

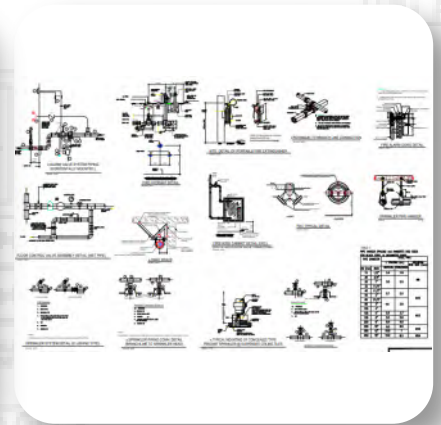
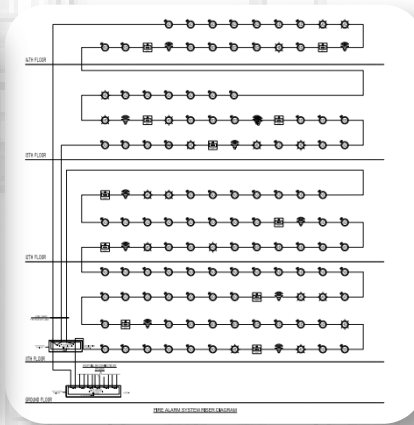
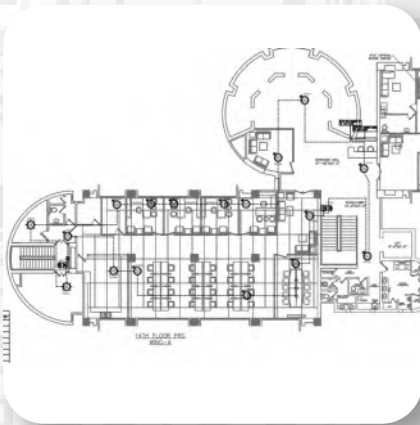
BIDDING DOCUMENTS FOR SUPPLY AND INSTALLATION OF FIREFIGHTING SYSTEM AT PRCL TOWER, KARACHI UNDER UPGRADATION OF FIREFIGHTING SYSTEM AT PRCL, HOK (VOLUME IV)

NOVEMBER-2023



PAKISTAN REINSURANCE COMPANY LIMITED

ENGINEERING CONSULTANCY SERVICES FOR RENOVATION OF PRCL OFFICE BUILDING AT KARACHI



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FIREFIGHTING SYSTEM – TECHNICAL SPECIFICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes general requirements for Equipment, Piping, Pipe Fittings, and incidental related items as required for complete firefighting systems.

1.2 REFERENCES

- A. ANSI: American National Standards Institute
 1. ANSI B16.1: Gray Iron Pipe Fittings and Flanged Fittings: Classes 25, 125, and 250
- B. ASTM: American Society for Testing and Materials
 1. ASTM A53 or A120: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 2. ASTM A135: Standard Specification for Electric-Resistance-Welded Steel Pipe
 3. ASTM A183: Standard Specification for Carbon Steel Track Bolts and Nuts
 4. ASTM A234: Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
 5. ASTM A307: Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
 6. ASTM A47: Standard Specification for Ferritic Malleable Iron Castings
- C. AWWA: American Water Works Association
 1. AWWA C151: Ductile Iron Pipe, Centrifugally Cast, for Water
 2. AWWA C209: Cold-Applied Tape Coatings for Steel Water Pipe and Fittings
 3. AWWA C214: Tape Coating Systems for the Exterior of Steel Water Pipelines
- D. NFPA: National Fire Protection Association
 1. NFPA 13 Standard for the Installation of Sprinkler Systems
 2. NFPA 14 Standard for the Installation of Standpipes and Hose Systems
 3. NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection, 2016 Edition.
 4. NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 5. NFPA 22 Standard for Water Tanks for Private Fire Protection

1.3 CONTRACTOR'S TECHNICAL RESPONSIBILITIES:

Contractor shall provide the following;

- A. Contractor shall provide detailed calculations for flow and head required for firefighting system, detailed shop drawings along with complete data sheets and specifications of equipment/ material, and shall be submitted to the Consultant for approval prior to ordering such equipment. No material or equipment may be ordered, delivered to the job site or installed until the Contractor has in his possession the approved shop drawings and data sheet for the particular material or



equipment. The shop drawings shall be complete as described herein. The Contractor shall furnish the number of copies required by the conditions of the contract.

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

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

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

Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of contract time, and no claim for extension by reason of such default will be allowed.

Shop Drawings:

The Contractor shall prepare and submit for approval detailed shop drawings for all items, manufacture, fabrication and assembly undertaken and are required for the proper execution of any items of work connected with the satisfactory completion of the Contract. These drawings should be based on and referred to with drawings, instructions and specifications given in the Contract Documents and Supplier's manuals. The detailed procedure of submission, approval and recording of these shop drawings shall be indicated by the Consultant.

EQUIPMENT DEVIATIONS

Where the Contractor proposed to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part or the mechanical, electrical or architectural layout, all such redesign, and all new drawings and detailing required therefore, shall be prepared by the Contractor at his own expense as approved by the owner's representative.

Where such approved deviation requires a different quantity and arrangement of duct work, piping, wiring, conduit and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring, and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

WARRANTY

All equipment supplied for these specifications shall be free from defects in material, workmanship, and title, and shall be of the kind and quality described herein. If it appears within warranty period by the contractor that the equipment does not meet the warranties specified above, the contractor shall correct any defect, including non-conformance with these specifications, at his option, either by repairing any defective part or parts or by making available at his plant a repaired or replacement part.

The foregoing warranty is exclusive and in lieu of other warranties, whether written, oral, implied or statutory.



B. Test Reports and Certificates: Inspections and pipe tests.

C. Other: Certified welders' certificates.

1.4 PURCHASE OF EQUIPMENT / MATERIAL

All the equipment and material e.g. pumps, fire extinguishers and sprinklers will be purchased direct from the Manufacturer or authorize representative of the manufacturer to ensure the use of genuine material. Manufacturer's certificate and copies of delivery challans for all such material will be produced as and when desired.

Note: All Equipment/ material shall be UL Listed/ FM Approved unless approved by Design Engineer/ Consultant.

1.5 QUALITY ASSURANCE

Contractor will ensure following;

- A. Regulatory Requirements: Piping material and installation shall meet requirements of the local fire, and building codes and serving utility requirements.
- B. Pipe Cleaning: Should any pipe be plugged or should foaming of water systems occur, disconnect piping, re-clean, and reconnect without additional expense.
- C. Correct any damage to the building or systems resulting from failure to properly clean the system without additional expense.

1.6 COORDINATION

In selecting the equipment, the tenderer shall carefully check and confirm that the equipment can be installed and conveniently serviced and maintained within the respective spaces indicated on the drawings for unit installation.

1.7 DELIVERY, STORAGE & HANDLING

Equipment/ Material shall be delivered factory assembled with protective crating and covering and their delivery coordinated in sufficient time to allow movement into building.

Preparation for shipment shall be in accordance with Vendor's standards. Contractor shall be solely responsible for the adequacy of the preparation for shipment provisions with respect to materials and applications.

Adequate protection shall be provided against mechanical damage and atmospheric corrosion in transit and for a 6-month period of outdoor storage at job site prior to installation. Control panels shall be protected from moisture penetration.

Miscellaneous parts shall be tagged or marked with the equipment item number for which they are intended.



1.8 WARRANTY

Contractor shall guarantee and provide a written statement as proof that the unit shall perform as specified on the Data Sheets.

All equipment shall be guaranteed for satisfactory performance and shall be warranted against faulty design, defective or improper materials.

a) All equipment must be supplied with Manufacturer's Warranty for a period of 3 YEARS from the date of commissioning of equipment.

b) The Contractor shall guarantee that the material and workmanship incorporated into the work are new and the best of their respective kinds for the service intended and that all items will be free from inherent defect in design, workmanship and materials, and that all equipment in its several parts will operate successfully at all capacities up to and including the maximum specified load without undue noise, heating, straining of parts, wear and vibration.

1.9 MAINTANENCE

The contractor shall be responsible for maintaining the equipment for a period of 01 year from the date of commissioning of equipment. The cost of labor manpower for the 01 year shall be included in the tender bid price and shop supplies including consumables if required.

1.10 PRE-SHIPMENT INSPECTION AND TESTING

Pumping Equipment shall be assembled at the manufacturer premises or premises of authorized representative of manufacturer, inspected/ tested and determined to be in compliance with the specifications. Any deviations found shall be corrected.

PART 2 - PIPES AND FITTINGS

2.1 HIGH DENSITY POLYETHYLENE PIPE

Pipe:

High Density Polyethylene Pipe in accordance with ASTM D3035 Standard Spec for PE Pipe (DR-PR) Based on Controlled Outside Diameter & ASTM D3261 Butt Heat Fusion PE Fittings for PE Pipe & Tubing. PN rating not less than maximum system static pressure.

