

Engineering: The Built Environment
21st Century Fellows Program

**An Evaluation Report
For Phase I:
Summer Institute
July 23 - August 3, 2007**

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Abstract

Engineering: the Built Environment is a special program offered at the MathScience Innovation Center in partnership with the American Council of Engineering Companies of Virginia (ACEC/VA). The purpose of this program, a part of the Center's *21st Century Fellows Program*, is to train nominated teachers (Engineering Fellows) in basic principles of engineering as they relate to the "built environment" and to assist the Fellows in the development of materials and strategies to incorporate more engineering related activities into the regular classroom with the end goal being the recruitment of more students into the field of engineering. Upon completion of all phases of the program, Fellows will become acknowledged specialists in their local school divisions. After a two-week summer Institute (Phase I), the Fellows reported that they had a stronger understanding of the fields of engineering, methods and principles of engineering, and an increased menu of meaningful and engineering related teaching activities

Daily activities for the summer Institute reflected the range of engineering disciplines related to the built environment including mechanical, structural, electrical, environmental, and civil engineering, as well as the process of design and build. A total of eight field trips, hosted by ACEC/VA member firms, were held at local engineering sites such as highways, bridges, buildings, water treatment plants, and manufacturing facilities to observe these principles in action. Fellows also conducted lab activities to model engineering principles and participated in lecture/discussion of course content. Thirty-nine ACEC/VA professionals, representing twenty-five firms, served as guest speakers to cover the topics of engineering fundamentals, the process of design and build, career paths to engineering, environmental engineering, and structural engineering. Fellows were also provided with resource materials from Virginia schools of engineering. As a culminating activity, participants were required to contribute to a virtual field trip of engineering projects at Virginia's state capitol.

All Fellows completed a pre-post self-assessment of their conceptual understanding of engineering, ability to incorporate engineering concepts into school curricula, skills possessed to disseminate information to teachers and students, and ability to be an advocate for engineering careers. On a five-point scale, Fellows began with ratings ranging from 1.19 to 1.45 which represented "little" to "some" knowledge. By the end of the Institute, Fellows rated themselves between 2.77 and 3.24 which represented "some" to "much" knowledge. In the targeted areas, the changes in pre-post scores represented growth of 39 to 57%. All Fellows stated that they achieved their learning goals, had a stronger understanding of engineering concepts, and had acquired a large number of *Standards of Learning* (SOL) related teaching activities and strategies for use in the classroom. Recommendations included providing more time in class to work on assigned projects, including high school teachers in the population from the beginning, and providing awareness workshops within divisions to solicit participants.

Next steps for the program will include fall and spring follow-up meetings, classroom follow-up visits to assist Fellows in conducting engineering activities and programs with students in local school divisions, completion of virtual field trip pages for the web site, and development and holding of special programs for students along with continued professional development at the school and division level.

Goals

The overall goal of the MathScience Innovation Center's *21st Century Fellows* program is to develop a cadre of outstanding educators to lead implementation of 21st Century initiatives within consortium school divisions. Upon completion of all components of the program, *21st Century Engineering Fellows* will demonstrate the following qualifications:

1. Conceptual understanding of the content and/or process of engineering;
2. Ability to design effective and engaging lessons that teach core standards through engineering content and/or process;
3. Ability to work as a member of a team to implement professional development for teachers, special programs for students, or virtual learning opportunities;
4. Skill in providing students with information on engineering careers.

Population

Seventeen educators participated in this course. These Fellows were nominated by their local school divisions and then completed an application for admission to the program. Metropolitan Richmond school districts represented were Chesterfield County, Hanover County, Henrico County, Petersburg City, Powhatan County, Richmond City, Richmond Catholic Diocese Schools, and West Point Public Schools. Two Fellows were male and fifteen were female. There were seven African American and ten Caucasian participants. Total teaching experience ranged from one to twenty-eight years with a mean experience of twelve years. Fellows included three elementary, eight middle school, and six high school teachers.

