2012 MONTANA SUMMER TRANSPORTATION INSTITUTE

FHWA/MT-12-003/6439-159

Final Report

prepared for
THE STATE OF MONTANA
DEPARTMENT OF TRANSPORTATION

in cooperation with
THE U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

October 2012

prepared by
Susan Gallagher

Western Transportation Institute
Montana State University - Bozeman

RESEARCH PROGRAMS

MDT

2012 MONTANA SUMMER TRANSPORTATION INSTITUTE

Final Project Report

by

Susan Gallagher

of the

Western Transportation Institute
College of Engineering
Montana State University – Bozeman

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Federal Highway Administration

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16. Abstract The Summer Transportation Institute (STI) hosted by the Western Transportation Institute (WTI) at Montana State University (MSU) aims to heighten student interest in transportation careers at the pre-college level. The program recruits high school students to participate in a two-week educational program on the MSU campus. The residential program introduces participants to all modes of transportation, seeks to build creative problem-solving skills, and supports college and career planning activities. The 2012 STI program was comprised of rising tenth, eleventh, and twelfth grade students from four states. Students lived on the MSU campus while participating in a multidisciplinary academic curriculum, which included guest speaker presentations, hands-on laboratories, and field trips. Students were exposed to an array of transportation careers and gained leadership skills while working on team design-build projects. During the evenings and weekend, STI students participated in educational, sports, and team-building activities. Sixteen secondary school students participated in the 2012 Summer Transportation Institute, which ran from June 10 to June 22, 2012.			
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PROGRAM ADMINISTRATION

1. Host Site: Western Transportation Institute, Montana State University
2. Address: PO Box 174250, Bozeman, MT 59717-4250
3. Project Director: Susan Gallagher
4. Length of Program: 2 weeks
5. Type of Program: Residential
6. Grade Level(s): Entering 10th, 11th, and 12th grades
7. Number of Students per Grade: 10^{th} grade (7), 11^{th} grade (4), 12^{th} grade (5)
8. Number of Student Applications Received: 23
9. Number of Students Selected for Program: 23
10. Number of Students to Complete Program: 16

ABSTRACT

The Summer Transportation Institute (STI) hosted by the Western Transportation Institute (WTI) at Montana State University (MSU) aims to heighten student interest in transportation careers at the pre-college level. The program recruits high school students to participate in a two-week educational program on the MSU campus. The residential program introduces participants to all modes of transportation, seeks to build creative problem-solving skills, and supports college and career planning activities. 2012 STI participants comprised of rising tenth, eleventh, and twelfth grade students from four states. Students lived on MSU campus while participating in a multidisciplinary academic curriculum, which included guest speaker presentations, hands-on laboratories, and field trips. Students were exposed to an array of transportation careers and gained leadership skills while working on team design-build projects. During the evenings and weekend, STI students participated in educational, sports, and team-building activities. Sixteen secondary school students participated in the 2012 Summer Transportation Institute, which ran from June 10 to June 22, 2012.

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1 INTRODUCTION

The Summer Transportation Institute (STI) hosted by the Western Transportation Institute at Montana State University (MSU) serves to attract high school students to participate in an innovative summer educational program in transportation. The STI aims to address the nation's need for a diverse pool of transportation professionals by heightening pre-college student interest in transportation careers. Program activities are designed to enhance participants' problem-solving, communication, and critical thinking skills and to introduce them to the broad array of opportunities available in the transportation field. The 2012 STI hosted sixteen high school students on the Montana State University campus for two weeks during June. The curriculum included presentations and activities related to various transportation modes with an overarching focus on transportation safety. Academic activities were enhanced by field trips and hands-on design/build activities. The program also provided a career and college counseling component, and team-building activities.

2 COMMITTEE, PARTNERS, AND STAFF INFORMATION

2.1 Intermodal Advisory Committee

An Intermodal Advisory Committee (IAC), made up of representatives from government, industry, and academia, was formed to assist the STI program in developing a well-balanced curriculum, planning activities and field trips, obtaining technical expertise, and conducting strategic planning. Members of the 2012 IAC are listed in the Section I Attachment provided in Appendix A.

A teleconference was held with IAC members on May 29, 2012 to discuss the program. The meeting began with an overview of what had been accomplished to date. Student recruitment was the biggest concern for the program given the very late funding confirmation and quick turnaround before the start of the program. IAC members provided school contact information for local schools and assisted in getting the word out via their own networks. IAC member Scott Keller volunteered to make arrangements for the participants' field trip to the Montana Department of Transportation (MDT) headquarters in Helena and to host a networking barbecue for STI participants, MDT Design Unit interns, and STI instructors. IAC members were also instrumental in obtaining continued financial support for the program from the Montana Chapter of the Institute of Transportation Engineers (ITE) (as discussed in Section 2.2 below).

