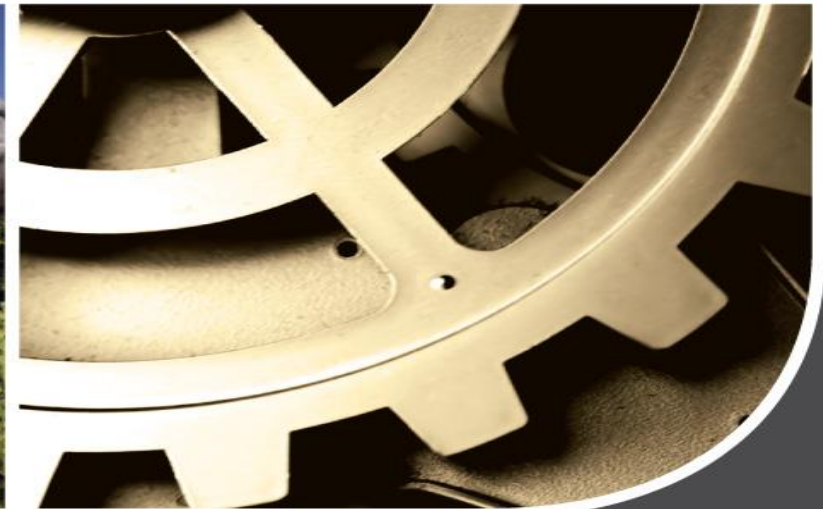


NATIONAL DEPARTMENT OF LABOUR CONSTRUCTION EXPLOSIVES AND MHI DIRECTORATE OHS CONFERENCE 2019.

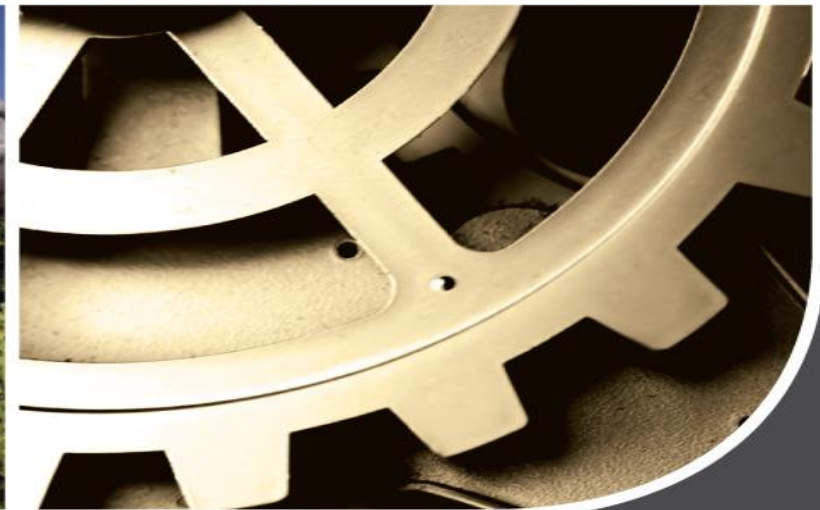


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FINDINGS OF INCIDENT INVESTIGATIONS OF STRUCTURAL COLLAPSES.



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The presentation.

- 1. Background of the Construction Industry**
- 2. Definitions.**
- 3. Obligations of Designers in relation to Structures.**
- 4. Obligations of Contractors in relation to Structures.**
- 5. Incidents**
- 6. Findings /Causes**
- 7. Proposed solutions.**

BACKGROUND OF THE CONSTRUCTION INDUSTRY

Introduction

- ❑ Construction Industry contributed 12 -16% of the GDP in previous financial year
- ❑ Average of 12 500 Construction sites in the previous financial year (7 500 + 5000)
- ❑ Employs 1.463 million workers by June 2016 (+/- 1.0 million-informal)
- ❑ Responsible for **1.5 to 2.0 of fatalities** per week
 - ❑ 2003 -2008 = 2500 - 3500 sites
 - ❑ 2008- 2018= 8000 – 12 500 sites
- ❑ **R490 million** WCC payments made in previous financial year



