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16. Abstract <p>The transportation engineering profession, like every other profession that relies heavily on the engineering, technology and science fields, faces a challenging future. A recent study by the National Science Board reported a troubling decline in the number of U.S. citizens that are training to become scientists and engineers. Even more disturbing is the number of females entering engineering and technology fields. Only 9 percent of American engineers are women and only 18 percent of engineering degrees are earned by women. Unless transportation as a profession becomes more focused on encouraging women to study engineering and technology the projected shortages become even more alarming. In short, the current and future success of the transportation infrastructure and its diverse array of components depend on developing a large cadre of individuals, both male and female, to design, plan, manage, operate, and maintain the vast infrastructure in place.</p> <p>This study developed a series of one-day conferences and/or events specifically for girls. These events offered an opportunity to gain hands on experience and insight into what transportation, engineering, and technology careers have to offer. The events provided girls with experiences to encourage interests in science and math, as well as offering exposure and mentoring from female role models that currently work in transportation and engineering fields. By providing a venue that allowed girls to recognize their interests in math and have an early successful experience, two of the crucial factors to encourage careers in technology and engineering are fulfilled. These events were designed in a format that it can be used by any college, university or professional organization as a prototype.</p>					
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GO GIRL!

Facilitating Exploration of Transportation Careers for Girls

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ABSTRACT

The transportation engineering profession, like every other profession that relies heavily on the engineering, technology and science fields, faces a challenging future. A recent study by the National Science Board reported a troubling decline in the number of U.S. citizens that are training to become scientists and engineers. Even more disturbing is the number of females entering engineering and technology fields. Only 9 percent of American engineers are women and only 18 percent of engineering degrees are earned by women. Unless transportation as a profession becomes more focused on encouraging women to study engineering and technology the projected shortages become even more alarming. In short, the current and future success of the transportation infrastructure and its diverse array of components depend on developing a large cadre of individuals, both male and female, to design, plan, manage, operate, and maintain the vast infrastructure in place.

This study developed a series of one-day conferences and/or events specifically for girls. These events offered an opportunity to gain hands on experience and insight into what transportation, engineering, and technology careers have to offer. The events provided girls with experiences to encourage interests in science and math, as well as offering exposure and mentoring from female role models that currently work in transportation and engineering fields. By providing a venue that allowed girls to recognize their interests in math and have an early successful experience, two of the crucial factors to encourage careers in technology and engineering are fulfilled. These events were designed in a format that it can be used by any college, university or professional organization as a prototype.

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A special section in each chapter will address participation and acknowledgment of the many contributors who made the success of the individual *Go Girl!* Events possible.

DISCLAIMER

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the information presented herein. This document is disseminated under the sponsorship of the Department of Transportation, University Transportation Centers Program, in the interest of information exchange. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

EXECUTIVE SUMMARY

The transportation engineering profession, like every other profession that relies heavily on the engineering, technology and science fields, faces a challenging future. A recent study by the National Science Board reported a troubling decline in the number of U.S. citizens that are training to become scientists and engineers. Even more disturbing is the number of females entering engineering and technology fields. Only 9 percent of American engineers are women and only 18 percent of engineering degrees are earned by women. What makes these numbers even more startling is the US Bureau of the Census projection for the year 2021 is that females will make up 53.5 percent of the total US population. At the same time, women's share of the total labor force will also continue to rise. By 2005, women will comprise 48 percent of all workers in the US. Beginning as early as 2006, 63 percent of new entrants in the workforce will be women. Unless transportation as a profession becomes more focused on encouraging women to study engineering and technology the projected shortages become even more alarming. In short, the current and future success of the transportation infrastructure and its diverse array of components depend on developing a large cadre of individuals, both male and female, to design, plan, manage, operate, and maintain the vast infrastructure in place.

This project developed a series of one-day conferences and/or events specifically for girls. These events provided an opportunity to gain hands on experience and insight into what transportation, engineering, and technology careers have to offer. This type of venue allows girls to recognize their interests in math and have an early successful experience, two of the crucial factors that encourage careers in technology and engineering.