Fittings:

HDPE fittings shall be in accordance with ASTM D3350 Standard Specification for PE Pipe & Fittings Materials

Service:

1. Below grade, incoming fire protection main.
2. Below grade, water supply main.



2.2 BLACK STEEL PIPE, SCHEDULE 40 PIPE:

Pipe:

Schedule 40, in accordance with ASTM A120 or A53. (UL Listed)

Fittings:

150-pound screwed malleable iron on 2 inches and below, Schedule 40 welded fittings in accordance with ASTM A234 for 2 1/2 inches and above or mechanical couplings on select piping as herein specified. Fittings below grade shall be welding fittings. All elbows on pumped systems shall be long radius type. Short radius elbows are not acceptable for use except as approved by the Port on a case-by-case basis.

Service:

1. Above grade Fire protection system,
2. Miscellaneous drains and overflows.

2.3 FLANGED JOINTS

- A. Flanges shall be cast iron or steel for screwed piping and forged steel welding neck for welded line sizes. Pressure rating and drilling shall match the apparatus, valve or fitting to which they are attached. Flanges shall be in accordance with ANSI B16.1; 150-pound for system pressures to 150 psig; 300-pound for system pressures 150 psig to 400 psig. Gaskets shall be 1/16-inch thick, Cranite or equal, ring type, coated with graphite and oil to facilitate making a tight joint. Make joint using American Standard hexagon head bolts, lock washers and nuts (in accordance with ASTM A307 GR.B) for service pressures to 150 psig; alloy steel stud bolts, lock washer and American Standard hexagon head nuts (in accordance with ASTM A307 GR.B) for service pressures 150 psig to 400 psig. Use length of bolt required for full nut engagement. Provide electro-cad plated bolts and nuts on cold and chilled water lines.

2.4 UNIONS

- A. Unions shall be 150 psi malleable iron or brass, brass to iron seat or viton O-ring, ground joint, black or galvanized to match pipe. 200 psi WOG bronze, ground joint, solder type for copper tubing. Where dissimilar metals join, dielectric unions, couplings or flanges shall be installed.

2.5 UTILITY MARKERS

- A. Provide plastic utility warning tape and locate wire over all buried piping.

2.6 PIPE WRAPPING

- A. For all below ground steel piping and fittings, provide complete covering of Scotchrap No. 51, or equal, 20 mil thickness, protective tape applied over Scotchrap pipe primer applied at 1 gallon per 800 square feet of pipe surface.
- B. At the Contractor's option, pipe may be furnished with factory applied jacket of "X-tru-coat" with Scotchrap.



2.7 PIPING, HANGERS, SUPPORTS, ANCHORAGE, AND SEISMIC RESTRAINTS

All pipe supports shall be in accordance with following Table;

Pipe Support	Material	Finish	Standard	Certification
Trapeze	Carbon steel	Electro-zinc plated	-	UL Listed/ FM Approved
Swivel hanger	Carbon steel	Electro-zinc plated/ copper color	UL 203	UL Listed/ FM Approved
Clevis hanger	Carbon steel	Electro-zinc plated/ copper color	UL 203	UL Listed/ FM Approved
Steel pipe clamp	Carbon steel	Electro-zinc plated/ copper color	UL 203	UL Listed
Steel pipe clamp with EPDM	Carbon steel	Electro-zinc plated	-	ISO
Beam clamp	Malleable iron	Electro-zinc plated	-	ISO
Top beam clamp	Malleable iron	Electro-zinc plated	-	ISO
Standard U-Bolt	Carbon steel	zinc coating	-	ISO
Thread rod	Carbon steel	zinc plated	ASTM A307	ISO

Table: Pipe support Materials

PART 3 - FIRE HYDRANTS AND FIRE MAINS NETWORK

- Three-way 6" dia UL listed controllable wet pillar hydrants with 4" pumper outlet shall be provided with valve chamber and hose cabinet having 30m hose length alongside the main buildings and courtyard area.
- Designed working pressure of fire hydrant shall not be less than 18 Bar.
- A fire department connection shall be provided for automatic wet Standpipe/ combined system in buildings, no more than 12 ft from fire vehicle access road, as per NFPA 14.
- Fire department connections shall be listed for a working pressure equal to or greater than the pressure requirement of the system demand.
- A listed check valve shall be installed in fire department connection. No shutoff valve shall be permitted in the fire department connection piping.
- All equipment/ component of system shall be listed and approved.

PART 4 - FIRE PUMP ROOM

- Fire pumping system shall consist of set of three UL Listed pumps;
 - i. Vertical Shaft Electric motor driven Fire Turbine Pump - Duty Pump
 - ii. Vertical Shaft Diesel engine driven Fire Turbine Pump - Standby Pump
 - iii. Jockey pump - Pressure Maintenance Pump
- Capacity and rating of fire pump shall be in accordance with design report/ drawings.
- The main fire pump will be UL listed Vertical Turbine Type pump.



- For diesel engine fire pump, where a total of 121 percent of the net rated shutoff (churn) pressure plus the maximum static suction pressure, adjusted for elevation, exceeds the pressure for which the system components are rated, a pressure relief valve shall be installed.
- A Pressure relief valve where an electric variable speed pump or a diesel pressure limiting driver is installed, and the maximum total discharge head adjusted for elevation with the pump operating at shutoff and rated speed exceeds the pressure rating of the system components.
- Each pump, including the jockey pump, shall have its own individual controller and each controller shall have its own individual sensing line.
- All equipment/ component of system shall be listed and approved.
- Only long radius elbows shall be used in fire pump room.

PART 5 - PUMP CONTROLLER AND ACCESSORIES

General Controller Description

The Fire Pump Controller shall be factory assembled, wired and tested as a unit and shall conform to all requirements of the latest edition of NFPA 20 and by Third Party Listed by Underwriters Laboratories (UL) and Approved by Factory Mutual (FM).

Controller Equipment Features

The controller shall include the following standard features:

- NEMA Type 2 drip proof metal freestanding enclosure
- Operator Interface Device (OID) with 4 lines by 20 character display with large character backlit LCD capable of being read in both direct sunlight or dark lighting conditions
- 10 pushbuttons for easy screen navigation, system test, lamp test, alarm reset, and horn silencing
- Multicolored LED's for alarm and mode annunciation
- LEDs shall be labeled with removable labels to allow for easy field modification of language changes
- All controller settings shall be programmable through the OID and shall be protected by two password levels
- All features shall be enabled or disabled through the OID, no jumpers or external wires shall be needed or allowed to activate or deactivate a feature
- The system status data shall be displayed on the OID. The displayed items shall include: System pressure, Phase to Phase (AB, BC, AC) voltage, Phase current (A, B, C), System Events and Notifications, Current time and date, Number of starts, Total motor run hours, displayed countdown timers for: Sequential motor start and motor stop, Status of Automatic Stop Setting.
- Audible horn with silence feature for silencable alarms
- Lamp test feature
- Foreign languages selectable through the OID
- One RS485 Serial Port
- MODBUS Communication Protocol via RS485 port
- All wiring terminals on PCB's shall be removable type
- Service Entrance Rated
- Microprocessor based logic with real time/ date clock capable of running a minimum of 14 days without AC power connected to controller and non-volatile flash memory to permanently store the continuous pressure log, event log, alarm log and all user changeable set points and system data. Battery backup of any kind not allowed.
- Input and output status LED's to provide visual indication of each discrete input's or output's on/off status



PART 6 - DOUBLE COMPARTMENT FIRE HOSE REEL CABINET 1" / 2.5"

Cabinet manufactured from mild steel with 1.2mm thickness and painting from inside and outside with Epoxy Powder Red with minimum 70 micron to protect the cabinet from Weather factors.

Upper Fire Hose Reel Cabinet 1 " Contain the following Items:

1. Manual Swing Type Hose Reel coiled With Lay flat Fire hose made of Flexible rubber which reinforced with fiber industrial and the internal diameter of the hose 1" inches and the length of 30 meters.
2. Valve 1 "inch made of Copper which Rust-resistant material to control the process of opening and closing the water
3. Fire Nozzle 1" inch UL Listed

Lower Fire Hose Reel Cabinet 2.5" Contain the following Items:

1. Manual Swing Type Hose Reel coiled with Lay flat Fire hose of red polyester and padded inside with a layer of Rubber and the internal diameter of the hose at the fullness 2.5" and the length of 30 meters
2. Landing Fire Hydrant 2.5 "inch made of Rust-resistant material and equipped with wheel to control the process of opening and closing the water and is suitable for the possibility to install at water feeding pipe of the Main fire network in all diameters.
3. Fire Nozzle 2.5"-inch UL Listed

The cabinet is well equipped to install at Wall mounted.

