HIGHER TECHNICAL INSTITUTE

CIVIL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

STRUCTURAL FAILURES

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STRUCTURAL FAILURES

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SUMMARY

The project is about structural failures. The purpose of the work is to find the main parts of structural failures, analyzed them carefully and take lessons from them, so that we will avoid the same mistakes of having disastrous failures

This project is mainly divided into five parts. This five parts are the most probable reasons of structural failures which are the following:

- Concrete
- Structural steel
- Masonry
- Foundations
- Corrosion

Also this project includes photographs of case histories helping you to realized the serious of this subject.

INTRODUCTION

By the word structure failure we mean when the structure can not afford the requirements that it has been designed. Large scale structural failure is a nightmare that haunts the construction industry. The financial devastation, the demolished reputations and the lost of life that could result from a collapse have trouble the sleep of probably every architect, engineer, contractor or owner at some time.

We do not have structural failure because of the materials. Materials do not fail. They follow their laws of nature and physics perfectly. Human who produce the materials failed to manufacture them properly. The engineer who selected the wrong materials failed. The welder who produced low-quality welds failed. The producer of the steel used to manufacture the bolt, the engineer who designed the bolt, the designer who selected the bolt-all in combination or each individually ma have failed. All failures are caused by human errors.

That's why a politician, that he was an engineer before said:

" ***The great liability of the engineer... compared to men of other professions... is that this works are out in the open where all can see them. His acts... step by step...are in hard substance. He can not bury his mistakes in the grave like the doctors. He can not argue them into thin air... or blame the judge...like the lowers.***

He can not, like the architects, cover his failures with trees and vines. He can not, like the politician, screen his shortcomings by blaming his opponents... and hope the people will forget. The engineer simply can not deny he did it. If his works do not work... he is dammed. "

As I said before all failures are caused by human errors. These errors may be systematic or accidental. A form of systematic errors is when we using instrument with inaccurate calibration. Also a steel rule may be too short when it is cold and too long when it is hot. On the other hand accidental errors are a result of combination to observation. Mistakes due to acceptance of wrong data or due to lack of experience may lead to failure. Moreover a blunder may be the result of failure.

With these human errors it is sure that we will have fatalities. According to the ***National Safety Council***, an average of about *2500* persons have been killed and *218000* injured yearly in construction accidents in the *10*-year period *1977-1987* in the ***United States***.
With the research of these accidents they have four distinct accident-prone situation:

- When temporary structures fail.
- When workers and materials or workers and equipment come into contact.
- When operations involved inherent engineering hazards-explosives, injurious gases toxic fumes, or dusts.
- When individually follow unsafe practices.

To prevent structural failure is better to have in mind the following factors:

- Communications and organizations in the construction industry.
- Inspection of construction by the structural engineer.
- General quality of design.
- Structural connection design details and shop drawings.
- Selection of architects and engineers.
- Timely dissemination of technical data

But the most important is to improve *education* and *training.*