

Hazards Identifications and Risk Assessment in Port Berth Construction - A Case Study

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Abstract: Port & Harbors are the basic infra for the logistics and transportation of goods for international trade. India peninsular the sixteenth largest maritime country of the world surrounded by Bay Of Bengal and Indian Ocean, i.e. 7,517km as a result there are 13 major and 205 minor and notified ports available. In Financial year the traffic has been increased 2.09%, keeping an eye on the upcoming traffic load, the Indian Government has taken up Sagarmala programme. Under the programme, Government has envisioned 189 projects for modernization of ports by investing Rs. 1.42 trillion. The sector is facing a lot of risk in terms of life and environment protection while expanding the same. To make the expansion fruitful and the expansion projects involve heavy Cranes, huge manpower, huge expertise and experienced managers, engineers, supervisors etc. During the execution of activity at various sections, numerous hazards exists which may impose harm to the deployed employees and surrounding if adequate measures not taken. This paper describes the hazards in Port Berth Construction at Visakhapatnam Port Trust with preventive control measures to avoid incident, accident.

Key Words: Piling, Diaphragm wall, Dredging, Drowning, Safety, Electrical, Mechanical, Barge, Training, Fire.

1. INTRODUCTION

Indian Construction Industries plays a vital role in the economy of the country. Robust construction set up and good safety practice is the strength for quality product. It takes months, years to ensure good safety practices, to build up safe working culture & maintain an organization reputation. But an incident might be a catastrophic agent to destroy all reputation, endeavour of organizations including the direct cost like damage to life of human being, property and environment at a larger scale. Port berth construction is not easy as other construction activities, as it comes under heavy infra category. Inadequate Safety measures may lead to catastrophic major incidents may results into harm to human being, to environment. It is a moral and legal responsibility of any employer to ensure Identification of hazards and take required steps to minimize the risk due for ensuring Zero Incident at work place. Hence, review of Hazards and required safety measured for each identified

hazards in Port Berth Construction industry is much more essential to control the hazards. Here, in this paper we have discussed all the hazard, risk and task involved while executing the Visakhapatnam Port Trust EQ 02-05, 38916 DM berth construction project.

2. DIFFERENT DEPARTMENTS

In Constructing the Port Berth, different departments and sections involved:

- Plant & Machinery.
- Store and Logistic.
- Quality Control.
- Quality Assurance.
- Civil Engineer.
- Environment Department - Handling of Waste Materials and preventing the surrounding environment.
- HR and Admin
- Purchase and Stores
- Information and Technology department.
- Legal and Liasoning Department.
- EHS (Environment, Health, Safety, Fire)
- Accounts.
- Planning.
- Commercial and Billing

