

2010 SUMMER TRANSPORTATION INSTITUTE

FHWA/MT-10-003/6439-041

Final Report

prepared for
THE STATE OF MONTANA
DEPARTMENT OF TRANSPORTATION

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

September 2010

prepared by
Susan Gallagher

Western Transportation Institute
Montana State University - Bozeman



RESEARCH PROGRAMS



You are free to copy, distribute, display, and perform the work; make derivative works; make commercial use of the work under the condition that you give the original author and sponsor credit. For any reuse or distribution, you must make clear to others the license terms of this work. Any of these conditions can be waived if you get permission from the sponsor. Your fair use and other rights are in no way affected by the above.

2010 SUMMER TRANSPORTATION INSTITUTE

Final Project Report

by

Susan Gallagher

of the

Western Transportation Institute
College of Engineering
Montana State University – Bozeman

prepared for the

State of Montana
Department of Transportation
Research Programs

in cooperation with the

U.S. Department of Transportation
Federal Highway Administration

September 2010

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. FHWA/MT-10-003/6439-041	2. Government Access No.	3. Recipient's Catalog No.	
4. Title and Subtitle 2010 Summer Transportation Institute		5. Report Date September 2010	
		6. Performing Organization Code	
7. Author(s) Susan Gallagher		8. Performing Organization Report Code	
9. Performing Organization Name and Address Western Transportation Institute PO Box 174250 Montana State University – Bozeman Bozeman, Montana 59717-4250		10. Work Unit No. (TRAVIS)	
		11. Contract or Grant No. MSU G&C #4W3073 MDT Project #6439-041	
12. Sponsoring Agency Name and Address Research Programs Montana Department of Transportation 2701 Prospect Avenue Helena, Montana 59620-1001		13. Type of Report and Period Covered Final Report March 2010 – August 2010	
		14. Sponsoring Agency Code 5401	
15. Supplementary Notes Program performed in cooperation with the Montana Department of Transportation and the U.S. Department of Transportation, Federal Highway Administration. This report can be found at http://www.mdt.mt.gov/research/projects/admin/summer.shtml .			
16. Abstract The Summer Transportation Institute (STI) hosted by the Western Transportation Institute at Montana State University 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. In order to meet this goal, the STI serves to heighten pre-college student interest in transportation careers and to enhance the necessary skills of students from diverse backgrounds to achieve careers in the transportation field. Fifteen secondary school students participated in the residential program at MSU from June 13 to June 25, 2010. The STI recruited rising tenth, eleventh, and twelfth grade students from a mix of backgrounds and hometowns. Students lived on MSU campus while learning about career opportunities in transportation. The two-week program provided a multidisciplinary academic curriculum, which included guest speaker presentations, hands-on laboratories, and field trips. Students learned about all modes of transportation and gained leadership skills while working on team design-build projects. Highlights included field trips to the Montana Department of Transportation headquarters in Helena, Gallatin Field airport, and two major road redesign projects in Billings, Montana. In addition, the participants learned about college preparation and career planning. During the evenings and weekend, STI students participated in educational, sports, and team-building activities.			
17. Key Words Workforce Development, K-12 Outreach, Transportation Career, Education and Training, Labor Force, Educational Services, Engineers, High Schools		18. Distribution Statement unrestricted. this document is available through the National Technical Information Service , Springfield VA. 21161.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 27	22. Price

DISCLAIMER

This document is disseminated under the sponsorship of the Montana Department of Transportation and the United States Department of Transportation in the interest of information exchange. The State of Montana and the United States Government assume no liability of its contents or use thereof.

The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official policies of the Montana Department of Transportation or the United States Department of Transportation.

This report does not constitute a standard, specification, or regulation.

ALTERNATIVE FORMAT STATEMENT

MDT attempts to provide accommodations for any known disability that may interfere with a person participating in any service, program, or activity of the Department. Alternative accessible formats of this information will be provided upon request. For further information, call (406) 444-7693, TTY (800) 335-7592, or Montana Relay at 711.

