxes

a) Gauge formed sheet and reinforced sheet metal with screw fastened cover. Provide without knockout.

b) Paint Wireway/box with manufacturer's standard baked enamel over lead primer.

4.17 Boxes

a) Outlet Boxes - outlet boxes shall be provided for each wiring device or lighting fixtures/outlet.

b) Junction Boxes - provide junction boxes for splicing or pulling wires. Provide as shown on the plans or wherever necessary.

c) All boxes shall be electrically grounded.

4.18 Conduits/Fittings

Conduits, fittings shall be used with exposed conduits to maintain good symmetry with adjacent wall, etc..

4.19 Wires

a) Use standards in pulling wires.

b) Splices of wires/cables shall be done inside junction boxes or auxilliary gutters using standard connectors. No wires shall be spliced inside conduits.

4.20 Panelboards and Circuit Breaker

a) NEMA type/enclosure unless noted, PEC rules and regulations circuit breakers type shall be 460V and 230V number of pole as required.

b) Word "space" indicated in the schedule shall mean that complete bus, insulators, etc. shall be included ready to accept future circuit breaker of the same frame size as the largest branch circuit breaker.

c) Maximum distance from floor to uppermost part of the panelboards shall be 1.80m.

d) Panel directory shall be provided for each panelboards complete with necessary data. All circuit breaker of panelboards shall be marked to its actual phase connection (i.e. OAB, BC, CA).

e) Directory shall be typewritten and placed inside of panel doors.

f) Specifications for panel boards, and air circuit breaker.

1) Panel boards to be used shall be flush mounted in areas that are visible to the general public, (such as corridor and lobbies) and may be flush or semi-flush mounted when located in the Electrical rooms or in in areas where they are not visible to the general public. All panel boards shall be mounted, set plumb and installed symmetrical with surrounding objects.

2) Each lighting panel board shall be mounted in baked enamel, 16 gauge cabinet properly reinforced, and of sufficient size to allow gutter space with a minimum of 100mm (4 inches) on all sides.

3) Each cabinet shall be furnished with a plain pressed trim and a door of No. 14 gauge, steel, painted with two coats, to match the surrounding walls. Doors shall be furnished with hinges, door stop and lock with keys, all doors being keyed alike. Single door shall be provided for lighting panels.

4) Power distribution panels shall be similar to lighting panels, except that minimum gutter space all around shall be 114 mm (4-1/2 inches) on all sides, if mains are 225 amperes. Use 204 mm (8 inches), if mains are 400 to 600 amperes. Gutter space indicated are minimum.

5) Circuit breakers shall be of the common trip magnetic thermal type, with the ratings and number of poles as indicated in the load schedule and on the drawings.

6) Interrupting capacities of the various ACB in symmetrical amperes shall be as follows:

FOR LIGHTING CIRCUITS ON LOADS:

ACB AMPERES	240 VOLTS
70 and below	10,000 V
70 to 100	10,000 V
Above 100 A	22,000 V

FOR INDUSTRIAL TYPE MOTORS & DISTRIBUTION PANEL BOARDS :

AMPERES	240 VOLTS	480 VOLTS
70 and below	25,000 V	14,000 V
Above 70 to 250	25,000 V	18,000 V
Above 250 to 400	42,000 V	30,000 V
Above 400 to below 800	65,000 V	35,000 V
Above 800	85,000 V	50,000 V

5.0 TELEPHONE SYSTEM

5.01 The ELECTRICAL CONTRACTOR shall furnish and install all materials and labor necessary to complete the system in accordance with the latest issue of BICS standard. Any changes or addition required for proper operation of the system shall be supplied without additional cost to the Owner.

a) Conduit system including boxes, cabinets.

b) Telephone outlets

c) Number 22-4/C jacketed wires from telephone terminated cabinet to outlet.

d) Grounding system

5.02 All wiring shall be run through rigid PVC conduits. Cables for telephone branch conduits shall be 0.32 sq. mm. (#22 AWC) twisted priple PVC jacketed with number of runs shown on the plans.

5.03 Telephone lines to each outlets shall be properly tagged at each outlets and at the telephone terminal cabinet. Splicers shall be made with 3mm #UG splicers.

5.04 A continuous length of bars, stranded 14 sq. mm copper wire connected to the building grounding system shall be terminated at the terminal cabinet thru a ground bushing.

5.05 Outlet boxes for telephone instruments shall be of size and type to suit individual location. Wall telephone outlets shall be provided with a 9.8 mm cord hole at the middle.

