
NJTPA PERFORMANCE RESULTS STUDY

Assessing The Impacts Of Implemented
Transportation Projects

Study Overview



Presentation

- Performance Results Study Goal
- Process
- Products
- Findings
- Next Steps

Goal: Evaluation After Implementation

Methodology for evaluating impacts of transportation projects and programs. Objectives:

- Look back, but gear toward future decisions
- Cover improvements relevant to NJTPA and partners
- Transportation, economic, environmental, social impacts
- Systematic and practical techniques
- Data collection and technical tools
- Support planning, including Congestion Management Process
- Support new legislative and regulatory requirements for performance-based planning

North Jersey Transportation Planning Authority

The Metropolitan Planning Organization for Northern New Jersey



- 6.7 million people, 3.2 million jobs
- 384 municipalities, 4,200 square miles
- 23,000 miles of roads, 177 miles of toll roads
- 250 local and express bus routes
- 390 mile, 10-line 150-station commuter rail
- 14 mile rapid transit, 15 mile light rail lines
- 18 ferry routes, 58,000 park-and-ride spaces
- 4,700 roadway / 600 rail bridges
- airports, sidewalks, bicycle paths, paratransit
- largest Atlantic container port
- 25 tons of freight by rail annually

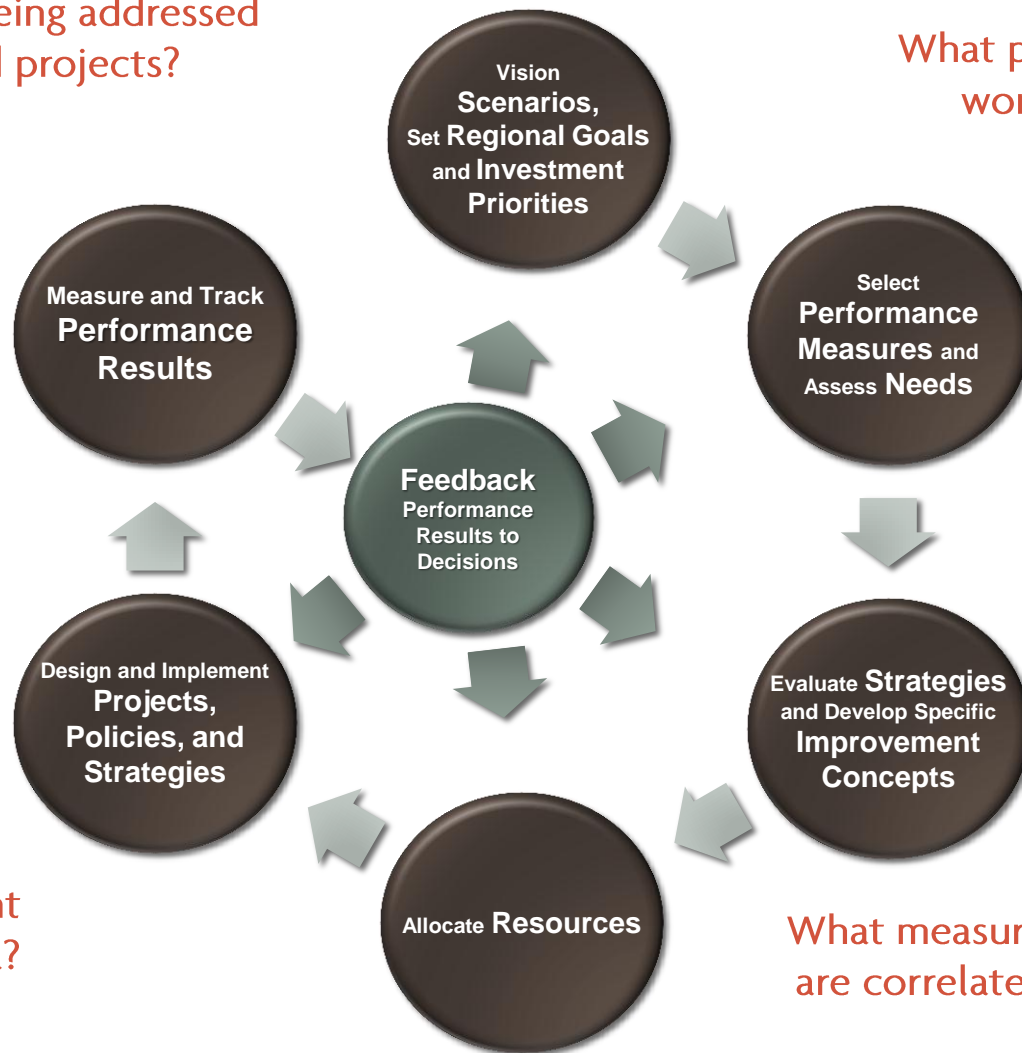
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To Support the Regional Planning Process