ACKNOWLEDGMENTS

The author gratefully acknowledges the efforts of members of the Intermodal Advisory Board. Acknowledgement of financial support and matching dollars for this program is extended to the Montana Department of Transportation, the Federal Highway Administration, the Montana Institute of Transportation Engineers Chapter, Summit Aviation as well as the Research and Innovative Technology Administration (RITA) at the United States Department of Transportation through the Western Transportation Institute at Montana State University.

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: 10th grade (5), 11th grade (7), 12th grade (3)
8. Number of Student Applications Received: 21
9. Number of Students Selected for Program: 18
10. Number of Students to Complete Program: 15

ABSTRACT

The Summer Transportation Institute (STI) hosted by the Western Transportation Institute at Montana State University 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. In order to meet this goal, the STI serves to heighten pre-college student interest in transportation careers and to enhance the necessary skills of students from diverse backgrounds to achieve careers in the transportation field. Fifteen secondary school students participated in the residential program at MSU from June 13 to June 25, 2010. The STI recruited rising tenth, eleventh, and twelfth grade students from a mix of backgrounds and hometowns. Students lived on MSU campus while learning about career opportunities in transportation. The two-week program provided a multidisciplinary academic curriculum, which included guest speaker presentations, hands-on laboratories, and field trips. Students learned about all modes of transportation and gained leadership skills while working on team design-build projects. Highlights included field trips to the Montana Department of Transportation headquarters in Helena, Gallatin Field airport, and two major road redesign projects in Billings, Montana. In addition, the participants learned about college preparation and career planning. During the evenings and weekend, STI students participated in educational, sports, and team-building activities.

TABLE OF CONTENTS

1	Introduction.....	1
2	Committee, Partners, and Staff Information.....	1
2.1	Intermodal Advisory Committee.....	1
2.2	Partners/Sponsors.....	1
2.3	Program Staff.....	2
3	Program Objectives.....	2
4	Marketing & Student Selection Process.....	3
5	Program Curriculum.....	3
5.1	Academic Program.....	3
5.2	Enhancement Program.....	6
5.3	Sports and Recreation Program.....	6
5.4	Orientation and Closing Awards Program.....	7
6	Evaluations.....	7
6.1	Classroom Session Evaluations.....	7
6.2	Team Design-Build Project Evaluations.....	8
6.3	Enhancement Program Evaluations.....	9
6.4	2010 STI Overall Program Evaluation.....	10
7	Preliminary Financial Report.....	12
8	Senior Survey Data.....	12
9	Recommendations.....	13
10	Appendix A: Section 1 Attachments.....	14
11	Appendix B: Demographic Summary Report.....	18
12	Appendix C: Preliminary Financial Report.....	19
13	Appendix D: STI Schedule.....	20

LIST OF TABLES

Table 1: Student Classroom Evaluation Summary Scores	8
Table 2: Team Design-Build Project Evaluation	8
Table 3: Enhancement Program Summary Evaluations	9
Table 4: End of Program Survey Summary	11

1 INTRODUCTION

The Summer Transportation Institute (STI) hosted by the Western Transportation Institute at Montana State University 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 capable of developing creative long-term solutions to a growing host of complex and intermodal transportation issues. In order to meet this goal, the STI serves to heighten pre-college student interest in transportation careers and to enhance the necessary skills of students from diverse backgrounds to achieve careers in the transportation field. The 2010 STI hosted fifteen high school students on the Montana State University campus for two weeks during June. The curriculum included an overview of various college and professional careers related to the transportation field. 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 2010 IAC are listed in the Section I Attachment provided in Appendix A.

The IAC met together with the Montana Department of Transportation (MDT) Technical Panel on May 19, 2010 to discuss the program. The meeting began with an overview of what had been accomplished to date. Feedback from IAC members was solicited regarding the proposed curriculum and field trips. To bolster students' exposure to the private sector, it was suggested that a field trip to Billings, Montana be added to the curriculum in order to meet with transportation consultants from various firms and to tour two major road reconstruction projects. IAC members Scott Keller and Danielle Scharf were instrumental in contacting project engineers and coordinating a tour through the relevant travel corridors in Billings.

