Chapter Forty
SPEED STUDIES

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Chapter Forty
SPEED STUDIES

The speed study is a common traffic investigation requested by the public and local governments. Its recommendations have a direct impact on the public (e.g., speed limit signs). This is often a very sensitive issue for local officials and citizens. A consistent approach to the investigation is imperative. This chapter documents the Department's procedures for conducting speed studies in accordance with the appropriate laws and criteria.

40.1 GENERAL

40.1.1 Types of Speed Studies

Speed studies are conducted to identify regulatory speed limit signing, geometric design speeds, and travel times. The following discusses the various types of speed studies conducted by the Department:

1. Spot Speed Studies. The Department conducts spot speed studies to measure speeds at specific locations under the traffic and environmental conditions prevailing at the time of the study. Spot speed studies are used to:

    a. establish regulatory speed limits (see Section 40.2);

    b. determine the design speed for geometric design elements (e.g., horizontal curves, vertical curves, sight distances);

    c. aid in conducting safety studies; and

    d. analyze special operational situations (e.g., work zones, school crossings).

2. Travel Time Studies. Travel time is the time taken by a vehicle to traverse a given segment of a street or highway. The Department conducts travel-time studies to:

    a. evaluate the effectiveness of traffic improvements,

    b. provide input to economic analyses of alternatives, and

c. provide input to studies that evaluate trends in efficiency and level of service.

3. Speed Delay Studies. Delay is the time lost by a vehicle due to causes beyond the control of the driver. The Department conducts delay studies to:

a. identify problem areas (e.g., intersection, lane restrictions);

b. determine the efficiency of a route with respect to its ability to accommodate traffic volumes;

c. evaluate the effectiveness of traffic improvements; and

d. provide input to economic analyses of alternatives.

This chapter provides information on spot speed studies. Information on speed studies for travel time and delay can be found in the ITE Manual of Transportation Engineering Studies and other traffic engineering publications.

40.1.2 Sign Legends

Regulatory and advisory speed signs and other sign legends that are displayed along Montana highways will remain in US Customary units until notified otherwise. The information presented in this chapter is in dual units. As a translation guide, Figure 40.1A may be used to determine the appropriate US Customary speed limit legend from the metric data.

40.1.3 Speed Study File

The Traffic Engineering Section maintains a file of speed studies that have been previously conducted. The data that is typically maintained in the Speed Zones File is as follows:

1. district;
2. city;
3. route;
4. county; and
5. relevant dates (e.g., request, response, signed, implemented).

Records of the latest Transportation Commission actions are on file in the Engineering Division. During the speed study, the investigator should review and update this file for pertinent information.

40.1.4 Applicable Legal Statutes

The following legal statutes from the Montana Code Annotated are applicable to speed studies and should be considered during the investigation:

1. 61-8-303 — Speed restrictions, basic rule,
2. 61-8-309 — Establishment of special speed zones,
3. 61-8-310 — When local authorities may and shall alter limits,
4. 61-8-312 — Special speed limitations on trucks,
5. 61-8-313 — Special speed limitations (on bridges),
6. 61-8-314 — Traffic violations in construction zone and work zone,
7. 61-10-128 — When authorities may restrict right to use roadway, and
8. 61-1-410 — Definition of Urban District.

Metric Speed Data (km/h)	US Customary Sign Legend (mph)
30	20
40	25
50	30
60	35
60	40
70	45
80	50
90	55
100	60
110	65
110	70
120	75

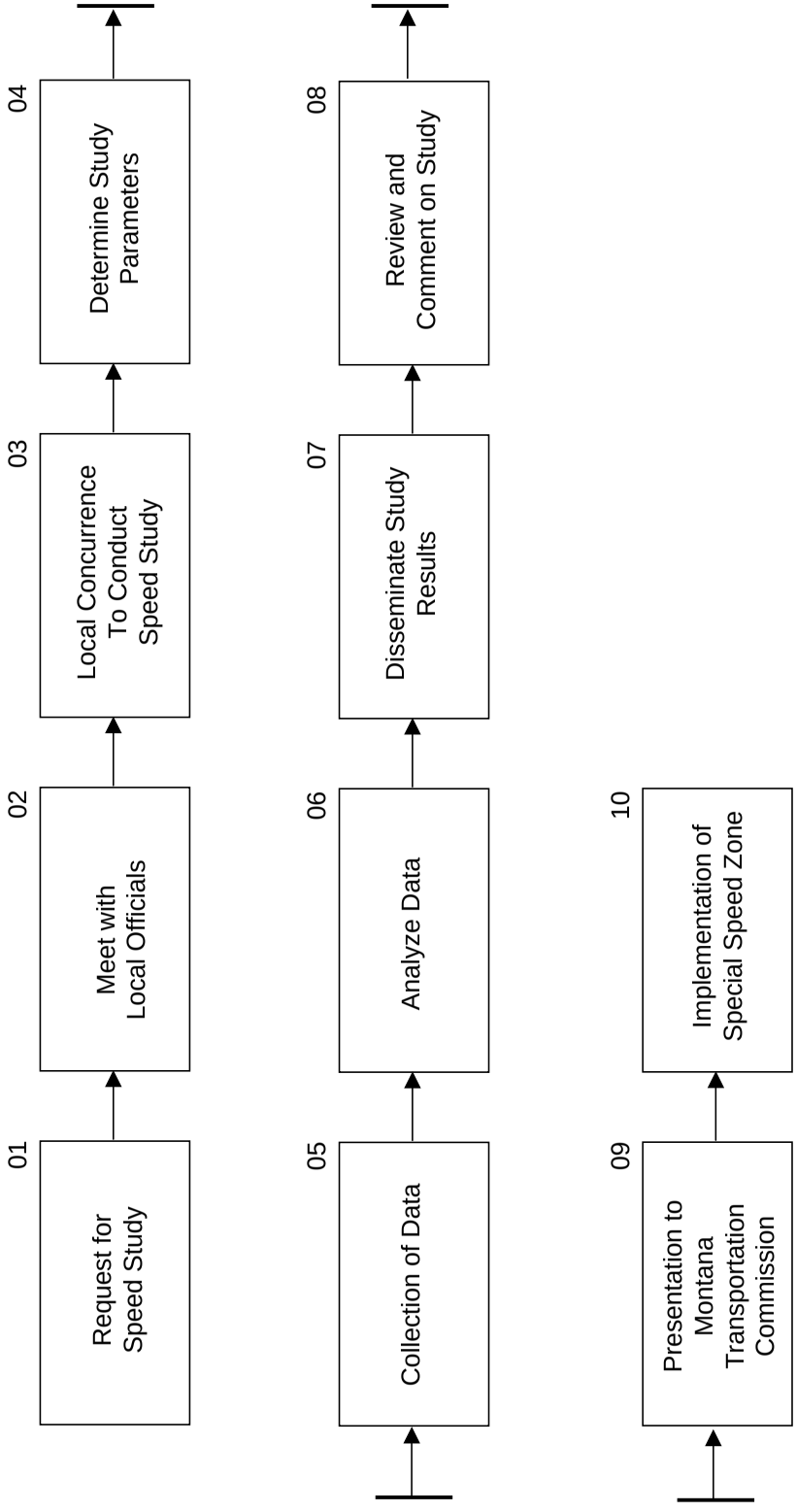
US CUSTOMARY SIGN LEGENDS FROM METRIC DATA

Figure 40.1A

40.2 SPEED STUDY PROCEDURES

To provide a consistent approach in determining special speed zones, Figure 40.2A presents a flow chart illustrating the proper steps that should be followed when conducting a speed study. Following the flow chart is a brief description for each activity within the flowchart.

Intradepartmental units (e.g., Road Design, Districts, Signing and Pavement Marking Unit) may also request the Traffic Investigations Unit to conduct a speed study for design purposes or as part of a traffic engineering study. If the study is conducted for purposes other than establishment or modification of a special speed zone, then prior approval to conduct the study by the local government is not required. Figure 40.2A illustrates the procedures for conducting speed studies.



SPEED STUDY PROCEDURES

Figure 40.2A

SPEED STUDY ACTIVITY

Activity Title:	Request for Speed Study
Activity No.:	01
Responsible Unit:	MDT Traffic Investigations Unit

Activity Description:

Initial requests for speed studies can be received from any number of sources including concerned citizens, school officials, local governments, special interest groups, civic groups, special boards, agencies, MDT offices, etc. These requests may be in the form of telephone calls or letters to either the District Office or directly to the Central Office.

The Traffic Investigations Unit may contact the local government in writing to request authorization to proceed with the speed study.

SPEED STUDY ACTIVITY

Activity Title:	Meet with Local Officials
Activity No.:	02
Responsible Unit:	MDT Traffic Investigations Unit

Activity Description:

After a request is received from a local government, the MDT Traffic Investigations Unit through the Traffic Engineer will acknowledge their request by letter. The letter will state that Department policy requires the Traffic Engineer, or designee, to meet with the local officials to discuss its procedures for conducting a speed study. Section 40.5 provides a sample of the Department's response letter.

