Republic of Iraq

Ministry of Higher Education and Scientific Research

University of Baghdad

College of Engineering

Civil Engineering Department

EFFECT OF THE GROUND WATER ON THE

FOUNDATION CONSTRUCTION AND MATERIAL

By

Israa Abdullreda

Supervisor

Assistant lect. Mustafa Malik Jasim

Shawal, 1440   **June, 2019**

Analysis & Design of Multi-Story

Building Subjected by wind load

- Name: Noor Tariq Amen

- Section: Fourth Grade –B-

-Supervisor: Asst. Lect. Ayad Ali.

-Date: 2019/6/22

<div dir="rtl">

(تحليل وتصميم مبنى متعدد الطوابق يخضع لحمل الرياح)

اسم طالبة المشروع :- نور طارق

المرحلة:- رابع مدني -B-

المشرف على المشروع :- م.م.اياد علي

تاريخ التسليم :- 2019/6/22

</div>

Abstract

In this project, The design of multistory building was conducted using STAAD Pro software. First, the geometry, supports, member sections and material parameters were inserted. Then the building was subject to dead and live load. Structural analysis was performed to find critical forces in the building. Then reinforced concrete was designed according to these forces. Finally, wind load was added and the building was checked if it is adequate for the wind load or not.

الاسم : نورس سعد مجذاب

المشروع : تصميم وتحليل بنايه كونكريتيه متعددة الطوابق متعرضة لهزه ارضيه

اسم الاستاذ المشرف : م.م.أياد علي عباس

Name: Nawras Saad Mijtheb

Project: analysis and design of multi- story building

Subjected by seismic load

Supervisor: Asst. Lect. Ayad Ali Abbas

Abstract :

My project is talk about how to analysis and design of multi-story building subjected by seismic load by using (Staad –pro).

Firstly: we draw the the modeling by using Staad –pro it is an imaginary model but it very close to the reality building form the load that applied on it .

Second: chose a section to the beam and column and we divided aver beam in each panel to it is mash by using mash tool in Staad – pro.

Third: we enter the load to the building dead load and live load as shown in me projected.

Fourthly: we make an analysis to the building to choose the critical load or moment in each element (beam, column and slab).

Fifth: from the above point we make our manual calculator to find the number of rebar in beam and to cheek the column under the applied in all the building direction.

Sixth: in this step we enter the seismic load to me building

To study the effected of the seismic on the building and as show from the (IBC) that I use it to enter the seismic load according to it is and as Show in chapter five in my project and it not effected in higher degree to the structure in beam or in slab but it effected show in column so we add a shear reinforcement in the effected of the force.

Seventh: all the result a recorded it in my project a show in picture and in calculation that a use code ACI318 -14 to get the result from it is formula that all I can took about my project because all details of calculation in my project on this CD.

University of Baghdad
College of Engineering
Civil Engineering Department

ANALYSIS AND DESIGN OF A MULTISTORY STEEL BUILDING USING BIM

A Project Submitted to

The Civil Engineering Department at the University of Baghdad in Partial Fulfillment of the Requirements for the Degree of B.Sc. in Civil Engineering

Submitted by

Jumana Yousif

Under the Supervision of

Lecturer Aqeel Talib

JUNE   2019

Abstract

This project presents the analysis and design of a multistory steel building under the Building Information Modeling (BIM) environment. The steel building is intended to be used as an office building that occupies an area of $400m^2$ in addition to parking garages and green area surrounding the building. The building consists of three floors and includes administration area, offices, meeting rooms as well as large conference room. The existence of long spans requires the use of steel structure in additional to other benefits mentioned in the next chapter.

The building is modeled under the BIM environment using Autodesk Revit and Autodesk Robot Software. The building is first modeled in Revit software then exported to Robot software to perform the analysis and design. Robot software presents a very useful feature in designing the steel connection. It automatically recalls the results of the analysis of the two members selected to form the connection from the results of the full 3D model. Robot then presents the type of connections for the user to choose from to perform the required calculations.

University of Baghdad
College of Engineering
Civil Engineering Department

Analysis and Design of a Multistory Concrete Building with BIM Software

A Project Submitted to

The Civil Engineering Department at the University of Baghdad in Partial Fulfillment of the Requirements for the Degree of B.Sc. in Civil Engineering

Submitted by
Muhanad Hayder

Under the Supervision of
Lecturer Aqeel Talib

Abstract

The goal of this project is to present the analysis and design of a multistory concrete building utilizing the benefits of the Building Information Modeling (BIM) system.

The building modeled under the BIM environment is a three-story concerete structure. The building utilizes different types of flooring systems; the first and third floor consist of two-way slab with beams while the second floor incorporates two-way ribbed system(waffel slab). The building has an area of approximately 400m^2 and includes panels with long spans (8mx11m).

The building is first modeled using Revit software. Revit helps in preparing the final drawings and documentations of the building as well as in preparing the model to be exported to Robot software to preform the analysis and design calculations. This is a very effective modeling feature that helps save time at the early stages of modeling and when modifications are required.

After this abstract, the project presents the advantages of concrete structure and different types of members in chapter one. In chapter two general information and description of the building are given. Chapter three shows how the building is modeld in REVIT, data and properties of membrs and the analytical model resulted. Finally, the results of analysis and design using ROBOT is presented in chapter four.

Abstract

The aim of this project is to study the Standard Penetration Test (SPT) as one of the most important soil investigation tests and the correlation of test results with the other soil mechanic properties.

اسم المشروع: خصائص القص للخرسانة الاسفلتية الباردة

اسم الطالب: هشام رعد

المشرف: سعد عيسى

المستخلص :

- ان البحث الحالي موجه بالاساس لدراسة مشاكل القص للخرسانة الاسفلتية من خلال الخلطة الاسفلتية البارده وخصائصها.

- اعتمد البحث على استعمال الخلطة الاسفلتية الباردة للطبقة السطحية باستخدام المستحلب الاسفلتي ذي الشحنة الموجبة.

- تم تحضير قوالب مارشال باستخدام 75 ضربة لكل وجه من القالب وتم ذلك بعد خلط الركام والمستحلب بدرجة حرارة المختبر البالغة 25 درجة مئوية.

- تم قبل الحدل تعريض الخلطة الاسفلتية الى التهوية لضمان التخلص من كمية مناسبة من ماء المستحلب. كانت التهوية لمدة نصف ساعة وبدرجة حرارة 60 مئوية.

- تم تحضير قوالب وباربعة نسب مختلفة من المستحلب من 4-5.5 %

- تم اجراء فحص مقاومة القص على جميع القوالب.

- وجد ان اعلى كثافة للخلطة الاسفلتية هي في نسبة اسفلت 4.5%

- اقصى مقاومة للشد الغير مباشر هي في نسبة اسفلت 4.5%

- اعلى نسبة V.F.A كانت في نسبة اسفلت 5.5%

- اعلى نسبة فراغات هوائية كانت في نسبة اسفلت 4%

تمت التوصية بامكانية استخدام الخرسانة الاسفلتية الباردة في اعمال الصيانة.

اسم المشروع: خصائص الشد للخرسانة الاسفلتية الباردة

اسم الطالب: عمر احمد عبد اللطيف

المشرف: سعد عيسى

<u>المستخلص :</u>

- ان البحث الحالي موجه بالاساس لدراسة مشاكل الشد الغير مباشر للخرسانة الاسفلتية من خلال الخلطة الاسفلتية البارده وخصائصها.

- اعتمد البحث على استعمال الخلطة الاسفلتية الباردة للطبقة السطحية باستخدام المستحلب الاسفلتي ذي الشحنة الموجبة.

- تم تحضير قوالب مارشال باستخدام 75 ضربة لكل وجه من القالب وتم ذلك بعد خلط الركام والمستحلب بدرجة حرارة المختبر البالغة 25 درجة مئوية.

- تم قبل الحدل تعريض الخلطة الاسفلتية الى التهوية لضمان التخلص من كمية مناسبة من ماء المستحلب. كانت التهوية لمدة نصف ساعة وبدرجة حرارة 60 مئوية.

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تمت التوصية بامكانية استخدام الخرسانة الاسفلتية الباردة في اعمال الصيانة.

Design Of Vertically Curved Member W-Shape

تصميم العتبات المنحنية عمودياً المقطع –W

A PROJECT
SUBMITED TO THE COLLEGE OF ENGINEERING
OF UNIVERSITY OF BAGHDAD in a partial
fulfillment of the requirement for the degree of bachelor
in Civil Engineering

By

Zainab Dhiaa Ridha

Supervised by

Dr. Ahmad Jabbar Hussain al-shimmeri

Abstract

Iron sections have been cut and curved by various tools and geometric shapes due to the importance of curved sections of commercial and industrial facilities. During bending operation should risk of fracture and the degree of distortion is determined and this is by knowing the behavior of iron after the passage of the yielding stage, it bears the elongation and then necking, which occurs after the break that we try to avoid.