2.2 Partners/Sponsors

In addition to IAC members, a number of university departments and private and public transportation agencies provided support to the STI program. The 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. MDT-Helena staff also developed a promotional video

about the STI program for distribution to schools and to post on project websites. IAC member Scott Keller (MDT Design Unit) escorted students on both the Helena and Billings field trips, providing valuable information along the way. He also served as a guest speaker during the program, introducing STI participants to a wetland reconstruction project completed by the MDT Design Unit on campus. Consulting firms HKM and Sanderson Stewart provided staff time during the field trip to Billings. Ryan Haskins, flight instructor from Summit Aviation and Director of Aviation Technology at the College of Technology, provided an overview of aviation careers to the students and set up tours at the airport. The Montana Institute of Transportation Engineers (ITE) Chapter contributed \$500 to the program to cover travel costs for field trips. Program 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, MDT, HKM, and Sanderson Stewart. 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. 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 February 2010 to principals and guidance counselors at Montana high schools. Information was additionally distributed via the WTI website, MDT, and the Montana ITE Chapter. Students entering the 10th, 11th, or 12th grade were encouraged to apply for the program. The STI program especially seeks to attract Native American student participants. A number of recruitment strategies were deployed to reach this population. STI applications and program information were sent to program coordinators from programs that serve Native American students and other underrepresented or underserved groups including Upward Bound, Gear Up, and Talent Search. In addition, representatives from MSU distributed information about the STI program at college fairs held at seven different reservation high schools in Montana. The STI Project Director also shared program information with approximately 100 Native American high school students attending MSU's Native American Preview Day.

Twenty-one applications were received for the program. Three applicants were not accepted to the program because they had already participated in the past. Selection letters were sent out to the remaining eighteen applicants together with a detailed information packet and permission forms. Fifteen of the accepted applicants elected to attend the program. All fifteen completed the two-week program. The Demographic Data Summary for 2010 STI participants is provided in Appendix B.

5 PROGRAM CURRICULUM

5.1 Academic Program

The 2010 Summer Transportation Institute at MSU involved students in a comprehensive academic program. Topics covered included traffic engineering, infrastructure design, road ecology, urban planning, 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 a glider and a balsa wood bridge competition. 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.

Road Ecology

Angela Kociolek, Ecologist at the Western Transportation Institute, discussed green transportation systems with STI participants. She introduced basic concepts in ecology and how they relate to the way the transportation system interacts with its surrounding environment. The group discussed the impacts that transportation systems have on the environment and what can be done to mitigate the negative effects. The students then learned about specific mitigation measures in use to protect wildlife and travelers from animal-vehicle collisions, which include highway fencing, overpasses, underpasses, and driver warning systems.

Matt Blank, Research Associate at the Western Transportation Institute, introduced issues related to road stream crossings. He described how engineers study the hydrology of streams and of the culverts that pass under roads to determine whether culverts present barriers to the passage of fish. The impact that fish passage barriers may have on fish migration patterns and population viability were discussed. The students then learned how to measure flow in a nearby stream.

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.

Urban Planning

Pat McGowen, Assistant Professor in Civil Engineering at MSU, discussed urban transportation planning and introduced the students to traffic simulation programs Synchro and TrafficSim. The participants used the software to redesign an intersection in Bozeman. Students then experienced being urban planners using the computer game SimCity. The students were asked to design a workable city transportation infrastructure without bankrupting the treasury.

Traffic Engineering

Ahmed Al-Kaisy, Associate Professor of Civil Engineering at MSU, facilitated a number of activities designed to introduce students to the field of traffic engineering. Through classroom presentations, students learned about the purpose of the road system, its users, various road classifications, and how roads relate to land use. Students discussed the concept of carrying capacity and issues of congestion and explored the impact speeds had on congestion. They collected speed data in the field using a radar gun, entered the data into Excel in order to obtain mean speeds, and then populated a traffic simulation model with this data. By manipulating the speed data in the simulation software, they could compare how different speeds impacted road capacity and congestion. The combination of classroom, computer, and field exercises provided the students with a robust overview of traffic engineering concepts.

