

process. If this accommodation is needed regularly for certain conditions, it should be brought to the attention of the **Office of Roadway Engineering (ORE)** for possible inclusion in the overall WZSZ process.

1203-3 Speed Zone Studies

1203-3.1 General

Generally, a Speed Zone Study used to support a request for alteration of a speed limit should include **Forms 1296-2** (Speed Zone Warrant Sheet), and **Form 1296-5** (Speed Check Form) and a scaled area map, sketch, or aerial view to identify the location of the proposed zone. Alternative abbreviated study procedures have been developed to address certain situations involving: narrow or low-volume rural roads, unimproved County Roads, residential and commercial **County** subdivision streets, freeways, rural expressways and high-speed divided highways, and temporary traffic control zones on high-speed (≥ 55 mph) multi-lane highways. These are addressed in **Sections 1203-2.6, 1203-2.7, 1203-2.8 and 1203-2.9**, respectively.

If conditions are not relatively consistent throughout the section under study, consideration should be given to splitting the study area into shorter sections. Turning lanes, or other special lanes, are not normally used in this calculation.

1203-3.2 Field Review

A field review of the roadway section shall be made noting various physical conditions along and adjacent to the highway and identifying where crashes have occurred. The Speed Study Data Sheet (**Form 1296-3**) or a similar document may be useful in consolidating this information. (**Form 1296-4** provides a completed sample of this form, using symbols from **Table 1297-1**.) The field review should consider:

1. Roadway width, width of lanes, width of berm, setbacks of the buildings, distances to any fixed objects within 10 feet of the pavement edge, and type and condition of the pavement surface should also be shown.
2. On **ODOT**-maintained routes, SLM log points shall be used. A 1 inch = 0.1 mile scale should be used along the centerline of the roadway. Lateral dimensions need not be scaled.
3. The review should consider features 500 feet beyond each end of the proposed zone.
4. Pavement marking or restricted sight distances less than 600 feet, signals and flashers, and Warning and Regulatory Signs.
5. The number of, and point at which, more than five pedestrians per hour cross or walk on the pavement.
6. The number and type of crashes that occurred in the last three years.
7. Test runs should be made; however, these will also be conducted by the **District** personnel reviewing requests submitted to **ODOT**.
 - a. Test runs should be made by driving as fast as it is comfortably safe.
 - b. Test runs should be made in such a way that other traffic will not delay the test car.
 - c. The speed should be recorded at a range of 0.10 to 0.25 mile interval or more.
 - d. The average speed of three test runs should be determined in each direction.

1203-3.3 Speed Check (Form 1296-5)

Except when using one of the abbreviated study procedures described in **Sections 1203-2.6 through 1203-2.9**, or a summary sheet resulting from a mechanical speed check device and its associated software, a speed check using **Form 1296-5** (Speed Check Form) or a similar form, shall be included in the study.

1. Speed checks may be taken with any device that will indicate vehicle speed with an accuracy of ± 10 percent.
2. Record speeds of 100 vehicles for each direction of travel (observation need not exceed one hour even if less than 100 vehicles are recorded traveling in each direction).
3. Speed checks should be taken at the 1/3 points (total of four checks) for zones 0.25-1.00 mile in length, and at 0.5-0.75 mile intervals for zones over 1 mile in length.

1203-3.4 Speed Zone Warrant Sheet (Form 1296-2)

1203-3.4.1 General

Form 1296-2 should be used in analyzing speed reduction requests that do not fall into the categories discussed in **Sections 1203-2.6 through 1203-2.9** for the abbreviated Speed Zone request procedures. The data collected from the field review of the location and the information discussed in **Subsection 1203-3.4.2** are used to complete **Form 1296-2**.

The current form was developed as a **Microsoft Excel** file; however, it may also be completed by hand.

The first sheet of **Form 1296-2** is basically for data input. In the Excel file, when the mouse cursor hovers over the characteristics designations A1, B1, etc. a text description of that category pops up. There are also links to graphic examples of the characteristics categories and crash data samples. The second sheet in the file is a more traditional version of the warrant form: it includes the formulas and makes the calculations, based on the data entered on the first sheet. The third sheet provides a graphic illustration of the roadway characteristics information; and the last sheet provides a sample crash diagram for the roadway section showing which types of crashes should be included when performing a speed study.

The roadway characteristics information and “types of crashes” illustration used with this form are the same as those introduced with the Narrow and Low-Volume Roads short form in 2008. **Table 1296-6** provides additional information about the Roadway Characteristics categories used with this form, and **Figures 1298-3 through 1298-5** provide aerial view illustrations to help describe these categories.

If the Excel software is not available, sheet 1 or 2 may be copied, completed by hand, and submitted.

A Comments section has been provided on the form in case there is additional information the requesting agency wants to bring to the reviewer’s attention (**see Subsection 1203-3.5**).

