



TRANSPORTATION RESEARCH BOARD

OF THE NATIONAL ACADEMIES

# 5<sup>th</sup> INTERNATIONAL VISUALIZATION IN TRANSPORTATION SYMPOSIUM AND WORKSHOP

October 23 - 26, 2006

Hyatt Denver Tech Center, Colorado

## FINAL PROGRAM

500 Fifth Street, NW  
Washington, DC 20001

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Visualization in Transportation Committee (ANBJ5T)  
Michael Manore, P.E., Chair

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Transportation Research Board  
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- *Federal Lands Division*
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American Association of State Highway Transportation Officials  
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**HOST**

Colorado Department of Transportation

**CONFERENCE ORGANIZING COMMITTEE**

Michael Manore, *Chair*  
R. Wade Allen, Systems Technology, Inc.  
Ronald Hughes, ITRE-North Carolina State University  
Charles Hixon, III – Bergmann Associates  
Tom Greaves – SPARPOINT Research, LLC  
Frank Broen, Teach America  
Teresa-Marie Rhyne, Center for Visual and Analytics Institute, North Carolina State University

**TRANSPORTATION RESEARCH BOARD STAFF**

Mark Norman, Director, Technical Activities  
Richard F. Pain, Transportation Safety Coordinator  
Reggie Gillum, Meeting Coordinator  
Joanice L. Cole, Senior Program Assistant

## **GOAL of the 5<sup>th</sup> INTERNATIONAL VISUALIZATION in TRANSPORTATION SYMPOSIUM:**

TRB has supported awareness and research regarding visualization since the early 1990's...both at its annual meetings, and through an ongoing series of symposia. The last TRB symposium on visualization was held in 2002 in Salt Lake City just following the Winter Olympics.

More than four years have gone by, and visualization technologies have continued to evolve at a considerable pace, yet the highway transportation industry is still years behind its counterparts in aerospace, architecture, plant facilities, automotive, shipping, and others, when it comes to fully embracing visualization tools and the corresponding mindsets.

Times, however, are changing. Recent technologies like *Google Earth*, *3D PDF*, *Terrestrial & Airborne LIDAR*, *Driving Simulators*, *Construction Machine Control*, and *Steel Bridge Fabrication* (to name a few) are gaining the awareness and interest of transportation organizations.

As fascinating as these advancements are, it is still not clear how visualization directly assists in addressing our transportation needs. Additionally, the understanding of *digital infrastructure, training, organizational and implementation requirements* is knowledge yet unearthed for most transportation organizations and professionals.

*The goal of this event, therefore, is: To develop an awareness of visualization in the context of our transportation needs, and promote ideas for action that evolves our ability to address those needs.*

## **OBJECTIVES:**

To achieve this goal, the Symposium encompasses four primary objectives:

- Continue to promote the education and awareness of the benefits (realized and potential) of visualization technologies and practice as applied to the transportation industry;
- For the first time, provide a program that brings together the diversity of expertise needed to deliver effective transportation programs in the context of visualization technologies and practice;
- Provide a balance of traditional presentations and audience-engaging panel sessions on research, demonstration & practice;
- Gather and document the knowledge exchanged and ideas generated in order to drive innovation in practice, targeted research, and technology development *to evolve the use of visualization in transportation.*

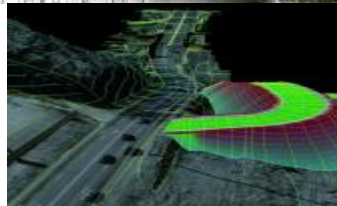
**SPECIAL EXECUTIVE SESSION:**

On Monday, October 23, 2006, as part of its 5th International Symposium on Visualization, TRB will host a special half-day working session exclusively for upper and executive management professionals in the highway transportation industry.

There are three primary objectives of this session:

1. To provide an executive overview of the technology and state of practice regarding visualization;
2. To facilitate an interactive discussion regarding current and evolving issues in delivering our transportation programs;
3. Explore the potential of visualization to assist in delivering those programs.

This session is open to leaders in federal, state, and local agencies, as well as those in consulting, construction, and academic organizations.



## DEMONSTRATIONS

This year's symposium will not host an official Exhibit Hall. However, technology providers, researchers, and consultants will be provided casual table set-ups to allow you to do personal, ad hoc presentations for interested parties as part of the evening receptions on:

- MONDAY OCT 23 @ 5:00 PM – 7:00 PM
- TUESDAY OCT 24 @ 5:00 PM – 7:00PM

Demonstrators are encouraged to bring their own desktop displays. Also, a large screen projector and DVD player will be provided for those who wish to run un-narrated displays of their work.