A total of seven separate events were piloted to diverse audiences across Texas. Each event created using a slightly different approach for sparking girls' interest in STEM. All of the events were produced at a cost of less than \$1,000 and all of the events were well attended and well received. A total of 201 girls participated in the initial *Go Girl!* outreach events and over 3,400 other girls were reached through *Go Girl!* career fair and science night events. A number of these events have continued to be replicated through other funding sources. The types of events conceived through this project are highly popular with students, teachers, and corporate entities. It is important to remember in creating an event that the main objective is to create a fun and exciting event that introduces girls to role models in STEM, help them recognize their abilities in science and math, and to expose them to transportation and engineering as career choices. Although this type of event will not solve all of the problems of the coming workforce challenges, they can create interest in fields such as science, math and engineering.

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1.0 INTRODUCTION

1.1 OVERVIEW

The transportation engineering profession, like every other profession that relies heavily on the engineering, technology and science fields, faces a challenging future. Studies by the National Science Board report troubling declines in the number of US citizens that are training to become scientists and engineers. One study showed that while more than half of the science and engineering degree holders are age 40 or older, the number of students entering college degree programs in these disciplines have declined. In short, the current and future success of the transportation infrastructure and its diverse array of components depend on developing a large cadre of individuals, both male and female, to design, plan, manage, operate, and maintain the vast infrastructure in place.

The number of females entering engineering and technology fields has not proportionally increased when compared to the number of women entering the work force. Only 9 percent of American engineers are women and only 18 percent of engineering degrees are currently earned by women. What makes these numbers even more startling is the US Bureau of the Census projection for the year 2021 is that females will make up 53.5 percent of the total US population. At the same time, women's share of the total labor force will also continue to rise. By 2005, women will comprise 48 percent of all workers in the US. Beginning as early as 2006, 63 percent of new entrants in the workforce will be women. Unless transportation as a profession becomes more focused on encouraging women to study engineering and technology the projected shortages become even more alarming.

A recent survey conducted as an independent study course by Mr. David Sparks of Queen City Independent School District, surveyed female engineers in five states. This survey revealed that 79 percent of female engineers had chosen their career prior to entering college. The survey also discovered that 58 percent believed that more females did not choose engineering due to sexism or social and societal stereotypes. Factors that encouraged females to choose engineering or technology careers were recognizing abilities in math and science and early successful experiences in math and science. These successful experiences included role models and activities that excited the student about science and mathematics.

1.2 STUDY OBJECTIVES

The main objective for this project was to develop a series of one-day conferences and/or events specifically for girls. The events were designed with the following criteria in mind:

- Offer an opportunity to gain hands on experience and insight into what transportation, engineering, and technology careers have to offer;
- Provide girls with experiences to encourage interests in science and math;
- Offer exposure and mentoring from female role models that currently work in transportation and engineering fields;
- Provide a venue that allowed girls to recognize their interests in math and have an early successful experience, two of the crucial factors to encourage careers in technology and engineering are fulfilled; and
- Designed in a format that it can be used by any college, university or professional organization as a prototype conference to encourage girls to enter the transportation and engineering fields.

1.3 REPORT FORMAT

This report begins with an introduction chapter followed by a networking chapter that discusses the importance of collaboration in producing successful events. Each subsequent chapter details an event created during the *Go Girl!* project. The chapter will include a detailed list of partners, event modules, and subsequent feedback received from the participants. The report will close with a summary and conclusions chapter.

2.0 NETWORKING: A FORMULA FOR COLLABORATION

Early in the *Go Girl!* project, the research team was able to form a network of supporters from earlier collaborations and networking. This network of supporters enhanced the capability of the team to conduct quality events in a number of highly desirable venues, forge new alliances, and create long term partnerships for outreach.

Foremost in the networking aspect of the study was the opportunity provided by the University of North Texas and the South Central Girls Collaborative (SCGC). The University of North Texas was awarded a grant through the auspices of the National Science Foundation. This grant created the SCGC, which is dedicated to supporting girls' endeavors in science, technology, engineering, and mathematics (STEM). SCGCP extends the success of the National Girls Collaborative Project to Texas and the surrounding states. The collaborative goals are to connect existing organizations to maximize access to shared resources within projects, and with public and private sector organizations and institutions interested in expanding girls' participation in STEM and to strengthen capacity by sharing research and program models, outcomes, and products. The kickoff event for the SCGCP coincided with the beginning of the *Go Girl!* project and team leader Debbie Jasek was invited to make a presentation at the Collaborative Conference about *Go Girl!* The conference was attended by over 100 teachers, higher education faculty, and representatives from businesses, informal science organizations, and girl-serving organizations and was highlighted by a keynote address by astronaut and scientist, Dr. Mary Ellen Weber. This opportunity resulted in multiple requests for *Go Girl!* events from groups across Texas.