5.06 The terminal cabinet shall be cold gauge steel construction and provided with snap catch and brass lock. The cabinet shall be provided with 9 mm thick pressure-treated wooden backboard and required number of terminal blocks.

6.0 FIRE DETECTION AND FIRE ALARM SYSTEM DESCRIPTION

A. Operation

The system shall utilize smoke and heat detectors, manual stations, bells, annunciator and control panel with supervisory buzzer and lights. The early stage of fire outbreak sensed by the detector will send a pre-sentinal on duty of the situation. If, upon verification by the guard, the signal is confirmed, the general alarm thru the bells can be issued by operating on the FACP or on any manual station. The system can be reset to normal surveillance mode thru the operation on the FACP.

B. Components and Features

1. Fire Alarm Control Panel (FACP)

This FACP shall be flush mounting type. It shall be able to handle at least 15 detector per circuit and must be capable of initiating general alarm condition. Input voltage shall be for 230 volt, single phase, 60 hertz, and shall incorporate the following features.

a. Visual alarm thru lamps to indicate zone coverage indication of fire outbreak. The annunciator panel shall consist of supervised lamp indicator representing at least 32 zones.

b. Testing Switch

c. Reset control to switch off the general alarm and then resume automatic detention.

d. Provide component necessary for outgoing automatic signal for feature connections to a main FACP. This signal from the smoke detectors to this FACP shall likewise be automatically transmitted to another control panel called the main fire alarm control panel (MFACP) likewise.

e. Stand by 24 volts DC battery.

f. This FACP shall be provided with a component for the "incoming signal " such that any signal from a main FACP will automatically activate the alarm bell of this FACP.

g. FACP normal power supply shall homerun to panel (LPBE-2) located at basement EE room.

2. Fire Alarm Bell

Fire alarm bell shall be for 24 VDC operation gong type, at least 150mm diameter.

3. Manual Station

Equipped with telephone jack for fireman's communication system fresh butter type with reset switch color red. Shall be interfaciable to monitor module that is addresseable.

4. Fire Alarm Control Balance

- must be monitored or supressed
- with battery back-up supply charger module and clearer module
- with fire zone indicator lamp
- various test function
- trouble lamps indicator
- test continuity
- rest switched
- lamp test
- trouble fire alarm sounder or "buzzer"
- with back-up digital zone indicator

C. Brand / Manufacturer

The equipment / drawings to be installed shall be "EDWARDS" or approved equal.

D. Requirements :

1. Installation shall comply with the manufacturer's standard / requirements.

2. Prior to installation of any equipment, the Contractor shall submit shop drawing on actual wiring runs, one line diagram, detailed drawing necessary for installation, and equipment specification sheets.

3. All other items not specifically mentioned but are necessary for the completion of the fire protection and alarm system in accordance with the approved plans and specifications.

E. Test

The Contractor shall apply such tests for the equipment/ devices as folows :

a. Fire alarm bell
b. Fire Alarm Annunciator
c. Manual Station
d. Zone system & etc.

Replace or remedy all effective works and devices.Submit typewritten report to Engineer.

SPL-2 – HEALTH AND SAFETY

GENERAL GUIDELINES

In compliance with Section 17 of DOLE D. O. No. 13, the implementation of construction safety shall be considered in all stages of project procurement (design, estimate, and construction) and its cost shall be integrated to the overall project cost under Pay Item "SPL-Construction Safety and Health" as a lump sum amount, to be quantified in the detailed estimate. Likewise, all requirements, provisions, and instructions pertaining to the implementation of Construction Safety and Health in every project shall be included in the project bidding documents specifically under the Instructions to Bidders.

Further considering industry practices and applicable government requirements, the following guidelines are hereby issued to all concerned:

1. Definition of Terms

As used herein, the terms below shall be defined as follows:

a. Occupational Safety and Health - As defined is the:

1) Promotion and maintenance of the highest degree of physical, mental, and social well-being of workers in all occupation;

2) Prevention among its workers of any departures from health caused by their working conditions;

3) Protection among workers in their employment from risk usually from factors adverse to health; and,

4) Placing and maintenance of worker in an environment adopted to his/her psychological ability.

b. Occupational Safety and Health Standard (OSHS)

By the powers vested in the Department of Labor and Employment under Article 162 of the Labor Code of the Philippines, the Occupational Safety and Health Standards (OSHS) was promulgated for the guidance and compliance of all concerned with the main objective of protecting every workingman against the dangers of injury, sickness or death through safe and healthful working conditions, thereby assuring the conservation of valuable manpower resources and the preservation of loss or damage to lives and properties, consistent with national development goals and with the State's commitment for the development of every worker as a complete human being.