During the meeting with the local officials, the Traffic Engineer, or designee, will discuss:

1. the requirements of the Montana Code Annotated;
2. the Department and Transportation Commission's responsibilities;
3. the local official's responsibilities;
4. the limits of the study;
5. the procedures that will be used to conduct the speed study;
6. any additional elements that will be studied (e.g., pedestrian movements, crash history); and
7. the possibility that the speed limit may increase or decrease after the study is completed.

Section 40.5 provides the guidelines for conducting this presentation. This meeting will be held at the local officials' convenience and should be held with a majority of the members of the local government body present. In addition, the local law enforcement and an MDT District representative should also be requested to attend the meeting. The local government may request to waive this meeting.

SPEED STUDY ACTIVITY

Activity Title:	Local Concurrence to Conduct Speed Study
Activity No.:	03
Responsible Unit:	Local Officials

Activity Description:

Upon completion of the meeting, the local officials must decide whether or not to continue the study. They must submit a letter within 30 days to the MDT Traffic Engineer stating that they understand the Department's procedures and that they wish to continue with the study. A sample of this request is provided in Section 40.5.

If no approval is received within 30 days, the speed study request will not be pursued and the existing regulatory speed limits approved by the Transportation Commission will remain in effect.

Exceptions to proceed without the consent of local officials must be approved by the Chief Engineer on a case-by-case basis.

SPEED STUDY ACTIVITY

Activity Title: Determine Study Activity

Activity No.: 04

Responsible Unit: MDT Traffic Investigations Unit

Activity Description:

Upon receipt of the formal request, the Traffic Investigations Unit will initiate the research for the speed study (e.g., crash history, existing signing, traffic volumes). It will determine:

1. the type and amount of data to be collected,
2. the approximate locations for the data collection,
3. the times and days the data should be collected,
4. the type of equipment that should be used, and
5. who will be responsible for data collection.

The Traffic Investigations Unit will conduct the study. The District may assist in data collection. The Traffic Investigations Unit will prepare a memorandum for the Traffic Engineer's signature to the District stating that speed samples need to be collected. This memorandum will address:

1. the approximate locations where the speed data should be collected (these locations should be marked on plats, maps or plan sheets);

2. how the data should be collected (e.g., radar, road tubes);

3. times and days the data should be collected; and

4. any other conditions or factors that should be considered (e.g., schools, pedestrians, major traffic generators).

Section 40.5 provides further information on what should be addressed in the memorandum.

SPEED STUDY ACTIVITY

Activity Title: Collection of Data

Activity No.: 05

Responsible Unit: Traffic Investigations Unit/MDT District Office

Activity Description:

Section 40.3.2 discusses the factors that should be considered when collecting the data. When the District assists with data collection, upon completion of the task, the District will forward the following information to the Traffic Investigations Unit through the Traffic Engineer:

1. times the data were collected;
2. data collection forms, tapes and/or files;
3. speed survey form;
4. weather data;
5. overall sign inventory (e.g., specific times when speed limit restrictions apply); and
6. any other miscellaneous information pertinent to the study.

SPEED STUDY ACTIVITY

Activity Title:	Analyze Data
Activity No.:	06
Responsible Unit:	MDT Traffic Investigations Unit

Activity Description:

The Traffic Investigations Unit is responsible for analyzing the speed study data to identify the appropriate speed limit for the area. The designer will input speed data into the computer to determine the pace, the median speed, the standard deviation, the 85th-percentile speed, etc. This information will set the foundation for identifying the appropriate speed limits for the area. Section 40.4 discusses the elements considered in determining the appropriate speed limit.

The Traffic Investigations Unit will be responsible for preparing a report from the Traffic Engineer to the District. This report should be prepared within 30 days of completion of the study and summarize the results of the study and the Department's recommendations for the District Administrator's review. Section 40.5 discusses the information that should be included with this report.

Upon receiving the District Administrator's comments, the Traffic Investigations Unit will finalize the report for distribution.

SPEED STUDY ACTIVITY

Activity Title:	Disseminate Study Results
Activity No.:	07
Responsible Unit:	Traffic Engineering Section/MDT District Office

Activity Description:

The District is responsible for presenting and explaining to the local officials the Department's findings and recommendations. This will occur in a meeting with the local officials. The District will also be responsible for organizing this meeting.

The District will inform the Traffic Investigations Unit of the date the information was presented to the local officials.

SPEED STUDY ACTIVITY

Activity Title: Review and Comment on Study

Activity No.: 08

Responsible Unit: Local Officials

Activity Description:

The local officials will have 60 days after the presentation to respond and/or comment on the results. All comments should be directed to the Traffic Engineer. The Department will consider these comments in its final recommendations to the Montana Transportation Commission. All comments will be presented in conjunction with the Department's recommendations to the Montana Transportation Commission. If the local government does not respond within 60 days, the Department will present its final recommendations irrespective of the lack of response.

SPEED STUDY ACTIVITY

Activity Title:	Presentation to Montana Transportation Commission
Activity No.:	09
Responsible Unit:	MDT Traffic Investigations Unit

Activity Description:

At the end of the 60-day comment period for the local officials, the Traffic Investigations Unit through the Traffic and Safety Engineer will forward, in a memorandum, the Department's final recommendations to the Engineering Division for presentation to the Montana Transportation Commission. A sample recommendation is provided in Section 40.5. The Traffic Investigations Unit will inform the District of the upcoming Commission meeting. The District will notify the local government of the recommendations on the special speed zone, the location and the date of the Commission meeting. The Chief Engineer, or designee, will present these recommendations to the Commission at its next regularly scheduled meeting.

The Montana Transportation Commission will take official action on the special speed zone recommendations.

SPEED STUDY ACTIVITY

Activity Title:	Implementation of Special Speed Zone
Activity No.:	10
Responsible Unit:	MDT Traffic Investigations Unit/District Office

Activity Description:

Once the Commission approves the speed zone change, within five working days of receiving notification of the Commission's action by the Chief Engineer, the Traffic Investigations Unit through the Traffic Engineer will inform the District of the necessary information to implement the speed zone revision. The District will implement the changes.

When the changes have been made, it will be the responsibility of the District Traffic Engineer to inspect the installation for accuracy. After this inspection, the District Traffic Engineer will certify in a memorandum to the Traffic Engineer that the changes have been made, inspected and are in conformance with the Commission's actions.

The Traffic Investigations Unit is responsible for submitting a copy of the Transportation Commission actions on special speed zones to the Montana Highway Patrol.

40.3 DATA COLLECTION

40.3.1 Study Parameters

The Traffic Investigations Unit is responsible for determining the appropriate data collection stations, collection times, equipment to be used and any additional study parameters. The following sections discuss the various parameters that should be addressed prior to collecting the actual data.

40.3.1.1 Preliminary Data

Prior to determining the appropriate stations, equipment to use, etc., the designer needs to obtain and review:

1. existing construction plans and specifications;

2. crash history (e.g., computer printout);

3. major traffic control devices (e.g., signals);

4. all existing files pertaining to the site (e.g., previous traffic investigations, previous speed studies, complaints, existing approved speed limits);

5. geometric information (e.g., alignment restrictions, sight restrictions); and

6. recent photo logs or aerial photos.

The Traffic Investigations Unit should review the site prior to the Department's informational meeting with the local officials. This will allow familiarity with the actual field conditions. The designer should consider site plans and the field review when determining the parameters for the study. This review can identify the appropriate location for observers and/or equipment and possible factors that may affect the study results (e.g., factory entrances, schools).

40.3.1.2 Station Selection

Readings must be taken at a sufficient number of stations to ensure an accurate representation of the traffic speeds throughout the study section. When evaluating the station selections, the designer should consider the following:

1. General. A speed study should collect a sufficient number of stations to define the boundaries of the special need and identify significant changes in the speed profile. Safety is a major aspect of all station selections. Ensure that the data

collector is not located in a dangerous situation. In addition, the data collector should be located inconspicuously, as practical, to not affect the data collection with his/her presence.

2. Urban. In urban and suburban areas, measurements should be at frequent points where traffic, environmental and/or roadway characteristics change. Approximately 1600 ft (500 m) intervals are desirable between stations. Select stations at mid-block locations where there is minimum disturbance from turning movements from adjacent streets or start up traffic from stop signs or traffic signals.

3. Rural. Normally, measurements are made at points where traffic, roadway and/or environmental characteristics change and at locations near both ends of the project.

The designer should mark the locations on plats and document any other pertinent information for the data collector. In general, the data collector should collect the information as near as practical to locations shown in the plats. Some minor adjustments may be required for safety or to become more inconspicuous. Significant deviations should be noted by data collector.

40.3.1.3 Time of Day/Week/Year

Traffic speeds tend to fluctuate during various times of day. For example, congestion during peak time periods may significantly reduce the overall vehicular speed of a facility. To obtain a thorough overall understanding of the traffic patterns, samples should include several pertinent time periods throughout the day. Speed limits are based on free-flow operations. Therefore, speed measurements for speed zoning purposes should be conducted during day time periods when traffic conditions are the closest to free or uninterrupted flow. Ensure that the counts reflect typical operating conditions and are not influenced by part-time operations for short duration periods or special events (e.g., schools, factory entrances, park or recreational locations). If detail on these features is desired, conduct the speed study during these peak time periods. Studies should not be conducted in inclement weather. For example, snow and ice will significantly reduce the overall speed of the facility well below typical flow conditions.