The support of the Texas Institute of Transportation Engineers (TexITE) organization was also central to the success of the *Go Girl!* events. This organization and its Future Engineers Committee, chaired by research team member Melisa Finley, was invaluable in providing contact information in various cities where *Go Girl!* events were held. These contacts graciously volunteered time, provided items for goody bags, assisted in recruiting participants, and provided information and counsel to the research team.

Similar support was also provided by the Women's Transportation Seminar of Houston. This professional organization of women in transportation provided immense help by assisting in recruiting, volunteering time, and encouraging their corporations and agencies to provide items for goody bags. Through their efforts enough giveaway items were collected to create goody bags not only for the Houston area, but for the entire program.

3.0 HOUSTON GO GIRL!

EVENT DATE: February

EVENT LOCATION: Houston Museum of Natural Science, Challenger Learning Center

TARGET GROUP: 7th through 9th Grade Girls from Houston area

NUMBER OF PARTICIPANTS: 38

CONTRIBUTORS: Texas Transportation Institute, Houston Museum of Natural Science, Challenger Learning Center, Discovery Dome, Women's Transportation Seminar, Texas Department of Transportation, Frank H. Dotterweich College of Engineering at Texas A&M University at Kingsville, Dwight Look College of Engineering at Texas A&M University, Texas Southern University, Johnson Space Center, Walter P. Moore and Associates, Parsons Brinckerhoff, HNTB, Brown & Gay, Michael Baker, Gunda Corporation, Wilbur Smith Associates, Pate Engineers, Turner Collie & Braden, Inc, Harris County After School Enrichment (CASE), and the City of Houston Engineering Department.

THE EVENT:

The Houston *Go Girl!* Event was co-hosted by TTI and the Challenger Learning Center, which is part of the Houston Museum of Natural Science. The event was held on Saturday, February 11, 2006. Girls participating in this event joined in an engineering and transportation career awareness session, a Challenger Mission, a pizza lunch, and a scavenger hunt. Corporate volunteers manned tables for the career awareness session and after lunch teamed up with the girls for the scavenger hunt. The event was originally scheduled from 9:30 a.m. to 2:30 p.m. However, due to the popularity of the event and the enthusiastic participation the final team of girls and volunteers left the museum at 5:00 p.m.

Challenger Mission

The Challenger Learning Center was begun at the museum after the 1986 accident of the Space Shuttle Challenger. The families of the crew members wished to continue the educational mission of the crew. The learning center consists of a space shuttle flight simulator and a mission control. The mission control area has the most up-to-date technology, including flat screen plasma monitors, video projection, and the latest in computer technology.

The students participated in a mission for the year 2076 and were divided into astronauts and colonists. The mission, named Operation: LEAPFROG – Lunar Exchange

And Preparation For Research On-Going, has two phases. In phase one: The New Tranquility Base colonists must act as Mission Control to bring their replacements from Earth orbit to the Moon. Once they arrive, the replacements will take over Mission Control in New Tranquility Base. Phase two begins with new mission controllers and new astronauts ready to begin the journey to Mars. The mission is completed with a successful landing on Chryse Planitia, the Golden Plains of Mars. Along the way astronauts must complete experiments and make sure the ship is functioning properly, while mission controllers track information, do research and ensure the safety of the crew.

The Challenger Mission required the girls to use multiple math, science, and computer skills in a team setting. The success of the mission relies on responsibility, teamwork, communications, and good decision-making.

Engineering and Transportation Career Awareness

The Engineering and Career Awareness Session was hosted by a number of corporate volunteer partners. Each partner set up a booth style station that illustrated how science, math, and engineering are used in the real world. The displays provided insight of a number of projects in the Houston area which involved women engineers. Several tables were also set up by Universities promoting Engineering Careers. The following agencies and companies set up booths. Walter P. Moore and Associates, the Texas Department of Transportation, Frank H. Dotterweich College of Engineering at Texas A&M University at Kingsville, Dwight Look College of Engineering at Texas A&M University, Texas Southern University, Johnson Space Center, Parsons Brinckerhoff and HNTB. The Women's Transportation Seminar provided volunteers to make goodie bags for each of the girls to take home.

Many of the volunteers were women engineers who provided the girls with insight on opportunities for women engineers. The college and university participants provided the girls with information on colleges offering engineering as well as information on how to prepare for a successful transition from high school to college life.