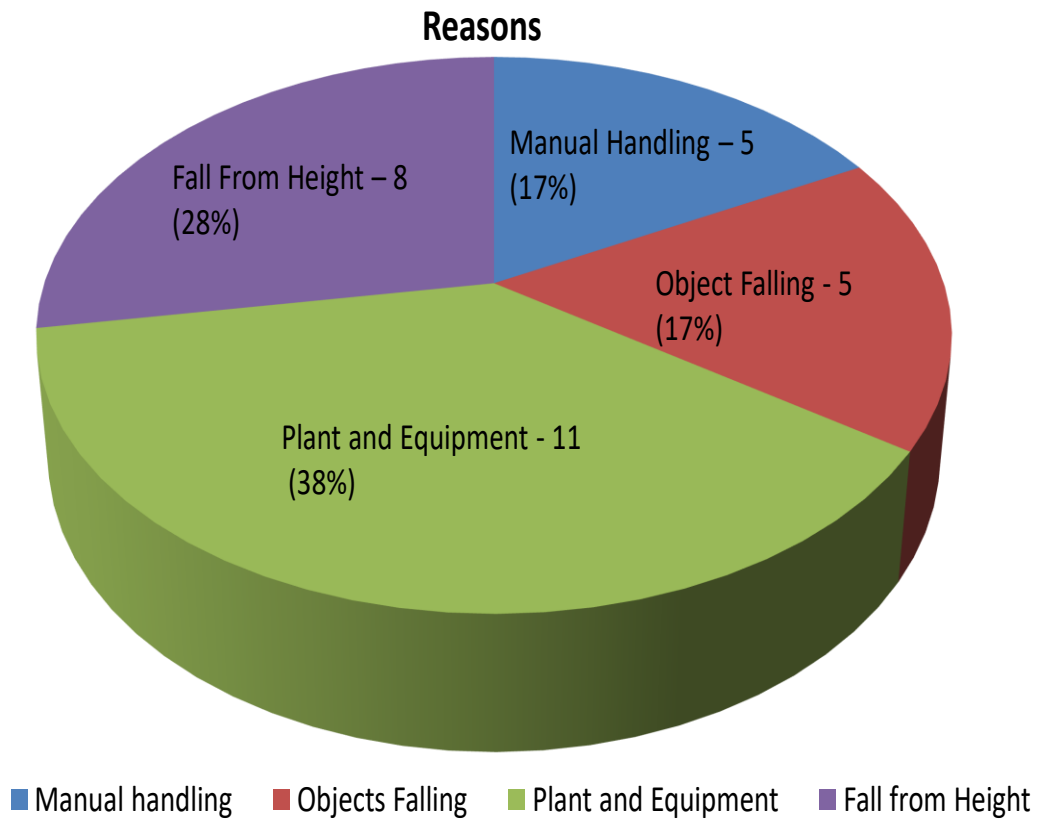
3. HAZARDS and CONTROL MESURES

3.1 THERE ARE DIFFERENT HAZARDS INVOLVED IN EXECUTING THE DIFFERENT ACTIVITIES.

- Physical Hazard
- Chemical Hazard
- Electrical Hazard
- Mechanical Hazard
- Fire & Explosion Hazard
- Occupational Health Hazard
- Drowning Hazard

3.2 REASONS OF ACCIDENTS:

Reasons Of Accidents



4. ACTIVITY INVOLVED FOR EXECUTING THE PROJECT:

1. Dredging.
2. Under Water Drilling and Blasting.
3. 35T Cage Lifting and Lowering at bore hole.
4. Piling & Diaphragm Wall
5. Civil Works.

5. PHOTOGRAPHS

DREDGING BY EXCAVATOR



PILE BORING



UNDER WATER DRILLING AND BLASTING



DIAPHRAGM WALL



35 TON DIAPHRAGM WALL CAGE LIFTING



CIVIL WORKS



DIAPHRAGM WALL CAGE LOWERING INTO BORE HOLE



6. HAZARD IDENTIFICATION RISK ASSESSMENT: -

Procedure of Assessment: The procedure being followed by the EHS Management Team at site – All the section In-charge, Concerned Managers/ Engineers related to that particular task to be present for the assessment, in which they share the possible hazard that might be involved from their Vision, Prediction out of their past experience.

6.1 RISK RATING SCORE CALCULATION PROCEDURE.

6.2

6.1.1 Number Of person affected (N)

Number of Person Affected	N
1 Person	1
2-5 Person	2
5+ Person	3
Public/Vulnerable People	3

