

# Delaware Center for Transportation

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## 2013 Delaware Transportation Infrastructure Forum Problem Identification Statements



*Identifying Important Issues Related to the Transportation  
Infrastructure in Delaware and Surrounding Region*

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The Delaware Center for Transportation and the Delaware Department of Transportation

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# **ADMINISTRATION, GOVERNMENT & POLICY**

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# **ADMINISTRATION AND GOVERNMENT POLICY**

## **Problem Statement 1**

### ***Identify the Trends Affecting Organizational Development in Transportation***

Description: The problem is to identify the trends affecting organizational development in Transportation.

The following issues regarding the trends that affect organizational development in transportation were identified:

- What trends affect organizational development in transportation?
- What needs are developing and/or projected as a result of those trends (fast- or slow-burning issues)?
- Which frameworks, changes, staff skill sets and/or roles could potentially address those needs?

## **Problem Statement 2**

### ***Financing***

Description: The problem is to identify which transportation funding mechanism and options are available and communicate them to stakeholders. It is important to maintain financial stability using cost reporting and forecasting techniques which are sensitive to changes to current funding and economic trends.

The following issues regarding financing were discussed:

- Given current funding and economic trends, which transportation funding mechanism and options are available, and politically feasible in Delaware?
- What are the true values for Delaware's transportation assets and the full extent of its transportation costs?
- How are those values best calculated and then communicated effectively to the public?

## **Problem Statement 3**

### ***Strategic Management***

Description: The primary issues of strategic management's critical challenges in the future are: leadership, program delivery role, system performance, and corporate capacity.

The following issues regarding strategic management were identified:

- Strategic Management: How can cross-disciplinary mentoring, training or teamwork lead to more competitive, more valuable engineering products?
- How can new technologies help to make bureaucratic processes and internal/external communications more efficient, effective and transparent?
- What are the current gaps or disconnects between federal models and Delaware's outlier status?
- Which strategies are needed to address the downloading of federal responsibilities, and to integrate transportation, emergency mitigation, land use and environmental planning?

#### **Problem Statement 4**

##### ***Data Management***

Description: Keep the database up to date for efficient transfer of information and good communication.

The following issues regarding data were discussed:

- What is the state of the state's data (location, accessibility, compatibility, gaps, digitized vs. non-digitized)?
- What are the options for sharing and systematizing data collection, maintenance, retrieval, formatting, and outputs?
- Which options are feasible within agencies, across agencies, and among levels of government that maximize Delaware's resources and models?
- Which constraints are conferred by the need to preserve data integrity, security, privacy and revenue generating opportunities?

#### **Problem Statement 5**

##### ***Personnel Management and Soft Skill***

Description: The problem is to improve personnel management by reducing personnel turnover, explore ways to improve salary, administration, and employee training. Soft skills improvement should be done by communicating more effectively to the public. Engineers can achieve the goal by developing a crucial public and professional communication effort.

The following issues regarding personnel management and soft skills were discussed:

- Which factors affect high levels of state agency turnover?

- How can turnover/training costs be reduced, and what are the costs/benefits of policy alternatives? (Flex time/changes to state merit system/tying salaries to performance-based measures/ improving salaries/uniform state-wide training)?
- How can transportation issues be communicated/marketed more efficiently to the public?
- How can engineers develop crucial public communications and contextual (economic, social) analysis skills, and what are relevant roles for educational/professional organizations in doing so?

## **Problem Statement 6**

### ***Workforce Development***

Description: The public image of the transportation industry is poor and needs improvement and the workforce needs better development. The problems may be helped by improving the hiring, training, and retention rates of employees.

The following issues regarding workforce development were identified:

- Which approaches to organizational culture, training and/or hiring can help to improve staff approaches to data management and maintenance?
- What are the prospects for developing and implementing a state-wide training program or academy?
- What are the workforce impacts of negative public perceptions of an agency or industry?



# **AVIATION, RAIL & MARINE**

## **Moderators:**

**Allan Zarembski – University of Delaware**

**Bobbie Geier - Department of Transportation**

**Eugene Cipriani – Keystone Acquisition Services, Corp**

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# **AVIATION, RAIL AND MARINE**

## **Problem Statement 1**

### ***State of Focus Group in Aviation, Rail and Marine***

Description: The problem is to integrate all transportation systems; road, aviation, rail and marine, for efficient planning and capital improvements in transportation infrastructure.

The following issues concerning aviation, rail and marine were discussed:

- Focus of the group was that aviation, rail, and marine are secondary within the state to auto and truck transportation and as such the infrastructure is limited and constrained.
- Need/Opportunity for upgrading infrastructure, capacity, and capability.
- Opportunities for intermodal transportation operations:
  - Freight (Rail-Highway-Marine)
  - Passenger (Heavy Rail-Light Rail-Highway-Ferry)

## **Problem Statement 2**

### ***Aviation's Role in Delaware***

Description: Improve recognition of the varied aviation facilities in Delaware and plan for integrated transportation options (i.e. Rail Connection between Wilmington and New Castle Airport).

The following issues regarding aviation's role in Delaware were discussed:

- Aviation's role in DE includes a range of general aviation facilities that are not well recognized.
  - Recent limited commercial service at Wilmington New Castle Airport.
- Does Delaware have what it takes to sustain quality scheduled air service?
- What facility development will support and sustain the air service in the future?
- Is there an opportunity to develop integrated transportation options?
  - Rail Connection between Wilmington and New Castle Airport.

### **Problem Statement 3**

#### ***Status and Challenges in Marine Transportation***

Description: Plan for rail and larger ship access to ports and rebuild marine facilities to accommodate the increase in marine freight (43 percent domestically and 67 percent internationally) between 2010 and 2020.

The following issues concerning status and challenges in marine transportation were discussed:

- Issue of limited rail access to port facilities.
  - Inclusion of rail lines at marine facilities allow for intermodal operations.
    - Intermodal hubs are of interest to freight railways in the US; many have already constructed them at other ports to facilitate their operations.
    - Require expansion/development of port facilities to facilitate container storage and train access.
    - Possibility of public/private co-operation options.
- Limited marine facilities
  - Revitalize and increase access to the ports to facilitate their future growth.
  - Rebuild port facilities and institute dredging in order to handle new, larger “standard” of ships.

### **Problem Statement 4**

#### ***Ferry Transportation Options: Parts of an integrated Passenger Transportation System***

Description: There is a need for the coordination of ferry transportation systems with land-based transit services to ensure that passengers can easily reach their destination without using a private automobile. The improved ferry transportation network will provide new capacity to overburdened roadway networks.

The following issues were discussed regarding ferry transportation options:

- Development of Ferry transportation options as part of an integrated passenger transportation system.
  - Currently very limited; 6 hour transit time from North to South of State.
  - Seasonal high speed ferry.

### **Problem Statement 5**

#### ***Status of Rail-Freight and Rail-Passengers***

Description: Plan for expansion of rail freight shipments and the increased infrastructure expansion in the Northeast. Separation of freight access from NE corridor congestion will improve the accessibility.

The following issues were discussed on the above problem statement:

- Petroleum products example of expanded freight service opportunities.

- Oil shipments to refineries used to be from marine transport, now they are from rail transportation.
- Allows source changes, such as the Delaware City refinery switching from foreign oil to oil from Nebraska.
- Infrastructure expansion to support growth.
  - Expansion of current infrastructure (adjacent to NEC).
  - Expansion of infrastructure to south of state.
- Separation of freight access from NE Corridor congestion.
  - Improved access (Chesapeake connector flyover for freight over NE corridor).
  - Integration of freight growth with passenger rail growth, such as the Newark DE station plans and the future of the industry along the lines.
  - Opportunities for short line growth of local rail freight.
- Passenger Rail Operations.
  - MARC service into Newark and Wilmington.
  - Increased service to center and south of state.
  - Land use vs. population density vs. rail access.

## **Problem Statement 6**

### ***Safety of Railways; Safety of Oversight***

Description: A study at the Government Accountability Office (GAO) reveals that the rail network is one of America's safest modes of transportation, although several recent rail accidents have reinforced the need for constant effort from the private and public sector to ensure safety for rail passengers, the public, and railroad employees. Even though compared to trucking, rail is statistically safer but people focus on the major accidents instead. So, development and implementation of risk-based approach for safety inspection of the railroad network, reauthorizing rail safety program, and provision for new rail safety, creation of rail safety reduction plans and education of the public may help people to understand the associated risks in rail industry. In order to address the concern of liability issues, emphasizing the importance of field testing should be given to ensure that multiple phases of testing take place to identify, analyze and correct the problems, and thus it will reflect the core values of accountability, integrity and reliability.