Geotechnical Engineering

Robert Mokwa, Associate Professor of Civil Engineering, 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. Once students were comfortable with bridge design concepts, they formed two-person teams for a design/build challenge. Each team was charged with designing and building a small scale, balsa wood truss bridge. A formal competition was held between the student teams. 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, air traffic control and airplane maintenance. The students met flight instructors at Summit Aviation, viewed the school's state-of-the-art flight simulator, and were treated to a thirty-minute "discovery flight" in the school's small training aircraft. Students also participated in a hands-on glider design/build exercise. 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

Human responses to roadway signage, traffic, and driving environment are a key element in safety, and students 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. Industrial Engineering Graduate Research Assistant Shaun Durkee facilitated these activities.

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 three field trips during the 2010 program as described below.

Gallatin Field Airport

STI participants toured airport fire and rescue, air traffic control tower, 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 MDT headquarters in Helena, Montana. MDT Director, Jim Lynch, 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 CADD 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, MT. The ferry tour covered the history of water transportation on the Missouri, beginning with Lewis and Clark's historic journey.

Billings Montana

Students traveled to Billings, Montana to meet with transportation consultants from HKM and Sanderson Stewart. The project engineers discussed the benefits of roundabouts on traffic safety and congestion, provided an overview of two major road redesign projects in Billings using roundabouts, and led a tour of the two redesigned travel corridors.

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:

- Understand steps necessary to enter college;
- Develop and use employability tools; and
- Recognize and appreciate the value of diversity in the workforce.

Megan Somers 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.

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: Frisbee, bouldering, hikes, game and movie nights, folf, a group barbecue, a visit to the Museum of the Rockies, volleyball, and swimming.

5.4 Orientation and Closing Awards Program

STI participants arrived on campus on Sunday, June 13 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. The students took a pre-program survey and WTI Research Director, Jerry Stephens, provided an overview of the transportation field. Students also 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 25, 2010. The closing ceremony was completely planned by the STI students. They chose decorations for the room and organized the agenda. The participants prepared a musical slide show and presented in small teams on a topic covered during the STI. They designed posters and props to demonstrate activities and topics. Participants also presented STI instructors with certificates of appreciation. Each student received a certificate of completion from STI staff. Winning design teams received special recognition.

6 EVALUATIONS

6.1 Classroom Session Evaluations

STI students completed evaluations during the camp to provide program staff feedback on the curriculum and classroom activities. The classroom evaluations were used to gauge whether the students found the activities and instructors to be engaging and to elicit comments and suggestions for improvements. In addition to eliciting open-ended responses regarding each course module, students indicated their level of agreement with a specific statement on evaluation forms using the following scale:

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

Average scores for agreement with statements on classroom activities are summarized in Table 1. Student responses were generally positive, with average scores ranging from 3.8 to 4.8. Comments on the driving simulator activity revealed that students enjoyed the activity, but were frustrated by the instructor not having enough time to assist them. The activity involved multiple

stations and was led by a graduate student. In future, additional instructors with more teaching experience would be helpful to adequately facilitate the activity and answer questions.

Students were invited to write open ended comments on each activity, but few elected to do so. The comments written did underline the importance of hands-on activities to keep students interested and engaged. One student reflected that although a speaker was fairly interesting “I just didn’t like sitting through all those presentations, I’m more hands on.” Several students commented that the concrete making and breaking activity was their favorite.

Table 1: Student Classroom Evaluation Summary Scores

Statement	Concrete Design	Soils / Geotech	Driving Sim	Traffic Engineering	Fish Passage	Road Ecology	Sim City
The instructor was available when I had a question or needed assistance.	4.67	4.69	4.33	4.45	4.40	4.33	4.13
The instructor was friendly and considerate.	4.87	4.69	3.87	4.36	4.40	4.53	4.53
The instructor was enthusiastic and knowledgeable about program topics and activities.	4.67	4.62	3.93	4.27	4.47	4.60	4.20
The instructor encouraged students to strive for excellence in projects and activities.	4.60	4.62	3.93	4.18	4.07	4.27	4.13
The instructor explained assignments well and provided assistance when necessary.	4.80	4.69	4.00	4.09	4.33	4.47	3.93
The instructor treated everyone fairly.	4.80	4.62	3.80	4.45	4.53	4.60	4.33

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. All of the students agreed that they enjoyed the two projects and that the competitions were fun and challenging.

