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Jordan University of Science and Technology

Engineering Training Report

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***Training Institution
Saudi oger – Riyadh***

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Declaration

This report was written by (Rahaf Mohammad Al- Addasi) a student in the (Civil Engineer Department) at Jordan University of Science and Technology (J.U.S.T). It has not been altered or corrected as a result of assessment and it may contain errors and omissions . The views expressed in it together with any recommendations are those of the student .

Training Summary / Abstract:

Engineering training: Its one of the main courses in civil engineering.

Every student who has passed 117 credit hours or more can take this "three hours credit " course ; the period of the training is 40 days.

The purpose of this course is to apply the theoretical knowledge into practical work.

There was two main parts in our training the first part was practical part and the second part is office work .

The student can be trained as site engineer ; it give you the opportunity to supervise the construction work closely , or as design engineer using software programs such as prokon ,STTAD , AutoCAD, E taps .

The training started at 11/9/2011 and last till 27/10/2011 , during this you can see the subsequent of the construction work and how to manage and control the work due to schedule.

Chapter 1 **company profile:**

The story of Saudi Oger Limited began in January 1978 when it was incorporated under the rules and laws of Saudi Arabia. It started as a construction company based in Riyadh.

Since its inception, Saudi Oger has become one of the leading Construction, Facilities Management Service Provider and Infrastructure Project Development companies in The Kingdom of Saudi Arabia and the region. In relatively short period of time Saudi Oger Ltd. has grown into a multi-company, multi-divisional organization with subsidiaries and affiliates in the Kingdom of Saudi Arabia and abroad.

The Company employs many executives, professional managers and several thousands of high caliber skilled staff whose disciplines covers and supports every aspect of its business lines. Today Saudi Oger Limited line of business covers Construction, Facilities Management, Real Estate Development, Printing, Telecommunication, Utilities and IT services

The construction activities comprise two specialized divisions:

- **Private Project Construction Division (PPCD)** undertakes projects in prestigious facilities and Government complexes, for which the most stringent controls and the highest levels of quality must be attained in order to meet the highest degrees of client specifications.
- **General Projects Construction Division (GPCD)** undertakes wide variety of major projects in the competitive market.

Some of Saudi oger Projects:

- Riyadh Schools (Riyadh).
- Saudi Oger Training Institute (SOTI).
- King Abdullah University of Science and Technology (KAUST).
- UAE university in Al-Ein.
- Princess Noura Bint Abdulrahman University for Woman (PNU)



Figure 1: The King Abdullah Financial District



- *Figure 2: Princess Noura Bint Abdulrahman University for Woman (PNU)*

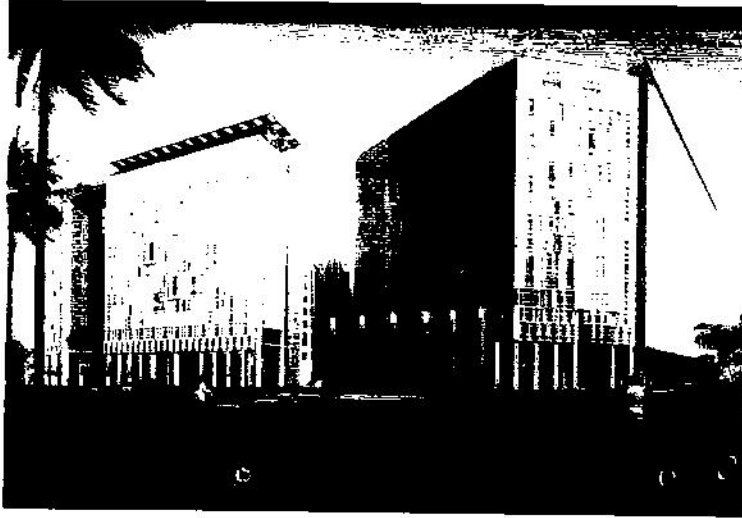
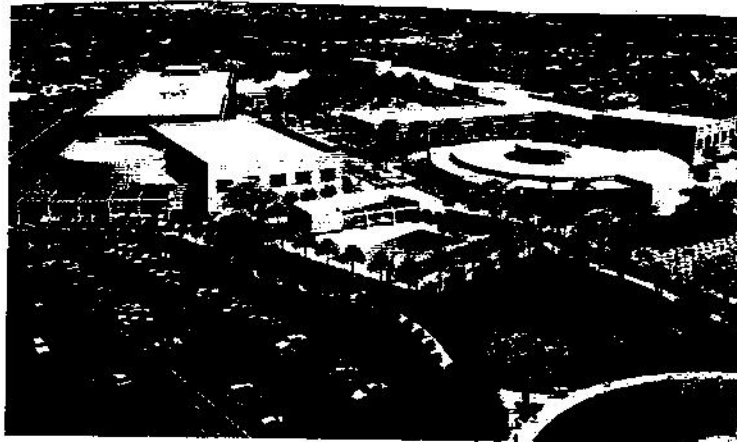