The following issues were discussed on the safety of railways:

- Safety of railways; safety oversight.
  - Compared to trucking, rail is the statistically safer but people focus on the major accidents instead. Education of the public may help to get them to understand the risks.
  - Liability issues.

## **Problem Statement 7**

### ***Transportation Interconnection***

Description: To facilitate the transportation interconnection in Delaware in particular from airports to rail stations, services like ZIP Cars (short term rental cars), bus connections, and shuttle air might be beneficiary for disembarked people to get to their required ways.

The following issues were discussed on transportation interconnection:

- Transportation Interconnection.
  - From airports to rail stations, once people disembark they require ways to get to where they are going. Possibilities include ZIP cars (short term rental cars), bus connections, and shuttle air services.

## **Problem Statement 8**

### ***Light Rail Options for Delaware***

Description: Light rail option for Wilmington and possibly Newark might prove more flexible than heavy rail as stations can be spaced closer. Additionally, more reliable than buses as trains can be run closer together.

The following issues were discussed regarding light rail option for Delaware:

- Light Rail has been shown to work in other cities but has major initial resistance that eventually subsides as usage meets or exceeds projections. More flexible than heavy rail as stations can be spaced closer; more reliable than buses as you can run more trains closer together.



# **BRIDGES & STRUCTURES**

## **Moderators:**

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**Jason Hastings – Delaware Department of Transportation**

**Joseph Volk – HNTB Corporation**

# **BRIDGE AND STRUCTURES**

## **Problem Statement 1**

### ***Long-Term Performance and Durability of Accelerated Bridge Construction (ABS) Systems***

Description: According to the report of Federal Highway Administration (FHA), the proven benefits of Accelerated Bridge Construction (ABC) system includes the minimized traffic disruption, improved work zone safety, and reduced on-site environmental impacts. ABC also has long term performance and durability attributes. To understand the durability of ABC, especially for the seismic response the segmented joints and spliced girder systems of ABC can be leveraged towards energy dissipation. In this regard, a couple of important facts like variability of time in project construction, durability and performance of high performance concrete need to be studied. Reduce the number of bridges that have structural problems by analyzing their common problems. Cost benefit analysis for maintenance of bridge, decks and paint systems are recommended. Fatigue crack growth behavior of steel bridge members under randomly applied loading and extreme life region is an important consideration during the service life of steel bridges.

The following topic regarding Accelerated Bridge Construction (ABC) system and high performance concrete was identified:

- What is the long term performance and durability of Accelerated Bridge Construction (ABC) systems? Variability of time in project constructions needs to be studies.
- Durability and performance of high performance concrete needs to be investigated.

## **Problem Statement 2**

### ***Performance of Geosynthetic Fiber Reinforced Polymer (GFRP) Materials in Different Parts of Bridges Construction***

Description: Glass Fiber Reinforced Polymer (GFRP) rebar is a promising material to resist the corrosion typically experienced by bridge deck reinforcement. There should be a study of the performance of the GFRP materials in bridge construction. The deterioration of concrete bridge structures by corrosion is commonly caused by chloride ions which are primarily found in northern or coastal climates. This is caused by de-icing salts and sea water. The GFRP bars are formed from tightly wound fibers that cause the bar to bulge between wraps. In some cases, a light resin coat surface provides additional protections to the wrapped fibers.

The following issue regarding Geosynthetic Fiber Reinforced Polymer (GFRP) was identified:

- What is the performance of GRFP materials in different parts of bridge construction?

### **Problem Statement 3**

#### ***Categorizing and Identifying Structurally Deficient Bridges***

Description: The majority of the bridges (in particular steel bridges) in the interstate of highway system were constructed between 1950 and 1980 and maintenance needs to be evaluated to reduce the number of potential structural failures. Current bridge maintenance activities include repairing bents/damages steel beams, cracked/spalled concrete, damage in expansion joints, damage or bent railings, and removal of surface coating. Structurally deficient bridges need to be identified.

The following issue was identified regarding structurally deficit bridges:

- Structurally deficit bridges should be categorized; common problems should be addressed to reduce the number of them.

### **Problem Statement 4**

#### ***Revising Criteria for Fatigue in Sign Structures***

Description: Fatigue is a process in which damage or premature failure of a structure or component of structure occurs due to repetitive loading. Recently main sign supporting structures have experienced failures due to fatigue loadings imposed by winds. This has resulted in revised design standards that are significantly more conservative than past specifications, causing the need for significant retrofits or upgrades to a significant number of sign supporting structures.

The following issue was identified regarding revisited criteria for fatigue in sign structures by the moderators and from the audience responses received in the 2013 Delaware Transportation Forum at University of Delaware:

- Revisited design criteria or practices for sign structures to resist fatigue loading are a necessity.

### **Problem Statement 5**

#### ***Cost and Durability of Metalizing***

Description: In recent times, a metalizing coating system has been used on current bridge project construction supports to reduce the corrosion. It is important to improve the service life and reduce the overall cost as compared to other bridge maintenance options.

The following issue was identified regarding cost and durability of metalizing:

- Cost and durability of metalizing should be investigated.

## **Problem Statement 6**

### ***Cost-Benefit Analysis for Maintenance of Bridge***

Description: A planned strategy of cost-effective treatment for bridge maintenance program is necessarily important to preserve and extend the useful life of a bridge. It is important to develop a routine schedule for bridge maintenance activities using cost-benefit analysis. Identify and schedule daily, weekly, monthly, and annual maintenance activities. Special maintenance activities involving lane closures and turnarounds should be minimized.

The following issue was identified regarding cost-benefit analysis for maintenance of bridge:

- Cost-benefit analysis needs to be done for maintenance of bridge decks, joints and paint systems.





# **CONSTRUCTION, PAVEMENT AND MATERIALS**

## **Moderators:**

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Transportation**

**Thomas Clements – Century Engineering**

# **CONSTRUCTION, PAVEMENT AND MATERIALS**

## **Problem Statement 1**

### ***Data Collection***

Description: Traditionally effective interaction between the traffic data-collection, technical analysis, and the pavement designers led to a successful pavement design. Conversely, the lack of good data management and the absence of repeatability and precision in large data collection efforts may lead to a poor design. The introduction of new technology and advanced data management tools may be helpful for smooth transition of data collection system, and to organize large data, It is very important to ensure good data and that it flows properly between different departments. Effective data transfer between different parties is very important. In some cases data may be collected using public surveys instead of a technology-based system.

The following issues were identified regarding data collection:

- Managing large data: lack of good data management rules and the inherent issues of absence of repeatability and precision in large data lead to a difficulty in making “good” decisions.
- Large data collection is very expensive. How can we make the data collection process cost effective?
- Smooth transition of data collecting systems to accept the large data and personnel to use the new technologies.
- How to efficiently connect work flow between different departments that share data and decision/ results? Sometimes, each department may only need a small portion of the data. Improving the efficiency of data/result transfer between different parties is very important.
- How to collect data with public participation instead of technology-based systems?

## **Problem Statement 2**

### ***Design, Construction and Bidding Process***

Description: Although the concept of low-bidder is the typical basis for selecting contractors, there is tremendous potential for considering innovative construction alternative ideas in the bidding process. The concept of Design-Build (D-B) system is also considered as innovative contracting system as in this system the design and construction service are contracted to a single entity which may be a better approach to minimize the risk of delay by overlapping, phase by phase design and construction of a project. As designer and contractors both work directly for the owner, the involvement of contractor during design process will allow contractor to be innovative and help share the risk of the contract.

