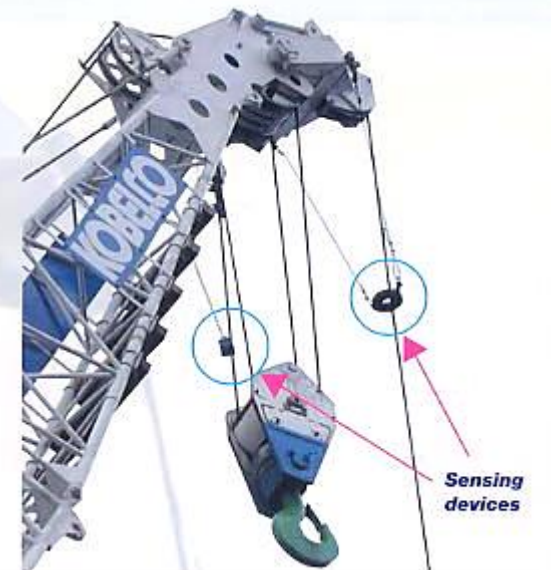


■ CRANE CAPACITIES :

Working height (m)	12.20	15.25	18.30	21.35	24.40	27.45	30.50	33.55	36.60	39.65	42.70	45.75	48.75	51.80	Working height (m)
3.7	9.50.00														2.7
4.0	9.48.90	46.024.1													4.0
4.5	39.90	39.90	21.134.7												4.5
5.0	33.40	33.30	33.20	31.125.2	30.055.7										5.0
6.0	24.90	24.80	24.70	24.60	24.50	22.906.3									6.0
7.0	19.90	19.80	19.70	19.60	19.50	18.40	19.30	17.807.3							7.0
8.0	16.90	16.80	16.70	16.60	16.50	16.40	16.30	16.20	16.10	14.708.4					8.0
9.0	14.40	14.30	14.20	14.10	14.00	13.90	13.80	13.70	13.60	13.50	12.109.5				9.0
10.0	12.90	12.80	12.70	12.60	12.50	12.40	12.30	12.20	12.10	11.00	11.90	11.80	11.70	11.60	10.0
12.0	10.30/11.8	9.90	9.80	9.70	9.60	9.50	9.40	9.30	9.20	9.10	9.00	8.90	8.80	8.70	12.0
14.0		8.10	8.00	7.90	7.80	7.70	7.60	7.50	7.40	7.30	7.20	7.10	7.00	6.90	14.0
16.0		7.00/14.3	6.90	6.80	6.70	6.60	6.50	6.40	6.30	6.20	6.10	6.00	5.90	5.80	16.0
18.0			6.00/16.9	5.90	5.80	5.70	5.60	5.50	5.40	5.30	5.20	5.10	5.00	4.90	18.0
20.0				5.10/19.8	5.00	4.90	4.80	4.70	4.60	4.50	4.40	4.30	4.20	4.10	20.0
22.0					4.30	4.20	4.10	4.00	3.90	3.80	3.70	3.60	3.50	3.40	22.0
24.0					4.20/22.2	3.70	3.60	3.50	3.40	3.30	3.20	3.10	3.00	2.90	24.0
26.0						3.50/24.9	3.10	3.00	2.90	2.80	2.70	2.60	2.50	2.40	26.0
28.0							2.80/27.6	2.70	2.60	2.50	2.40	2.30	2.20	2.10	28.0
30.0								2.30	2.20	2.10	2.00	1.90	1.80	1.70	30.0

Load and Range Charts



Limit Switches



Bypass Switch Lock

Foundation Assessment



INSPECTION REQUIREMENTS FOR STATUTORY LIFTING EQUIPMENT



Lifting Equipment Classification	Before being taken into use for the first time	Frequency of Inspection (At least once in)	4 yearly Load Test	Examination and Load Test after Major Repair	Examinations & Load Test	
					Location Change	Deregistered or not used for > 1 year
Lifts (LL) & Hoists (LH) (see table 1)	• Manufacturer's Test Certificate; and • Examination and load test by AP	6 months	Yes	Yes	Yes	Yes
Lifting Appliances (LA) (SWL > 150 kg)	• Examination and load test by AP	12 months	Yes (for SWL > 10t) No (for SWL < 10t)	Yes	No	Yes
Lifting Machines (LM) • Derricks • Fixed cranes • Other LM	• Examination and load test by AP	12 months	Yes	Yes	Yes	Yes
Lifting Machines (LM) • Mobile cranes • Piling machines	• Examination and load test by AP	12 months	Yes	Yes	No	Yes
• Other LM	• Examination and load test by AP	6 months (for personnel)	Yes	Yes	Yes only for lifting	Yes