2.2 Partners/Sponsors

The Montana Chapter of the Institute of Transportation Engineers (ITE) contributed $300 to supplement the STI budget. IAC (and ITE Chapter) members Scott Keller and Danielle Scharf have successfully advocated for the continuing financial support ITE annually provides to the STI program. In addition, the MSU Department of Civil Engineering provided access to the bulk materials and transportation laboratories and laboratory equipment, and the Tait Computer Laboratory. The Western Transportation Institute (WTI) made its Driving Simulation Laboratory available to students and provided use of its classroom and A/V equipment for classroom activities. The Montana Department of Transportation provided staff time during the field trip to

Helena. IAC member Scott Keller (MDT Design Unit) escorted students on the Helena field trip and served as a guest speaker during the program, introducing STI participants to a wetland reconstruction project completed by the MDT Design Unit on campus. Ryan Haskins, flight instructor from Summit Aviation and Director of Aviation Technology at Gallatin College, provided an overview of aviation careers to the students and set up tours at the airport. Partners are listed in the Section I Attachment in Appendix A.

2.3 Program Staff

Full-time program staff included the Project Director, an Academic Program Coordinator, a Teaching Assistant, and two Residence Hall Advisors (RAs). Teaching staff were responsible for assisting with the development of classroom and hands-on activities, leading classroom activities, and assisting guest instructors with classroom management. The RAs were hired to supervise students during weekends and evenings and to plan and lead leadership, recreation, and team-building activities.

A number of full-time research staff from the Western Transportation Institute as well as faculty from the Civil Engineering Department contributed to the development of the STI curriculum. Guest speakers also included staff from program partners Summit Aviation and MDT. All teaching and program staff are listed in the Section I Attachment in Appendix A. The STI topic presented by each instructor is given in parentheses after the person's title.

3 PROGRAM OBJECTIVES

The objectives of the MSU Summer Transportation Institute are to:

- Increase students' awareness of the significance of transportation in their daily lives;
- Expose high school students to the variety of transportation careers available and demonstrate how transportation professionals work to identify and solve real-world issues that have society-wide impacts;
- Increase students' understanding of the importance and need for creative and innovative transportation solutions;
- Develop communication and collaboration skills; and
- Provide college and career guidance.

The success of the program in meeting these objectives was evaluated based on 1) an assessment of the program curriculum in covering all relevant topics; 2) student responses to program evaluations administered after each activity; and 3) student responses on evaluations administered at the end of the program, which requested an overall assessment of all program aspects. The Program Director also conducted exit interviews with STI teaching staff at the end of the program. Results from evaluations are included in the *Evaluations* portion of this report.

4 MARKETING & STUDENT SELECTION PROCESS

Posters, announcements, and applications about the program were sent in January 2012 to principals and guidance counselors at Montana high schools. Program information and application forms were also posted on the WTI website. MSU representatives distributed information about the STI program at college fairs held on Montana reservations and application

packets were sent separately to programs that serve Native American students and other underrepresented or underserved groups including Upward Bound, Gear Up, and Talent Search. Students entering the 10th, 11th, or 12th grade were encouraged to apply for the program.

Twenty-three applications were received and all twenty-three applicants were accepted into the program. Six selected participants declined to participate before the program began. A contributing factor was the late confirmation of program funding. Some students chose other summer activities rather than to wait for confirmation that the STI program would be held. One student attended for the first two days, but chose to leave early for personal reasons. The remaining sixteen participants completed the two-week program. The Demographic Data Summary for 2012 STI participants is provided in Appendix B.

5 PROGRAM CURRICULUM

5.1 Academic Program

The 2012 Summer Transportation Institute at MSU involved students in a comprehensive academic program. Topics covered included traffic engineering and planning, infrastructure design, road ecology and environmental engineering, aviation, safety and human factors. STI participants learned about career opportunities from professionals representing public and private sector transportation organizations as well as academia. Hands-on activities related to each topic helped to develop students' problem-solving skills and reinforced what they had learned. In addition to classroom activities, students participated in a number of team design/build projects, including crash attenuator, glider, and balsa wood bridge competitions. The team projects served to build teamwork and communication skills while fostering creative problem solving.

Components of the academic program are outlined in detail below, and a daily schedule is provided in Appendix D.

Roads and the Environment

Rob Ament, Road Ecology Program Manager at the Western Transportation Institute, discussed environmental impacts of transportation networks with the STI students. The concept of road ecology was introduced and participants learned about various projects aimed at mitigating the negative impacts of roads on wildlife.

Scott Keller, from the Montana Department of Transportation Design Unit, introduced students to the concept of conservation banking and presented a wetlands mitigation project that the MDT Design Unit is conducting with assistance from undergraduate student interns. The students were able to visit the site following his presentation.

Dr. Otto Stein, Professor of Civil Engineering at MSU, provided an overview of hydrological concepts as they relate to wetlands and roadways. Students were introduced to bioresource engineering and the work of environmental engineers.