The following issues were identified regarding design, construction and bidding process:

- Innovative contracting
  - Issues with the Design-Build (D-B) system: A system in which the design and the construction services are contracted to a single entity may be a better approach to minimize risks of delay by overlapping, phase by phase, design and construction of a project. On the other hand, “Big” contractors (with professional depth and breadth) may try to take advantage of this process and D-B approach may limit the clients’ options in the selection process.
  - Qualification Vs. Low-cost based evaluation process.
  - CM/GC- Designer and Contractor both work directly for the owner. Requires legislation in Delaware. Contractor involved during design process. Allows contractor innovation and helps share the risk of the contract. Delaware’s construction program may not be large enough to support non-traditional methods of contract delivery.
- Problem of using traditional project contracts:
  - Time issues: delaying maintenance work to the point where traffic jams/delay becomes inevitable.
  - No room to involve contractors in the design process to reduce time and cost of constructions.
- Enhancing the designers’ knowledge about constructability.
- Performance based scoring of contractors: can this lead to the selection of a contractor that lowers risks related to construction and maintenance?
- Weighing contractors’ qualifications based on the importance and size of projects.
- “Intelligent” construction: sectional- and longitudinal- composite pavements; load-frequency-based design and construction.
- A working definition of sustainable pavement construction.

### **Problem Statement 3**

#### ***Improving Roadway Drainage***

Description: Inadequate drainage of water on highways poses a significant safety concern. In order to prevent the pooling of water on roadways, the topic of rapid removal of water must be addressed during the construction and selection of materials phase. In order to better equip decision makers, research should be carried out to identify effective methods of rapid water removal and improving the surface design method of pavements as well as methods to assess the usefulness of such improvements.

The following issues were identified regarding improving roadway drainage:

- Role of pervious concrete in minimizing surface run-off and improving overall drainage performance for roadways as well as parking lots and bike lanes.
- Reinforced base/sub-base construction: Assessing the strength and drainage performance of a pavement system when base/sub-base is reinforced with polymer.
- Innovative methods to handle fluctuation of the ground water table and minimizing its damaging effects on pavement performance.
- Non-destructive testing techniques to assess quality and performance of the existent drainage system. e.g. GPR, NDG, Industrial X-ray CT.
- Long term evaluation of drainage system performance. Occurrence and impact evaluation of clogging and in-situ cleaning techniques.
- Sampling and/or data collection procedures for infiltration evaluation.

The logo is a circular seal. The outer ring contains the text "DELAWARE CENTER FOR" at the top and "URBAN TRANSPORTATION DESIGN" at the bottom. Inside the ring is a stylized "U" and "D" monogram. Above the monogram is a fleur-de-lis symbol.

## **DESIGN**

### **Moderators:**

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**Raymond Harbeson – H4 Design, LLC**

**Shilpa Mallem – RK&K Engineers**

## **DESIGN**

### **Problem Statement 1**

#### ***CADD Training, Surveying and Communication***

Description: Formal training on CADD program, either as a separate class or part of a design course, is highly recommended currently as over the past few years there has been a transition from having CADD technicians do CADD work to having engineers doing CADD work. Additionally, land surveying, communication training and instruction on the use of new technology are needed as part of the overall education in design. These skills are required in order to make sure that the future workforce is well equipped to handle both the rapid technological changes happening as well as workforce barriers.

The following issues regarding CADD training, Surveying and Communication were identified:

- Formal CADD Training, either as a separate class or part of design courses.
- ADA Design- more training on ADA design, either as a separate course or part of an advanced roadway design course. Special attention needs to be given to railroad crossing and construction areas.
- Land Surveying training at the undergrad level, either as a separate course or as part of other design courses.
- Communication training is needed on the use of new technology and proper professional communication documentation.

### **Problem Statement 2**

#### ***Transit Oriented Design***

Description: Transit oriented design (TOD) is considered a tool for promoting smart economic growth as well as better transportation choices, such as providing a way to switch from using a car to using transit systems, bicycle, and pedestrian modes of transportation. This necessitates new design solutions for when these different modes of transportation operate and interchange within the TOD. According to Transit Cooperative Research program (TCRP) report 102, over 100 joint development projects of TOD exist on or adjacent to US transit-agency property. TOD project implementation ideally starts with a vision and proceeds to strategic area planning backed by appropriate zoning as well as policy incentives and regulations. The national survey of U.S. transit agencies also revealed that the tools most frequently used to leverage TOD are funding for station-area planning and ancillary capital improvements; the introduction of density bonuses to encourage the production of affordable housing units; and relaxation of parking standards.

The following issues concerning Transit Oriented Design were discussed:

- As transportation choices (car, transit, bicycle and pedestrian) increase within the public right of way, new design solutions are needed at the interface points of the different transportation modes.
  - Creative design solutions of safe pathways for all modes must be researched.
    - A study of the dynamic weather impact on those designs is needed.
  - Collecting data and information and then evaluating the various designs currently installed at these interface points would provide useful points of reference.

### **Problem Statement 3**

#### ***Utilities***

Description: As highway projects are often designed with little or no consideration of utilities, sometimes it becomes impossible to choose between relocation of all of the utilities and leaving all of the utilities in place while meeting the scope and mission of the highway construction, as well as also minimizing the impacts to those utility facilities. By developing a plan which can balance between these extremes, it becomes possible to gain substantial savings in utility relocation costs and impacts as well as potential overall reductions to the project budget and timeline.

The following issues regarding utilities were identified:

- Research is needed on the best ways to utilize new technologies (GPS, ground penetration radar, etc.) to produce accurate mapping of existing utility lines within the public right of way.
- Procedures and policies are needed to allow the electronic sharing of utility location maps between utility companies, road designers and contractors while still providing the necessary security and liability protection needed by the utility owners to make them comfortable with sharing the information.

### **Problem Statement 4**

#### ***Road and Roadside Design***

Description: The focus of road and roadside design from a safety perspective in both urban and rural environment is challenging because of greater difference in demand and functional use of space adjacent to roads. Common road and roadside configurations associated with design standards, such as roadside objects placed near lane merge points, fixed object placement on intersections, driveways that interrupt positive guidance, and roadside configurations commonly known to be hazardous must be identified and have their impact on roadway safety documented. Although new concepts have been included on recent highway designs, follow-up research is needed to determine if these concepts are producing the desired results.

The following issues concerning road and roadside design were discussed:

- Has the deployment of shoulder rumble strips on high speed highways changed the need for wide clear zones?
- Have roundabouts produced the capacity and safety benefits intended?
- Have reduced lane widths implemented on Context Sensitive Designs achieved reduced speeds and remained safe?
- Are the latest guardrail standards still valid as smaller, more fuel efficient vehicles become a higher percentage of the national vehicle mix?

## **Problem Statement 5**

### ***3D and BIM Modeling and Specifications***

Description: 3 Dimensional (3D) modeling and Building Information Modeling (BIM) is migrating into transportation design as a better interface between current software and the production of construction plans and documents. Issues with model ownership and data sharing need to be resolved and research should be undertaken on how to make this new technology in a cost effective manner. The ability to have consistent specifications will allow for different interpretations of functionality and minimize assumptions by developers whereas flexible specifications will aid the design team to evaluate performance effectively.

The following issues regarding 3D and BIM modeling and specifications were identified:

- Follow-up research is needed to determine if performance based specifications are effective and if there are areas where improvement is needed.
- 3D and BIM modeling is migrating into transportation design.
  - A better interface between current software and the production of constructive plan documents is needed to make the use of 3D models more effective.
  - Model ownership and data sharing issues need to be resolved and research on how to make the technology more cost effective is also needed.

## **Problem Statement 6**

### ***Context Sensitive Design***

Description: Context sensitive design is considered a model for transportation project development with the objectives to optimize safety of the facility for both the user and the community, to preserve the environmental, scenic, aesthetic, historic, and natural resource values of the area and to efficiently and effectively use of the resources (time, budget, community) of all involved parties. The development of visualization techniques such as the previously mentioned 3D & BIM technologies, can be used to assist in the decision-making process regarding design options and act as a voice for a context sensitive design solution.

The following issues concerning context sensitive design were identified:



- Research is needed on how to make visualization technology more cost effective, so it can be utilized on smaller, lower cost projects.
- Guidance is needed on how to improve public communication through social media.
- Follow up research on Context Sensitive Design is needed to determine if the customized design have produced the desired outcomes.

## **Problem Statement 7**

### ***Bike and Pedestrian Design***

Description: These days more roadway designs are including bicycle and pedestrian facilities as part of their overall design practice. This inclusion of bicycle and pedestrian facilities has been a part of a wider *Complete Streets* design approach which aims to provide safe and comfortable ways to combine these modes of transportation with regular automobile operations.