Definitions

"**competent person**" means a person who—

- has in respect of the work or task to be performed the required **knowledge, training and experience** and, where applicable, **qualifications**, specific to that work or task: Provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualification Framework Act, 2008 (Act No.67 of 2008), those qualifications and that training must be regarded as the required qualifications and training; and
- is familiar with the Act and with the applicable regulations made under the Act;

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- is familiar with the Act and with the applicable regulations made under the Act;

Notes:

- **An all-inclusive assessment should be on all four components knowledge, training and experience, and where appropriate qualifications exist in relation to the work to be performed.**
- **Part (b) of the above definition is best reflected through demonstration of understanding of the OSH Act and its various applicable regulations.**

Definitions

"construction manager/ project manager " means a **competent person** responsible for the management of the physical construction processes and the coordination, administration and management of resources on a construction site;

(must be registered with SACPCMP)

"design" in relation to any structure, includes **drawings, calculations, design details and specifications;**

Definitions

"designer" means—

- a competent person who—
 - (i) prepares a design;
 - (ii) checks and approves a design;
 - (iii) arranges for a person at work under his or her control to prepare a design, including an employee of that person where he or she is the employer; or
 - (iv) designs **temporary work, including its components**;

Definitions

"**designer**" means—

- an **architect or engineer** contributing to, or having overall responsibility for a design;
- a **building services engineer** designing details for fixed plant;
- a **surveyor** specifying articles or drawing up specifications;
- a **contractor carrying out design work as part of a design and building project**; or
- an **interior designer, shop-fitter or landscape architect**;

CONSTRUCTION REGULATIONS 2014 Obligations of the Designer

-Serious Challenge!

The Construction Regulations.

(1) The designer of a structure must—

(a) ensure that the applicable safety standards incorporated into these Regulations under section 44 of the Act are complied with in the design;

(b) take into consideration the health and safety specification submitted by the client;

Stake Holders of the Construction Industry

"designer" means—

- (a) a competent person who—
 - (i) prepares a design;
 - (ii) checks and approves a design;
 - (iii) arranges for a person at work under his or her control to prepare a design, including an employee of that person where he or she is the employer; or
 - (iv) designs temporary work, including its components;
- (b) an architect or engineer contributing to, or having overall responsibility for a design;
- (c) a building services engineer designing details for fixed plant;
- (d) a surveyor specifying articles or drawing up specifications;
- (e) a contractor carrying out design work as part of a design and building project; or
- (f) an interior designer, shop-fitter or landscape architect;

CONSTRUCTION REGULATIONS 2014 Obligations of the Designer- **Serious Challenge!**

The Construction Regulations.

(1) The designer of a structure must—

(c) before the contract is put out to tender, make available in a report to the client—

- (i) all relevant health and safety information about the design of the relevant structure that may affect the pricing of the construction work;
- (ii) the geotechnical-science aspects, where appropriate; and
- (iii) the loading that the structure is designed to withstand;

Stake Holders of the Construction Industry

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- (d) a surveyor specifying articles or drawing up specifications;
- (e) a contractor carrying out design work as part of a design and building project; or
- (f) an interior designer, shop-fitter or landscape architect;

CONSTRUCTION REGULATIONS 2014

Obligations of the Designer

The Construction Regulations.

(1) The designer of a structure must—

(d) inform the client in writing of any known or anticipated dangers or hazards relating to the construction work, and make available all relevant information required for the safe execution of the work upon being designed or when the design is subsequently altered;

(e) refrain from including anything in the design of the structure necessitating the use of dangerous procedures or materials hazardous to the health and safety of persons, which can be avoided by modifying the design or by substituting materials;

Stake Holders of the Construction Industry

"designer" means—

- (a) a competent person who—
 - (i) prepares a design;
 - (ii) checks and approves a design;
 - (iii) arranges for a person at work under his or her control to prepare a design, including an employee of that person where he or she is the employer; or
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- (d) a surveyor specifying articles or drawing up specifications;
- (e) a contractor carrying out design work as part of a design and building project; or
- (f) an interior designer, shop-fitter or landscape architect;