| Division | Name | School |
|-------------------------------|--------------------|--|
| Chesterfield | Benjamin Barnwell | Meadowbrook High School |
| | Melinda Miller | Carver Middle School |
| Hanover | Marsha Caudill | Liberty Middle School |
| | Eileen Malick | Atlee High School |
| | Stephanie Moore | Oak Knoll Middle School |
| Henrico | Sarah Morris | Wilder Middle School |
| MathScience Innovation Center | Beth Kappus | K-5, Math Science Innovation Center |
| Petersburg | Phyllis Barnette | Petersburg High School |
| | Marsha Hopkins | Walnut Hill Elem. School |
| Powhatan | Anne Larrick | Powhatan Junior High School |
| | Diane Leighty | Powhatan High School |
| | Donia Spott | Powhatan Middle School |
| Richmond | Chastity North | Boushall Middle School |
| | LaTonya Waller | Lucille Brown Middle School |
| | Patricia Woodberry | Holton Elementary School |
| Richmond Catholic Diocese | Adria Hogan | Benedictine High School |
| West Point | Mohammad Barbarji | West Point High School |

Most Fellows stated that they were interested in integrating more engineering and technology into their teaching. Another common interest included learning how to connect mathematics and science in practical ways that can be used in the classroom and shared with other teachers.

The Fellows received an honorarium of \$1,000 for attending the summer Institute (Phase 1), as well as lunches and free instructional materials. Upon completion of the academic year component, they will receive an additional \$1,000.

Strategies

A two-week Institute was held from 9 am to 3 pm during the period of July 23-27 and July 30 to August 3, 2007. A. Christian Lundberg, Coordinator for K-12 Special Programs at the MathScience Innovation Center, led development and implementation of the program. Betsey Ameen, a middle school physical science teacher at Falling Creek Middle School in Chesterfield County, was employed to assist with design of instructional materials and Institute implementation. Dr. Echol Marshall, Writer/Producer, and John Sylvester, Coordinator for Technology developed the computer-based content management system for the virtual field trips, filmed components for model sites, and assisted Fellows with development of virtual field trips. Mrs. Beverly Lewis, Business Manager, and Ms. Tawana Gilyard, Operations Assistant, handled logistics.

Mrs. Nancy Israel, Executive Director of ACEC/VA, interacted with members to secure speakers and field sites. Members of the ACEC/VA Executive and Education Committee who assisted her were:

John Mann, President
 Mike Matthews, Immediate Past President
 Kim Beatley, TranSystems
 Michael Biscotte, HSMM/AECOM
 Dan DeYoung, DJG, Inc.
 Tim Groover, Wiley & Wilson
 Kerry Herr, DJG, Inc.
 Gib Seese, Schnabel Engineering, Inc.
 Sam Kirby, Froehling & Robertson.

Once volunteers were identified, Mr. Chris Lundberg interacted with them to refine presentations and field experiences. Thirty-nine engineering professionals served as guest speakers or field trip leaders.

| | | | |
|----------------|-----------------|-------------------|-----------------|
| Cindy Allen | Jessica Borsits | Keith Burns | Ken Butler |
| Gary Crossman | Janet Daniels | Danny Davis | Dan De Young |
| Ian Frost | Kerry Herr | Bob Hill | Arthur Hudgins |
| Ray Johnston | Chris Kiefer | Sam Kirby | Brenda Kliesen |
| Kevin Kokal | Mike Laing | Carrie Langelotti | Jeff Lighthiser |
| John Mann | Mike Matthews | Art McKinney | Bob Mills |
| Mike Morecroft | Dan Niccolucci | Mike Pierce | Ken Pope |
| Ernie Pryor | Steve Rose | David Sayre | Rich Sliwoski |
| Robert Smith | Mark Steiner | Lindley Vaughan | Gary Weishaar |

| | | | |
|-----------------|-------------|-----------------|--|
| Nelson Williams | Keith Woody | Chris Zachwieja | |
|-----------------|-------------|-----------------|--|

The engineering professionals participating in the summer institute represented twenty-five firms.

| | | |
|---|---------------------------------------|--|
| Alliance Engineering | Austin Brockenbrough & Associates | Frank Batten College of Engineering and Technology |
| Commonwealth Architects | Daniels & Associates | Department of General Services, State of Virginia |
| DJG Inc. | DMJM Harris | Draper Aden Associates |
| Dunbar Milby Williams Pittman & Vaughan | ECS Mid-Atlantic | EEE Consulting, Inc. |
| Froehling & Robertson, Inc. | Hamilton Beach/Proctor-Silex | Hankins & Anderson |
| HSMM/AECOM | Mann & Associates | McKinney & Company |
| R. Stuart Royer & Associates | Schnaebel Engineering, Inc. | Timmons Group |
| TranSystems | Virginia Department of Transportation | Virginia Geotechnical Services (S&ME Inc.) |
| Wiley & Wilson | | |