40.3.1.4 Operational Characteristics

Environmental characteristics influence the travel speed along a facility. This may include the following:

1. Roadside Development. The type of development along a roadside can have a significant influence on traffic speeds. A dense development that is in close lateral proximity to the roadway will tend to increase the motorist's perception of a potential conflict. As such perception intensifies, the traffic stream will tend to reduce its speed.

2. Roadway Geometrics. Geometric elements (e.g., roadway width, intersection spacing, horizontal alignment, median type, curb and gutter versus rural section) can effect traffic flow and its relative speed profile. These elements are a static visual influence on a driver's perception of a potential conflict. This is similar to the effects of roadside development.

3. Parking Activity. On-street parking availability along a roadway will affect the speed profile of the roadway's traffic stream. The on-street parking density influences a motorist's perception of roadway width. In addition, vehicles move in and out of on-street parking spaces and drivers get in and out of the parked vehicles. The motorists will adjust their speed in anticipation of a potential conflict.

4. Pedestrian Activity. The visual recognition of pedestrian activity near the traveled way will influence a motorist's recognition of a potential conflict. The denser the pedestrian activity and the closer its relative lateral location to the traveled way, the greater a motorist's perception of potential conflict becomes. The traffic stream will tend to reduce its speed accordingly.

5. Directional Speeds. Vehicles will be influenced according to which direction they travel as they are approaching or leaving an urban area, entering or exiting a curve, traveling on grades or multi-lane facilities, etc. It will be necessary to measure speed readings in both directions.

6. Vehicular Classification. The percent of heavy trucks in the traffic stream will directly affect the travel speed of the facility. Heavy trucks generally require a longer time to accelerate and decelerate than do passenger vehicles. In addition, there may exist lower regulatory speed limits for truck traffic.

40.3.1.5 Equipment Selection

The equipment used to generate the data required will depend on the information desired. Pneumatic tubes and radar are the most frequent methods used by the Department to collect speed data. The following discusses several of the devices that may be used:

1. Pneumatic Tubes. Two pneumatic tubes are set a certain distance apart per manufacturer's specifications and are attached to pressure actuated switches. Passing vehicles activate the switches. By measuring the time for a vehicle to travel the distance between the tubes, the vehicular speed can be automatically determined. The speeds are collated into 20 speed bins or groups. Pneumatic tubes allow the data collection to continue for several hours or even days to retrieve a significant number of data points. A major advantage of this method is the data points can be directly downloaded into the office computer for analysis. Generally, the data is not subject to human deficiencies (e.g., vehicle selection). Some of the limitations on the use of pneumatic tubes include:

   a. Speed Bins. The data can be segregated into 20 speed bins. Typically, this may require the collector to set groupings at spacings of 2 to 4 mph (3 to 6 km/h). Analysis is dependent on the number of data points grouped in each bin.

   b. Setup. Pneumatic tubes require the data collector to actually place the tubes within the travelway. The setup and removal of the tubes must be conducted in a safe and effective manner. This requires waiting for favorable traffic conditions (e.g., low volume) and safe work procedures.

   c. Sample Selection. Pneumatic tubes will take the readings of all vehicles within the traffic stream. Care should be taken to identify potential conflict (e.g., stopping or slowing vehicles, traffic control devices, pedestrian crossing). The lowest speed bin can be used to segregate the unavoidable minor conflict. Where conflict is extensive, an alternative station site should be selected.

2. Radar. Radar operates on the Doppler principle with either radar or ultrasonic beams directed at certain frequencies at the moving vehicle. A radar unit can be easily operated by one person. The observer can take readings in both directions without having to change site locations (e.g., other side of the road). There are limitations on radar data collection which include:

   a. Accuracy. Radar units can produce angular errors, which can occur when the angle between the radar beam and the target is significant. For example, angles of 15° can reduce the actual reading by 2 mph (3 km/h). The greater the angle, the greater the error. If the data collector is unaware of these errors, the actual results may be significantly skewed. Select sites so that the angle can be less than 15°.

   b. Biased. The data collector may become biased to which vehicle in a platoon is always read (e.g., first, last) or to the fastest vehicle. The data

collector must be aware of these tendencies to provide an unbiased data sample.

c. Beam Spread. The radar beam spreads out in an inverse funnel manner after it leaves the unit. The further away the target is, the greater the chance the observer may be observing the wrong vehicle (e.g., large trucks, vehicles following too close, vehicles traveling in the opposite direction).

d. Location. Due to the angular error observed in Item a., the observer must be located relatively close to the roadway. This is a safety concern. Precaution should be taken to locate the vehicle in a safe as well as effective position.

e. Sample Size. To obtain a reasonable number of data points, it is the Department's policy to collect at least 100 readings. For low-volume roads, 100 readings may not occur in a reasonable time period. In this case, then the pneumatic tubes should be considered.

3. Alternative Methods. Speed surveys can also be conducted by employing either the floating car technique or inductive loops. The floating car technique may be used in areas where it is not feasible to collect vehicular speeds using another method. This may be in areas of low traffic volume where the automated speed counter cannot be used. This method consists of driving through the area following a random vehicle using engineering judgment on roadside environment, roadway surface, vertical curves, geometrics, and ball-banking the horizontal curves to determine an appropriate speed limit.

40.3.1.6 Sample Size

To obtain statistically accurate results, a minimum number of data points is necessary. The minimum sample size can be determined using the criteria presented in ITE's publication Transportation Engineering Studies. However, a minimum of 100 data points should be collected for each site.

The designer should provide the data collector with the minimum sample size for each site and direction. In addition, if pneumatic tubes are used, the designer should provide the minimum number of hours the pneumatic tubes should be in place. The minimum number of hours will ensure that the minimum number of data points are collected.

40.3.2 Field Collection Procedures

40.3.2.1 General

Good planning prior to collecting the data can enhance the accuracy of the measurements. Before collecting the data, the data collector should consider the following:

1. Area Review. During the area review, the investigator should note the following elements:

   a. the general environment of the area (e.g., rural, commercial, residential);

   b. pavement condition;

   c. driveway locations;

   d. geometric restrictions (e.g., crest vertical curves, horizontal curves);

   e. location of existing speed limit signs and other traffic control devices;

   f. location of no passing zones; and

   g. location of nearby traffic generators (e.g., factories, malls, schools, churches).

2. Station Selection. In general, collect the information as near as practical to locations shown in the plats by the designer. Some minor adjustments may be required for safety, to correct radar angular errors and to become more inconspicuous. Note these deviations on the data collection forms.

3. Time. Ensure that sufficient time is available to collect enough data points within the allotted time period. Plan to spend at least two hours for setup, calibration and removal of the equipment. If public notice of the sampling has occurred, it may be necessary to discontinue the collection and return later to resume collection. If more than one site will be collected, consider the combined effort of travel and setup time within the allotted time period.

4. Additional Equipment. In addition to the appropriate equipment selection mentioned in Section 40.3.1.5, the investigator should consider the need for a stop watch, a ball-bank indicator for establishing advisory speeds on horizontal curves, a measuring wheel for determining sight distances, a video camera and a camera.

5. Observers. Although one person can normally accomplish the field survey task, it is desirable, under busy urban conditions or on high-speed facilities, to assign an additional staff person to assist with road tube setup. The additional person will monitor the traffic conditions while the road tubes are being setup.

6. Safety. As with all field studies, safety is critical. Any time while working near moving traffic, whether to install or to recover measuring devices or to take observations, there will be some drivers that will not see the data collector. Care and vigilance must be applied at all times. Install or remove measuring devices under low-volume conditions. Park all vehicles in such a way that it will not impede the motorists view of the data collector. When walking along or near the roadway, wear hard hats and reflective orange, yellow or strong yellow green vests at all times.

40.3.2.2 Pneumatic Tubes Method

Always use extreme care when placing the tubes within the travel lanes. If practical, place them during low traffic volume time periods. The distance between tubes should be set in accordance with the manufacturer's recommendations. Calibrate the collection device in accordance with the manufacturer's specifications. All bin categories should have been defined by the designer.

40.3.2.3 Radar Method

The following factors should be considered when collecting data with radar:

1. Angle of Incidence. To reduce the angular errors for radar, place the units so that the radar beam is less than 15° from the direction of travel and about 3 ft (1 m) up from the roadway surface. Angles within these ranges will produce results that are within 2 mph (3 km/h).

2. Radar Capabilities. Radar capabilities vary considerably from manufacturer to manufacturer. Be fully aware of the manufacturer's setup and calibration procedures. If the observer is unfamiliar with the unit, run several samples prior to the start of actual data collection.

3. Target Vehicle Selection. The general principle is to randomly select vehicles which represent the general traffic study population. Except in low volume situations, it is impossible to observe every vehicle. Exercise care to ensure that the following errors are not made when determining the vehicular selection:

a. Platoon Leader. Do not always select the platoon leader. Try to select vehicles from varying positions within the platoon. If platoons are densely packed, it may mean that congestion has been reached and that traffic is too heavy to permit a proper survey.

b. Close Followers. Do not select those vehicles following too close to other vehicles. These vehicles will generally travel at a greater speed if left to there own discretion. In general, a gap of 4 seconds between vehicles should be observed.

c. Stand Out Vehicles. There is a natural tendency to record those vehicles which stand out from the rest of the traffic (e.g., trucks, fast moving vehicles, slow moving vehicles). An over representation of these vehicles will bias the results. To overcome this tendency, select the every *nth* vehicle. However, ensure that the *nth* vehicle is not influenced by outside sources (e.g., traffic signals).

d. Trucks. The designer should have provided the number of required truck readings. If not, determine the number of truck readings from the percent of trucks within the traffic stream.