Inspection by Authorized Examiner

Examples of Site Provisions and Good Practices by Contractors

A Great Workforce A Great Workplace



Organised Work and Proper Segregation /Demarcation



Segregation of Man and Machine



Access Areas with Proper Demarcation



Racks for Material Storage



Manned Access Control to Blasting Areas



Demarcation of Excavation Limits

Examples of Site Provisions and Good Practices by Contractors

Provide Adequate Facilities



Eye Wash Facilities



First Aid Room



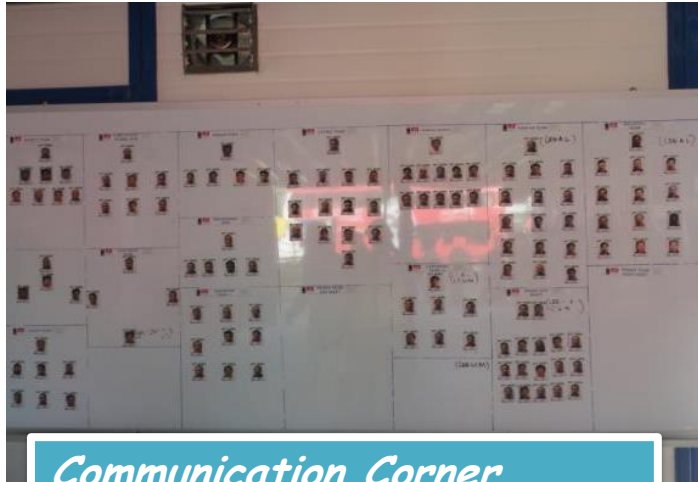
Workers Rest Areas



Water Stations

Examples of Site Provisions and Good Practices by Contractors

Proper personal storage areas & Communication Areas



Communication Corner



Translated Messages



Boot Racks / Bag Hangers

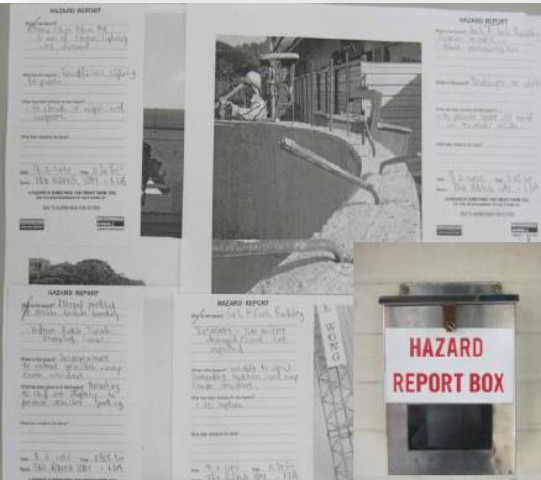


Examples of Site Provisions and Good Practices by Contractors

A Great Workforce A Great Workplace



Controls & Checks



Mandatory Hazard Reporting



Monthly Lifting Gear tags



Regular Checks on Cranes



Internal SWOs

JSEA AUDIT REPORT	
Client:	Land Transport Authority (LTA)
Contract Project:	DTL3-CR11 Design and Construction of Station at Beauty World and Tunnel
Type of Audit:	<input checked="" type="checkbox"/> Safety <input type="checkbox"/> Environmental
Location:	DTL3-CR11 Building - M16
Activity:	Construction of 47' deep
Subcontract:	M. Chen Yim
JSEA Ref. No.:	ADP14-000-1980 (Rev 2)
Auditor:	Thomas Rosewood
Author:	Shirley Chang
Audit Findings:	
1. No evidence from signed off.	
2. Item 1 - Piling - Only a 2' pump available on site.	
3. Item 1A - No evidence from signed off.	
4. Item 2B - No evidence from signed off.	
Other observations:	
a. Piling risk on main excavation not approved. Excavator not signed off.	
b. Additional evidence required on main excavation to assist operator in loading adjacent.	
Recommendations:	
1. HSE will be monitoring a 2' pump for clearing after from water column.	
2. Item 1B - To include that safety must be rechecked every 4 hours and approved by M16.	
3. HSE additional entries on main excavation.	
Mitigation:	
M16	
Distribution:	
JSEA-CR11 Building Project Manager	
JSEA-CR11 Building Subcontractor	
JSEA-CR11 Building Client/Owner	
JSEA-CR11 Building M16 Manager	

Risk Assessment Audits



Safety Stand Down / Time Out



Safe To Build – Project Safety Review (Civil) Civil Feasibility / Concept Safety Submission



Hazards / Risks

- Challenges in construction as most of the tunnel will be submerged
- Critical risk of flooding identified as works would be in open sea
- Any failure of the TERS will be catastrophic.