Pizza Lunch

At noon participants and volunteers joined each other for a pizza luncheon. The volunteers sat at designated tables and were joined by the girls. Each table had at least 3 corporate volunteers and at least 2 female engineers or scientists. This format allowed students and the volunteers to have one-on-one conversations about science and engineering in an informal setting. The research team has found from previous events that the one-on-one setting is very beneficial to some students.

Scavenger Hunt

After lunch the girls again divided into teams and joined a corporate volunteer for a scavenger hunt in the hall of energy portion of the museum. This proved to be a very popular event as teams spent quality time exploring and learning in the museum proper.

As stated previously the event was scheduled to end at 2:30 p.m., however due to the popularity of this event and the day the end time was moved until 4:00 p.m.

ASSESSMENT OF EVENT

The Houston *Go Girl!* event was evaluated through a survey of the girls and their parents regarding the event and its contents as well as informal feedback from the volunteers. The vast majority of the girls provided positive marks for all the sessions. The girls highlighted the Challenger Learning Center and “being able to talk to real engineers and scientists” as the most beneficial part of the experience.

4.0 TEXAS A&M UNIVERSITY KINGSVILLE GO GIRL!

EVENT DATE: February 24, 2006

EVENT LOCATION: Texas A&M University Kingsville, Frank H. Dotterweich College of Engineering

TARGET GROUP: Grades 7-12 and College Undergraduate Engineering Students

NUMBER OF PARTICIPANTS: 53

CONTRIBUTORS: Texas Transportation Institute, Texas Department of Transportation, Frank H. Dotterweich College of Engineering at Texas A&M University at Kingsville, Dwight Look College of Engineering at Texas A&M University, American Society of Civil Engineers Student Chapter at Texas A&M Kingsville, and the Society of Women Engineers Texas A&M Kingsville Chapter

THE EVENT:

The Texas A&M University Kingsville (TAMUK) event was held in conjunction with Javelina Engineering Week. This is an annual event hosted by the Frank H. Dotterweich College of Engineering. The concept for this particular *Go Girl!* event was the result of a conversation about the shortage of women faculty in the engineering departments as well as the growing population of women engineering students. Several male faculty members mentioned that many of their female students often had gender related questions about work as a professional engineer that they felt they were not able to adequately address. It was decided that creating a forum where female students could interact and ask questions to female engineering professionals would be beneficial. The objective of the forum was to provide a venue for students to discuss gender issues with practicing engineers. It was decided that the event would be a popular addition to Javelina Engineering Week.

A panel of engineers was assembled including representatives from the Texas Transportation Institute and the Texas Department of Transportation Corpus District. The panel included engineers who were recent graduates as well as engineers who had practiced for a number of years. The engineers also included single women, new mothers, and mothers with school aged children. This allowed the participants to draw on the knowledge of a group of women engineers

The event organizers anticipated that the forum would be attended by 30 students. However, at least 53 participants arrived and provided a standing room only audience for the forum. The ages of the attendees ranged from junior high school through undergraduate college students. Junior high and high school students from four different school districts attended the forum. College undergraduates representing five different

engineering majors also attended the forum and later participated in the informal conversations at lunch.

The forum proceedings were moderated by a research team member. Each panel member introduced herself and gave a small opening statement regarding her personal and professional background and experiences, including something or someone who influenced her decision to become an engineer. The forum was then opened to questions from the audience. The questions asked to the panel included:

- *“What is it like to be the only woman at a job site?”*
- *How do you juggle being a mom and field work?*
- *Is it alright to wear makeup in the field?*
- *Why did you become an engineer? And*
- *Do you like engineering and field work?*

After the formal portion of the forum, attendees were asked to join the panel members for a pizza lunch and informal discussions.

Pizza Lunch

At noon participants and volunteers joined each other for a pizza luncheon. The volunteers sat at designated tables and were joined by the girls. This format allowed students and the volunteers to have one-on-one conversations about science and engineering in an informal setting. Most of the students and all of the engineers attended this event. Although the lunch was only scheduled to last 30 minutes, this portion of the forum lasted for over 1.5 hours.

