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AFGHANISTAN

ENGINEERING SUPPORT PROGRAM

WO-LT-0042

Afghan Woman Internship Program
2013 Academic Year Final Report

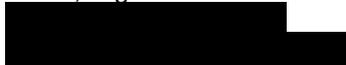
May 7, 2014

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AFGHANISTAN ENGINEERING SUPPORT PROGRAM

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DISCLAIMER

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EXECUTIVE SUMMARY

Tetra Tech's (Tt) Afghanistan Engineering Support Program (AESP) provides opportunities for female students enrolled in engineering, architecture, and related programs through its internship program which begin in the Fall 2011. Engineering, considered a male dominated field in Afghanistan, offers little opportunities for recently graduated female engineers. Tt AESP's internship program provides workplace interaction and training while promoting gender equality and women's empowerment, a focus of USAID's mission in Afghanistan.

At the beginning of the year, female graduates from Kabul University and Kabul Polytechnic University applied for one of four internship positions. Through an interview process, Tt AESP selects the four candidates to participate in Tt AESP's Afghan Women Internship Program. Each year the women selected come from different backgrounds, skill levels, and engineering fields. Throughout the year, the interns spend hours training, learning skills, and interacting in the Tt AESP office environment. Through this process and interaction, the interns learn several valuable lessons and gain real life experiences better equipping them for the future workforce.

Tt AESP's 2013 Afghan Women Internship Program covered three areas. The first, and main focus of the program, was to integrate concepts students learned in their respective engineering programs with practical experience. This was accomplished by providing engineering training programs and engaging in discussions to supplement and expand upon concepts learned in the classroom. The second area encompassed professional development training, such as communication and workplace etiquette. The third area, aimed to contribute to social development outside of the Tt AESP internship program, to promote gender equality and encourage participation of female students in math and science based professions.

This program, which just completed its second year, provided a general engineering internship. The program structure evaluated at the close of the year provided useful input for future engineering internship programs. Several enhancements will be incorporated into the program during the third year. Year three enhancements include:

- Expanding to include students in electrical engineering
- Personalizing the training per the interns' engineering discipline
- Defining specific engineering supervisors to maintain the interns' roles as part of a specialized engineering team
- Scheduling more outreach events to encourage young women in the community to further their education and pursue degrees in math and science
- Associate and align program with other USAID sponsored women internship programs

Year three enhancements will help the internship program grow into an even greater resource for future math and science based internship program.



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1.0 INTRODUCTION

The mission of the Afghan Women Internship Program is to provide opportunities for female students enrolled in engineering, architecture, and related programs at universities in Afghanistan to apply skills and concepts learned in a university environment to “real world” situations. While the program is centered on workplace interaction and training to expand the interns’ capabilities, the overall focus is to promote gender equality and women’s empowerment. The Tt AESP provides the interns with the tools to not just succeed, but also thrive in a male dominated field and culture.

In January 2013, eight female engineering students from Kabul University and Kabul Polytechnic University were interviewed. Four were selected to participate in Tt AESP’s Afghan Women Internship Program, three from Kabul University and one from Kabul Polytechnic University, representing the fields of civil engineering, architecture, and hydrology. They spent three days a week interning for one year, from January 2013 through December 2013. In that time, they worked and trained with a variety of engineers in diverse applied engineering topics. The details of the interns’ training and work experience are described in the sections below.

2.0 INTERNSHIP PROGRAM

Tt AESP’s 2013 Afghan Women Internship Program covered three areas. The first, and main focus of the program, was to integrate concepts students learned in diverse engineering programs with practical experience. This was accomplished by providing engineering training programs and discussions to supplement and expand upon concepts learned in the classroom. The second area encompassed professional development training such as communication and workplace etiquette. The third area, aimed to contribute to social development outside of the Tt AESP internship program, to promote gender equality and encourage participation of female students in math and science based professions.

The main objectives for the interns included:

- Solve realistic engineering planning and design problems
- Become familiar with current codes, standards, and specifications
- Develop skills for interacting with practicing professionals
- Develop skills for interacting with individuals outside of the engineering profession
- Participate in women empowerment programs

As part of the internship requirements, all four interns were asked to write a final summary and evaluation of their experiences in the program. These documents can be found in Appendix A.

2.1 ENGINEERING TRAINING

The female engineering interns in the Tt AESP internship program learned engineering skills and professionalism by working on AESP workorders (WOs), attending training sessions, and shadowing Tt AESP and USAID engineers.

All four interns education was based around the field of civil engineering, therefore, program topics centered on this engineering discipline. Engineering topics covered included:

- Structural Engineering
- Water Resources and Wastewater Treatment
- Transportation Engineering
- Site Design Engineering
- Civil Engineering related to Electrical Engineering

The majority of the work the interns focused on was directly related to AESP WOAs described in Section 2.1.1. In addition to this direct project experience, other training included supplemental workshops, shadowing events with professional engineers, site visits and software training.

2.1.1 Engineering Work

Where possible, the interns were asked to participate in engineering work for various AESP WOAs. Due to the heavy emphasis on electrical work at AESP and the interns' education in civil engineering related fields, only a couple of WOAs had relevant work available. The interns' supported work on WOLT-0070 Tarakhil Power Plant Fire Water Replacement and WOLT-0067 Gardez-Khost Road Design.

On WOLT-0067 Gardez-Khost Road Design, the interns supported the review and submission of the as-built drawings. They learned what to look for in the review of as-built drawings and how to craft the supporting documentation. This WO was ongoing for many months during the internship period, therefore occupied majority of the interns' time.

On WOLT-0070 Tarakhil Plant Fire Water Replacement design, the interns participated on many levels, including site visits to collect data, participation in meeting and design discussions, and performing calculations to examine pipe diameters. One major part the architectural and civil engineering interns participated in was the development and review of the civil and electrical drawings throughout the majority of the latter half of the internship period.

2.1.2 Engineering Documents

A major part of engineering design is development of engineering documents. This was a focus for the interns throughout their internship period, as it is important to any engineering field.

All interns participated in cost estimation and bill of quantity development on many levels. This included training and discussions with Tt AESP engineers, as well as, attending training sessions with USAID engineer, Sayed Torak. This allowed the interns to participate in the development of engineering cost estimate documents, including updating the operations and maintenance manual for Kabul University.

Related to cost development, the interns were asked to participate with procurement documents. This included researching and contacting vendors, specifically for AESP electrical projects.

All interns were expected to improve their technical writing skills. In particular, they participated in the development of general reports for all WOs. In addition, the interns were expected to report on their internship experience in the form of memos and reports. After they developed each document, they were given feedback on report organization and technical writing. All of these documents can be found in the Appendices. They also participated in the development of other miscellaneous documents, such as Tt AESP fire codes.

2.1.3 Workshops

Workshops served as major training component aimed at supplementing the interns' education and experience. Some workshops or trainings were required for all interns, however others were tailored to the interns' personal interests. These varied from in depth, hands-on type workshops to detailed discussions with various engineers on specific topics.

2.1.3.1 Concrete

In April, a concrete workshop was given in three parts: lecture, mixing, and lab testing. A Tt AESP local national engineer and an expatriate senior engineer with experience in concrete led all three workshops. The lecture consisted of concrete mix design, testing standards, and an assignment. Upon completing the assignment, the interns were asked to mix their design and perform cone tests. Their designs set in cylinders for a few days, upon which they took the cylinders to a lab for testing. See Appendix B for the interns' memorandums on the concrete workshop.

2.1.3.2 Soils

In May, a soils workshop was given in two parts: lecture and lab testing. In both parts, the interns' learned about five different soil tests and their application. In the lab, they witnessed the tests being performed by the lab technicians. See Appendix C for the interns' memorandums on the soils workshop.

2.1.3.3 Asphalt

In July, a Tt AESP transportation engineer held an asphalt workshop in one part consisting only of a lecture. This workshop covered asphalt composition and creation, application to road construction and tests to use while building roads. There was no lab portion for this workshop due to safety issues; however, the interns did visit a road construction site as mentioned in 2.1.5 Site visits to examine road construction. See Appendix D for the interns' memorandums on the asphalt workshop.

2.1.3.4 Water Sampling and Testing

A water sampling and testing workshop was given to provide the interns with experience in water and sanitation engineering. Petri film E. coli/ Coliform disks were used and proper sampling technique was taught, including using clean pipets and new gloves for all samples. After sampling, the disks were incubated for 48 hours. The results were counted and reported, and any measures necessary were taken. Water related discussions accompanied this training, including the importance of water purification and the health related consequences of unclean water sources.

2.1.3.5 Water and Wastewater Training

A water and wastewater treatment design workshop was given by an expatriate wastewater specialist. Although there was no hands-on training component to this workshop, the interns were encouraged to research and ask questions about these topics.

2.1.3.6 Transportation - Geometric Design of Highways

A Tt AESP local national transportation engineer, who also lead the asphalt workshop, gave a transportation workshop to the interns. The focus of this workshop was designing highways. As with the water and wastewater training, the interns were asked to research more and ask questions.

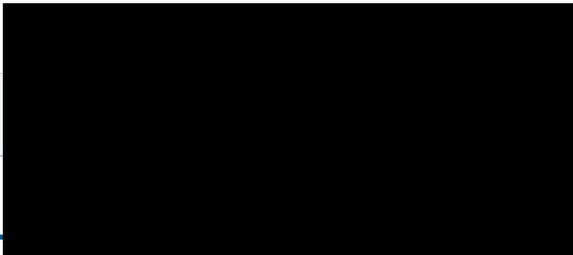
2.1.3.7 Project Management Professionals Training Sessions

Tt AESP local national Technical Services Manager held Project Management Professional(PMP) training for all of the Tt AESP staff, including the interns. This training included a basic overview of all the concepts required to obtain a PMP certificate, study resources, and the significance of obtaining this internationally recognized certification.

2.1.4 Shadowing

All four interns visited USAID to shadow engineers and learn about current USAID projects, plans and staff. They met with several engineers (Table 1) and held discussions about ongoing USAID projects. They also attended meetings to improve their communication skills by interacting with other professional engineers from USAID and associated organizations. During the final shadowing event in June, engineers in more specific fields based on the interns' interests were identified for shadowing. The interns collaborated in pairs on memorandums summarizing their experiences. These documents may be found in Appendix E.

