Evaluation approach for regionally significant projects: highways

July 22, 2016

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Background

- ON TO 2050 will include a capital element
- Evaluation methods build on previous plans and interim work with RTOC and with LTA projects
- Staff seeking feedback on evaluation methods for highway projects
- Comments today will be reported back at September Transportation Committee meeting
- Separate discussion in fall of transit project evaluation
- Main product is a “project need and benefits” report in summer 2017
- Evaluation aimed at producing information on benefits, not a ranked list of projects
Project categories

• Arterial capacity additions (on NHS, $100 m or more)
  – Evaluation with only needs analysis

• Expressway capacity additions
  – Full evaluation with travel demand model

• State of good repair / system preservation ($250 m or more)
  – Document need for project, mostly qualitatively
Needs analysis

• Major focus at CMAP on measuring and comparing needs on transportation system
• Lots of observed data available now
• Concept:
  – Holistic scoring of network based on mobility, reliability, condition, and safety needs
  – Locations where investment is needed may be prioritized based on planning factors
• Builds on previous work with RTOC
Arterial project evaluation

**Needs analysis**

- **Asset condition**
  - Pavement
  - Bridges

- **Separate scores for:**
  - Mobility
  - Safety
  - Reliability

**Planning factors**

- **Equity**
- **Environmental impact**
- **Support for existing communities**
- **Economic benefits**
- **Freight benefits**
- **Future traffic growth**
- **Potential for operations improvements**
Needs analysis

• 0 – 100 index, with higher scores meaning higher need

• Mobility
  – Combination of travel time index and hours of congestion

• Reliability
  – Planning time index (95 %ile travel time divided by free flow travel time)

• Safety
  – Serious injury and fatality rate per VMT, 5% locations receive max score

• Pavement condition
  – Combination of CRS and IRI and probably age of pavement

• Bridges scored separately
  – Yes/no indication of whether project addresses deficient bridges
Condition score = 51
Mobility score = 43

Condition score = 32
Mobility score = 39
Note on pavement age

- CRS and IRI ratings can be good while underlying structure of pavement is not
- For long-range plan, issue is whether road needs reconstruction
- Several options:
  - Number of times resurfaced
  - Age of pavement
  - Deterioration rate
- Recommend age of pavement – would ask implementers to supply that information
Equity impact

- Fraction of traffic on project that comes from excluded communities: 0 – 100 index
  - Defined in inclusive growth strategy paper based on demographics
- Based on travel model partial demand analysis for network
Natural resource impact

- Potential impact on regionally-important natural resources (identification underway)
- Based on buffer distance from project
Support for existing communities

- Fraction of traffic on project that comes from areas within current municipal envelope
- Based on travel model partial demand analysis for network
Economic benefits

• Two evaluation areas:
  1. Benefits to key industries and areas
  2. Benefits from industry clustering

• Refines previous work for Chicago Metals Manufacturing Consortium under LTA program

• Uses travelshed of project to determine areas and firms that would benefit from project
  • Area where 85% of trips using facility start or end, based on travel model select link analysis
Benefits to key industries – metal firms example

Touhy Ave project

Weber Rd project
Identifying key industries

Criteria:

• Export-oriented (part of a “traded cluster”)
• Regional specialization
• High in-region road transportation costs
Key industries

- Transportation and Logistics
- Distribution and E-commerce
- Food Processing & Mnfg
- Paper and Packaging
- Marketing, Design, and Publishing
- Recreational and Small Electric Goods
- Upstream Metal Manufacturing
- Leather and Related Products
- Printing Services
- Lighting and Electrical Equip
- Downstream Metal Products
- Metalworking Technology
Benefits from industry clustering

- Clustering also results from making a larger mass of employment accessible via transportation improvements
  - Often referred to as “wider economic benefits” or positive externalities of transportation projects
Benefits from industry clustering

- Hypothetical 10% capacity improvement on each highway segment
- SHRP2 C11 project method used to estimate increase in gross regional project (GRP) from clustering
  - Gravity model sensitive to travel time savings, employment, and wages
- GRP increase indexed 0 – 100 and mapped
Other economic analysis

- Underutilized industrial buildings near transportation projects
- Overlays with infill areas defined in the plan development process
Freight benefits

• Lots of work at CMAP in past year on freight needs analysis
  • Truck-focused mobility, reliability, safety, etc. scores
  • Bottleneck identification
  • Freight-related land uses

• Will carry out similar overlay analysis to gauge benefits to truck traffic

• Discuss with Freight Committee in fall 2016
Other planning priorities

- **Traffic growth on project links**
  - Higher growth suggests higher priority

- **Potential to address needs through operations improvements**
  - Use info from highway operations strategy paper
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Questions?
Expressway evaluation

• Needs analysis plus evaluation of projects using travel demand model
• More comprehensive evaluation of mobility benefits and environmental impacts
Base modeled travel benefits on current conditions

- Socioeconomic forecasts for 2050 not yet available
- High-level project comparison doesn’t really need exacting evaluation of future market for project
- However:
  - Rate of traffic growth is a planning priority factor
  - Conformity analysis will be carried out later with 2050 forecasts
Mobility and accessibility benefits

- Congested vehicle hours traveled, regionally and in travel market
  - Considering reporting excess vehicle hours traveled
- Work trip auto travel time, regionally and in travel market
- Number of jobs accessible within 45 minutes
- Impact on transit ridership
- Heavy truck congested VHT, regionally and in corridor
Safety benefits

• Estimate shift of traffic from arterials to expressway and compute crash reduction using standard rates for each facility type
Environmental impact

• Benefit to excluded communities from improvement in job accessibility
• Change in criteria pollutant emissions affecting environmental justice communities
• Greenhouse gas emissions
Environmental impact

• Potential for project to:
  • Induce development where there are important natural resources
  • Induce development in areas with groundwater limitations
  • Create impervious cover directly or indirectly, particularly in the watersheds of high quality streams
  • Reduce monetary value of ecosystem services

• Use local accessibility change resulting from project to estimate probability of household change
Groundwater limitations, sensitive watersheds, and ecosystem service value
Economic impact

• Analysis using commercial economic impact software (TREDIS)
• Report long-term gross regional product with project versus without project
  • GRP is the market value of all goods and services produced in the region
Under consideration

- Benefit cost analysis
  - Partial benefit-cost analysis based on user benefits only: travel time savings, vehicle operating costs, and crash reduction
State of good repair projects

• Document need for project, mostly qualitatively
• Indicate low remaining service life, number of deficient bridges, safety issues, any opportunities to improve function
• Examples
  • Reconstruction of Central Tri-State Tollway
  • Reconstruction of North Lake Shore Drive
Questions?

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