Students toured the MSU Subzero Laboratory, a cold room used for research on snow, ice, and winter conditions. The laboratory is used for transportation research related to infrastructure materials, freeze/thaw, frost heave, deicers and avalanches. Students were able to experience snow falling in June and to hear about research efforts currently being undertaken in the lab.

Traffic Engineering and Planning

Civil Engineering Professor Pat McGowen discussed transportation planning and introduced the students to the traffic simulation programs Synchro and TrafficSim. Participants learned about carrying capacity, congestion, and forecasting. They then experienced being transportation engineers through a hands-on activity that explored the impact road design has on congestion. Participants used intersection counters to "map" a local intersection by counting the cars that were traveling certain directions. They then determined how the intersection would be able to handle forecasted traffic loads in the future using traffic simulation programs. Using the software, they were able to explore various redesigns of the intersection to improve traffic movement.

Geotechnical Engineering

Eli Cuelho, Research Engineer at the Western Transportation Institute, introduced STI participants to the field of geotechnical engineering. After learning basic concepts, various soil properties were physically demonstrated. The importance of soils as foundations for structures, including roadways, was emphasized. Students demonstrated their acquired knowledge of soil properties in a laboratory competition. Student teams designed and built small scale, reinforced soil retaining walls. The walls were subjected to increasing loads until they collapsed.

Concrete

STI participants were introduced to concrete, a frequently used material for construction of transportation infrastructure. They learned about the various components that make up concrete and concepts behind concrete mix design. The students then made trial concrete batches in the laboratory using different mix designs. Samples were cast and cured from each trial batch for material property testing. Equivalent samples that had been previously cast and cured were then subjected to material property testing using compression equipment in the lab. The compression tests demonstrated the differences in concrete strength that resulted from different design mixes. Mike Berry, Assistant Professor of Civil Engineering, facilitated these activities.

Bridge Design

Civil Engineering Professor Jerry Stephens introduced students to bridge design and demonstrated a number of basic mechanics principles using foam, balsa wood, and reinforced and unreinforced concrete beams. Students also worked in teams of two to design and build a small scale, balsa wood truss bridge. The teams competed in a formal competition where loads were added to the bridges until they failed. Awards were given based on efficiency, aesthetics, and craftsmanship.

Aviation

Ryan Haskins, Director of Aviation Technology and licensed flight instructor, introduced students to aviation careers and airline regulation. The students visited the Gallatin Field Airport and toured a number of its facilities. They spoke to professionals in security, fire and rescue operations, and airplane maintenance. The students met flight instructors at Summit Aviation, and experienced a thirty-minute “discovery flight” in the school’s small training aircraft. Students also participated in a hands-on glider design/build challenge. Working in teams of two, gliders were designed and built based on knowledge gained during flight trials that experimented

with wing placement and nose weight. Final glider designs were reviewed and tested in a competition. Awards were given for aesthetics and engineering.

Traffic Safety and Human Factors

STI participants were introduced to human factors research as a critical component of traffic safety studies. They learned how researchers use driving simulation laboratories to safely conduct human factors research, and they developed and "drove" scenarios using WTI's state-of-the-art driving simulator. Participants were additionally able to experiment with texting while driving in a safe environment and to experience how differing levels of driver distraction impact driver performance. WTI Human Factors Research Assistants Jessica Mueller and Kaysha Young facilitated these activities.

Participants additionally learned about roadside hazards and crash attenuators. They then formed engineering teams and were challenged to design and build a crash attenuator as economically as possible out of provided materials (plastic bags, cotton balls, straws, etc.). The team able to build the cheapest and most efficient crash attenuator won an award. The attenuators were tested using a ramp, a toy truck, and an egg (as passenger).

Alternative Modes of Transportation

WTI Research Associate Rebecca Gleason gave a presentation on alternative modes of transportation, focusing on transit and biking. She discussed what some urban communities are doing to promote biking and transit ridership.

Field Trips

Field trips supplemented classroom and laboratory activities, providing students with an opportunity to meet and speak with practicing transportation professionals. Students participated in two field trips during the 2012 program as described below.

Gallatin Field Airport

STI participants toured airport fire and rescue, aircraft maintenance operations, and Summit Aviation flight school during a field trip to the airport (described above as part of the aviation module).

Montana Department of Transportation

STI participants visited the headquarters of the Montana Department of Transportation (MDT) in Helena, Montana. MDT staff met with STI participants to discuss transportation issues and careers. The MDT historian provided an overview of the history of transportation in Montana, including land and water transportation. STI students were treated to tours of both the Photogrammetry Section and the Computer-aided Design unit at MDT.

Following the tour of MDT, the students took a boat ride on the Missouri River through the Gates of the Mountains just north of Helena, Montana. The ferry tour covered the history of water transportation on the Missouri, beginning with Lewis and Clark's historic journey.