Table 1. USAID Shadowing Details

Dates Visited	USAID Shadowed Engineers
February 12, 2013	
May 14, 2013	
June 18, 2013	

2.1.5 Site Visits

Three types of site visits took place during the internship period. The most important site visits took place at the USAID and US Embassy construction sites for new Embassy housing and offices. These were led by USAID construction engineers and occurred over a fourmonth period to demonstrate different stages of the construction process to the interns. See Appendix F for summaries of these shadowing events.

Another major site visit was to Chelstoon Road managed by the Ministry of Urban Development. An expatriate transportation and construction engineer led the site visit, which

covered pavement design and road construction processes. This was an important application for the asphalt workshop that took place.

The final site that was visited was Tarakhil Power Plant. The interns accompanied both local national and expatriate engineers to the site to collect data for the Tarakhil Power Plant Water Piping System replacement design.

Table 2, below summarizes the site visits offered to the interns during the year.

Table 2. Site Visit Details

Sites	Applicable Engineering Disciplines	Dates
USAID/US Embassy Construction Sites	Structural, Civil, Architectural Engineering	May 4, 2013
Municipality Chelstoon Road Construction	Transportation, Civil Engineering	June 6, 2013
USAID/US Embassy Construction Sites	Structural, Civil, Architectural Engineering	June 29, 2013
USAID/US Embassy Construction Sites	Structural, Civil, Architectural Engineering	September 26, 2013
Tarakhil Power Plant	Civil, Electrical Engineering	Various

2.1.6 Software

Software training was provided to the interns through their work on AESP WOs and during specific training programs offered to the interns. Basic and advanced tutorials for AutoCAD Civil 3D 2010 were provided, which included work on reinforced concrete structures, electrical drawings, pipeline design, as well as intermediate projects designed to cover broader design topics and practice learned skills. Advanced work was provided for the interested interns, who participated on a deeper level with the WO AutoCAD design. The interns learned both Tt AESP and USAID AutoCAD standards.

Other software training included ETABS and STAAD Pro, common structural engineering design software used in Afghanistan. This training included the design of a reinforced concrete structure of a multi-story building to an applied project.

ArcGIS training was provided to all interns for two to three hours a week over a month. The training included basic introduction to GIS applications and assignments to practice those applications. Some interns took a greater interest in GIS and pursued more involved projects.

All common Microsoft Office programs, such as Excel, Word, PowerPoint, were used throughout the internship period, with special emphasis on Excel as a tool for structural design aid and other minor applications.

Table 3 summarizes the software program training offered to the interns.

Table 3. Software Training Details

Software	Applicable Engineering Disciplines	Training Level
AutoCAD Civil 3D	Transportation, Architectural Structural, and Electrical	Intermediate to Advanced
ETABS	Structural	Intermediate
STAAD Pro	Structural	Beginner
ArcGIS	Urban Planning/Mapping	Beginner
Microsoft Excel	All fields	Beginner to Intermediate

2.2 PROFESSIONAL TRAINING

Throughout the internship period, the interns were continually exposed to common workplace etiquette beyond typical engineering tasks. This training included topics in communication and professional development.

2.2.1 Communication

Communication is an important aspect in all business settings and is oftentimes not emphasized as strongly in science related fields. It is, however, just as important to include communication as part of any workplace learning experience. Tasks covered under communication included:

- USAID document preparation
- Document control, including filing procedures and structures
- Technical writing (memos, reports, emails)
- Meetings; including etiquette, preparation, and minutes
- Presentations, public speaking, and Microsoft PowerPoint design
- Tracking lists for procurement or other Tt AESP operations
- Periodic reports, such as daily or quarterly reporting
- Proper transfer of official documents
- Quality assurance (QA) of engineering documents, including process and protocol

2.2.2 Professional Development

Upon nearing the end of their internship period, emphasis was placed on skills useful for post internship and graduation employment. These workshops covered:

- Resume review
- Cover letter discussions
- Interview etiquette

The resume workshop included resume structure, examples, and discussions on how to appeal to different types of jobs, and the interaction between the cover letter and resume. Each

intern had a chance to discuss their personal resumes for improvement and present revisions for professional review. Following this, professional interviews were covered, which included actual interviews and individual feedback from the interviewers.

2.3 GENDER INITIATIVE COMPONENTS

The internship program itself is part of USAID's gender empowerment initiative. However, within the internship program, the interns participated in gender empowerment tasks to expand their personal development.

In an effort to expand the visibility of the internship program, a networking event, Women in Engineering, was held in April in Kabul. . The purpose of the event was to bring engineering and construction businesses owned by women, student engineers, and engineering firms seeking female technical employees, together to share information. Applicants previously not selected for the Afghan Women Internship Program and students too young to qualify for the program were invited to attend, as well as, members of the Society of Afghan Women in Engineering and Construction (SAWEC), USAID, and other consulting firms. All attendees shared the need and desire for young women in enter into technical professions.

Lastly, as part of the promotion of this program and women empowerment in Afghanistan, USAID asked the interns to participate in filming a promotional video. All four interns attended this event, which was filmed at the USAID/US Embassy construction sites where the interns' had been learning from USAID engineers during their internship with AESP.

3.0 SUMMARY AND ANALYSIS

Tt AESP 2013 Afghan Women Internship Program covered many engineering workplace topics crucial to the development of the young female engineers' careers. Topics included basic workplace tasks such as technical writing, engineering design, document control, engineering calculations, and training in common engineering software. Experience provided by the program also included lessons in more specific engineering topics, such as wastewater treatment, transportation engineering, and construction site visits, as well as shadowing experienced engineers from a variety of backgrounds.

This program structure is a basis to build a general engineering internship useful for future engineering internship program development. However, several enhancements will be incorporated into the program as it enters into its third year . Year three enhancements include:

- Expanding to include students in electrical engineering
- Personalizing the training per the interns' discipline
- Defining specific engineering supervisors to maintain the interns' roles as part of a specific engineering team
- Scheduling more outreach events to encourage young women in the community to further their education and pursue degrees in math and science
- Associate and align program with other USAID sponsored women internship programs

Year three enhancements will help the internship program grow into an even greater resource to advance the education and careers of young women in Afghanistan.

APPENDICES

APPENDIX A
INTERN 2013 FINAL REPORTS



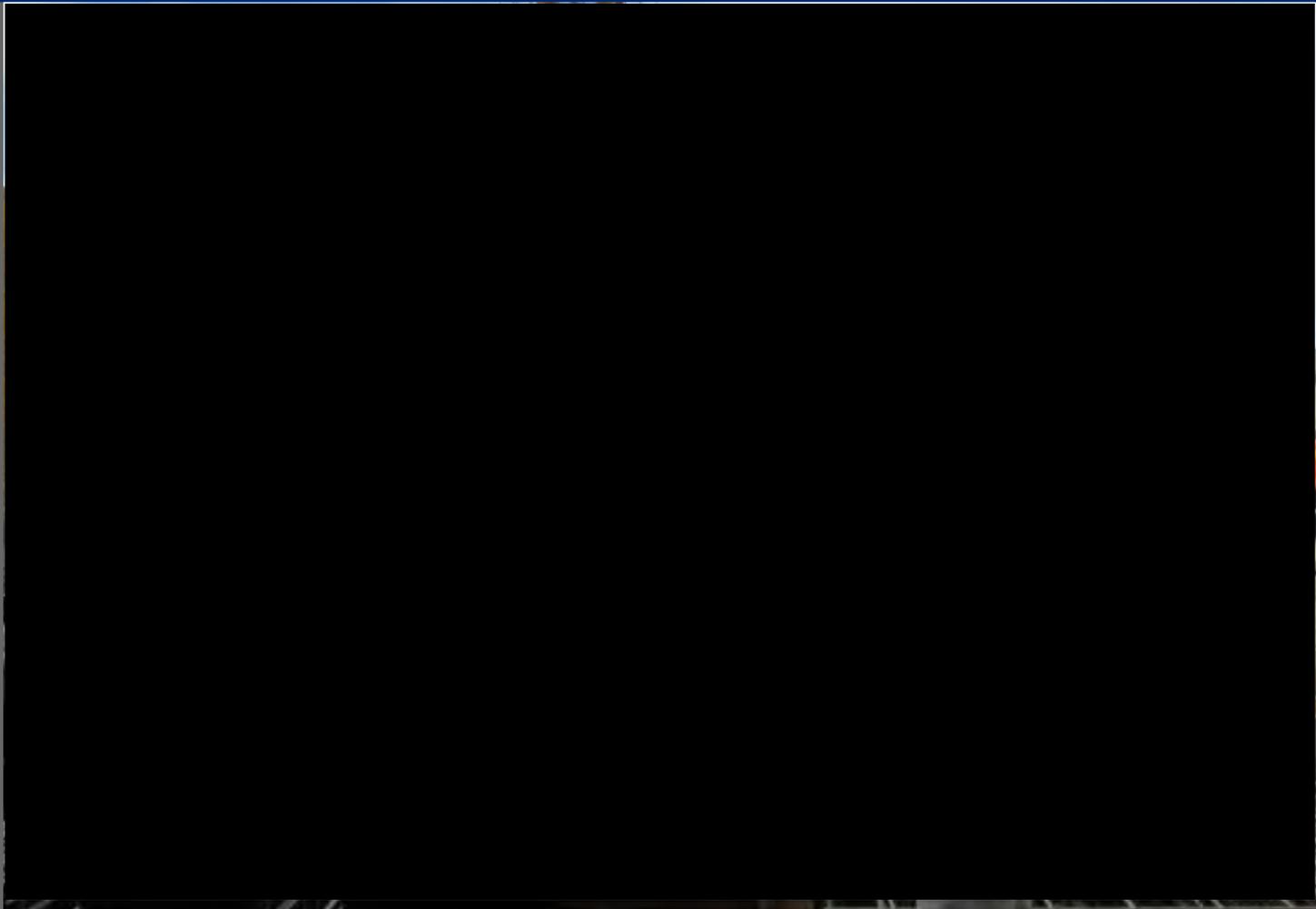
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ENGINEERING SUPPORT PROGRAM

WOLT-0042

Afghan Women Internship Program

[REDACTED] - 2013 Final Report



January 14, 2014

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AFGHANISTAN ENGINEERING SUPPORT PROGRAM

WO-LT-0042

AFGHAN WOMEN INTERNSHIP PROGRAM
2013 FINAL REPORT



JANUARY 12, 2013 - JANUARY 12, 2014

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Prepared for:



Prepared By:
Tetra Tech, Inc.
Afghanistan Engineering Support Program

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1.0 INTRODUCTION

Internships help fill a gap that exists between engineering in the classroom and engineering in the real world. I fortunately got this opportunity from Tetra Tech (Tt). My internship period was very helpful for me to build up my professional career and experience real world engineering outside of the classroom. My internship period started 12 January 2013 and ended 16 January 2014. In this report I will give a brief overview of my internship period with Tetra Tech's (Tt) Afghanistan Engineering Support Program (AESP).