## REGISTRATION DESK LOCATION & SCHEDULE

The Registration Desk for this event is located on the Second Floor in front of the Pre-Function Area. The Registration Desk Schedule will be as follows:

- SUNDAY OCT 22                      NOON – 6:30PM
- MONDAY OCT 23                      7:00AM – 6:00PM
- TUESDAY OCT 24                      7:00AM – 6:00PM
- WEDNESDAY OCT 25                      7:00AM – NOON

## SPEAKER AND VISUAL AID REQUIREMENTS

The Presenter & Panelist guideline and release form can be downloaded at the Symposium website:  
<http://www.trb.org/Conferences/Visualization/Presenters.asp>



When attending sessions, please remember to turn off or silence your cell phones and other wireless communications. If you must take a call, please step out of the room. Thank you for your cooperation.

## DRESS ATTIRE FOR ATTENDEES:

MONDAY, October, 23, 2006 – Business Dress

TUESDAY, October 24 – THURSDAY, October 26, 2006 – Business Casual

**\*\*\* MAP OF MEETING ROOMS IS ON THE INSIDE BACK COVER \*\*\***

# FINAL PROGRAM

MONDAY OCTOBER 23, 2006

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7:00AM – 8:15AM                      EXECUTIVE BREAKFAST                      [CENTENNIAL – top floor](#)

8:15AM – 11:30AM                      EXECUTIVE SESSION                      [CENTENNIAL – top floor](#)

- **Opening & Introductions**  
Michael Manore, Chair, TRB Visualization Committee
- **Welcome & Objectives Overview**  
Thomas Norton, Executive Director, Colorado Department of Transportation  
Cynthia Burbank, Associate Administrator, Federal Highway Administration
- **Overview of Visualization Technologies & NCHRP 36-04 Findings “Visualization in Project Development”**  
Charles Hixon, III, Synthesis Consultant, Bergmann Associates, Inc.
- **Facilitated Discussion on Issues and Needs for Decision-makers**  
Barbara Harder, B.T. Harder, Inc.

11:30PM – 1:30PM                      EXECUTIVE LUNCH                      [CENTENNIAL – top floor](#)

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1:30PM – 3:15PM                      OPENING SESSION                      [GRAND MESA D, E](#)

- **Symposium Opening Welcome**  
Richard Pain, Transportation Research Board
- **Overview and Intent of the Symposium**  
Michael Manore, Chair, TRB Visualization Committee
- **Colorado Welcome and Opening Perspectives**  
Thomas Norton, Executive Director, Colorado Department of Transportation
- **Update on SAFETEA-LU Requirements & Perspectives on Visualization for Planning**  
Cynthia Burbank, Associate Administrator, Federal Highway Administration
- **Decision-Making and Public Engagement from a Multi-Modal Planning Perspective**  
Charles Goodman, Director of Systems Planning, Federal Transit Administration
- **Regional Council Perspectives on Visualization**  
Denver Regional Council of Governments

3:15PM – 3:45PM                      BREAK                      [ATRIUM](#)

3:45PM – 5:00PM                      OPENING SESSION (cont.)                      [GRAND MESA D, E](#)

- **Progress & Directions in Visualization Technology**  
Teresa-Marie Rhyne, Director, Visual Analytics Institute, North Carolina State University
- **The Ultimate Purpose of Visualization**  
Jeffrey Coleman, Manager; Robert Singerman, Business Development Manager, URS Corporation

5:00PM – 7:00PM                      RECEPTION                      [GRAND MESA F](#)

**TUESDAY OCTOBER 24, 2006**

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7:00AM – 8:00AM

**BREAKFAST**

[ATRIUM](#)

8:00AM – 9:30AM

CONCURRENT PAPER SESSIONS

- [Planning Track](#)

[GRAND MESA F](#)

**Moderator: Timothy Case**, Parsons Brinkerhoff

- 1      **Scenario Planning for Idaho’s 30-Year Transportation Vision**  
David Biggs, Envision Sustainability Tools, MetroQuest
- 2      **Visualizing METRA: An Interactive Visualization Tool**  
Laxmi Ramasubramanian, Hunter College  
Susan McNeil, University of Delaware
- 3      **Multimedia Use in Visualization of transportation Projects: From Project Pursuits to Client Reviews and Public Information**  
Jesse Miguel, HNTB Corporation