5.2 Enhancement Program

The enhancement program was designed to prepare students for college and to promote career self-awareness. The desired outcomes for the enhancement program were for students to: 1) better understand the steps necessary to enter college; 2) better understand what college majors are available and coursework requirements for those majors; 3) develop employability tools; and 4) better understand potential career paths.

Heather Wofford from the MSU Admissions Office spoke with STI participants about college entrance exams, college preparatory coursework, choosing an academic major, obtaining financial aid, and academic support services available for college students. STI participants also interacted with current college students to gain a better understanding of college life during a barbecue for STI participants and undergraduate student interns from MDT's on-campus Design Unit and the Western Transportation Institute.

In order to enhance students' career awareness, participants took the on-line "Strong Interest Inventory," a test designed to highlight a person's strengths and interests in relation to potential career fields. Erin McCormick from the MSU Career Services Office met with students to distribute and discuss the results of the Strong Interest Inventory and to help students put the information into context. She outlined some steps students could take to narrow their career choices and provided some basic career statistics. To develop participants' employability tools, she helped students to understand the importance of developing a good resume and honing their interviewing skills.

The Department Head in Civil Engineering, Dr. Brett Gunnink, provided the students with an overview of the Civil and Construction Engineering program at MSU and career development in these fields. His presentation included course requirements for Civil Engineering majors, licensing requirements for engineers after graduation, and professional certifications and continuing education for practicing professionals.

5.3 Sports and Recreation Program

The objectives of planned weekend and evening activities were to provide students additional experience working in teams and to promote a spirit of collegiality and good sportsmanship among the STI participants. Each evening, the Resident Advisors (RAs) organized ice-breakers, team-building activities, and team sports. Activities were varied to cater to the variety of interests within the group. Activities included: basketball, ping pong, soccer, swimming, football, and dancing. Students attended a free outdoor Shakespeare play on campus, visited the Museum of the Rockies and local farmer's market, hiked to Palisade Falls, and conducted a talent show.

5.4 Orientation and Closing Awards Program

STI participants arrived on campus on Sunday, June 10 and moved into their dormitory rooms with the assistance of the RAs and teaching staff. After the new arrivals were situated, an orientation was held for the students and parents. All staff members were introduced and an overview of planned STI activities provided. STI rules, regulations, and expectations were

reviewed in detail as well as consequences for non-compliance. The following day, students received an orientation to the academic program and participated in a tour of the Montana State University campus.

Family members of STI participants as well as STI instructors, sponsors, and IAC members were invited to the STI Closing Ceremony held on June 22, 2012. The closing ceremony was completely planned by the STI students. The participants prepared a photo slide show and presented each topic covered during the STI to their parents. Each student received a certificate of completion from STI staff. Winning design teams received special recognition and three pairs of students received special bonuses for participation and performance over the course of the program.

6 EVALUATIONS

6.1 Classroom Session Evaluations

Daily evaluations, which encouraged narrative input from the students in the form of a daily journal, were administered to the students. In addition to quantitative questions, the daily journals asked questions specifically focused on knowledge gained from each course module. The questions were designed to foster reflection on each day's activities.

The quantitative portion of daily evaluations allowed students to indicate their level of agreement with a specific statement using the following scale:

5 = Strongly agree
4 = Agree
3 = Neutral
2 = Disagree
1 = Strongly Disagree

These questions were used to gauge whether the students received adequate assistance and sufficient explanation for each topic covered.

Average scores for agreement with statements on classroom activities are summarized in Table 1. Student responses were very positive, with average scores ranging from 4.13 to 4.94.

Table 1: Student Classroom Evaluation Summary Scores

Statement	Concrete Design	Soils / Geotech	Human Factors	Traffic Engineering	Road Ecology
Students were able to ask questions and discuss related issues during the course of the activity.	4.75	4.88	4.75	4.56	4.69
The presentation related well to the laboratory or field activity that followed.	4.81	4.88	4.38	4.50	N/A
The instructor provided sufficient explanation of the concepts covered.	4.94	4.69	4.56	4.13	4.63

Reflective questions focused on knowledge gained during each module. For example, on one day of the program, students attended a presentation on geotechnical engineering followed by a laboratory activity in which they built soil retaining walls. In their journals, participants were asked to list three reasons knowledge of soil properties is essential for transportation professionals. Following the driving simulator activity, students were asked to consider what type of study they might undertake to improve safety if they were a researcher in the driving simulator laboratory. They were also asked to consider and list the pros and cons of using a simulator versus the "real world" for their proposed study.