AW18x86 is hen the hard way to form the circular arch in, which is subjected to three concentrated loads. The supports are restrained against translation in all directions and rotationally free in all directions. Verify that the W18x68 is adequate for the imposed loading Bracing, which prevents out- of- plane translation and torsional rotation is provided at five locations.

Effects of Waste Glass Powder on the Geotechnical Properties of soft Clay Soil

Fakhita Bassim Hamdi

supervised by Dr. Balqees Abdulwahid

Department of Civil Engineering, College of Engineering, University of Baghdad

Abstract

This study assesses the stabilizing effect of powdered glass on soft clay soil. Broken waste glass was collected and ground into powder form suitable for addition to the clay. Thousands of tons of glass bottles and jars enter landfills each day. Recycling this glass is an excellent way to reduce waste, lower construction costs and help the environment.

The present work investigates the effect of recycled crushed glass on geotechnical properties of cohesive soil brought from Al-Nahrawn City. Three percentages (4, 8, and 12%) were added to soft clay soil and before this process; the glass was crushed manually by hammer and sieved to suit the particle size of soil study.

The results showed that 4 % of crushed glass treat the cohesive soil and gives more advantage comparing with untreated soil. Because the behavior of crushed glass that works as a granular material, the plasticity index was decreased with the increase of additive. Also, the optimum moisture content decreased with the increasing of glass powder, while the dry unit weight increased because the soil became stiff with increasing of additive to 4% additive then it will be decrease because the specific gravity of glass powder is less than the soil (2.58).

Ideal percentage of Glass Powder as a stabilizer is 4%, it can be concluded that the crushed glass is environmentally clean, readily available, and relatively low-cost material that can be one of the replacements for traditional aggregate to enhance the geotechnical properties of soft cohesive soils.

Keywords: clay soil improvement, soft clay, glass recycle, sustainable material.

اسم المشروع

المقارنة بين الطريقة الثالثة وطريقة خطوط الخضوع للبلاطات الخرسانية المسلحة العاملة باتجاهين الحالة (4) .

COMPARISON BETWEEN METHOD THREE

AND YIELD LINE THEORY FOR TWO- WAY

REINFORCED CONCRETE SLABS – CASE4

PREPARED BY

NOOR AYAD

SUPERVISED BY

Dr.Ali H.AL-Ahmed

The aim of this project to stady the difference between method 3 and yield line method for analysing and designing two-way concrete slab.

Method 3 or coefficient method is aquick hand-method of calculating the moments in two-way slabs supported by edge beam. The expressions for moment take the form of coefficient multiplied by total forced load per unit length on the span and the length of the clear span .

The moment coefficient method included for the first time in ACI code 1963 is applicable to two-way slabs supported on four sides of each slab panal by walls, steel beams . the coefficient method is not included in current versions of the ACI Code 318 , but it can still be used for two-way slab systems with edge beams.

YIELD LINE THEORY:

The inelastic behavior of reinforced concrete structures has been the subject of intensified studies for many decades.

Meathod of solution

External work done by load : the work can be calculated as the product of the total load and the displacement of the point .

Internal work done by resisting moment: the work can be calculated by summing the products of bending moment per unit length of yield line . the length of the yield line , and the angle change at that yield line corresponding to the virtual displacement.

Compare the results and choose the lowest moment .

Ministry of Higher Education &

 Scientific Research

Baghdad University

College of Engineering

Civil Engineering Department

Design Horizontally Curved Continuous Member.

Prepared By:

Fatima Abbas Khudhair

Supervised By:

Ass. Prof. Dr. Ahmed Jabbar Hussain

Abstract

Iron sections have been cut and curved by various tools and geometric shapes due to the importance of curved sections of commercial and industrial facilities. During bending operation should risk of fracture and the degree of distortion is determined and this is by knowing the behavior of iron after the passage of the yeilding stage, it bears the elongation and then necking , which occurs after the break that we try to avoid .

Has been studied horizontal continuous curve W21×101 forms a circular curve with a 30 ft radius and total angle of 90° between the W14×90 columns. The beam is continuous across an HSS column at the midspan , where torsion of the curved beam is restrained by W21×55 beam . The section has a time loader case 1 both span loaded and case 2 only span loaded.

First was found geometric properties from AISC manual and using AISC table (3-23) ,case 12 & 29 was obtained reaction at pin and continuous support for both case also moment positive and negative considering torsion load and warping and by using equation (H1-1) in AISC but axial loaed not exist , the account then calculated shear and serviceability .They are all checking.

Experimental study for reactive powder concrete using accelerated curing method-autojenous method.

دراسة عملية لخرسانة المساحيق الفعالة المعجلة الانضاج- بطريقة الانضاج الذاتي

اشراف/د.زينة خضير

Abstract:

Reactive Powder Concrete (RPC) is catching more attention now days because of its high mechanical and durability characteristics. RPC mainly comprises of cement, silica fume, silica sand, quartz powder an. RPC has been able to produce with compressive strength ranging from 200MPa to 800MPa with flexural strength up to 50MPa and in some cases can replace traditional steel reinforcement .RPC will allow the concrete industry to optimize material use, generates economic benefits, and build structures that are strong and durable.

The accelerated curing is a good way to accelerate strength and it is necessary to produce RPC, so we select autojenous method from ASTM standard. The results of compressive strength are increased with accelerated method.

The 2-days accelerated curing equal to 2.85 of 28-days compressive strength.

Name of student: حيدر احمد شوقي

Name of supervisor: أ.م.د.زينة خضير عباس

Experimental study for reactive powder concrete using accelerated curing method- warm water method.

دراسة عملية لخرسانة المساحيق الفعالة المعجلة الانضاج- بطريقة الحمام الدافئ

اشراف/د.زينة خضير

Abstract:

Abstract

Reactive Powder Concrete (RPC) is catching more attention now days because of its high mechanical and durability characteristics. RPC mainly comprises of cement, silica fume, silica sand, quartz powder and steel fibers. RPC has been able to produce with compressive strength ranging from 200MPa to 800MPa with flexural strength up to 50 MPa and in some cases can replace traditional steel reinforcement. RPC will allow the concrete industry to optimize material use, generates economic benefits, and build structures that are strong and durable.

The accelerated curing is a good way to accelerate strength and it is necessary to produce RPC, so we select warm water method from ASTM standard. The results of compressive strength are increased with accelerated method.

The 1-days accelerated curing equal to 3.33 of 28-days compressive strength.

Name of student: محمد عطا عبيد —شعبة د

Name of supervisor: أ.م.د.زينة خضير عباس

الاسم: كوثر صلاح حسن

اسم المشرف د. سرى كريم

اسم المشروع :تقييم كفاءه اداء
محطة الرستمية

مياه الصرف الصحي أو المياه العادمة (Sewage Water)، هي عبارةٌ عن مُخلّفاتٍ سائلة ناتجةٍ عن أنشطة الإنسان المُختلفة سواءً كانت المنزلية، أو التجارية، أو المؤسسية، أو الصناعية؛ بحيث يتمّ تَجميعها من خلال شبكةٍ من الأنابيب والقنوات لتصل إلى نقطةِ تجميع مُحدّدة للبدء بعمليّة المعالجة، وتُسمّى هذه النقطة بمحطّة مُعالجة المياه.ولاهميه هذا الموضوع تم اخذ محطة الرستمة لدراسة كفاءة اداءها **يقع مشروع الرستميه القديم على ضفاف نهر ديالى جنوب مدينة بغداد في منطقة الرستميه،عند نهاية خط بغداد الرئيسي الناقل لمياه الصرف الصحي يخدم المشروع مناطق بغداد الواقعة بين قناة الجيش شرقاً ونهر دجلة غرباً ابتداءً من منطقة الأعظمية شمالاً وصولاً إلى منطقة الرستميه جنوباً، ويقدر تعداد السكان المشمولين بهذه الخدمة اليوم بحوالي المليوني شخص .مراحل الانشاء المرحلة الأساسية والتوسع الأول مدمج جزئياً مع المرحلة الأساسية والتوسع الثاني**

للمعالجة ثلاث مراحل رئيسية، تسمى مرحلة أولية، ومرحلة ثانوية ومرحلة ثالثة. أولا تفصل المواد الصلبة عن مياه الصرف السائلة، ثم تحول المواد العضوية الذائبة في المياه إلى مواد صلبة تدريجيا عن طريق ميكروبات دقيقة تتولد في المياه. في المرحلة الأخيرة يتخلص من المواد الصلبة البيولوجية أو يعاد استخدامها ويمكن عندها تطهير المياه كيميائيا أو فيزيائيا. تضخ المياه المعالجة بعد ذلك إلى أي مجري مائي أو نهر. من الممكن أيضا أن تستخدم في زراعة الغابات الخشبية، وملاعب الجولف، والحدائق العامة، كما أنه من الممكن ضخها تحت الأرض لإعادة ملء خزان المياه الجوفية.

