

## **SHRP 2: Project L03- Analytic Procedures for Determining the Impacts of Reliability Mitigation Strategies**

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### **Overview**

The objective of this project was to develop technical relationships between reliability improvement strategies and reliability performance metrics. This project defined reliability, explained the importance of travel time distributions for measuring reliability, and recommended specific reliability performance measures. The research reexamined the contribution of the various causes of nonrecurring congestion on urban freeway sections, however, some attention was also given to rural highways and urban arterials).

Numerous actions that can potentially reduce nonrecurring congestion were identified with an indication of their relative importance. Models for predicting nonrecurring congestion were developed using three methods, all based on empirical procedures: The first involved before and after studies; the second was termed a 'data poor' approach and resulted in a parsimonious and easy-to-apply set of models; the third was entitled a 'data rich model' and used cross-section inputs including data on selected factors known to directly affect nonrecurring congestion. An important conclusion of the study is that actions to improve operations, reduce demand, and increase capacity all can improve travel time reliability.

### **Data Sets**

1. **L03 Raw Weather Data** –Raw weather data as received from NOAA for Knoxville, Tennessee for the period of 1/1/00 – 12/31/08.
2. **Atlanta Detector Inventory** – Describes the basic characteristics of the study sections in terms of the field data collection equipment. Routes include GA400, I-20, I-1285, I-75 and I-85.
3. **Atlanta 2006 Incidents** – The incident data for Atlanta for 2006. Work zones are included as an “incident type”. This level has been processed from the raw event records, which have multiple entries per event, which allow for blockages to change during the course of an event.
4. **Atlanta 2007 Incidents** – The incident data for Atlanta for 2007. Work zones are included as an “incident type”. This level has been processed from the raw event records, which have multiple entries per event, which allow for blockages to change during the course of an event.
5. **Atlanta 2008 Incidents** – The incident data for Atlanta for 2008. Work zones are included as an “incident type”. This level has been processed from the raw event records, which have multiple entries per event, which allow for blockages to change during the course of an event.
6. **L03 Atlanta Raw Traffic Data 2006** – The raw data file received from the Atlanta TMC which includes vehicle volume counts.

7. **L03 Atlanta Raw Traffic Data 2007** – The raw data file received from the Atlanta TMC which includes vehicle volume counts.
8. **L03 Atlanta Raw Traffic Data 2008** – The raw data file received from the Atlanta TMC which includes vehicle volume counts.
9. **L03 Atlanta Raw Traffic Data 2008 - Part 1** – The raw data file received from the Atlanta TMC which includes vehicle volume counts.
10. **L03 Atlanta Raw Traffic Data 2008 - Part 2** – The raw data file received from the Atlanta TMC which includes vehicle volume counts.
11. **L03 Atlanta Raw Traffic Data 2008 - Part 3** – The raw data file received from the Atlanta TMC which includes vehicle volume counts.
12. **L03 Atlanta Raw Traffic Data 2008 - Part 4** – The raw data file received from the Atlanta TMC which includes vehicle volume counts.
13. **L03 Atlanta Raw Traffic Data 2008 - Part 5** – The raw data file received from the Atlanta TMC which includes vehicle volume counts.
14. **Caltrans District 4 Station Configuration File** – This file is Caltrans District 4 configuration file that includes the geo location information of stations that were used to collect bay area traffic data.
15. **D11 Stations Configuration File** – This file is Caltrans District 11 configuration file that includes the geo location information of stations that were used to collect bay area traffic data.
16. **Caltrans District 7 Station Configuration File** – This file is Caltrans District 7 configuration file that includes the geo location information of stations that were used to collect bay area traffic data.
17. **L03 Event Houston 2006** – These are the combined incident, work zone, and weather data files summarized by study section, year, and analysis period.
18. **L03 Event Houston 2007** – These are the combined incident, work zone, and weather data files summarized by study section, year, and analysis period.
19. **L03 Event Los Angeles** – These are the combined incident, work zone, and weather data files summarized by study section, year, and analysis period.
20. **L03 Event Minneapolis 2007** – These are the combined incident, work zone, and weather data files summarized by study section, year, and analysis period.