2.0 ACTIVITIES

Some of the main activities I did during this internship program which was really useful and interesting to me are listed below:

- WO-A-0090 Tarakhil PP Fire Suppression Component Analysis: I did all calculations for the system to check its efficiency and for different pipe diameters
- Update Fire Codes
- WOLT0076: I draft the 1st quarterly report for this work order
- WOLT0067: With assistance from [REDACTED] I worked on Gardez Khost Road as-built drawings
- Tt's Health and Safety Plan: [REDACTED] asked me to work on the building drawings and make necessary changes
- Purchase Request Tracking: I worked on a purchase request tracking list
- WO-LT-0074: Annual Road OM Cost Budget
- Daily reports and the contractor schedule updated for MIS Manager, [REDACTED]
- WO-A-0090 Tarakhil PP Fire Suppression Component Analysis: I formatted the Tarakhil Specifications
- WO-LT-0009 AMD 6 RC East: I worked on a spreadsheet for this work order
- Print electrical files: Labeled them and bound for MIS Manager, [REDACTED]

Communication is an important aspect in all business settings and is often times not emphasized as strongly in science related fields. It is however, just as important to include communication as part of any workplace learning experience which I did. Tasks covered under communication included:

- USAID document preparation
- Document control: including filing procedures and structures
- Technical writing (memos, reports, emails)
- Meetings: including etiquette, preparation, and minutes
- Presentations: public speaking, and Microsoft PowerPoint design

Upon nearing the end of my internship period, emphasis was placed on skills useful for post internship and graduation employment. These workshops covered:

- Resume review
- Cover letter discussions
- Interview etiquette

3.0 TRAININGS

During my internship on the Tt AESP I learned engineering skills through training sessions that were provided for us.

The main training sessions I received are listed below.

Concrete training: One of my expectations from this internship is to get experience with practical work. The concrete activity was one of the best things we did. The training provided for us, consisted of three sessions on three separate days. They were a concrete lecture, a concrete activity at the villa, and concrete lab, each described below.

- **Soil training:** As a civil engineering student, soil is an important topic. The soil training organized by Tt office was very efficient. We learned several theories plus practical work in this training. Our training was designed in two sessions, a soil lecture on May 21, 2013 and a soil lab on May 23, 2013.
- **Asphalt training:** The asphalt training was very informative and useful. I had no previous background in the topics covered in this lecture. The lecture provided information on the following topics:
 - a. Content of asphalt mixture
 - b. Procedure for producing asphalt in the plant
 - c. Application and use of different types of asphalt in road construction
 - d. Essential tests related to asphalt paving site inspection with purpose and procedure
- The training prepared for us on October 24 (half day) and October 31 (full day) by [REDACTED] was very technical and practical. He was very prepared and willing to share all his knowledge and information. The topics he discussed in detail were construction cost estimation, preparation of BOQ and preparation of work plan. First he explained the importance, usage and application of these terms in construction projects. Then he discussed his work in great detail on estimation of resources, materials and cost of a designed project which help us in understanding the whole concept.

All common Microsoft Office programs, such as Excel, Word, PowerPoint, were used throughout my internship period.

- The first software training offered to us was intermediate level AutoCAD 2010. This software is very necessary for a civil engineer and the training provided for us was sufficient to prepare any type of drawing. Each week we had two session of AutoCAD. We individually worked on many structural and architectural projects from start to final print out. We finished this training successfully in a month and I'm now able to prepare a drawing according to AutoCAD professional standards and Tt standards.
- The second training was basic introduction to ETABS.

- The last training was GIS software. We had this training for a month and learn the basics of GIS. The training included lessons, practical application and practicing.

We are provided online training once a week in Microsoft Office software by Tt through Simon Sez website. Software trainings that I completed include MS Project and Advanced Excel techniques.

4.0 SITE VISIT AND USAID SHADOWING:

Shadowing was a completely new experience for me and each shadowing experience was specialized for a new topic. In total we did three shadowing trainings.

Our internship program offered us many valuable skills and work experience that we really enjoy. One of these experiences was our first visit to USAID to shadow the experienced engineers. Shadowing the USAID engineers every minute, we learned and experienced something new and interesting.

Our second visit to USAID to shadow was more interesting. During our first session on February 12, we had suggested that there be more emphasis on technical trainings. Thankfully, the main focus of this shadowing was on engineering and technical topics.

We spent the majority of our time with [REDACTED]
[REDACTED] talked about the following topics:

- Cost estimation, preparation of a BOQ with a practical example of a retaining wall
- How to prepare and organize a project work plan.

On June 18 we experienced the third shadowing, this time it was focused on water resource and hydrology topics. We had an appointment with [REDACTED], Hydrologist, PhD, and water resource specialist from the Office of Economic Growth and Infrastructure (OEGI) at USAID.

Three site visits took place during the internship period. We received an opportunity for three visits to USAID and US Embassy construction site.

We are fortunate to have received an opportunity to experience our first site visit at the biggest construction site in Kabul City. For us, the purpose of this site visit was to gain a better sense of engineering and construction field at work. This construction site was quite different than the typical constructions site in Kabul City and those which we have seen before. The construction site was according to the international standard. At the Embassy site construction they were using the latest civil engineering technologies.

During these site visits I saw the engineering terms I learned in theory, saw them in the practical world, and also saw new methods of technology in the engineering profession.

My visits to these sites were informative and offered a unique experience. I appreciate the help and the expertise provided about our profession.



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Afghan Women Internship Program

[REDACTED] - 2013 Final Report

January 16, 2014

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AFGHAN WOMEN INTERNSHIP PROGRAM
2013

FINAL REPORT



JANUARY 16, 2013 TO JANUARY 16, 2014

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1.0 Introduction

The Afghan Women Internship Program at Tetra Tech (Tt) provides an excellent opportunity for female engineering students in Afghanistan. Projects during the internship can vary and often causes confusion for students. However, the internship program provides a work experience where students set clear learning objectives that connect course content to real world employment. Interns build professional skills and networks. Interns in the program have personal computers, specific work space, expert engineers for mentorship, professional working environment, and several bookshelves with many useful engineering books. The Afghan Women Internship Program is a beneficial project of Tt that helps Afghan women engineers in all engineering fields. The main goal of this program is to increase the female engineer students' engineering communication, and provide real job skills knowledge. During this internship program we had several trainings which improved my engineering, communication, skills, and knowledge.

2.0 Activities

My learning objectives and activities are as follows:

- In the transportation department I learned geometric design of highways in detail.
- References, standards, and specifications of various engineering departments were introduced.
- Introduction to some electrical projects and participation in electrical discussions.
- Comparison of the English and Dari versions of the Kabul University project operation and maintenance manual. Listed discrepancies found throughout the manuals. Provided feedback after reviewing AutoCAD drawings.
- Helped provide vendors for the electrical department.
- Participating in Afghan Women Olympic 2013 Competition: It was a competitive match between Afghan women and expatriates of the Tt office. Both the Afghan women and expatriate women provided insight into different skills. Our team placed first.
- Providing spreadsheets for RC North Project Evaluation.
- Provided PDF folders for each of the roads in support of the Annual Road OM Cost Budgets.
- Prepared fire codes various projects.

3.0 Trainings

We had various trainings during our three months. We trained in engineering software such as AutoCAD (2D) and ETABS with [REDACTED], Tt Structural Engineer.

Tt had two sessions of project management presented by [REDACTED], Tt's Technical Services Manager. The training provided information on controlling a project and certification of a project.

Software training consisted of AutoCAD; Civil 3D, ETABS, GIS. Tt provided online trainings. The interns participated in training in Microsoft Office, Microsoft Project, and Microsoft Excel.

Soil training: The soil lecture, on May 21 in the Tt office, was presented by engineer Ali Jan which was beneficial for all interns. On May 23 the interns went to Imran Soil Laboratory for hands-on-learning. The interns discussed the following:

- Sieve analysis
- Atterberg limit
- Sand cone method
- Standard proctor test
- Modified proctor test

Interns were invited to attend asphalt training, objectives of this training were as follows:

- What is asphalt and what it is used for?
- Useful tests related to asphalt
- Usage of AASHTO T 166-Bulk specific gravity of compacted asphalt mixtures

Interns participated in a training workshop which provided interview skills for future employment.

4.0 Site Visits and Shadowing

The site visit was really interesting for me when we visited USAID and saw all the construction that was around the USAID compound. Site visits have added incredible experience to our career pertaining to actual construction. I found these site visits very useful and interesting as they have enabled me to see the theory being put into practice and gain invaluable knowledge. We were able to inspect the usage of material in different parts of buildings and learned about the design of columns, slabs, stirrups, and why we use them in the column.

During this period of internship we conducted two site visits.

Road Construction Site Visit: Chelston Road was in construction during our visit. We met municipality staff and had a great discussion with them. This site visit helped me to understand about pavement and how to design it. The site visit also taught me about subgrade, sub base, compaction, materials process concept and layers. Engineer [REDACTED] expatriate Afghan was our instructor.

US Embassy and USAID Site Visit: [REDACTED], the project manager, reviewed drawings with us. He described the progress of work for the architectural and civil drawings. Some of the concepts delivered included, studs, piles, beam design, waterproofing, installation, and foundation lying.

USAID Shadowing: On February 12, 2013 the interns visited USAID to shadow USAID engineers learning about current projects and ongoing work.

5.0 Recommendations

- Interns should be more involved with Tetra Tech projects and be provided with some responsibilities to work on
- Training in cost estimation
- Send interns to training courses
- More site visits
- Being prepared to understand the scope of site visit to be more confident on our work
- Priority should be given to engineering software trainings
- Preparing a schedule for our engineering software trainings on Primavera and MS Project
- Schedule the shadowing and site visit according to the interns school schedule
- Training in wastewater by an expert of that field
- Site visit in different field
- More lab opportunity according to our trainings

6.0 Acknowledgement

The Afghan Women Internship Program is a very beneficial project of Tt and can help Afghan Women Engineers in all engineering and other fields. I am thankful of USAID and all of the staff of Tt for encouraging the interns to improve our engineering communication, skills, and knowledge. I am thankful of the following people for their support, encouragement, and guidance during my internship:

[REDACTED] Civil Engineer, Tetra Tech

[REDACTED], Structural Engineer, Tetra Tech

[REDACTED] for providing us assignments, trainings, and lab facilities

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ENGINEERING SUPPORT PROGRAM

WO-LT-0042

Afghan Women Internship Program

[REDACTED] - 2013 FINAL REPORT

January 15, 2014

This publication was produced for review by the United States Agency for International Development. It was prepared by Tetra Tech, Inc.