6.1.2 Severity (S)

Severity/Effect on Health	S
Negligible	1
Minor	2
Major	5
Fatal (Death)	10

6.1.3 Likelihood (L)

Likelihood	L
Probable	0.5
Remote	1
Possible	5
Likely	10
Certain	20

6.1.4 Risk Rating Score (RRS)

Acceptable	A	<10
Low	L	10-19
Medium	M	20-49
High	H	50-99
Very High	VH	100+

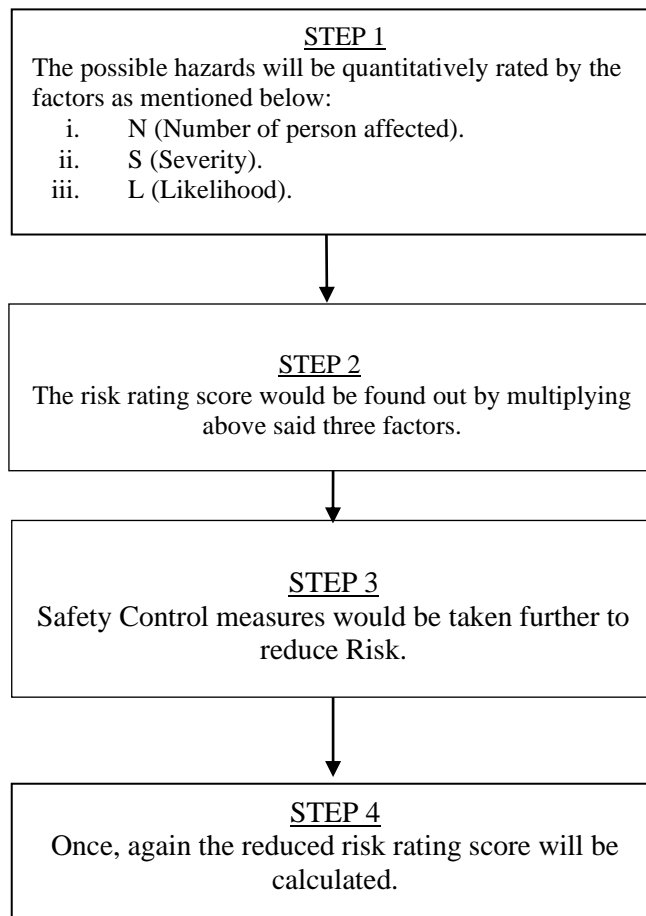
Very high risk: This risk is intolerable, immediate action of avoidance and protection needed urgently. Temporary mitigation measures should be taken instantly and action plan for final solution should be started and take place within 1 month.

High risk: Preventive and Corrective action are to be ensured to decrease the risk are required. Provisional countermeasure should within 1 month and action plan for final solution within 3 months.

Medium risk: Regular Inspections are required to confirm that the risk is in control. Continuous Inspection is also required to ensure that risk is not rising further. Preventive and corrective actions can be taken as per need.

Low risk: This is green zone which displays that the risk is within tolerable limit. In the zone the risk is under control, regular monitoring of activities and administrative control is necessary.

6.2 STEPS FOLLOWED FOR THE ASSESSMENT:



6.3 HAZARD IDENTIFICATION OF RISK ASSESSMENT FOR DREDGING WORK.

Dredging													
Sl. No.	Task	R / N R	Hazard	Hazard Effect	RRS				Control Measures	RRS			
					N	S	L	RR S		N	S	L	RR S
1	Dredging by floating barge mounted by Crane & Back hoe	R	Collision with other crafts.	Injury to Personnel/ damage to equipment / Capsizing of floating crafts.	2	10	5	100	a) The trained/experienced master of the dredger must follow approved marine traffic route by taking prior necessary approval from the port traffic authorities. b) Dredger/ Barge must be fixed with operational, calibrated navigation & communication equipment onboard. c) All crew members must wear life jacket during navigation equipped with rescue life boat for Emergency response.	1	10	1	10

	Falling into water	Drowning.	2	10	5	100	a) No working should be permitted during extreme weather conditions. b) Barge should be equipped with handrail, life boat and personnel with all life saving equipment i.e. Lifebuoy.	2	10	1	20
	Incoming tide	Drowning Of personnel and Sinking of Barge.	2	10	5	100	Dredger/Tug must be barred at the times of cyclonic or extreme condition by following the tide chart and IMD instruction, equipped with all safety equipments.	2	10	1	20
	Failure of lifting tools and tackles i.e. wire rope, D-Shackle & Dog Clamps of crane.	Property damage	1	5	5	25	Visual inspection & preventive maintenance schedule must be done to prevent such failures.	1	2	1	2
	Electricity	Electrocution.	2	10	5	100	a) Electrical doubly insulated cables must be routed through ELCB 30MA. c) Only trained, authorized & licence holder electrician to be deployed. d) Electrical Inspection must be done on regular basis as per preventive maintenance schedule.	2	5	1	10
	working at night	Injury to person	2	10	5	100	a) Proper illumination must be provided as per standard b) Light ray must not directly focus on face.	2	5	1	10
	Noise	Adverse Health effect & Distraction	2	5	5	50	a) Deployed equipment should be of good quality. And Continuous noise level monitoring to be done as per the standard. b) Administrative control like shifting of deployed person in 6hr, providing earmuffs to be done as per Sop.	2	5	1	10