Figure 3: King Abdullah Bin Abd Al Aziz Waqf in Al Madina Al Monawara



- *Figure 4: King Abdullah University of Science and Technology (KAUST).*

Training Outline:

- 1- Site tours
- 2- Office work
- 3- Drawings study.

Chapter 2:

Practical Training.

2-1) Site work:

In the following sections describe the duties and jobs in detail that done during the training :

2-1-1): The King Abdullah Financial District:

The King Abdullah Financial District will house the large community of professionals working within the financial sector and related industries, hosting the head quarters of the Capital Market Authority, the Stock Exchange, banks, financial institutions and other service providers such as accountants, auditors, lawyers, analysts, rating agencies, consultants, and IT providers.

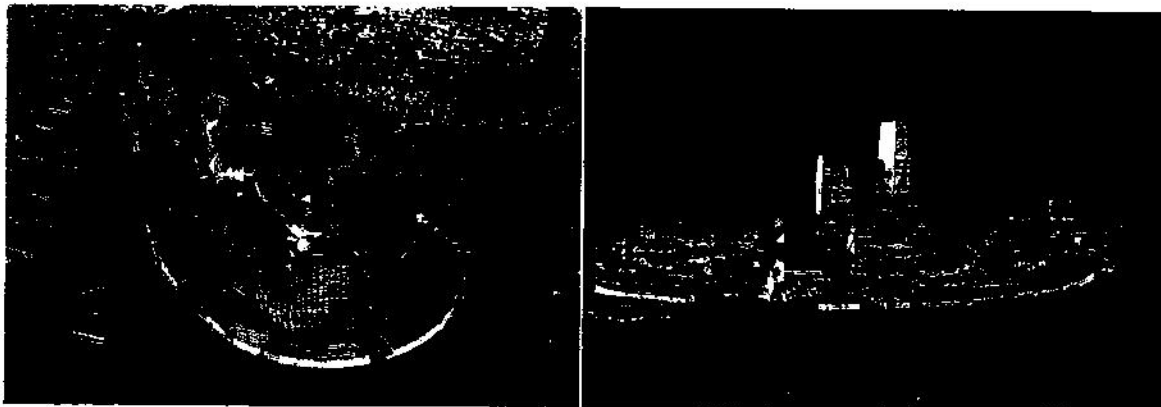




Figure 5: The King Abdullah Financial District

During the training the remaining work was finishing as follow:

Control finishes of the five-star hotel rooms:

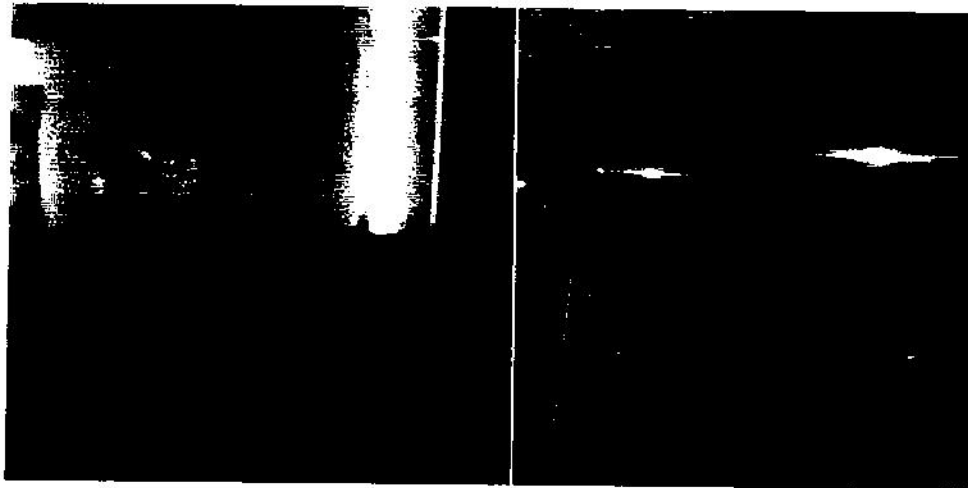


Figure6: finishes of the five-star hotel rooms

2-1-2): MOF & National Economy Complex project

The administration complex spreads over an area of 43,000 square meters which is part of the total site area of 700,000 square meters in the heart of Riyadh.

The complex is divided into 4 sectors

- 1) The main administration building, a seven story building and other annexes
- 2) The library and auditorium, which is uniquely designed to house conferences and VIP meetings.
- 3) The deputy's tower
- 4) And the guest center, that comprises of men's sport center and women's social club and other various sport facilities

The complex is supported by various utility buildings which are interlinked by roads, sidewalks, beautiful landscaping and parking areas.

The complex is designed to combine the Islamic architectural concept with modern designs with great care of the environment; thus creating ideal working conditions for all the staff



Figure 7 : MOF & National Economy Complex project

During the training the remaining work was finishing as follow:

False Ceiling:

The method of assemble the false ceiling is illustrated in the figure bellow:

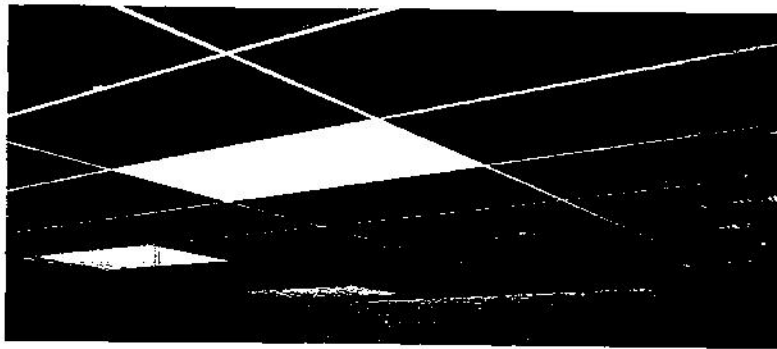


Figure 8: False Ceiling

A dropped ceiling is a secondary ceiling, hung below the main (structural) ceiling. They may also be referred to as a drop ceiling, false ceiling, or suspended ceiling, and are a staple of modern construction and architecture. The area above the dropped ceiling is called the plenum space.

A typical dropped ceiling consists of a grid-work of metal channels in the shape of an upside-down "T", suspended on wires from the overhead structure. These channels snap together in a regularly spaced pattern. Each cell is filled with lightweight "tiles" or "panels" which simply drop into the grid. Tiles can be selected with a variety of materials, including wood, metal, plastic, or mineral fibers, and can come in almost any color. Light fixtures, air grilles, and other fixtures are available which can fit the same space as a tile for easy installation. Most tile material is easily cut to allow fixtures in other shapes, such as incandescent lights, speakers, and fire sprinkler heads.

The suspended ceiling was originally developed to hiding the underside of the floor above and to offer audio balance and control in a room. The audio performance of suspended ceilings has improved dramatically over the years, with enhanced sound absorption and attenuation.

Expansion Joints:

Since building expansion joints are designed to isolate sections of a building, they inevitably cut through floors. Copper and copper alloys can be used in floor expansion joints in two ways: as trim and cover plates, or to prevent the flow of water through the expansion space.

Many factors affect the amount of temperature-induced movement that occurs in a building and the extent to which this movement can occur before serious damage develops or extensive maintenance is required. In some cases joints are being omitted where they are needed, creating a risk of structural failures or causing unnecessary operations and maintenance costs. In other cases, expansion joints are being used where they are not required, increasing the initial cost of construction and creating space utilization problems.