- [Engineering Track](#)

[GRAND MESA A,B,C](#)

**Moderator: Jeffrey Coleman**, URS Corporation

- 1      **Value of Visualization within an Engineering Consulting Firm**  
Paul Brown, Parsons Brinkerhoff, Cardiff, UK
- 2      **3D Visualization and Micro-Simulation Applied to the Identification and Evaluation of Geometric and Operational ‘Solutions’ for Improving Visually Impaired Pedestrian Access to Roundabouts and Channelized Turn Lanes**  
Ronald Hughes, ITRE-North Carolina State University
- 3      **A Tandem Effort: Balancing Architectural Desires with Structural Needs**  
Michael Mundy, HNTB Corporation

9:30AM – 10:00AM

**BREAK**

[ATRIUM](#)

10:00AM – 11:30AM

CONCURRENT PAPER SESSIONS

- [Planning Track](#)

[GRAND MESA F](#)

**Moderator: R. Wade Allen**, Systems Technologies, Inc.

- 1      **A Visualization Experience of the Northern Illinois Planning Commission**  
Yukun Dong, University of Delaware
- 2      **Towards an Advanced Spatial-Temporal Visualization System for the Metropolitan Washington D.C.**  
Chang-Tien Lu, Virginia Polytechnic Institute and State University
- 3      **Various Uses of Color in 3D Visualizations to Demonstrate Traffic Operations to Decision-makers and the Public**  
Mark Yedlin, KLD Associates, Inc.

- Engineering Track [GRAND MESA A,B,C](#)  
**Moderator: Richard McDaniel**, Federal Highway Administration
  - 1 **Using Visualization for the Design Process of Rural Roads**  
Wolfgang Kuhn, University of Leipzig, Germany
  - 2 **Rapid 3-D Modeling and Simulation of Underground Transportation Structures**  
James Kainz, Applied Research Associates
  - 3 **3D/4D/nD Modeling Real-time Visualization in Transportation**  
Douglas Eberhard, Parsons Brinkerhoff

11:30AM – 1:00PM

LUNCH

[ATRIUM](#)

1:00PM – 2:30PM

CONCURRENT PAPER SESSIONS

- Planning Track [GRAND MESA F](#)  
**Moderator: Mark Yedlin**, KLD Associates, Inc.
  - 1 **Atlanta Regional Commission Uses Oblique Imagery to Help New Orleans Recovery Effort**  
Art Kalinski, Atlanta Regional Commission
  - 2 **Visualization Data Standards for Planning & Design**  
Cyrus McCall, McCormick Taylor, Inc.
  - 3 **Delivering the NY Transit System Advertising System to NYC**  
Erin May, URS Corporation

- Engineering Track [GRAND MESA A,B,C](#)  
**Moderator: Ronald Hughes**, ITRE-North Carolina State University
  - 1 **Use of Visualization Technology for Right-of-Way Acquisition and Eminent Domain**  
David Walterscheid, Federal Highway Administration
  - 2 **A Four-D, Real-Time, Transportation Visualization System**  
Michael Pack, Center for Advanced Transportation Technology
  - 3 **Leveraging of Civil Data Models During Construction**  
Paul DiGiacobbe, Nave Newell, Inc.

2:30PM – 3:00PM

BREAK

[ATRIUM](#)

3:00PM – 5:00PM

CONCURRENT PAPER & PANEL SESSIONS

- Planning Track [GRAND MESA F](#)
  - **Visualization and Practices for Regional Planning**  
**Moderator: Jody McCullough**, Federal Highway Administration

**Description:** SAFETEA-LU requires that we use visualization to describe plans as part of the Public Participation Plan requirement in Metropolitan and Statewide Transportation Planning. This session will highlight two visualization techniques that have helped regions describe their transportation visions and goals.

Interactive planning support tools facilitate the creation of sustainable visions, and support the implementation of transportation plans. MetroQuest is a proven approach for urban and regional planning that can turn stakeholders into constructive partners. MetroQuest is one of the leading software tools that can be used to visualize regional growth issues. Through workshops, participants balance dozens of priorities in areas such as transportation, housing development and environmental stewardship. Envision Utah used visualization throughout the process to involve key decision-makers and the community to gain support at the ground level. Building grass roots support for your transportation plan will ensure its successful implementation. Envision Utah provided critical technical information to help analyze the impacts of growth on transportation, air quality, land use, water supply/demand, and infrastructure costs. Through the involvement of the public, local and state elected officials, the business, civic, and religious communities, and other key stakeholders, Envision Utah gathered information about what Greater Wasatch Area residents value and how they think growth should be accommodated.