			Worker/Staff Entering to offshore	Drowning	2	10	5	100	<p>a) Navigation of barge should start with prior permission from the traffic control department and brief tool box talk.</p> <p>b) Single entry and exit with register, token system to be followed to ensure people count.</p> <p>c) Ensure deployed trained and experience must wear lifejacket and other applicable Ppes while going to offshore.</p> <p>d) Ensure weather condition is good and Barge is equipped with all safety devices.</p>	2	5	1	10
			Person being hit by equipment	Injury/Fatality of person	2	5	5	50	<p>a) Project specific training, must be imparted to the deployed trained and experienced pilot and workmen.</p> <p>b) Use Proper signalling systems and communication systems to be ensured for all navigation and work must be stopped in harsh weather.</p>	2	5	1	10
2	Changing of grab	R	Working near water	Drowning.	1	10	5	50	<p>a) Project specific training.</p> <p>b) No staff working during extreme weather conditions.</p> <p>c) Worker or person should wear life jacket, life buoy, emergency boat should be made available for 24 by 7.</p> <p>d) Railing on Barge must be ensured.</p>	1	10	1	20
3	Transporting dredged soil by land mode	R	Toppling of dumper/Excavator	Injury/Fatality of person	2	5	5	50	<p>a) Trained, authorized and experienced driver & operator must be deployed,</p> <p>b) Ensure Every earth moving equipment (dumper, tripper, excavator) must have helper with whistle</p> <p>c) Area to be cordoned off by displaying adequate poster & warning signages with identified passage, illumination and Traffic marshal at each entry.</p> <p>d) Ensure all safety devices i.e. Reverse horn, rear view mirror, reverse & head light etc in working condition.</p>	2	5	1	10

4	Transporting dredged soil by water mode	Collision with other passing by crafts and barges.	Personnel / damage to equipment / Capsizing of floating crafts.	2	1 0	5	100	<p>a) Necessary permission from the port traffic master & other relevant port authorities prior to start the work.</p> <p>b) Deployment of skilled & experienced personnel having sound knowledge of all relevant international navigational safety rules & abides by local regulations, safe navigation.</p> <p>c) Usage of calibrated navigation & radio communication between land & sea must be maintained during navigation.</p> <p>d) The Barge /tug master must adhere to the approved marine traffic route plan.</p> <p>e) To tackle the emergency situations like drowning, extreme rough weather i.e. cyclone, heavy wind flow - the deployed workmen must be trained, wear life jackets. The Tugs must have the emergency kit etc.</p> <p>f) No work shall be carried out during rough weather conditions.</p>	2	5	1	10
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7. CONCLUSION

8. REFERENCES

We have noticed the significant reduction in risk level i.e. RRS (Residual Risk Score) after the analysis. By Hazard Identification Risk Assessment we have reduced the risk from high level to Low and Acceptable level by taking all the applicable safety precautionary measures and preventive measures.

Hazard Identification Risk Assessment is a tool to mitigate the risk well before executing the work by analyzing the risk by finding the root cause with all the experts input. Organizations are now a day's using this HIRA tool as a major key player to mitigate the loss of life, property, environment etc as well as the indirect cost like Organization Image, problems in bagging the business/ projects, man-hour loss etc.

Organizations whether it may be Brownfield/Greenfield Project; Process/Manufacturing/Chemical Plant can use the Hazard Identification Risk Assessment as an effective tool and prevent themselves from catastrophic consequences and have better productivity, quality with zero incident .

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