40.3.3 Field Documentation

To obtain an accurate representation of the study conditions, the observer will be responsible for documenting the following items:

1. Time. Record the start time, end time and any down time. For any down times note the times when the study was interrupted, when it was restarted and why the interruption occurred.

2. Survey Data. During the speed study, survey and site data must be collected. This data will include information about existing speed zones, prevailing speeds, location of residence and business developments, locations of crash sites, roadway alignment, traffic volumes and general roadside physical characteristics. Also note any visibility restrictions and other deficiencies that may affect the overall prevailing speeds.

3. Weather Data and Road Surface Conditions. Note the type of weather and road surface conditions at the time of the study.

4. Data Collection Forms. Figure 40.3A illustrates a sample form used to record the results from manual and radar collections. Outputs from the pneumatic machines will be sufficient for data collection purposes. The investigator should

contact the Traffic Investigations Unit for the latest revision of data collection forms or if the use of additional forms is necessary.

5. Miscellaneous. Note any additional information that may have affected the speeds at a given point (e.g., special events, pedestrians, pavement condition, nearby maintenance or construction operation enforcement efforts).

SPEED STUDY

DATE TIME POSTED SPEED WEATHER

RECORDED BY LOCATION PAVEMENT

DIRECTION COMMENTS

mph	10	20	30	40	TOTAL
20-21					
22-23					
24-25					
26-27					
28-29					
30-31					
32-33					
34-35					
36-37					
38-39					
40-41					
42-43					
44-45					
46-47					
48-49					
50-51					
52-53					
54-55					
56-57					
58-59					
60-61					
62-63					
64-65					
					TOTAL

DIRECTION COMMENTS

mph	10	20	30	40	TOTAL
20-21					
22-23					
24-25					
26-27					
28-29					
30-31					
32-33					
34-35					
36-37					
38-39					
40-41					
42-43					
44-45					
46-47					
48-49					
50-51					
52-53					
54-55					
56-57					
58-59					
60-61					
62-63					
64-65					
					TOTAL

SAMPLE DATA COLLECTION FORM
(Speed Studies) (US Customary)

Figure 40.3A

SPEED STUDY

DATE TIME POSTED SPEED WEATHER

RECORDED BY LOCATION PAVEMENT

DIRECTION COMMENTS

km/h	10	20	30	40	TOTAL
38-40					
41-43					
44-46					
47-49					
50-52					
53-55					
56-58					
59-61					
62-64					
65-67					
68-70					
71-73					
74-76					
77-79					
80-82					
83-85					
86-88					
89-91					
92-94					
95-97					
98-100					
101-103					
104-106					
					TOTAL

DIRECTION COMMENTS

km/h	10	20	30	40	TOTAL
38-40					
41-43					
44-46					
47-49					
50-52					
53-55					
56-58					
59-61					
62-64					
65-67					
68-70					
71-73					
74-76					
77-79					
80-82					
83-85					
86-88					
89-91					
92-94					
95-97					
98-100					
101-103					
104-106					
					TOTAL

SAMPLE DATA COLLECTION FORM
(Speed Studies) (Metric)

Figure 40.3A

40.4 DATA ANALYSES

40.4.1 Statistical Analyses

Once the speed data has been collected, the data must be characterized with respect to the entire speed population. This requires the use of statistics to analyze the sample data. The following sections discuss some of these statistical analyses.

40.4.1.1 Definitions

Numerous statistical analyses can be performed on the collected speed data. These analyses can be found in most of the engineering literature. The following are the common statistical terms used to analyze the speed data:

1. Arithmetic Mean. The arithmetic mean is the most common measure of central tendency. It is determined by summing all the data points and dividing it by the sample size.

2. Average Travel Speed. Average travel speed is the distance summation for all runs of a floating car divided by the total time summation. (Note: Average running speed only includes the time the vehicle is in motion. Therefore, on uninterrupted flow facilities which are not congested, average running speed and average travel speed are equal.)

3. Design Speed. Speed selected to determine the various geometric design features of the roadway. Section 24.3.2 discusses the selection of design speed in general. Chapter Twelve of the MDT Road Design Manual provides specific design speed criteria for various conditions.

4. 85th-Percentile Speed. The 85th-percentile speed is the speed at or below which 85 percent of the traffic is moving. The most common application of the value is its use as a major factor in determining the speed limit for a highway section.

5. Frequency Distribution. Frequency distribution demonstrates at what speeds the majority of the drivers are traveling for a given location. It can also be used to quickly compare two or more sample sites.

6. Median Speed. Median speed is the speed represented by the middle value when all data speed points are arranged in ascending order. For spot speed studies, it represents the 50th-percentile driver.

7. Modal Spot Speed. Modal spot speed is the speed value that occurs most frequently in a sample of speed measurements.

8. Normal Distribution. The normal distribution can be constructed from statistical formulas but, essentially, it is a distribution that falls under a bell curve. A bell curve is defined as a curve in which its highest point is at the median speed.

9. Pace. Pace is defined as that 10 mph (15 km/h) range of speeds in which the highest number of observations is recorded.

10. Running Speed. Running speed is the average speed of a vehicle over a specified section of highway. It is equal to the distance traveled divided by the running time (the time the vehicle is in motion).

11. Sample Size. Sample size is the minimum number of readings required to obtain a desired level of confidence.

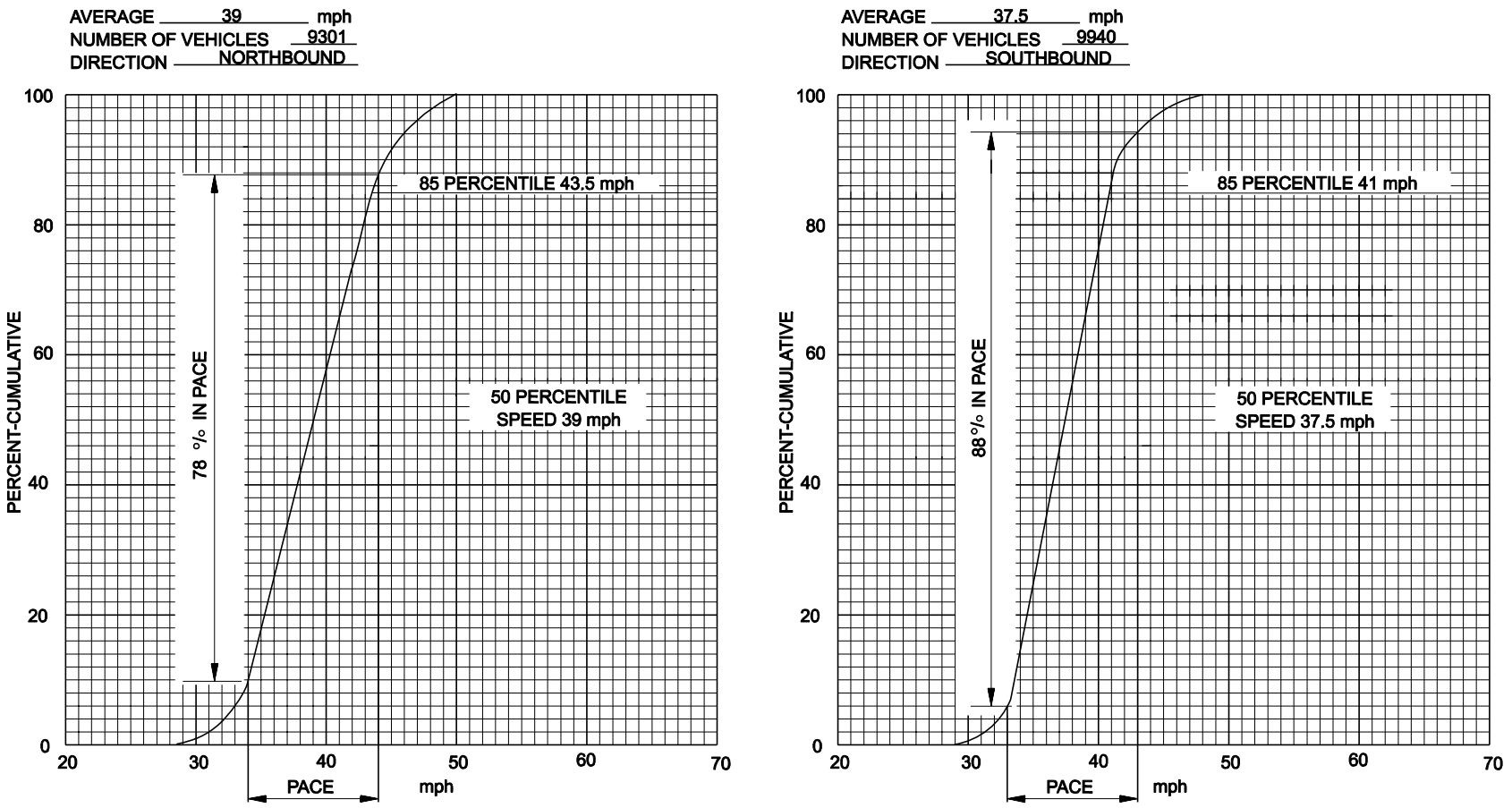
40.4.1.2 Data Processing

A computer program is used to determine the median speed, the 85th-percentile speed and the pace speeds. As a quick reference tool, the field data should also be shown graphically. The following discusses several of these graphic displays:

1. Cumulative Speed Distribution Curves. Cumulative speed distribution curves will typically show an S-type curve. These curves allow the designer to quickly determine the 85th-percentile or other speeds. Reviewing the figure, one can quickly determine if data may be skewed or biased for some reason. This may require the designer to obtain additional data. Figure 40.4A provides a sample of cumulative speed distribution curve. Plot cumulative curves for each speed check location and for each direction of travel.

