SECTION 6 - SUBSECTION D

AIR CONDITIONING SYSTEM

CONTENTS

1. Operational Requirements

Jordan River- Site SOW

1.1 The air conditioning and ventilation system shall provide the facility with environmental conditions suitable for the operational regime of the building and their equipment.

1.2 The designer shall take the following considerations into account:

1.2.1 The total dependence of the core of the inspection site on X-ray operational systems and computer systems on the air conditioning and ventilation systems

1.2.2 Removal of gases emitted from the exhausts of cars located in closed spaces and along the tunnel.

1.2.3 The dependence of the people working in the building, including radiography on the ventilation and air conditioning system.

1.2.4 As part of the proposal the Bidder will describe the preferred air-conditioning method, when taking into account initial cost as well as long time expenses.

2. Basic Assumptions

2.1 The design should be split air conditioners

Each room will receive its own air conditioning unit

2.2 Maintenance: The system shall be designed to ensure that in certain situations when maintenance operations have to be carried out in the system as a whole or in part of it this shall not interfere with the functional capability of the system or with the efficiency of work at the facility or with the operational capability.

2.3 Control: Effective control over system performance, as result of the climatic conditions in the various parts of the building (temperature, humidity, air purity, etc.) and operation of essential parts of the system will be proposed by the Company.

The Bidder shall propose air-condition monitoring system (including energy efficiency data).

2.4 Pollution: The system shall allow ventilation of the building and an efficient evacuation of smoke or polluted air accumulated in the building because of fire, welding works, flooding or any other occurrence.

2.5 Reserve: The system shall be designed with a spare capacity of at least 10%.

2.6 Energy Saving and Conservation: The systems shall be designed so as to operate optimally in an energy saving manner but without impairing the operational requirements, the required backup and the working conditions in the facility.

2.7 The system shall be designed for a service life of at least 20 years, taking into account an expected 2% annual growth. (Preparations will be made for the gradual addition of cooling units, pumps and air conditioners). Note: The expansion shall not be at the expense of backup.

2.8 In case of electrical breakdown the system will not operate, except emergency ventilation and smoke evacuation.

2.9 The materials used in the HVAC system shall have fire rating certification according to IS 1001.

2.10 Air conditioning equipment and installation in the building shall be a subject to inspection and approval of Client representative.

2.11 The equipment shall be manufactured by an authorized dealer/representative in Israel (must have approved equipment and the ability to provide spare parts and maintenance service).

2.12 The air conditioning system and equipment shall comply with GOI General Specifications (Chapter 15) and the requirements hereinafter.

2.13 All systems and equipment shall be "heavy duty" type, and withstand the defined atmospheric conditions of the Jorden River site area (high temperatures and humidity) All materials and equipment surfaces shall be protected and coated with epoxy type paint.

3. Scope of Work

3.1 The scope of work for supplying and constructing a complete heating, ventilation and air conditioning system, including but not limited to the following:

A. Air cooling split units

B. Fresh air and standard air handling units

C. Air distribution system

D. Fire/smoke damper

E. Ceiling diffusers, supply and return air grilles, extract grilles

F. Sound and vibration control

G. Insulation for piping and ducts

H. Electrical system

I. Automatic control, alarm system and instruments

J. Painting and protection

K. Testing, balancing and commissioning

L. Operation and maintenance instructions

4. Required Design Conditions

4.1 The air conditioning system shall meet the planned surrounding environment heat dissipation.

4.2 Special-destination rooms: temperature 22 deg. C (+/- 1 deg); relative humidity 50% (+/- 10%).

4.3 Office rooms and public areas: temperature 22 deg C (+/- 1 deg); no humidity control.

4.4 The calculation of cooling and air conditioning output shall be made with reference to a peak heat load in summer.

4.5 The degree of air filtration required for the computer rooms (technical) shall be 65% to ASHREA # 52-76.

4.6 Clean, filtered and air conditioned air shall be supplied to the building at the rate of at least 10 CFM per person.

4.7 The minimum and maximum temperatures for the radiography equipment zone shall be determined in accordance with the manufacturer's requirements.

5. Noise Level Limits

Noise level resulting from the air condition operation shall be as follows:

5.1 Noise level of normal vertical or horizontal air handling unit of up to 2500 CFM shall not exceed 50 dB (Sound Pressure Level) scale A, measured at 1 meter distance from the unit

5.2 Noise level of air handling unit shall not exceed 50 dB (Sound Pressure Level) scale A, measured at 1 meter distance from the unit. If necessary, the units shall be installed in acoustically insulated masonry built compartments.