A sample of student comments provided in response to reflective questions is given below:

- *I had not heard of human factors and its applications before today. I found it mind blowing how realistic [the driving simulator] was.*
- *I was surprised by how many different studies and types of research the simulator could be used for.*
- *With the simulator, a study could be done to discover the appropriate age to be allowed to drive a car with a license.*
- *I was not aware of how much design goes into guard rails and construction equipment. I learned that cost is a big factor in engineering.*
- *The crash attenuators [activity] allowed our first critical thinking experience and pushed us to improve on cost and effectiveness.*
- *I was really intrigued when we were told that concrete production is 7% of the world's global warming issue. It was cool though to see that engineers are using less environment endangering methods.*
- *One interesting concept about bridge design is the many structural designs that are adequate. Another interesting concept is the many ways a bridge could fail.*
- *I learned that there were different [bridge] designs depending on the lengths of the bridges. I also learned that adding steel to where there is tension on concrete helps it to be stronger.*
- *I didn't know that they planned intersections for the future. It was fun to see the different ways to keep the intersection from congestion.*
- *What was interesting was the many variables the [traffic simulation] program could handle and change. You can collect information by hand which is time consuming and you can collect it electronically and that is expensive.*
- *I learned that the timing of the traffic signals and how the lanes are set up affects how fast the cars can go.*

- *I haven't thought much in the past about the environmental impacts of our transportation system.*
- *[The subzero laboratory] showed me that scientists have come very far. They are now able to study winter conditions all year long.*

6.2 Team Design-Build Project Evaluations

STI participants also evaluated the balsa wood bridge and glider team projects they completed (see Table 2). The team design-build activities were intended to meet the objective of improving students' communication and collaboration skills. Most of the participants agreed that they learned to work on teams better. The majority (15 out of 16) felt challenged by the projects and enjoyed the creative design process.

Table 2: Team Design-Build Projects

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The team design/build activities were well organized.	12	3			1
Adequate time was allotted for the design/build projects.	12	2	2		
I was challenged by the projects.	9	6		1	
I learned to work in a team better.	8	4	1	3	
I learned some new leadership skills.	7	6	2	1	
I received adequate instruction.	8	6	1	1	
I enjoyed the creative design process.	12	3			1

* Number of respondents. N=16

6.3 Enhancement Program Evaluations

The STI program aimed to provide participants with career and college guidance. The Enhancement Program evaluations show that the program was largely successful in meeting this objective. As shown in Table 3, students felt more knowledgeable about applying to college and more confident about making college and career choices.

Table 3: Enhancement Program Summary Evaluations

Statement	2011 Summary Score
I feel more confident about making career choices.	4.56
I understand my career preferences better.	4.5

Scale: 5=Strongly agree; 1= Strongly disagree

Student narrative comments on daily journals underline the impact the STI program had on participants' perspectives regarding college and careers.

- *The information about Civil and Construction Engineering was interesting and made me consider going into engineering more seriously.*
- *Civil Engineering may be a future career for me. I wasn't aware of all the different areas before.*
- *I learned that the flight industry has many careers, including everyone on the ground.*
- *Obtaining a pilot's license seems like an obtainable goal. I learned that even in small aircraft, there are a lot of technical things that you need to know.*
- *I learned that you should try to get an internship in college so that you will be able to get a better job. They are very important.*
- *I found out jobs I have never thought about before…The information was useful to me in thinking about my career options.*
- *I found that I really do know already what path I wish to take for college and careers. I found some sub-interests that I could possibly explore more.*

6.4 2012 STI Overall Program Evaluation

An end of program survey was administered to gauge how students' attitudes toward college and career choices, engineering, and MSU, may have been changed by the program. The survey also evaluated the success of the program in meeting its objectives to: 1) increase participants' awareness of the significance of transportation; 2) expose participants to the variety of transportation careers available; 3) improve participants' understanding of the society-wide impacts made by transportation professionals; and 4) increase students' understanding of the need for innovation in transportation.

Fifteen participants completed the overall program evaluation. Eight reported an increased interest in engineering while two reported a decreased interest. Four students reported an increased interested in attending MSU for college. Fourteen respondents reported feeling more confident about making future college and career choices. All fifteen participants agreed that the STI helped them prepare for college.

On knowledge gained during the program, fourteen participants reported increased understanding of the importance of various transportation modes, thirteen agreed they better understood the significance of transportation professionals' impacts on society, and fourteen

understood the importance of innovation in transportation. All fifteen agreed they learned more about transportation careers.

In terms of skill development, fourteen participants agreed that the STI improved their problem-solving skills, eleven reported increased confidence in handling college courses, and thirteen agreed that they improved their ability to work on team projects. Overall, the majority of participants agreed that the program was meeting its objectives.

Table 4 below provides a breakdown of student responses to end of program evaluation questions.