PART 7 - SINGLE COMPARTMENT FIRE HOSE REEL CABINET 1"

Cabinet manufactured from mild steel with 1.2mm thickness and painting from inside and outside with Epoxy Powder Red with minimum 70 micron to protect the cabinet from Weather factors.

Cabinet Contain the following Items:

1. Manual Swing Type Hose Reel coiled With Lay flat Fire hose Made Flexible rubber which reinforced with fiber industrial and the internal diameter of the hose 1" inches and the length of 30 meters.
2. Side Valve 1 "inch made of Copper which Rust-resistant material to control the process of opening and closing the water
3. Fire Nozzle 1" inch

Hose Reel able to withstand pressure equal three times of the maximum operating pressure of 12bar without exploding. The cabinet is well equipped to install at Wall mounted.

PART 8 - AUTOMATIC FIRE SPRINKLERS

All fire sprinklers shall be UL listed Quick Response Pendant/ Upright Automatic Wet Fire Sprinklers with K factor 5.6 and 68 °C Rated Temperature.

PART 9 - EXECUTION

9.1 PREPARATION

A. Measurements, Lines, and Levels:

1. Check dimensions at the building site and establish lines and levels for the work specified in this section.



2. Establish all slopes and elevations by instrument, working from an established datum point. Provide elevation markers for use in determining slopes and elevations in accordance with the drawings and specifications.
3. Use established grid and area lines for locating trenches in relation to buildings and boundaries.

9.2 EXCAVATION AND BACKFILL

- A. Perform all necessary excavation and backfill required for the installation of mechanical work, Site Repair pipelines or other work damaged during excavation and backfilling.
- B. All piping shall be full bedded on sand. Place a minimum 4-inch-deep layer on the leveled trench bottom for this purpose. Remove the sand to the necessary depth for piping bells and couplings to maintain contact of the pipe on the sand for its entire length. Lay all other piping on a smooth level trench bottom, so that contact is made for its entire length.

9.3 PIPING INSTALLATION

- A. Install unions in all non-flanged piping connections to apparatus and adjacent to all screwed valves and appurtenances requiring removal for servicing, located so that piping may be disconnected without disturbing the general system.
- B. Mechanical Couplings:
 1. On systems using galvanized pipe and fittings, fittings shall be galvanized at factory.
 2. Before assembly of couplings, lightly coat pipe ends and outside of gaskets with approved lubricant.
 3. Pipe grooving shall be in accordance with manufacturer's specifications contained in latest published literature.
- C. Install all piping to drain.
- D. Support all piping independently so that its weight is not carried by the equipment.
- E. Install utility warning tape and locate wire over the entire length of the underground piping utilities, Trenching, Backfilling, and Compacting.
- F. Underground Water Systems: Provide mechanical joint restraints or concrete thrust blocks, prior to testing pipe, at changes in direction. Block size as required for types of fittings involved.
- G. Flexible Joints/Seismic Connectors: Install where piping crosses building expansion joints and were indicated on drawings. Install in accordance with the manufacturer's instructions.

9.4 PIPING JOINTS

- A. Pipe and fittings shall be joined using methods and materials recommended by the manufacturer, in accordance with standard practice and applicable codes. Cleaning, cutting, reaming, grooving, etc., shall be done with proper tools and equipment. Hacksaw pipe cutting is prohibited. Peening of welds to stop leaks is not permitted.



- B. Do not install couplings in floor, wall, or grade beam sleeves.
- C. Steel Piping:
1. Screwed Joints: Cut pipes evenly with pipe cutter, and ream to full inside diameter, with all burrs and cuttings removed. Joints shall be made up with suitable lubricant or Teflon tape, applied to male threads only, leaving two threads bare. Tighten joints so not more than two threads are left showing. Make junctions between galvanized steel waste pipe and bell of cast iron pipe with tapped spigot or half coupling on steel pipe to form spigot end, and caulk.
 2. Flanged Joints: Pressure rating of flanges shall match valve or fitting joined. Coat joint gaskets with graphite and oil.
- D. Welded Joints:
1. Preparation for Welding: Bevel piping on both ends before welding.
 - a. Use following weld spacing on all butt welds:

<u>Nominal Pipe Wall Thickness</u>	<u>Spacing</u>	<u>Bevel</u>
1/4" or less	1/8"	37 1/2°
Over 1/4", less than 3/4"	3/16"	27 1/2°
 - b. Before welding, remove all corrosion products and foreign material from surfaces.
 2. Joints shall be made by the arc-welding process using ASME certified welders. Port openings of fittings shall match the inside diameter of the pipe to which they are welded. Use full radius welding elbows for all turns; use welding tees for all tees. Use reducing fittings for size reduction. Weldolets may be used for branches up through one-half the pipe size of the main to which they are attached. Nipples will not be allowed.
 3. Welding Operation:
 - a. After deposition, clean each layer of weld metal to remove slag and scale by wire brushing or grinding. Chip where necessary to prepare for proper deposition of next layer.
 - b. Weld reinforcement no less than 1/16 inch nor more than 1/8 inch above normal surface of jointed sections. Reinforcement shall be crowned at center and tapered on each side to surfaces being joined. Exposed surface of weld shall be free of depressions below surface of jointed members.
 - c. No welding shall be done when temperature of base metal is lower than 0°F. Material to be welded during freezing temperatures shall be made warm and dry before welding is started. Metal shall be warm to the hand or approximately 60°F.
- E. Screwed Joints: Use Teflon tape or Teflon liquid dope applied to male threads only.

9.5 INSTALLATION, PIPE WRAP

- A. Install in accordance with AWWA C209 and C214.
- B. Apply in accordance with the manufacturer's instructions.
- C. Apply wrapping to fittings in field after installation.

9.6 ADJUSTING AND CLEANING

- A. Clean interior of all piping before installation.
- B. Flush sediment out of all piping systems with a minimum velocity of 5 to 6 FPS.



- C. Prepare system for adjusting and balancing. If any system components, including control valves, balancing valves, automatic flow control valves, strainers, or other valves and specialties have sediment present, remove, clean and replace damaged or worn components.

PART 10 - TESTING

Hydrostatic tests shall be performed at not less than 13.8-bar (200-psi) pressure for 2 hours, or at 3.4 bar (50 psi) in excess of the maximum system pressure.

Nondestructive testing of suitable method (UT, MT etc.) shall be performed at least 15% of all weld joints as per ASME/ ASTM standards.



SPECIAL PROVISIONS

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SPECIAL PROVISIONS

1 GENERAL

1.1 Specifications - Special Provisions shall form an integral part of Bid and the Contract documents.

1.2 The Contractor shall notify all sub-contractors of the provisions of these Special Provisions.

2 DESCRIPTION OF PROJECT, WORKS INVOLVED AND SITE

Capital Development Authority, Islamabad hereinafter called "the Employer" wishes to receive bids for the "Supply and Installation of Firefighting System at PRCL Tower, Karachi under Upgradation of Firefighting System at PRCL, HOK ", as mentioned in BOQ and specified in Technical Specifications

3 CODES, STANDARDS AND CERTIFICATES

A. Applicable Standards

Except as otherwise provided by these Specifications or the Drawings, all materials, equipment and fabrication and testing thereof shall conform to the latest applicable standards and codes referred in the Specifications by use of the abbreviations explained below:

Abbreviation:	Full Form:
ASCE	American Society of Civil Engineers
ASA	American Standard Association
BCP	Building Code of Pakistan
NFPA	National Fire Protection
IEC	International Electrotechnical Commission
NEC	National Electrical Code

ICAO	International Civil Aviation Organization
PS	Pakistan Standards (Pak)
BSICP	British Standard Institute Code of Practice
PSI	Pakistan Standard Institute
UBC	Uniform Building Code (USA)

If the Contractor, at any time and for any reason, wishes to deviate from the above standards or desires to use material or equipment not covered by the above standards, he shall state the exact nature of the changes, the reason for making the change and shall submit complete specifications of the materials and equipment to the Engineer for approval.

B. Standards other than those Specified

Where requirements for materials or equipment are specified by reference to a standard which has its origin in one country, it is not the intention to restrict the requirements solely to that standard and that country. Other standards, including standards of other countries, will be accepted provided the requirements thereof, in the sole opinion of the Engineer, are at least equal to the requirements of the standard specified. The Contractor may propose to the Engineer an equivalent standard other than that specified, in which case he shall submit the proposed standard and all other information required and shall submit written proof that his proposed standard is equivalent in all significant respects to the standard specified. All submissions must be made in the English language.

C. Codes and Standards at Site

The Contractor shall supply and have at his site office:-

- a) Copies of all latest editions of codes and standards referred to in these Specifications or equivalent codes and standards as approved by the Engineer.
- b) Catalogues and published recommendations from manufacturers supplying products and materials for the project.

- c) The Contractor shall provide manufacturer's or supplier's materials which must meet the requirements of a specific code or standard as stated in these Specifications.

