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(A Government of India Enterprise)

**Multi-Modal Logistics Hub (MMLH)
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Tender No. MMLH / FPS/ PT/25

DESIGN BASIS REPORT

(Doc No. MMLH/FPS/DBR)

for

PROVISION OF SUITABLE FIRE PROTECTION & DETECTION SYSTEM

for

Multi-Modal Logistics Hub at Visakhapatnam, Andhra Pradesh

OF

M/s. VISAKHAPATNAM PORT LOGISTICS PARK LTD., VISAKHAPATNAM, A.P.

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1.0 INTRODUCTION:

M/s. Visakhapatnam Port Logistics Park Ltd. (VPLPL) intends to set-up a Multi Model Logistics Hub (MMLH) at Visakhapatnam, A.P. The site is located on a land of 53.0235 acre at Visakhapatnam near Mulagada Village and adjacent to Mindi Railway Sidings of Visakhapatnam Port Trust. The site is about 4.0 km away from Sheela Nagar Junction at NH-5 and 8km from Airport.

	Location/Address	Ph. No	Distance
Police Station	Gajuwaka Police Station, 100 feet Road, near MRO Office, Gajuwaka, Vizag	0891-2517071.	6 Km-16 min via NH16
Hospital	ESI hospital- Scindia Junction road, Gandhigram, HSL Colony, Vizag AP-530011	0891-2577195	8.2 Km-15 min via E-India Petroleum Route
Fire Station	Raja Rammohan Roy Rd, near 1 Town Police Station, Vizag, AP-530001	0891-2568905	10.3 Km-18 min via Port Road

Wind Speed : 50 m/sec

2.0 OCCUPANCY DESCRIPTION

- 2.1 A Multi-Modal Logistics Hub (MMLH), a multi-modal freight-handling facility being developed on a land of 53.025 acre in phases. In 1st phase, an area of 35 acre is being developed.
- 2.2 The Hub is basically divided into 2 areas, i.e. Exim Area & Domestic Area. In the 1st phase, 24 acres of Exim/Bonded area and 11 acres of Domestic area are being developed. Facilities considered in Phase is only covered in this report.

EXIM (Bonded) Area: It is proposed that the Bonded area will have CFS / ICD, Warehousing, Cold Storage/Temperature Controlled Warehouse, Open Cargo Storage, Hazardous & Non-Hazardous Cargo Handling, Truck Parking etc.

Domestic (Non-Bonded) Area: It is proposed that the Non-Bonded area will have Yard for Container Storage, General Warehousing, Cold Storage, Open Cargo Storage, Truck Parking, empty container storage, Repairs and maintenance area for containers etc.

- 2.3 Major Structures and open areas in both Exim and Domestic areas

EXIM (Bonded) Area:

- A warehouse at ambient temperature is proposed in Exim area of size 120 M x 45 M x 10.5 Mtrs (eave height).
- Temperature Controlled Warehouse 40 x 25 Mt (Exim) X 11.5 m (eave height). Both apex roof sheds of dimensions specified above with standard height of 4.5-5.0 Mtrs. (1:10 slope) (IS-3594 to be followed)
- Admin building in Exim built-up area – 2500 sq.mt, G+1 Floors, Floor height - 4.0 Mt.
- Worker Rest Room, Drivers Rest Room, Canteen Bldg, Pump House, Security Blocks, LT Panel room.

Domestic (Non-Bonded) Area:

- e) A warehouse at ambient temperature is proposed in Domestic area 117 M x 45 M x10.5 Mtrs (eave height).
Both apex roof sheds of dimensions specified above with standard height of 4.5 Mtrs. (1 :10 slope) (IS-3594 to be followed)
- f) Temperature Controlled Warehouse 40 x 25 Mt (Exim) and 80 x 25 Mt. (Domestic) -11.5 mtr eave height
- g) Electrical substation (part open yard & partly covered) in 12 x 24 Mt incoming: 33 KV, Outgoing : 415V, 3 phase.
- h) Workers Rest Rooms, Drivers Rest Rooms, LT Panel Rooms, Admin & Canteen Bldg, Pump house Tool Room, Container Repairing Shed and Security Block.