Likewise, further described as: rules and regulations implementing Article 162 (Safety and Health Standards), Book IV, Title I, P. 0.442; set of mandatory OSH standards which codifies all safety orders being enforced prior to its promulgation; and - contains administrative requirements, general safety and health rules, technical safety regulations, and other measures to eliminate or reduce OSH hazards in the work place.

c. Construction Safety and Health Standards - shall mean Rule 1410, Construction Safety and other relevant rules of the Occupational Safety and Health Standards (as amended) of the Department of Labor and Employment (DOLE).

d. Construction Safety and Health Program - refers to a set of detailed rules to cover the processes and practices that should be utilized in a specific construction site in conformity with the OSHS including the personnel responsible and the penalties for violations thereof.

e. Construction Safety and Health Officer - refers to safety personnel or any employee/worker trained by his employer to implement occupational safety and health programs in accordance with the provisions of DOLE D.O. No. 13 and the Occupational Safety and Health Standards (OSHS).

f. Personal Protective Equipment (PPE) andDevices - are equipment and devices designed to protect employees from workplace injuries or illness resulting from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. It also includes variety of devices and garments such as face shields, safety glasses, hard hats, safety shoes, goggles, coveralls, gloves, vests, earplugs, respirators, safety harness and lifelines.

2. Purpose

The purpose of these guidelines is to establish a uniform methodology in estimating the required resources (manpower and equipment) for the implementation of Construction Safety and Health Standards in the workplace in compliance with the provisions of DOLE D.O. No. 13.

3. Methodology

The minimum construction safety and health requirements for project shall be prepared during the detailed engineering stage.

In order to establish a uniform basis for estimating the required quantity of resources (manpower and equipment) for a project the following methodology shall be used.

a. Construction Safety and Health Program (CSHP)

Section 5 of the DOLE D.O. NO.13 provides that every construction project shall have a suitable Construction Safety and Health Program (CSHP).

For the purpose of these guidelines, all projects regardless of amount, funding source and mode of implementation shall comply with the minimum safety and health requirements.

The contractor's proposed CSHP shall be in accordance with DOLE D.O. No. 13, series of 1998 and its Procedural Guidelines to be submitted as part of the first envelope (Technical Proposal) during the bidding process and later the winning bidder shall submit the same for approval of the DPWH authority, subject to concurrence by DOLEBWC.

For project to be implemented by administration, a CSHP shall also be prepared by the DPWH Implementing Office in accordance with the requirements of DOLE D. O. No.

13, s. of 1998 and likewise it shall also be submitted to DPWH authority for approval and thereafter to be concurred also by the DOLE-BWC.

The required Construction Safety and Health Program (CSHP) for specific project shall include but not limited to the following:

a. composition of the Safety and Health personnel responsible for the proper implementation of CSHP;

b. specific safety policies which shall be undertaken in the construction site, including frequency of and persons responsible for conducting toolbox and gang meetings;

c. penalties and sanctions for violations of the Construction Safety and Health Program;

d. frequency, content and persons responsible for orienting, instructing and training all workers at the site with regard to the Construction Safety and Health Program which they operate; and

e. the manner of disposing waste arising from the construction.

b. Construction Safety and Health Organization

To ensure that the Construction Safety and Health Program are observed and implemented at the project site, at the start of D.O. No. 56 s. 2005 construction, each site shall have an established construction safety and health organization composed of the following personnel:

b.1 Safety Engineer/Officer

Section 7.1 of D.O. NO.13 states that "The general contractor must provide for a full time Officer, who shall be assigned as the General Construction Safety and Health Officer to oversee full time the overall management of the Construction Safety and Health Program".

Section 7.2 states that " The general contractor must provide for additional Construction Safety and Health Officer/s in accordance with the requirements for Safety Man / Officer of Rule 1033, Training and

Personnel Complement, as amended by DOLE D.O. No. 16 depending on the total number of personnel assigned to the construction project site, to oversee the effective compliance with the

Construction Safety and Health Program at the site, under the direct supervision of the General Construction Safety and Health Officer".

For the purpose of these guidelines, and as recommended by DOLE, for every construction project with 100 and above workers, an accredited safety officer by DOLE-BWC shall be employed. Only the cost for the Construction Safety and Health Officer, whether on full time or part time basis, actually assigned at the construction site shall be included in the cost estimate.