Developing Conceptual Understanding of Engineering. Presentations were conducted by fourteen ACEC/VA member professionals. The topics for these presentations included fundamentals of engineering, structural engineering, environmental engineering, and the process of design and build. A career pathways panel was also held to present information on academic requirements for engineering careers and programs offered by various Virginia engineering schools. Fellows traveled by van to experience eight field trips at local engineering sites hosted by ACEC/VA member professionals. These sites included the State Capitol renovation, Rocketts Landing (brownfield development), the New Kent LEED Rest Stop, VDOT I-295 Flyover Project, design and build methods at Hamilton Beach/Proctor-Silex, the James River Water Plant, and the downtown Richmond Hilton Hotel Convention Complex (old Miller & Rhoads building rehabilitation).

Incorporating Engineering Concepts into School Curricula. Several classroom engineering activities were conducted with Fellows. These included hands-on activities in design and build, mechanical engineering, electrical engineering, structural engineering, and civil engineering. Fellow engaged in discussion following instructional activities, presentations, and field trips and shared ideas for classroom incorporation. Major resources included the ACEC *Those Amazing Engineers* publication, the PBDS/WGBH *Design Squad Educators Guide*, and various web resources for lessons and activities.

Disseminating Information to Other Educators and Students. A major end product for the Institute was for the Fellows to learn how to create virtual engineering field trips to use with students in the classroom. MathScience Innovation Center faculty developed the model for the virtual field trips as well as the formats for lessons, activities, graphics, and video clips. MathScience Innovation Center faculty performed the writing, filming, and editing of two initial virtual field trips which were used as models for Fellows to follow in creating their own products. These field trips included the new VCU Critical Care Hospital and the new Route 17 Highway (adjacent to the Great Dismal Swamp).

MathScience Innovation Center faculty provided training for Fellows in the use of digital cameras and MovieMaker software to capture pictures and video. MathScience Innovation Center faculty also developed a special Content Management System (CMS) for Fellows to use to organize information and post their products to the web site for virtual engineering field trips. Fellows were trained on use of CMS. During the Institute, Fellows worked in teams to contribute to the development of a field trip on engineering of the Virginia State Capitol renovation and the visitor's center. Components included a field trip overview, lesson activities, photographs, video clips, and web links and resources. Fellows also worked individually and in groups to create virtual field trips for the sites visited during the summer institute, i.e. Rocketts Landing, New Kent Rest Area, VDOT I-295 Flyover, Hamilton Beach/Proctor-Silex, James River Water Plant, and the Hilton Hotel Complex. Finally, the Fellows were also trained on the use of a web-based system (Moodle) for follow-up and virtual sharing and learning. A web-site with representative projects will be posted in mid to later October, 2007.

Advocating Engineering Careers. The different presentations and field trips by ACEC/VA member professionals served to present Fellows with many ideas and resources for promoting engineering as a career choice with students. Program information from Virginia's engineering schools, as well as feeder community college programs, was shared with them.

For a two-week overview and a day by day schedule of the program activities see Appendix A.

Program Assessment

A pre-assessment of engineering related questions was administered to all Fellows on the first day of the Institute. A post-assessment of the same questions was administered on the last day of the course. Fellows were asked to share their general comments, ideas and expectations for how they plan to apply their learning with students and colleagues. Fellows also completed a standard MathScience Innovation Center evaluation for professional development workshops. The pre-post assessments and comments are summarized in relation to the associated four main program outcomes and an overall program evaluation is provided.