2.4 A suitable and adequate Fire Fighting, Detection and Protection Systems are proposed to be installed as under with relevant drawing Nos. indicated against each head

- Hand appliances (Extinguishers, including Sand Buckets)
- Fire Hydrant System
- Fire Detection and Alarm System
- Water Sprinkler System
- CCTV System (Not in Fire Protection Tender Package)
- Public Address System (Not in Fire Protection Tender Package)

In the above systems, Fire Hydrant, Protection, Sprinkler Systems and fire detection and alarm systems are proposed to be installed simultaneously during construction phase, without losing much time in procurement of Fire Pumps and allied Fire Fighting equipment.

The entire occupancy is considered as ORDINARY HAZARD as per norms. However, as per NBC Code, the occupancy falls under Group-H category and can be termed as mixed occupancy.

3.0 OBJECTIVE:

The function of the Fire Detection and Protection System is to ensure reliable and efficient Fire Detection and Protection facilities in the occupancy.

- In order to mitigate the occurrence and spread of fire.
- Providing protection and safety for operating personnel and dumped materials
- Early detection and warning of fire, so as to minimize the damage and consequential losses resulting from the fire.

The above requirements will be met by optimum selections of Fire Protection System devices and by adequate Fire Detection and early warning measures.

The system is designed in compliance with the recommendation guidelines of Tariff Advisory Committee (TAC) and the relevant norms of National Building Construction Code (NBC)

The objective of this report is as follows:

- Identify the risk / hazardous areas and determine the type of Fire Protection and Detection System for various areas.
- Determine and recommend basic system features and equipment parameters
- Describe the system features and operation.

- Indicating the requirements of fire water pumps and storage tank for the proposed occupancy

4.0 SYSTEM DESCRIPTION

4.1 Fire Hydrant System

Two individual pumping systems are designed for the two independent areas, i.e. Exim and Domestic, based on water demand calculations.

Fire Water Pumps for the proposed two occupancies are as follows:

4.2 Exim Area

- | | | |
|------------------------------------------------------------------------------|---|-------|
| a) Electrical Motor Driven Pump – 171 M ³ /Hr, 70 MWC head | – | 1 No. |
| b) Diesel Engine Driven Pump – 171 M ³ /Hr, 70 MWC head (Standby) | – | 1 No. |
| c) Jockey Pump – 10.8 M ³ /Hr with increased head of 88 MWC | – | 1 No. |
| d) Electrical Motor Driven Terrace Pump- 54 M ³ /Hr, 35 MWC head | - | 1 No |

4.3 Domestic Area

- | | | |
|--------------------------------------------------------------------------------|---|-------|
| a) Electrical Motor Driven Pump – 171 M ³ /Hr, 70 MWC head | - | 1 No. |
| b) Standby Diesel Engine Driven Pump 171 M ³ /Hr, 70 MWC head | - | 1 No. |
| c) Jockey Pump of capacity 10.8 M ³ /Hr at increased head of 88 MWC | - | 1 No. |
| d) Electrical Motor Driven Terrace Pump- 54 M ³ /Hr, 35 MWC head | - | 1 No |

4.4 Operating Philosophy of Fire Pumps

Normally Fire protection system headers Ring Main will be charged with water to designated pressure recommended as 7 kg/ sqcm. In the event of fire, when any hydrant or any fire protection system such as Sprinkler System operate or any leakages in any part of the network, the resultant fall in header pressure will initiate the automatic sequential operation of :

Fire Pumps with Electrical Motor driven Jockey pumps starting first to maintain the system pressure. In case of further fall of header pressure, Electrical motor driven main pump will cut-in to operation automatically to supply water to the system. Failure to start of main pumps on demand will result in further fall in header pressure or if the header pressure still falls even when pumps are running then this signal will actuate the stand-by diesel engine driven pump to start automatically. Stopping of the Main & Diesel engine driven pumps shall be manual after confirming that there is no necessity of water any further.

This complete sequential operation of fire pumps will be signaled with an Alarm in the Control Panel.

Each Pump can also be started manually from local controls during emergency and/or testing. If the Pump is in running condition then it will be stopped manually.