Table 4: End of Program Survey Summary

	Number of Responses				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
STI Participant Goals					
1. I was able to meet other students with interests similar to mine.	8	5	1	1	
2. I was able to design and build projects.	11	4			
3. I was able to learn more about careers in transportation.	11	4			
4. I had fun while attending STI.	10	4		1	
5. STI helped me prepare for college.	10	5			
6. I was able to learn more about engineering.	10	5			
7. I would recommend the STI to other students.	9	3	2		1
8. I was able to learn more about Montana State University.	12	3			
9. Before the STI, I was interested in majoring in engineering.	5	4	5	1	
10. After the STI I would consider majoring in engineering.	7	4	2		2
11. Before the STI, I was interested in attending MSU.	7	4	2	1	1
12. After the STI, I would consider attending MSU.	8	5	1		1

	Number of Responses				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
13. The camp helped me to understand better the importance of college preparatory class work.	8	4	3		
14. I feel more confident now about making future college and career choices.	11	3	1		
15. I feel better able to work on a team project.	6	7	1	1	
16. I feel more confident that I can handle college courses.	7	4	4		
Speakers					
1. The speakers aligned with what I expected out of the camp.	6	6	3		
2. I enjoyed the speakers.	3	7	3	2	
3. The speakers led me to consider majoring in engineering.	5	6	1	2	
4. The speakers led me to consider attending MSU.	8	3	3		1
5. I learned about the importance of different modes of transportation.	7	7			1
6. I understand better how transportation professionals identify and solve problems that impact me in everyday life.	7	6	2		
7. I understand better how important innovation is for transportation.	9	5	1		
8. Camp presentations and activities helped me to develop my problem-solving skills.	7	7	1		

7 PRELIMINARY FINANCIAL REPORT

The 2012 STI received a budget of $40,029.49. Approximately $39,863.62 was spent out of the grant to support program activities. A detailed preliminary financial report (Section III Attachment) is presented in Appendix C.

8 SENIOR SURVEY DATA

In order to gauge the impact that the Summer Transportation Institute had on participants' career and college choices after high school, a survey was emailed and mailed to former STI participants the summer following the completion of their senior year in high school. In total, seventy-seven participants from the 2007-2011 programs had graduated high school by summer 2012. Of the seventy-seven graduates, twenty-five students responded to the survey (a 32% survey success rate). Data from twenty respondents was incorporated into the 2009-2011 annual reports. Five additional responses were received in 2012. A breakdown of 2012 survey responses is provided in Table 5 below.

Table 5: Senior Survey Responses

Survey Question	Yes	No
Did you apply to college?	5	
Are you currently enrolled in college?	5	
Did the STI experience impact your decision?	3	2
Did your STI experience help you in choosing a major?	4	1
Did your STI experience help prepare you for college entrance?	4	1

All five respondents had applied to and were enrolled in four-year institutions of higher education. Three of the five STI alumni had enrolled in Engineering programs (two in Mechanical Engineering and one in Chemical Engineering). Of the three Engineering students, two were attending Montana State University and one the South Dakota School of Mines and Technology. One past participant was enrolled in the Wildlife Biology program at the University of Montana and one in University Studies at Montana State University.

The senior survey asked respondents for narrative comments on how the STI affected their choices after high school. The responses highlight the impact the program had on helping students choose a college and major, prepare for college, and boost their confidence about succeeding in college.

- *It made me want to go to college more than I already wanted to and it also inspired me to try harder in school to actually make it through the engineering program. This program is a great program and should be continued! If I could redo the program I definitely would! Thank you for a great opportunity!!*
- *Well, I honestly thought that I was interested in engineering before I attended STI, but the program helped me to realize that I wasn't really. I did reinforce my vague interest in science in general, so I have now headed in that direction. I am taking Chemistry and Biology this semester. But two weeks on campus really made me want to come to MSU. I love it here! Thank you for offering the program!*
- *I knew I wanted to attend college and liked the feel of MSU-Bozeman campus. Good to see what types of jobs engineers work on.*
- *I knew I wanted to go into a science field after graduating high school, but the STI helped me to decide to go into an engineering field.*
- *[STI] showed me the options; boosted what girls could do; showed me I could do it.*

9 RECOMMENDATIONS

The 2012 Summer Transportation Institute at Montana State University provided sixteen secondary school students with exposure to the field of transportation, opportunities to learn about the variety of transportation careers available, and college preparatory and career planning experience. Student feedback and evaluations show that the participants were positive about the STI classroom activities, design-build team projects, and enhancement activities that were incorporated into the program curriculum.

The "incentives program" began in 2011 was continued in 2012 based on STI staff recommendations. The program promotes active participation in classroom and recreational activities by awarding points to student teams throughout the two-week program for various achievements. The highest scoring teams are awarded gift cards at the Closing Ceremony. The program is made possible thanks to program sponsors like the Montana ITE Chapter. The Project Director will continue to seek additional program sponsorships from non-federal sources to continue to implement this recommendation in future years.