Developing Conceptual Understanding of Engineering. At the beginning and end of the summer institute Fellows rated their conceptual understanding of content and/or processes of engineering on a five point scale, e.g. 0 (none), 1 (little), 2 (some), 3 (much), and 4 (expert). The pre-Institute average was 1.45, and the post-Institute average was 3.24. This represents a total average increase of 1.79 or 55% growth. As shown in Table I, the greatest change occurred in understanding of the methods used by engineers (2.44 increase). Fellow's open-ended comments also reflected growth in this area:

- *Lots of information and insight into different types of engineering*
- *Lots of experiences through field trips, guest speakers, and hands-on activities*
- *Extremely valuable information from the engineers participating*
- *Very informative with real life connections*
- *Learned about civil engineering, structural engineering.*

Table I. Change in Fellows' Self-Assessment of Conceptual Understanding of Engineering

| Question | Pre-Mean | Post-Mean | Change |
|---|-------------|-------------|-------------|
| 1. Basic principles of engineering | 1.75 | 3.06 | 1.31 |
| 2. Areas of engineering relating to the built environment | 1.25 | 3.0 | 1.75 |
| 3. Methods used by engineers | 1.25 | 3.69 | 2.44 |
| 4. Process of design & build vs. scientific method | 1.56 | 3.19 | 1.63 |
| Average | 1.45 | 3.24 | 1.79 |
| Percent Increase | | | 55% |

(Based on a scale of 0-4, where 0 represented no ability and 4 represented expert)

Incorporating Engineering Concepts into School Curricula. On the pre-post institute assessment, Fellows also reported on the availability of materials, their knowledge of strategies for teaching students, techniques for integrating engineering into school curricula, and the ability to design classroom materials. Again, Fellows rated their skills on a five point scale. The pre-Institute average was 1.35, and the post-Institute average was 2.99. This represents a total average increase of 1.64 of a change of 55%. The greatest change occurred in relating engineering to multiple *Standards of Learning* (SOL) content (1.94 increase). Table II shows Fellows' responses for the six areas related to this program goal. Fellow's open-ended comments reflected growth:

- *There was a wealth of teacher contacts, lessons, videos, etc.*
- *Can complement my teaching of SOL's with engineering methods, techniques, and skills*
- *Have learned to enhance my classroom instruction*
- *Will incorporate engineering with cooperative problem solving in classes*
- *Will use contacts for class speakers and shadowing*
- *Will have students design a geo-thermal heat system*
- *Will replace traditional after school science club with a science/math explorers program.*

Table II. Change in Fellows' Self-Assessment of Skills for Incorporating Engineering Concepts into School Curricula

| Question | Pre-Mean | Post-Mean | Change |
|---|-------------|-------------|-------------|
| 1. Strategies for basic principles of engineering | 1.56 | 3.0 | 1.44 |
| 2. Areas of engineering relating to the built environment | 1.25 | 3.0 | 1.75 |
| 3. Strategies for methods used by engineers | 1.06 | 2.81 | 1.75 |
| 4. Strategies for design & build vs. scientific method | 1.56 | 3.0 | 1.44 |
| 5. Relationship of engineering to multiple SOL content | 1.25 | 3.19 | 1.94 |
| 6. Integration of engineering activities into curriculum | 1.44 | 2.94 | 1.5 |
| Average | 1.35 | 2.99 | 1.64 |
| Percent Increase | | | 55% |

(Based on a scale of 0-4, where 0 represented no ability and 4 represented expert)

Disseminating Information to Other Educators and Students Fellows rated their skills in developing student and teacher programs based upon the summer Institute. Skills in designing and writing lessons for the web as well as proficiency with technical equipment and software need to develop virtual field trips were assessed on a five point scale. Responses related to this program goal are displayed in Table III. The pre-Institute average was 1.19, and the post-Institute average was 2.77. This represents a total average increase of 1.58 or a growth of 57%. The largest area of growth was in use of the MovieMaker video editing software (1.94 increase). Fellows' open-ended comments described their plans for dissemination of engineering concepts and activities:

- *Will be leading county-wide staff development*
- *Will put together a workshop for teachers*
- *Will work with students to develop school project on green engineering*
- *Will work with colleagues to differentiate lessons and activities to incorporate engineering*
- *Will talk with other 6/7 grade teachers to conduct model lessons in their classes*
- *Will work to develop a 1-2 week summer program for m.s. (middle school) students in local school division*
- *Will co-teach engineering lessons with colleagues*
- *Would like to teach class for VTEA annual conference.*