4.5 Hydrant Ring Main Piping (refer drawing)

Each Pump House shall deliver water into the connected ring main piping covering the entire area affiliated to that specific pump house. The ring main piping shall normally run over ground taking support from existing boundary wall at 5 mtr interval and on sleepers, i.e. Pedestals (where it is away from wall), adequately clamped and, necessary tap offs are provided on the ring main for individual protection of areas like Warehouse, Admin Building, TCW's, etc. As per site requirement, the pipe shall be buried with wrapping

and coating. The ring main shall maintain a designated pressure of 7 kg/cm² all the fire 24 x 7 days and loss in pressure shall be compensated by auto starting of the Jockey Pump.

However, the Single Hydrant Landing Valves and Super Jet Monitors are also provided on the ring main at specified distances as per the standard code of practice.

4.6 Fire Fighting Equipment: Landing Valves, Super Jet Monitors, First Aid Hose Reels are provided on ring main at specified places for instant operation of the equipment, in case of any disaster

4.7 Sprinkler Systems

Automatic Sprinkler System is provided in both the Warehouses through Alarm Valve Gong and Bells. The Warehouse is protected by QB Sprinklers fixed on the ceiling with proper structural tie-rod arrangement. The tap offs for Sprinkler System are taken from the nearby Hydrant Ring Main Piping.

The following design parameters are considered for Sprinkler Systems in Exim & Domestic areas- Warehouses, Admin Building and TCW.

- Design standard : As per IS 15105-2002
- Commodity classification : Rack Storage, different commodities categorized under moderate hazard
- Storage Height considered : 7.6 Mtr. To 9 Mtr.
- Sprinklers proposed : QB type rated temperature 68 Dec C
- Design density : 5 LPM/ Sq. m.
- AMAO considered : 360 Sq. Mt.

4.8 Escape Hydrants and Sprinkler System

It is assumed that there will be 6 Nos. of entrances for loading and un-loading operation in the Warehouse in both Exim and Domestic areas. Near the entrances, Escape Hydrants and First Aid Hose Reels are provided to contain any incipient fires and major fires.

5.0 DESIGN BASIS

5.1 Design Basis of Exim area

As per TAC, the occupancy falls under "LIGHT HAZARD".

Pump sizing for Exim Area

		<u>Eg. No. of SFH</u>
Method (1) -	No. of Hydrants	41 Nos.
7.5.10 NB-1) -	No. of Super Jets 7x3	21 Nos.
	No. of FAH 15 / 3	<u>05 Nos.</u>
		67 Nos.

The Pump discharge as per No. of Hydrants in Light hazard

$$171 \text{ M}^3 / \text{hr} \quad - \quad (i)$$

(from 55 Nos. to 100 Nos. of equivalent SFH) and head is considered as 70MWC

As no building is exceeding 15 mts in ht. Care is taken to attain a minimum pressure of 3.5 kg/sq cm at the farthest end from the pumping station in deciding the head of the pumps.

Method (2) – Maximum demand requirement

Design density : 5 LPM/ Sq. m.
AMAO considered : 360 Sq. Mt.
Total water Demand : $360M^2 \times 5LPM/ Sq. m. = 1800 LPM=108 Cum /Hr.$

So, maximum demand in sprinkler as per AMAO is 108 Cum/hr. ---- (ii)
From the observations (i) & (ii) a higher size pump is selected for the EXIM area.

In a nutshell for Exim Area:

Recommended pumping and storage system for Hydrant and Sprinkler / Water Curtain System.

- Common pumping capacity for Hydrant & Sprinkler - 171M³/Hr@7bar 70 (MWC)
- Common standby Diesel Engine Driven Pump - 171M³/Hr@7bar 70MWC)
- Common Jockey Pump - 10.8 M³/Hr (8.8 bar (88MWC)
For one hour back-up
- Booster Pump to be located terrace of admin building for wet riser - 54 M³/Hr @3.5 bar
- Fire Water Tank (over ground Steel) capacity for 1 hour back-up - 200 M³/KL
- Fire Water Terrace Tank on the Admin building -10 KL (not in scope of Fire Package)

A schematic layout of Pump Room and allied piping arrangement is enclosed.

5.2 Design Basis of Domestic Area)

As per the TAC the occupancy falls under “LIGHT HAZARD”

Pump sizing for Domestic Area

		<u>Eq. No. of SFH</u>
Method (1) -	No. of Hydrants	28 Nos.
7.5.10 NB-1) -	No. of Super Jets 5x3	15 Nos.
	No. of FAH18 / 3	<u>06 Nos.</u>
		49 Nos.