CONSTRUCTION REGULATIONS 2014

Obligations of the Contractor

The Construction Regulations. Structures

A contractor must ensure that—

- all reasonably practicable steps are taken to prevent the uncontrolled collapse of any new or existing structure or any part thereof, which may become unstable or is in a temporary state of weakness or instability due to the carrying out of construction work;

Stake Holders of the Construction Industry

"structure" means—

- (a) any building, steel or reinforced concrete structure (not being a building), railway line or siding, bridge, waterworks, reservoir, pipe or pipeline, cable, sewer, sewage works, fixed vessels, road, drainage works, earthworks, dam, wall, mast, tower, tower crane, bulk mixing plant, pylon, surface and underground tanks, earth retaining structure or any structure designed to preserve or alter any natural feature, and any other similar structure;
- (b) any falsework, scaffold or other structure designed or used to provide support or means of access during construction work; or
- (c) any fixed plant in respect of construction work which includes installation, commissioning, decommissioning or dismantling and where any construction work involves a risk of a person falling;

CONSTRUCTION REGULATIONS 2014

Obligations of the Contractor

The Construction Regulations. Structures

A contractor must ensure that—

- no structure or part of a structure is loaded in a manner which would render it unsafe; and
- all drawings pertaining to the design of the relevant structure are kept on site and are available on request to an inspector, other contractors, the client and the client's agent or employee.

Stake Holders of the Construction Industry

"structure" means—

- (a) any building, steel or reinforced concrete structure (not being a building), railway line or siding, bridge, waterworks, reservoir, pipe or pipeline, cable, sewer, sewage works, fixed vessels, road, drainage works, earthworks, dam, wall, mast, tower, tower crane, bulk mixing plant, pylon, surface and underground tanks, earth retaining structure or any structure designed to preserve or alter any natural feature, and any other similar structure;
- (b) any falsework, scaffold or other structure designed or used to provide support or means of access during construction work; or
- (c) any fixed plant in respect of construction work which includes installation, commissioning, decommissioning or dismantling and where any construction work involves a risk of a person falling;

CONSTRUCTION REGULATIONS 2014

Obligations of the Owner of a structure

The Construction Regulations.

Structures

An owner of a structure must ensure that—

- (a) inspections of that structure are carried out periodically by competent persons in order to render the structure safe for continued use;
- (b) that the inspections contemplated in paragraph (a) are carried out at least once every six months for the first two years and thereafter yearly;
- (c) the structure is maintained in such a manner that it remains safe for continued use;
- (d) the records of inspections and maintenance are kept and made available on request to an inspector.

Incident 1.



7/31/2019

Incident 1.



Incident 1.

FINDINGS / CAUSES

- **No designer on site** at the time of collapse.
 - **Lack of competent person** on site,(knowledge, training and experience, and where appropriate qualifications).
- **No design drawings of falsework** for the span that collapsed.
 - drawings, calculations, design details and specifications
- **No Information/sequence/ procedures** of construction work.
- **Incompetent construction manager** - method used during pouring of concrete.

Incident 2.



Incident 2.

FINDINGS / CAUSES

- **Incorrect Support Work, Manufacturer/ Suppliers**
 - **Wall thickness of the prop.** (1.8mm vs 3.32mm) 33% less weight to be carried
 - **Safety factor** (Broacher- 2.5, and calculations 1.18)
- **Incorrect use of material,** (Brick footings used instead of base jacks)
- **No design drawings of falsework for the span that collapsed. drawings, calculations, design details and specifications**
- **No Information/sequence/ procedures of construction work.**
- **Incompetent construction manager**

Incident 3.



Incident 3.

FINDINGS / CAUSES

- **No approved plans**
- **No proper foundation footings** (Builder continued on a previous garden/retaining wall)
- **No design drawings of the slab, false work and support work** for the slab that collapsed. drawings, calculations, design details and specifications
- **No Information/sequence/ procedures** of construction work.
- **Incompetent construction manager** – incorrect sequence/procedure to remove false work.