5.3 All air conditioning equipment shall be mounted using vibration absorbers.

5.4 In the event that the specified noise levels are not attained, the Contractor shall add, at his own expense, acoustic isolation elements and vibration absorbers as necessary until the specified noise levels are achieved.

6. Specifications of the Air Conditioning System

6.1 The air conditioning system shall be designed for both cooling and heating.

6.2 The system of the building shall be based on a number of split units installed on the roof.

6.3 The fresh air shall be delivered to the rooms in quantities consistent with the ASHRAE requirements.

6.4 Each room shall have an individual temperature regulator.

6.5 Each room air conditioning unit shall have a 30% output redundancy, for cases of increased load or designation change.

6.6 Air ducts, piping and drains installation shall be concealed (inside the ceiling, floor and/or special shafts) but easily accessible for maintenance and alteration purposes.

6.7 Duct between fire zones shall be completely sealed. Automatic fire dampers shall be installed in the ducts.

6.8 The building sewage system shall collect and drain all air conditioner condensate.

7. Split air Units

7.1 The cooling units shall be obtained from a manufacturer well-known / branded in Israel. Maintenance services shall be available from a local agent able to provide service and maintenance.

The backup unit for critical systems shall enter into operation automatically, when necessary.

7.2 The cooling gas shall be of a modern type, nontoxic and harmless to the environment.

7.3 Controls

A. Unit controls shall include a microprocessor, LOCAL/OFF/REMOTE monitoring system, selector and a diagnostic display.

B. Shall be capable of executing the following functions:

1. The unit shall contain communication panel (communication box) designated for transferring unit control data.

8. Fans

(Refer to the General spec. clause 15021)

8.1 Fan characteristic curve shall be submitted.

8.2 Noise level data, spectrum analysis and dB (sound pressure level – scale A) level shall be submitted.

8.3 Fans shall be fitted with protective belt guards, inlet screens required to comply with safety requirements of all authorities.

9. Air Ducts and Air Diffusers

9.1 Treated air shall be delivered from the air conditioning unit to the building and back in galvanized metal ducts. The duct will comply with clause 15052 of the General Specification. Duct seams shall be sealed with silicone sealant and checked for tightness and noise, as detailed in the General Specification.

9.2 The air ducts shall be insulated on the outside by 25 mm thick fiberglass layer with a vapor barrier. The insulation shall be full, continuous and sealed with aluminum coated fabric adhesive tape.

9.3 The exposed ducts shall be insulated on the inside with 1" thick internal thermal and acoustic insulation layer.

9.4 Outside exposed ducts shall be primer coated and painted with a topcoat similar in color to the building walls.

9.5 Air delivered at the ceiling shall be supplied via insulated ducts to air diffusers installed in the ceilings of the individual rooms. Each air-supplying branch shall be equipped with a damper for manual regulation.

10. Ventilation of the kitchen and Toilet Room

10.1 The ventilation shall be based on fans and exhaust ducts made of PVC.

10.2 Air suction shall take place at two levels (at the ceiling and on the floor), at the quantities required according to the accepted standards.

10.3 The ventilation of the kitchen and toilet rooms shall be based on a duct system and exhaust fans. Air quantities and their delivery shall be to accepted standards.

10.4 Tunnel ventilation shall be achieved by a number of suspended high capacity tube axial fans.

11. Electric Boards (Power and Control)

11.1 Board for the critical cooling unit and AHU (e.g. Linac accelerator unit etc.) shall be connected to operator's control. The board shall be equipped with a selector switch “local/remote”.

11.2 The air handling units for the equipment and computer rooms shall be fed from zone electric boards in their vicinity (the Electrical Corporation field), every unit from a separate board.

11.3 The fan & coil units shall be fed from local secondary boards with possibility of central cutoff when necessary.

11.4 Every air conditioner, serving for backup shall be fed from a board separate from that of the equipment being backed up.

11.5 In case of fire detection, the air conditioning and ventilation shall be stopped in the affected zone.

11.6 Ammeters, voltage drop and power outage protection devices shall be mounted on the panel. Feed and control cables shall be routed inside PVC ducts. External exposed cables shall be routed in galvanized steel pipes or ducts.

11.7 The complete air conditioning equipment, piping and ducts shall be connected to a grounding circuit according to the Israeli Electricity Law, and shall be subject to approval by an authorized inspector.

11.8 The return air ducts shall be equipped with a smoke detector and safety thermostat, which will cut off air conditioner operation and activate the fire detection panel warning light and siren in the event of fire.

11.9 All electric panels shall be equipped with an automatic gas type fire extinguishing system.

12. Control of the Air Conditioning Systems

12.1 The air conditioning systems shall include all the controls required for automatic operation, in accordance with the order of their units, including the activation of the backup units.