There are notable recommendations concerning expansion, isolation, joints, and the manner in which they permit separate segments of the structural frame to expand and to contract in response to temperature fluctuations without adversely affecting the buildings structural integrity or serviceability

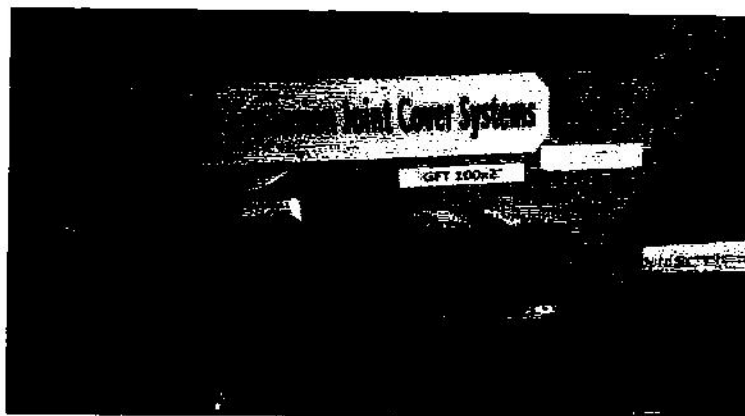


Figure 9: Expansion joints samples

Construction of Stone Masonry :

The stone building used for many reasons: beauty, strength, and durability

In the MOF & National Economy Complex project Engineers choose Riyadh stone, walls wearing with stone (that is better and stronger). As shown from the pictures bellow:

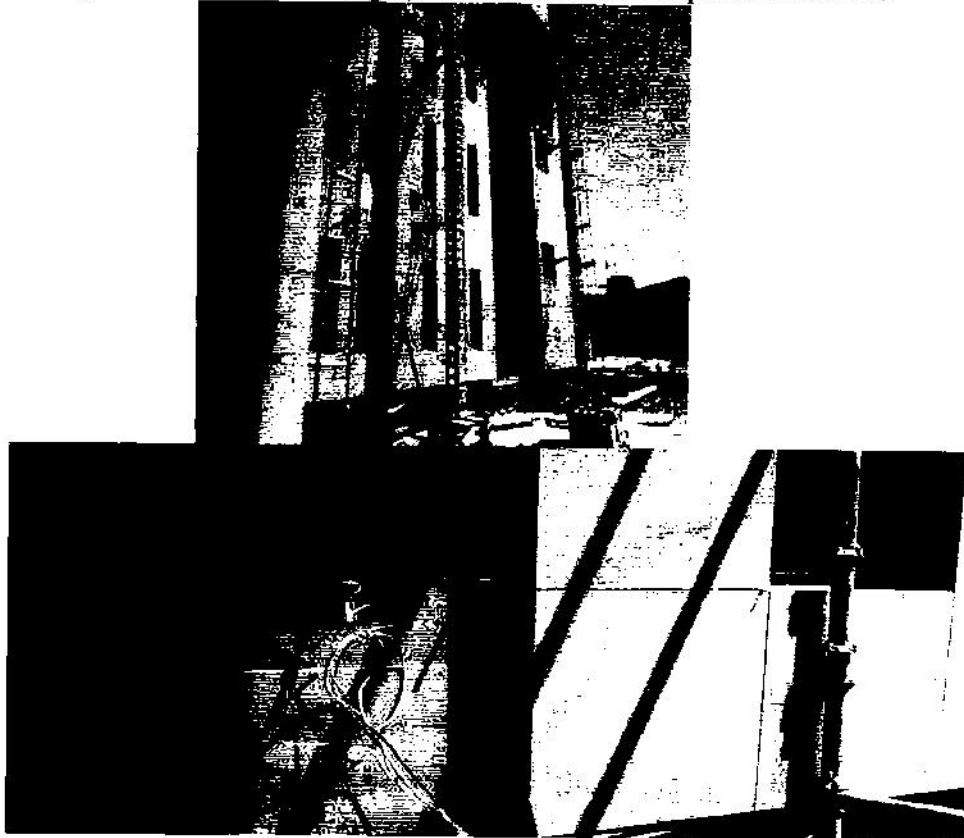


Figure 10: Construction of Stone Masonry

Stone installation:

There are two primary types of stone installation. The first is the "hand-set" method, in which each stone is individually attached to the building's primary structural frame or onto a secondary wall framing system.

