Appendix 1

**TERMS OF REFERENCE**

**regarding the Public Invitation to participate in Public Tender for
"Operation and maintenance of equipment, buildings and land at the Embassy of Bulgaria in India"**

PART 1

The Maintenance company provides the necessary qualified staff to carry out regular servicing and maintenance of the equipment, buildings and land of the Embassy of the Republic of Bulgaria in India. Any machines or equipment, which are property of the Bulgarian Еmbassy in New Delhi and have been damaged as a result of improper usage by the staff of the contractor shall be renewed or repaired at the expense of the contractor. In any case in which there is a breakdown of machines or equipment, which are property of the Bulgarian Embassy in New Delhi, the contractor shall submit a protocol in which it is mentioned – the model and serial number of the defective equipment, the time and date when it happened, the circumstances which caused the damage, the character of the break down, the contractor’s staff member who has identified the problem. Service and maintenance include, but are not limited, to the following:

# AIR CONDITIONING / HEATING SYSTEMS

# І. Central Air-conditioning plants:

1. To operate the A/C plants consisting of two Carrier make screw chillers of 150 TR. capacity each and one Westing House make screw chiller of 45 TR. capacity so as to provide air-conditioning 24 hours a day.
2. To record hourly in a log book the following parameters of each center A/C plant when in use (log sheet attached):
3. Suction pressure;
4. Discharge pressure;
5. Phase to phase incoming voltage;
6. Compressor motor amperes;
7. Condenser pump motor amperes;
8. Chiller pump motor amperes;
9. Cooling tower(s) motor amperes;
10. Water pressure and temperature of inlet and outlet of the condenser and chiller;
11. Water level in cooling tower and operation of float valves;
12. Dry and wet bulb outside temperature;
13. Report on any abnormal performance of any part of the plant and or allied equipment.
14. To check daily and to carry out the following jobs:
15. Water level in expansion tanks;
16. Cleaning of plants;
17. Rectification of minor faults;
18. Reporting of any other problems;
19. Recording and maintaining of required temperature and humidity;
20. Cleaning of cooling tower filters;
21. Cooling tower water level and noise level;
22. Performance of pump;
23. Attending to complaints from the Chancery building and from the residential flats;
24. Daily cleaning of the swimming pool.
25. Check-up performed monthly:

To check the electrical panels and its wiring for any loose connections, pitted (fixed and moving) contacts of contactors, to lubricate the moving parts and to undertake corrective actions on the following:

1. Cleaning of fans and motors of cooling towers;
2. Clean air filters of Air Handling Units;
3. Check bearings of pumps, motors and blowers and lubricate as and when required;
4. Changing Cooling Tower water and basin cleaning.
5. Cleaning Y Strainers;
6. Valve and motor glands water leakage rectifying.

**ІІ. Boilers:**

1. To check and adjust the thermostat to maintain the required temperature inside the buildings;
2. To check the firing, oil spray and exhaust smoke and adjust if necessary;
3. To stop oil leakage, if any;
4. To check oil pressure and water pressure daily;
5. To check the functioning of photo switch, pressure switch, thermostat, controller, timer, nozzle, spray and electrode firing and electrode firing and adjust/replace, if defective;
6. To operate the softening plants as and when required;
7. To check the hardness of water and scale formation in primary coils;
8. To check the heat transfer from primary circuit to secondary circuit;
9. To check the room temperature corresponding to boiler outlet temperature.

**ІІІ. Air Handling Units:**

1. To keep clean and free of dirt and foreign matters all AHU-s and to lubricated regularly all moving parts of the control dampers.
2. To examine the V-belts and to adjust the tension to ensure belts are in good condition and properly aligned; when replacement of V-belts of a particular drive is required, to ensure usage of complete set of matching belts;
3. To correct excessive vibration by checking all bolts, set screws, foundation bolts and isolators etc.
4. To check automatic running of AHU motor through VFD (variable frequency drive)
5. The check every 3 months or earlier as required the clogging of coils and dust layer on the surface of coils and fins;
6. To inspect monthly all motorized valves and modulating motors to ensure their satisfactory performance with their corresponding thermostat. If the valve is malfunctioning the Embassy is to be informed about the required/recommended replacement of part;
7. To inspect and clean the fan housing and blowers annually and to clean all drain pans and drain lines every 3 months.

**ІV. Fan Coil Units**

To wash with detergent, to oil the motor, to adjust the blowers, to check the motorized valve, to clean the filter, to adjust vibration by tightening nut bolts, to check the electrical connection, to check the motor shaft alignment, to clean the return air filter, to check the grill air temperature and to check if it is corresponding to water temperature in plant room.