21. **L03 Event San Francisco** –These are the combined incident, work zone, and weather data files summarized by study section, year, and analysis period.
22. **L03 Event San Francisco** –These are the combined incident, work zone, and weather data files summarized by study section, year, and analysis period.
23. **L03 Houston AVI Volume Distribution** –This file provides the volume distribution per 5 minutes interval per station in Houston.
24. **Jacksonville Stations Configuration File** – This configuration file for Jacksonville, FL detectors includes the geolocation information of stations that were used to collect traffic data.
25. **L03 Jacksonville Incident Data** – This file contains the raw incident data for Jacksonville for 2008.
26. **Jacksonville Stations to Sections Matching File** – This configuration file is for Jacksonville, FL detectors and includes the section ID matching for each detector station used to collect traffic data.
27. **L03 Los Angeles Raw Traffic Data** – The raw data file received from PeMS for Los Angeles, San Diego, and the Bay Area, respectively.
28. **L03 Minneapolis Station Configuration** – These data describe the basic characteristics of the study sections in terms of the field data collection equipment.
29. **L03 Minneapolis Raw Traffic Data 2006** – The raw traffic data file received from the Minneapolis-St. Paul TMC that includes volume and speed data.
30. **L03 Minneapolis Raw Traffic Data 2007** – The raw traffic data file received from the Minneapolis-St. Paul TMC that includes volume and speed data.
31. **L03 Orlando Arterial Travel Times** – These data are the QC-passed travel time measurements
32. **San Diego Traffic Data - 2005** – Raw data file received from PeMS covering the San Diego area that includes volume and speed data.
33. **L03 San Diego Raw Traffic Data** – Raw data file received from PeMS for Los Angeles, San Diego, and the Bay Area, respectively that includes volume and speed data.
34. **Atlanta 2006 Section Trips** – This file contains all of the section-level metrics at the 5-minute reporting interval necessary for computing travel time performance.

35. **Atlanta 2007 Section Trips** – This file contains all of the section-level metrics at the 5-minute reporting interval necessary for computing travel time performance.
36. **Atlanta 2008 Section Trips** – This file contains all of the section-level metrics at the 5-minute reporting interval necessary for computing travel time performance.
37. **Houston 2006 Section Trips** – This file contains all of the section-level metrics at the 5-minute reporting interval necessary for computing travel time performance.
38. **Houston 2007 Section Trips** – This file contains all of the section-level metrics at the 5-minute reporting interval necessary for computing travel time performance.
39. **Jacksonville 2008 Section Trips** – This file contains all of the section-level metrics at the 5-minute reporting interval necessary for computing travel time performance.
40. **Minneapolis Section Trips** – This file contains all of the section-level metrics at the 5-minute reporting interval necessary for computing travel time performance.
41. **San Francisco Bay Area Traffic Data - 2002** – This dataset is a raw data file received from PeMS for the Bay Area that includes speed and volume data.
42. **Bay Area Traffic Data from PeMs - Jan to June 2003** – This dataset is a raw data file received from PeMS for the Bay Area that includes volume and speed data at 5-minute intervals.
43. **Bay Area Traffic Data from PeMs – July to December 2003** – This dataset is a raw data file received from PeMS for the Bay Area that includes volume and speed data at 5-minute intervals.
44. **Bay Area Traffic Data from PeMs – Jan to June 2004** – This dataset is a raw data file received from PeMS for the Bay Area that includes volume and speed data at 5-minute intervals.
45. **Bay Area Traffic Data from PeMs – July to December 2004** – This dataset is a raw data file received from PeMS for the Bay Area that includes volume and speed data at 5-minute intervals.
46. **Bay Area Traffic Data from PeMs – Jan to June 2008** – This dataset is a raw data file received from PeMS for the Bay Area that includes volume and speed data at 5-minute intervals.
47. **Bay Area Traffic Data from PeMs – July to December 2008** – This dataset is a raw data file received from PeMS for the Bay Area that includes volume and speed data at 5-minute intervals.
48. **San Francisco Station Configuration** – This file contains the latitude and longitude information for San Francisco Bay Area PeMS data collections stations used in Project L03.