The second is the panelized installation method, in which the stone panel or multiple panels are preinstalled onto a frame or attached to a precast concrete panel. The frames or panels are transported to the building, where the entire assembly is attached to the building's structural frame or secondary structural members or framing system.

In either installation system, anchors must be used to attach and support the stone panels to the building's primary or secondary framing system, or to the panelized system frame or element. Anchors that are in direct contact with stone are usually constructed of non-corroding metals such as Type 304 stainless steel or aluminum.

In this project we use hand set method to install stones :

Hand-Set Systems

There are numerous types and styles of anchors used to support and anchor individual stone panels. Commonly used anchor types include:

- Kerf supported stone with stainless steel or aluminum angles
- Side supports, dowels, straps, and disks
- Undercut anchor
- Embedded Adhesive Pin Anchor

Plastering :

Plaster is a building material used for coating walls and ceilings. Plaster starts as a dry powder similar to mortar or cement and like those materials it is mixed with water to form a paste which liberates heat and then hardens. Unlike mortar and cement, plaster remains quite soft after setting, and can be easily manipulated with metal tools or even sandpaper. These characteristics make plaster suitable for a finishing, rather than a load-bearing material.

Cement plaster is a mixture of suitable plaster, sand, portland cement and water which is normally applied to masonry interiors and exteriors to achieve a smooth surface. Interior surfaces sometimes receive a final layer of gypsum plaster. Walls constructed with stock bricks are normally plastered while face brick walls are not plastered. Various cement-based plasters are also used as proprietary spray fireproofing products. These usually use vermiculite as lightweight aggregate. Heavy versions of such plasters are also in use for exterior fireproofing, to protect LPG vessels, pipe bridges and vessel skirt.

Plastering Accessories:

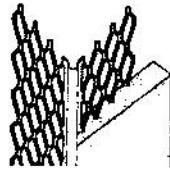


Figure 11 : Plastering Accessories

-ANGLE BEAD

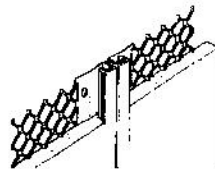
(Pre-galvanised Steel)

Provides a true, straight corner which protects and reinforces plaster where it is most vulnerable



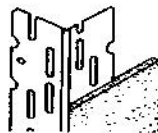
-MOVEMENT BEAD:

Forms movement joints in plaster and render and allows for +3mm, -1mm movement.



-THIN-COAT ANGLE BEAD

For 3mm plaster finishes on plasterboard or any smooth background.



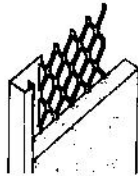
-DRY LINING ARCH BEAD

Readily bends to create curves and arch forms for decorative plaster requirements in thin coat and dry lining applications.



**-PLASTER STOP BEAD
(Pre-galvanised Steel)**

Finishes and reinforces plaster edges.



Gypsum board:

A gypsum board partition is a wall that is made of a gypsum wall board. In Europe it is called plasterboard - two sheets of paper with hardened plaster between - the wall construction is typically a stud (metal or wood) with two layers of gwb to either side to create the wall - then the sound transmission insulation must be added , then it is spackled(plastered), sanded and painted for your finished wall.

1. Start with proper framing. Be sure studs are straight with double studs at inside corners to provide adequate nailing surface at adjoining walls.
2. Align all electrical outlets, heating ducts, etc., so they will be flush with the wallboard surface
3. Start with the ceiling, applying Gold Bond Gypsum Wallboard at right angles to joists. To support the board's weight, use a temporary T-brace

Nail or screw boards to the joists, using 1-1/4" drywall nails for 1/2" wall-board, 1-3/8" drywall nails for 5/8" wallboard or 1-1/4" Type W gypsum drywall screws. Space nails not to exceed 7" on ceilings and 8" on sidewalls, a minimum of 3/8" and a maximum of 1/2" away from wallboard edges. Screws should be spaced no more than 12" apart on ceilings and 16" apart on sidewalls.