الحسابات والنتائج:

لتوفر معلومات كافيه لسنه 2017 للعناصرBOD,COD,TSS

تم حساب كفاءه هذه المواد خلال المرحلة الاساسية ومرحلة التوسع الاول ومرحلة التوسيع الثاني للقسم الشمالي والجنوبي وتمت الملاحظة ان الكفاءة في المرحلة الاساسية جيده جدا مقارنة مع التوسيع الاول والتوسيع الثاني ولكافه العناصر المأخوذة

APPLICATION OF TOTAL STATION

SUBMITTED BY

DHIAA HUSEEIN ALI

SUPERVISION

DR. ATHRAA HASHIM MOHAMMED

Total station surveying

Total station surveying **- defined** as the use of electronic survey equipment used to perform horizontal and vertical measurements in reference to a grid system (e.g. UTM, mine grid).

A total station (TS) or total station theodolite (TST) is an electronic/optical instrument used for surveying and building construction. It is an electronic transit theodolite integrated with electronic distance measurement (EDM) to measure both vertical and horizontal angles and the slope distance from the instrument to a particular point, and an on-board computer to collect data and perform triangulation calculations.[1]

Robotic or motorized total stations allow the operator to control the instrument from a distance via remote control. This eliminates the need for an assistant staff member as the operator holds the retroreflector and controls the total station from the observed point. These motorized total stations can also be used in automated setups knows as Automated Motorized Total Station (AMTS).

A. Angle measurement

Most total station instruments measure angles by means of electro-optical scanning of extremely precise digital bar-codes etched on rotating glass cylinders or discs within the instrument. The best quality total stations are capable of measuring angles to 0.5 arc-second. Inexpensive "construction grade" total stations can generally measure angles to 5 or 10 arc-seconds.

B. Distance measurement

Main article: Distance measurement

Measurement of distance is accomplished with a modulated infrared carrier signal, generated by a small solid-state emitter within the instrument's optical path, and reflected by a prism reflector or the object under survey. The modulation pattern in the returning signal is read and interpreted by the computer in the total station. The distance is determined by emitting and receiving multiple frequencies, and determining the integer number of wavelengths to the target for each frequency. Most total stations use purpose-built glass prism (surveying) reflectors for the EDM signal. A typical total station can measure distances with an accuracy of about 1.5 millimeters (0.0049 ft) + 2 parts per million over a distance of up to 1,500 meters (4,900 ft).[2]

Reflector less total stations can measure distances to any object that is reasonably light in color, up to a few hundred <u>meters</u>.

C. Coordinate measurement

The coordinates of an unknown point relative to a known coordinate can be determined using the total station as long as a direct line of sight can be established between the two points. Angles and distances are measured from the total station to points under survey, and the <u>coordinates</u> (X, Y, and Z or easting, northing and <u>elevation</u>) of surveyed points relative to the total station position are calculated using <u>trigonometry</u> and <u>triangulation</u>. To determine an absolute location a Total Station requires line of sight observations and can be set up over a known point or with line of sight to 2 or more points with known location, called <u>free stationing</u>.[3][4]

For this reason, some total stations also have a <u>Global Navigation Satellite System</u> receiver and do not require a direct line of sight to determine coordinates. However, GNSS measurements may require longer occupation periods and offer relatively poor accuracy in the vertical axis.[3]

D.Data processing

Some models include internal electronic data storage to record distance, horizontal angle, and vertical angle

measured, while other models are equipped to write these measurements to an external <u>data collector</u>, such as a hand-held computer.

When data is downloaded from a total station onto a computer, application software can be used to compute results and generate a <u>map</u> of the surveyed area. The newest generation of total stations can also show the map on the touch-screen of the instrument immediately after measuring the points.

1. Introduction

1.1. The Total station is designed for measuring of slant distances, horizontal and vertical angles and elevations in topographic and geodetic works, tachometric surveys, as well as for solution of application geodetic tasks. The measurement results can be recorded into the internal memory and transferred to a personal computer interface.

1.2. The basic properties are unsurpassed range, speed and accuracy of measurements. Total stations are developed in view of the maximal convenience of work of the user. High-

efficiency electronic tachometers are intended for the decision

it has the broad audience for sole of industrial problems.

1.3. Angles and distances are measured from the total station to points under survey, and the coordinates (X, Y, and Z or northing, easting and elevation) of surveyed points relative to the total station position are calculated using trigonometry and triangulation.

1.4. Data can be downloaded from the total station to a computer and application software used to compute results and generate a map of the surveyed area.

1.5. A **total station** is an electronic/optical instrument used in modern surveying. It is also used by archaeologists to record excavations as well as by police, crime scene investigators, private accident Reconstructionist and insurance companies to take measurements of scenes. The total station is an electronic theodolite (transit) integrated with an electronic distance meter (EDM), plus internal data storage and/or external data collector.

1.6. The purpose of any survey is to prepare maps, control points formed a basic requirement for the preparation of these maps.

1.7. There are several numbers of methods like traverse, triangulation etc., to provide these control points.

1.8. Whatever the method the provision of control points, includes the measurement of two entities (Distance and Angle).

1.9. Again, distance can be measured by using various instruments like **chain, tape.**

1.10. Linear Tap.

1.11. Gunter's chain (20m and 30m).

1.12. Steel band (20m and 30m).

1.13. Inver tap.

1.14. Hunter Short Base (80m).

1.15. Electronic Distance Measurement Instruments, Total station and GPS.

1.16. Angle can be measured by using a THEODOLITE.

1.17. Once distance and angular measurement is over computation is performed to provide the control points. A combination of all the three results in a powerful instrument called **TOTAL STATION**. Hence, the **TOTAL STATION** is an instrument which consists of the following:

    a.   Distance measuring instrument (EDM).

    b.   An angle measuring instrument (Theodolite).

    c.   A simple microprocessor.

2. Instrumentation

2.1. It consists of an EDM, Theodolite, Microprocessor combined
into one. It also has a memory card to store the data. It also consists of battery socket which houses the battery. A fully charged battery works for about 3 to 5 hrs. continuously.
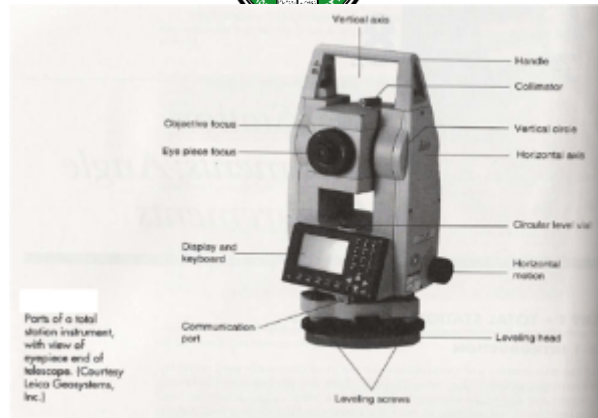
Figure 1: Different Parts of Total Station

2.2. Accuracy of a Total Station:

Accuracy depending upon the instrument and varies from instrument to instrument

2.2.1. The angular accuracy varies from1″ to 20 ″.
2.2.2. Distance accuracy depends upon two factors.

Instrumental error which ranges from

$+/-10mm$ to $+/-2mm$.

2.2.3. Error due to the length of measurement.

It can be from $+/-10mm$ to $+/-2mm$ per kilometer.

1 prism, 2.5–2.7 km2 prisms

5-7 km3 prisms

10-12 km NIKON One second$+/-2mm/km$ or 2ppmTriple the number of prisms double the distance. LEICA One second SOKKIA One second.

2.3. Accuracy & Precision

2.3.1. Precision is the reproducibility of the measurement.

2.3.2. Accuracy is how close the measured position is to the actual location

Measurement of distance is accomplished with a modulated microwave or infrared carrier signal, generated by a small solid-state emitter within the instrument's optical path, and reflected by a prism reflector or the object under survey. The modulation pattern in the returning signal is read and interpreted by the onboard computer in the total station. The distance is determined by emitting and receiving multiple frequencies, and determining the integer number of wavelengths to the target for each frequency. Most total stations use purpose-built glass Porro prism reflectors for the EDM signal, and can measure distances to a few kilometers. Reflectorless total stations can measure distances to any object that is reasonably light in color, to a few hundred meters.

Principle:

Given the co-ordinate of the instrument position and bearing of a backward station the co-ordinates of any other point can be computed.

Total station can be used

a. When two points are given.

b. When only one co-ordinate is given. In this case the coordinate of the back station is determined by any suitable method.

c. When no co-ordinates were given in which case arbitrary system of coordinates can be used.