AFGHANISTAN ENGINEERING SUPPORT PROGRAM

WOLT-0042

AFGHAN WOMEN INTERNSHIP PROGRAM
2013 FINAL REPORT



January 12, 2013 –January 12, 2014

DISCLAIMER

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.



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1.0 INTRODUCTION

I participated in the Afghan Women Internship Program from January 2013 to January 2014 that was funded by USAID and implemented by Tetra Tech (Tt). Various types of tasks from engineering to general skills that were accomplished are listed and discussed in this paper. Some suggestion and recommendations are also added in this report to improve the future internship programs.

An Internship is engaging students in service activities primarily for providing them with hands-on experience that enhances their learning or understanding of issues relevant to a particular area of study. An internship program also contributes significantly and positively towards enhancing the knowledge base and motivational level of students. Benefits include improvements in career-related direction, improved marketability of graduates, job expectations, interpersonal skills, leadership, etc. I can describe an internship as a bridge between the theory of the classroom and the world of practice.

The Afghan Women Internship Program of Tt provides a good opportunity for female students in engineering faculties in Afghanistan. We had personal computers, a nice working space, expertise engineers around us, professional working environment, and several book shelves with many useful engineering books in our office. The prepared facilities were great. The main goals of this program are to increase the female engineer students' engineering, communication, and real job skills and knowledge.

During this internship program we had several trainings which improved my engineering, communication, and other general skills and knowledge. Those trainings helped me with my school projects very well and also will help me in my future engineering career. We had some training on general topics like presentation skills, public speaking, communication skills, resume writing, and interview skills. Other very important types of trainings I had during my internship are engineering software trainings, like AutoCAD, GIS and MS office. They are very useful, necessary, and important software for any civil engineering students to learn and help in both their school projects and their future career. It is a very effective program for interns because their skills on the mentioned trainings will be improved side by side with the load of their school studying so that when they graduate they have enough experience and skills to work as a civil engineer. The Afghan Women Internship Program was a successful program. I am so thankful to USAID for funding and Tt for implementing this program. Tt provided the necessary facilities, and meaningful opportunities for work experiences to the engineering students. This program is a route for the young engineers' to grow and encourages them to pursue more education and work experiences.

I hope the details and suggestion in this report will be helpful for the next internship program. I also hope this successful internship program will encourage other engineering companies and organizations to join in providing meaningful work experiences to engineering students.

2.0 ACTIVITIES

I worked independently and sometimes as part of a team. I participated in a series of small projects, several trainings, construction site visits, and meetings. Becoming familiar with the engineering working environment is the most valuable skill that I gained during my internship in Tt. Working and participating in a real engineering project was my first goal

when I enrolled in this internship program. It is necessary for engineer interns to join a real project with specific tasks assigned to them. This is a skill that could not be obtained through classroom teaching. Working for Tt and attending several meetings had many advantages. It improved my communication skills and also familiarized me with a professional engineering working place. This helps interns to build confidence, experience and maturity. Other advantages interns benefit from include experiences and knowledge of from expert engineers. Interns will be prepared for work in other offices and build communications to interact with different people.

Participated Projects:

- Trainings
- Construction Site Visits
- Water & Waste Water Engineering
- Communication Skills
- Computer Programs Trainings
- AutoCAD
- GIS
- Microsoft Office Programs
- General Trainings
- General Skills

3.0 TRAINING

- Introducing Tt roles
- Internet usage
- Being on time
- Payments for interns
- Tour of Tetra Tech
- Introduction with the staff
- Orientation to the office environment
- Increasing communication skills
- To find someone who really can help with my field of studying
- Filing systems
- Projects introduction
- File locations
- Codes
- Standards
- Tt guides were sufficiently cooperative
- AutoCAD training, including basic roles of AutoCAD
- GPS usage, how to use it, where and what projects to use it on
- Assignment of GPS usage
- CAD standards
- Water testing to include, testing water in the Tt Villa
- Microsoft programs
- Concrete training, quality, slump testing, cylinders, and lab testing
- Soil training; California Bearing Ratio (CBR), proctor testing, Sieve analysis, Altenburg limits, Sand cone method and lab testing

- Asphalt training with a site visit
- Presentation training, preparing power point presentations, practicing oral and written communications
- Women's Kabul Olympics, encouraged to participate in sports to build team building skills, build communication between Afghan women and expats
- Resume writing and interview skills
- GIS training

4.0 SITE VISIT AND SHADOWING

American Embassy new building (construction project)

- First site visit (introduction) and being familiar with drawings
- Second visit was all about how they are working, how many workers, when they will finish the project, how will they connect all three buildings with each other, installing elevators and the quality of the materials
- Third visit was our last. We shared all our knowledge from the projects with experts and we gained more experience from viewing the projects and their answering our questions.

Site Visiting was useful for all of us as and the intern's thank Tt and USAID.

Site Visit (Chelsetoon Road)

After asphalt training, we had a road visit. We met some Afghan engineers who were working on that road, talked with them and they shared their experience.

The site visits are a necessary experience and good opportunity for interns to visit other working environments outside of school and the office. The site visits are beneficial for interns in many ways. The interns see what is happening and watch progression in the site, what the onsite challenges are for engineers, and how they face those challenges. This gives the interns a chance to ask and have answers to their questions from expert engineers on site. Interns will also have a better understanding of their school subject from a more practical aspect. It will be clearer for them on how to apply their engineering knowledge and skills in the field and what skills may need improvement. I had some construction site visits in different engineering fields during the internship period with Tt. One of the most interesting and effective site visits was observing the road construction process and US Embassy construction project. The first meeting was related to my field of study and it was very useful for me. I did learn a lot.

5.0 RECOMMENDATIONS

- More interaction with different staff of Tt
- More involved in monthly or weekly meetings
- Monthly report from interns
- More scheduled program for trainings
- Better scheduling of engineering software training based on the interns' school subjects



- Assignment to complete after finishing each software training
- More assigned tasks related to the trainings
- Better to have some architect expertise trainer on AutoCAD training
- More training on English writing skills
- Work more on reviewing submittals
- Have more assigned tasks
- Be more involved in Tt projects
- Have some real job on designing, reviewing submittals, etc.
- Have more site visits
- Work on some water supply, transportation, wastewater, etc. subjects
- Ask for interns' suggestions in their monthly report to improve the internship program and know the interns' needs
- Have various role position in office

6.0 ACKNOWLEDGEMENTS

This internship program could not have been a success without the vital contributions, assistance, support, and knowledge of some of the Tetra Tech staff during the internship. Many thanks to the following persons for their support, encouragement, and guidance during my internship:

██████████, Civil Engineer, Tetra Tech

██████████ Structural Engineer, Tetra Tech

██████████ P.E, Water/ Sanitation Sector Lead, Tetra Tech

Transportation ██████████

Transportation ██████████

Transportation ██████████

Transportation ██████████

Electrical Engineer ██████████

MIS Manage ██████████

GIS Engineer ██████████



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ENGINEERING SUPPORT PROGRAM

WO-LT-0042

Afghan Women Internship Program

[REDACTED] - 2013 Final Report

January 10, 2014

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AFGHANISTAN ENGINEERING SUPPORT PROGRAM

WO-LT-0042

AFGHAN WOMEN INTERNSHIP PROGRAM
2013 FINAL REPORT



JANUARY 12, 2013 – JANUARY 12, 2014

DISCLAIMER

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1.0 INTRODUCTION

The women internship program, funded by USAID, conducted at Tetra Tech (Tt) is a useful and helpful program for female engineers in Afghanistan. The internship provides practical training experience under supervision for professional careers, allowing students the opportunity to sharpen their skills, gain experience, and apply those classroom skills to projects in a professional setting.

Interns participating in the program with Tt, gain experience and learn beneficial engineering issues, team work, office communication skills, working in an engineering environment, administrative rules and more importantly strength and self-confidence. Interns are experienced software trainings, site visits, shadowing in USAID and construction materials workshops. Interns are provided computers, Outlook email address, and mentorship from expert engineers, educational books and other resources.

2.0 ACTIVITIES

When I was at school I just wished all the time to join with an international organization to learn and to work according to standards. Fortunately I find this opportunity to join with Tt in fourth class.

I worked individually and sometimes as a team member. In last two months I was independently involve in performing tasks. It was a great job experience for me. I participated in several projects, worked in CAD on drawings for the projects, provided reports, provided bill of quantity and estimation for the project and reviewed the maps and as-built drawings.

I had some software and construction materials trainings, worked on standard CAD, attended site visits and USAID shadowing. Project titles I worked on include:

- Tarakhail Power Plant (CAD work and standards checking)
- Review of as-built drawings of GK Road
- Fuel delivery report for Tetra Tech heating system and generators
- Attending weekly and other working meetings
- Preparing of Bill of Quantity (BOQ) for Salang project
- Water sampling test
- General skills
- General trainings
- Communication skills
- Participating for empowerment of women in Kabul municipality meeting
- Computer programs trainings (Auto CAD and GIS)

3.0 TRAINING

The followings are the main trainings that I have participated during one year of my internship in Tetra Tech:

- **Software workshops (AutoCAD and GIS) Programs:** I was familiar with AutoCAD program before, but I learned new techniques, working standards in drawing, and standard printing. In addition, we had GIS workshop with Hamayoon Amanzai where we had chapter and practical learning.
- **Concrete Training:** This training was organized in three parts (lecture, concrete mix design calculation, and concrete lab). This training was very helpful because aside from the theoretical lessons, we become practically involved in the process of providing a concrete mix design and testing them.
- **Soil Training:** Soil training consisted of two parts (soil lecture and soil lab). We performed five test on soil in the lab that included:
 - CBR (California bearing ratio) test
 - Proctor test
 - Sieve analysis
 - Altenburg limits
 - Sand Cone method

It was very important training for me because I hadn't watched soil test in the lab but Tetra Tech made this opportunity available to have soil training.

4.0 SITE VISITS AND SHADOWING:

Shadowing is one of the new and effective programs which engineers make group discussions and share ideas and new information with each other. Everyone can explain their ideas and thoughts about the subjects.