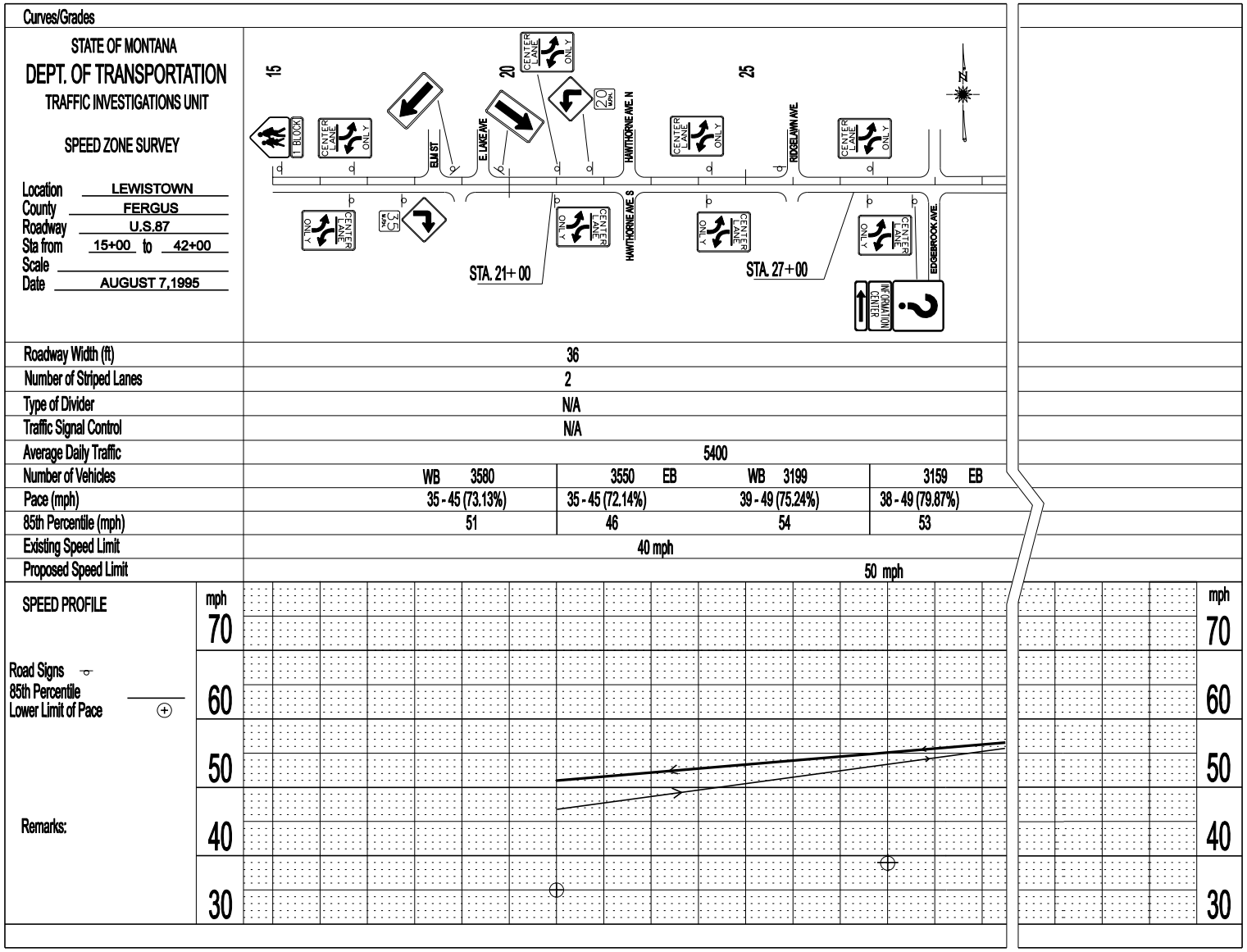
2. Speed Profile. This chart allows the user to analyze the various factors (e.g., driveways, side streets) that may have affected the study results. The critical speed (e.g., 85th-percentile speed) and the pace for each direction is shown on the speed profile figure. A sample speed survey profile drawn on CADD is shown in Figure 40.4B.

3. Speed Distribution Diagram. Another very useful tool for analysis and evaluation of the spot speeds is a speed distribution diagram. Figure 40.4C illustrates a sample speed distribution diagram. This figure provides an instant evaluation for what speeds the majority of the drivers are traveling. If for some reason the



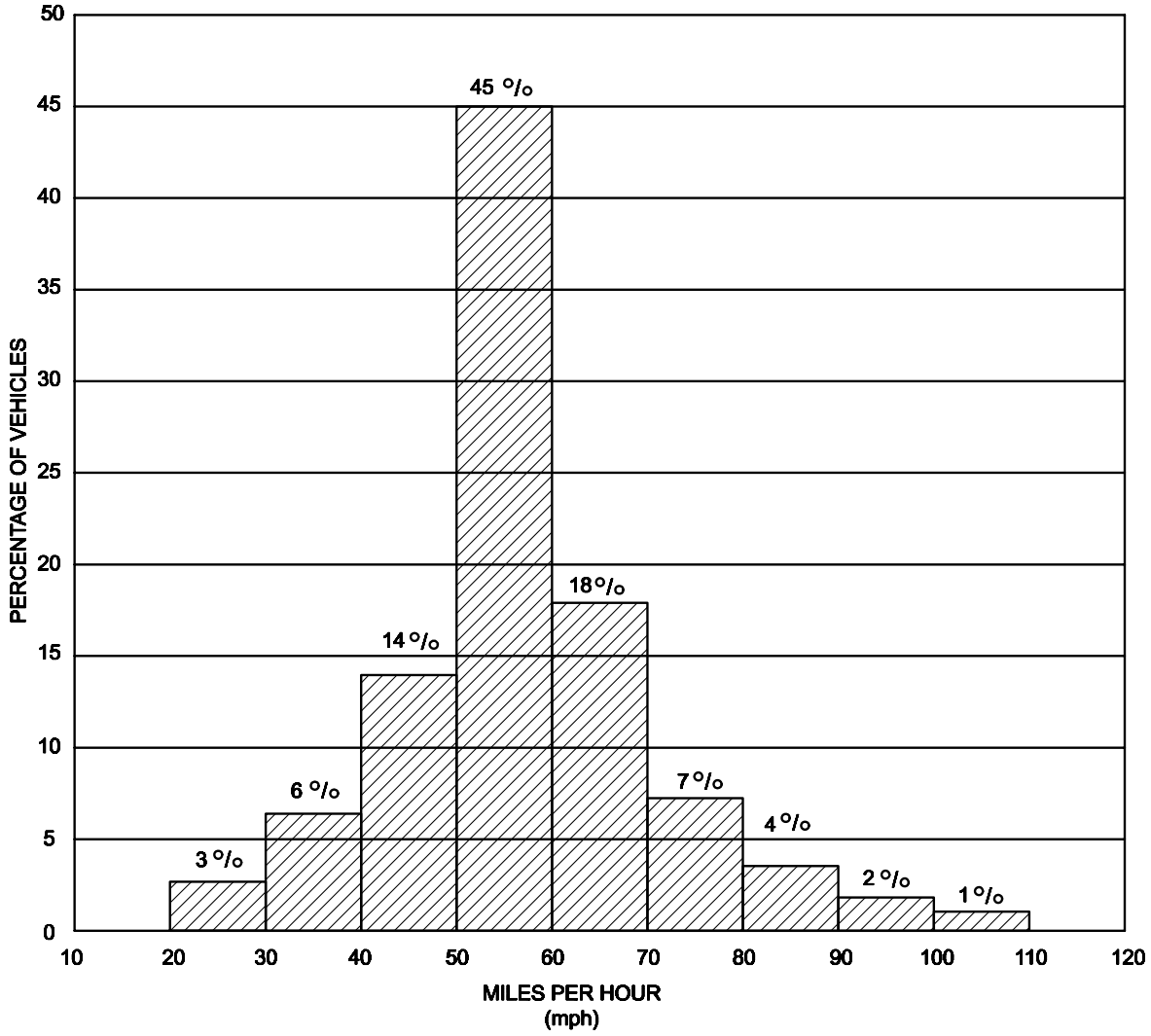
SAMPLE CUMULATIVE SPEED DISTRIBUTION CURVES

Figure 40.4A



SAMPLE SPEED PROFILE

Figure 40.4B



SAMPLE SPEED DISTRIBUTION DIAGRAM

Figure 40.4C

shape does not represent a normal bell curve, it may be an indication that the data may be biased and that additional data may be required. This figure can also be useful when discussing a proposed speed zone with an officer or an interested official on the percentage of the motoring public that can be expected to drive at speeds outside any proposed speed limit at that point.