**В. GENERATING SETS**

**І. To check daily:**

1. Engine oil in sump;

2. Fuel in day tank;

3. Electrolyte level in batteries, to top it up with distilled water, if required (also to check specific gravity of batteries once a month and to record it);

4. Water coolant level in radiator and filling if required;

5. Cleaning generating sets and panels for keeping them dust and oil free.

**ІІ. Diesel Fuel**

1. To make a request in advance for filling of main diesel storage tank;
2. To check the automatic operation of solenoid valves if satisfactory working;
3. To fill the day fuel tank of the DG sets as and when required;
4. To remove water from day tank, if any;
5. To rotate the filter for diesel fuel to settle down the foreign materials;
6. To check and rectify the oil leakage if any and to perform line cleaning;
7. To clean the oil and air filter.

**ІІІ. To record hourly in the Log Book the following characteristics of the Generating Sets during Power Outage:**

1. Oil pressure and temperature of Engine;
2. Water temperature of Engine;
3. Battery charging of Engine;
4. Phase to Phase voltage generated by the alternator;
5. Current drawn Per phase from the alternator;
6. Reading of KW;
7. Report abnormal working of any part of the GENSET in the Remarks Column;
8. Voltage frequency;
9. R.P.M. of the set.

## **Note:** To regularly attend to problems of general nature such as engine not taking load, black smoke, erratic operation of engine, engine starting problem and surging of engine.

## **ІV. Generating Control panels, AMF and Power Panel.**

To clean the generator control panels every six months and to check for circuit breakers/contactors current transformers, fuse units, protective devices, under voltage coil, cable connections, internal control wiring, all bus bar connections, grounding connections, and working all KWH meters etc.

**V. Alternators**

1. To check and lubricate the bearings of alternators on the basis of the Hrs run/time periods as per the recommendation of manufacturers;

2. To check, clean / replace the Carbon brushes as required;

3. To clean and check every 6 months the Control Panel of alternators from dust and loose connections;

4. To attend to voltage drop problems of minor nature such as failure of minor components and their replacement as required;

5. To perform annual mеgger testing of insulation value of the windings of starter and rotor.

**С. ELECTRICAL INSTALLATION & EQUIPMENT REPLACEMENT.**

1. To attend to day to day complaints such as replacement of bulbs, tube, control gear, starters, holders, switches, wires, fitting, MCB’s, power switches, relays, contactors, indication lights, elements, timers, fuses, measuring instruments, halogen lamps and swimming pool area lights;
2. To check the garden light as and when required;
3. To clean the distribution boxes, to tighten the connections and to replace burnt wires;
4. To perform preventive servicing of main/sub distribution panels and to replace defective parts annually;
5. To check the city mains voltage and to contact the suppliers in case voltage is less than the permissible limits;
6. To inform NDMC for oil checking in HT OCBs, transformers, oil test, dehydration of oil and get the job done;
7. To inform NDMC for HT tripping, LT tripping and get the supply restored;
8. To check the heating of cables and rectify accordingly;
9. To check the automatic operation of generators, motor control center, garden light, rain water pumps, boilers and to rectify in case of defect.

### WATER SUPPLY SYSTEM

1. To start the tube well every day and to close it as per program, to replace and repair the hydrants;

2. To fill the underground water tank with NDMC / tube well water every day and to clean when required;

3. To feed the chlorine to drinking water on the basis of requirement;

4. To back wash the drinking water filtration tank when the water pressure drops down;

5. To keep all swimming pool re-circulation equipments in working order; to apply chlorine and to clean the swimming pool; to inform the Embassy in advance about requirement of chlorine granules;

6. To perform preventive maintenance of fire pumps, fire electrical board, fire hydrants to keep the system ready at all times; to test start the fire pump at least once per month;

7. To check the minor water leakage in the pipe line, such as hot water, drinking water, toilets, garden and rectify accordingly;

8. To maintain 24 Hrs. drinking water supply inside the Embassy compound through automatic operation of the system. To do all necessary preventive maintenance for all water supply equipment to keep them in perfect order and clean. The Maintenance company will also see that each pump is used on a regularly scheduled rotation basis;

9. To soften the municipal/raw water through the water softeners to fill filtered water underground tank;

10. To record in a log book the water meter reading of the 3 main water supply lines on the first day of every month.

1. To attend to day to day complaining for replacements, rectification of W/C, washbasin, kitchen sink, shower, water taps, bath tubs;
2. To clean / open the toilets, kitchen pipe lines when these are choked;
3. To open the storm water drain/pipe line as and when required;

PART II

SCOPE OF THE CIVIL WORK / GARDENING

1. To clean all roads and paved areas outside the buildings but within the Embassy Compound, Garage and Car parking areas, roofs of the buildings, windows of the buildings from outside, all technical areas, staircases of Bulgarian staff residences, swimming pool areas, areas around the Chancery building;
2. To attend to door locks, windows and their fittings and attending to replacement of broken glasses as and when required;
3. To perform paint jobs, polish jobs or patch repairs to cement – plaster;
4. To attend to seepage if any;
5. To mow the lawn;
6. To maintain the grass and plants outside the residences including watering, fertilizing, trimming of plants and hedging, plantation of new plants, spraying with insecticides as and when necessary, removal or green garbage and cleaning, removal of unwanted grass / plants from the garden;
7. To perform operations of Pest Control.
8. Once a month to clean the lawn from garbage around the Embassy in front of Gate 1 and Gate 2.