Are regional needs being addressed by implemented projects?

What projects and policies work well together?



What design features work well?

What types of projects might have unintended consequences?

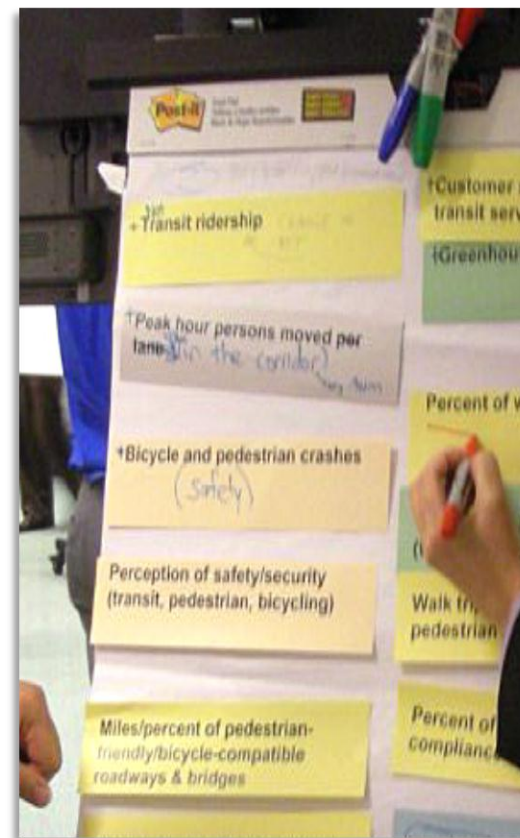
Are we using the right prioritization criteria?

What measures are correlated?

Coordination and Consultation

Engaged NJTPA policy makers and stakeholders from member counties, cities, and implementing agencies on:

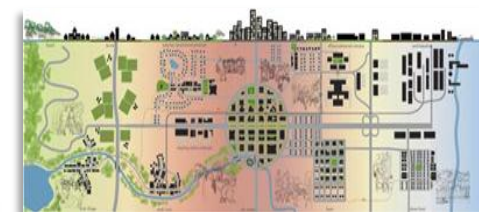
- Performance-based planning elements
- Regional goals, performance measures, investment strategy, project categories
- Agency roles, needs, sensitivities, and resources
- Data about projects and performance



Performance Measures and Project Types

Performance measures:

- Driven by policy and planning goals
- Mix quantitative and qualitative analysis
- Consistent across projects, large or small; urban, suburban, or rural; passenger or freight
- Transparent and understandable results
- Data and effort required



Project categories:

- Drawn from NJTPA policy
- Projects in plans and programs
- Grouped based on performance measure and methodological commonalities