The following issues regarding bike and pedestrian design were discussed:

- More roadway designs are including bicycle and pedestrian facility as part of their overall design (complete streets).
  - Follow-up research is needed on the effectiveness of the design concepts that have been included on recent projects.
- Research is needed to develop creative design concepts for providing bike/pedestrian facilities along existing and new roadway and better guidance is needed on which design concepts are most appropriate for each class of highway.
- On the policy side, a study needs to be done on the best approach to expand both the bicycle and pedestrian networks.
  - Is it better to require facilities to be included on every project or is it better to look at an area and require each project to make an investment into the system by building the next most useful link?
- Better approaches need to be developed to educate the public on the rules of the road for bicycles to help promote safety, as we mix more cars and bicycles on the highway system.

## **Problem Statement 8**

### ***ADA Design***

Description: According to the United States access board about 14% of US population has impairments which reduce and limit the mobility. According to the Americans Disability Act (ADA) it is mandatory to ensure access to build environment for the people with disabilities.

The ADA standards establish design requirements for the construction and alteration of facilities subject to the law.

The following issues regarding ADA design were identified:

- Follow-up research is needed to determine and publish the best design practices for making our current transportation system accessible.
- Design approaches for railroad crossings, limited Right-of-Way and temporary pathways through construction zones need to be developed.
- Research is also needed to determine if the specific standards listed on the ADA Law can and should be made more flexible.

### **Problem Statement 9**

#### ***Common Grounds of Follow-up Research, Data Sharing and Research Collaboration***

Description: After careful considerations of design research opportunities in the transportation field, several common issues for research recommendations were developed.

The following issues regarding common grounds of follow-up research, data sharing and research collaboration were identified:

- One common comment throughout the design discussion was the need for follow-up research whenever the results from the previous studies are applied in practice and in projects.
- Another common issue mentioned under many topics was the need for better ways to share data collected with all stakeholders.
- More opportunities need to be planned to allow additional interaction between researchers and designers.
  - In addition to annual research showcases, research presentations at professional society meetings (ASHE, ASCE, ITE etc.), periodic email updates to the engineering community on current studies, and more research workshops, where practicing engineers can provide input during research projects, will all help to provide better final products and help disseminate findings more widely within the local engineering community.

The logo is a circular seal. The outer ring contains the text "DELAWARE CENTER FOR" at the top and "TRANSPORTATION" at the bottom. Inside this ring is a shield with a compass rose design. Overlaid on the shield is a large, stylized "UD" representing the University of Delaware. Above the shield is a fleur-de-lis.

# **ENVIRONMENT**

## **Moderators:**

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# **ENVIRONMENT**

## **Problem Statement 1**

### ***Develop Sustainability Metrics to Measure Project Design Performance***

Description: In order to measure and compare sustainable designs and their performance, a standardized metric should be developed and implemented. Such a metric should look at the numerous issues associated with these projects, such as public safety, environmental impact and user satisfaction. By having a standardized metric to compare alternative options, it becomes possible to recognize the projects with the highest levels of accomplishment in environmentally sustainable design.

The following issue was identified regarding development of sustainability metrics to measure project design performance:

- Develop sustainability metrics to measure project design performance.
  - How do we integrate level of service, environmental impact, public safety, and user satisfaction?

## **Problem Statement 2**

### ***Develop a Return on Investment (ROI) and a Delaware-Specific Report***

Description: A Return on Investment (ROI) report is used to calculate the expected return on a specific investment. Through the use of ROI reports on alternatives for a project, it becomes possible to determine which alternative has the best return once it has been built. The return is not always a return of funding, but may include environmental and social improvements. By developing a comprehensive ROI report, including major environmental externalities in the calculations, Delaware can focus on researching and implementing the best available technologies on projects. Another report should also focus on studies done in the Northeast Corridor on alternatively-fueled vehicles and their associated infrastructure needs. By developing this report, future choices can be made with respect to sustainable environmental, economic and social issues.

The following issues regarding return on investment (ROI) and a Delaware-specific report were discussed:

- Develop a Return on Investment (ROI) matrix which includes environmental externalities and use this to research best available technologies from around the world and report on what new technologies are worth implementing in Delaware to make fact based political decisions.
- Develop a Delaware-specific report evaluating the results of Northeast Corridor studies of electric and other alternatively-fueled vehicles and from this develop implementation paths for alternative-fuel stations or other transportation infrastructure needed for these new vehicle types.

### **Problem Statement 3**

#### ***Evaluate Flooding Effects on Transportation Infrastructure, Including Effects on Economic Value and Local Community Planning***

Description: The primary goal of evaluating the effects of flooding and sea-level rise on transportation infrastructure is to identify the assets with the highest risk of damage from these environmental effects and to provide that information to decision makers. The methods used in the evaluation of at-risk assets must include consequence-based criteria such as loss of life, ability to re-route around problem areas, the time required to rebuild and other associated economic costs.

The following issue was identified on the above mentioned topic:

- Evaluate flooding effects on transportation infrastructure, including the effects on economic value and local community planning.

### **Problem Statement 4**

#### ***Develop Tools to Effectively Educate Policy Makers for Decision Support Regarding Environmental Sustainability***

Description: Scientific tools such as environmental, socioeconomic, and integrated models can provide decision makers methods in which to explore problems and generate quantitative information. The information gained through the use of these methods will provide the foundation from which objectives such as environmental sustainability can be achieved.

The following issue was discussed on the development tools to effectively educate policy makers for decision support regarding environmental sustainability:

- Develop tools to effectively educate policy makers for decision support regarding environmentally sustainability.

### **Problem Statement 5**

#### ***Develop Protocols for Incorporating Both Future Climate Projections and Historical Data for Infrastructure Design and Planning***

Description: In order to better design infrastructure and prevent issues arising from changes in climate, these potential changes in climate must be accounted for in the design stage. As there are numerous future climate projections, protocols must be implemented in order to ensure that infrastructure designs are sufficient for the most likely climate scenarios. These protocols should be safety focused over appropriate timeframes and include scientific and technical risk assessment. In a similar way, historical data should also be covered by these protocols. By incorporating historical data, future projections can be refined to provide a more localized picture of the hazards that encompass the specified infrastructure's area.

The following issue was discussed on the above mentioned topic:

- Develop protocols for incorporating both future climate projections and historical climate/flooding data for infrastructure design and planning
  - Example: Combining information from 100 year storm events with projected modelers for the design of storm water culverts.

### **Problem Statement 6**

#### ***Use Existing Infrastructure to Assess the Environmental Impact of Transportation System***

Description: The environmental impact of transportation system improvements, such as congestion reduction and transit signal priority, are not fully developed. Research through the use of existing infrastructure must be undertaken in order to provide decision-makers with accurate data on how these improvements will affect the environmental impact of the existing or designed transportation systems.

The following issues were discussed regarding use existing infrastructure to assess the environmental impact of transportation system:

- Use existing infrastructure data to assess the environmental impact of transportation systems.
- Propose new studies as needed to address unanswered questions
  - For example, how do improvements such as congestion reduction, transit signal priority, smart-timer technologies and mass transit efficiency affect local air quality, storm water pollution etc.
  - Life cycle analyses



# **LOCAL ISSUES**

## **Moderators:**

**Edward O'Donnell – University of Delaware**

**Matt Carter – Delaware LTAP/T<sup>2</sup> Center**

**Charles O'Donnell – George Miles & Buhr  
Architects/Engineers**

## **LOCAL ISSUES**

### **Problem Statement 1**

#### ***Snow Removal on Roads and Sidewalks***

Description: The timely removal of snow from road and walkways is hampered within the state of Delaware by the lack of effective enforcement measures and unclear agreements between the Delaware Department of Transportation (DelDOT) and municipalities. This is also important for the growing older population and those who are unable to reasonably meet the challenges of snow and ice storms. Involvement of research centers like the T<sup>2</sup> center can also provide more training on winter maintenance.