4 MANUFACTURER'S RECOMMENDATIONS

Installation of manufactured items shall be in accordance with procedures recommended by the manufacturer or as approved by the Engineer.

5 UNITS OF MEASUREMENTS

The units as described in schedule of prices (Volume-II & III of bidding documents) throughout the Project.

6 EXISTING CONDITION AT SITE

Drawings and information pertaining to existing project conditions are furnished for reference. Neither the Employer nor the Engineer warrants the adequacy or correctness of these. The Bidders are encouraged to visit the project site to assess the existing site conditions.

7 PROTECTION AND PRECAUTIONS

The Contractor and his sub-contractors shall afford all necessary protection to existing structures and will be required to make good at his own expense any damage done to such structures through his own or his representatives or subcontractors' fault and negligence.

The Contractor and his sub-contractors shall afford all necessary protection to existing roads in the area. He will clear and make good at his own expense any damage to or debris on these roads through his own fault and negligence. He must at all-time ensure the free and normal flow of traffic and shall not cause obstruction to the traffic system. The Contractor and his sub-contractors shall provide and maintain necessary protection and precautionary measures such as warning signs, warning lamps and barricades etc. to prevent accidents.

The Contractor shall promptly correct all such damage to original condition at no additional expense to the Employer. The Contractor shall cooperate with trades performing work under other Contracts as necessary for completion.

8 SEQUENCE OF CONSTRUCTION

The Contractor shall submit his proposal for approval of the Engineer the sequence of Construction, prior to starting the works. The works shall be executed as per approved sequence of construction with due consultation of the Employer.

9 LINES AND LEVELS

Survey control points will be established by the Engineer. The Contractor shall be responsible for verifying these and shall be responsible for all requirements necessary for the execution of any work to the locations, lines, and levels specified or shown on the drawings, subject to such modifications as the Engineer may require as work progresses.

10 PLANT, EQUIPMENT AND TOOLS

The Contractor shall provide at his cost modern plant, equipment and tools, adequate and befitting to the nature, magnitude and size of this Contract, in strict compliance with the requirements of the General Conditions of Contract, Conditions of Particular Applications and Technical Specifications.

11 PARTIAL POSSESSION

Whenever, as determined by the Employer any portion of work performed by the Contractor is in a condition suitable for use, the Employer may take possession of or use such portion. Such use by the Employer shall in no instance be construed as constituting final acceptance, and shall neither relieve the Contractor of any of his responsibilities under the Contract, nor acts a waiver by the Employer of any of the conditions thereof, provided that the Contractor shall not be liable for the cost of repairs, re-work, or renewals which may be required due to ordinary wear and tear resulting from such use. However, if such use increases the cost or delays to the completion of remaining portions of work, the Contractor will be entitled to an equitable adjustment.

If, as a result of the Contractor's failure to comply with the provision of the Contract, such use proves to be unsatisfactory, the Employer will have the right to continue such use until such portion of the work can, without injury to the Employer, be taken out of service for correction of defects, errors, omissions, or replacement of unsatisfactory materials or equipment, as necessary for such work to comply with the Contract; provided that the period of such operation or use pending completion of appropriate remedial action shall not exceed twelve months unless otherwise mutually agreed upon in writing between the parties.

12 EXISTING SERVICES

The Contractor shall search for, find, locate and protect any wiring, cable, duct, pipework, etc., within or immediately adjoining the site area. The Contractor shall take full responsibly

for safety of existing service lines, utilities and utility structures uncovered or encountered during excavation and construction operations.

The Contractor shall take full responsibility for damaging any such service lines, utility/utility structure and any cost and/or expense that arises or issues from any such damage shall be borne directly by himself. Should any damage to any such service occur the Contractor shall forthwith take remedial action, initiate safety precautions, install temporary services and carryout repair all at his own cost and expense and inform the Engineer and notify all relevant authorities.

Existing utilities which are to remain in service for or after the works are to be determined by the Contractor. If any existing service lines, utilities and utility structures which are to remain in service are uncovered or encountered during these operations, they shall be safeguarded, protected from damage, and supported. The Contractor shall preserve, maintain and keep in perfect working conditions, any existing facilities required to be preserved by the Employer/the Engineer.

13 CONSTRUCTION AREA AND ACCESS

The Employer will provide the Contractor possible space within or nearby the area of site of works for the storage of plant, equipment and materials and for Contractor's temporary office, during the currency of the Contract. In case the adjacent area as required by the Contractor is not available within the Project boundary for storage of plant, equipment and machines then the Contractor shall arrange at his own expense possible space for storage of plant, equipment and machines at his own cost and expense. On no account shall such temporary installations conflict/interfere with any of the permanent installations, services and any operational function of the Employer. The handling and storage of all plants, equipment and materials at site shall be the sole responsibility of the Contractor and at no risk and cost to the Employer. The Contractor shall protect all material against corrosion, mechanical damage or deterioration during storage and erection on site. The protection methods shall be to the approval of the Engineer

14 CONSTRUCTION & CHECKING AT SITE

The Contractor shall submit to the Engineer in due time for approval and discussion, his proposals and plans as to the method and procedure to be adopted for the temporary and permanent works involved.

The submitting to these suggestions and arrangements, and the approval thereof by the Engineer shall not relieve the Contractor of his responsibilities and duties under the Contract. The carrying out of all work included in the Contract is to be supervised by a sufficient number of qualified representatives of the Contractor and full facilities and assistance are to be afforded by the Contractor for the Engineer or his Representative to check & examine the execution of the work.

The Engineer reserves the right to inspect all parts of the works but may at his discretion waive inspection on certain items. This shall in no way absolve the Contractor from his responsibilities. This particularly applies to the checking of materials, the accurate setting out of foundations, and to the leveling, setting and aligning of the various parts, and to the proper fitting and adjustment of manufactured and finished materials and fixtures in position.

If the Engineer or his Representative find that the work progress is slow in such a way that the works or parts thereof will not be completed in the time specified, then he shall order the Contractor to work overtime or in shifts and the Contractor shall comply. These arrangements of contractor will be free of all financial encumbrances and at no additional costs to the Employer.

In the event of night work, the Contractor shall provide sufficient and adequate lighting to the satisfaction of the Engineer or his Representative and shall supply the necessary manpower for satisfactory continuation of the work after normal hours.

15 STORAGE & HANDLING FACILITIES

The Contractor shall make his own arrangements for providing the necessary space for the storage of plant, equipment and materials and for Contractor's temporary office, in and around the site of works, during the currency of the Contract.

16 PRODUCT DATA

Manufacturer's standard schematic drawings shall be modified or deleted to indicate only information which is applicable to the project. Such standard information shall be supplemented to provide all additional applicable information.

Manufacturer's catalogue sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive literature shall be clearly marked to identify

pertinent materials products or models. Dimensions and required clearances shall be indicated. Shop performance characteristics and capacities shall be noted.

17 PRODUCT QUALITY AND HANDLING

Suppliers of local and foreign products and installations specified shall have been regularly engaged in the business of manufacturing, fabricating, installing and / or servicing work required for a period not less than 5 years. In addition, the Engineer may request as appropriate a:

- list of similar installations that describes project, scope and date of completion.
- complete literature, performance data, and technical data.
- list of services records within Pakistan.
- location of the service office from which this installation could be maintained.
- For the actual fabrication, installation and testing of the specified work use only thoroughly trained and experienced workmen completely familiar with the items required and with the manufacturers recommended methods of installation. In acceptance or rejection, no allowance will be made for the lack of skill on the part of workmen

Use all means necessary to protect materials before, during and after installation and to protect the installed work and materials of all other trades. In the event of damage, immediately make all repairs and replacement necessary for approval and at no additional cost to the Employer.

18 INSPECTION & TESTS REPORTS

All equipment and materials furnished under these specifications and all work performed in connection therewith will be subject to rigid inspection by the Engineer or the Engineer's Representative. Acceptance of equipment and material or the waiving off inspection thereof shall in no way relieve the Contractor of his responsibility for meeting the requirements of the Contract.

The Contractor shall furnish the Engineer with certified true copies of test reports of all materials used in the manufacture and fabrication of all equipment and material including metal work, steel pipes, fire bricks etc. The result of these test shall be in such form as to show compliance with the applicable Specifications, standards and codes for the material used.

19 FIELD LABORATORY AND TESTING

19.1 General

The Contractor shall provide and maintain a field laboratory equipped with approved equipment to perform all the tests required by the Engineer. The quality control testing shall be performed by the Contractor's competent personnel in accordance with a site testing and quality control programme to be established by the Contractor and approved by the Engineer. The Engineer may however, require certain tests to be performed.

19.2 Testing Laboratory Certificates

The Engineer may accept a certificate from central engineering lab or reputable commercial testing laboratory, satisfactory to him, certifying that the product has been tested within a period acceptable to the Engineer and that it conforms to the requirements of these specifications.