On the part of the government, the implementing office shall designate as part of their project staff a Safety Engineer who shall be responsible for ensuring compliance with the pertinent DOLE

Guidelines as well as the DPWH Guidelines on Occupational Safety and Health during the execution of the construction. The counterpart safety and health officer of the contractor shall closely coordinate and report to the government Safety Engineer.

b.2 Health Personnel

Rule 1412.01 of OSHS states that "at every construction site there shall be an organized and maintained medical and dental health service and personnel' conforming with Rule 1960 Occupational Health Services.

For the purpose of these guidelines only the medical and dental practitioners actually assigned in the project site and as required on the above stated Rule shall be included in the total cost of safety.

Manpower rates shall be based on the prevailing rates of such professionals in the area which is found favorable to the government.

Employment period shall be based on the approved project duration and shall be adjusted correspondingly as the duration increases/decreases.

c. Personal Protective Equipment and Devices (PPE)

Section 6 (Personal Protective Equipment) of D. O. No. 13 guidelines states that "every employer shall, at his own expense, furnish his workers with protective equipment for eyes, face, hands and feet, lifeline, safety belt/harness, protective shields and barriers whenever necessary by reason of the hazardous work process or environment, chemical or radiological or other mechanical irritants of hazards capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical agent".

All Personal Protective Equipment and Devices shall be in accordance with the requirement of the Occupational Safety and Health Standards (OSHS) and should pass the test conducted and/or standards sets by the Occupational Safety and Health Center (OSHC).

For General Construction Work the required Basic PPEs for all workers shall be Safety Helmet, Safety Gloves and Safety Shoes. Specialty PPEs shall be provided to workers in addition to or in lieu of the corresponding basic PPE as the work or activity requires.

d. Signages and Barricades

Construction Safety Signages and Barricades shall be provided as a precaution and to advice the workers and the general public of the hazards existing in the worksite.

For road construction signages and barricades, it shall be in accordance with or in compliance to Department Circular No.9, Series of 2004 (Re: Road Safety Manuals and Handbooks) particularly on the 'Road Works Safety Manual.

e. Facilities

Section 16 of DOLE D.O. NO.13 requires that the employer shall provide the following welfare facilities in order to ensure humane working conditions;

a. adequate supply of safe drinking water;

b. adequate sanitary and washing facilities;

c. suitable living accommodation for workers, and as may be applicable, for their families; and

d. separate sanitary, washing and sleeping facilities for men and women workers.

For the purpose of these guidelines, facilities related to construction safety and health shall be in accordance with OSH Standards and the manner of costing shall be based on previously approved guidelines of the Department, duly quantified as a separate pay item.

f. Safety and Health Training

Section 13 of DOLE D.O. No. 13 requires that the contractor shall provide continuing construction safety and health training to all technical personnel under his employ.

4. Costing

In consideration of the cost involved of providing the necessary safety equipment and manpower for an effective implementation of safety in the workplace, and in compliance with DOLE D.O. No. 13, with safety as a separate pay item, the following shall be used as a guide:

a. Personal Protective Equipment

The PPEs shall be provided by the Constructor, and its cost shall be duly quantified and made part of the overall cost of safety and health (SPL). The use of PPEs shall conform to Rule 1080, Personal Protective Equipment and Devices of OSHS.

b. Clinical Materials and Equipment

Clinical materials and equipment such as medicines, beds and linens, other related accessories shall be to the account of the Constructors implementing the project and shall be in accordance with Rule 1960, Occupational Health Services of OSHS.

c. Signages and Barricades

The quantities and cost of signages and barricades necessary for a specific item of work shall be quantified and made part of that particular pay item of work.

For general signages and barricades not included in specific pay item of work but necessary for promoting safety in and around the construction site, the quantities and cost shall be a separate pay item and included in the overall cost of safety and health (SPL).

d. Facilities

Facilities such as portable toilets, waste disposal, sanitary and washing facilities, convenient dwellings and office, adequate lighting, and other facilities related to construction safety and health shall be in accordance with OSH Standards and previously

approved guidelines of the Department and shall be quantified and the cost thereof be made a separate pay item under "Facilities for the Engineers" and "Other General Requirements" as required in the DPWH Standard Specifications.

e. Salaries/wages of Health and Safety Personnel

Labor cost for the medical and safety personnel actually assigned in the field shall be included in the overall cost of safety and health (SPL). Duration of employment shall be based on project duration of the particular project.

f. Safety and Health Training

Cost associated for the provision of basic and continuing construction safety and health training to all safety and technical personnel shall be made part of the indirect/overhead cost of the project.

ITEM NUMBER	DESCRIPTION	UNIT OF MEASUREMENT
SPL-2	Provision on Health and Safety	l.s.