Incident 4.

FINDINGS / CAUSES



Incident 4.



Incident 4.

FACTORS THAT MAY HAVE CAUSED THE COLLAPSE.

- Incompetent construction manager – incorrect placing of reinforce-steel in beams. (18y32 vs 6y32)
- Cube test failures (12kpa, 18kpa Instead 35Kpa, Lucky Cement?)
- No approved plans, Revision drawings not taking into consideration changes made. (Removal of columns/ Incorrect pilling)
- “Slender ‘column’ design (Construction load vs live load)
- Lack of Information/sequence/ procedures of construction work and removing support work.

Findings/Causes of collapses summarised

Challenges of Health & Safety in the Construction Sector.

Evidence from incident investigation conducted indicates: (mostly fatalities and structural collapses)

- ◆ **Lack of competent person** performing Health and Safety in construction work, (design phase, construction phase and handing over)
- ◆ **Lack of management and supervision** of Health and Safety in construction work.

Recommendation

STAGE 1 – CONCEPT / PRE-FEASIBILITY

Definition

Agreeing client requirements and preferences, assessing user needs and options, appointment of necessary consultants in establishing project brief, objections, priorities, constraints, assumptions and strategies in consultation with client. In this phase **various design options, engineering, transport, technological and construction methods are considered for the project.**

STAGE 2 – FEASIBILITY

Definition

Various design, engineering, transport, technological and construction methods are reduced to options best suited (output from engineering) **Health and safety evaluations done on the various options and associated hazards and risk.**

Recommendation

STAGE 3 – FINAL DESIGN DEVELOPMENT

Definition

Manage, **coordinate and integrate the detail design development process** within the project scope, time, cost and quality parameters.

STAGE 4 - TENDER DOCUMENTATION AND PROCUREMENT

Definition

The process of establishing and implementing procurement strategies and procedures, including the preparation of necessary documentation for effective and timeous execution of the project. **How much is health and safety/ Risk prevention?**

Recommendation

STAGE 5 - CONSTRUCTION DOCUMENTATION AND MANAGEMENT

Definition

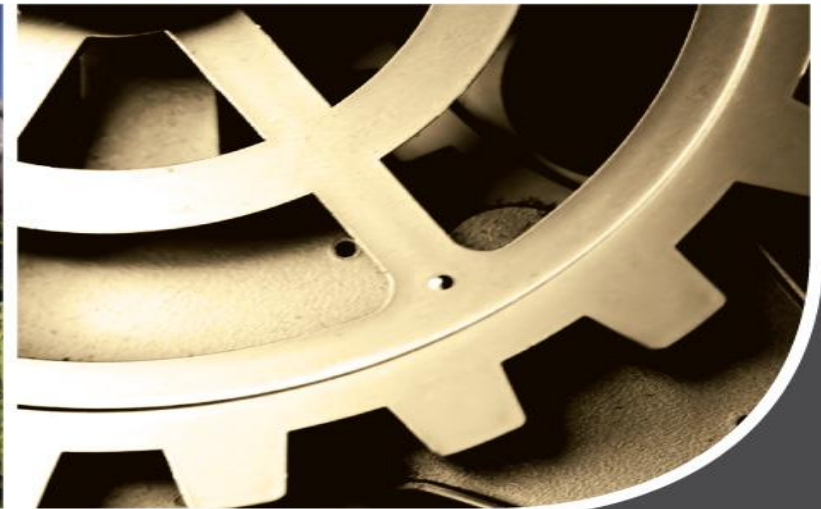
The management and administration of the construction contracts and processes, including the preparation and coordination of the necessary documentation to facilitate **effective safe execution** of the works

STAGE 6 - PROJECT CLOSE - OUT

Definition

The process of managing and administering the project close out, including preparation and co – ordination of the necessary documentation to facilitate the **effective operation of the project**

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