These devices, also called electronic Tachometers, can automatically measure horizontal and vertical angles as well as slope distances
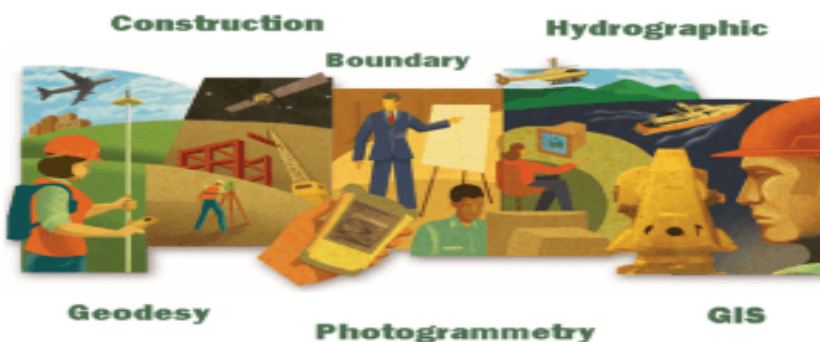
From a single set up. From these data they can instantaneously compute horizontal and vertical distance components, elevations, and coordinates, and display the results on LCD. They can also store the data, either on board or in external data collectors. If the coordinates of the occupied station and a reference azimuth are input to the system, the coordinates of the sighted point are immediately obtained. This information can be directly stored in an automatic data collector, there by eliminating manual recording. These instruments are of tremendous value in all types of surveying. Total Stations offer many advantages for

almost all types of surveying. They are used for topographic, Hydrographic, cadastral, project and construction surveys.

2.4. Accessories for Total Station

With approximately more than 40 different models are available to choose, they are currently the dominant instrument in surveying.

The EDM instrument component installed in a Total Station is relatively small but still has distance ranges adequate for most work. Lengths up to about 2 km can be measured with a single prism, and up to about 6 to 7 km with triple prism.

The angle resolution of available Total Stations varies from as low as a half-second for precise instruments suitable for control surveys, up to 20″ for instruments made specifically for construction stakeout.

2.5. Functions Performed By Total Stations

Total Stations, with their microprocessors, can perform a variety of functions and computations, depending on how they are programmed. The capabilities vary with different instruments, but some standard computations include:

a. Averaging multiple angle and distance measurements.

b. Correcting electronically measured distances from prism constant, atmospheric pressure, and temperature.

c. Making curvature and refraction corrections to elevations determine by trigonometric levelling.

d. Reducing slope distances to their horizontal and vertical components.

e. Calculating point elevations from the vertical distance components (supplemented with keyboard input of instrument and reflector heights).

f. Computing coordinates of survey points from horizontal angle and horizontal distance.

- **Averages** multiple **angle** measurements.
- **Averages** multiple **distance** measurements.
- Computes **horizontal** and **vertical distances.**
- **Corrections** for temp, pressure and humidity.
- **Computes** inverses, polars, resections.
- **Computes** X, Y and Z **coordinates.**

2.6. Operation of Total Station

Because the Total Station contains delicate electronic components they are not as rugged as ordinary Theodolite. They must be packed and transported carefully, handled gently and carefully removed form their cases.

The setting of Total Station over the station mark is similar to an ordinary Theodolite. This includes

a. Centering
b. Levelling
c. Removal of parallax

Total Stations are controlled with entries made either through their built-in keyboards or through the keyboards of hand-held data collectors. Details for operating each individual total station vary somewhat and therefore are not described here.

The accuracy achieved with total station is mainly depends on operator procedure of Careful centering and levelling of the instrument

- Accurate pointing at targets.
- Taking averages of multiple angle measurements made in both direct and reverse positions

Peripheral equipment that can affect accuracy includes

- Tribrach's
- Optical plummets
- Prism and
- Prism poles

Tribraches must provide a snug fit without slippage. Optical plummets that are out of adjustment cause instruments to be set up erroneously over the measurement point. The prism poles should be perfectly vertical and prism should be well fitted on that. Prisms should be checked frequently to determine their constants.

2.7. Remotely Operated Total Station (ROBOTIC)

The remote positioning unit (RPU) enables control of a total station instrument from a distance

Robotic total stations allow the operator to control the instrument from a distance via remote control. Robotic

systems offer reflector less measurement superior to any other instrument available – capable of precision measurements this technology has tremendous benefits for every user. This eliminates the need for an assistant staff member as the operator holds the reflector and controls the total station from the observed point. The remote positioning unit, which is attached to a prism pole, has a built-in telemetry link for communication with the total station. Even a person is not needed near the total station. The Total station automatically moves and locates the target. A person is required at the target at different survey locations. The Robotic Total stations speed up the survey work and reduce the manpower. Robotic total station is the latest, most advanced system on the market today that boasts a new modern design, faster motors, 2000 meter reflector less range. Available in 1, 3, and 5 second angle accuracies, you can select the instrument that best fits your requirements.

2.8. Features Include:

- Innovative, completely cable-free system design.
- New RC-3 with Superior XTRAC™ Quick-Lock tracking technology.
- The most advanced, longest range, and most powerful reflector less technology available.
- Full-color, graphical Windows Mobile instrument & field controller interface.
- Lighter weight than the competition.

Applications of Total Station

There are many other facilities available, the total station can be used for the following purposes.

- Detail survey i.e., data collection.
- Control Survey (Traverse).
- Height measurement (Remove elevation measurement-REM).
- Fixing of missing pillars (or) Setting out (or) Stake out.
- Resection.
- Area calculations, etc.
- Remote distance measurement (RDM) or Missing line measurement (MLM).

3.1. Data Collection Option

Measurements can be stored "on board" with all the total stations. The two options that are available are

3.1.1. Data can be stored directly in the memory of the microcomputer, and later downloaded to an external storage device via a RS – 232 connections.

3.1.2. The second option is the removable memory card. When one card is full, it can be removed and another card can be quickly installed.

3.2. Detail Survey

Given two points whose coordinates are known, a total station can be used to get the coordinates of various other points based upon those two co-ordinates. Care should be taken that

the new point's survey are carefully coded. The Map of the area can be obtained after downloading and processing.

3.3. Control Survey / Traverse:

It is similar to any type of EDM Traverse.

Definition of Traverse: –

Traverse is the method of control survey in providing horizontal and vertical controls along a pre-defined route by means of establishing a series of connected lines joining the traverse stations.

3.3.1. Traverse:

- In traverse a number of connected survey lines form a framework of survey.
- The direction and length of survey lines are measured with the help of an angular measuring device (Theodolite) and distance measuring device (Tape, chain, EDM, GPS etc.).

Figure 1: Traverse

3.3.2. Classification of Traverse (Based on accuracy & Based on Instrument used):

a. Based on accuracy
b. Primary traverse: accuracy 1:50,000 (Instrument: T3 and invar wire)
c. Secondary traverse: accuracy 1:20,000 (Instrument: T3 and EDM)
d. Tertiary traverse: accuracy 1:1000 (Instrument: T2 and Chain)
e. 1:2000 (Instrument: T2 and Steel Band)
f. Based on Instrument used
g. Chain traverse
h. EDM traverse
i. Plane-table traverse

3.3.3. Classification of Traverse:

a. **Open traverse:** Starts from a known control point and ends at unknown point.
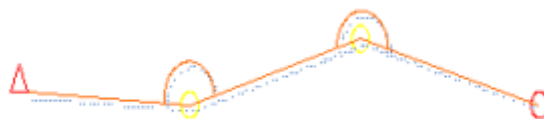
Figure 2: Open Traverse

b. **Closed traverse:** Starts from and ends at known control points.

Figure 3: Closed Traverse

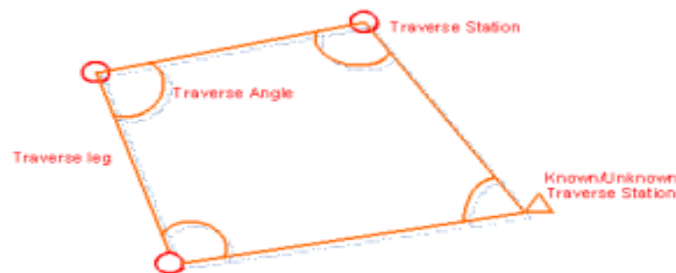c. **Closed Circuit traverse:** Starts from and ends at known control points.

Figure 4: Closed Circuit Traverse

3.3.4. Application of traverse

a. Providing control points for large scale surveys.
b. Boundary surveys
c. Fixing route of a river, road, canal accurately.
d. Project surveys.
e. Alignment surveys and many more.
f. True North i.e. Meridian line
g. Grid North line
h. Magnetic North line
i. Any arbitrary reference line.

3.4. The reference line may be:
3.4.1. Azimuth:

- Azimuth of any survey line or traverse leg is the clockwise angle from True North.

3.4.2. Grid Bearing:

- Grid Bearing of any survey line or traverse leg is the clockwise angle from Grid North.

3.4.3. Magnetic Bearing:

-
-

- Magnetic Bearing of any survey line or traverse leg is the clockwise angle from Magnetic North.