**Panelists:**

- **David Biggs**, MetroQuest.
- **Donald McAuslan**, Metropolitan Washington COG
- **Darren Smith**, Metropolitan Washington COG
- **Theodore Knowlton**, Envision Utah

- Engineering Track I [GRAND MESA A,B,C](#)  
**Moderator: Michael Manore**, Bentley Systems, Inc.
  - 1 **An Efficient Means for Prototyping and Reviewing Roadway Designs Through Visualization**  
 R. Wade Allen, Systems Technologies, Inc.  
 Michael Pack, Center for Advanced Transportation Technology
  - 2 **3D Modeling for Lighting Visualization for Enhanced Safety**  
 Paul Lutkevich & Christopher Leone, Parsons Brinkerhoff
  - 3 **The Use of Simulation Visualization as an Aid to Roadway Design**  
 Thomas Granda, Turner-Fairbank Highway Research Center, Federal Highway Administration
- Engineering Track II [MESA VERDE \(first floor\)](#)  
**Moderator: Bruce Jenkins**, Managing Partner, Spar Point Research, LLC
  - 1 **Evaluating Rock Faces by Ground-based laser Scanning Techniques**  
 John Kemeny, University of Arizona  
 A. Keith Turner, Colorado School of Mines
  - 2 **Using Ground Based Rotating LIDAR for 3D Viewing and Measuring**  
 Laurence Rohter, Illinois Institute of Technology
  - 3 **FHWA’s Digital Highway Measurement and Ground Penetrating**  
 Michael Trentacoste, Turner Fairbank HRC, Federal Highway Administration

5:00PM – 7:00PM

[RECEPTION](#)

[GRAND MESA D, E](#)

WEDNESDAY OCTOBER 25, 2006

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6:30AM – 7:30AM

BREAKFAST

[ATRIUM](#)

7:30AM – 9:30AM

CONCURRENT PANEL SESSIONS

- Planning Track

[GRAND MESA F](#)

- **Visualization and Practices for Corridor Planning**

- Moderator** – Benjamin Williams, Federal Highway Administration

**Description:** Visualization tools can be used in planning transportation corridors. Carter & Burgess employed techniques during the design-build of the Transportation Expansion (known as T-Rex) Project in Denver. Visualization provided a highly accurate method of examining alternatives at the design stage, when options are most open. The T-REX project includes the reconstruction of 16.5 miles of two interstate highways and the design and construction of 19 miles of light rail transit. Design Visualization created engaging, believable imagery, providing a window into the future so the public could actually picture, and help others picture, how this project would unfold.

Donley & Associates uses real time visualization in roadway planning to evaluate road alignments, lane configurations and potential traffic study demands/loads. The analysis results can inform the design process and citizen involvement. Skilled users can produce simple, but useful visualizations in just a few minutes as Donley & Associates describes. Off the shelf software packages include Google Earth, CommunityViz's SiteBuilder3D, and ESRI's ArcScene/ArcGlobe.

Each system differs in GIS compatibility, visual quality and ease of use. The sample project depicts a proposed road alignment located southeast of Durango. The road connects the proposed 3 Springs development with Ewing Mesa and it provides an alternate route for traffic on US 160 and US 550.

**Panelists:**

- Wendy Wallach, Carter Burgess
- Charles Donley, Donley & Associates, Inc.
- David Hinnant, North Carolina Department of Transportation
- Dony Dawson, Carter Burgess

- Engineering Track

[GRAND MESA A,B,C](#)

- **Advancements in Surveying & Remote Sensing**

- Moderator** – Bruce Jenkins, Spar Point Research, LLC

**Description:** This session will review how laser scanning, airborne LIDAR, GPS and traditional survey integrated with CAD and GIS impacts project safety, schedule, quality and cost for the design, construction and operation of transportation infrastructure assets.

**Panelists:**

- **James V. Flint**, Bohannon Huston, Inc.
- **Paul Mrstik**, Terrapoint Canada, Inc.
- **John Kemeny**, Department of Mining and Geological Engineering, University of Arizona

9:30AM – 10:00AM

**BREAK**

[ATRIUM](#)

10:00AM – NOON

CONCURRENT PANEL SESSIONS

- [Planning Track I](#) [GRAND MESA F](#)
  - **Modeling Traffic for Planning & Design Decision-making**  
**Moderator** – **Thomas Furlani**, Center for Computational Research, University at Buffalo

**Description:** This session will overview developments relating to traffic modeling and visualization in order to provide a context for open discussion. Panelists and Moderator will draw on prior experience and will discuss future trends and where they believe the technology is headed. After the presentations, the panel will engage the audience in discussing some of the challenges and interests associated with modeling and visualizing traffic along with the utility this capability provides for the planning, design, and approval process.