49. **L03 San Francisco Raw Traffic Data** – The raw data file received from PeMS for Los Angeles, San Diego, and the Bay Area, respectively includes speed and volume data reported at 5-minute intervals.
50. **Atlanta 2006 Station Data** – This file is the QC-passed and processed data file at the station level (all lanes in a direction) that reports volume, speed and travel times at 5-minute intervals.
51. **Atlanta 2007 Station Data** – This file is the QC-passed and processed data file at the station level (all lanes in a direction) that reports volume, speed and travel times at 5-minute intervals.
52. **Houston Station Data 2006** – This file is the QC-passed and processed data file at the station level (all lanes in a direction) that reports volume, speed and travel times at 5-minute intervals.
53. **Houston Station Data 2007** – This file is the QC-passed and processed data file at the station level (all lanes in a direction) that reports volume, speed and travel times at 5-minute intervals.
54. **Jacksonville 2008 Station Data** – This file is the QC-passed and processed data file at the station level (all lanes in a direction) that reports volume, speed and travel times at 5-minute intervals.
55. **Los Angeles Area Traffic Data from PeMS** – This dataset is a raw data file received from PeMS that includes volume, occupancy, and speed data collected at 5-minute intervals.
56. **Minneapolis 2006 Station Data** – This file is the QC-passed and processed data file at the station level (all lanes in a direction) that reports volume, speed and travel times at 5-minute intervals.
57. **Minneapolis 2007 Station Data** – This file is the QC-passed and processed data file at the station level (all lanes in a direction) that reports volume, speed and travel times at 5-minute intervals.
58. **San Diego Station Data** – This file is the QC-passed and processed data file at the station level (all lanes in a direction) that reports volume, speed and travel times at 5-minute intervals.
59. **L03 Weather Station to Section Mapping** – This file provides a mapping of each weather station to the Project L03 analysis sections. Data were extracted in each of the following locations: Atlanta, GA; Jacksonville, FL; Houston, TX; Los Angeles, CA; San Diego, CA; Bay Area, CA; and Minneapolis, MN.

60. The following files include travel time distributions and reliability metrics for each study section for each year and time slice:
- 1) Atlanta 2006 Reliability Profile Stats
  - 2) Atlanta 2006 Travel Time Distribution Data
  - 3) Atlanta 2007 Reliability Profile Stats
  - 4) Atlanta 2007 Travel Time Distribution Data
  - 5) Atlanta 2008 Reliability Profile Stats
  - 6) Atlanta 2008 Travel Time Distribution Data
  - 7) Houston 2006 Reliability Profile Stats
  - 8) Houston 2006 Travel Time Distribution Data 9) Houston 2007 Reliability Profile Stats
  - 10) Houston 2007 Travel Time Distribution Data
  - 11) Jacksonville 2008 Reliability Profile Stats
  - 12) Jacksonville 2008 Travel Time Distribution Data
  - 13) Minneapolis 2006 Reliability Profile Stats
  - 14) Minneapolis 2006 Travel Time Distribution Data
  - 15) Minneapolis 2007 Reliability Profile Stats
  - 16) Minneapolis 2007 Travel Time Distribution Data
  - 17) Minneapolis Project ba Reliability Profile Stats
  - 18) Minneapolis Project ba Travel Time Distribution Data
  - 19) Minneapolis Project bb Reliability Profile Stats
  - 20) Minneapolis Project bb Travel Time Distribution Data
  - 21) Minneapolis Project Ca Reliability Profile Stats
  - 22) Minneapolis Project Ca Travel Time Distribution Data
  - 23) Minneapolis Project Cb Reliability Profile Stats
  - 24) Minneapolis Project Cb Travel Time Distribution Data
  - 25) Minneapolis Project E2a Reliability Profile Stats
  - 26) Minneapolis Project E2a Travel Time Distribution Data
  - 27) Minneapolis Project E2b Reliability Profile Stats
  - 28) Minneapolis Project E2b Travel Time Distribution Data
  - 29) Minneapolis Project Ea Reliability Profile Stats
  - 30) Minneapolis Project Ea Travel Time Distribution Data
  - 31) Minneapolis Project Eb Reliability Profile Stats
  - 32) Minneapolis Project Eb Travel Time Distribution Data
  - 33) Minneapolis Project ga Reliability Profile Stats
  - 34) Minneapolis Project ga Travel Time Distribution Data
  - 35) Minneapolis Project gb Reliability Profile Stats
  - 36) Minneapolis Project gb Travel Time Distribution Data 37) Minneapolis Project ha Reliability Profile Stats