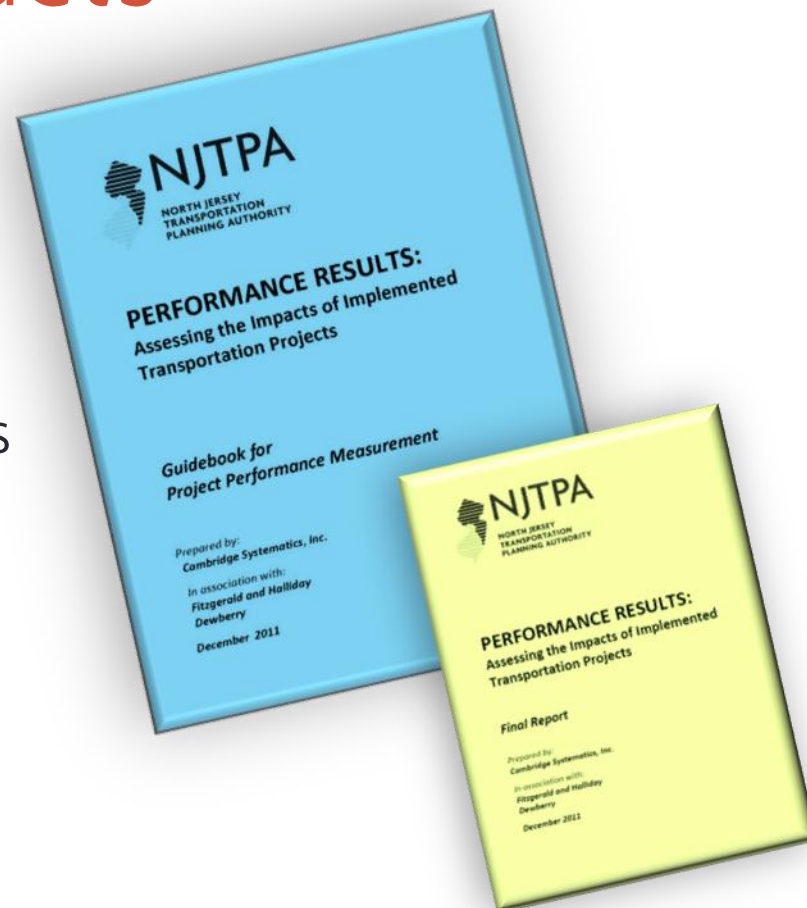
Products

Guidebook for Project Performance Measurement

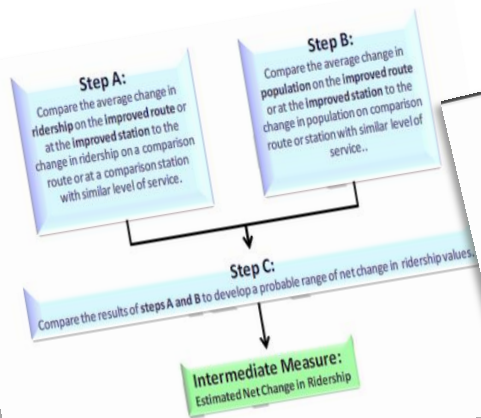
- Data ingredients and sources
- Step-by-step processing instructions
- Illustrative calculations

Final Report

- study process
- next steps
- directions for future research and development



Using the Guidebook



Guidebook for Project Performance Measurement
 Roadway Behavior, ITS Projects, and Safety Improvement Projects

Data Inputs and Sources

Primary data inputs to the analysis include the following:

Data Inputs	Sources
Roadway link length	NDOT Roadway Network File, NDOT Straight-Line Diagrams, Aerial Photos
Roadway link characteristics:	NDOT Roadway Network File, NDOT Straight-Line Diagrams, Aerial Photos
<ul style="list-style-type: none"> Roadway functional classification Number of lanes and lane widths in each travel direction Number of shoulders and shoulder widths in each travel direction Terrain type, horizontal and vertical curvature Vehicle classification and composition (percent trucks and heavy vehicles in traffic flow) Median type and lateral clearance Number of access points and bottlenecks per mile Number of signals and estimated green time for primary flow as a proportion of total cycle length 	<ul style="list-style-type: none"> Can assume zero grade if terrain information is not available Default value may be available in software. Also can use average values for roadway of similar functional class in same county or in NJTPA region if link-specific data are not available
Hourly traffic volumes in each direction and directional distribution of peak hour traffic	NDOT Traffic Monitoring System
Household travel survey data collected by NJTPA or American Community Survey 5-year average data work/trip/commute trips in place/county in which live/work	

3.3.1 Evaluating System Coordination Measures

NJTPA System Coordination Goal - Enhance system coordination, efficiency and intermodal connectivity.