3.4.4. Azimuth and Grid Bearing:

a. Azimuth can be obtained by astronomical observations.
b. Azimuth can be computed by Latitude and Longitude (Spherical coordinates).
c. Grid Bearing can be obtained by astronomical observations by applying Convergency.
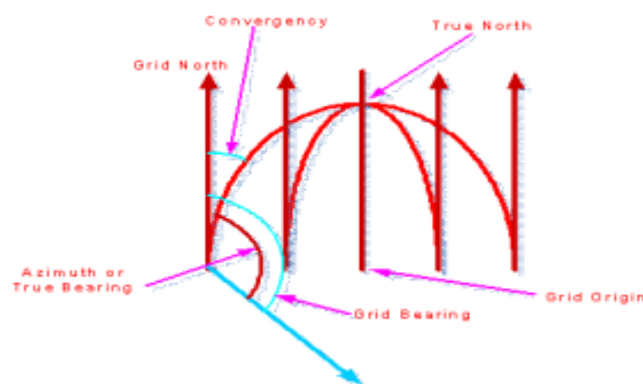d. Grid Bearing can be computed by Grid coordinates.

Figure 5: Azimuth and Grid Bearing

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Convergency:

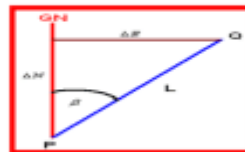$$Convergency = \Delta L Sin \phi_0$$
$$\Delta L = L - L_0$$

ϕ_0 Latitude of the Grid origin

L_0 =Longitude of the Grid origin

L= Latitude of place of observation

Grid Bearing = True Bearing − Convergency

A. Azimuth from True North
B. Bearing from Grid North
C. grid Convergency
PQ - Baseline
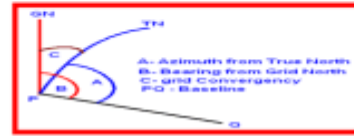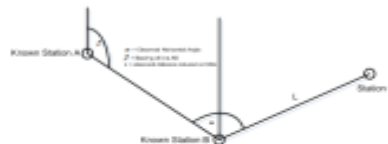
Reduce the observed Azimuth to Bearing

Compute Coordinates

$$\Delta E = L Sin \beta$$
$$\Delta N = L Cos \beta$$

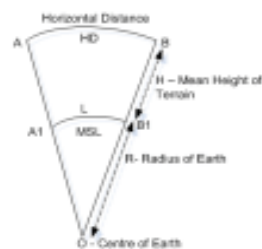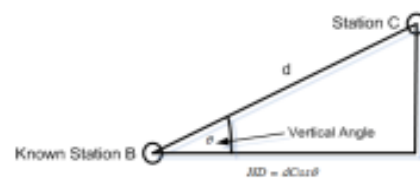Coordinates of Station P – E and N (Known)

Coordinates of Station Q - E + ΔE

N + ΔN

Computation of coordinates

β = Observed Horizontal Angle
β = Bearing of line AB
L = observed distance between A and B

- Compute bearing of line AB $\beta = Tan^{-1}(\frac{\Delta E}{\Delta N})$

- Reduced observed slope distance on Horizontal
- Reduced Horizontal Distance on MSL.

Station C

d

Vertical Angle

Known Station B θ

$HD = d Cos \theta$

Horizontal Distance

A   HD   B

H – Mean Height of Terrain

A1   L   MSL   B1

R- Radius of Earth

O - Centre of Earth

In similar Triangle OA1B1 and OAB

$$\frac{L}{HD} = \frac{R}{R+H}$$

OR

$$L = HD.\frac{R}{R+HD}$$

L is the MSL Distance used for further computation

3.5. Remote Elevation Measurement (REM)

The process of finding the height of objects without actually going to the top of the object is known as Remote Elevation

Measuring (REM) i.e., a total station placed remotely (faraway) from the object is used to measure the heights.
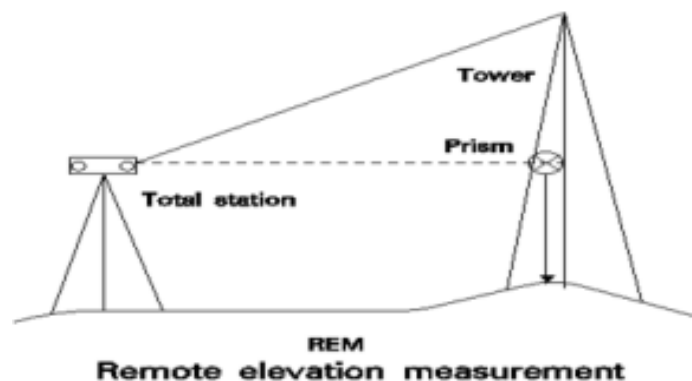

Figure 6: Remote Elevation Measurement

Method: The prism is kept at the base of the object sight the telescope to the prism, and measure the slope distance 'd', now tilt the telescope up-to the tip of the object. The height of the object is displayed, from the bottom of the prism depending upon the instrument.

This feature measures the elevation of a point where a prism can not be placed directly. The measurement is extended along the plumb line while the elevation is continuously displayed.
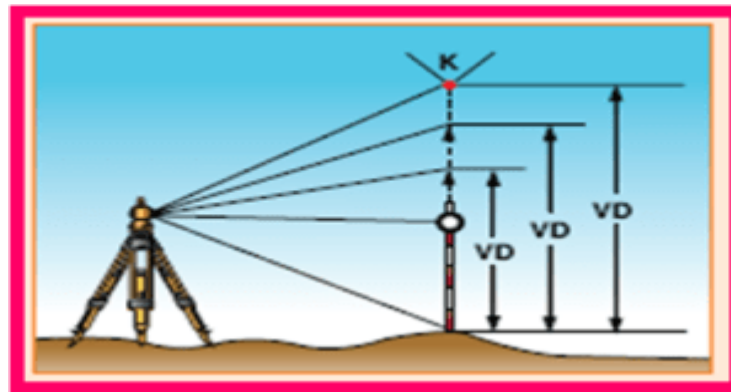
Remote Elevation Measurement:

Figure 7: Remote Elevation Measurement

3.6. Remote distance measurement (RDM) or Missing line measurement (MLM):

The process of finding the distance between two points A & B (which are not inter-visible from each other) from another point 'I' (instrument position) is known as RDM.

This method is very useful for finding distances between two points which has an obstruction between them. It is of two types:
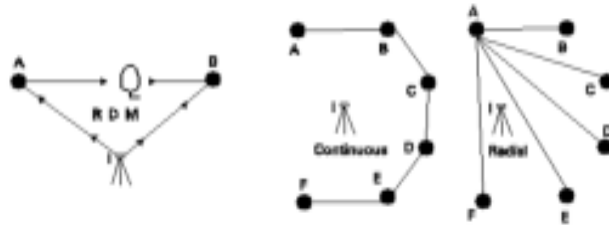
• Continuous
• Radial

Figure 8: Remote Distance Measurement

Distances can be obtained either in the **continuous mode** i.e., AB, BC,CD, DE,EF etc., or in the **radial mode** i.e., AB,AC,AD,AE,AF etc., however, the field procedure is same for both only the selection of operation varies. This is required when there are obstructions in between survey line.
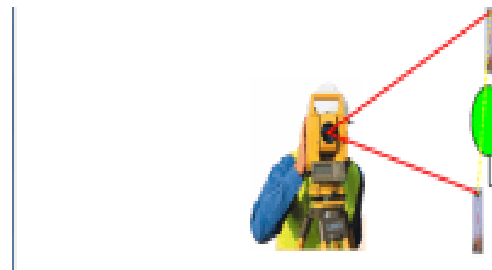

Figure 6: Missing Line Measurement

3.7. Fixing of missing pillars (or) Setting out (or) Stake out:

The process of fixing missing pillars on the ground using its theoretical coordinates is known as STAKE OUT. Here two other known coordinates are required.

- Process of finding the positions of known coordinates points e.g. missing boundary pillars.
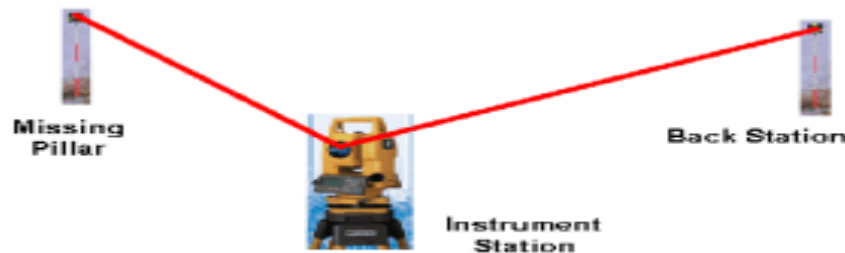

Figure 7: Stake Out

3.8. Resection:

The process of finding the coordinate of the instrument position making use of other control points (points whose coordinates are known) is known as RESECTION.
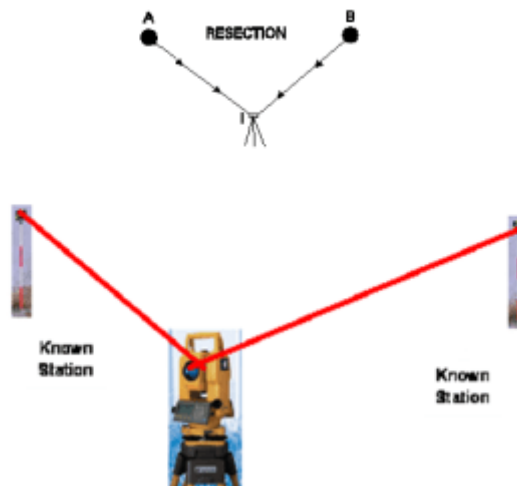
Figure 8: Resection