4. Crash Trends. Where the crash history research indicates crash trends exist, conduct a detailed crash analysis. This may include developing a collision diagram. This will help to determine if the crash trends can be attributed to the speed of traffic and the relation to roadway geometry. Chapter Forty-three provides additional information on crash analyses.

40.4.2 Identifying the Special Speed Zone

Once information describing the existing operational conditions at the site has been gathered and collated, an analytical process can begin that places perspective on the concept of a special speed zone. The investigator must arrive at conclusions that identify if a special relationship exists between travel speed and the roadway environment within the segment under review. The designer will arrive at the conclusion that a section of roadway is special if its operating character significantly deviates from what would normally be covered by general statutory speed regulation. There are many factors that assist in arriving at this final judgment.

The first and probably the most difficult step in the decision-making process involved with a speed zone evaluation is determining if the site involves a special circumstance. The term special relates to speed zone when:

> *Circumstances indicate that the statutory speed limit(s) are greater or less than is reasonable and safe under operational and environmental conditions found to exist.*

All of the data elements described in this chapter are combined in the engineering and traffic evaluation. The investigator must compile an accurate description of the site from this information, which answers the question on the existence of special circumstance and the length of that segment.

Once the decision that a section of roadway is special, two direct questions must be answered. First, what is the appropriate speed limit? Second, what is the length and boundaries of the segment to be regulated by that speed limit? There are primary and secondary factors that go into arriving at the answers to both of these questions.

40.4.2.1 Primary Factors

When determining the appropriate speed limit, consider the following primary factors:

1. 85th-Percentile Speed. In general, the preferred posted speed is one that is in the immediate vicinity of the 85th percentile. The 85th-percentile speed is usually at or near 2 mph (3 km/h) of the upper limit of the pace and can be determined from the speed distribution curve. Experience indicates that a speed limit set near the 85th-percentile speed is reasonable and safe for ordinary conditions and facilitates the orderly movement of traffic.

2. Pace. The speed limit should be coordinated with the upper limit of the 10 mph (15 km/h) pace.

3. Speed Profile. The choice of a speed limit is also directly related to the initial speed at which traffic enters the segment and changes through the segment under study. As a general rule, variations in limits should follow a 10 mph (15 km/h) change rate.

4. Montana Code. The Montana Code Annotated sets the maximum statutory speed limits. The code covers speed regulations for urban districts and rural areas, time of day, type of vehicle and special circumstance (e.g., work zones, maintenance conditions).

40.4.2.2 Secondary Factors

When determining the appropriate speed limit, consider the affects of the following secondary factors on speed selection and sign placement:

1. Development. The speed limit may be affected if there are developments along the facility which may cause significant roadside friction (e.g., numerous residential or commercial driveways). Montana Code Annotated 61-1-410 defines urban district as “the territory contiguous to and including any street which is built-up with structures devoted to business, industry, or dwelling houses situated at intervals of less than 100 feet (30 m) for a distance of 0.25 mile (400 m) or more.”

2. Transitional Zones. When a special speed zone is placed on the boundary between a rural area and an urban district, give consideration to advanced warning of a pending significant change in speed regulation. Proper placement of the “REDUCED SPEED AHEAD” warning sign should consider recognition time for the amount of regulatory speed reduction encountered at the first special

speed limit sign and outside influences on that recognition by adjacent side culture or vertical alignment.

3. Adjacent Sections. Coordinate the special speed limit selected for the study section with adjacent sections of roadway to ensure compatibility between the two sections.

4. Crashes/Hazardous Conditions. Consider the number, type and trends of crashes and the relationship to the travel speed in the corridor; see Chapter Forty-three. Do not use regulator speed zones to warn motorists of hazardous conditions. If a hazardous condition exists within the road segment under study, further investigation is necessary to evaluate the causes and appropriate actions.

5. Geometrics. Consider the affects of geometric elements (e.g., horizontal and vertical curvature, sight distance) when determining the appropriate speed limit. The location of significant geometric elements should be overlaid with the speed profile to assess their influence. This assists in adjusting sign locations and in coordinating with other operational measures (e.g., advanced warning signs) and, when necessary, physical modification.

6. Pedestrian/School/Senior Centers. Evaluate the density and level of pedestrian activity adjacent to and crossing the roadway facility. Pedestrian age should also be considered. This information should be overlaid with the speed profile to better understand the influence the pedestrian activity has on travel speed. This effort will also assist in assessing the level of vehicular/pedestrian conflict that exists and the need for adequate traffic control. Methods to identify these situations should be in place (e.g., signs, pavement markings, flashing beacons, traffic signals). The Montana Code Annotated allows the speed limit near a school or senior citizen center to be reduced to 80% of the speed limit determined to be appropriate for that facility as indicated by an engineering and traffic investigation. For schools, this speed limit reduction is typically signed with a variable message speed limit sign. Chapter Forty-two provides additional information on determining the speed limit near schools. In areas where motorists are not expecting pedestrians or are unaware of the pedestrian conflicts, it may be necessary to post a pedestrian warning sign.

7. Parking. The effects of on-street parking density and turnover should also be considered.

8. Traffic Mix. When determining an appropriate speed limit, consider the effects of the mix of vehicle types (e.g., trucks, cars, buses) in the traffic stream. Geometric features (e.g., vertical alignment) may influence travel speed of trucks

to where a significant speed differential exists with passenger cars generating a potential conflict.

9. Seasonal Factors. Assess the seasonal variation in traffic conditions. There may be sufficient variation to warrant investigation of special seasonal issues (e.g., summer tourist and recreational activity).

If the determination of the proper speed and of the length of the speed zone is performed carefully with full consideration of all pertinent facts, a logical and fair speed zone can be created. The reasonableness of speed zone is apparent to the average motorist and enforcement will be easier if there is less public disagreement.

40.4.3 Sign Locations

The preferred location for the beginning and ending points of speed zones is where there are definite changes in the character of the roadside development (e.g., rural and urban boundaries). It is often desirable to begin and end a speed zone to encompass an important road intersection or driveway of a major traffic generator (e.g., schools, residential development). Place the actual sign in accordance with the location criteria in Section 18.2.2 and the Manual on Uniform Traffic Control Devices. It is important to note the location of other traffic control devices in the segment and coordinate the speed limit signs with them effectively.

40.5 SPEED STUDY PRESENTATIONS

40.5.1 Speed Study Letters and Memorandum

Section 2.2 provides the Department's general criteria for preparing correspondence for individuals, groups or units inside and outside of the Department. The following sections discuss the common correspondence for speed studies.

40.5.1.1 Response to Initial Local Requests

Requests for revising the speed zone can come from several sources. However, the request will only be considered after the local officials concur with the study. After the local officials concur and submit a request for a speed study or speed limit revision, a letter is prepared acknowledging their request and informing them that MDT policy requires the Department to meet with them to discuss the speed study procedures. Section 40.5.2 discusses how to conduct this meeting with the local officials.

The Project Engineer, or designee, is responsible for preparing the letter to the local officials. The letter should be organized as shown in Figure 40.5A and is prepared for the Traffic Engineer's signature. After the Traffic Engineer has signed the letter, copies will typically be distributed to the project file and to the following individuals:

1. Traffic and Safety Engineer,
2. District Administrator,
3. Project Engineer, and
4. any other individuals, agencies, local officials, etc., deemed appropriate.

40.5.1.2 Formal Request for Speed Study

After meeting with the Department, the local government has 30 days in which to request that a formal speed study be conducted. The Department will not conduct a speed study unless this letter is received from the local officials. Figure 40.5B provides a sample format that may be used by the local officials to request a speed study.

(Date)

(Commission Chairman)
(Address)

Subject: Engineering Investigation Request
(Highway/Street) - (County/City)

Your engineering and traffic investigation request concerning *(Highway/Street)* in *(County/City)* has been received. Before we can take any further action, our procedures require that we meet with the local governing body. Because this route is within the jurisdiction of *(County/City)*, it is necessary that we meet with the *(County/City)* Commission.

The meeting will last approximately forty-five minutes to an hour, depending on the number of questions. The purpose of the meeting is to explain our speed zoning methodology. We request that the majority of the *(County/City)* Commission be present and that the local law enforcement be invited to this meeting. This meeting can be held at a time and location convenient to the Commission. To schedule this meeting, please contact *(Traffic Engineer)* at *(Telephone Number)*.

(Traffic Engineer)
Traffic Engineer

cc: *(Distribution)*

LETTER TO LOCAL OFFICIALS
(Response to Initial Request)

Figure 40.5A

(Date)

(Traffic Engineer)
Traffic Engineer
Montana Department of Transportation
2701 Prospect Avenue
Helena, MT 59620

Subject: Speed Zone Study

Based on the procedures outlined at the recent meeting, the *(County/City)* Commissioners request that the Montana Department of Transportation complete a speed zone study and investigation on *(Highway/Street)*. It is our understanding that you will take sampling during several intervals to obtain a better consensus of the traffic flow. The Department personnel will present its findings and recommendations to the *(County/City)* Commissioners on the completion of the study.

