

audiences such as local-elected officials, and the general public. Fact sheets and summaries should focus on the impacts of ramp meters, without going into great detail on how the impacts were derived. Any discussion on the details on how the evaluation was conducted is likely to either confuse readers or be ignored altogether.

5.3.3. Media Releases

The media can provide practitioners a means to gain positive support for ramp metering from motorists and local leaders. Media releases, in either electronic or hardcopy format, can be used to express the benefits of ramp meters prior to and during construction. The local media should be notified of program goals, objectives, and benefits well in advance of when meters are expected to be turned on. This will help form a working relationship with the media that will be needed to publicize the benefits of ramp meters later on.



Although the media can aid in acquiring public support, the media can also be obstructive if not handled properly. If the benefits of ramp metering are oversold and unrealistic, credibility of the implementing agency can be questioned.

6.0. SPECIFIC MONITORING RECOMMENDATIONS FOR US 95 RAMP METERING

This section contains specific recommendations for monitoring the operation of the ramp meters on US 95. Metering began on March 29, 2005.

6.1. Objectives for Metering US 95

The objectives of ramp metering on US 95 are as follows:

- ▶ Reduce crash rate in the metered section of freeway.
- ▶ Increase mainline speeds in metered freeway sections.

- ▶ Keep ramp queues contained on the ramps, except when severe incidents occur.

The measures that best reflect these objectives are:

- ▶ Crash rates,
- ▶ Mainline speeds (or travel times), and
- ▶ Ramp queue lengths (or time in queue).

6.2. Monitoring Approach

As mentioned in Section 2, a corridor approach should be taken for monitoring performance of the initial ramp metering implementation on US 95. The geographic extent of the corridor analysis should be southbound only from roughly Ann Road to the interchange with US 93/I-15 (Spaghetti Bowl).

6.3. Data Collection

Two types of data will need to be collected in order to monitor the US 95 ramp meter operation, automated data and field observation/manual data.

6.3.1. Automated Data Collection

There are two types of automated data that will need to be collected. These data are listed and described below:

- ▶ Crash Data
- ▶ Mainline Speed Data

6.3.1.1. Crash Data

Crash rates will be important information to collect. This data will not be available for several months and because crash rates spike at different times of year, generally one year of after data is needed to derive statistically significant conclusions. Crash data analysis should be part of the one-year evaluation report.

6.3.1.2. Mainline Speed Data

Detector data (volume and speed) will be collected on the mainline at the following locations:

- ▶ SB 95 between Craig and Cheyenne
- ▶ SB 95 between Cheyenne and Lake Mead
- ▶ SB 95 between Lake Mead and Rainbow curve

Ramp volumes will also be collected at the following locations:

- ▶ SB to Cheyenne off ramp
- ▶ Cheyenne to SB on ramp (general purpose and HOV)
- ▶ SB to Lake Mead off ramp
- ▶ WB Lake Mead to SB on ramp (general purpose and HOV)
- ▶ EB Lake Mead to SB on ramp (general purpose and HOV).

Automated data collection spanned three week days prior to the initiation of ramp metering and should continue throughout the ramp metering operation. The FAST system is being used to the extent possible to collect this data.

6.3.2. Manual Data Collection

Manual data collection (observations) have been or are being made in two ways. First, 24-hour time lapse recording from cameras in the field are used to observe flows on the mainline and metered ramps before and after metering starts. The recordings were for made for three week days before the start of ramp metering. After ramp metering began, video recordings should continue to be made for comparison purposes.

The second manual data collection method to be used are field observations. Field observations should be made while ramps are metered. Observers should record the extent of queues at the three ramps metered on US 95:

- ▶ Cheyenne to SB on ramp
- ▶ WB Lake Mead to SB on ramp
- ▶ EB Lake Mead to SB on ramp.

Ideally, each ramp was visited at least once every 15 minutes while the ramps are being metered each day the first week of metering. The second week, observations were recommended for 3 days during metered times. After the second week, field observations should be on an as needed basis, during metered times.

6.4. Data Analysis

The analysis of data for the initial ramp metering operation should consist of:

- ▶ Comparison of before and after crash rates (after sufficient time has passed to collect statistically valid sample of crash records).
- ▶ Comparison of before and after mainline speeds. Averages and standard deviations should be compared. Care should be given to make sure sample sizes reflect statistically valid results.
- ▶ Average queue lengths after metering starts.
- ▶ Qualitative assessment of overall ramp observations.

6.5. Data Reporting

NDOT and RTC should be prepared to provide qualitative assessment of the operation of the ramp metering system on the first day of operation. As soon as possible, information on mainline speeds and volumes should be prepared and released to the media, the public, and decision makers. Simple graphs and charts and explanatory text should be provided in the form of press releases and fact sheets.

6.5.1. Three Month Report

NDOT and RTC should plan on releasing a quantitative and qualitative report on the first 3-months of ramp metering operation. The report should include:

- ▶ A description of ramp metering on US 95 and plans for metering elsewhere in the region.
- ▶ An explanation of the data collected and analyzed.
- ▶ Results of the analysis, both qualitative and quantitative. Qualitative analysis should include any public survey results and summaries of field observations. Quantitative analysis should include mainline speed comparisons, ramp queue observations, and identification of safety issues.
- ▶ Actions taken over the course of the metered operation.

- ▶ Conclusions from the analysis and recommendations for improvements.

6.5.2. Annual Report

NDOT and RTC should plan on producing and distributing an annual report on the ramp metering operation. The format and analyses should be similar to that of the 3-month report, with collision and benefit-cost analyses added. Region-wide analyses and travel time reliability measures should be added as additional corridors are metered and travel time measures are implemented.

The exact format of the annual report should be revisited and finalized after the 3-month report has been distributed and judgments can be made regarding its effectiveness.