Interdependencies between Data, Analysis Tools, and Performance Measures

The following diagram is a simplification of the interdependencies between data, analysis tools, and performance measures:

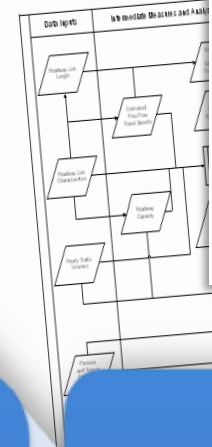


Table 3.2-A: Sample of Outputs of Person-hours and Ton-hours of Delay Calculations for One Direction of Flow
 (NOTE: Contains fictional data for illustration purposes only)

	Before Construction	During Construction	After Construction	No-Build
Link delay (hours per year)	390,000	420,000	150,000	500,000
Percent passenger vehicles	92%	92%	92%	92%
Persons per vehicle	2.1	2.1	2.1	2.1
Annual person-hours of delay	783,480	811,440	289,800	966,000
Estimated net project impact ("After Construction" - "No Build") Annual person-hours of delay				-476,200
Percent heavy vehicles	8%	8%	8%	8%
Tons per truck	16	16	16	16
Annual ton-hours of delay	489,200	537,600	182,000	640,000
Estimated net project impact ("After Construction" - "No Build") Annual ton-hours of delay				-448,000

Define the Project to be Evaluated

Assign the Project to a Project Category

Determine the Applicable Measures for the Analysis

Determine the Geographic Scale of Analysis
 Collect "Before Year" data and "After Year Data; then Conduct Evaluation

Compile and Monitor Results

Adjusted Ridership = 2,500 - 2,071 = 429 riders

Net Ridership Change = 2,500 - 2,071 = 429 riders

$$\text{Adjusted Ridership} = \text{Ridership}_{\text{post-constr. Improved corridor/station}} - \text{Ridership}_{\text{post-constr. Improved corridor/station}} + \text{Ridership}_{\text{pre-constr. Improved corridor/station}} - \text{Ridership}_{\text{pre-constr. Improved corridor/station}}$$

$$= 2,500 - \frac{2,900}{2,800} = 2,071 \text{ riders}$$

Findings: Overall

- Evolving field; guidebook intended to be a living document
- Rarely a “one-size-fits-all” approach to analysis of performance results:
 - Every project has unique circumstances and context
 - Some projects are truly “one-of-a-kind”
 - Every project will require a great deal of judgment by the evaluator