During the last year we had several shadowing opportunities at USAID. Shadowing was one of the programs that I interested a lot. It was a new experience in my life. We became familiar with USAID engineers, discussed different subjects and shared our ideas with each other. These shadowing experiences were really useful and informative for me because in a short period of time we received lots of updated information from experienced engineers.

Site visits are one of the important and beneficial opportunities for the students. Site visits provide the opportunity to practically know what is happening at the site and see the progressing of the site, what the onsite challenges are for engineers, and how they face those challenges. So, it is a good chance for them to ask and solve their questions because there are many experienced and various engineers on the site.

We had four times site visits, three times to US Embassy buildings under construction where we saw the construction work progress and it was very instructive for me because it was the first time that I saw a project that is built according to the construction rules.

Every time we got better experience and new information because it was very equipped project.

We had a site visit from Kabul Poly Charkhi Road that [REDACTED] helped us regarding our questions.

5.0 RECOMMENDATIONS

Our internship program was very perfect and complete program, however I have the below recommendations for more improvement of this program:

- Technical Writing Training
- Useful Codes Training (IBC, ASHTO...)
- More emphasize on Cost Estimate of the projects
- Increase USAID and other Ministries Shadowing
- Increase site visits from under construction buildings
- More Project Management, QA and QC Training
- Safety Training
- Total Station training
- Material Testing in the LAB individually

6.0 ACKNOWLEDGEMENT

As an intern I want to thank USAID and Tetra Tech organizations that held the effective internship program for female engineer students and our kind supervisor [REDACTED] that always tried to make our schedule and programs according to our suggestions.

Thanks to USAID engineers for nice shadowing and site visits programs and their patience for sharing their information and answering our questions.

Thanks to [REDACTED] and all the staff. They always answered our engineering question very kindly. I feel very fortune that before graduating from school, I became successful in an engineering environment which it is very useful and useful for me. Thanks again from all those that made these opportunities for us.

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APPENDIX B
CONCRETE WORKSHOP MEMORANDUMS

To: [REDACTED]

From: [REDACTED]

Date: August 20, 2013

Re: Concrete Training

This Concrete training consisted of three stages. For the first step [REDACTED] [REDACTED] and [REDACTED] offered a presentation in regards the following titles:

- What is concrete?
- The factors to be considered in the mix design of concrete
- Calculation as per ACI mix design method.
- Sampling freshly mixed concrete scope.
- Sampling from stationary mixers, except paving mixers
- Sampling from pump or conveyor placement systems
- Concrete testes
- Mix design calculation.

At the end of the presentation they gave us an assignment to provide a concrete mix design.

The second part of the training was concrete mix design everyone prepared a concrete mix design according to their specific concrete mark (Strength) which was assigned to them. It was really useful for us because we practically made concrete to learn about it. We put the concrete mix in cylinders and we wrote about the characteristics of our mixed concrete on the cylinders. We did the cylinder test for the concrete strength and the slump test to check the workability of the concrete.

The third part of the training was concrete lab. In this lab, we opened the concrete cylinders to test the concrete strength after curing for seven days.

This training was helpful because from one side we learnt the theoretical lessons also become practically involved in the process of providing a concrete mix designs and testing them.

I would like to thank and appreciate the efforts of Tetra Tech engineers who helped us in this training, especially Engineer [REDACTED]

Assignment given by XXXXXXXXXX

Date: 16/04/2013

Objective: The purpose of this assignment is mix design calculation for M: 30Mpa at last I should find ratio between components of concrete (cement content: fine aggregate: coarse aggregate).

My concrete mix design assignment is below:

Select Water Cement Ratio = 0.45 for concrete grade M30 according to Diagram of (Compressive Strength vs. w/cm Ratio)

Select Water Content = 172 Kg

(From IS: 10262 for 20 mm nominal size of aggregates Maximum Water Content = 186 Kg/ M³)

Hence, Cement Content = $172 / 0.45 = 382.3 \text{ Kg / M}^3$

Formula for Mix Proportion of Fine and Coarse Aggregate: $1000(1-a_0) = \{(\text{Cement Content / Sp. Gr. Of Cement}) + \text{Water Content} + (F_a / \text{Sp. Gr.} * P_f)\}$

$1000(1-a_0) = \{(\text{Cement Content / Sp. Gr. Of Cement}) + \text{Water Content} + C_a / \text{Sp. Gr.} * P_c\}$

Where C_a = Coarse Aggregate Content

F_a = Fine Aggregate Content

P_f = Sand Content as percentage of total Aggregates = 0.36

P_c = Coarse Aggregate Content as percentage of total Aggregates = $0.64a_0$ = Percentage air content in concrete (As per IS: 10262 for 20 mm nominal size of Aggregates air content is 2 %) = 0.02

Hence, $1000(1-0.02) = \{(382.3 / 3.15) + 172 + (F_a / 2.62 * 0.36)\}$

$686.6 = F_a / 0.943$

$F_a = 647.6 \text{ Kg/ Cum}$

As the sand is of Zone II no adjustment is required for sand.

Sand Content = 647.6 Kg/ Cum

$1000(1-0.02) = \{(382.3 / 3.15) + 172 + (C_a / 2.67 * 0.64)\}$

Hence, $C_a = 1173.3 \text{ Kg/ Cum}$

And we are dividing all components on the smallest number

382.3:647.6:1173.3

$(382.3:647.6:1173.3)/382.3$

The concrete mix design for the concrete with mark 30 is: 1:1.7:3.1

To: ██████████
From: ██████████
Date: May 2, 2013
Re: **Concrete Training**

One of my expectations from this internship is get experience with practical work. The concrete activity was one the best things we did. The training provided for us consisted of three sessions in three separate days. They were a concrete lecture, a concrete activity at the villa, and concrete lab, each described below.

- 1. Concrete Lecture:** the first session was a lecture in the Tetra Tech office. The lecture covered the procedure for mix design of concrete. The lecture was good, but I felt lack of preparation by the instructor which decreased my interest to the class. At the end of the class, each of us was assigned to do a mix design calculation for a specific strength of concrete. My assignment was a mix design for 20 Mpa strength of concrete.
- 2. Concrete activity at the villa:** one week after concrete lecture was the second session. We physically performed the mix design in the Tetra Tech office compound for the specific strength of concrete assigned to us in the lecture. I experienced each step that I wouldn't be able to practice somewhere else and all necessary equipment and materials were provided for us. I mixed the cement, sand, gravel, water with shovel then did the slump test, filled cylinders with fresh concrete, and finally, I had two concrete cylinders containing my mix design. Eng. ██████████ made this session more exciting for us by sharing his experience.

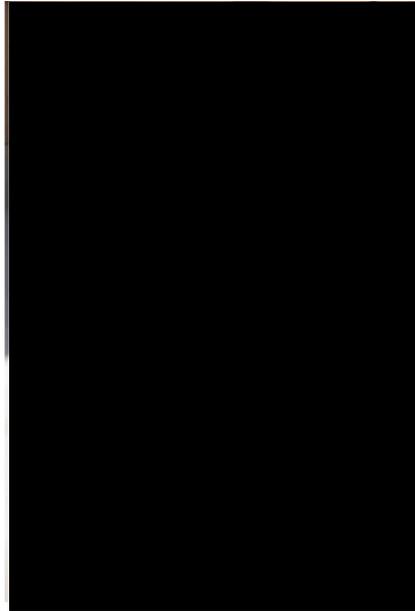


Figure 1- Slump test of fresh concrete in Tetra Tech Villa

3. **Concrete Lab:** the concrete cylinders we cast in the villa were taken to laboratory to test them. We did this on the 7th day after mixing where the lab performed a tensile test of the concrete.

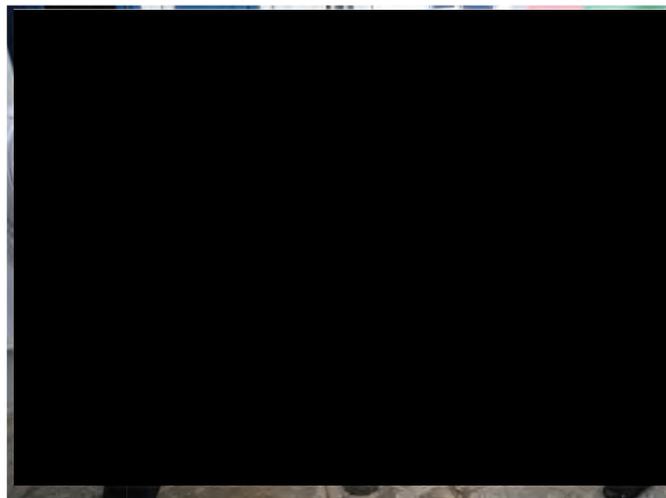


Figure 2- preparation for tensile test of concrete cylinders in laboratory

The laboratory was very well equipped and had the latest and standard apparatuses for concrete testing. The test was according to the standards. During the test, we had the lab forms for tensile test of concrete and I did the associated calculation with the expert working in the lab to find the strength of concrete cylinders. I found this training very helpful. Concrete mix design and tensile tests are primary things that civil engineers should know about and



MEMORANDUM

Experience. I would appreciate a series of concrete trainings with more topics. The other important concept in concrete is design methods. This is a very interesting topic for me. I would like to see the design method which structural engineers use and see examples of reinforced concrete design. Also I want to experience the rebar tests in a laboratory and a brief lecture about rebar and its usage

-END OF MEMO-

APPENDIX C
SOILS WORKSHOP MEMORANDUMS



MEMORANDUM

To: [REDACTED]