It is also our understanding that we will have 60 days after receiving the recommendations and findings to transmit our comments to you. The Montana Department of Transportation's recommendations and our comments will then be presented to the Montana Transportation Commission for its actions on this speed zone request.

The changes, as approved by the Montana Transportation Commission, will be implemented as soon as practical after receiving notification of approval.

Sincerely,

BOARD OF COMMISSIONERS
(County/City), Montana

_____
(Chairman)

_____
(Member)

_____
(Member)

REQUEST FOR SPEED STUDY
(Local Request)

Figure 40.5B

40.5.1.3 Speed Study Parameters

The Traffic Investigations Unit is responsible for determining the parameters for conducting the speed study and outlining them. If the District is assigned the field data collection, the District Traffic Engineer will be responsible for this activity. The Traffic Investigations Unit will prepare the memorandum for the Traffic Engineer's signature, which will be forwarded to the District. After the Traffic Engineer has signed the memorandum, copies will be distributed to the project file and to the following individuals:

1. Traffic and Safety Engineer,
2. Traffic Engineer,
3. Project Engineer, and
4. any other individuals or units deemed appropriate.

The memorandum should outline the parameters under which the study should be conducted. These study parameters are discussed in Section 40.3.1. The following presents the topic areas that should be addressed in the memorandum:

1. Introduction. The introduction should note the locality who requested the study and why they requested the study. It should summarize any meetings the Department may have had with the local officials and the general consensus of these meetings.

2. Study Location and Limits. Provide a brief description of the study location. Attach a small map, plats or plans to the memorandum indicating the locations or sites where the data should be measured.

3. Time of Day/Week/Year. Provide the times and days the study should be conducted. If the time or day is left to the discretion of the data collector, note any restrictions on when the data should or should not be collected (e.g., off-peak periods).

4. Directional Readings. Indicate the locations that will require separate readings for each direction of travel.

5. Equipment. Note the type of equipment required to take the measurements and any parameters to be used to set up the equipment (e.g., the position of bins on pneumatic counters, maximum angles for radar).

6. Sample Size. Provide the minimum number of samples that should be taken at each site (e.g., at least 100 samples should be taken at each collection site). The minimum sample size can be determined from Section 40.3.1.6. Provide the

current AADT, DHV, traffic distribution, peak-hour volumes and percentage of trucks.

7. Other Studies. If the data collector is required to obtain information on other factors (e.g., pedestrians, crash history), clearly define the information required and how the information should be collected.

8. Miscellaneous. Note that the data collector is responsible for providing a summary of all factors that may have affected the study results; see Section 40.3.3.

9. Notification. After the data has been obtained, note the individual or unit who will receive the data (e.g., Traffic Investigations Unit). Provide a contact individual and telephone number to answer any questions.

40.5.1.4 Speed Study Report

It will be the responsibility of the Project Engineer, or designee, to prepare the Speed Study Report once the data has been received and analyzed. This Report will provide written documentation of the findings and recommendations for the speed zone. The Report is prepared for the Traffic Engineer's signature and sent to the District Administrator for review. The District will present the findings to the local officials and gather their comments. After the Traffic Engineer has signed the Report, copies will be distributed to the project file and to the following individuals:

1. Traffic and Safety Engineer,
2. Traffic Engineer,
3. Project Engineer, and
4. any other individual or units deemed appropriate.

In general, the Speed Study Report should be prepared in the order and format discussed below. This will provide a uniform presentation for all Department Speed Study Reports and will ensure that all appropriate information will be addressed. Not all of the subject areas listed below will be required for every Report, and adjustments may be required as deemed necessary. The level of coverage for each item will also vary from study-to-study. Although in-depth coverage of the individual details is usually not provided in this Report, sufficient detail must be provided to allow the reader to fully understand the problem and any proposed recommendations. Detailed analyses may be added as appendices to the Report.

The following provides the topic areas, in order, that should be addressed in the Speed Study Report:

1. Introduction. The introduction should note the locality who requested the study and why the study was requested. It should summarize any meetings the Department may have had with the local officials and the general results of those meetings.

2. Study Location and Limits. A brief description should be provided of the study location. Some of the descriptors that may be used include:

   a. county name;
   b. city/town name;
   c. Indian reservation;
   d. route number;
   e. functional classification;
   f. reference points;
   g. study length;
   h. crossing routes and/or local streets;
   i. distance and direction from nearby towns/cities; and
   j. direction of the route.

3. Physical Characteristics. A brief description of the study area's physical characteristics may include a discussion of the following:

   a. year when the existing road/bridge was built or reconstructed and when it was last overlaid or rehabilitated;

   b. number of lanes and lane widths;

   c. paved width of roadway;

   d. general terrain of the area;

   e. rural or urban location;

   f. general description of the existing horizontal and vertical alignment, including all features which may contribute to the traffic problem;

   g. development type (e.g., residential, commercial, industrial);

   h. location of key features (e.g., schools, shopping centers, residential developments);

   i. parking conditions;

   j. any other unique physical characteristics related to the study area; and

k. special features within the study limits (e.g., National Forest, state parks, etc.).

4. Traffic Data. The traffic data listed in the Speed Study Report may include any of the following:

a. current AADT,
b. 85th-percentile speed,
c. pace speed,
d. median speed,
e. DHV,
f. traffic distribution,
g. turning volumes,
h. peak-hour volumes,
i. number and percent of trucks,
j. pedestrian volumes, and
k. existing approved speed limits.

5. Crash History. This section should briefly summarize the following crash history data:

a. number of crashes by year (generally for the past 3 years);

b. types of crashes;

c. a listing of the crash study locations;

d. listing of locations with an unexpectedly high number of crashes;

e. overall crash and severity rates for the study locations;

f. truck crash and severity rates for the study location, if applicable;

g. statewide average crash and severity rates for similar routes, if available;

h. a description of specific crash trends; and

i. a brief description of why a higher than normal number of crashes may be occurring.

6. Studies. The Speed Study Report should list the other studies conducted, a brief description of how the study was conducted and an overview of the results. Not all of the studies listed below will be required for every speed study, and

adjustments will be needed to the Report as deemed necessary. The Speed Study Report may address one or more of the following studies:

a. pedestrian studies,
b. school crossing studies,
c. traffic volume studies,
d. existing traffic control devices inventory, and/or
e. any other study or analysis deemed necessary.

7. Miscellaneous Features. This section may include a discussion on those features which are not identified in one of the above areas that may have had an effect on the speeds. This section may also address the use of the special speed limits near schools and/or senior citizen centers.

8. Conclusions and Recommendations . This section should summarize the issues and concerns identified during the study. It should clearly define the recommended speed limit(s) and length and location of each speed zone. Maps or plan sheets may be used to illustrate the locations of the speed zones.

9. Notification. The end of the Report should instruct the District Administrator to provide the results of the study to the local officials for their comments and/or approval. The local officials should be informed that they have 60 days in which to respond and comment on the study before the recommendations will be forwarded to the Transportation Commission for approval.

A sample speed study report is illustrated in Figure 40.5C.

Montana Department of Transportation
Helena, Montana 59620

Memorandum

To: (*Name*)
District Administrator-Billings

From: (*Name*)
Traffic Engineer

Date: *(Date)*

Subject: Speed Zone Study
Old U.S. 87 - Lockwood School

Yellowstone County Commissioners, on the behalf of Lockwood School officials, requested a speed zone study on Old U.S. 87 east of Billings. Local officials request a posted 15 mph speed limit during the AM and PM crossing periods at the Lockwood School crosswalks.

The subject portion of Old U.S. 87 is a State maintained urban route constructed under a Federal-aid project in 1938. This route travels through a residential environment and provides access to rural areas southeast of Billings. The road has a fair driving surface with minimal shoulders on each side.

We have completed all data collection and have conducted a drive-through within the study area. Data collection activities included monitoring vehicular speeds at six locations, reviewing sight distances, evaluating parking practices and conducting a sign inventory.

Field data collection occurred during the month of May under good weather conditions. Sight distances are good, and parking practices are off-street.

A review of the crashes revealed that fifteen (15) crashes have occurred within the study area during the last three years. The following table categorizes the crashes that have occurred.

	Angle	Rear-End	Other
Intersection	5	1	3
Non-Intersection	0	1	5

Two crashes involved bicyclists. Neither crash occurred during actual school crossing periods or involved a crosswalk. The crash rate is 5.20. No definable crash trends can be attributed to any single existing condition.

SAMPLE SPEED STUDY REPORT

Figure 40.5C

The current speed limit was approved by the Transportation Commission in 1975, and an extension of the 45 mph speed limit proceeding 270 ft east of Dry Creek was approved in 1983. The following describes the existing speed zone:

- 45 mph - beginning at station 165+20 on FAP 187-C (i.e., at the intersection of the Old U.S. 87 and Old Hardin Rd.) to station 157+50 on FAP 187-C (i.e., approximately 300 ft west of Lockwood School) for a total of 770 ft;

- 35 mph - beginning at station 157+50 on FAP 187-C to station 151+50 on FAP 187-C (i.e., approximately 330 ft east of the Lockwood School) for a total of 660 ft; and

- 45 mph - beginning at station 151+50 on FAP 187-C to station 144+00 (i.e., approximately 270 ft east of Dry Creek) for a total of 750 ft.