3.9. Area Calculation:

Area can be computed of any figure just by giving the coordinates of the corner of the figure.

a. Area Calculation.
b. Process of finding the area of a closed figure.
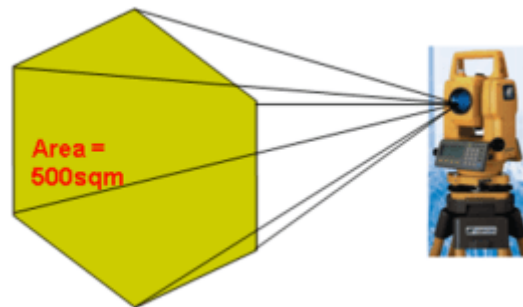
Figure 9: Area Calculation

4. Uses of Total Station

The uses of Total Station are as follows:

1. Mine Survey
2. Cadastral Survey
3. Engineering Survey
4. Large Scale Survey
5. Road / Rail / Canal Survey

Some total stations also have a **GNSS interface** which combines the advantages of these two technologies (GNSS – line of sight not required between measured points; Total

Station – high precision measurement especially in the vertical axis compared with GNSS) and reduce the consequences of each technology's disadvantages (GNSS – poor accuracy in the vertical axis and lower accuracy without long occupation periods; Total Station – requires line of sight observations and must be set up over a known point or with line of sight to 2 or more points with known location).

Field work

1- we received from survey engineering dpt. Ground setting point with known coordinates
2- we calibrated two of these points (GC14) and (GC15).
3- depending on the two points gc14 and gc15, we transfered the points from the roof of architecture eng. dpt.To civil eng. dpt roof.
4- we measured the corners of civil eng. dpt.

Difficulties we faced:

1- the delation of receiving the known coordination points from survey eng. dpt.

2- the working till too late periods after the end of official time hours

3- the difficulties in using the device since it is the first time we used it.

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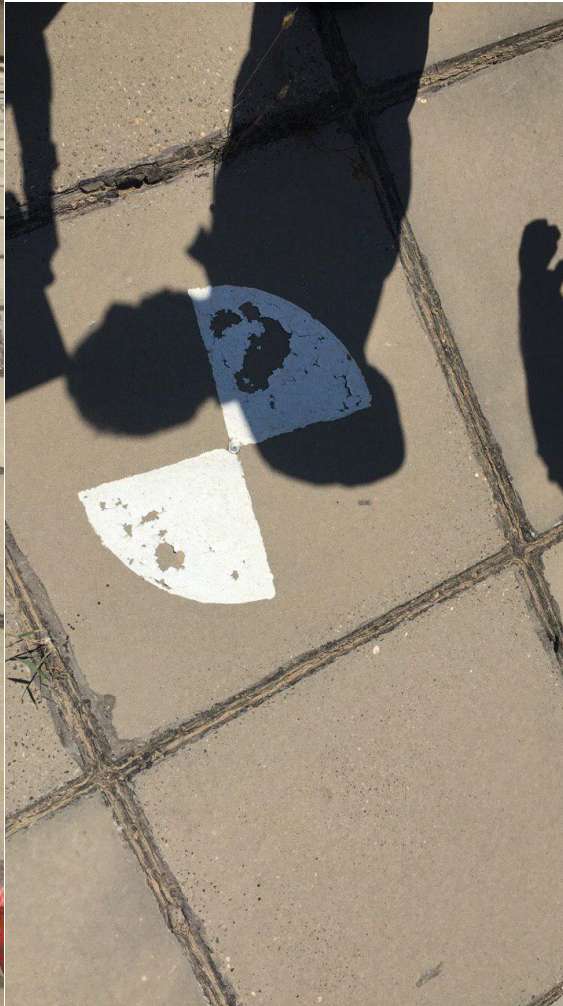
Name	Easting	Northing	Elevation	Description
1	441716.517327	3681725.338707	32.960232	SS
2	441700.954978	3681737.317533	32.913129	SS
3	441624.907706	3681681.832354	32.663445	SS
C1	441674.267622	3681734.545479	41.737151	SS
C2	441691.280192	3681724.278175	41.708767	SS
C3	441680.937915	3681706.927582	41.710411	SS
C4	441663.891844	3681717.460891	41.728524	SS
C5	441718.172416	3681726.614286	41.737780	SS
C6	441670.216897	3681755.987978	32.815431	SS
C7	441665.183355	3681759.045562	32.796898	SS
D1	441674.064761	3681738.095942	32.661320	SS
D2	441691.615339	3681728.470242	32.668932	SS
D3	441681.457587	3681709.971460	32.646771	SS

D4	441680.951044	3681705.139329	32.723237	SS
D5	441664.396253	3681718.376643	32.648238	SS
D6	441663.644683	3681718.824986	32.667683	SS
D7	441703.852848	3681722.034976	32.728028	SS
DH	441700.850339	3681729.467337	32.699514	SS
g1	441650.213528	3681737.863426	32.670977	SS
g2	441644.010786	3681727.668063	32.657834	SS
g3	441669.535074	3681724.999973	32.548287	SS
g4	441668.795223	3681726.098974	32.716593	SS
g5	441669.740284	3681724.676243	32.643606	SS
GC14	441744.638000	3681791.373000	41.082000	occ1
GC15	441742.049000	3681698.586000	41.215000	BS

Results:

A precise points with 5mm deviation.

مقارنة بين الطريقة الثالثة وطريقة خطوط الخضوع للبلاطات الخرسانية العاملة بأتجاهين

(Case3)

COMPARISON BETWEEN METHOD THREE AND YIELD LINE THEORY FOR TWO-WAY REINFORCED CONCRETE SLABS – CASE3

PREPARED BY

Zainab Mohammed(class-c-)

SUPERVISED BY

Dr. Ali H. Al-Ahmed

SUMMERY

THE AIM OF THE PROJECT

The aim of this project is to study the difference between method 3 and yield line method for analyzing and designing two-way concrete slabs, eleven case studies have been accounted to show the differences between these methods.

DESIGN BY METHOD THREE

Method 3 or Coefficient Method is a quick hand-method of calculating the moments in two-way slabs supported by edge beams. The expressions for moment take the form of coefficient multiplied by total factored Load per unit length on the span & the length of the clear span. The Moment Coefficient Method included for the first time in ACI Code 1963 is Applicable for two-way slabs supported on four sides of each slab panel by walls or steel beams. The Coefficient Method is not included in current versions of the ACI Code 318, but it can still be used for two-way slab systems with edge beams. The panel must be divided into middle strips and edge strips in both the short and long Direction. The width of the middle strip in each direction is equal to 1/2 the clear span length. The 2 edge strips are then 14 the width of the clear span length.

YIELD LINE THEORY

The inelastic behavior of reinforced concrete structures has been the subject of Intensified studies for many decades. A major contribution of these studies was focused on the prediction of collapse load of such structures.

METHODS OF SOLUTION

External work (EW or We) equals to the product of external load and the distance through which the point of application of the load moves.

The internal work (IW or W;) done during the assigned virtual displacement is found by summing the products of bending moment per unit length of yield line (m).

There are two types of failure in Case three, therefore, the bending moment will be calculated for each mode using Yield Line Method then compare it with the bending moment calculated by Method Three. Whichever calculated moment is less from both methods, will give more economical value.

Stress and Strain Analysis for Flexible Pavement	اسم المشروع باللغة الإنكليزية
تحليل الاجهاد والانفعال للتبليط المرن	اسم المشروع باللغة العربية
فرقان حيدر نوري	اسم الطالب
أ.م.د.محمد قادر اسماعيل عيسى البياتي	اسم المشرف

Abstract

A highway pavement is a structure consisting of superimposed layers of selected and processed materials whose primary function is to distribute the applied vehicle loads to the subgrade. Pavement is the actual travel surface especially made durable and serviceable to withstand the traffic load commuting upon it. Pavement grants friction for the vehicles thus providing comfort to the driver and transfers the traffic load from the upper surface to the natural soil. The simplest way to characterize the behavior of a flexible pavement under wheel loads is to consider it as a homogeneous half-space. A half-space has an infinitely large area and an infinite depth with a top plane on which the loads are applied. The most practical mechanistic method for analyzing flexible pavements is Burmister's layered theory. Based on two-layer elastic systems, various charts were developed for determining pavement responses. Two methods can be used to characterize viscoelastic materials: a mechanical model and a creep-compliance curve. Both are closely related, and each can be converted to the other. The advantage of using a mechanical model is that the stress—strain relationship can be visualized physically to develop the governing differential equations; the advantage of using a creep-compliance curve is that it can easily be obtained by a laboratory creep test.