Table 2: Team Design-Build Project Evaluation

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Activities were well organized.	*8	5	2		
I was challenged by the activities.	8	5	1		1
Adequate time was allotted for the activities.	4	8	1	2	
I felt free to ask questions.	6	5	3	1	
I learned to work in a team better.	2	7	5	1	
I gained some leadership skills.	2	4	8	1	
I enjoyed the creative design process.	6	8	1		
I received adequate instruction.	4	8	3		
Competitions were fun and challenging.	9	6			
I enjoyed the glider project.	11	4			
I enjoyed the balsa wood bridge project.	11	4			

* Number of respondents. N=15

The majority of participants enjoyed the creative design process. Student comments regarding what they enjoyed most about the balsa wood bridge competition included:

- *Creativity and teamwork.*
- *The thought that was needed for the design.*

Students enjoyed the team glider project because:

- *I liked making the glider using points that we learned from presentation.*
- *The trial-error process was fun.*
- *I've never done something like it so it was super fun and interesting.*

Several of the students commented that they found working on teams easy or at least that the process was familiar to them. Comments regarding what students learned about working in teams included:

- *All people have ideas to share.*
- *New ideas help.*
- *If you work together you can get done faster and more efficiently.*
- *It's easy.*
- *I work well in a team.*
- *Nothing I haven't learned before.*
- *Nothing new.*

6.3 Enhancement Program Evaluations

One of the program objectives was to provide STI 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	Summary Score
Presentations were well organized.	4.36
Enough time was allotted for the activities.	4.29
I felt free to ask questions.	4.43
I feel more knowledgeable about the process of applying to college.	4.07
I feel more confident about making career choices.	4.21
I understand my college and career preferences better.	4.14

Scale: 5=Strongly agree; 1= Strongly disagree

Student comments highlight the impact the Strong Interest Inventory and career presentation had on them. They enjoyed:

- *Discovering more about myself.*
- *Getting ideas about possible careers.*
- *Finding out what I would be good at.*

Students learned:

- *How easy it is to apply to college and where to apply for scholarships.*
- *What MSU has to offer.*
- *That it is up to you to decide your college course.*
- *A lot about MSU that I didn't know before.*

One student felt the information received “made me want to go to MSU more.” A second noted that it “enforced my decision to become an engineer.” The only suggestion for changes to the Enhancement Program was to allow more time for the career planning component.

6.4 2010 STI Overall Program Evaluation

An end of program survey was administered to gauge how students’ attitudes toward college preparatory courses, engineering, and MSU, may have been changed by the program. The survey also queried participants’ program expectations and perceptions. Observations based on these survey results include:

- 1) The majority of participants felt more knowledgeable about careers in transportation and engineering following the STI;
- 2) Nine students reported that the STI helped them to prepare for college;
- 3) The majority of students enjoyed the STI program and all but one participant would recommend the STI to other students;
- 4) The STI program generated interest in attending MSU after high school;
- 5) The STI program had a negligible effect on what classes students intended to take in high school and on their choice of major after high school.

A summary of the survey results is given in Table 4 (Note: not all fifteen students answered every question).

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.	3	10	1	1	
2. I was able to design and build projects.	7	8			
3. I was able to learn more about careers in transportation.	9	4	2		
4. I had fun while attending STI.	9	5	1		
5. STI helped me prepare for college.	5	4	4		
6. I was able to learn more about engineering.	7	5	2		
7. I would recommend the STI to other students.	8	6	1		
8. I was able to learn more about Montana State University.	10	3	2		
9. Before the STI, I was interested in majoring in engineering.	4	3	4	2	2
10. After the STI I would consider majoring in engineering.	4	2	6	2	1
11. Before the STI, I was interested in attending MSU.	3	2	5	4	1
12. After the STI, I would consider attending MSU.	8	1	5	1	
13. I will take different classes in high school after attending STI.	1	1	8	4	1
Speakers					
1. The speakers aligned with what you expected out of the camp.	2	6	4	3	
2. I enjoyed the speakers.	2	5	5	2	
3. The speakers led me to consider majoring in engineering.	2	6	4	3	

	Number of Responses				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
4. The speakers led me to consider attending MSU.	3	6	4	1	
Projects					
1. The projects helped me understand transportation careers better than before.	6	7	1	1	
2. In general, the projects gave me some practical experience related to transportation.	7	5	3		
3. Enhancement activities were beneficial.	9	3	1	2	