Quality and Availability of Data

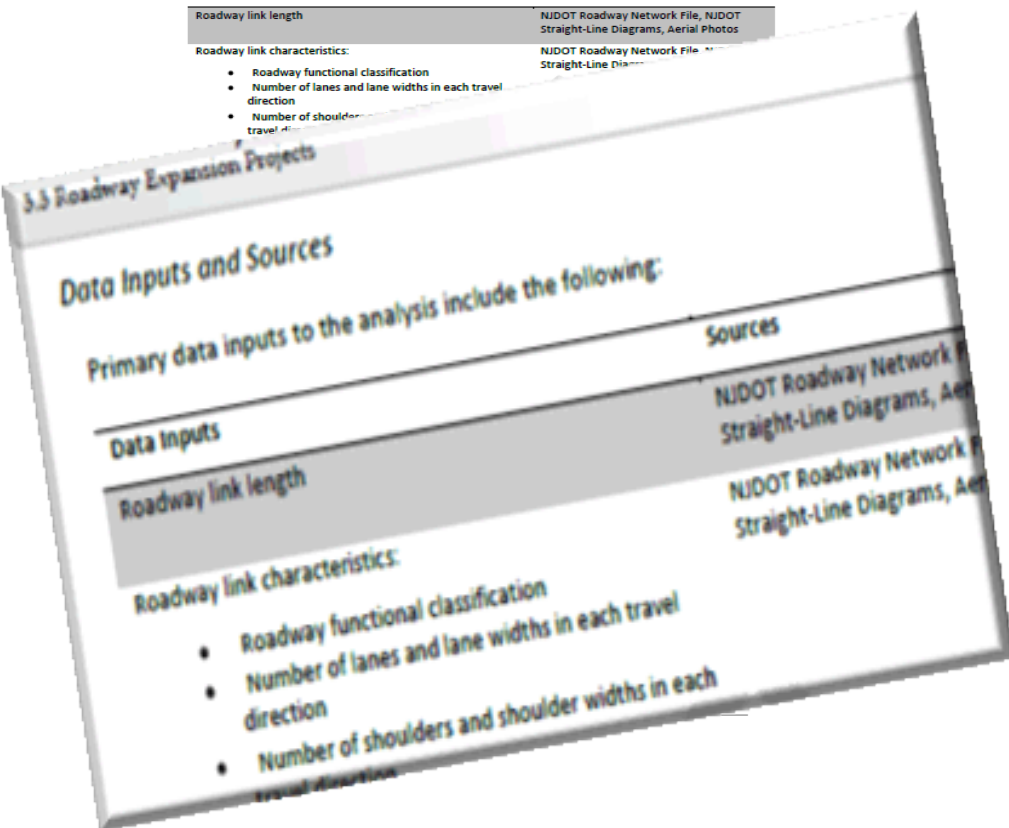
Guidebook for Project Performance Measurement
3.3 Roadway Expansion Projects

Data Inputs and Sources

Primary data inputs to the analysis include the following:

Data Inputs	Sources
Roadway link length	NJDOT Roadway Network File, NJDOT Straight-Line Diagrams, Aerial Photos
Roadway link characteristics:	NJDOT Roadway Network File, NJDOT Straight-Line Diagrams, Aerial Photos
<ul style="list-style-type: none"> Roadway functional classification Number of lanes and lane widths in each travel direction Number of shoulders and shoulder widths in each travel direction 	

- Availability
 - Origin/destination data
- Granularity
 - Travel time and speeds
- Reliability
 - Safety data
- Consistency
 - Land use data



Collecting Data: Time Frames



- Before/after
- Immediate vs. long-term impacts
- Consider synergies with other actions

Scale of Analysis

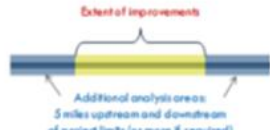
- Consider magnitude of impact:
 - Project type
 - Performance measure
 - Diversion of travel
 - Mode shift (transit)

Handbook for Project Performance Measurement
 3.3 Roadway Expansion Projects


Geographic Scale of Analysis

An analysis of System Coordination measures for roadway projects requires that all affected roadway(s) be evaluated. The figure below shows the geographic extent for which data should be analyzed.