20 SURVEYING INSTRUMENTS

20.1 General

The minimum quantity of survey equipment is stated below which shall be available with the Contractor at site of Works along with qualified Surveyors and Survey Helpers. The equipment shall be maintained throughout the Contract Period and replaced by the Contractor in case of damage or loss. The survey equipment shall be made available to the Engineer when requested. All surveying equipment shall be in good working condition.

21 APPROVAL OF MATERIALS AND PLANT

21.1 Quality of Materials

All materials, fixtures, fittings, supplies and plant furnished under the Contract shall be new and unused, standard first grade quality and of the best workmanship and design. No inferior or low-grade materials, supplies or articles will be either approved or accepted, and all work of assembly and construction shall be done in a first-class and workmanlike manner. In asking for prices for materials intended for delivery to the Site and incorporation in the Works under any portion of these Specifications, the Contractor shall provide the manufacturer or supplier with complete information as may be necessary to secure compliance to this Clause and, in every case, he shall quote this Clause in full to each such manufacturer or supplier.

21.2 Submission of Samples and Data

21.2.1 The Contractor shall furnish for approval of the Engineer with reasonable promptness all samples as directed by the Engineer or specifically called for in the Specifications and in accordance with the time schedule provided in the schedule of submittals. The Engineer shall check and approve such samples with reasonable promptness only for conformance with the design concept of the Works and for compliance with the information given in the Contract Documents. All work shall be in accordance with approved samples.

21.2.2 Samples shall be furnished so as not to delay fabrication, allowing the Engineer reasonable time for consideration of the sample submitted.

21.2.3 Each sample shall be properly labeled with the name and quality of the material, manufacturer's name, name of the project, the Contractor's name and the date of submission, and the Specifications Article number to which the sample refers.

21.2.4 The manufacturer's installation directions shall be provided with each sample. The Contractor shall pay all transportation costs and deliver samples to the Engineer's office, Site or testing laboratory as directed by the Engineer.

21.2.5 Samples shall be of adequate size to permit proper evaluation of the material by the Engineer. Where variations in colour, texture, dimensions or other characteristics are to be expected, the Contractor shall submit samples showing the maximum range of variation. Materials exceeding the range of variation of the approved samples shall not be used on the Work.

21.2.6 In order to permit coordinated selection of colours and finishes, the Contractor shall deliver samples of all related items to the Engineer at one time. Samples of such materials will not be approved until all related samples have been submitted.

21.2.7 If both Shop Drawings and samples are required for the same item, the Engineer may require both to be submitted before approving either.

21.2.8 The Contractor shall erect Mock-up samples of finished items where specifically called for in the documents or as directed by the Engineer. The Mock-up samples shall be preserved/protected by the Contractor till the end of the project or as directed by the Engineer.

21.2.9 No acceptance or approval of any Shop Drawings or sample, or any indication or request by the Engineer on any Shop Drawings shall constitute an authorization for any increase in the Contract Sum.

21.3 Inspection

All material and Plant furnished, and all work performed under this Contract will be subject to inspection by the Engineer at all times and in all states of completion both off-Site and on-Site. The Contractor shall furnish promptly without additional charge, all facilities, labour and materials reasonably needed for performing such inspection and testing as may be required by the Engineer.

21.4 Approved Sample at Site

The Contractor shall, at all times, keep on the Site approved samples. All such samples shall be made available to the Engineer as and when required.

22 DRAWINGS

22.1 Bid Drawings

Bid Drawings issued with the Bid Documents, called the Bid Drawings, show scope of the work to be performed by the Contractor. The Drawings issued with bidding documents are conceptual and showing employer requirement.

22.2 Definition of Term Drawings

The term Drawings as used in the Specifications means the Drawings referred in Clauses 12.1 and 12.2 above.

22.3 Drawings to Be Furnished By the Contractor

The Contractor shall submit to the Engineer for review, such drawings as are required under the Contract, sufficiently in advance of the work intended to be executed.

22.3.1 Reinforcement Drawings

Reinforcement placement drawings and bar bending schedules (to be provided by the Contractor as per clause 11 above) of all RCC work shall be prepared by the Contractor and submitted in triplicate to the Engineer for approval, sufficiently in advance of the works in which they are intended to be used.

22.3.2 Shop Drawings

- (a) The Contractor shall submit to the Engineer for review two (2) copies of all drawings to be issued for setting out, fabrication, supply order and construction; based on data, requirements, dimensions, details, codes, standards and design provided in the drawings issued by the Employer. Such drawings shall be submitted at least Fourteen (14) days before they are required for use. If within a period of fourteen (14) days after submission, the Engineer notifies the Contractor that a drawing fails to comply with the relevant requirement of the Contract, it shall be rectified and resubmitted for approval **at the Contractor's cost. Fabrication or construction shall not commence on any part of the Works until the shop drawings or construction drawings for that part of the Works have been approved by the Engineer.**

The Works shall be executed in accordance with the drawings as approved by the Engineer. If the Contractor wishes to modify any approved drawings, he shall immediately notify the Engineer and submit revised drawings for approval. If the Engineer instructs that further drawings are necessary for executing the Works, the Contractor shall prepare such drawings and submit them for approval.

The Contractor at his cost shall rectify errors, omission, ambiguities, inadequacies and other defects.

Approval by the Engineer, in accordance with this paragraph, shall not relieve the Contractor of any of his responsibilities under the Contract.

- (b) The shop drawings shall be properly identified indicating the part of the Works, the name of the contractor / supplier etc., the date of preparation and the dates of all revisions. The Shop Drawings shall be complete and shall show the design dimensions, proposed materials to be used, finishes, type of shop paint and all other details in connection thereto.

- (c) Where adjoining work requires shop drawings, the Contractor shall prepare and submit composite shop drawings, which shall show and define the work under all affected trades. If the Contractor executes work before coordinating with other trades so as to cause interference with work of those trades, he shall make changes necessary to correct the conditions without extra cost to the Employer.

(d) No changes shall be made by the Contractor in the resubmitted shop drawings in excess of the corrections spelled out by the Engineer and in a separate note on the shop drawings.

(e) No work in the shop shall be started and no material or plant ordered until the Engineer has approved the shop drawings. It shall be the responsibility of the Contractor to submit the shop drawings on a schedule that allows reasonable time for checking and approval and subsequent fabrication. Failure to submit shop drawings in ample time for checking, correcting, and rechecking will not justify extension of time for completion of the Works.

(f) The Contractor shall also check and verify all site measurements whenever requested by other Specialist Contractors or by other Sub-Contractors to enable them to prepare their own shop drawings and pass on the information with

sufficient promptness, so as not to delay the work in any way. A copy of all such information passed on shall be given to the Engineer.

22.3.3 As-Built Drawings

The Contractor shall, at all times, keep on Site a separate set of prints of all drawings on which all significant changes between the work shown on the Drawings and that which is actually constructed, shall be noted neatly, accurately and promptly as the work progresses. The Subcontractor(s) shall, at all times, keep on Site, a separate set of prints of the drawings (showing their parts of the Works) on which all significant changes between the work shown on the Drawings and that which is actually constructed, shall be noted neatly, accurately and promptly as the work progresses. Such drawings shall show the exact physical location and configuration of the works as actually installed.

The Contractor shall, within fourteen (14) days of issuance of Taking-Over Certificate for whole of the Works, furnish to the Engineer for his approval two (2) copies of such marked up drawings. One (1) copy of each of the marked-up drawings approved by the Engineer shall be returned to the Contractor by the Engineer and these shall be used for the preparation of the As - Built Drawings.

The Contractor shall furnish to the Engineer six (6) complete sets and one reproducible copy of all As -Built Drawings within twenty-eight (28) days of receipt of drawings stated above, from the Engineer.

23 PROTECTION OF THE WORKS

The Contractor shall whenever necessary cover up and protect the works from weather and damage by his own or other workmen performing subsequent operation. The Contractor shall provide all necessary dustsheets, barriers and guard rails and clear away the same at completion.

24 RESTORATION AND CLEANING

Upon completion of the works the Contractor shall restore all items covered by the Contract to the satisfaction of the Engineer.

The Contractor shall do regular cleaning and clear away all rubbish and excess materials that may accumulate from time to time on completion and before handing over. Upon completion of the works, he shall obliterate all signs of temporary construction facilities such as work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction, as directed by the Engineer. All working areas shall be cleaned; floors and paving scrubbed and the works and site shall be left in a clean and satisfactory state for immediate use and occupation. Care shall be taken not to use any cleaning materials, which may cause damage to the surface to be cleaned.

The Contractor shall also take all necessary precautions to keep the works and site free from vermin during construction and he shall leave the works vermin free on completion. Application of pest control agents shall not commence until the specific product, name, method and extent of application have been submitted to and approved of by the Engineer.