Effect of internal curing on properties of reactive powder concrete

GHAITH MAHER MOHAMMED

Supervision

Prof. Dr. Nada Mahdi Fawzi

Abstract

The majority of the volume of concrete is occupied by aggregate, in conventional concrete mixtures. The aggregate is relatively inert and intended to be stable. New methods are being developed where the aggregate plays an integral role in the development of the paste microstructure. This method, known as (Internal Curing), uses saturated lightweight aggregate as a shrinkage mitigation strategy to reduce the effects of self-desiccation and improve the overall properties of concrete i.e., curing is taken to happen 'from the outside to inside'. In contrast, 'internal curing' allows for curing 'from the inside to outside' through the internal reservoirs (in the form of many types of saturated fine or coarse LWA, recycled aggregate) created It has proposed by that less expansive crushed recycled concrete

 My project is using sustainability material and Studying the effect of different curing methods on the properties of hardened concrete (compressive strength). The treatments used include ordinary treatment by immersion in water at 35°C and curing in air .Then comparison between properties of these type of curing.

Effect of sustainability materials on properties of self compacting concrete

Fayroz Mahdi

Supervision

Prof. Dr. Nada Mahdi Fawzi

Abstract

These days, the performance required for concrete structures is progressively complex and differentiated. Self-compacting cement is a liquid mixture reasonable for setting in structures with crowded reinforcement without vibration. Self-compacting concrete advancement must guarantee a decent harmony among deformability and stability. Likewise, similarity is influenced by the qualities of materials and the mix extents; it ends up important to advance a methodology for mix design of SCC. This research displays an exploratory procedure for the plan of self-compacting cement mixes with various water-concrete proportions (w/c) and other consistent proportions by nearby materials. The test results for acknowledgment attributes of self-compacting cement, for example, slump flow, V-funnel and L-Box are displayed. Further, compressive strength, tensile strength and modulus of elasticity of specimens were additionally decided and results are incorporated here

Abstract

الطالبة الهام عبد الرزاق

اشراف:ا.م.اكرام فرعون احمد

$\mathcal{B}$endable concrete also known as Engineered Cementitious Composites abbreviated as ECC is class of ultra-ductile fiber reinforced cementitious composites, characterized by high ductility and tight crack width control. This material is capable to exhibit considerably enhanced flexibility. An ECC has a strain capacity of more than 3% and thus acts more like a ductile metal rather than like a brittle glass. A bendable concrete is reinforced with micromechanically designed polymer fibres. In this research a survey of mechanical properties of different ECC mixtures are evaluated by incorporating supplementary cementitious material.

This research presents current literatures about various active research that are taking place around the world on study of behavior of Engineered Cementitious Composites (ECC) by incorporating Polyvinyl Alcohol (PVA) and other kinds fibers and by using various mineral ad-mixtures. Engineered Cementitious Composites is mainly designed based on the role of micro-mechanical interaction with exceptional strain capacity of about 3 to 5% compared to 0.01% of normal concrete. The

volume fraction of the fiber used is also less than 2 percent and showing an extensive strain hardening behavior of the composites.

الخلاصة

تعرف الخرسانة القابلة للانثناء ايضا باسم الخرسانة الهندسية للمركبات السمنتية والتي هي نوع من المركبات السمنتية المسلحة بالياف فائقة المطيلية للسيطرة وسد الشقوق . هذه الخرسانة لها القابلية على اكتساب تحسن ملحوظ في الانثناء وتملك انفعال يصل الى اكثر من 3% والذي هو اعلى من انفعال الزجاج الهش والالياف التي يسلح بها هذا النوع من الخرسانة تكون مايكروميكانيكية التصميم ومن النوع البوليمري.

هذا البحث يوضح الخواص الميكانيكية للخرسانة المطيلية بوجود المركبات السمنتية ويقدم البحث استعراض للبحوث السابقة المعتمدة في هذا المجال والتي تدرس هذا النوع من الخرسانة بوجود الياف بولي فينيل الكحول والمضافات المعدنية . تعد الخرسانة المطيلية مصممة بحيث لها دور في التفاعل الميكانيكي المايكروي وبقدرة انفعال تصل الى 3-5 % في حين ان الكونكريت العادي انفعاله يصل الى 0.01 % والنسبة الباعية للالياف تصل لاقل من 2% واعطت تقوية انفعال شديدة لهذه المركبات.

Abstract

د الرابع/ توفيق محمود

اشراف /ا.م.اكرام فرعون احمد

The cement industry does not fit in sustainable development due to raw materials used for the production does not recycle and are non-renewable. The waste material or by-product from the industry which can be utilized for reduction of carbon dioxide CO2 emission. Emphasis on energy conservation and environmental protection has been increased in recent times which have led to the investigation of alternatives to customary building materials and technologies. Thus, the material or by product of an industry could be used in cement production thereby minimizing carbon. Inorganic polymer or organic polymer composites possess the potential to form a substantial element to form an environment friendly and sustainable constructional building material which produces lower greenhouse footprint when compared to the traditional concrete.

Major efforts were dedicated to greenhouse CO2 mitigation with the development of low CO2 geopolymer cements. Research on this very important geopolymer application started in 1990 at Penn-State University, Materials Research Laboratory, USA. The production of 1 tonne of kaolin based-geopolymeric cement generates 0.180 tonnes of CO2, from combustion carbon-fuel, compared with 1 tonne of CO2 for Portland cement, i.e. six times less.

Effect of High Temperature and Flam on Reactive Powder Concrete   اسم المشروع
:

اسم الطالب : علي عبد الستار

Abstract

Reactive powder concrete (RPC) is one of the latest and most important developments in concrete technology.

Fire is the most sever environmental condition affecting on concrete structures, thus investigating for fire safety in structural concrete is important for building construction. The slow heat transfer and strength loss enables concrete to be effective for fire resistance. Concrete structures withstand when exposed to fire according to: their thermal properties, rate of heating, characteristic properties of concrete mixes and their composition and on the duration of fire, and concerned as thermal property with other factors such as loss of mass which affected by aggregate type, moisture content, and composition of concrete mix. The present research goal is to study the effect of rising temperature on the compressive strength and tensile strength of the reactive powder concrete samples. Then investigate the behavior of reactive powder concrete when exposed to elevated temperature from zero to 500Co and flam then compared with specimens without exposed to temperatures with and without used steel fiber with different time of curing 30 and 60 day, then tested compressive strength and tensile strength for RPC of the specimens. From test results steel fibers significant increase ductility and strength for the specimens.

اسم المشروع   :

Effect of High Temperature and Flame on Reactive Powder Concrete with Lime Stone Cement.

اسم الطالب : محمد زياد

Abstract

Cement is a composite materials utilized for development of base construction all through the world. The late issue confronted by the specialists is the expanding upkeep expense of the structure. The upkeep expense of the structure building the general expense of the under taking.

Reactive powder concrete (RPC) is one of the latest and most important developments in concrete technology and it is substitute hotspot for the compressive quality.

RPC is a composite material its workability enhanced by utilizing super plasticizer. RPC possess ultra-high static and dynamic strength, high fracture capacity, low shrinkage and excellent durability under serves condition.

The basic principles for the development of RPC were explained by many researchers. These principles can be lasted as below:

• There is no coarse aggregate and maximum aggregate size may be between 0.3 t0 0.6mm.

• Powder is carefully optimized to achieve very high compactness.

• Using high cement content, low water to cement ratio (less than 0.2).

• Silica fume or other suitable pozzolanic material can be added to the mix.

• Super plasticizer is need

• Steel fibers are to be added to increases the concrete ductility.

Fire is the most sever environmental condition affecting on concrete structures, thus investigating for fire safety in structural concrete is important for building construction. The slow heat transfer and strength loss enables concrete to be effective for fire resistance. Concrete structures withstand when exposed to fire according to: their thermal properties, rate of heating, characteristic properties of concrete mixes and their composition and on the duration of fire, and concerned as thermal property with other factors such as loss of mass which affected by aggregate type, moisture content, and composition of concrete mix. The present research goal is to study the effect of rising temperature on the compressive strength of the reactive powder concrete samples. Then investigate the behavior of reactive powder concrete when exposed to elevated temperature from zero to 500Co and flam then compared with specimens without exposed to temperatures with and without used steel fiber. From test results steel fibers significant increase ductility and strength of RPC with lime stone cement when increase age of concrete.

Abstract--

اشراف/م.رواء خالد

Internal Sulfate attack on same properties of Reactive Powder concrete

غدير نصير كاظم المرحلة الرابعه – B

Abstract

This work is denoted to study the resistance of (RPC) to internal sulfate attack after adding natural gypsum to sand as a partial replacement by weight. All the specimens were curried in water. Four sulfate contents (0.23, 0.75, 1.0, and 1.25 %) are used as a partial replacement by weight with fine aggregate we are studied. (36) cubes and two prisms were cast throughout this project. Compressive strength, and length change are investigated at 60 days . The reduction in strength was continuous and higher in later ages and for higher SO_3 content with reference to the mix with 0.23% $SO_{.3}$. Test results showed that Reactive powder concrete had lost strength, and also the change length will be increase while the internal sulfate contained increase too.