Table III. Change in Participants' Self-Assessment of Skills Needed to Disseminate Programs to Other Teachers and Students

| Question | Pre-Mean | Post-Mean | Change |
|--|-------------|-------------|-------------|
| 1. Knowledge for use of digital video camera | 1.75 | 2.69 | 0.94 |
| 2. Creating web pages | 0.94 | 2.69 | 1.75 |
| 3. Knowledge for use of MovieMaker software | 0.81 | 2.75 | 1.94 |
| 4. Writing lesson activities for the web | 1.25 | 2.94 | 1.69 |
| Average | 1.19 | 2.77 | 1.58 |
| Percent Increase | | | 57% |

(Based on a scale of 0-4, where 0 represented no ability and 4 represented expert)

Advocating Engineering Careers. Fellows also reported on their ability to serve as "advocates" for engineering careers and opportunities. Responses related to this program goal are shown in Table IV. The pre-Institute average for this area was 2.10, and the post-Institute average was 3.41. This represents a total average increase of 1.32 or a 39% change. The largest area of growth was in the area of knowledge of career opportunities for engineering (1.44 increase). Fellows' open-ended comments illustrate ways that they will serve as advocates:

- *Have much better grasp of engineering careers*
- *Hope to share the need for engineers with all of SPACE staff and include activities in our inventions unit*
- *Will use web pages and get students to interview local engineers*

- Will be using the words “engineer” and “engineering” frequently with students
- Will design an introduction to engineering challenge.

Table IV. Change in Fellows’ Self-Assessment of Skills Needed to Be an Advocate for Engineering

| Question | Pre-Mean | Post-Mean | Change |
|---|-------------|-------------|-------------|
| 1. Career opportunities for students in engineering | 2.25 | 3.44 | 1.19 |
| 2. Career pathways for students | 1.94 | 3.38 | 1.44 |
| Average | 2.10 | 3.41 | 1.32 |
| Percent Increase | | | 39% |

(Based on a scale of 0-4, where 0 represented no ability and 4 represented expert)

Overall Program Evaluation. Fellows also completed a standard MathScience Innovation Center evaluation for professional development workshops. Participants were asked to respond to a series of statements using five categories, e.g. Strongly Agree (SA), Agree (A), No Opinion (N), Disagree (D) and Strongly Disagree (SD). From 88% to 94% of respondents strongly agreed with statements, with the remaining respondents agreeing. These positive responses reinforced achievement of program goals. For detailed responses, see Table V.

Table V. Fellows’ Perceptions of Overall Program (Percentages)

| Statement | SA | A | N | D | SD |
|--|-----------|----------|----------|----------|----------|
| 1. The program increased my academic understanding of the concepts/skills. | 94 | 6 | 0 | 0 | 0 |
| 2. The instructional strategies were engaging and effective in helping me learn the concepts/skills. | 94 | 6 | 0 | 0 | 0 |
| 3. The instructors were enthusiastic and motivated me to learn. | 94 | 6 | 0 | 0 | 0 |
| 4. The instructors were organized and used appropriate techniques for adult learners. | 88 | 12 | 0 | 0 | 0 |
| 5. The instructors exhibited a command of the subject matter. | 88 | 12 | 0 | 0 | 0 |
| 6. The program provided me with ideas that I will integrate into my teaching. | 88 | 12 | 0 | 0 | 0 |
| Average | 91 | 9 | 0 | 0 | 0 |

(Percentage of responses, based on scale where SA = Strongly Agree, A= Agree, N = No Opinion, D = Disagree, and SA = Strongly Disagree)

The MathScience Innovation Center’s program evaluation also included a section for each Fellow to indicate the degree to which they will use and share materials from the program. Fellows predicted that they will share the information and materials from the course with over **150 other teachers** in their local school divisions over the next several months. Fellows also predicted that they will share the information and materials with

over **1,200 students** during the 2007-08 academic year. All Fellows stated that they would definitely include engineering activities in their regular teaching.

Conclusion

Overall, the Fellows who completed the summer Institute commented that the course was very well organized and showed substantial pre-thought and planning. Many Fellows stated that the program was challenging in terms of the information presented and the fast paced daily schedule. They perceived that the Institute was a good mix of guest speakers, field trips, and classroom activities. Also, all Fellows stated that they achieved their learning goals. They reported that they had a stronger understanding of engineering concepts and an increased repertoire of strategies for integrating engineering into the curriculum. Several Fellows commented that the instructors effectively related the materials to classroom implementation and addressed their individual needs as teachers and learners.