Slightly recess the nail head with the final blow of the hammer. You will want to indent the face paper without tearing it. This action is called "dimpling". Later, these slight depressions will be finished smooth with joint compound.

SOUND INSULATION:

In any kind of building, noise can be transmitted from one room to another in two ways Through airborne and/or structure borne. To quantify the amount of sound insulation offered by partitions, Transmission Loss (TL or R) and Sound Transmission Class (STC) are Normally used [9] .

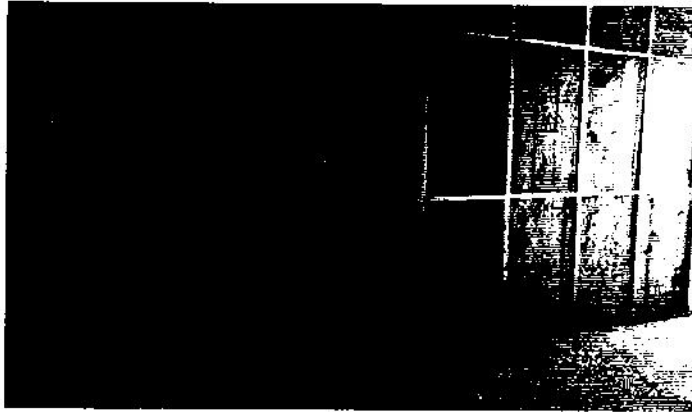


Figure 12: Gypsum board and sound insulation

2-1-1): Ministry Of Education

Consists of four floors and the basement of the built up area of the role of one nearly up to 25.000 m² and built-up area for the entire building of more than 128.000 m², and parking the role of the basement and within the project site (superficial) to the number 2700 car, while the women's section constitutes 30 percent of the built-up area of the the total project area of 270,000 square meters

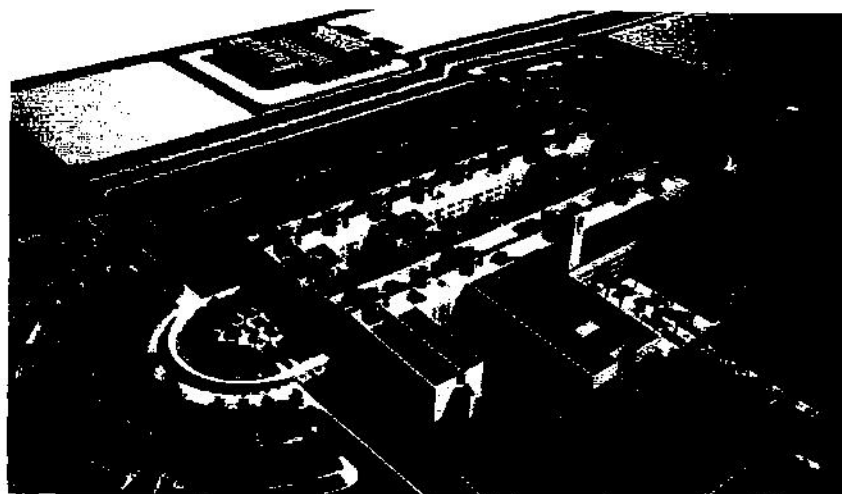


Figure 13: View for Ministry of education

The works that done in this project:

• Beam casting .

Beams Casting:

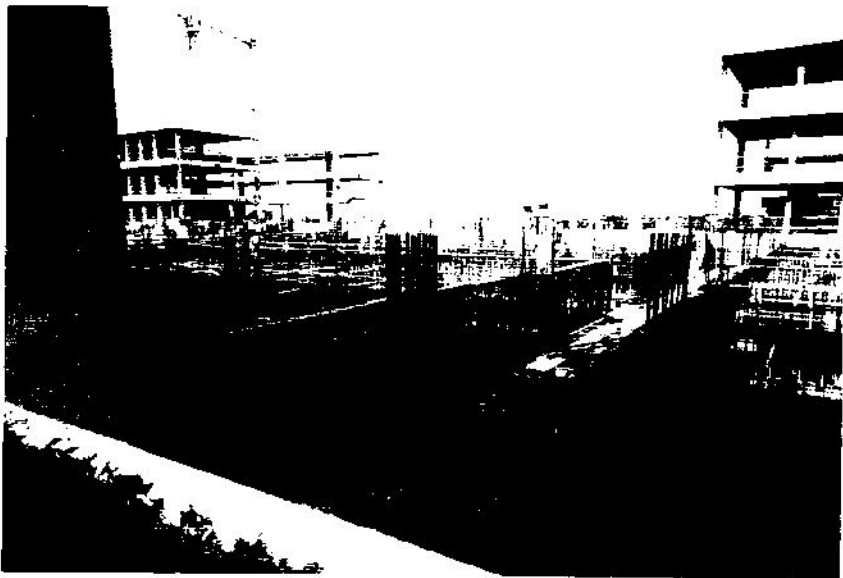
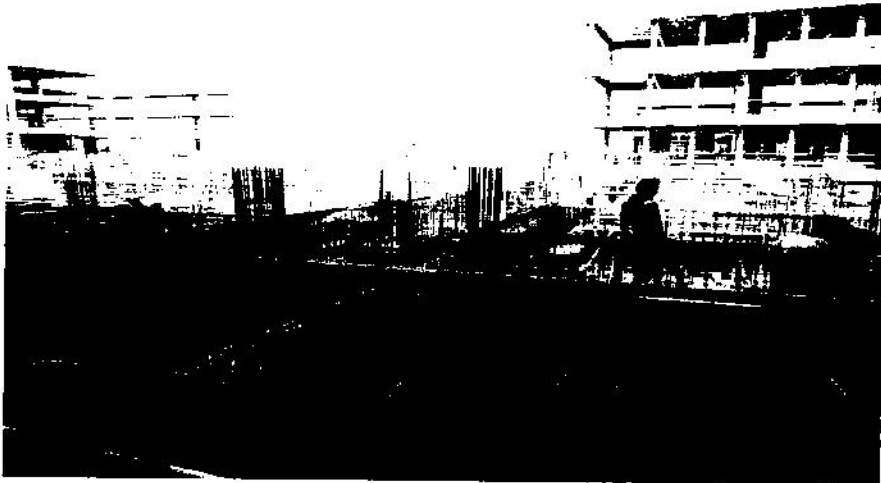


Figure 14: Beams Casting

Concrete:

-Mixing:

Mixing of this project is ready mix.

Mixing concrete correctly is vital for durable and long lasting foundations

Concrete is a mixture of cement , sand (fine aggregate) , small stone or gravel (coarse aggregate) and water . It has many applications , from fence posts to motorway bases and , because of this ; there are many different ratios for the constituents to be mixed

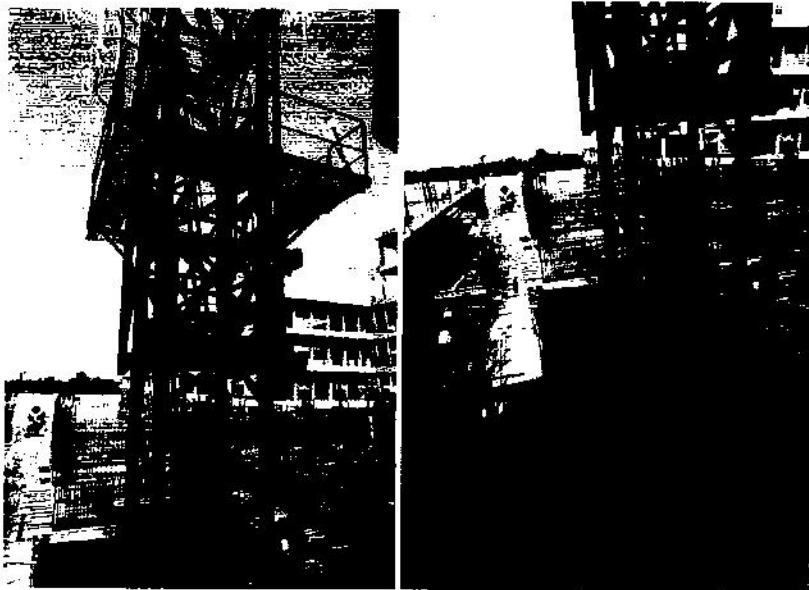
Remember that water is the key ingredient. Too much water results in weak concrete. Too little water results in a concrete that is unworkable.