25 SITE OFFICE AND TEMPORARY FACILITIES TO BE PROVIDED BY THE CONTRACTOR

25.1 Contractor's Office, Facilities Etc.

The Contractor shall establish and maintain a Site office. The Contractor shall provide all facilities in connection with the execution, completion, of the Works, remedying defects therein and maintenance of the utility services. The facilities shall not be limited to the Contractor's Site Office, labour camps, work yard and storage areas, temporary water supply, waste water

disposal, temporary electricity, medical unit, temporary roads, fire protection and firefighting equipment etc. The Contractor shall be solely responsible for arranging all utilities and the Contractor shall setup, maintain and operate an architectural and engineering facility at site with adequate number of technical and support staff as well as equipment required for particular nature of job covered under the Contract to prepare drawings/shop drawings for approval of the Engineer.

The Contractor shall arrange his labour camp, work yard, storage area and site office.

25.2 Temporary Services

25.2.1 Temporary Water Supply

The Contractor shall supply in sufficient quantity all necessary potable and other water for construction purposes for all trades at points within a reasonable distance of any working area being constructed. The Contractor shall make arrangements and pay charges for water service installation, maintenance and removal thereof, and pay the costs of water for all trades.

At completion of the work, the temporary water services equipment and piping shall be removed by the Contractor at his own expense.

25.2.2 Temporary Electricity

The Contractor shall make all the necessary arrangements for a temporary electricity service, pay all expense in connection with the installation, operation and removal thereof and pay the costs of electricity consumed by all trades. The Contractor shall arrange and furnish an Electric Power Generating set at site and maintain the generating set in perfect working condition through-out the duration of Contract. The generating power of the set shall be sufficient to operate all plant and equipment as well as the camps and offices of the Contractor and the offices of the Engineer/Employer, during construction at site. Should the set fail to meet the required demand at site or fail to function or operate, the Contractor shall immediately replace the same with other generating set/s to the satisfaction of the Employer as well as the Engineer.

A temporary lighting system shall be furnished, installed and maintained by the Contractor as required to satisfy the minimum requirements for safety and security and to the satisfaction of the Engineer.

When the permanent electrical power and lighting systems are in an operating condition, they may be used for temporary power and lighting for construction purposes provided that the Contractor obtains the written approval of the Engineer and the Employer and assumes full responsibility for the entire power and lighting system and pays all costs for operation and maintenance of the system.

At completion of construction work, or at such time as the Contractor makes use of permanent electrical equipment and devices, temporary electricity services shall be removed by the Contractor at his own expense.

25.2.3 Waste Disposal

The Contractor shall make such temporary provisions as may be required in order to dispose of any chemicals, fuels, oils, grease, bituminous materials, waste and soil waste and the like without causing pollution to either the site or the environment. Disposal of any materials, wastes, effluent, garbage, oil, grease, chemicals and the like shall be in areas specified by the concerned local authority proposed by the Contractor and subject to the approval of the Engineer. If any waste material is dumped in unauthorized areas the Contractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, disposed off as directed by the Engineer and replaced with suitable fill material compacted and finished with topsoil all at the expense of the Contractor.

25.2.4 Fire Protection

The Contractor shall provide and maintain adequate fire protection in the form of barrels of water with buckets, fire bucket tanks, fire extinguisher, or other effective means ready for instant use, distributed around the project and in and about temporary inflammable structures during construction of the works.

Gasoline and other flammable liquids shall be stored in and dispensed from safety containers approved by the Engineer and storage shall not be within working area.

Torch-cutting and welding operations performed by the Contractor shall have the approval of the Engineer before such work is started and a chemical extinguisher is to be available at the location where such work is in progress.

The Contractor shall follow the instructions and specifications of the Civil Defense Department or any other local department concerned with such activities.

26 CONSTRUCTION SCHEDULE

A Construction schedule shall be maintained in accordance with the provisions of the General Conditions of Contract.

The schedule shall be accompanied with sufficient data and information including all necessary particulars of constructional plant, equipment machinery, temporary Works, arrival of plant, equipment at site and their installation, method of operation, work forces employed, etc., for activities of the Works.

Should the Engineer consider any alteration or addition in the programme and time schedule, the Contractor shall conform thereto without any cost to the Employer.

Whenever necessary and wherever the progress of the actual work shows departure, the programme and time schedule shall be undated and submitted to the Engineer for his approval.

27 SUBMISSION REQUIREMENTS

Schedule submission at least **sixty days** before the dates when reviewed submittals will be needed.

Submit Shop Drawings as per provision given in Sub-Clause 19.5 (a) and number of copies of Product Data which the Contractor requires for distribution plus four copies which will be retained by the Engineer.

Submit three samples unless otherwise specified.

Accompany submittals with transmittal letter, in duplicate, containing:

- i. Date
- ii. Project title and number
- iii. **Contractor's name and address**
- iv. The number of each Shop Drawing, Product Data and the Sample submitted.
- v. Notification of deviations from Contract Documents.
- vi. Other pertinent data.

28 RESUBMISSION REQUIREMENTS

Shop Drawings:

Revise initial drawings as required and resubmit as specified for initial submittal. Indicate on drawings any changes which have been made by the Engineer.

Product Data and Samples: Submit new data and samples as required for initial submittal.

29 WEEKLY PROGRESS REPORT AND PHOTOGRAPHS

30.1 During the continuance of the Contract, the Contractor shall submit weekly progress on forms as approved by the Engineer. Such weekly reports shall show the actual progress completed as of date of the report plotted against the schedule as given by the Contractor at the start of work and shall be broken down so as to indicate status of all activities associated with mobilization, material procurement, manufacture, surveys works, tests with regard to the agreed contract programme.

30.2 The Employer and the Engineer reserve the right to coordinate the schedules of this Contractor and other Contractors working at the Site, and to adjust and/or change any and all such schedules as required during the course of construction in order to achieve a coordinated project in harmony with the Employer's completion date.

30.3 Commencing after the first week of construction, and continuing every week until completion, the Contractor shall take and submit photographs to the Engineer's Representative, to show progress of his work and completion of each structure or major feature.

30 CONTRACTOR TO NOTIFY DELAYS ETC.

Any delay which will affect the completion of Works shall be detailed by the Contractor who shall state the action he is taking for effective completion of the Contract programme.

The Contractor shall submit a report in respect of the various sections of the Works, the equipment in use or held in readiness, a return of labour and supervisory staff, and details of any matters arising which may generally affect the progress of the work. The Contractor shall give a summary of the detailed progress report giving the position with regard to the agreed Contract programme. The progress reports shall be set out in a format to the approval of the Engineer and forwarded promptly so that on receipt the information contained therein is not more than 21 days out of date. If during execution of the Contract, the Employer considers the

progress position of any section of the work to be unsatisfactory, or for any other reason relating to the Contract, he will be at liberty to convene a meeting and the Contractor's Representatives are to attend such meeting.

The Contractor's Site Office shall prepare and submit 6 copies of a weekly progress report to the Employer and Engineer's Site Office. This report shall summarize site activities and record and details where difficulties in maintaining the agreed programme are being experienced or are likely to cause subsequent delay. The Contractor's Site Office shall also prepare and submit to the Engineer's Site Office 2 copies of Daily Activity Report summarizing the main activities to be undertaken each day, noting special activities such as tests, alignment checks, etc. The Contractor shall be responsible for expediting the delivery of all material and equipment to be provided by him and his subcontractors.

31 PHOTOGRAPHS

As soon as work commences on Site, the Contractor shall provide at least 10 to 12 photographs (soft copy) of the works from positions to be selected by the Engineer.

The negatives/soft copy of all photographs shall be held at the Contractor's Site Office, numbered and handed over to the Employer at the completion of the Contract.

32 SIGN BOARD

The Contractor shall erect and maintain at the Site in a location to be approved by the Engineer two (2) Sign Boards of dimensions approved by the Engineer. The Sign Boards shall be made of metal. It shall be mounted on steel posts securely anchored and braced. The Contractor shall paint on the Sign Boards, the name of the Works, and the names of the Employer, Engineer and the Contractor both in English and Urdu Language.

33 COORDINATION OF WORK AT SITE

The Contractor shall take cognizance that during the execution of the project, other Contractor will be working concurrently on this site.

All works of his responsibility shall be coordinated by the Contractor so as to give the necessary facilities to other Contractor or their workman or any other employ, who execute or supervise any work on the site.

The Contractor shall ensure that the necessary safety precaution will be observed and interferences shall be avoided specially for the works executed side by side by different Contractors.

Due consideration must be given to permit access to sections of the work as required by other Contractors for the extension of their works. With a view to coordinate the works, the Engineer may from time to time direct the order of the works to be carried out.

No payment shall be made to the Contractor for the works involved under this sub clause.