Institute strengths identified by Fellows included the organization of the program and the participation of local engineering professionals. Most Fellows reported that they believed the course presented a good balance of engineering content and teaching activities. Many commented that the experience was “**eye-opening**” and that they enjoyed the “experiential nature” of the program and the opportunity to see real-life applications of math and science. One Fellow stated that “**this is an idea whose time has come.**” Another commented that they would like to see such a program as “mandatory for all math and science teachers.”

Comments in support of all four program goals resulted from Fellows completion of the statement: “**I am the teacher who will ___**”:

- *Create more innovative projects for my students to explore engineering concepts*
- *Use these activities*
- *Incorporate engineering concepts into the curriculum*
- *Present all branches of engineering*
- *Get students excited about the possibility of becoming an engineer*
- *Promote engineering with both students and teachers*
- *Implement what I have learned into my lesson plans*
- *Promote the engineer’s passion!*
- *Teach engineering.*

All Fellows stated that they were impressed by the enthusiasm of the engineers and their level of commitment to the program. Some commented that they felt overwhelmed with the amount of information covered during the two-weeks. Recommendations included providing more time in-class to work on assigned projects, including high school teachers from the beginning (middle school was initial focus), and providing “awareness” workshops to solicit more teachers for the program.

Appendix A

Summer Institute Schedule – General and Daily

Engineering: The Built Environment

A.C. Lundberg 7/17/07

21st Century Fellows Program

Week One

| Day 1 July 23 | Day 2 July 24 | Day 3 July 25 | Day 4 July 26 | Day 5 July 27 |
|---|---|---|---|--|
| Welcome and Introductions | Review and discussion | Review of Moviemaker | Review and reflections | ACEC/VA Field Trip: |
| Program Overview Goals & Expectations Web Site Overview Model Web Lesson | ACEC/VA Speaker: Engineering Fundamentals Kevin Kokal (Alliance Engineering) | Model Lesson – Mechanical Engineering (Betsy Ameen, MathScience Innovation Center Faculty) | Model Lesson – Electrical Engineering (Betsy Ameen, MathScience Innovation Center Faculty) | Quantico Museum Mike Matthews (Hankins & Anderson) |
| ACEC/VA Speaker: Why Engineering? Mike Matthews (Hankins & Anderson) John Mann, (Mann & Assoc.) Carrie Langelotti (Brockenbrough) | Intro to MovieMaker & CMS for web site (John Sylvester, MathScience Innovation Center Faculty) | Review of Zee-Maps for web site Brainstorming for activities/lessons | ACEC/VA Panel: Career Paths to Engineering Gary Crossman (ODU) Dan DeYoung Cindy Allen (DJG) Janet Daniels (Daniels Assoc) | (Final program being worked out by Mike Matthews) 10 a.m. – 1:00 p.m. |
| Lunch | Lunch | Early Lunch | Lunch | Lunch on-site |
| ACEC/VA Field Trip: State Capitol Rich Sliwoski, (DGS & engineers) | ACEC/VA Field Trip: Rocketts Landing David Sayer, (S&ME & engineers) | ACEC/VA Field Trip: New Kent Rest Stop Kerry Herr (DJG inc) | ACEC/VA Field Trip: I-295 Short Pump Danny Davis, (DMJMHarris) | Return to MathScience Innovation Center 3 p.m. |

Week Two

| Day 6 July 30 | Day 7 July 31 | Day 8 August 1 | Day 9 August 2 | Day 10 August 3 |
|---|--|---|--|--|
| Review of Week 1 ACEC/VA Speaker: The Design Process Art McKinney, (McKinney & Co.) | ACEC/VA Field Trip: James River Water Plant Gary Weisharr (R. Stuart Royer) | Small group work on activities, CMS review | CMS Review Work on web site lesson activities | Review of week's activities |
| Model Lesson – Design and Build (Betsy Ameen, MathScience Innovation Center Faculty) | | ACEC/VA Speaker: Structural Engineering Lindley Vaughan (DMWPV) | | Presentations of draft activities for web site |
| Lunch | Lunch | Lunch | Lunch | Lunch |
| ACEC/VA Field Trip: Hamilton Beach / Proctor-Silex (Keith Burns) Kevin Kokal (Alliance Eng.) | ACEC/VA Speaker: Engineering and the Environment Ian Frost ,(EEE) Gary Weishaar (R. Stuart Royer) Kerry Herr (DJG) | ACEC/VA Field Trip: Miller & Rhoads Renovation – Sam Kirby (F&R) Bob Mills(Commonwealth Architects) | Model Lesson – Structural Engineering (Betsy Ameen, MathScience Innovation Center Faculty) | Wrap-up Post-assessment Review of goals Expectations for fall of '07 and spring '08 |
| | Group work on lesson activities | | Group work on activities | Closure Q & A |