External **Sulfate attack on same properties of Reactive Powder concrete**
علي عبد الكريم   ـ المرحلة الرابعه – B –اشراف م. رواء خالد

Abstract

External sulfate attack is considered as very important problems of concrete manufacture in Iraq and Middle East world countries . The Objective of this project is to produce Reactive powder concrete by incorporating a local pozzolana with a partial replacement by weight of cement and is   containing (polypropylene fiber and steel fiber) . This material was prepared to conform engineering requirements of specification (ASTM C618 - 92) in terms of its physical and chemical properties. The external sulfate attack was studied specimens have been casted, directly and continuously cured, and full immersed in a solution containing $MgSO_4$ and Na_2SO_4 the concentration of the sulfate ion used in this study was equal to upper limit defined in ACI318M building code (10000 ppm),other specimens have been direct and continuously cured and fully immersed in tap water,(36) cubes and two prisms for change length are used at 60 days of exposure. Test results showed continuous development with time in mechanical properties for RPC when cured in water but results deterioration when cured in sulfate water also, the expansion of RPC cured in tap water much lower than that of RPC exposed at sulfate solution.

Effect of Replacing the Aggregate of Asphalt Concrete Mixture by Crushed Glass for Base Course

تأثير استبدال ركام الخلطة الاسفلتية بالزجاج المطحون للطبقة الاسفلتية

Abstract

The reuse or recycling of waste materials in different aspects of life is served the objective of sustainability and be beneficial to society. In recent years, a wide variety of waste materials were used in pavement construction. One of these materials is glass that generally produces in large quantities and crushed glass can be considered feasible alternative source of aggregate for asphalt mixture production. This study focused on examining the asphalt mixture properties of base course using crushed glass as aggregates. Crushed glass with various percentages by total weight retained on sieve 9.5mm, 4.75mm, 2.36 mm, 0.3 mm and 0.075 mm was used in the study. The results indicate that mixes containing crushed glass had lower Marshall stabilities and tensile strengths compared to conventional mixes. The study has concluded that recycling and reuse of waste glass in asphalt mixture for glass content not more than 16 percent could be possible and yield a result which satisfies the specification of asphalt concrete base course mixtures.

Prepared By

Hala Mukhlos Abbo

Supervised By

Lec. Roaa H. Latief

Studying of Moisture Damage Performance and Punching shear Strength of Hot Mix Asphalt Containing Waste Glass

دراسة فعالية ضرر الرطوبة وقوة القص للخلطة الاسفلتية الحارة التي تحتوي على مخلفات الزجاج

Abstract

The need to modify conventional pavement rises due to high maintenance cost of the highway systems. With the continuously increased consumption, a large amount of waste glass materials is generated annually in the world. This paper aims to study the performance of pavement asphalt in which a fractional aggregate is replaced with crushed glass. In this paper, some important properties of asphalt mix, including moisture damage and punching shear strength are investigated. The original sample is prepared without adding glass for different percentages of bitumen. Other samples are prepared by adding crushed glass to the mix with 8%, 16%, 24$, 32%, and 40% by the weight of total mix. The results show that the properties of glass-asphalt mixture are improved in comparison with normal asphalt pavement. It is concluded that the use of waste glass in asphalt pavement is desirable.

Prepared By

Bakir Nabil Ghazi

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Lec. Roaa H. Latief

Effect of coal powder on Marshall properties of asphalt concrete mixes

MOROG JAFFER   **Supervisor Aliaa faleh**

Abstract

Practical experience of highway networks showed that high percentage of road pavements are suffering from cracking and rutting. This problem had often occurred due to the shortage in asphalt mix properties as well as the increase in traffic loading. Fatigue, creep and rutting of asphalt mix in long term may be occurred due to the shortage in the mechanistic properties of either of the binder and/or the asphalt mix. This study investigates the effect of using coal powder as an additive to the filler on the behavior of asphalt mixes. The scope of the study includes the investigation of the properties of the asphalt mixes using different percentages of coal powder (1, 2, 3 and 4% by filler weight). Results indicate that, the optimum asphalt content is 5.1% which achieve the best results in Marshall tests. Marshall Stability is increased by about 27.5% and flow is decreased by about 20.2 %. The unit weight increases, while the air voids percentage (AV %) is kept within the accepted limits. Finally, adding coal powder to the asphalt cement mixes success in enhancing the properties of hot mix asphalt.

Effect of coal powder on indirect tensile strength of asphalt concrete mixes

HASAN BAHAA   **Supervisor Aliaa faleh**

Abstract

The main objective of this research was to investigate the effect of coal waste powder as filler material in hot mix asphalt. After sampling the coal waste material from a coal washing plant, it was processed to achieve natural coal waste filler. Furthermore, after incinerating the natural coal waste powder at 750 C, the coal waste ash was produced. The main laboratory program consisted of Marshall stability, indirect tensile strength and resilient modulus tests conducted in dry and saturated conditions. Based on the obtained results in comparison to the reference mix (i.e. a mix containing limestone powder) the coal waste and its ash resulted in higher stability and the indirect tensile strength values increase as the coal powder increases in temperature 25 °c . This maximum increase was in 1% of coal powder (2225 kpa) and the lowest value in 4% coal. On the other wise , in temperature 40 ° c ,the value of indirect tensile strength began in max value (500kpa) and increased to 300 kpa in 4% coal .there are clear difference in the value of IDT between two temperatures test .

The results of the mechanical tests indicated that the use of coal waste powder and especially its ash improved the performance of HMA compared to limestone and zeolite. Furthermore, the use of the coal waste ash resulted in nearly similar mechanical properties to ordinary Portland cement. Finally, it can be concluded that, the use of coal waste powder as filler in HMA not only leads to desired mechanical properties, but also reduces the volume of the pollutants waste in environment.

اسم الطالب : البشير محمد سنان عبد الحق

الرابع (د) اشراف:م.هديل خالد

The Influence of Using Adhesive Cement as a Partial Replacement of Cement on Some Properties of Reactive Powder Concrete Exposed to External Sulfate Attack

Abstract

Reactive powder concrete is a new cementitious material. The composition of reactive powder concrete is Portland cement, very low water-to cement ratio, a high dosage of super plasticizer and the presence of very fine crushed quartz and silica fume. Reactive powder concrete is coarse aggregate free. Excessive amount of sulphates in soil or water can attack and destroy a concrete that is not properly designed. The main objective is to study the Influence of Using Adhesive Cement as a Partial Replacement of Cement by (0, 20 and 40) % on some properties like Length change and compressive strength of Reactive Powder Concrete Exposed to External Sulfate Attack. The experimental work included of casting and testing of 36 concrete cubes and 36 prism, the where fully immersed in ground water solution with sulfate $CaSO_4$ =10000 ppm and Mg SO_4=10000 ppm (severe external sulphate attack). The results showed that the compressive strength development continuously increases when using 20% Adhesive Cement as a Partial Replacement of Cement by about 7.6% at 28 day compared with the reference mix IA1 (0%) , but this augmentation decreased when using 40% Adhesive Cement as a Partial Replacement of Cement less than the reference mix IA1 (0%) . The percentage of length change for specimens exposed to external sulfate attack showed better behavior when using 20% adhesive cement as partial Replacement of Cement.

اسم الطالب: منتظر خالد كاظم

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Effect of Using Adhesive Cement as a Partial Replacement of Cement on some properties of Reactive Powder Concrete Exposed to Internal Sulphate Attack

Abstract

Contamination of aggregates with sulfate salts (especially gypsum) is a major problem in Middle East concrete construction. Fine aggregate has more detrimental effect due to its large surface area (fineness). An experimental work had carried out to investigate the effect of using adhesive cement as a partial replacement of cement on some properties of Reactive Powder Concrete exposed to internal sulphate attack. The percentage of (1%) sulfate contents in fine aggregate and the percentage of adhesive cement (0, 20 and 40) % as a partial replacement of cement were studied. Teasing program included the length change and compressive strength testes. 36 concrete cubes and 36 prisms were casted throughout this program. The test period was extended to 60 days. The percentage increase in compressive strength is higher at later ages because of the harmful effect of internal sulfate was obvious in early ages of curing. The results showed that the compressive strength development increases when using 20% Adhesive Cement as a Partial Replacement of Cement by about 22.38% at 28 day , but this resultes decreased when using 40% Adhesive Cement as a Partial Replacement of Cement but still higher than the mix with 0% adhesive cement . The length change of the specimens exposed to internal sulfate attack was higher in earlier ages of curing for all mixes and it showed better behavior when using 20% adhesive cement as a partial Replacement of Cement and it is the proverbial percent used.