34 SITE FACILITIES TO BE PROVIDED BY THE CONTRACTOR

34.1 General

Without prejudice to the generality of the various clauses of the Contract, particular attention is drawn to the obligation of the Contractor to make his own arrangement at his own expense for the following

34.2 Labour Camps and Staff Residences

The Contractor shall provide, operate and maintain labour camps and staff residences and are required for the proper and efficient progress of the work to house his own employees. For the purposes of operation and maintenance of the Camps and Residences, the Contractor shall comply with the rules of Pakistan Labour Camp Rules 1960 and all other applicable provisions of the Pakistan Labour Laws.

34.3 Administrative and Field Office

The Contractor shall provide, operate and maintain administrative and field offices required for his staff and would be responsible for Operation and Maintenance, furniture, equipment, appliances, janitor services and security of the same.

34.4 Work yards and Storage Areas

The Contractor shall provide, operate and maintain all sheds, fencing, foundations and all above ground structures required to store material or equipment brought on to the site by him. The Contractor shall be responsible for the security of his entire camps, residence, site and field offices work yard and storage area.

34.5 Water Supply, Sewerage System and Electricity (if required)

The Contractor shall make his own arrangement, at his own expense for provision, operation and maintenance of electric supply, reasonable supplies of raw and potable water and sewerage system at the site of works and his labour camps, staff residences and offices. The Contractor shall pay all fees, and charges (including bills) of whatsoever nature to the concerned departments (if any) in order to procure connections of the above facilities and thereafter using these facilities.

34.6 Medical Care

The Contractor shall arrange provision of adequate medical facilities for his employees.

Adequately equipped and properly staffed first aid stations or dispensaries shall be provided by the Contractor at camps and other strategic locations, to administer first aid treatment at all times free of charge to all persons on the Site, including personnel of the Engineer and the Employer. The nature, number and location of facilities furnished and the Contractor's staff for administering first-aid treatment shall meet the requirements of the Health Services of the Government of Pakistan and of Section III of the Manual "Safety Requirements for Construction by Contract", published by the Employer, and shall be subject to approval by the Engineer.

34.7 Other Facilities

The Contractor shall also be responsible for providing at his own cost other facilities for his own staff and labour such as educational, recreational, transport, telephone and catering if required.

35 CONSTRUCTION PROCEDURES

The Contractor shall advise the Engineer of proposed construction procedures in accordance with the General Conditions of Contract.

If the Engineer shall see that the work progress is slow in such a way that the work will not be completed in the time specified, then he shall order the Contractor to work overtime or in more shifts and the Contractor shall obey these orders without any additional payments and without any objections or request for compensation.

36 NOTIFICATION TO ENGINEER

The Engineer shall be notified daily in writing of the nature and location of the Works the Contractor intends to perform the next day so as to enable necessary inspection and measurement to be carried out. The Engineer may, if necessary, direct that longer notice be given of certain operations.

37 NIGHT WORK

When work is done at night the Contractor shall maintain from sunset to sunrise such lights on or about his work and plant as the Engineer may deem necessary for the proper observations of the work and the efficient execution thereof.

38 WEATHER

No work is to be undertaken when, in the opinion of the Engineer, the weather is so unsuitable that proper protection of the work cannot be ensured.

39 CO-ORDINATION WITH OTHER CONTRACTORS

It shall be the responsibility of the Contractor to keep-up good relations with other Contractors employed on site by the Employer. The Contractor shall cooperate and coordinate his work with that of the other Contractors working at the Site, to whatever extent may be necessary to complete the Project in accordance with the approved programme of the Works and in accordance with the Engineer's instructions. Should a disagreement or dispute arise between the Contractor and other contractors, the same shall be referred without delay to the Engineer for his decision. Upon such decision, the Contractor shall proceed with the work in accordance therewith. In case the access to the works of other contractors is through the Site area of the Contractor, the Contractor shall coordinate with and permit all reasonable access to other Contractors.

40 ACCIDENT PREVENTION, SAFETY MEASURES AND PROTECTIVE EQUIPMENT

The Contractor shall comply and enforce compliance by all his sub- contractors with the highest standards of safety and accident prevention in accordance with international standards and in compliance with all applicable laws, ordinances and statutory provisions.

All requisite barriers, fences, warning signs, lights and other safety precautions as required for the protection of persons and property on or adjacent to the site shall be provided at the Contractor's cost.

All false work, scaffolding and handrails shall be well constructed and secured at all times. Where overhead work is being carried out, warning signs shall be installed at ground level clearly warning of the overhead work.

All warning signs shall be in two languages, English and Urdu, and shall at all times be maintained in a clean and legible condition, to the satisfaction of the Engineer. Trash shall be removed at frequent intervals to the satisfaction of the Engineer. Netting shall be provided at all levels where work is in progress, all around the working area.

41 SETTING OUT OF WORK AND SURVEY

41.1 Reference Points, Lines

The Contractor shall establish benchmarks and / or reference line at the Site in accordance with the instructions of the Engineer. The Contractor shall set out its work from these benchmarks and lines. The Contractor shall supply plant, equipment, materials and labour for checking if required of the survey control by the Engineer. Slope stakes will be set by the Contractor before commencement of excavation and will be re-established as required during progress of work using established bench-marks and reference points.

41.2 Verification

The Engineer may make checks as the work progress to verify lines and grades established by the Contractor and to determine the conformance of the work as it progresses with the requirements of the Drawings and Specifications. Such checking by the Engineer shall not relieve the Contractor of his responsibility to perform all work in accordance with the Drawings and Specifications and the lines and grades given therein.

Based upon the basic control, the Contractor shall provide his own primary control points, as needed for the Works, and shall preserve and maintain them until otherwise authorized.

The Contractor shall be responsible for maintaining all survey markers/monuments, and property corners. If any markers/monuments are destroyed by the Contractor, the Contractor shall arrange, at his own cost, to retrace and replace them to the entire satisfaction of the Engineer. If a monument cannot be replaced in its original position, the Contractor shall install

a witness corner. The Contractor shall complete and file monument reference cards on all monuments as per instructions of the Engineer.

The Contractor shall provide experienced construction surveyors with adequate experience in the construction surveys similar in nature as required by this Contract.

Based upon established basic control monuments the Contractor shall establish all lines and grades necessary to control the Works, and shall be responsible for all measurements that may be required for execution of the Works to the tolerance prescribed below.

The Contractor shall perform such surveys and computations as are necessary to determine quantities of work performed or placed during each progress payment period, and shall also perform all surveys necessary for the Engineer to determine final quantities of work in place. The Engineer will determine final quantities based on original ground levels determined by the Contractor and agreed by the Engineer.

The Contractor shall notify the Engineer at least 24 hours before performing a quantity survey and, unless specifically waived, quantity surveys shall be performed in the presence of an authorized representative of the Engineer.

Degree of accuracy for the survey works shall satisfy the following specified tolerances:

- (a) Structure points shall be set within 0.01 foot accuracy from point to point, except where tighter tolerances are required.
- (b) Cross-section points shall be located within 0.10 foot, horizontally and 0.01 foot vertically.
- (c) Permissible closing error for a levelling line meant for establishing Temporary Bench Mark (TBMs) shall not exceed $0.045 \times \sqrt{M}$ foot, where M is in miles. The permissible closing error shall be duly adjusted.

The Contractor shall provide all materials, equipment and labour required for surveying work, including, but not limited to, instruments, stakes, spikes, steel pins, templates, platforms, and tools, and except as required to be incorporated in the work or left in place, all such materials and equipment, shall remain the property of the Contractor. Surveying instruments shall be in perfect working condition and shall be subject to rigid inspection for proper operation at least after every two weeks of use. Defective instruments shall be promptly replaced or repaired and adjusted to the satisfaction of the Engineer.

42 PAYMENT OF WORK

No payment shall be made for the works involved within the scope of this section of specification unless otherwise specifically stated in the Bills of Quantities or herein. The cost thereof shall be deemed to have been included in the total price quoted by the Contractor. The payment will be made on monthly basis on actual work done.

43 SPECIFICATION EPILOGUES

(To remain in force during the entire completion/Contract period).

i. The Work(s) comprising the Contract, shall be constructed, completed and guaranteed, strictly conforming to and in accordance with the stipulated specifications for execution of such works, providing of materials/services and etc.as provided in the Contract Documents and or as directed by the Engineer.

ii. In the event of missing / non-availability of particular specification (s) applicable to or to govern the execution of such item(s) of works/ contract hereof, having no effect or bearing upon the rate/price or valuation of the contract, the relevant standard specifications of particular application from the following sources/standards/codes shall be consulted/ applied thereto, as required and the contractor shall be obliged to strictly follow the instructions issued by the Engineer, in this regard:

a) Except as otherwise provided in the Contract Documents, all material, fabrication, execution and testing thereof shall conform to the applicable standards, codes/specifications contained in the following list to equivalent applicable British standard and specifications established and/or as approved in the country of manufacture or supply:

AASHTO American Association of State Highway and Transportation Officials.