Daily Agendas -- Engineering: The Built Environment A.C. Lundberg
 21st Century Fellows Program 7/17/07

| Day | Time | Topic | Presenter(s) |
|----------------------------------|---------------|--|--|
| Day 1 Monday July 23, 2008 | 9:00 – 9:15 | Welcome & Introductions & Icebreakers | Chris Lundberg |
| | 9:15 – 9:30 | Project Overview * Activities * Participant Expectations * Fall '07/Winter '08 Timeline | Chris Lundberg |
| | 9:30 – 9:45 | Web Site Overview Model Field Trip | Betsy Ameen John Sylvester |
| | 10:15 – 10:30 | Break | |
| | 10:30 – 11:30 | Why Engineering? | Mike Matthews John Mann Carrie Langelotti |
| | 11:30 – 12:30 | Lunch (& video camera tutorial) | John Sylvester |
| | 1:00 – 3:00 | Field Trip: The Renovated State Capitol of Virginia | Rich Sliwoski, DGS of VA Jeff Lighthiser, Draper Aden |
| | 3:00 – 3:30 | Closure – Q & A | Chris Lundberg Betsy Ameen |

| Day | Time | Topic | Presenter(s) |
|-----------------------------------|---------------|--|-------------------------------|
| Day 2 Tuesday July 24, 2008 | 9:00 – 9:30 | Review and Discussion * Components for State Capitol Field Trip Project * Individual Trip Projects * Format for Activities | Chris Lundberg |
| | 9:30 – 10:30 | Engineering Fundamentals | Kevin Kokal Alliance Co. |
| | 10:30-10:45 | Break | |
| | 10:45 – 12:00 | Intro to MovieMaker for Virtual Field Trip Video Clips | John Sylvester |
| | 12:00 – 12:30 | Lunch | |
| | 1:00 – 3:00 | Field Trip: Rocketts Landing Project | David Sayre S&ME Co. |
| | 3:00 – 3:30 | Closure – Q & A | Betsy Ameen Chris Lundberg |

| Day | Time | Topic | Presenter(s) |
|-------------------------------------|---------------|--|----------------------------------|
| Day 3 Wednesday July 25, 2008 | 9:00 – 9:30 | Review of MovieMaker and Discussion | Chris Lundberg John Sylvester |
| | 9:30 – 10:30 | Model Lesson Activity Structural Engineering | Betsy Ameen |
| | 10:30-10:45 | Break | |
| | 10:45 – 11:30 | Review Web Activity format Brainstorming for Field Trips Work in Teams on Lesson | John Sylvester Chris Lundberg |
| | 11:30 – 12:30 | Lunch | |
| | 1:00 – 3:00 | Field Trip: New Kent Rest Area | Kerry Herr DJG Co. |
| | 3:00 – 3:30 | Closure – Q & A | Betsy Ameen Chris Lundberg |

| Day | Time | Topic | Presenter(s) |
|------------------------------------|---------------|--|--|
| Day 4 Thursday July 26, 2008 | 9:00 – 9:15 | Review and Reflections Virginia Engineering Schools | Chris Lundberg |
| | 9:15 – 10:15 | Model Lesson Activity Electrical Engineering | Betsy Ameen |
| | 10:15-10:30 | Break | |
| | 10:30 – 11:30 | Panel Discussion: Career Paths to Engineering | Gary Crossman Janet Daniels Dan DeYoung Brenda Kliessen |
| | 11:30 – 12:30 | Lunch | |
| | 1:00 – 3:00 | Field Trip: I-295 Short Pump | Danny Davis DMJM Harris |
| | 3:00 – 3:30 | Closure – Q & A | Betsy Ameen Chris Lundberg |