ASSESSMENT OF EVENT

The Kingsville *Go Girl!* was evaluated through an informal assessment by the junior high and high school participants and a more in-depth assessment of the TAMUK engineering undergraduate students who attended the forum. Both assessments positively rated the forum. The more in-depth discussions with the female undergraduate revealed the true worth of forum's value. Many of the students revealed that the true value was that it allowed them to talk to successful professionals who actually worked in the field and were able to answer questions regarding the balance of professional and personal lives. Some of these students were not only the first female in their family to attend college but the first student to attend college. The thought of entering a workplace that is male dominated is often very intimidating. An event such as the *Go Girl!* forum provided a venue for them to ask questions without embarrassment.

5.0 WEST TEXAS GO GIRL! ENGINEERING FOR A DAY EVENT

EVENT DATE: March 24, 2006

EVENT LOCATION: Frienship Bennet Intermediate School, Lubbock, Texas

TARGET GROUP: 6th through 8th grades

NUMBER OF PARTICIPANTS: 70

CONTRIBUTORS: Texas Transportation Institute, Texas Department of Transportation, Texas Tech University College of Engineering, Frenship Independent School District, Rolling Plains Education Consortium, Spur Independent School District, Motley County Independent School District, Patton Springs Independent School District, Guthrie Consolidated School District, Jayton-Girard Independent School District, Turkey-Quitaque Independent School District, Paducah Independent School District, Texas Tech University College of Education, and Parkhill, Smith & Cooper Construction.

THE EVENT:

The *Go Girl!* Engineering Day was designed as an engineering fair. The main objective of the fair was to allow middle school girls to meet and interact with female engineers and participate in hands-on activities related to science, technology, engineering, and math. The event was located at Frienship Bennet Intermediate School Gym. A round-robin station was set up with each engineer and/or mentor located at a table. A total of seven stations were manned by participating engineers. Examples of activities at tables included:

- Highway signs how they are made and why they are important;
- How do you make hot mix and what is it for;
- Chemical engineers what do they do?;
- Career choices in Engineering, and
- Building buildings and other things.

In addition to presenting an activity about their particular engineering field, the participating engineers were encouraged to talk about their careers, why they chose engineering, and hold a short question and answer period.

The girls were divided into small groups of eight to nine girls. Each group visited a station for 20 to 25 minutes at the end of that time frame the group of girls then rotated to the next station. By the end of the day each group had visited all stations. Each girl was then presented with a goody bag to remember the day.

Lunch with an Engineer

At lunch time girls ate with the female engineer and mentor that they had visited in the last session. The girls and engineers were treated to a box lunch provided by Texas Tech University College of Engineering. This format allowed students and the volunteers to have one-on-one conversations about science and engineering in an informal setting. It also allowed the girls a chance to ask questions about engineering careers.

ASSESSMENT OF EVENT

The West Texas event was evaluated through an informal poll of both the participants and the volunteer engineers who manned the stations. The event was originally scheduled to host 40 girls however, 70 girls attended the event. After minor adjustments to how the event was run, all of the participants were accommodated. All of the girls and the sponsors accompanying the girls rated the event as both fun and a good experience. Some of the participating schools traveled over 60 miles to attend. Volunteers were complementary of the experience and all of them indicated that they would enjoy participating in similar events in the future.

6.0 SOUTH TEXAS CAREER FAIR GO GIRL! EVENTS

EVENT DATE: March 30, 2006 and March 31, 2006

EVENT LOCATION: Robstown and Kingsville

TARGET GROUP: 7th through 12th grade

NUMBER OF PARTICIPANTS: 3,000 plus

CONTRIBUTORS: Not Applicable

THE EVENT:

These two *Go Girl!* events were dissimilar from other events, in that the project team participated in an ongoing science night and career fair with a table and activities specifically targeting girls attending the event. Each year Robstown Independent School District (ISD) hosts a night specifically geared towards STEM. The school invites agencies and area businesses and corporations to set up activities and booths that illustrate how STEM is used in that particular business in “real world” situations. Over 200 students and their families attended the career night.

This night is open to all Robstown ISD students and their parents, but specifically targets junior high and high school students. The *Go Girl!* team was invited to participate in the science night activities. The *Go Girl!* team created a booth on how math and science is used in transportation that also featured women in transportation roles. The video *The Road to Success: Women in Highway Construction*, produced and distributed by the Texas Department of Transportation was the featured video for the booth. All of the illustrations of Engineers and Transportation Workers for the booth depicted women in key roles. Handouts included information from Engineer Girl and the Women in Engineering Society. Female transportation professionals manned the booth.