ASTM American Society of Testing Materials

ASME American Society of Mechanical Engineers

AISC American Institute of Steel Construction

ASA American Standards Association

AWS American Welding Society

AWWA American Water Works Association

BSS British Standard Specifications & Materials)

CDA Capital Development Authority, Islamabad

MES For schedule items and for non-schedule works the standard specifications/ as per the direction of the Engineer shall be followed.

PSI Pakistan Standards Institute

If the Contractor, at any time and for any reason, wishes to deviate from the above standards or desires to use material or equipment not covered by the above

b) standards/codes, he shall state in writing the exact nature of change/substitution/ replacement, the reason for making such change, and shall submit complete detailed (illustrated) specifications of the materials/services and the equipment and etc. to the Engineer for his express approval, at least thirty days before the actual use at the site, subject to such rate/price or valuation adjustments, decided by the Engineer. Such cost decision/adjustment shall be conclusive and binding on the Contractor.

44 WASTAGE

No Payment shall be made under any circumstance for wastage of materials, supplies and /or fixtures supplied by the Contractor. In all cases payment shall be made only on the basis of the net quantities of work done. It is up to the Contractor to calculate and make allowance for any or all such wastage (e.g. cut ends of reinforcement bars, spillage of Cement and the like) in establishing the unit rates or price for the items of the Works.

45 ENVIRONMENTAL PROTECTION

The Contractor shall exercise care to protect the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring or defacing of the natural surroundings in the vicinity of works. Except where clearing is required for the Permanent works, approved construction roads and the Temporary Works, and for excavation operations, all trees and native vegetation shall be preserved and shall be protected from **damage which may be caused by the Contractor's construction operations and equipment**. On completion of the works, all work areas shall be smoothed and graded in a manner to conform to the natural appearance of the landscape. Where unnecessary destruction, scarring, damage or defacing may occur as a result of the Contractor's operations, it shall be repaired, replanted, or otherwise corrected as directed by the Engineer at no additional cost to the Employer.

46 QUARRY OPERATIONS

The Contractor shall obtain materials from licensed and government approved quarries only. The quarry operation shall be undertaken within the purview of the rules and regulations in force.

47 SOIL EROSION AND SEDIMENTATION CONTROL

The Contractor shall carry out the works in such a manner that soil erosion is fully controlled, and sedimentation and pollution of natural watercourses, ponds, tanks and reservoirs is avoided. At suitable places sedimentation basin with impervious linings will be constructed for containing, stopping and trapping any silt run off for premature siltation of downstream watercourses and reservoirs.

48 FUEL AND CHEMICAL STORAGE

All fuel and chemical storage shall be sited on an impervious base within an embanked area and secured by fencing. The storage area shall be located away from any watercourse or wetland. The base and walls of the embankment shall be impermeable and of sufficient capacity to contain 110% of the volume of tanks.

Filling and refueling shall be strictly controlled and subjected to formal procedures. All valves and trigger guns, shall be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use. The contents of any tank or drum shall be clearly marked. Measures shall be taken to ensure that no contamination happens or discharges enter any drain or water courses.

49 WATER QUALITY

The Contractor shall prevent any interference with the supply to or abstraction from polluted water sources (including underground percolating water) as a result of execution of the works.

Areas where water is regularly or repetitively used for dust suppression purposes shall be laid to fall to specially constructed settlement tanks to permit sedimentation of particulate matter. After resettlement, the water may be re-used for dust suppression.

All water and liquid waste products arising on the sites shall be collected and disposed off at location outside or off site and in a manner that shall not cause nuisance or pollution.

The Contractor shall not discharge or deposit any matter arising from the execution of the works into any place except with the permission of the Supervisor Engineer and the regulatory authorities concerned.

The Contractor shall protect all watercourses, water ways, ditches, canals, drains, lakes and the like from pollution, silting, flooding or erosion as a result of the execution of the works.

The Contractor shall submit the details of his temporary drainage works system (including all surface channels, sediment traps, washing basins and discharge-pits) to the Supervisor Engineer for approval prior to commencing work on its construction.

50 AIR QUALITY

The Contractor shall devise and arrange methods of working to minimize dust, gaseous or other air borne emissions and carry out the works in such a manner as to minimize adverse impacts on air quality.

Bituminous hot-mix plants and concrete batching plants shall be located sufficiently away from habitation, agricultural operations or industrial establishments.

The Contractor shall utilize effective after sprays during the delivery and handling of materials when dust is generated and dampen stored material during dry weather.

Stockpiles of materials should be sited in sheltered areas or within hoarding, away from sensitive areas. Stockpiles of friable materials shall be covered with clean tarpaulins with application of sprayed water during dry and windy weather. Stockpiles of debris shall be dampened prior to their movement, except where this is contrary to the specifications.

Any vehicle with an open load carrying area used for transport of potentially dust producing materials shall have properly fitting side and tailboards. Materials having potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with clean tarpaulin in good condition. The tarpaulin should be properly secured and extended to at least 280 mm over the edges of the sideboard and tailboard.

During high wind, no dust generating operations shall be permitted within 200 m of residential areas having regard to the prevailing direction of the wind.

Construction vehicles and machinery shall be kept in good working order and engine turned off when not in use. Appropriate measures shall be taken to limit exhaust emissions from

construction vehicles, machinery and plant and The Contractor shall include details of such proposed measures in the mitigation and monitoring plan to be submitted to the Supervisor.

In residential areas or other sensitive areas, such as nurseries, schools, hospitals, etc. advance warning shall be given to potentially affected persons so that some measures can be taken by them before commencement of the works.

Any open vehicle carrying a load of freshly mixed asphalt concrete for transportation and laying the pavement must have a full cover of tarpaulin sheet. In this manner its toxic fumes will be reduced against any atmospheric contamination.

51 NOISE

The Contractor shall consider noise as an environmental concern in his planning and during execution of the works.

The Contractor shall use plant and equipment conforming to applicable standards and directives on noise, vibrations and emissions shall include the details of measures for abating noise at source in the mitigation and the monitoring plan to be submitted to the Supervisor Engineer.

52 SAMPLING

It shall be the responsibility of The Contractor to take samples as required by The Engineer and to provide all necessary transport, labour, tools, containers, wrappings and so forth for **uplifting and dispatching samples to The Engineer's Laboratory.**

53 ENVIRONMENT ENHANCEMENT

All existing highways and roads used by vehicle of The Contractor or suppliers of materials or plant, and similarly any new roads which are part of the works and which are being used by traffic, shall be kept clean and clear of all dust/mud or other extraneous materials dropped by the said vehicles or their tyres. Similarly, all dust/mud or other extraneous materials from the works spreading on these highways shall be immediately cleared by The Contractor.

Clearance shall be effected immediately by manual sweeping and removal of debris, or, if so directed by The Engineer, by mechanical sweeping and clearing equipment, and all dust, mud and other debris shall be removed entirely from the road surface. Additionally, if so directed

by the Supervisory Engineer, the road surface shall be hosed or watered using suitable equipment.

Any structural damage caused to the existing roads by The Contractor's construction equipment shall be made good without any extra cost.

On completion of the works, The Contractor shall reinstate all areas with proper vegetation to the satisfaction of the Supervisor Engineer.

The Contractor shall remove all old tyres and internal rubes from within the limits of right of way and subject to the agreement of adjacent landowners for additional areas of 75 m on either side of the road centreline. The Contractor shall dispose of all materials in a manner approved by the Supervisor Engineer.

Where directed by the Supervisor Engineer, The Contractor shall improve and reinstate the land on which informal roadside service area has been established, by removing all debris and contaminated soils, regarding to natural ground levels and re-establishing the original vegetation where appropriate. All debris and contaminated materials shall be disposed off on site as approved by the Supervisor Engineer.

54 MEASUREMENT AND PAYMENT

The work under this clause shall neither be measured nor be paid separately. The cost incurred in this respect shall be deemed to have been covered in the quoted rates by the bidder at page 08.

In case of failure of The Contractor to comply with all or any provision(s) of this clause the damage(s) caused shall be attributable towards The Contractor, and The Engineer shall assess the amount of such damage(s) which shall be deducted from the monies due or to become due to The Contractor. However, the said amount may be reimbursed to The Contractor on rectification of all damage caused and subsequent certification by The Engineer that the said damage has been rectified by The Contractor at his own cost as per the requirements specified herein above.

Where directed by The Engineer, The Contractor shall improve and reinstate the land on which informal roadside service area has been established, by removing all debris and contaminated soils, regarding to natural ground levels and re-establishing the original vegetation where

appropriate. All debris and contaminated materials shall be disposed off site as approved by The Engineer.

a. **Provision of Printer + photocopier (A3)** = 01 No.

Panasonic (DP-8045)/Konica Minolta or equivalent: within 14 days of the Engineer's Order to Commence the Works.

b.

55 PAYMENT FOR WORK REQUIRED BY SPECIAL PROVISIONS

Unless otherwise specifically stated in the Contract, the price of all works required by the Special Provisions shall be considered to be included in the Contract Price.