**Panelists:**

- **Frank L. Dolan**, Bergmann Associates
- **Matthew Martimo**, Citilabs
- **Mark Yedlin**, KLD Associates, Inc.

- [Planning Track II](#) [GRAND MESA D,E](#)
  - **Visualization and Practices for Neighborhoods, Projects , & Places**  
**Moderator** – **Charles Goodman**, Federal Transit Administration

**Description:** Probably no where else does the use of Visualization techniques affect planning more closely than at the Neighborhood, Project Level. However, transportation planning is seldom thought of as a visual process. Often, transportation decisions are made on the basis of engineering plans or diagrams, with the focus primarily on traffic or alignment considerations. At the same time, these designs have a big impact on the livability of the street and the community. We seek public input when making transportation decisions, but there is typically little ability for understanding and visualizing what the choices really are. Through the use of visualization techniques like GIS-based analysis, 3D visualization tools, and Google Earth, communities are provided with new exciting tools that allow them to envision land use alternatives, understand their potential impacts, explore options, and share possibilities. The ability to truly show how transportation relates to its surroundings is vital to reaching consensus, overcoming objections and in accelerating the review process with town councils and the public. This session will present a number of examples of how various affordable visualization tools can lead to better decision-making, especially when coupled with design charrettes and

other public engagement venues. A panel of experts from CommunityViz, Winston Associates, and the Pikes Peak Council of Governments will highlight these tools and how they are used in transportation planning and project decision-making.

**Panelists:**

- **Douglas Walker**, Placeways, LLC
- **Chase Mullins**, Winston Associates
- **Craig Casper**, Pikes Peak COG

- Engineering Track

[GRAND MESA A,B,C](#)

- **Progress in Context Sensitive Solutions and Visualization**

**Moderator** – **Charles Hixon, III**, Bergmann Associates

**Description:** This Panel Discussion will focus on the higher level applications of visualization within the Context Sensitive Solutions (CSS) process. Issues such as; How is Visualization used within the CSS process, What is the process to introduce visualization and obtain approvals for its use, What is the funding process, How can Visualization be monitored and measured within the CSS process, and what team members are needed to utilize Visualization within the CSS process will be addressed (*along with others*) during this panel discussion.

**Panelists:**

- **Lisa Olszak**, Olszak Management Consultants, Inc.
- **Angelo Papastamos**, Utah Department of Transportation
- **Jonathan Nepstad**, AICP, Fehr & Peers

NOON – 1:00PM

LUNCH

[ATRIUM](#)

1:00PM – 3:00PM

CONCURRENT PANEL SESSIONS

- Organizational Track

[GRAND MESA F](#)

- **Opportunities and Challenges in Transportation Data Visualization**

**Moderator** - **Harvey J. Miller**, University of Utah

**Description:** Transportation research and application are moving from a data-poor to a data rich environment. New technologies such as intelligent transportation systems, location aware technologies (e.g., the global positioning system), video cameras, satellite and airborne remote sensing, automated toll systems, and so forth, are greatly increasing the volume and scope of transportation data. The cost of storing and sharing these data is decreasing due to increasing capabilities for data warehousing and data infrastructures. The continuing geometric growth of computing power and is also improving the means for transportation data processing.

Despite these growing potentials, there is still a widespread feeling among transportation researchers and practitioners that we are “drowning in data” rather than exploiting it to its fullest extent. Many of the traditional analytical tools used in research and practice were developed in an era of scarce data and weak computing: they can only scratch the surface

of the vast information space implied by these data. These unrealized capabilities are apparent at the same time when there is a critical need for new thinking about the major challenges facing transportation over the next decade, such as congestion, safety, security, infrastructure renewal and the environment.

Data visualization and improved interoperability offers potential for making sense of the large volume of data being collected about transportation systems. The insights gained through deeper and more holistic exploration of transportation data can generate new ways of thinking about and analyzing transportation systems and their challenges. This panel will bring together leading experts in transportation data visualization to discuss its opportunities and challenges in basic research and application.