| Day | Time | Topic | Presenter(s) |
|----------------------------------|-------------------|--|---|
| Day 5 Friday July 27, 2008 | 8:00 a.m. 8:30 | Meet at MathScience Innovation Center Leave for Quantico | Chris Lundberg |
| | 10:00 – 1:30 | Field Trip: National Museum of the Marine Corps | Mike Matthews Hankins & Anderson Steve Rose Quantico Museum |
| | 12:00 | (lunch on site) | |
| | 3:00 – 3:30 | Closure – Q & A | Betsy Ameen Chris Lundberg |

| Day | Time | Topic | Presenter(s) |
|----------------------------------|---------------|--|--|
| Day 6 Monday July 30, 2008 | 9:00 – 9:15 | Review of Week One Q & A | Chris Lundberg |
| | 9:30 – 10:30 | The Process of Design and Build | Art McKinney McKinney & Co. |
| | 10:30 – 10:45 | Break | |
| | 10:45 – 11:30 | Model Lesson Activity: Design and Build | Betsy Ameen |
| | 11:30 – 12:30 | Lunch | |
| | 1:00 – 3:00 | Field Trip: Hamilton Beach / Proctor-Silex Facility | Keith Burns, Hamilton Beach Kevin Kokal Alliance Eng. |
| | 3:00 – 3:30 | Closure – Q & A | Chris Lundberg |

| Day | Time | Topic | Presenter(s) |
|-----------------------------------|--------------|---|--|
| Day 7 Tuesday July 31, 2008 | 9:00 – 12:30 | Field Trip: James River Water Plant | Gary Weishaar R. Stuart Royer & Assoc. |
| | 12:30 – 1:30 | Lunch | |
| | 1:30 – 2:30 | Engineering and the Environment ("Green" engineering and sustainable development) | Ian Frost Gary Weishaar Kerry Herr |
| | 2:30 – 2:45 | Break | |
| | 2:45 – 3:30 | Group Work on Lesson Activities | Betsy Ameen Chris Lundberg |
| | | | |

| Day | Time | Topic | Presenter(s) |
|------------------------------------|---------------|---|---|
| Day 8 Wednesday Aug. 1, 2008 | 9:00 – 10:30 | Review, Q & A Introduction to Web Site CMS | Chris Lundberg John Sylvester |
| | 10:30 – 10:45 | Break | |
| | 10:45 – 11:45 | Structural Engineering | Lindley Vaughan DMWPV |
| | 11:45 – 12:30 | Lunch | |
| | 1:00 – 3:00 | Field Trip: Miller & Rhoads Renovation | Bob Mills Commonwealth Architects Sam Kirby F & R |
| | 3:00 – 3:30 | Closure – Q & A | Chris Lundberg |

| Day | Time | Topic | Presenter(s) |
|-----------------------------------|---------------|--|----------------------------------|
| Day 9 Thursday Aug. 2, 2008 | 9:00 – 9:30 | Review & Discussion CMS Review | Chris Lundberg John Sylvester |
| | 9:30 – 11:30 | Group Work on Activities | |
| | 11:30 – 12:30 | Lunch | |
| | 12:30 – 1:30 | Model Lesson Activity Civil Engineering | Betsy Ameen |
| | 1:30 – 1:45 | Break | |
| | 1:45 – 3:15 | Group Work on Activities | Betsy Ameen |
| | 3:15 – 3:30 | Closure – Q & A | Chris Lundberg |

| Day | Time | Topic | Presenter(s) |
|-----------------------------------|---------------|--|-------------------------------|
| Day 10 Friday, Aug. 3, 2008 | 9:00 – 9:30 | Review, Q & A, misc. items CMS Review | Chris Lundberg |
| | 9:30 – 10:30 | Presentations of draft activities for web site | Participants |
| | 10:30 – 10:45 | Break | |
| | 10:45 – 11:30 | Continue presentations, review of expectations for fall '07 | Chris Lundberg |
| | 11:30 – 12:30 | Lunch | |
| | 12:30 – 1:30 | Post assessment Discussion of fall '07 and future expectations Review of Moodle site for distance learning | Chris Lundberg |
| | 1:30 – 3:30 | Presentation of certificates Closure – Q & A | Chris Lundberg Betsy Ameen |