7 PRELIMINARY FINANCIAL REPORT

The 2010 STI received a budget of \$33,677.02. To date, \$27,015.37 has been expended. The Montana Department of Transportation has documented \$4,800 in cost-share for the program and the Western Transportation Institute documented \$3,535 in in-kind contributions. Documentation for additional in-kind and matching contributions to the program is being collected. 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, twenty-seven participants from the 2007, 2008, and 2009 programs had graduated high school by summer 2010. Of the twenty-seven graduates, eleven students responded to the survey (a 41% success rate). Data from five respondents was incorporated into the 2009 annual report. Six additional responses were received in 2010. A breakdown of 2010 survey responses is provided in Table 5 below.

Table 5: Senior Survey Responses

Survey Question	Yes	No
Did you apply to college?	6	
Are you currently enrolled in college?	6	
Did the STI experience impact your decision?	3	3
Did your STI experience help you in choosing a major?	4	2
Did your STI experience help prepare you for college entrance?	2	4

All six respondents had applied to and were attending college after high school (five were attending four-year institutions, one was enrolled in a two-year program). Of the students in four-year institutions, four students were enrolled in engineering programs (two in electrical engineering and two in mechanical engineering) and one was enrolled in a pre-med program. Two students are attending University of Idaho, two are enrolled at Montana State University, and one is at Georgia Tech. The student in the two-year program is seeking to complete a transportation communications course in order to work with a railway.

The senior survey asked respondents for narrative comments on how the STI affected their choices after high school. Many of the comments highlighted the impact the program had on helping students narrow down their choices of college major:

1. *It gave me a helpful preview of Bozeman, and encouraged me to know that engineering, if not necessarily transportation engineering, was a good choice for me.*
2. *STI influenced my decision to go into Electrical Engineering because I wasn't sure which field of engineering I wanted to be in. Though I enjoyed my experience at STI, I learned there that Civil Engineering is not for me.*
3. *Helped firm up engineering choice.*
4. *It showed me that engineering wasn't right for me.*

Additional comments included:

- *I would consider that STI, if nothing else, prepared me for college. I feel that the environment of the program is very similar to that which I am experiencing in college, and I believe that STI played a role in preparing me for this experience.*

9 RECOMMENDATIONS

The 2010 Summer Transportation Institute at Montana State University provided fifteen 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.

Overall, the program was very successful in meeting its stated objectives and the curriculum and activities developed for the 2010 Summer Transportation Institute will be used as a template for future STI programs at MSU. However, one change is recommended for subsequent STI programs. In order to better evaluate projected outcomes for the program, new survey instruments will be developed that encourage greater narrative input from the students and focus less on classroom delivery and more on knowledge gained from each course module.

10 APPENDIX A: SECTION 1 ATTACHMENTS

National Summer Transportation Institute Program - Annual Report	
Section I: Inter-modal Advisory Committee (IAC)	
State: Montana	Host Site: Montana State University
Fiscal Year: 2010	
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 Division
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
Name:	Sue Sillick
Title:	Research Programs Manager
Organization:	Montana Department of Transportation

National Summer Transportation Institute Program - Annual Report

Section I: Partners/ Sponsors

State: Montana	Host Site: Montana State University
Fiscal Year: 2010	
Name:	Ryan Haskins
Title:	Director, Aviation Technology
Organization:	College of Technology/Summit Aviation
Role/Contribution:	Aviation presentation to students/ Airport tour
Name:	Lisa McFarland
Title:	Workforce Development Coordinator
Organization:	Montana Department of Transportation
Role/Contribution:	Development of promotional STI DVDs for recruitment
Name:	Erin Claunch
Title:	Treasurer
Organization:	Montana Institute of Transportation Engineers (ITE) Chapter
Role/Contribution:	Monetary support
Name:	Teri Swenson
Title:	Project Engineer
Organization:	DOWL HKM
Role/Contribution:	Presentation/ tour of Airport Road project in Billings
Name:	Kirk Spalding
Title:	Project Manager
Organization:	Sanderson Stewart
Role/Contribution:	Presentation/ tour of Shiloh Road project in Billings