13. Work Plans, Equipment Specifications and Samples

13.1 Additionally to the General Specification stipulations, the Contractor shall submit work plans and specifications.

13.2 Inspector's approval of work drawings and/or equipment items in no way relieves the Contractor from full responsibility for the quality and/or suitability of the equipment, as detailed in the Specifications and plans. The Contractor (or representative of) is obligated to visit the premises and ensure that the conditions thereof conform to the work drawings.

13.3 All Contractors' production drawings shall be furnished using computer magnetic media and standard drawing file formats, to be agreed upon. , After obtaining engineering approval, they shall be submitted to the inspector and shall remain a government property.

14. Running-in

The contractor shall execute a run-in acceptance test of the systems and devices after finishing the assembly and installation works, subject to the

inspector's approval. Continuous operation during 5 full consecutive days and nights, without failures shall be considered a successful run-in test pass.

15. Demonstration and Training

15.1 The Contractor shall demonstrate the operation, control and maintenance of the system components and functions.

15.2 Each demonstration shall include an operator training including troubleshooting and servicing of the demonstrated component.

16. System Delivery

The terms of delivery are as follows:

16.1 Contractor completed all works on the system.

16.2 Contractor completed all system tests and adjustments, and prepared suitable test reports.

16.3 Contractor shall carry out a system run-in test.

16.4 Contractor completed all demonstration and training obligations.

16.5 Contractor prepared and delivered all installation manuals.

16.6 The systems shall be delivered in the presence of Contractor's technicians who participated in the installation and running-in of these systems / components.

17. Documents and Plans

The Contractor shall supply the following documents:

17.1 List of motors and electrical elements with relevant data including but not limited to manufacture, type, model, current and voltage rating, isolation, overload adjustment etc.

17.2 Clearly worded operating instructions including a troubleshooting section.

17.3 Maintenance instruction with periodic maintenance sections, as required.

17.4 Recommended spare parts list.

17.5 After making necessary corrections in accordance with the inspector's remarks and after obtaining engineering approval, the Contractor shall submit five copies of the complete documentation, with a set of CD media, hereinafter the "Installation Manual", to the inspector.

17.6 As stated, submittal of the Installation Manual shall be a condition for delivery. During the delivery/acceptance process the team shall carry out part of the inspections described in the Installation Manual, in particular the operation and maintenance instructions.

17.7 All production drawings shall be included "as made" in the Installation Manual.

18. Important Points

18.1 The air conditioning system shall provide a continuous reliable service 24 hours a day, 365 days a year. In any event of failure resulting in non-delivery of conditioned air, the backup system shall instantly take over.

18.2 The planning shall include a comprehensive solution for dust filtering, deposits and corrosion problems in all system components.

18.3 All air conditioning equipment, including spare parts, shall be purchased in suitable quantities and models, according to manufacturer and designer recommendations to ensure continuous work and minimum of downtime for repairs.

18.4 The equipment shall be designed for easy maintenance of all components. During maintenance period, the system shall continue to provide service though the use of backup units.

18.5 The equipment chosen shall ensure maximum reliability in long-term continuous operation, as well as withstanding to frequent stops and starts.

18.6 Location of the air conditioning equipment shall be planned so as to occupy minimum space, and minimize the effects of noise, vibration, voltage drop etc.

18.7 During operation or when being turned on/off, the air conditioning system shall not cause any disturbances on the mains or RFI/EMI effects.

18.8 The Contractor shall supply a full-set of spare parts for two years of operation. The minimal spare parts kit shall include (but not limited to) two spare air filter kits and one spare set of fan and condenser belts.

18.9 The Contractor shall connect the air conditioning unit, the ducts, piping etc. to grounding plates, as required by the Israeli Electricity Law.

18.10 Suction points for the fresh air fans shall be installed so as to prevent suction of odors and gases emitted from the lavatories, the accumulator rooms, and the generators.

18.11 The air conditioning system shall be designed in accordance with the “fire zones” and with arrangements regarding security compartmentalization. The air duct passages between fire zones shall be provided with automatic fire dampers integrated with the detection and warning systems.

18.12 In case of fire detection, the air conditioning and ventilation system shall switch to a different mode of operation: stoppage of fans in the affected zone, closure of the fire doors and smoke flaps, formation of overpressure areas for escape, activation of a smoke exhaust system, etc.

18.13 The air conditioning systems shall not raise the noise level in the special-purpose rooms above 50 dB, scale A.

18.14 Maintenance access to the air conditioning system will be by stairs ,and the area will be surrounded by a railing.