This booth was also used the next day at the South Texas Career Fair and Science Exposition. This annual event is sponsored by Riviera ISD and is held at the Kingsville Convention Center. The South Texas Career EXPO differs from a traditional "College Day" program. The program involves a hands-on, browse format for specific career disciplines in which actual instructors, business or industry personnel, present demonstrations. The goal is to provide a more comprehensive overview of the required course work and future career opportunities. Presenters who bring actual equipment and resources to demonstrate are extremely successful in attracting students to their program. Over 98 booths were set up for the EXPO and 28 schools brought over 2,800 students attended the EXPO.

ASSESSMENT OF EVENT

These particular events were not evaluated in the traditional sense, as no evaluations were completed by participants that visited the booths at the career expos. However, a large number of girls did visit the booth and pick up material regarding career choices. Over 1,000 pamphlets on transportation careers were distributed during the 2 day event. A number of discussions were held regarding women in transportation and their broadening roles in technology careers in the future.

7.0 BRYAN ISD GO GIRL! CAREER FAIR EVENT

EVENT DATE: April 25, 2006

EVENT LOCATION: Bryan High School Silver Campus

TARGET GROUP: 9th and 10th grade

NUMBER OF PARTICIPANTS: 400 plus

CONTRIBUTORS: Not Applicable

THE EVENT:

This *Go Girl!* event was very similar to the events held in south Texas in that the project team participated in an ongoing science and career fair with a table and activities specifically targeting girls attending the event. This fair was hosted by the Bryan ISD Technology Center and specifically targeted Bryan ISD students enrolled in technology courses.

The *Go Girl!* team was invited to participate in the career fair activities. The *Go Girl!* team created a booth on how math and science is used in transportation that also featured women in transportation roles. The video *The Road to Success: Women in Highway Construction*, produced and distributed by the Texas Department of Transportation was the featured video for the booth. A power point presentation on career options in transportation and engineering was also presented during the career fair. All of the illustrations of Engineers and Transportation Workers for the booth depicted women in key roles. Handouts included information from Engineer Girl and the Women in Engineering Society. Female transportation professionals manned the booth.

ASSESSMENT OF EVENT

These particular events were not evaluated in the traditional sense, as no evaluations were completed by participants that visited the booths at the career expos. However, a number of girls did visit the booth and pick up material regarding career choices and approximately 25 girls attended the power point presentation. Over 300 pamphlets on transportation careers were distributed during the day long event.

8.0 TEJAS GIRL SCOUT COUNCIL GO GIRL! EVENT

EVENT DATE: May 6, 2006

EVENT LOCATION: Dallas

TARGET GROUP: Kindergarten through 2nd Grade

NUMBER OF PARTICIPANTS: 40

CONTRIBUTORS: Tejas Girl Scout Council, DART, Texas Transportation Institute, Texas Department of Transportation

THE EVENT:

This event was the culmination of a plan for a Girl Scout/Brownie/Daisy Council Badge initiated in February. The project team, DART, and the Tejas Girl Scout Council drafted a plan for a Girl Scout Council Badge about transportation. The Badge called Girls on the Move was conceived as a troop level activity that would cover local and regional transportation and transit.

The first phase of the badge requirement would involve the learning about transportation in their community. This phase conducted during a troop meeting would include reading news articles, web articles, and books about transportation, transit, and transportation history. The second phase of the badge requirement would be a learning field trip led by personnel from TTI and DART.

The first field trip for the Girls on the Move Badge was held on Saturday, May 6, 2006. Forty Daisies and Brownies from 6 separate troops attended the field trip event. The Daisies and Brownies were accompanied by 12 Scout leaders, TTI project personnel, and a DART outreach representative. The field trip consisted of riding the light rail, a transportation identification game, and a ride on the historic McKinney Avenue Trolley.

Light Rail and Rail

The group met at the Park Lane Transit and Light Rail Station. After a safety briefing from DART and TTI personnel about riding the light rail, the group rode the light rail to Union Station. The group toured the station and viewed the departure of the Trinity Express Rail (TRE) and the arrival of Amtrak. The TRE commuter train connects the downtown areas of Dallas and Fort Worth, with stops in the Mid-Cities and DFW International Airport. The Texas Eagle is the Amtrak rail service that travels daily through Dallas. The Texas Eagle travels from Chicago to San Antonio.