National Summer Transportation Institute Program - Annual Report**Section I: Summer Transportation Institute Program Staff**

State: Montana	Host Site: MSU Western Transportation Institute
Fiscal Year: 2010	
Name:	Dr. Ahmed Al-Kaisy
Position Title:	Associate Professor (Transportation 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:	Assistant Professor (Transportation Planning)
Affiliation:	Civil Engineering Department, Montana State University
Name:	Dr. Robert Mokwa
Position Title:	Associate Professor (Geotechnical Engineering)
Affiliation:	Civil Engineering Department, Montana State University
Name:	Dr. Jerry Stephens
Position Title:	Professor (Structures)
Affiliation:	Civil Engineering Department, Montana State University
Name:	Dr. Matthew Blank
Position Title:	Research Engineer (Hydrology)
Affiliation:	Western Transportation Institute
Name:	Shaun Durkee
Position Title:	Graduate Research Associate (Human Factors)
Affiliation:	Western Transportation Institute
Name:	Rebecca Gleason
Position Title:	Research Engineer (Alternative Transportation Modes)
Affiliation:	Western Transportation Institute
Name:	Angela Kociolek
Position Title:	Research Associate (Road Ecology)
Affiliation:	Western Transportation Institute

National Summer Transportation Institute Program - Annual Report**Section I: Summer Transportation Institute Program Staff**

State: Montana	Host Site: MSU Western Transportation Institute
Fiscal Year: 2010	
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: PJ Kolnick	
Position Title: Residence Hall Advisor (STI)	
Affiliation: Western Transportation Institute	
Name: Erin Ryan	
Position Title: Residence Hall Advisor (STI)	
Affiliation: Western Transportation Institute	

11 APPENDIX B: DEMOGRAPHIC SUMMARY REPORT

FY 2010 National Summer Transportation Institute Program - Demographics Data Sheet

State:	Montana	Project Director:	Susan Gallagher
Host Site:	Western Transportation Institute	Program Dates:	June 13-25, 2010
		Program Length:	2 weeks

Select Grade Level		Applicant Data			
High School	X	Number of Applications Received:		21	
Middle School		Number of Participants Selected:		18	
Select Program Classification		Number of Participants that Completed the Program: 15			
Residential	X	Geographic Representation			
Non-Residential		Number of Cities: 11	Number of Counties: 10	Congressional District Number(s): 02, 110, 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:		14		1				9	6					5	7	3
Provide Type(s) of *Targeted Disabilities: N/A																

Schools Represented	
Name/City/State	Name/City/State
Park High School/Livingston/MT	
Lone Peak High School/Big Sky/MT	
CM Russel High School/Great Falls/MT	
Home Schooled/Roberts/MT	
Havre High School/Havre/MT	
Wolf Point High School/Wolf Point/MT	
Billings West High School/Billings/MT	
Thompson Falls High School/Thompson Falls/MT	
Laurel High School/Laurel/MT	
Peak to Peak Charter School/Lafayette/CO	
Ravenna High School/Ravenna/MI	

12 APPENDIX C: PRELIMINARY FINANCIAL REPORT

National Summer Transportation Institute Program					
Section III: Preliminary Financial Report					
		Budget			
		Categories	Approved	Expended	Unexpended
State:	Montana				
Host Site:	WTI	Personnel	\$13,885.00	\$9,811.05	\$4,073.95
Fiscal Year:	2010	Fringe Benefits	\$2,082.75	\$1,364.65	\$718.10
		Recruitment	\$650.00	\$31.59	\$618.41
		Contractual Services	\$500.00		\$500.00
		Food	\$300.00	\$300.00	\$0.00
		Travel	\$2,700.00	\$2,270.19	\$429.81
		Supplies	\$225.00	\$299.67	-\$74.67
		Room & Board	\$13,000.00	\$10,164.64	\$2,835.36
		Stipends			\$0.00
		Indirect Cost	\$3,334.27	\$2,773.58	\$560.69
		Totals	\$36,677.02	\$27,015.37	\$9,661.65
	Balance	\$9,661.65			