10 APPENDIX A: SECTION 1 ATTACHMENTS

NATIONAL SUMMER TRANSPORTATION INSTITUTE PROGRAM - ANNUAL REPORT

SECTION I: INTER-MODAL ADVISORY COMMITTEE (IAC)

State: Montana	
Fiscal Year: 2012	**Host Site: Montana State University**

Name:	Dr. Ahmed Al-Kaisy
Title:	Associate Professor, Civil Engineering
Organization:	Montana State University

Name:	Kris Christensen
Title:	MDT Project Manager for STI
Organization:	Montana Department of Transportation, Research

Name:	Scott Keller
Title:	Design Supervisor
Organization:	Montana Department of Transportation Design Unit

Name:	Lloyd Rue
Title:	Program Development Engineer
Organization:	Federal Highway Administration, Montana Division

Name:	Danielle Scharf
Title:	Associate/Senior Engineer
Organization:	Sanderson Stewart

National Summer Transportation Institute Program - Annual Report

Section I: Partners/Sponsors

State: Montana	
Fiscal Year: 2012	**Host Site: Montana State University**

Name:	Ryan Haskins
Title:	Director, Aviation Technology
Organization:	College of Technology/Summit Aviation
Role/Contribution:	Aviation presentation to students/Airport tour

Name:	Montana Institute of Transportation Engineers (ITE) Chapter
Title:	Treasurer
Organization:	Montana Institute of Transportation Engineers (ITE) Chapter
Role/Contribution:	Monetary support

SECTION I: SUMMER TRANSPORTATION INSTITUTE PROGRAM STAFF

State: Montana	
Fiscal Year: 2012	**Host Site: MSU Western Transportation Institute**

Name:	Dr. Otto Stein
Position Title:	Associate Professor (Hydrology, Bio-resource Engineering)
Affiliation:	Civil Engineering Department, Montana State University

Name:	Dr. Michael Berry
Position Title:	Assistant Professor (Infrastructure Materials)
Affiliation:	Civil Engineering Department, Montana State University

Name:	Dr. Patrick McGowen
Position Title:	Associate Professor (Transportation Planning)
Affiliation:	Civil Engineering Department, Montana State University

Name:	Eli Cuelho
Position Title:	Research Engineer (Geotechnical Engineering)
Affiliation:	Western Transportation Institute, Montana State University

Name:	Dr. Jerry Stephens
Position Title:	Professor (Structures)
Affiliation:	Civil Engineering Department, Montana State University

Name:	Jessica Mueller
Position Title:	Graduate Research Assistant (Human Factors)
Affiliation:	Western Transportation Institute

Name:	Kaysha Young
Position Title:	Undergraduate Research Associate (Human Factors)
Affiliation:	Western Transportation Institute

Name:	Rebecca Gleason
Position Title:	Research Engineer (Alternative Transportation Modes)
Affiliation:	Western Transportation Institute

Name:	Rob Ament
Position Title:	Program Manager (Road Ecology)
Affiliation:	Western Transportation Institute

National Summer Transportation Institute Program – Annual Report

Section I: Summer Transportation Institute Program Staff

State: Montana	
Fiscal Year: 2012	**Host Site: MSU Western Transportation Institute**
Name:	Susan Gallagher
Position Title:	STI Project Director
Affiliation:	Western Transportation Institute

Name:	Beez Lucero
Position Title:	STI Academic Program Coordinator
Affiliation:	Western Transportation Institute

Name:	Nicholas Pfister
Position Title:	STI Teaching Assistant
Affiliation:	Western Transportation Institute

Name:	Michael McKenzie
Position Title:	Residence Hall Advisor (STI)
Affiliation:	Western Transportation Institute

Name:	Danae Bray
Position Title:	Residence Hall Advisor (STI)
Affiliation:	Western Transportation Institute

11 APPENDIX B: DEMOGRAPHIC SUMMARY REPORT

FY 2012

National Summer Transportation Institute Program - Demographics Data Sheet

State:	Montana	Project Director:	Susan Gallagher
		Program Dates:	June 10-22, 2012
Host Site:	Western Transportation Institute	Program Length:	2 weeks

Select Grade Level		Applicant Data		
High School	X	Number of Applications Received:		23
Middle School		Number of Participants Selected:		23
Select Program Classification		Number of Participants that Completed the Program:		16
Residential	X	**Geographic Representation**		
Non-Residential		Number of Cities: 10	Number of Counties: 9	Congressional District Number(s): Montana 1 At-large

	Race/Ethnicity							Gender		Disability	Grade Level					
	African American	Caucasian	Hispanic American	Native American	Asian American	Pacific Islander	Other	Male	Female	Targeted Disabilities*	7	8	9	10	11	12
Number Of Participants:		12			1		3	10	6					7	4	5

Provide Type(s) of *Targeted Disabilities: N/A

Schools Represented	
Name/City/State	Name/City/State
Park High School/Livingston/MT	Peak to Peak Charter School/Lafayette/CO
Laurel High School/Laurel/MT	
Three Forks High School/Three Forks/MT	
Manhattan Christian High School/Manhattan/MT	
Bozeman High School/Bozeman/MT	
Capital High School/Helena/MT	
The Compass Academy/Idaho Falls/ID	
C.M. Russell High School/Great Falls/MT	
Helena High School/Helena/MT	
St. Thomas Aquinas/Ft. Lauderdale/FL	
Manhattan Yeshiva Jewish Day School/Manhattan/MT	