The following issues regarding snow removal on roads and sidewalks were discussed:

- Since public safety is the first priority during snow and ice storms, the main objective should be the return to normal business operation as quickly as possible, and to provide safe conditions in which to keep pedestrians safe and to be in compliance with the Americans with Disability Act (ADA). According to the laws/ordinances of Delaware, plowing generally does not occur until an accumulation of 3 inches of material is on the roadway surface. Salting is generally done from the start of snowfall to this point in time. However, snow which accumulates on the roadway in downtown business districts will begin to be removed within 48 hours following the completion of residential roadway cleaning. Hence, snow and ice removal agreements with surrounding jurisdictions are strongly encouraged for future benefits.

### **Problem Statement 2**

#### ***Town Agreements in Delaware***

Description: The town agreements in the state of Delaware need some comprehensive restructuring or inventory application. Until now, the existing town agreements are incomplete as neither DelDOT nor the municipalities necessarily have all of them and/or are unable to find all of them. Previous versions may not be applicable, as some were updated by projects but do not have the supporting documentation required. The current practice is that DelDOT maintains everything within the curbs while the municipalities maintain everything outside of the curbs. This poses hazardous for municipalities as they can become liable for unexpected issues during construction.

The following issues were identified regarding town agreements in Delaware:

- Develop a way to provide accurate information and updates on town agreements between town, county, public works departments, street departments or transportation departments.
  - Provide a way for towns to communicate on maintenance efforts.
  - Provide detailed information for inspectors to determine their scope of work.



- Provide a way for unique issues to be handled, such as snow removal on public roads which transition to private roads.

### **Problem Statement 3**

#### ***Municipal Infrastructure Inventory/Asset Management***

Description: Most municipalities do not have detailed asset records. Assets include pavement, curbs, sidewalks, curb ramps, grass strips, signage, parking lots, and drainage systems. Communication between municipalities and DelDOT need to be improved and databases prepared do that maintenance schedules for municipalities and DelDOT are launched.

The following issues were identified regarding municipal infrastructure inventory/asset management:

- Resource management, clearinghouse and data sharing: Resource management, clearing house and data sharing program holds the responsibility for the collection, storage, and maintenance of highway and traffic data for a state department of transportation. Along with the activity to keep the database running smoothly, it is generally performed by the database system for the sake of consistent knowledge transfer, education and communication. In the transportation industry, it is necessarily important to keep the data clean and well organized so that the project does not lose functionality over time. Since one of the primary goals of a data management is to provide instant data by retrieving and storing information, it is important to know the status of the state's data (location, accessibility, compatibility, gaps, and digitized vs non-digitized data). Additionally, available options for sharing and systematizing data collection, maintenance, retrieval, formatting, and outputs of data, feasible options within agencies, across agencies, and among levels of government need to be explored to maximize the resources and models of the state of Delaware.
- Towns need clarification of their infrastructure inventory/asset management: The focal point of the asset management program is to collect information about the assets, the management strategies, long-term expenditure forecasting, and business management processes. In a nutshell, it is a systematic process of maintaining, upgrading and operating physical assets in a cost-effective manner. Therefore if we could build a common ground of components consists of strategic plan, performance measuring standards and benchmarks, alternative analyses procedure, data collection, use of management system, implementation of the program and finally monitoring and reporting results, then the infrastructure inventory will be identified clearly.
- Asset (Management) –need to know what you have, what its value is and what it costs to maintain vs. not maintain (penalties/unacceptable conditions): Generally, most municipalities do not know what they have in any detail (pavement, curbs, sidewalks, curb ramps, grass strips, signage, parking lots, drainage system etc.) and don't have good assessment techniques or tool to measure the asset conditions. Actually asset management is a systematic process of maintain, upgrading and operating physical assets in a cost-effective manner. Therefore, communication between municipalities and

DelDOT need to be improved up to a substantial level. Also, an extensive education program on maintenance schedule for municipalities needs to be launched. Responsibilities need to be taken for curb maintenance (particularly but not exclusively as relates to snow). Another challenge in this area is that turnover of personnel or elected officials frustrate the process of asset management as the process of keeping inventory often falls through the cracks. So, good business practices need to be developed to keep the process running. Communication between or within municipalities could facilitate the asset management program as this kind of communication will aware the responsible officials about policies updated for specific projects. Since all the policies and agreements are not stored in one common location, collected data sharing and appropriate maintain program between towns and DelDOT will eliminate the existing inconsistencies.

#### **Problem Statement 4**

##### ***Status of Privately Maintained Roads***

Description: The privately maintained roads are considered as hidden liability and should be addressed. Maintenance of drainage, sidewalks, pavements etc. are paid by homeowners and/or homeowners' association (HOA). The cost associated with maintenance and replacement is typically underestimated. Many times, assets not properly designed, constructed, or inspected. Private roads often transition into public streets. Hence, amnesty program like New Castle County steps in to help HOA with private roads (snow removal, infrastructure issues) might be proven beneficiary.

The following issues regarding status of privately maintained road were discussed:

- Privately maintained roads: Because privately maintained roads are the responsibility of the owner, with the ownership rights the maintenance task involves ensuring that the road remains passable for other owners and as well as to confirm that the drainage facility is not damaged by rainfall, and also does not negatively affect other adjacent properties. Hence, private options like maintenance through private assessment, periodical funds could provide maintenance on an informal basis.

#### **Problem Statement 5**

##### ***Evaluating Methods (old versus new)***

Description: Along with communication and training program, new methods are being considered where old ones are reintroduced (e.g. pervious pavements, periodic street cleaning) to make sure all the parties are up to date. For example, a revision to Storm Water Best Management Practices may require a grass line rectangular swale intended for water quality, but maintenance crews may incorrectly follow an older practice and repoint a V-ditch.

The following issues concerning evaluation methods were discussed:

- ADA ramps at intersections: According to Department of Justice and Department of Transportation Joint Technical Assistance, Americans with Disability Act (ADA)

requires that the state and local governments ensure that persons with disabilities have access to the pedestrian routes in the public right of way. Generally curb ramps allow people with mobility disabilities to gain access to the sidewalks and to pass through centers islands in streets. Absence of intersection ramps may be dangerous, difficult, or even impossible for people who use wheelchairs, scooters, and other mobility devices. Otherwise, these individuals will be forced to put in danger while reaching their destination.

- **Reflectivity:** According to federal highway administration safety, adequately maintained retroreflective signs and pavement markings improve highway safety. Since the retro reflective properties of traffic control devices deteriorate over time, the active management of the maintenance of signs and pavement markings is needed to create a safe environment within the roadway vicinity. From the standpoint of sign retroreflectivity, new-technologies could be introduced to reduce the long-term costs of lighting needs balanced with understanding and addressing the need of the road users.
- **Drainage:** Drainage is an important consideration in the design of transportation projects as it nexuses with many features like protecting the highway, adjacent landowner, maintaining water quality and protecting other environmental resources. So, obligated by the state and federal laws and regulations, the aspects of drainage system should be designed in such a way to protect the highway from rainfall and runoff, adjacent land beyond the highway, floodplain and last but not the least water quality and natural resources.
- **Revamp Nonpoint Education for Municipal Officials (NEMO) program:** Being part of a national network, Nonpoint Education for Municipal Officials (NEMO) is operating in 30 states with the goals of offering training for community leaders and volunteer board members in science, management, and regulation of water resources. Therefore, the revamp of NEMO program through educational programs, workshops and small group training will assist the local land use officials and other community groups to accommodate growth along with protecting their natural resources and community character.
- **Old versus New Methods:** Along with communication and training program, new methods are being considered where old ones are reintroduced (e.g. pervious pavements, periodic street cleaning) to make sure all the parties are up to date. Relevant examples like newer storm water best management practices where a grass line rectangular swale intended for water quality but maintenance crews may repoint as a V-ditch if no one told them differently. Also, to get the best performance from pervious pavement, they need to be swept or vacuumed periodically but the pavement will collapse if the maintenance crews fail to recognize that. Judging the scenarios, it is necessary to engage more regulations (i.e. resources and personnel) in maintenance operation also.
- **Helping older people, senior communities:** An estimation conducted by the United States Department of Transportation (USDOT) reflects that the 65 and over population will grow by over 50 percent between now and 2020. Research also reveals that the most

vulnerable threats for aged people lies in intersections, situations like backing up a vehicle and in winter months/ visibility issues. So, in addition to traffic safety improvements long-term plans including transit improvement, security enhancement, side walk connections, and paths and trails may become particularly important to elderly community.