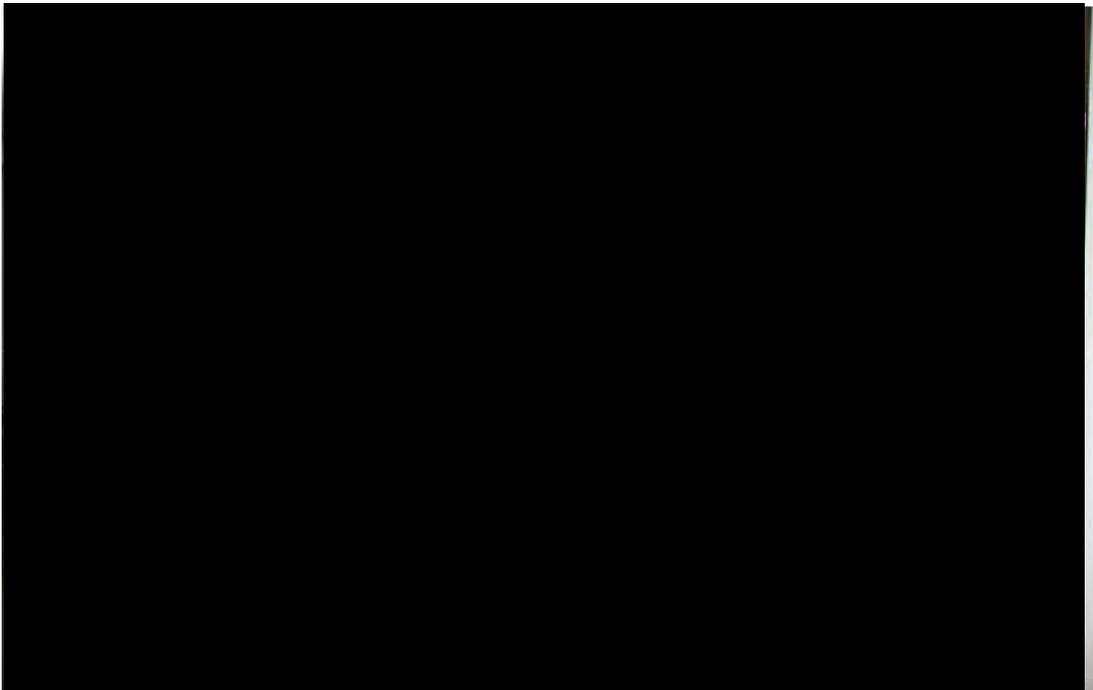
From: [REDACTED]

Date: May 2, 2013

Re: **Soil Training**

As a civil engineering student, soil is an important topic. The Soil Training organized by Tetra Tech office was very efficient. We learned several theories plus practical work in this training. Our training was designed in two sessions, a soil lecture on May 21, 2013 and a Soil Lab on May 23, 2013.

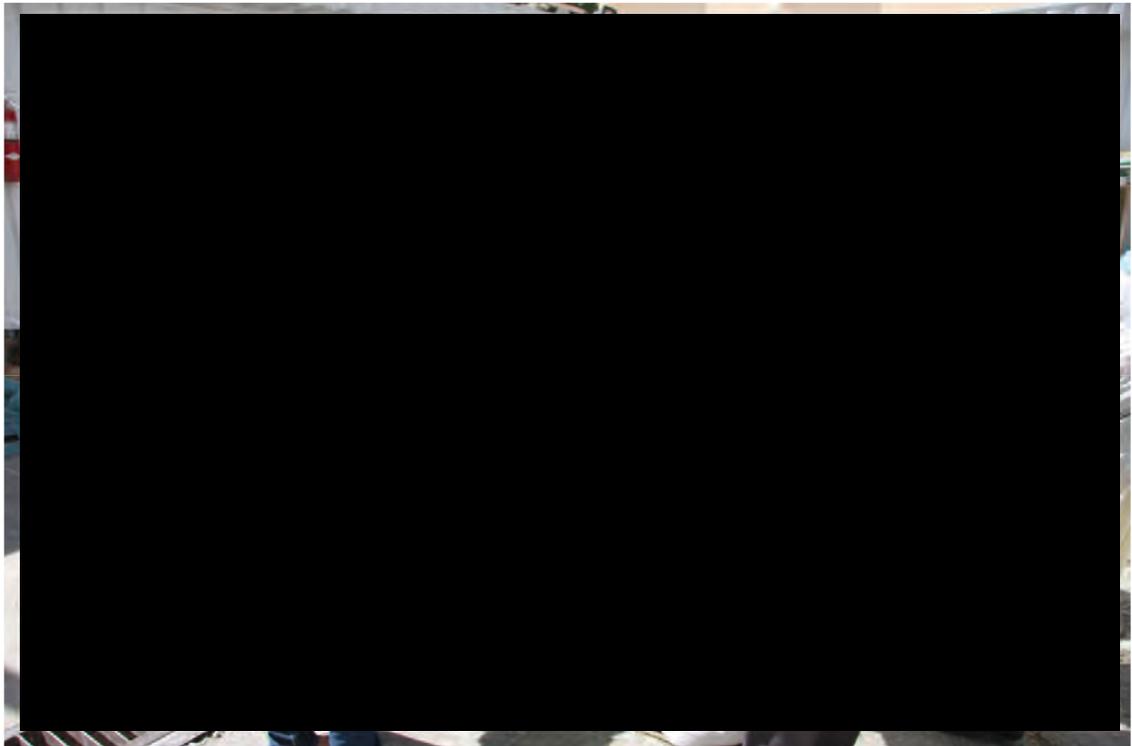
1. **Soil Lecture:** the first session of the soil training was a lecture in Tetra Tech office. Eng. [REDACTED] in cooperation with Eng. [REDACTED] provided us with a lecture. In the lecture, they briefly covered five tests of soil: the CBR (California bearing ratio) Test, the Proctor Test, Sieve analysis, Altenburg limits, and the sand cone method). The class was good; the presenter was well prepared and provided us with helpful notes.



2. **Soil Lab:** the second session of the soil training was in the Material Testing Laboratory.

We performed the five tests which we studied in soil lecture. The laboratory was well-equipped and had the latest apparatuses for all kinds of tests.

The tests were done by experienced people who were working in the laboratory. They explained and performed the tests very well. It was very understandable for us and they responded to our questions very technically.



This training helped us understand several topics which can be very helpful in our professional career and it was a great experience.

I appreciate extending this training and I would like to attend more soil lectures with new topics and experience the lab work again. Eng. [REDACTED] can make this training very interesting for us by sharing his experience and knowledge.



I'm interested to review and experience the practical application of soil in Tetra Tech road projects or other projects.

To: ██████████
From: ██████████
Date: May 29, 2013
Re: **Soil Lab Report**

The soil lecture was very beneficial for all interns. This was really fortunate that we received such an opportunity to attend and join this lecture of soil on May 21st in the Tetra Tech office presented by Engineer ██████████ and then on May 23rd We went to (-Imran-) soil lab to work practically on what we studied.

We should know proper laboratory testing of soils to determine their physical properties is an integral part in the design and construction of structures and foundations, the placement and improvement of soil properties, and specification and quality control of soil compaction.

This report describes the following activities that we did in the lab:

1. Sieve Analysis
2. Sand cone method
3. Atterberg limit
4. Standard proctor
5. Modified proctor

I want to give a brief overview about each of them:

1. Sieve analysis:

Testing objective:

The Standard grain size analysis test determines the relative proportions of different grain sizes as they are distributed among certain size ranges., The grain size analysis is widely used in classification of soils.

Pictured below is a full set of sieves (# 4 and 200 should always be included)

Sieve Number	Opening Size (mm)
4	4.750
6	3.350
8	2.360
12	1.680
16	1.180
20	0.850
30	0.600
40	0.425
50	0.300
60	0.250
80	0.180
100	0.150
140	0.106
200	0.075
270	0.053



Photo # 1: shows sieve numbers

1. Sand cone method :

Testing objective:

The Sand Cone Method is a sand replacement method for determining the field unit weight or the in-situ density of natural or compacted soil. There are three standard procedures used for determining this weight.



Photo # 2: Shows Sand Cone

2. Atterberg limit :

Testing objective:

The Atterberg Limits are different descriptions of the moisture content of fine-grained soils as it transitions between a solid to a liquid-state. For classification purposes the two primary Atterberg Limits used are the plastic limit (PL) and the liquid limit (LL). The plastic index (PI) is also calculated for soil classification.



Photo # 3: Shows the procedure of Atterberg limit

3. Standard proctor : **Testing objective:**

This test method uses a 5-1/2-pound rammer dropped from a height of 12 inches. The sample is compacted in three layers. See ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)) (AASHTO T99 - Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop



Photo 4: Shows proctor devices



4. Modified proctor test:

Testing objective:

This test method uses a 10-pound rammer dropped from a height of 18 inches. The sample is compacted in five layers. See ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m³)) (AASHTO T180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop).

APPENDIX D
ASPHALT WORKSHOP SUMMARIES

To: [REDACTED]
From: [REDACTED]
Date: July 4, 2013
Re: **Asphalt Training**

This memo provides a summary of the Asphalt lecture present by [REDACTED]

The asphalt training was very informative and useful. I had no previous background in the topics covered in this lecture. The lecture provided information included following topics:

- content of asphalt mixture
- procedure of producing asphalt in the plant
- application and use of different types of asphalt in road construction
- essential tests related to asphalt paving site inspection with purpose and procedure

The lecture note was very clear and helpful. We learned many things from it. It included some photos which gave us a clear picture of the lecture content.

The presenter was good but a little nervous at first. [REDACTED] made the lecture very interesting by sharing his experiences.

I've learned lots of basic and important things about asphalt from this lecture, for example the definition of asphalt, how it works and how it's produced. Also, I learned the method and calculation for the specific gravity of loose bituminous mixture and density of core testing.

Asphalt is very important and one of the main topics in civil engineering, I would recommend to extend this training to more advance topics.

I would highly appreciate a lab session to see the asphalt testing apparatuses and techniques and visit the asphalt plant to see the mixing procedures and asphalt design training. These would be the most effective activities for us.

To: [REDACTED]
From: [REDACTED]
Date: July 4, 2013
Re: Asphalt training

This asphalt training was an opportunity where we received lots of information about asphalt and asphalt tests. It was presented by Engineer [REDACTED] and Engineer [REDACTED] in the Tetra Tech office.

The lecture was interesting and informative with interesting pictures and we learnt many things from that training.

We learnt about the following tasks:

- What is asphalt and what it is used for?
- Useful tests related to asphalt
- Usage of AASHTO T 166-Bulk specific gravity of compacted asphalt mixtures

I want to give brief overview about them.

ASPHALT:

The terms bitumen and asphalt are interchangeable, except where asphalt is used as an abbreviation for asphalt concrete. Asphalt is a black and highly viscous liquid or semi-solid form of petroleum. The primary use of asphalt/bitumen is in road construction, where it is used as the glue or binder mixed with aggregate particles to create asphalt concrete. Its other main uses are for bituminous waterproofing product.



Figure 1: shows the Maimana Airport

Tests of asphalt paving:

- **Prime coat:**

A prime coat is “an application of a low-viscosity bituminous material to an absorptive surface, designed to penetrate, bond, and stabilize the existing surface and to promote adhesion between it and the construction course that follows. The major purpose of prime coat is to protect the underlying layers from wet weather by providing a temporary waterproofing layer. Additional benefits of prime coat are stabilizing or binding the surface fines together and promoting bond.