12 APPENDIX C: PRELIMINARY FINANCIAL REPORT

NATIONAL SUMMER TRANSPORTATION INSTITUTE PROGRAM

SECTION III: PRELIMINARY FINANCIAL REPORT

State:	Montana

Host Site:	WTI
Fiscal Year:	2012

Budget			
Categories	**Approved**	**Expended**	**Unexpended**
Personnel	$13,885.00	$15,752.23	-$1,867.23
Fringe Benefits	$3,471.25	$1,664.67	$1,806.58
Recruitment	$800.00	$606.84	$193.16
Contractual Services	$1,102.00	$1,168.00	-$66.00
Food	$300.00	$329.58	-$29.58
Travel	$2,800.00	$2,790.54	$9.46
Supplies	$250.00	$516.89	-$266.89
Room & Board	$12,200.00	$11,835.27	$364.73
Stipends			$0.00
Indirect Cost	$5,221.24	$5,199.60	$21.64
Totals	$40,029.49	$39,863.62	$165.87

Balance **$165.87**

Note: Expended Funds should include all expenditures whether invoiced or not.

13 APPENDIX D: STI SCHEDULE

2012 Summer Transportation Institute at Montana State University

Week 1: June 11 – June 15

Monday, June 11	Thursday, June 14
9:00-11:30 am: STI Orientation (Transportation knowledge pre-test; Program overview, schedule & expectations; small group activity) (STI Staff) [WTI Classroom, Rm 333] **Noon-1pm:** Lunch (Miller Dining Hall) **1:00-2:00:** Campus Tour [Meet at Admissions Office in SUB second floor] – (Admissions, x1989) **2-5pm:** Human Factors/Driving Simulator Demo—(Kaysha Young and staff)	**7am:** Pick up picnic lunches at Miller **8:15am:** Depart for Gallatin Field Airport **8:30am-1pm**: Field trip to Gallatin Field Airport and discovery flights with Summit Aviation (Picnic lunches) **2:00-3:00:** Aviation Presentation [CB202] **3:00-5pm:** Work on glider design/build challenge
Tuesday, June 12	**Friday, June 15**
9am-noon: Roadside safety and Crash attenuators project [CB202] **Noon-1pm:** Lunch (Miller Dining Hall) **1-2pm:** Intro to Civil and Construction Engineering (Gunnink) **[**CB202] **2-5pm:** Soil Reinforcement and Retaining Walls (Cuelho) [CB202]	**9-10am:** Trucking/Freight (Stephens) **[**CB202] **10am-noon:** Balsa Bridge Work **Noon-1pm:** Lunch (Miller Dining Hall) **1-4pm:** McGowen: Intersection counting and traffic study [Tait Lab]
Wednesday, June 13	**Saturday/Sunday June 16-17**
9-10:00: Hydrology (Dr. Stein) [CB202] **10-Noon:** [CB 202] Structures/Bridge Design-(Stephens) **Noon-1pm:** Lunch (Miller Dining Hall) **1-4pm:** Concrete Introduction and lab; concrete testing (Berry) [CB202/CB bulk materials lab] **4-5pm:** Balsa bridges design/build challenge	**Sports and Enhancement Activities**

Week 2: June 18 – June 22

Monday, June 18	Thursday, June 21
8am-9am: Strong Interest Inventory-[dorm computer lab] (STI staff) **9am-noon:** Balsa Bridge Work **Noon-1pm:** Lunch (Miller Dining Hall) **1-2pm:** Sub Zero Lab Tour **2-3:** Road ecology (Ament) [WTI Classroom] **3-4:** College prep/admissions process (Heather Wofford) [WTI Classroom] **4-5:** Finish up bridges and gliders	**6:30am**: Breakfast and pick up sack lunches **7am:** Depart for Tour of Montana Department of Transportation Headquarters (Helena) **2pm:** Gates of the Mountain ferry ride
Tuesday, June 19	Friday, June 22
9am-noon: Wetlands presentation & site visit (Keller) [WTI Classroom] **Noon-1pm:** Lunch (Miller Dining Hall) **1-2pm:** Evaluations **2-3pm:** Glider Testing [Romney] **3-4pm:** Alternative modes/biking (Gleason) (WTI Classroom) **6pm:** MDT Design Unit networking BBQ	**Morning:** Packing and Dorm Check Out **11am-Noon** (WTI Classroom) STI Closing Ceremony and Farewells
Wednesday, June 20	
9am-10am: Balsa Bridge Testing **10am - noon**: Final evaluations; transportation knowledge post-test (Jeopardy) **Noon-1pm:** Lunch (Miller Dining Hall) **1-3pm:** Career Planning/Strong Interest Inventory results (McCormick)Closing ceremony preparation (STI staff-WTI Classroom) **3-5pm:** Closing Ceremony prep (STI staff)	