Safe To Build – Project Safety Review (Civil) Civil Design Safety Submission

- To ensure hazards identified at concept stage are studied and further mitigated during detailed design.
- To highlight hazards that cannot be mitigated and needs to be addressed during construction.

Constraints/ Parameters:

- Difficult ground conditions with soft clay depths between 25 and 59m with an average depth of 45m
 - Excavation width of 60m required
 - Excavation depth 12 to 25m (depth of 8 storey building)
 - Excavation in sea (20m below mean sea level 14m beneath seabed)
- Land reclamation work was carried out in different phases in the 1970s and 1980s at Marina East and Marina South. A stretch of old seawall was left behind and buried 12m underground when reclamation was carried out.

Possible Failure of TERS at Marina Crossing

Inadequate TERS design, sudden discharge from Marina Barrage, Inaccurate calculation of discharge pressure from Marina Barrage, Collision by marine vessels

Control Measures

Civil Design Criteria, Statutory requirements of PE(TERS), AC(TERS) and QP(Supervision), LTA General Specifications for SHE, Advanced Consultancy, Robust TERS design

Additional Control Measures

Close liaison with PUB's Marina Barrage Team, Implement warning system (as per PUB system), Liaison with MPA, Lighting / markers to alert marine vessels, Emergency evacuation plan

Safe To Build – Project Safety Review (Civil) Civil Construction Safety Submission

- To demonstrate understanding of project civil hazards and competence to proceed with actual construction works.



Marina Channel after stage 1 cofferdam construction

- Extensive ground improvement works required before excavation.
- Robust and deep temporary walls and permanent piles required



Machinery on decking supported on steel pipe piles



Excavation and Strutting Works

Safe To Build – Project Safety Review (Civil) Civil Handover Safety Submission

- To provide operator information of maintenance hazards and operational safety manuals as well as any other information related to future construction work.

*Lighting maintenance,
fireboards replacement,
E&M systems, interface
for future road works*





Safety Demonstration by External Parties

1st Case:

A worker died after pipe connected to a concrete pump broke and hit him.

Issue about integrity and maintenance of the pipe / equipment owned by sub-contractor

2nd Case:

2 workers died after the "jumpwork" collapse from 24th storey of a building under construction



Subcontractor modified the anchor mechanism instead of using proprietary OEM components

3rd Case:

A worker died after a formwork which was being transported via a mobile rack collapsed onto him

Instead of using the specially designed mobile rack to transport the formwork, subcontractor "ordered" one from a local workshop

Systemic Lapses

Failure of the principal contractor to exercise proper control over the equipment brought in by his sub-contractor



Accident/ Incident Investigation & Sharing



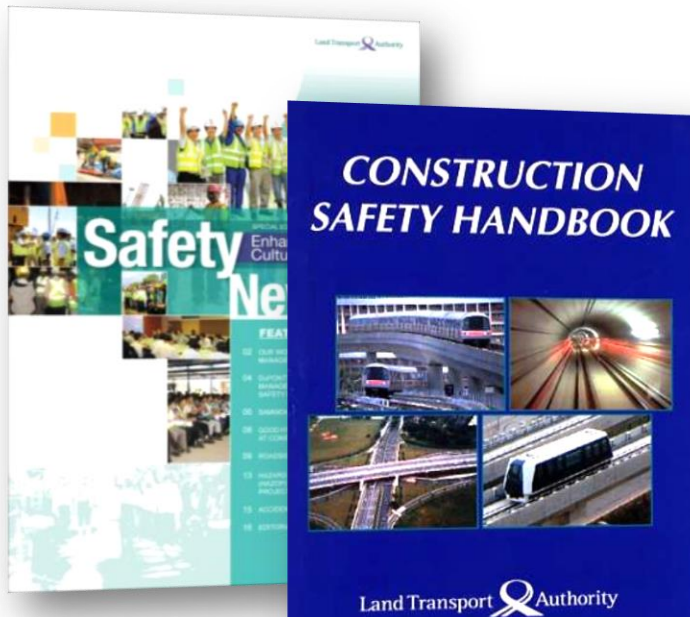
Safety Forum / Seminar



Customised courses



*LTA Annual Safety
Award Convention*



Newsletters, Guides and Handbooks



Planned General Inspections (PGI) and Night PGIs



Audits and Spot Checks



Dialogues with Senior Management of Contractors

- Specification of BizSAFE 3 and above for all contractors
- Implementation of BBS for all major road and rail projects

bizSAFE



The BizSAFE programme is a five-step programme that assists companies to build up their WSH and RM capabilities to improve safety and health at the workplace.





World Congress is coming to Singapore 3-6 September 2017 Marina Bay Sands

www.safety2017singapore.com





**Thank You for
your attention**