**Ministry of Higher Education**

**& Scientific Research**

**Diyala University**

**College of Engineering**

**Department of Civil Engineering**

**Simulation and Analysis of Slope Stability using PLAXIS 2D Program**

**A project**

Submitted to the Department of Civil Engineering

University of Diyala/ College of Engineering as a partial Fulfillment Requirement for the (B.SC)

Degree in Civil Engineering

**By**

Maha Qais Sadoon

Noor Qassim Hameed

Naba Salah Hasan

**Supervised by**

Dr. JASSIM M. ABBASS AL-SHAMMARY

*Doctor in Geotechnical Engineering*

2011 - 2012

**بسم الله الرحمن الرحيم**

**(( قل كل يعمل على شاكلته فربكم اعلم بمن هو أهدى سبيلا 84 ويسألونك عن الروح قل الروح من أمر ربي ومآ أوتيتم من العلم إلا قليلاً 85 ))**

**صدق الله العظيم**

**سورة الإسراء**

شكر وتقدير....

بالغ الامتنان والتقدير أتقدم الى أساتذتي الكبار الذين غرسوا فينا قيم العلم وسقوا مقاصد الفضيلة والأخلاق النبيلة وشدوا أسس القيم العليا التي تكفل تقدم واحترام شعبنا النبيل ....

فبمداد الفخر والاعتزاز اكتب خالص شكري وتقديري لأساتذة قسم الهندسة المدنية واخص بعبارات التقدير العالي للرعاية الخاصة التي قدمها الدكتور جاسم محمد. عباس فلا يسعنا إلا ان نتقدم له بأسمى معاني الامتنان والعرفان .

فله كل الإجلال والاحترام وادعوا إلى أن يحفظ الله الجميع لما فيه الخير والسداد.

مها, نبأ ونور

**Certification Supervisor**

We certify that we have read the project entitled" **Simulation** **and Analysis of Slope Stability using PLAXIS 2D Program**", was prepared under my supervision at the civil engineering department/college of engineering by: Maha Qassim, Naba salah and noor qais as a partial fulfillment of the requirement for the degree of B.Sc. Civil Engineering. .

Signature:

Name:

Title:

Date:

In view of available recommendations, I forward this project for debate by examining committee.

Signature:

Name:

Title:

(Head of the department)

Date:

**Certification Of The Examining Committee**

We certify that we have read the project titled " **Simulation** **and Analysis of Slope Stability using PLAXIS 2D Program** " , and as Examining Committee , examined the student in its content and in what is concerned with it , and that in our opinion it meets the standards of a project for the degree of B.SC in Computer Science.

Signature: Signature :

Name : Name :

Title: Title:

( Member ) (Member )

Date : / / 2012 Date : / / 2012

Signature:

Name :

(Chairman )

Date : / / 2012

Approved for Civil Engineering Department

Signature :

Name:

( Supervisor )

Date : / / 2012

الإهداء

إلى من علمنـــي مـالا أعلــــــم ...إلى من ملَكنــــي مـــا لا املـــــك إلى رب العـــــزة جـل جلالــــه

إلى معلم الإنسانية والقدوة المصطفى حبيب رب العالمين ورسوله محمد ( صلى الله عليه وآلــه وسلــــم )

إلى القمــر الــذي أنــــار لــي دربــي وأرشدني إلى طـــريق الصواب ... إلى والــــــــدي

إلى الشمعــة التي تحرق نفسها لأجــل أن تضـــئ لــي فــــي ظلمــات الليـل ... إلى والـدتي

إلى مـــن كنت لهــم شعلــة أمـــل في حيـــاتهم ... أخوتــي وأخواتــي

إلى كـــل ذرات التــــراب ... والــى جبــال بلادي والهضـاب ... إلى وطني العزيز

إلى كـل من مرَ في حياتي وتــرك بصمة حــب ونبضـــة قلــب ...أهـــدي ثمرة جهدي هذا ...

مها, نبأ ونور.

Acknowledgment

We would like to thank Dr Jassim M. Abbas head of our work, for all his effort criticizing suggestion, time and patience in helping us to complete this work.

This work would not be possible without his guidance and encouragement.

Also we would like to thank other members of the Civil Engineering Department in our College for their encouragement and help.

Finally, we would like to take the opportunity to thank our families for support and care.

Maha, naba and noor.

**ABSTRACT**

Stability analyses are routinely performed in order to assess the safe and functional design of an excavated slope (e.g. open pit mining, road cuts, etc.), and/or the equilibrium conditions of a natural slope. It has been a subject of interest to many earlier researchers. The analysis technique chosen depends on both soil characteristics and its conditions and the potential mode of failure. Analysis was made for structures with different slope for both cohesion and cohesion less soil.

Two-dimensional finite element approach has been used to simulate the whole geotechnical system using PLAXIS 2D Foundation software. The finite element was includes mohr-coloumb to model the soil.

This project presents a review of numerical techniques used in slope stability analysis emphasizing recent developments in numerical modeling.

This study illustrated that the factor of safety in the structure of slope case decreased while the slope was increasing for both types of soils. In addition, the displacement in the points when the section is change (in the critical zone) is increasing when the slope is increasing.