Based on the existing conditions, which include the 85th-percentile and the observed pace speeds, we recommend the following revision to the existing speed zone:

40 mph - beginning at station 166+35 on FAP 187-C (i.e., intersection of Old U.S. 87 and Old Hardin Rd.) extending to station 151+50 on FAP 187-C (i.e., approximately 135 ft east Hillner Rd. junction) for a total of 1485 ft.

It is our judgment that the observed 85th-percentile and pace speeds are an actual road condition that must be considered in determining the appropriate speed limit. Student safety is improved when all roadway conditions are recognized and adhered to.

Yellowstone County's purpose in requesting the speed zone study was to determine if a traffic and engineering investigation would merit a reduction of the current 35 mph limit at Lockwood School during school crossing periods. Based upon the recommended 40 mph limit and MCA Section 61-8-310 Subsection (1)(d), a 30 mph limit may be posted during school crossing periods. MCA Section 61-8-310 Subsection (1)(d) permits local authorities to adopt a variable speed limit in an area near a school or a designated crosswalk. The variable speed limit is 80%, rounded down to the nearest whole number evenly divisible by 5, of that set on the basis of an engineering and traffic investigation. In this case, Yellowstone County Officials may pass a county resolution implementing Section 61-8-310, Subsection (1)(d) for the Lockwood School. By using variable message signs, a 30 mph speed limit would be posted during school crossing periods. Our office will need a copy of such a resolution if it is passed.

Attached are straight lines and the computer data for Urban Route 1028 (Old U.S. 87). Please present the results to the proper local officials for their written approval and/or comments. Advise them that all comments are welcome and their suggestions or concerns along with our recommendations will be presented to the Transportation Commission. If any questions or problems arise, feel free to contact my office.

TRF;lockwd

cc:

SAMPLE SPEED STUDY REPORT
(Continued)

Figure 40.5C

40.5.1.5 Montana Transportation Commission Approval Request

After the city or county has had 60 days to review and comment on the Department's results, a memorandum is submitted to the Montana Transportation Commission requesting the Commission's approval. An electronic file is also provided to the Montana Transportation Commission Secretary. This request is prepared by the Project Engineer, or designee, for the Traffic and Safety Engineer's signature and sent to the Chief Engineer. Once the Traffic and Safety Engineer has signed the request, copies are made and distributed to the project file and the following individuals:

1. Traffic and Safety Engineer,
2. Traffic Engineer,
3. Project Engineer, and
4. any other individuals or units deemed appropriate.

The format for the Request should essentially follow the same format as for the Speed Study Report discussed in Section 40.5.1.4. In addition, add the response of the city or county commissioners to the study results before the Report's conclusions and recommendations. Note the date when the results where presented to the local officials and whether or not they have responded within the allotted 60 days. All comments will be presented in conjunction with the Department's recommendations to the Montana Transportation Commission.

40.5.1.6 Notification of Transportation Commission Meeting

Upon preparing a Commission agenda item, the Traffic Investigations Unit will prepare a memorandum to the District office. This memorandum will request the District office to inform local officials that the proposed speed zone recommendations will be acted on during the upcoming Commission meeting. It should also inform local officials that they have the option to attend the meeting.

40.5.1.7 Notification of Transportation Commission Approval

Once the Transportation Commission has approved the revised speed limits, the Chief Engineer, will notify the Traffic Engineer of the Commission's actions. The Project Engineer will prepare a memorandum, for the Traffic Engineer's signature, informing the District to revise the speed zone signing, and a letter for the Traffic and Safety Engineer's signature, informing the Montana Highway Patrol of the approved speed zone revisions. Copies of each document will be distributed to the project file and to the following individuals:

1. Traffic and Safety Engineer,
2. Traffic Engineer,
3. Project Designer, and
4. any other individuals or units deemed appropriate.

The format of the memorandum should include the following:

1. Commission Minutes. Note that the Transportation Commission minutes for the speed zone location are attached and include a copy of the minutes with the memorandum.

2. Locations. Include a straight line diagram, plan sheet, map, plat or some other diagram to indicate the actual locations of the speed zone signing. If available, provide the stationing of the actual sign location. If stationing is not available, clearly indicate the distance from landmarks to the sign locations.

3. Special Speed Limits. Note if the city or county has requested to implement the special speed limit law for schools and senior citizens centers. If a variable speed limit sign is required, note who is responsible for installing and who is responsible for maintaining and operating the sign.

4. Special Considerations. Note any special considerations the installer must consider when placing the signs (e.g., other signs, driveways).

5. Notification. Add a comment that the Traffic Engineer must be formally informed when the revised speed zone was actually implemented.

The format of the letter to the Highway Patrol should include copies of the Commission minutes describing the approved action and a map or plat illustrating the revised speed zone configuration.

40.5.2 Public Presentations

According to Department policy, the Traffic Engineer, or designee, is required to make a presentation to the local officials to describe the Department's procedures before conducting a speed study. These meetings often become a public forum for citizens and local officials to express their concerns. The Department's credibility is often questioned. The presenter must not let personalities affect the presentation. Under difficult circumstances, this may only be accomplished by being well prepared. To conduct a successful meeting, the presenter should consider the following:

1. Department Procedures. Figure 40.5D provides an outline of the issues that should be addressed by the presenter on the Department's procedures for speed

studies. By following this outline, the presenter will ensure that all of the applicable issues will be addressed.

2. Pamphlets. During the presentation, the presenter should make available MDT documents Realistic Speed Zoning in Montana and How Fast. These pamphlets reiterate the Department's policies and procedures for conducting a speed study and how it selects a reasonable speed limit.

3. Media Presentation. Videos and/or slides may assist the presentation. The audience will be able to see the area that will be reviewed, which may eliminate any confusion on those items under consideration. The ITE Manual of Transportation Engineering Studies discusses several of the issues for designing a media presentation.

4. Local Issues. The presenter must know the local issues that may be encountered at the meeting and the type and mood of individuals that may attend the meeting. The presenter should contact the District Traffic Engineer, local enforcement officials, government officials, etc., to acquire an understanding for the concerns before the meeting. This will allow the presenter to plan appropriate responses to the expected questions.

I. Introduction:

A. Montana Department of Transportation.
B. Traffic Engineering Section.
C. Names and titles of individuals at the meeting.

II. Purpose of Presentation:

A. Gather information on local concerns.
B. Step-by-step explanation of the process for a speed study.
C. Explain the applicable sections of the Montana Code Annotated.
D. Discuss the Department and local jurisdiction's responsibilities.
E. Procedures used to collect the data.
F. Procedures used to analyze the data.
G. What happens after the study.

III. Misconceptions:

A. Speed limit signs will slow the speed of traffic.

B. Speed limit signs will decrease the crash rate and increase safety.

C. Raising a posted speed limit will cause an increase in the speed of traffic.

D. Any posted speed limit must be safer than an unposted speed limit, regardless of prevailing traffic and roadway conditions

IV. Responsibilities/Jurisdictions:

A. Local officials have control over whether or not a study will be conducted.

B. A formal request for a study must be made by the local jurisdiction within 30 days after the presentation.

C. The Department will conduct the study.

D. The local officials may hire at their own expense an approved consulting firm to conduct speed zone investigations.

E. The Department will present the results of the study and its recommendations to local officials after the study is completed.

SPEED STUDY INFORMATION MEETING

Figure 40.5D

F. The local officials will have 60 days to respond to the Department's findings and recommendations.

G. After 60 days, the Department will present its findings and recommendations to the Montana Transportation Commission.

H. Local Officials will have the opportunity to address the Montana Transportation Commission.

I. The Montana Transportation Commission will act on the speed limit recommendation.

J. The Department will revise the signing as soon as practical after the Montana Transportation Commission's approval.

V. Montana Codes Annotated:

A. Basic Speed Law.

B. Absolute Speed Limit.

C. Montana Transportation Commission:

1. May change limits to special speed zones on all Federal-aid eligible highways.

2. Speed limits are based on an engineering and traffic investigation.

VI. Collection Procedures:

A. Information Collected:

1. Spot speeds.

2. Crash history.

3. Area survey (e.g., location of schools, factories, residential driveways).

4. Other (e.g., pedestrians).

SPEED STUDY INFORMATION MEETING
(Continued)

Figure 40.5D

B. Methods used:

1. Random sampling.
2. All vehicles.

C. Equipment used:

1. Radar.
2. Pneumatic tubes.
3. Other.

D. When the study will take place.

VII. Speed Determination Factors:

A. 85th-percentile speed.

B. Pace speed.

C. Roadside development and culture and roadside friction.

D. Crash history (last 36 months).

E. Parking practices and pedestrian activity.

F. Road surface conditions, shoulder conditions, grade alignment and sight distance.

G. Safe speed for curves or hazardous locations within the zone.

VIII. Comments and/or Questions.

SPEED STUDY INFORMATION MEETING
(Continued)

Figure 40.5D