- 38) Minneapolis Project ha Travel Time Distribution Data
- 39) Minneapolis Project hb Reliability Profile Stats
- 40) Minneapolis Project hb Travel Time Distribution Data
- 41) Reliability Travel Time Distribution Data Dictionary
- 42) Reliability Profile Stats Files Data Dictionary
- 43) SHRP Project 1a Reliability Profile Stats
- 44) SHRP Project 1a Travel Time Distribution Data
- 45) SHRP Project 1b Reliability Profile Stats
- 46) SHRP Project 1b Travel Time Distribution Data 47) SHRP 2a Reliability Profile Stats
- 48) SHRP Project 2a Travel Time Distribution Data
- 49) SHRP Project 2b Reliability Profile Stats
- 50) SHRP Project 2b Travel Time Distribution Data
- 51) SHRP Project 4a Reliability Profile Stats
- 52) SHRP Project 4a Travel Time Distribution Data
- 53) SHRP Project 4b Travel Time Distribution Data
- 54) SHRP Project 5a Reliability Profile Stats
- 55) SHRP Project 5a Travel Time Distribution Data
- 56) SHRP Project 5b Reliability Profile Stats
- 57) SHRP Project 5b Travel Time Distribution Data
- 58) SHRP Project 6a Reliability Profile Stats
- 59) SHRP Project 6a Travel Time Distribution Data
- 60) SHRP Project 6b Reliability Profile Stats
- 61) SHRP Project 6b Travel Time Distribution Data 62) SHRP 7a Reliability Profile Stats
- 63) SHRP Project 7a Travel Time Distribution Data
- 64) SHRP Project 7b Reliability Profile Stats
- 65) SHRP Project 7b Travel Time Distribution Data

61. The following data sets were developed as part of the analysis of congestion causes performed by the University of Washington's Washington State Transportation Center (TRACUW). More information can be found in the Appendix D of the final report.

- 1) L03 Seattle Congestion by Source I-405 Bellevue NB
- 2) L03 Seattle Congestion by Source I-405 Bellevue SB
- 3) L03 Seattle Congestion by Source I-405 Eastgate NB
- 4) L03 Seattle Congestion by Source I-405 Eastgate SB
- 5) L03 Seattle Congestion by Source I-405 Kenndale NB
- 6) L03 Seattle Congestion by Source I-405 Kenndale SB
- 7) L03 Seattle Congestion by Source I-405 Kirkland NB
- 8) L03 Seattle Congestion by Source I-405 Kirkland SB

- 9) L03 Seattle Congestion by Source I-405 North NB
- 10) L03 Seattle Congestion by Source I-405 North SB
- 11) L03 Seattle Congestion by Source I-405 South NB
- 12) L03 Seattle Congestion by Source I-405 South SB
- 13) L03 Seattle Congestion by Source I-5 Everett NB
- 14) L03 Seattle Congestion by Source I-5 Everett SB
- 15) L03 Seattle Congestion by Source I-5 Lynnwood NB
- 16) L03 Seattle Congestion by Source I-5 Lynnwood SB
- 17) L03 Seattle Congestion by Source I-5 NKing NB
- 18) L03 Seattle Congestion by Source I-5 NKing SB
- 19) L03 Seattle Congestion by Source I-5 SeattleCBD NB
- 20) L03 Seattle Congestion by Source I-5 SeattleCBD SB
- 21) L03 Seattle Congestion by Source I-5 SeattleN NB
- 22) L03 Seattle Congestion by Source I-5 SeattleN SB
- 23) L03 Seattle Congestion by Source I-5 South NB
- 24) L03 Seattle Congestion by Source I-5 South SB
- 25) L03 Seattle Congestion by Source I-5 South SB
- 26) L03 Seattle Congestion by Source I-5 Tukwila NB
- 27) L03 Seattle Congestion by Source I-5 Tukwila SB
- 28) L03 Seattle Congestion by Source I-90 Bellevue EB
- 29) L03 Seattle Congestion by Source I-90 Bellevue WB
- 30) L03 Seattle Congestion by Source I-90 Bridge EB
- 31) L03 Seattle Congestion by Source I-90 Bridge WB
- 32) L03 Seattle Congestion by Source I-90 Issaquah EB
- 33) L03 Seattle Congestion by Source I-90 Issaquah WB
- 34) L03 Seattle Congestion by Source I-90 Seattle EB
- 35) L03 Seattle Congestion by Source I-90 Seattle WB
- 36) L03 Seattle Congestion by Source SR 167 Auburn NB
- 37) L03 Seattle Congestion by Source SR 167 Auburn SB
- 38) L03 Seattle Congestion by Source SR 167 Renton NB
- 39) L03 Seattle Congestion by Source SR 167 Renton SB
- 40) L03 Seattle Congestion by Source SR 520 Red EB
- 41) L03 Seattle Congestion by Source SR 520 Red WB
- 42) L03 Seattle Congestion by Source SR 520 Sea EB
- 43) L03 Seattle Congestion by Source SR 520 Sea