- Education (training) and communication: In recent times, the importance of transportation education and training has grown as the focus is changing very rapidly. Especially, active communication between public and private interests, strategic management of human and capital resources, environmental impacts and most recently the introduction of innovative technologies have broaden the scope for transportation education, training and communication.
- Funding: As transportation infrastructure is too important for the growth of economy, the state and local funding approach for these transportation infrastructures has received special attention. Especially, in the state of Delaware funding the transportation provide external and internal stakeholders excellent and expedient customer service, to collect all revenue and pay all vendors in a timely manner, and to manage and maintain financial records in conformity with generally accepted accounting principles and in compliance with state and federal laws. So, with given current funding and economic trends, it is important to identify which transportation funding mechanism and options are available as well as politically feasible.
- Changing face of enforcements/tort liability: To date public information and education programs have been used extensively to improve and support the behavior of law-enforcement as part of road user based community programs. Especially through behavior change, drivers will behave on the highway system more defensively to avoid crashes as drivers behavior is a major contributing factor in all crashes associated with speeding and red light running.



# **MAINTENANCE**

## **Moderators:**

**Sue McNeil – University of Delaware**

**Jason Arndt – Delaware Department of Transportation**

**Alan Kercher – Kercher Engineering, Inc.**

# **MAINTENANCE**

## **Problem Statement 1**

### ***Integrated Asset Management and Asset Management Education***

Description: The term asset management sounds much like housekeeping and a boring, disciplined ‘ticking of all the boxes’. In contrast of maintenance of any project, the need for integrated asset management has gathered considerable momentum from regulatory interest and better optimization point of view. So, to quantify the uncertainties of different assets behavior and their future requirements; evaluate the performance values, costs and risks of assets in different time frames; systematic and coordinated strategies and policies to ensure asset care (maintenance) skill, and finally set up a foundation stone that help to build a robust funding structure are the key issues in developing an integrated asset management. The asset management education urgently addresses the big gaps and backlog at technical and workforce level; develop life cycle analysis, planning and costing in the maintenance program of a project.

Regarding integrated asset management and asset management education, the following issues were identified:

- Integrated Asset Management and Asset Management Education.
  - Different assets.
  - Different time frames.
  - Different strategies.
  - Funding.

## **Problem Statement 2**

### ***Database Management and Access***

Description: Maintenance data is an attempt to establish short, medium and long term maintenance strategies. Database management and access is an activity to keep the database running smoothly. It is necessarily important to keep the database clean and well organized so that the project does not lose functionality over time. Since one of the primary goals of a maintenance program is to provide an environment that is both convenient and efficient, the use of database management helps in retrieving and storing maintenance information.

The following issues regarding data management and access were discussed:

- Data Management and Access.
  - Knowledge transfer.
  - Education.
  - Communication.

### **Problem Statement 3**

#### ***Transition of New or Different Technology***

Description: The prime importance of transition of new and different technologies is to finely define improvement targets with stepwise strategies to achieve specific goal. The transition of new, innovative or different technology should be encouraged to evaluate and identify the optimal timing for application of preventative maintenance treatments that considers the cost-effectiveness and performance of maintenance treatments. In the implementation phase, a plan should develop for constructing and monitoring test sections for the purpose of collecting data needed to support the maintenance methodology.

The following issues regarding transition of new or different technology were identified:

- Transition of New or Different Technology.
  - Evaluation.
  - “Onesies”.
  - Implementation.

### **Problem Statement 4**

#### ***Other Issues***

Description: Successful maintenance improvement projects in large organizations require a systematic and well-founded approach that will lead to specific set of recommendation starting from planning and scheduling of works to identifying the number of critical assets. In a proactive maintenance report (for example moveable bridge) improvement initiatives like criticality analysis, backlog management and failure mode analysis are being considered for implementation successfully alongside of safety, sustainability and environment. On the other hand, in the case of reactive maintenance approach, late detection, high safety risk associate with high maintenance costs may lead to immediate shutdowns and indefinite downtime of a project.

The following other issues concerning other issues were also identified:

- Proactive versus reactive maintenance.
- Safety.
- Sustainability.
- Environment.

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# **MULTI-MODAL SAFETY ISSUES**

## **Moderators:**

**Silvana Croope – Delaware Department of Transportation**

**Adam Weiser – Delaware Department of Transportation**

**James Burnett – RK&K Engineers**

**Lt. William Hargrove – Newark Police Department**



# **MULTI-MODAL SAFETY ISSUES**

## **Problem Statement 1**

### ***Pedestrian/Bicycle/Driver Safety***

Description: Education and enforcement are the predominant issues to increase the safety practices of pedestrian, bicyclist and drivers. More research should be done on issues like signed and marked shoulders for bikers. Driver education is also encouraged. Literature search on best practices for bike/ped laws from other states also need to be explored.

The following issues regarding pedestrian/bicycle/driver safety were discussed:

- Pedestrian/Bicycle/Driver Safety
  - Education: How do you do it best? (Focus on target markets)
  - Enforcement: Vagueness of ped/bike crash data.
  - Should shoulder be signed/marked for bikes?
  - Research needed on right turn treatment.
  - More research needed on “Sharrow” effectiveness.
  - Education needed on how to ride safely ( U of D already proactive here).
  - Driver education/reeducation.
    - Current driver’s licenses are for life.
    - Policy change needed to require re-licensing/testing?
    - If so, based on poor performance (tickets/crashes) or age/interval?
    - Out-of-state motorists: DE has many, especially in beach area. Mix of local drivers (local road knowledge) with tourists (unfamiliar).
  - Literature search on best practices for ped/bike laws from other states.

## **Problem Statement 2**

### ***Integration of Planning and Engineering***

Description: For a specific design, and integrated approach for planning and engineering is highly desirable to ensure safety issues are addressed. For example, roundabouts safety advantages are substantially proven in most of the states but still the number is not significant in Delaware from the safety perspective. Hence, before and after study about the feasibility of implementation of a roundabout and saturation flow study of current Delaware roundabouts need to be studied along with education campaign. Feasible engineering solutions for safe planning (e.g. design of pull off areas for cell phone use) should be encouraged more around the states. A better planning to align pedestrian generators with possible destinations at intended crossing locations and engineering/planning for pedestrians at transit stop locations, distance between intersections and increase at transit services to minimize pedestrian traffic strategically should get promoted.

The following issues regarding integration of planning and engineering were discussed:

- Integration of planning and engineering concerning site specific design.

- Roundabouts have significantly safety advantages. Why aren't there more of them in Delaware?
  - Before/after safety study and saturation flow study of current DE roundabouts.
  - Education campaign.
- Design pull off areas for cell phone use.
- Better planning to align pedestrian generators with their possible destinations at intended crossing locations.
- Engineering/Planning for pedestrians: Transit stop locations, distance between intersections, increase transit services strategically to minimize pedestrian traffic.

### **Problem Statement 3**

#### ***Speed Photo Enforcement***

Description: The biggest challenges in speed photo enforcement are the obstacles to implementation and the skepticism towards the vendors who operate the speed photo enforcement program. As a result, extensive literature review is needed of other speed photo enforcement programs to find the best practices. School zones and work zones seem like best candidate (politically) for speed cameras, but the crash data may not correlate well for decision making. In this aspect, DelDOT needs to do some research about the validity of speed zones and posted speed limits. In a nutshell, this is an ongoing program with the Red light Camera program and Yellow time calculation in the state of Delaware.

The following issues regarding speed photo enforcement were discussed:

- Speed photo-enforcement- what are the options and how can we make a better case for policy makers?
  - Obstacles to implementation.
  - Skepticism of vendors running programs.
  - Literature review of other photo enforcement programs to find best practices?
  - School zones and work zones seem like best candidates (politically) for speed cameras, but crash data may not correlate well.
  - How do we avoid having DelDOT testify about the validity of speed zones and posted speed limits? This is an ongoing issue with the Red Light Camera Program and Yellow time calculations.

### **Problem Statement 4**

#### ***Data-Driven Analysis for Good Policy Decisions***

Description: Primarily, data driven analysis programs are important for the better consistency in data reporting. Hence, full documentation of crash data detail could be useful for the training of law enforcement personnel in how to effectively respond to and prepare a crash report. Necessary countermeasures should be adapted based on the changing demographics or pattern. To minimize the overall costs of the data analysis program, systematic approach for benefit/cost ratios should need to address.