13 APPENDIX D: STI SCHEDULE

2010 Summer Transportation Institute at Montana State University

Week 1: June 14 – June 18

<p>Monday, June 14</p> <p>8:30-10:30am: [WTI Classroom, Rm 333] STI Orientation (Transportation knowledge pre-test; Program overview-schedule & expectations; Transportation overview presentation) (STI Staff)</p> <p>10:30-11:30am: Strong Interest Inventory</p> <p>Noon-1pm: Lunch (Miller Dining Hall)</p> <p>1-2pm: Campus Tour (Meet at Admissions Office)</p> <p>2-4pm: [CB Soils Lab 202] Geotechnical Engineering introduction and soil tower competition (Mokwa)</p>	<p>Thursday, June 17</p> <p>8-10am: [WTI Bulk Materials lab] Concrete Introduction & Lab (Berry)</p> <p>10am-noon: [Transportation lab] Speed Study (Al-Kaisy)</p> <p>Noon-1pm: Lunch (Miller Dining Hall)</p> <p>1-3pm: [WTI Classroom, Rm 333] Structures/Bridge Design (Stephens)</p> <p>3-5pm: Team glider tests/presentation</p>
<p>Tuesday, June 15</p> <p>8:15am-noon: Gallatin Field Airport tour and discovery flights with Summit Aviation</p> <p>Noon-1pm: Lunch (Picnic)</p> <p>1-2pm: Aviation Careers discussion (Haskins)</p> <p>2-5pm: [WTI Classroom]Glider team design activity (STI Staff)</p>	<p>Friday, June 18</p> <p>8:30am-noon: [WTI Classroom, Rm 333] Balsa Wood Bridge team design project introduction (STI Staff)</p> <p>Noon-1pm: Lunch (Miller Dining Hall)</p> <p>1-4pm: Wetlands presentation & site visit (Keller)</p>
<p>Wednesday, June 16</p> <p>6:30am: Breakfast and pick up sack lunches</p> <p>7am: Depart for Tour of Montana Department of Transportation Headquarters (Helena)</p> <p>2pm: Gates of the Mountain ferry ride</p>	<p>Saturday/Sunday June 19-20</p> <p style="text-align: center;">- Sports and Enhancement activities</p>

Week 2: June 21 – June 25

<p>Monday, June 21</p> <p>9-10am: [WTI 333] Traffic Engineering (Al-Kaisy)</p> <p>10-noon: [Driving Simulator Lab] Human Factors/Driving Simulator Activity</p> <p>Noon-1pm: Lunch (Miller Dining Hall)</p> <p>1-2pm: [WTI 333] Road Ecology (Kociolek)</p> <p>2-5pm: [Tait Lab] Sim City transportation/urban planning activity (McGowen)</p>	<p>Thursday, June 24</p> <p>8am-9am: Balsa wood bridge design presentations & competition (STI staff)</p> <p>9-10am: [WTI 333]College Prep (Somers)</p> <p>10-11am: [WTI 333] Career Planning (McCormick)</p> <p>11am - noon: Final evaluations; transportation knowledge post-test (Jeopardy) (STI staff)</p> <p>Noon-1pm: Lunch (Miller Dining Hall)</p> <p>1-5pm: Closing ceremony preparation (STI staff-WTI Classroom)</p>
<p>Tuesday, June 22</p> <p>8am-5pm: Field Trip to Billings (Transportation Consulting work; Airport and Shiloh Roads redesign & roundabouts projects)</p>	<p>Friday, June 25</p> <p>Morning: Packing and Dorm Check Out</p> <p>11am-Noon (WTI Classroom) STI Closing Ceremony and Farewells</p>
<p>Wednesday, June 23</p> <p>8:30-9:30am: [WTI 333] Trucking/Freight (Stephens)</p> <p>9:30-10:30am: Alternative Modes of Transportation (Gleason)</p> <p>10:30am-noon: Balsawood bridges work</p> <p>Noon-1pm: Lunch (Miller Dining Hall)</p> <p>1-3 pm: [WTI Classroom] Balsa wood bridges (STI staff)</p> <p>3-5pm: Fish Passage/Hydrology (Blank)</p> <p>6pm: MDT Design Unit BBQ (Lindley Park)</p>	

This document was published in electronic format at no cost for printing and mailing.