- **Tack coat:**

The purpose of tack coat is to ensure bond between the existing pavement surface and a new pavement surface. Prior to tack application the surface should be clean, dry and free from loose material.

- **Temperature:**

The most important thing in the asphalt is the temperature that should be as follows:

1. Temperature at plant: from 60-65 centigrade
2. Temperature in the truck must not be lower than 155
3. Temperature under breakdown roller must not be down than 145 centigrade

- **Asphalt mixtures extraction:**

The Reflux extraction was performed in accordance with ASTM D 2172 Method B to extract the binder from each of the asphalt mixtures

- **Bulk specific gravity of compacted asphalt:**

This procedure covers the determination of bulk specific gravity (G_m) of compacted hot mix asphalt hot mixture aggregate (HMA)

- **Coring test:**

This Pavement Work Tip provides a guide to field procedures associated with coring of asphalt pavements for determining field density or other properties of in situ asphalt. It should be read in conjunction with existing specifications, standards or test methods and, where there is any conflict with such documents, the relevant specification/standard shall apply



- **Usage of AASHTO T 166-Bulk specific gravity of compacted asphalt mixtures:**

This test procedure determines the bulk specific gravity of specimens of compacted asphalt mixtures.

To calculate the bulk specific gravity, use the following formula:

$$\text{Bulk Specific Gravity } (G_{mb}) = [A / (B - C)]$$

A = Weight in grams of the specimen in air

B = Weight in grams, surface dry

C = Weight in grams, in water

APPENDIX E
USAID SHADOWING SUMMARIES

██████████
██████████
████████████████████

Date: May 2, 2013

Re: USAID Shadowing

This was our second visit to USAID to shadow the engineers there. During our first session on February 12th, we had suggested that there be more emphasis on technical trainings. Gratefully, the main focus of this shadowing was on engineering and technical topics.

We spent the majority of our time with ██████████, ██████████ and Eng. ██████████

██████████ talked about the following topics:

- Cost Estimation, preparation of a BOQ with a practical example of a retaining wall.
- How to prepare and organize a project work plan.

We also had a brief session with ██████████ and discussed the (KHPP) project. Specifically, we discussed construction progress and some general electrical topics such as generation, transmission and power distribution.

Eng. ██████████ gave a brief presentation of project management tools. The topics included workbreak down structure, critical path analysis and Earned Value. He also showed us some examples of MS Project and Primavera from ongoing projects.

We had just a few hours to be there, but I learned so many things. It was according to what I recommended last time: more focus should be on technical topics.

I appreciate the whole team who had part in arranging this shadowing. I'm very interested to shadow ██████████ more often and benefit from his engineering, technical and management experience. Also I recommend a full day or more than 3 hours of shadowing for the future, because spending time with engineers at USAID is very interesting to me. I prefer spending at least one afternoon per week or per two weeks with USAID engineers.

██████████ ██████████

████████████████████

| **Date:** August 26, 2013

Re: USAID Shadowing

Shadowing is one of the programs that I am interested a lot because in a little time and in a few hours we can achieve and receive lots of information in different engineering sections.

It was my third shadowing that was completely different than the previous times. Our last shadowing was in USAID but in this time my shadowing was in tetra tech. I attended in two parts:

1. Urban planning
2. Bidding ceremony.

My shadowing began at 2:00 o'clock and last for 2 hours.

At first one hour I met with ██████████, an architect and the project manager urban water supply and sanitation section in USAID.

We got introduced to each other and he was an experienced person.

He gave me lots of general information about the city planning.

I had a copy of my school city planning and I asked him my questions that were especially about Metro transportation network.

Then we both attend in bidding meeting.

It was really new and effective for me because I got familiar with contract bidding and proposal review condition and I learned many new things in this meeting.

I have to thank from our supervisor ██████████ Tetra Tech and USAID to make these useful opportunities for us.

I like to have many shadowing in the future.

Shadowing USAID

Visitors: [REDACTED]

Our internship program offered us many valuable skills and work experience that we really enjoy, one of these experiences was our recent visit to the USAID to shadow the experienced engineers. shadowing the USAID engineers, every minute we learned and experience something new and interesting.

We arrived at the USAID and were introduced and meet with [REDACTED] is an experienced structural engineer with a wealth of knowledge and was an excellent guide for our group. He introduced and explained several USAID engineering projects and provided other general information for us. [REDACTED] patiently answered our all questions in a very informative manner. He engaged us in a manner that prevented boredom. And also get us introduced to Eng. [REDACTED] who worked at the project of KHPP. He discussed about for a few minutes and gave lots of information about all parts of this project then [REDACTED] introduced us to the [REDACTED] [REDACTED] gave us a warm and cordial welcome. This made us feel comfortable and more confident. [REDACTED] then had us meet with the USAID Road and Transportation engineers for 30 minutes. The engineer's included [REDACTED]. They introduced themselves and explained the GK road project, specifically the codes and specifications they use. It was quit informative and helpful.

Next we met with [REDACTED] from the Economic Growth Department of USAID. She shared her experience working with internship students and gathered information from us about our experiences working with Tetra Tech as interns. She gave us tips on become connected to organizations associated with female interns and new graduates. She was a very nice lady.

The last session was with [REDACTED], USAID Structural engineer, and it was the most interesting and informative of the day. He showed us numerous photos and maps of the KHPP project and answered all of our question. [REDACTED] was extremely well prepared. The main thing he included was:

- Importance of properly managing a project
- Roll of structure engineers in Kandahar Helmand Power project (KHPP)
- Complete information about KHPP parts and design

One of the most interesting parts of the presentation was the application of hydraulics, hydrology theories, and fundamentals that we have studied in school. Seeing the practical application of them increases our understanding of the topics.

For us it was first time going to shadow an organization, and such programs are very helpful for our network improvement and becoming familiar to a new working environment. We will happily welcome same programs in future. And for the future shadowing we prefer to have more focus on technical and engineering discussions. Also would like to do some practical work or a small project relevant to our major. If there are some design projects already done, we would like to review the design and see the methods, technics and procedures have used by the engineers.

I like to participate at the shadowing programs in the future but I'm really interested to be with Civil Engineers especially Architects to use their useful experiences as well as I kindly suggest you to increase the time of shadowing two or three times per month with different engineering organizations.

APPENDIX F
USAID SITE VISIT SUMMARIES

To: [REDACTED]

From: [REDACTED]

Date: May 2, 2013

Re: **USAID and US Embassy Construction Site Visit**

We are fortunate to received opportunity to experience our first site visit at the biggest construction site in Kabul city. For us, the purpose of this site visit was to gain a better sense of engineering and construction field atwork.

As we arrived to USAID, [REDACTED], [REDACTED] accompanied us from the gate to their office.

At first, James explained the architecture, structural, and mechanical drawings of the USAID and US Embassy new buildings and gave us a brief idea of the site we were going to visit (*Reference figure 1 below*)

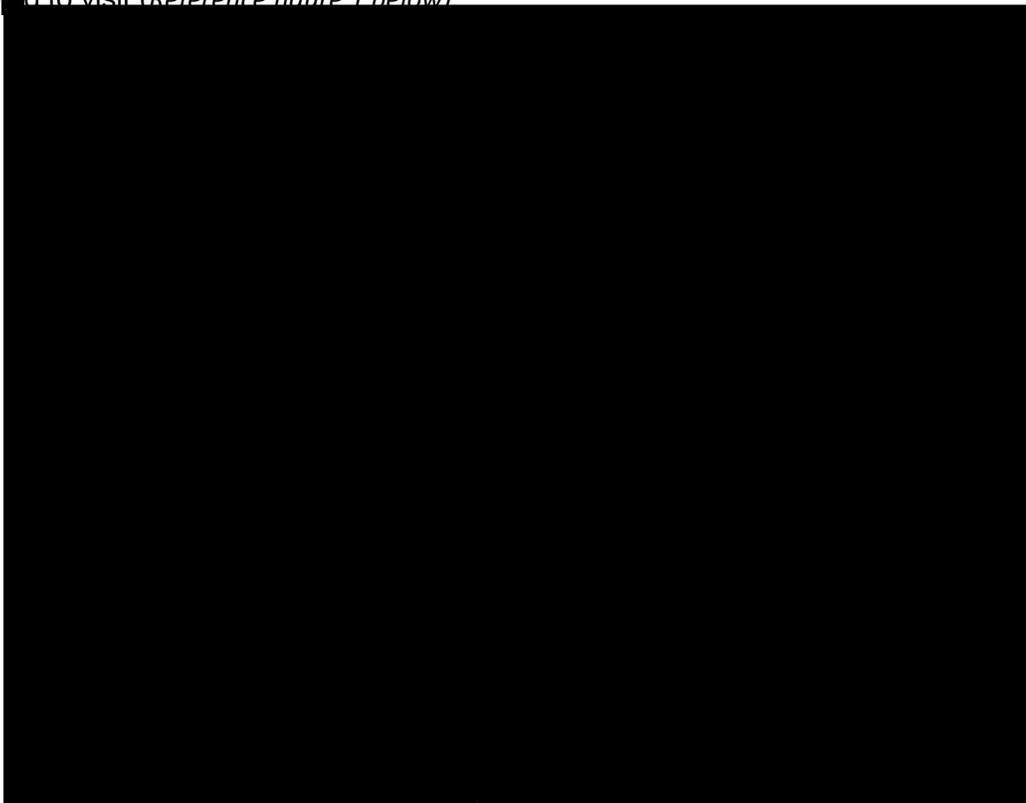


Figure 1: [REDACTED] showing the site drawings

Then, wereceived the hard hats and prepared to go to the site. This construction site was quite different than the typical constructions site in Kabul City and those which we

have seen before, it were according to the international standard. In the Embassy site construction they were using the latest civil engineering technologies. We have studied topics such as the piling in school, but we saw the actual application and construction of that for the first time.

We were very grateful that the senior project manager of this project [REDACTED] was our guide in the site; he briefly gave an overview of all parts of the site (*Reference figure 2 below*).