Tower crane

Tower cranes are a modern form of balance crane that consist of the same basic parts. Fixed to the ground on a concrete slab (and sometimes attached to the sides of structures as well), tower cranes often give the best combination of height and lifting capacity and are used in the construction of tall buildings. The base is then attached to the mast which gives the crane its height.

Further the mast is attached to the slewing unit (gear and motor) that allows the crane to rotate.

On top of the slewing unit there are three main parts which are: the long horizontal jib (working arm), shorter counter-jib, and the operators cab.



Placement

Mixing, transporting, and handling of concrete should be carefully coordinated with placing and finishing operations. Concrete should not be deposited more rapidly than it can be spread, struck off, consolidated, and bull floated. Concrete should be deposited continuously as near as possible to its final position. In slab construction, placing should be started along the perimeter at one end of the work with each batch placed against previously dispatched concrete. Concrete should not be dumped in separate piles and then leveled and worked together; nor should

The concrete be deposited in large piles and moved horizontally into final position.





Figure 16: Concrete Placement

2-2) Office Work

The works that done during the training in the office.

1. Quantity surveying for masonry work for the King Abdullah WAQF project.
2. Comparison reports and Technical review.
3. Auto CAD drawing.
4. Architectural and structural drawings study.

2-2-1) :Quantity surveying:

-Quantity surveying include the estimation of the total cost of the project Quantity surveying beginning by measuring the dimensions of the item on the take-off sheet

-The number of similar items is account to compute the total quantity.

-The cost of each item is known ; so we can estimate the total cost of the item , then to the all project.

2-2-2):Comparison reports

Comparison reports for:

- Some types of expansion joints.
- Fire rated doors standards.
- Sound transmission coefficient and fire barriers for masonry walls.

2-2-3) Auto CAD drawing.

Drawing by using the auto CAD, and learning more about the scale and the printing.

2-2-4) Architectural and structural drawings study:

The architectural and structural plans are the most important things for the site and design engineer.

Drawings divided into:

- 1) Tender drawings (primary one).
- 2) Shop drawings.
- 3) As built drawings (the final one).

Chapter 3:

Impact of Engineering and learned skills in Training.

In practical training learning you to determine quantities of materials, and to learn the important rule in engineer life that does it with less cost and higher safety.

Civil Engineering needs a practical practice in the field and a place to test the theorems taken in the university, and this training gives the opportunity to do that , which will help in the practical life to be a better engineer.

In the training period I've experience Engineers work as part of an extremely Significant contribution and learned how to perform well as part of a team,

Civil Engineers require some sort of interaction with workers. Whether they are

Working in A team situation, or just asking for advice, engineers have to have

The ability to Communicate and work with other people.

Chapter 4:

Conclusions:

- 1- The training is an important course because it closes the gap between the scientific study and practical study.
- 2- Learning you how to deal with other.
- 3- Finding that team work is the most important element in every successful project.
- 4- learned you that the civil engineer is capable of a lot of work such as supervision, implementation , the calculation of quantities and design engineering apprentice engineer and in the future can work as a consultant and contractor.
- 5- Learning you how to control & manage the site and how behaves when their problems by take a professional decision.
- 6- Plans must be clear and easy to read for those who used.
- 9- Successful engineer will find the economic design and the project is implemented less time .
- 11- The site engineer responsibility to make sure that everything is right on schedule and every member is doing on the right way.

Chapter 5:

Recommendations:

The training an excellent method and very important to each students in the engineering faculty, because it teaches us what happened in the field so that the university should do to increase the duration of training not for 40 days only, because the period that the students spent in training is very short.

The engineers in The engineering projects teach you, and gave you from their long experience, accept all our questions, and encourage you to ask. .

The training teaches you the important thing that the engineer must learn : the regulation and done the work at time.