The Pump discharge as per No. of Hydrants in ordinary hazard

As per site condition, no of hydrant may increase. Accordingly, safer side, total hydrants considered in 55-100 category of TAC guideline.

171 M³ / hr - (i)
(from 55 Nos. to 100 Nos. of equivalent SFH)

Method (2)

Design density : 5 LPM/ Sq. m.
AMAO considered : 360 Sq. Mt.
Total water Demand : $360M^2 \times 5LPM/ Sq. m. = 1800 LPM=108 Cum /Hr.$

So, maximum demand in sprinkler as per AMAO is 108 Cum/hr. ---- (ii)

From the observations (i) & (ii) a higher size pump is selected for the Domestic area.

In a nutshell for domestic Area:

Recommended pumping and storage system for Hydrant and Sprinkler .

- Common pumping capacity for Hydrant & Sprinkler - 171M³/Hr@7bar 70 (MWC)
- Common standby Diesel Engine Driven Pump - 171M³/Hr@7bar 70MWC)
- Common Jockey Pump - 10.8 M³/Hr (8.8 bar (88MWC)
For one hour back-up
- Booster Pump to be located terrace of admin building for wet riser - 54 M³/Hr @3.5 bar
- Fire Water Tank (over ground Steel) capacity for 1 hour back-up - 200 M³/KL
- Fire Water Terrace Tank on the Admin building -10 KL (not in scope of Fire Package)

6.0 Layout Considerations

The Hydrant protection considered is to meet any water demand in hazardous situations for the areas / plants considered as under.

- The Ring Mains will be planned as per facilities located in the plot plan for the entire domestic area occupancy with provisions for Fire Extinguishers.
- The fire water piping will mainly be routed above ground along the compound wall or sleepers at placed without causing any obstruction for other utility piping. It will travel underground at places where it can cause obstruction for vehicular traffic. Wind sacks are to be provided at highest elevated points in both EXIM & Domestic area.

Facility wise details of Fire Protection Appliances are provided in separate sheet.

7.0 Codes and Standards

1. Tariff Advisory Committee
2. National Building Constructions Code
3. IS specs for all equipment and Extinguishers

8.0 Electrical Supply

Electrical Load Specifications

The power supply for main electric pump, jockey pump control panel with 415V +/- 10%, 3 phase, 50 Hz AC supply from independent source of supply, preferably from the incomer of main supply to the occupancy.

The power supply or fire alarm control panel will be 240V +/- 10% 1 phase 50 Hz.

1. 75 HP for main electric pump
2. 15 HP for Jockey Pump
3. 12.5 HP for Terrace Pump
4. 5.0 HP for lighting of the pump house

Above rating are minimum for the motors. For each pump house of EXIM & Domestic Area.

A single phase 15A power plug point shall be provided at reception areas at Admin Buildings and Security Building for placing the FDA Panel in both Exim and Domestic areas.

FIRE DETECTION AND ALARM SYSTEMS

The following areas are considered for fire alarm and detection systems

Two individual fire alarm and detection systems are proposed for both exim and domestic areas. The systems proposed are of Addressable type and comprising of smoke, and heat detectors, multi sensors, manual call points, main control panel and repeater panel. The entire FAD system in both the areas are net worked with 1.5 sq mmX 2 core FRLS Cu armored cable.

EXIM AREA :

- 1) Administration Building (Heat & Smoke)
- 2) Cafeteria (Heat)
- 3) Drivers rest room(Smoke)
- 4) PEB Ware house (Smoke Detectors)
- 5) TCW building (ante room, and plant room)—smoke and multi sensor
- 6) LT room ---(smoke)
- 7) Container repairing room
- 8) Security lounge----(smoke)
- 9) Fire pump room (smoke)

DOMESTIC AREA

- 1) Administration Building (Heat & Smoke)
- 2) Cafeteria (Heat)
- 3) Drivers rest room(Smoke)
- 4) PEB Ware house (Smoke)
- 5) TCW building (ante room, and plant room)—smoke and multi sensor
- 6) LT room ---(smoke)
- 7) Container repairing room
- 8) Security lounge----(smoke)
- 9) Fire pump room (smoke)