The following issues regarding data-driven analysis for good policy decisions were discussed:

- Data-driven analysis to inform good policy decisions.
  - Need better consistency in data reporting.
  - Full documentation of crash details.
  - Are there areas/case studies we can look to as models of success?
  - We should adapt our countermeasures to changing demographics.
  - Should we use a more systematic approach to benefit/cost ratios? Are we really including all costs of crashes?

### **Problem Statement 5**

#### ***Accommodate Increased Heavy Freight Traffic***

Description: The problem is to explore ways to accommodate increases in heavy freight traffic. For example, the recent Panama Canal expansion is expected to shift heavy freight patterns. In accordance with traffic monitoring guide, virtual weight-in-motion (WIM), truck parking and truck staging for new loads should be researched. It is also necessary to assess the safety cost with increased freight movement. Research of the secondary effects on RR crossings (longer dwell time for motorists at crossing, longer queues, higher rear-end crash potential) may improve the safety environment in addition with better education on truck capabilities (turning, braking etc.).

The following issues regarding accommodate increased heavy freight traffic were discussed:

- How can we accommodate increased heavy freight traffic?
  - Panama Canal expansion likely to shift heavy freight patterns.
  - Virtual Weight in Motion (WIMs)?
  - What safety cost will increase freight movement have on our region?
    - Truck parking
    - Truck staging as they wait for new loads.
  - Better education on truck capabilities (turning, braking, etc.).
  - Secondary effects on railroad crossing: longer dwell times for motorists at crossing, longer queues, higher rear-end crash potential.



# **PLANNING**

**Moderators:**

**Marcia Scott – University of Delaware**

**Ralph Reeb – Delaware Department of Transportation**

**Jeff Riegner – Whitman, Requardt & Associates, LLP**

# **PLANNING**

## **Problem Statement 1**

### ***Incomplete and Inconsistent Pedestrian Access to the Transit System***

Description: The transportation system planning encourages non-motorized travel like walking and bicycling. Restricting pedestrians access to the transit system may create a safety risk and prevent the planning process from being effective. Federal legislation explicitly requires safety to be considered in the transportation planning process. In this aspect Short- and long-range plans should have a safety element as part of the plan, and when projects and strategies are evaluated for possible inclusion in the metropolitan transportation plan, safety issues should be a decisive factor in their rating system.

Regarding incomplete and inconsistent pedestrian access, the following issues were identified:

- Pedestrian access to the transit system is incomplete and inconsistent.
  - Federal legislation requires safety consideration.
  - Short and Long range plans should include safety as a major element.
  - Safety issues should have a larger impact in plan rating systems.

## **Problem Statement 2**

### ***Develop Holistic Approach for Project Prioritization Selection***

Description: A holistic approach needs to be developed to identify the newer concepts in tackling safety, competing priorities, reactive safety initiatives, identifying the funding silos, limited staff and tools, estimating the institutional resources, and addressing other safety documents. So, in the end, this approach will generate a transportation project benefit to society that would help in prioritization and selection of projects. Meanwhile, a deeper understanding of the transportation policy economic tradeoffs must be developed. From an operational planning point of view, roundabouts need to be designed in a way that will improve the safety of visually impaired pedestrians who use them. So, overall the general public must be educated on the benefits of innovative transportation policies, particularly in the area of financing.

The following issues regarding holistic approach in transportation were discussed:

- A holistic approach to estimating a transportation projects benefits to society should be developed to help with project prioritization and selection.
- A deeper understanding of the economic tradeoffs that are relevant to transportation policy must be developed.
- Roundabouts need to be designed so they are safe for visually impaired pedestrians.
- The general public must be educated on the benefits of innovative transportation policies, particularly in the area of financing.

### **Problem Statement 3**

#### ***Other Issues***

Description: Currently land development and transportation system improvement coordination efforts are stymied when market timing and financing issues are poorly documented and are not fully understood. Also, externalities are passed from one level of government to another (e.g. Federal to state and state to local) and as a consequence laws and regulations at the federal, state, and local levels of government are preventing the growth of smart projects. In fact, due to existing building codes, some smart development projects are considered illegal. Another issue in the Delaware planning process has been identified because the next generations of Americans are not getting drivers licenses, and seem to have a decreased desire to drive than in the past.

The following other issues in transportation planning session were identified:

- Currently, land development and transportation system improvement coordination efforts are stymied by market timing and financial issues which have not been well documented and are not fully understood.
- Externalities are passed from one level of government to another (Federal to State, State to Local).
- Currently there are laws and regulations at the federal, state and local levels of government that prevents the development of “smart” projects. “Smart” development is illegal due to building codes, zoning, etc.
- The next generation of Americans are not getting drivers licenses, and seem to have a decreased desire to drive than in the past. Is this long term and why?

The logo of the Delaware Center for Transportation is a circular seal. It features a blue outer ring with the text "DELAWARE CENTER FOR" at the top and "TRANSPORTATION" at the bottom in white capital letters. Inside the ring is a white shield with a blue border. The shield contains a large blue "U" and "S" (University of Delaware) and a smaller blue "D" (Delaware). Above the shield is a blue fleur-de-lis.

# **TRAFFIC AND ITS**

## **Moderators:**

**Mark Luszcz – Delaware Department of Transportation**

**Holly Rybinski – Rybinski Engineering**

**Adam Catherine - Stantec**

# **TRAFFIC AND ITS**

## **Problem Statement 1**

### ***Importance of Education and Communication***

Description: Successful communication and education programs may advise transportation researchers, planners, managers and others to overcome communication challenges. Moreover, this type of practice will show how incorporating a basic communication strategy can make that process easier and increase the likelihood of accomplishing the desired goal. In contrast to Traffic and ITS education and communication in Delaware, transportation professionals and the public have access to ways to communicate with each other; however there is still a significant communication gap. Transportation professionals need to understand the user expectations for access to information for the user's own safety as well as additional advantageous benefits.

The following issues regarding importance of education and communication were identified:

- In Delaware transportation professionals and the public have access to communicate with each other; however there is still a significant communication gap.
- Transportation professionals need to understand the user's expectations for information access and others.
- The public needs to understand our work primarily for their own safety and also to take advantage of additional benefits.

## **Problem Statement 2**

### ***Importance of Human Factors***

Description: Beyond communicating with public, we need to study human factors and behavior in a variety of areas. The ultimate goal we seek is to gain the public's trust so that people will follow stated guidance in order to travel safely. There is a need to address distracted driving, non-compliance with traffic control and elderly driver challenges as well.

The following issues regarding importance of human factors were discussed:

- Identify the probable causes and countermeasures when related with road user characteristics.
- To develop a proactive guidance including human centered concerns in design and planning and also to avoid potential user-related problems.
- In promoting the understanding of appropriate road user perspective of safe design.
- To generate adequate documentation as a resource for operational decision.



- Beyond communicating with the public, we need to study human behavior in a variety of areas. Ultimately we seek to gain the public's trust so that people will follow stated guidance in order to travel safely and mitigate issues related to:
  - Distracted driving
  - Non-compliance with traffic control
  - Elderly driver challenges

### **Problem Statement 3**

#### ***Importance of Safety***

Description: According to published report #627 of National Cooperative Highway Research Program (NCHRP), the objective to determine the safety of work zones have four specific considerations:

- To determine the crash rates for both nighttime and daytime work zones.
- Determine and identify the nature, similarities and differences between traffic related crashes in nighttime and daytime work zones.
- Develop management practices to promote safety and mobility in nighttime and daytime work zones.
- Develop work zone crash reporting recommendations to provide improved data collection for nighttime and daytime work zones.

From NCHRP Report #627, it is quite evident that we need to work continually on the fundamentals to keep people safe giving special attention to pedestrians. The practice should be such that all the signing, striping and signals make sense to those who encounter them. It is of great importance to implement safety projects in an expedited manner, keeping in mind to satisfy the requirements of ADA or other rules and regulations without unnecessary delay.

The following issues were identified concerning importance of safety:

- We need to continue to work on the fundamentals to keep people safe.
- Concern about pedestrians.
- We need to make sure that signing, striping and signals make sense to the public.
- Are our safety projects getting implemented swiftly enough or is the process bogged down by too many requirements such as ADA or complete streets?