**Panelists:**

- **Timothy Case**, Parsons Brinkerhoff
- **Thomas R. Furlani**, Center for Computational Research, University at Buffalo

- **Engineering Track I**

[GRAND MESA A,B,C](#)

- **Using Simulator Technologies to Improve Safety in Designs and Work Zones**

**Moderator** – **R. Wade Allen** – Systems Technologies, Inc.

**Description:** Driving simulation (immersive and desktop) promote a higher level of safety assessment and review of roadway projects. This panel session will summarize past, current and potential applications. Open discussion with the audience will be encouraged regarding utility of this approach, how to achieve this capability in various agencies, and the potential for wider adoption of these techniques.

**Panelists:**

- **Thomas Granda**, Federal Highway Administration
- **Michael Kelly**, Western Transportation Institute
- **Yiannis Papelis**, Center for Advanced Transportation Systems Simulation, University of Central Florida

- **Engineering Track II (Bridge)**

[GRAND MESA D,E](#)

- **Visualization for Bridge Design, Fabrication, and Construction**

**Moderator** – **Thomas Seiwert**, National Institute of Standards and Technology

**Description:** This session will look to present and discuss advancements, opportunities, and issues relating to the extension of 3D data into bridge fabrication and construction practices.

**Panelists:**

- **Krishna Verma**, Federal Highway Administration
- **Asif Habibullah**, CSRI
- **Michael Mundy**, HNTB
- **Jeffrey Coleman**, Creative Imaging, URS Corporation
- **Pingsha Dong**, Battelle
- **Luke Faulkener**, AISC

3:00PM – 3:30PM

BREAK

[ATRIUM](#)

3:30PM – 5:30PM

- Organizational Track

[GRAND MESA F](#)

- **Employing Visualization Organizationally**

- Moderator - Richard McDaniel**, Federal Highway Administration/EFLHD

**Description:** This session will discuss visualization in the context of the organizational considerations. More specifically: How is Visualization employed within the organization? What is the process to introduce visualization and obtain approvals for its use? How can Visualization be monitored and measured? What team members are needed to utilize Visualization?

**Panelists:**

- **Charles Hixon, III**, Bergmann Associates
- **Douglas Walker**, Placeways, LLC
- **Kevin Gilson**, Parsons Brinkerhoff
- **Steven Braun**, Florida Department of Transportation

- Engineering Track

[GRAND MESA A,B,C](#)

- **Visualization in Design/Build and Design/Bid/Build Project Environments**

- Moderator - Mark Taylor**, Federal Highway Administration

**Description:** The goal of the session is to present and discuss how 3D data and visualization (wire-frame data or rendered models) can and are being used to expedite, facilitate and support transportation construction activities. Panelists will present some the latest developments and issues on this subject followed by facilitated discussion with the audience. This session is intended to generate ideas and opportunities for action on where the highway design and construction industry should go in terms of research, development and technology (RD&T) to better support and leverage applications of the emerging 3D and visualization to expedite construction of transportation projects.

**Panelists:**

- **James Bodi**, Kiewit Western Co.
- **Paul DiGiacobbe**, Nave Newell, Inc.
- **Helen Peiker**, Colorado Department of Transportation

**THURSDAY OCTOBER 26, 2006**

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7:00AM – 8:00AM                      **BREAKFAST**                      [GRAND MESA D,E](#)

8:00AM – 9:30AM                      **PLENARY SESSION**                      [GRAND MESA D,E](#)

- **Linking Transportation, Land Use, and Conservation Planning Through Decision Support Tools**  
Patrick Crist, NatureServe
- **Visualizing the World via Google Earth, Google SketchUp, and 3D Warehouse**  
Michael Springer, Google

3D is increasingly becoming a standard - and expected - language for visualization. Google Earth, Google SketchUp and the Google 3D Warehouse are tools for both the professional and the consumer that help make 3D easier to create, visualize and share. Mike will share with us some of the phenomenon surrounding Google Earth and Sketchup in the world of 3D, and explore the opportunities for the future through new advancements such as 3D Warehouse.

9:30AM – 10:00AM                      **BREAK**                      [GRAND MESA D,E](#)

10:00AM – NOON                      **PLENARY SESSION**                      [GRAND MESA D,E](#)

- **A Future Visualized**  
Douglas Eberhard, Parsons Brinkerhoff
- **Research Agenda of the TRB Visualization Committee**  
Ronald G. Hughes, ITRE-North Carolina State University
- **Special Announcements & Closing Remarks**  
Michael Manore, Chair, TRB Visualization Committee

NOON    **SYMPOSIUM CONCLUDES**

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