The Maintenance company is to provide only the work force. Any materials, spare parts, glasses, hardware items, chemicals, fertilizers / manure, seed, pots insecticides, movers gardening tools, spray machine, water sprinklers PVC /, rubber hose pipe, hand trolley, brooms etc. will be provided by the Embassy.

PART III

**DETAILS OF TECHNICAL EQUIPMENT:**

1. **AIR CONDITIONING SYSTEM:**
2. **A/C PLANT :**
3. “Carrier” make Screw Chiller with 2 compressors and

capacity of 150 TR water cooled, operating on

F–134 a gas, with microprocessor based control. : 2 nos.

1. “Westinghouse” make 45 TR capacity package Chiller

consisting of 4 compressors sealed & operating on

F–22 gas. : 1 no.

1. **CHILLED WATER PUMP :**

a. 25 HP split casing type ‘Beacon’ make coupling set : 2 nos.

b. 20 HP split casing type ‘Beacon’ make coupling set : 1 no.

c. 7.5 HP Monobloc type ‘Beacon’ motor pump-set : 1 no.

1. **CONDENSOR WATER PUMP :**

a. 25 HP split casing type ‘Beacon’ make coupling set : 2 nos.

b. 20 HP split casing type ‘Beacon’ make coupling set : 1 no.

c. 7.5 HP Monobloc type ‘Beacon’ make motor pump set : 1 no.

1. **COOLING TOWERS :**
2. ‘Paharpur’ make FRP cooling tower with cross flow

design, PVC fills, gear box, fan & motor, of 185 TR

capacity. : 1 no.

1. ‘Paharpur’ make FRP cooling tower with cross flow

design, PVC fills, gear box, fan & motor, of 90 TR

capacity. : 2 nos.

1. **‘ZECO’ make Air–Handling Units** of different capacity

for Embassy Office Building. : 12 nos.

1. Central heating oil fired boilers of “Thermax” make

with primary pump. : 3 nos.

1. **Fan Coil Units of 1.0 TR, 1.5 TR, & 2.0 TR as per following:**

a. Ambassador’s Office : 3 nos.

b. Ambassador’s Residence : 9 nos.

c. Bulgarian Staff Residence:

 - Bigger Apartment: 3rd floor: 3 nos. : 5 nos. each

 - Smaller Apartment: 18 nos. : 4 nos. each

1. **M.S. Chilled water & Condensor water piping.**
2. **Window and split-type A/Cs wherever installed**
3. **WATER SUPPLY SYSTEM :**
4. **Underground water tanks to receive the water**

From NDMC & Tube-well.  : 2 nos.

1. **Underground water tank to receive unfiltered**

water & to feed to the garden. : 1 no.

1. **Underground water tank to receive filtered**

water & to provide water to booster pumps. : 1 no.

1. **Filtration Pumps :**
2. 2.0 HP motor pump set to take the water from

unfiltered water tank to send to filtered water tank

through pressurised sand filter (one working & one stand by): 2 nos.

1. 5.0 HP Automatic ‘Ejecto’ type pump to lift the water

from filtered water tank & to send to Embassy & residences

through pressure tanks (VFD driven)

(one working & one stand by). : 3 nos.

1. FRP water filtration tanks with filter medias and valves. : 2 nos.
2. **Water System:**

a. FRP water system with capacity to soften 1000 ltr/hour

with necessary valve etc. : 2 nos.

1. **Garden Water pump:**

7.5 HP Ejecto pump to pressurize the water lines

for garden. : 1 no.

1. **Swimming Pool Pump:**
2. 5.0 HP pumps to circulate the water of

swimming pool through sand filters : 2 nos.

(one working & one stand by).

1. **Fire Pump:**

Fire pump of 50 HP capacity to charge the fire

Hydrants in the event of fire. : 1 no.

1. **Geysers are installed in apartments & Ambassador**

residence for hot water supply.

1. **Borewell motor pump set.** : 1 no.
2. **ELECTRICAL INSTALLATION :**
3. **Electrical Distribution Panels.**
4. **All L.T. panel consisting of A.C.B.’s (M.D.O.) & switch**

Fuse units.

**3.** **D.G. set of 500 KVA capacity ‘Cummins’ make.** : 1 set

**4. D.G. set of 200 KVA capacity ‘Skoda’ make.** : 1 set

**5. AMF panel for D.G. set.** : 1 no.

**6.** **Distribution boxes with MCB’s & Isolators.**

**7.** **L.T. sub distribution boards at lower & upper** basements,

ground, first & second floor.

**8. Capacitor panel with capacitor banks.** : 3 nos.

**9. Garden lights & panel.**

**10. Building lighting.**

**11. Servo stabilizers**