#### **Problem Statement 4**

##### ***Scope of Emergency Operations***

Description: A variety of unexpected events can occur and impact the transportation system. It is therefore apparent that effective management of surface transportation operation is critical to improve public safety and mobility for any type of emergency occurrence. Resolving highway incidents and delay in the shortest possible time is important for both public safety and mobility as it offers more time for victim treatment, reduce the exposure of incident, and ultimately minimize public inconvenience. Resiliency of the system also needs to be planned in advance through development of a structured emergency transportation operation (ETO) to measure performance in the field to provide the basis for continuous improvement.

The following issues were discussed on the scope of emergency operations:

- A variety of unexpected events can occur and impact the transportation system. Resiliency of the system needs to be planned in advance.
- Key Issues
  - Power outages
  - Jurisdictional teamwork
  - Monitoring storm events
  - Debris management
  - Resuming normal operations

#### **Problem Statement 5**

##### ***Data***

Description: The need for appropriate uses of new data collection and dissemination technology is highly encouraged to keep a balance of new and old technologies in the process of integrating with future technologies.

The following issues regarding data were identified:

- What are appropriate uses for new data collection and dissemination technology?
- How can we balance new and old technologies to integrate with future technologies?

#### **Problem Statement 6**

##### ***Connected Vehicles***

Description: It is highly recommended to engage in the primary stages of connected vehicle technology in order to guide its development and to position DelDOT for expedited integration.

The following issue was discussed concerning connected vehicles:

- We need to become engaged in the preliminary stages of connected vehicle technology to guide its development and position DelDOT for expedited integration.

The logo is a circular seal with a blue border. Inside the border, the words "DELAWARE CENTER FOR" are at the top and "TRANSPORTATION" is at the bottom, both in white capital letters. In the center of the seal is a large, stylized white letter "D" with a smaller "T" inside it. Above the "D" is a small fleur-de-lis symbol. The entire logo is light blue and serves as a background for the text.

# **TRANSIT & PUBLIC TRANSPORTATION**

## **Moderators:**

**Martin Wollaston – University of Delaware**

**Cathy Smith – Delaware Department of Transportation**

**Dave Gula – WILMAPCO**

# **TRANSIT AND PUBLIC TRANSPORTATION**

## **Problem Statement 1**

### ***Redesigning Transit***

Description: Transit and public transportation is a social contract not just between the system and its rider but also between its residents. A good, vibrant and sensible transit system offers a collective sense of place as more users use this system; the benefits and challenges of building, operating and maintaining them perfectly come across with the diversity of sustainability and customer experience. In the state of Delaware, increased transit services which are needed mainly for Kent and Sussex Counties require surveys on geographic coverage area, frequency of service, and identifying the location of new bus stops. Additionally, the cost of alternative paratransit includes the best practices and evaluation of ability to pay and priority of trip. Important issues like partnership with DHSS client and services, 65+ policies for paratransit services in Kent and Sussex County, coordination of trips or grouping riders, accessibility for fixed routes and cost allocation plan need to be addressed in the process of redesigning transit.

The following issues were discussed regarding redesigning transit:

- Transit service proposed increases (Mainly Kent/Sussex).
  - Geographic coverage area.
  - Frequency of Services.
  - Location of new bus stops.
- Cost of Alternative Paratransit.
  - Ability to pay factor.
  - Priority of trip.
  - Best practices/evaluation.
- Partnership with DHSS client and services.
- Kent and Sussex 65+ policy for Paratransit services.
- Coordinating of trips/grouping riders.
- Accessibility if fixed routes.
- Cost allocation plan.

## **Problem Statement 2**

### ***Wilmington Transit Moving Forward***

Description: According to Delaware Transit Corporation (DTC), Wilmington functions as a hub of transportation, providing 10 million passenger trips a year, including bus and demand

response paratransit. This successful role is increasingly important to the overall economic vibrancy through the movement of people, accessibility to the public transportation system, for the improvement of air quality and to create access to jobs, Medicare and commercial centers. Since the focus of Wilmington Transit Moving Forward is to seek meaningful public transit improvement within Downtown Wilmington, amenities at bus stops such as announcements, bike racks, convenient and safe crossings, cleanliness of stops, energy efficiency at stops, education of riders, technology aids and applications for information distribution will utilize this public effort in the evaluation, prioritization and implementation of recommendation for the state smart transportation initiative.

The following issues was discussed regarding Wilmington transit moving forward:

- Wilmington Transit Moving Forward
  - Amenities at bus stops
    - Announcements
    - Bike racks
    - Convenient/crossing safety
    - Cleanliness of stops
    - Energy efficiency at stops
  - Education of Riders
  - Technology aids and app for information distribution

### **Problem Statement 3**

#### ***Park and Ride Facilities***

Description: The park and ride facilities in transit and public transportation provide an overview into why appropriate parking strategies and riding facilities need to be highlighted to understand the underlying traveler response factors, and exploring the interrelationship between park and ride facilities with various influences such as demographic, land use, travel options and incentives, and the behavioral mechanisms behind these choices. Downstream reason, faster bus routes, transfer, scope of national research on park and ride facilities, possibility of using park and ride facilities as a transit hub all these issues can be primarily used as setting a price for parking and riding facilities by owner/operators to cover a cost and earn a reasonable return on investment. To achieve an efficient economic, strategic and policy objectives, the use of innovative technology (e.g. APC devices) and smart decisions like smaller buses for lower ridership may be considered as effective measures.

The following issues were identified regarding park and ride facilities:

- Downstream reasons.
- Faster bus routes?
- Transfer.
- National research on Park and Ride facilities.

- Possibility of using as a transit hub.
- How to use technology for efficiency.
- Smaller buses for lower ridership.
- APC devices.

#### **Problem Statement 4**

##### ***Resort Services***

Description: In broad perspective of transit and public transportation, paratransit includes two major areas: 1) a specific type of paratransit required for public transit agencies in compliance with ADA (called ADA complementary paratransit) and 2) all other paratransit which covers demand-responsive paratransit. In the aspect of resort services, the reformation of paratransit needs to be addressed, keeping in mind the possible impacts to the existing riders. Several important issues such as the relationship of fixed-route transit and paratransit, size of the paratransit market, paratransit providers, service delivery, management options, coordination, quality and cost must be surveyed in order to identify the existing lapses while the new services are being developed. Additionally, re-allocating the paratransit buses into fixed route services and developing taxi reforms, such as Senior Citizen Affordable Taxi (SCAT) service, can be employed to take the place of paratransit bus trips for a substantial demand for a fleet of ADA accessible taxis. Research can be done in order to identify the possibility of bundling ADA trips on taxis or non-paratransit trips.

The following issues regarding resort services were discussed:

- Paratransit Reform: what are the impacts to existing riders?
- How long/what lapse is there while new services developed?
- Can “re-allocated” Paratransit buses be put into fixed route services?
- How can Taxi reform be employed to take place of Paratransit trips?
  - Delaware would need a fleet of ADA accessible taxis.
- Possibility of “bundling” ADA trips on taxi or non-paratransit trips.

#### **Problem Statement 5**

##### ***Express/Local Buses***

Description: The cost and effectiveness of various Bus Rapid Transit (BRT) components determine whether these selected BRT components are sufficiently effective for the specified application. Information available regarding the quality of service, convenience, travel time, comfort, reliability, convenience, safety, security, improved frequency will work as a guideline for BRT development scenarios in assessing the feasibility of different components within the

state of Delaware. Issues such as dedicated BRT routes for express services, bus announcement systems, the location of bus stops and bus service culture from both the driver and passengers' perspective need to be listened to or surveyed in order to support and fund the capital and operating costs as well as for developing community acceptance associated with this specific land-use development.

The following issues were identified regarding express/ local buses:

- Express/Local Buses
  - BRT dedicated bus routes for express service.
  - Bus announcement system.
  - Location of bus stops.
- Bus “Culture”: Drivers and riders need to be listened to/surveyed.



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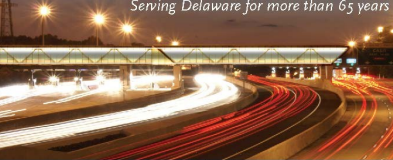
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