CASE 1: CORRIDOR CAPACITY EXPANSION with little or no traffic diversion expected




CASE 2: CORRIDOR CAPACITY EXPANSION with traffic diversion



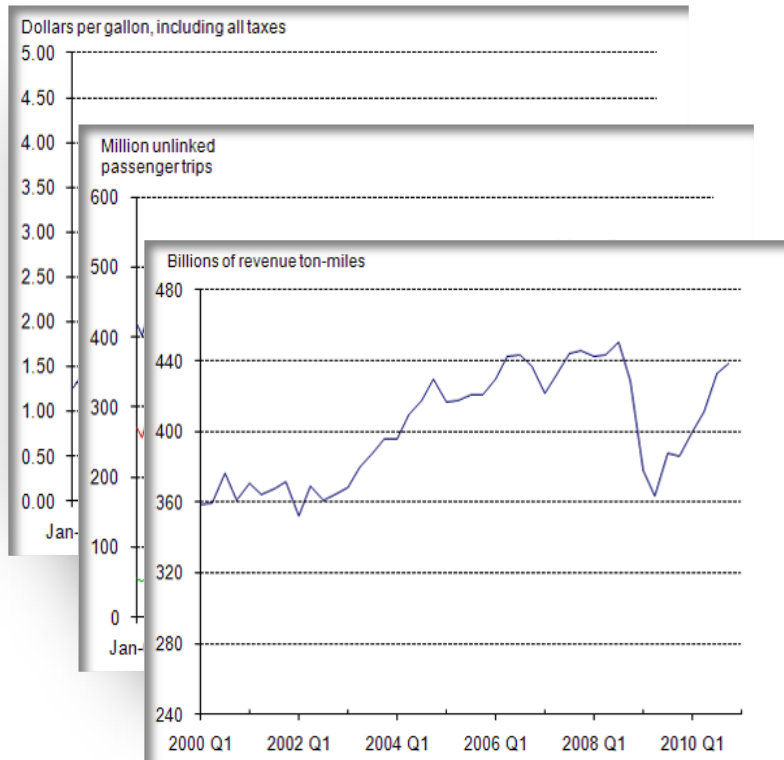
CASE 3: INTERCHANGE EXPANSION OR BOTTLENECK RELIEF

- 5 miles upstream and downstream
- Route(s) within 5 miles that may have been used as alternate(s) or bypass(es) of bottleneck



Improved roadway(s) ———
 Extent of improvements ■■■
 Other roads ———
 Expanded study area ■■■

Isolating Impacts



- Fundamental challenge
- Account for external changes
- Identify “control” locations
- What variables are correlated?
- “Triangulate” performance estimates with multiple methods

Performance Measure Readiness

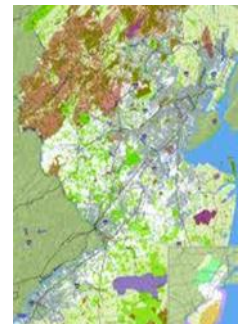
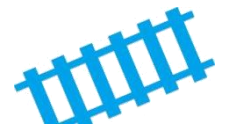
- Ready to Evaluate Today or Soon:

- Crashes/crash rate
- System condition (highway pavement and bridges)
- Travel time reliability on principal arterial and higher functional class
- Person-hours of delay (projects with local impact)
- Visual aesthetics of the built environment
- Network connectivity and continuity



Performance Measure Readiness

- Ready to Evaluate, but Data are Sparse:
 - System condition (transit and freight rail)
 - Transportation resiliency (protection, prevention, redundancy, and recovery)
 - Perception of security
 - Quality of wetlands, surface water, and drinking water
 - Impacts on protected lands



Performance Measure Readiness

- Significant Data Collection or Evaluation Effort:

- Accessibility measures (need analysis tools/models)
- Person-hours and ton-hours of delay
 - Projects with regional impact
- Transportation-related noise and vibrations
- Customer satisfaction measures (need surveys)
- Population and employment density
 - Census data not at fine-grained scale
- Land use and land value changes
 - Data not consistent across municipalities



Performance Measure Readiness

- Require Proxies Pending Further Research:
 - VMT, mode share, and net transit ridership:
 - Need O-D data and other detailed survey data
 - For now can use “triangulation” based on “control” cases and regional trends
 - Emissions: Use estimated net change in VMT and change in travel speed



Next Steps



- Continue to develop resources and capabilities
 - Enhance system and project data collection
 - Improve visualization techniques
 - Update over time as data and tools are developed
- Address legislative and regulatory requirements
 - MAP-21 goal areas and performance measures
 - State/regional measures and targets
 - Performance evaluation in plans and programs
 - CMAQ, HSIP, NHPP, freight state and MPO requirements
- Apply lessons learned in planning
 - Incorporate in plan development, including *Together North Jersey*, North Jersey Sustainable Communities Consortium
 - Utilize measures in studies, project prioritization



NJTPA Performance Results Study products are available at:

<http://www.njtpa.org/Plan/Need/PerfResults/PerformanceResults.aspx>

Defining the Vision. Shaping the Future.



NJTPA

**NORTH JERSEY
TRANSPORTATION
PLANNING AUTHORITY**