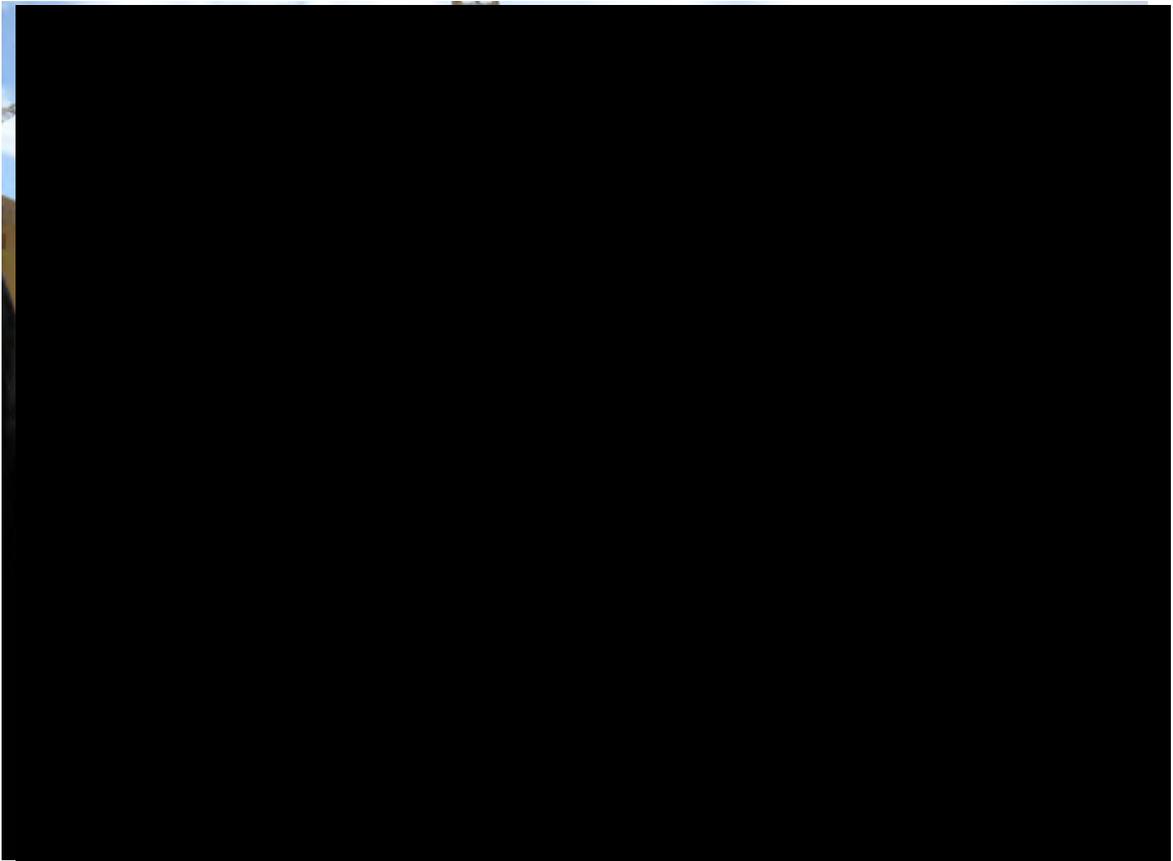


Figure 2: James is describing the design of reinforced concrete members

Although the construction area was very large, we could see almost all of the part easily.

The engineering terms that we just knew in theory but saw in practice for the first time were: usage of rebar and its types, waterproofing the foundation, application of standards and Codes, different machineries, safety arrangements, etc...

[REDACTED] responded very technically to our all questions.

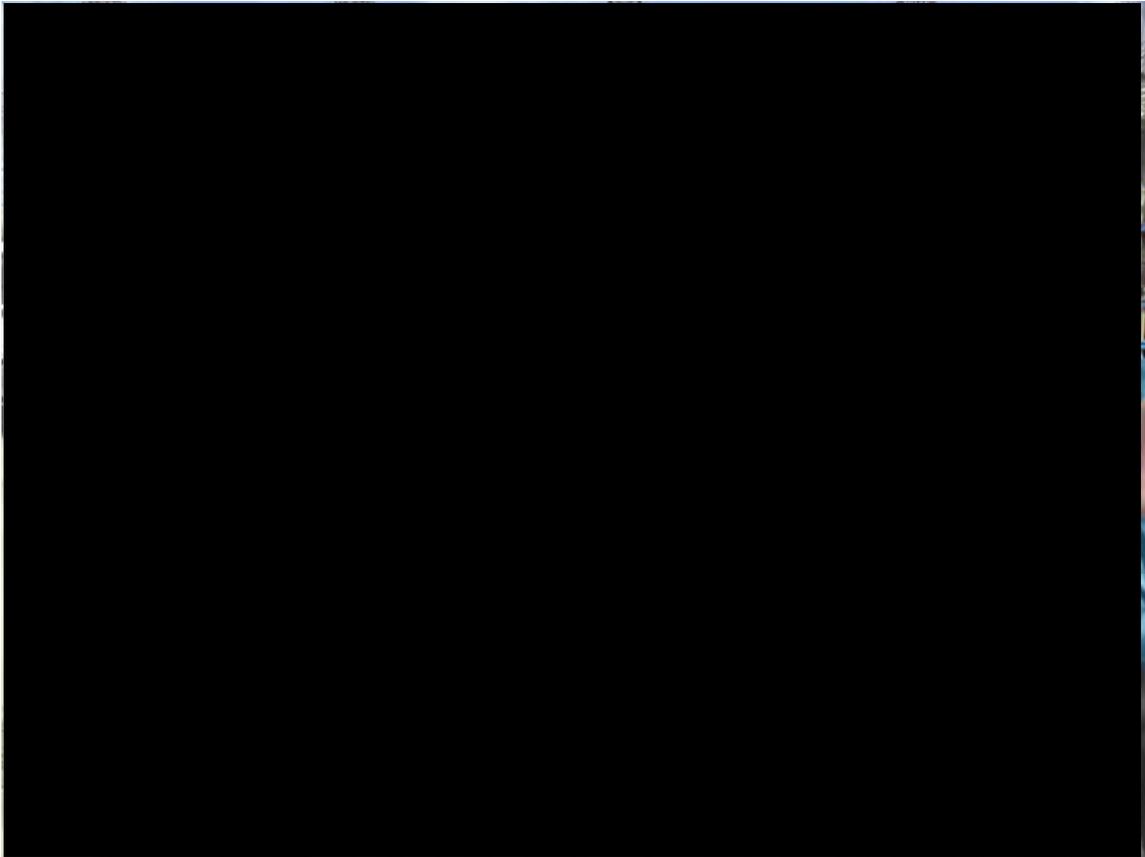


Figure 3: James is answering our questions

We experienced an informative and useful day there. We recommend having similar sessions in the near future. [REDACTED] were the perfect team and guides for us so in the next site visit we would appreciate their presence.

It would also be more effective if we would have more than an afternoon, Also, we want to follow the progress of this project in future and visit it in different stages. Especially if we could get the chance to see when they are pouring concrete.

We would like to thank USAID engineers [REDACTED] [REDACTED] [REDACTED] being great guides for us.

To: [REDACTED]

From: [REDACTED]

Date: January 11, 2014

Re: **USAID video filming**

The USAID construction site is the biggest construction site in Kabul city. The design was done by engineers in the United States according to international standards and the construction work is being performed by locally and internationally experienced engineers. It was the perfect site for us to learn about the field work and activities in the site.

On January 11 there was a film crew Hollywood, we had opportunity for the last time for video filming in the USAID constructions which was interesting journey for the interns. We arrived to USAID at 8 am and met the staff and director for video filming. The director of the film explained everything very well. Infect interns rule was to act as women engineers then we started our work also during filming we reviewed the drawings and talked about what is going on in there and discuss about progress of work in USAID construction site in the architect and civil drawings, structural details since we were familiar with these drawings.

We notice a huge progress in the site. Most of the things during previous site visit were just in drawings, but this time they were physically constructed in the field it was very interesting and a great chance to see the real Hollywood staff and the correct application of the drawings in the field.

We really appreciate the idea of USAID construction site visits with guidance of USAID engineers and the Hollywood filming group for introducing Afghan Women engineers to the world this is the best experience of our internship period. We learnt lots of things in those few hours there by seeing the progress of work. Every time we go there, we see new things and changes which can help us to understand the sense of construction work.

APPENDIX G
COST ESTIMATION TRAINING

To: [REDACTED]
[REDACTED]

Date: May 2, 2013

Re: Training with [REDACTED]

We were introduced with [REDACTED] in USAID shadowing for first time, I learned many things at the first and short meeting with him.

The training prepared for us on October 24 half day and 31 full day by [REDACTED] was very technical and practical. He was very prepared and willing to share all his knowledge and information.

The topic he discussed in very details were Construction Cost Estimation, preparation of BOQ and preparation of work plan. First he explained the importance, usage and application of these terms in construction projects then he work with very much detail on estimation of resources, materials and cost of a designed project which help us in understanding the whole concept.

In structural design of building he briefly he point to the types of foundation, reinforcement and design of foundation, design of columns, slabs and girders with reinforcement details which exceed our information a lot.

He shared his lessons learned and experiences from different type of construction projects in his career which was very interesting.

This training made me able to understand the importance of cost estimation in engineering projects and now I'm able to prepare BOQ, breakdown activities of a project and prepare work plan. Also this training helped me a lot in my school projects and homework. I found answer to my all questions related to estimating and scheduling a project.

I appreciate my supervisor for arranging the training and [REDACTED] for his time and sharing some useful hard and soft data for our record.

To: [REDACTED]
[REDACTED]

Date: November 8, 2013

Re: Training with [REDACTED]

This report includes the activities that we did on October 24 and 31. We were before introduced to engineer [REDACTED] in USAID office. He was very knowledgeable person we ask him to provide training for us and use from his information and knowledge.

Finally on October 24 we met in the Tetra Tech office at 2:00 pm then he talked about what he wants to discuss about and share with us. In fact he came with good preparation and talked about the following topics:

- Cost Estimation of a simple project
- How to prepare a BOQ to a project
- And work plan of a project

He discussed in very detailed about each task and usage, application, management of a project how to evaluate project cost estimation, about material that used in projects. His information was very technical and applicable. I've learned lots of basic and important things about each task.

Second day he came full day at (9:00 am) till (4:30). He discussed about design of structural building and its components as below:

- Design of Girder
- Design of Slabs
- Design of Columns
- Design and Types of foundation



Finally he talked about his experience that he had during projects in different places and also about the management of projects, how to be a good project manager. I am really thankful of him for sharing his knowledge, experience with us.

USAID/Afghanistan
U.S. Embassy Cafe Compound
Great Massoud Road
Kabul, Afghanistan
Tel: 202.216.6288
<http://afghanistan.usaid.gov>