Transportation Game

After leaving Union Station the group walked to the Hyatt Hotel and Reunion Tower. The group then discussed the historical transportation photos posted in the hallway that connects the station to the Hyatt. The group then took the elevators to the top of Reunion Tower. There the girls completed a hunt for transportation objects visible from the Tower. The girls were required to find a railroad bridge, a spaghetti bowl (interchange), a bus stop, a parking lot, a highway bridge, a river, a swimming pool on a roof, the Cotton Bowl, and the American Airlines Center.

Historic Trolley Ride

The group reassembled at Union Station and took the light rail to St. Paul station, where they walked the short distance to the Dallas Art Museum. The group then caught the historic McKinney Avenue Trolley to City Place. The McKinney Avenue Trolley car ridden by the group was the Number 186 also known as the Green Dragon. The Green Dragon was built in 1913. The girls watched the trolley operator “switch the poles,” thus allowing him to change the direction the trolley would travel and then helped him “flip the seats” before riding the Trolley. After the group arrived a City Place, they caught the light rail back to Park Lane Station, where they received their badges

ASSESSMENT OF EVENT

The evaluation by both Girl Scouts and Troop leaders was for the most part very positive. However, it was noted by some that the program was rather long for some of the youngest scouts. After discussion with the Council Leaders, it was decided that two versions of the field trip agenda would be created. A longer version with a lunch break would be created for older girls and a shorter version would be created for troops with younger girls.

UPDATE

The Girls on the Move Scout badge event has been conducted for a number of scout troops in the Dallas area. Several other councils around the state of Texas have indicated an interest in the program and are looking at creating similar badges for their area troops.

9.0 SUMMARY AND CONCLUSIONS

The concept for *Go Girl!* originated from reading the independent study by Mr. David Sparks of Queen City ISD. The study titled, *Why Women Choose Engineering: Analyzing the Factors that Contribute to Vocational Choice*, detailed a number of factors that influenced young women to choose engineering careers. Among those factors were recognizing abilities in science and math and encouraging those activities at crucial stages were important factors for women who chose engineering careers. Activities related as important in the study were peer acceptance, role models, and activities that encourage interest in engineering. The goal of *Go Girl!* was to create one day events that encouraged young women's interest in STEM areas and transportation careers, that could be easily replicated for future use.

Events

A total of seven separate events were piloted to diverse audiences across Texas. Each event created using a slightly different approach for sparking girls' interest in STEM. All of the events were produced at a cost of less than \$1,000 and all of the events were well attended and well received. A total of 201 girls participated in the initial *Go Girl!* outreach events and over 3,400 other girls were reached through *Go Girl!* career fair and science night events. Several of these events have continued to be replicated through other funding sources.



Figure 1. What do Engineers Do?



Figure 2. Standing Room Only

The most successful replication of a *Go Girl!* outreach event has been the Girl Scout Council transportation badge program in Dallas. A total of 4 of these events have been held and an additional 150 girls have completed the program. Several other Girl Scout Councils have expressed interest in replicating this program.



Figure 3. Girls On the Move!

Public Response and Corporate Participation

The response and support by both public and private agencies, corporations, and individuals for the events were overwhelming. Every agency, corporation, and individual contacted provided support for the program in some manner. Volunteers, venues for events, tickets for admission, transit fares, money for lunches, giveaways for goody bags, assistance in recruiting girls to attend events, cleanup, and enthusiastic participation were only a few of the ways that help and assistance were provided. These contacts across Texas continue to remain in contact with the project team and have offered assistance on other outreach projects as a result of networking achieved during this project.



Figure 4. Volunteers: Making It All Possible

As a direct result of this project, Debbie Jasek was invited to become a member of the Champions Board for the South Central Girls Collaborative, which is a program created by the University of North Texas through a National Science Foundation Grant. Through associations with this partnership, a number of mini-grants of \$1,000 were awarded to groups such as the Tejas Girl Scout Council and the Northeast Texas Girl Scout Council to continue *Go Girl!* originated events.

Conclusions

The types of events conceived through this project are highly popular with students, teachers, and corporate entities. These events are easily replicated and adjusted

to fit the needs of any area. They can also be produced with relatively small amounts of funding. It is important to remember in creating an event that the main objective is to create a fun and exciting event that introduces girls to role models in STEM, help them recognize their abilities in science and math, and to expose them to transportation and engineering as career choices. Although this type of event will not solve all of the problems of the coming workforce challenges, they can create interest in fields such as science, math and engineering. Repeated exposure in informal settings such as the *Go Girl!* events often do create the spark that determines whether a student will be successful in STEM and possibly choose that career path.