1203-3.4.2 Information Used in Completing Form 1296-2

The following data is used in completing the Warrant Sheet:

1. **Highway Development** consists of evaluating the extent of building development and classification of intersections. These components are described in **Table 1297-2**. Intersections at the end of the study area should not be counted.

The building development and intersection classification calculations are added and then the total is divided by the length (in miles) of the zone.

2. **Roadway Features** consists of evaluating the roadway design characteristics including lane width, shoulders curves and grades. **Table 1297-3** defines the Roadway Feature components.

It is recognized that shoulder features may not be consistent throughout the roadway section under study. A judgment will need to be made to determine the most prominent design, unimproved or improved, and width.

The names of the crossroads should be noted in the Comments section.

3. **85th-Percentile Speed** can be determined by taking spot speed observations during weekday off-peak periods. Spot speed checks should be taken to reflect only free-flowing vehicles. A vehicle is considered free flow if there is a minimum of five seconds gap (headway) from the other vehicle ahead of it, and it is not accelerating or decelerating for other reasons. If it is not possible to observe free-flow conditions, then the 85th-percentile speed of all vehicles should be increased 5 to 10 miles per hour to approximate the free-flow 85th-percentile speed. If the 85th-percentile speed of several speed checks varies considerably and is in more than one range in the warrant analysis, average the speed or select the most representative speed.

Another option for determining 85th-percentile speed involves the use of probe-based data. Traffic information is collected from **ODOT**-maintained roads, then data analytics is used to determine the 85th-percentile speed. The **Office of Traffic Operations (OTO)** has created detailed instructions for downloading the data and calculating the 85th-percentile speed using an **OTO** developed program. This information is available from the "Regulations" web page on the **OTO** website.

4. **Pace** is the ten mile per hour range of speeds containing the greatest number of observed speeds. If the paces of several speed checks vary considerably and are in more than one range in the warrant analysis, average the pace or select the most representative pace.
5. **Crashes/MVM** - intersection crashes not on the approach to the section under study should not be included in the evaluation; and crashes at horizontal curves should be considered only after all appropriate Warning and Advisory Speed signs are in place.

Caution needs to be exercised in applying the crash experience if there is an over representation of crashes caused by situations essentially independent of the permanent speed limit. Therefore, in determining a permanent speed limit, crashes caused by animals, impaired drivers, vehicle defects, load shifts, construction and environmental conditions, such as snow and ice, should not be included in the crash experience.

It is desirable to consider a review of crashes over a three-year period; however, crash data for one year is acceptable if more is not available. Copies of the crash reports, or a list documenting the location and type of each crash, shall be submitted with the request.

6. **Test Run** data is recorded by the **District** when reviewing the speed zoning request and the information is shown on the form because the average test run speed is beneficial in supporting the spot speed data as reflecting free-flow conditions. Also it is beneficial in comparing or matching the fit of the spot speed data to the full length of the section under study.

1203-3.5 Additional Information/Considerations

There may be a need to consider adjusting the speed limit more than normal rounding to the nearest five miles per hour of the calculated speed as reflected in the speed study. Therefore, each Speed Zone request form includes a provision for noting "Comments/Additional Information." This space has been provided for the requestor to note any additional information that might be of interest to the reviewer in considering the request. Items to consider or additional information to provide when recommending a speed limit different than the calculated value may include:

1. A study area near or adjacent to an incorporated area or other warranted speed reduction(s).
2. Maintaining uniformity of speed limits within a contiguous section of highway.
3. Truck volumes along with the lane width should be considered, i.e., Volumes:

| | |
|-----------|-------------------------------|
| < 5% | Low impact/consideration |
| 5% to 10% | Moderate impact/consideration |
| > 10% | High impact/consideration |

An effective width of 20 feet is considered adequate only for low-volume roads where meeting and passing are infrequent and the truck volumes are low.

4. Land along the study area is generally fully developed based on local zoning and/or local subdivision regulations.
5. Other conditions:
 - a. A large number of driveways with limited visibility.
 - b. The results of the test runs are not representative of the 85th-percentile or calculated speed.
 - c. Abnormal traffic volume flows.
 - d. A large number of horizontal and vertical curves requiring speed reductions.
 - e. The use of the road as related to access vs. mobility (e.g., functional classification).
 - f. An unincorporated area that looks to the driver the same as an incorporated area.
 - g. Large number of items that affect the assured clear stopping distance of the driver.
 - h. Volume of pedestrian traffic and/or official signed bike routes.
 - i. Proximity to a school.
 - j. Extreme geometric or other rare or unique work zone feature(s) that cannot otherwise be modified or mitigated and are not otherwise taken into consideration elsewhere in the process (for Work Zone Speed Zones that are on facilities other than high-speed, ≥ 55 mph, multi-lane highways).
6. Photographs may also be helpful in describing features of particular concern.

1203-4 Withdrawal of Authorization

The withdrawal of the authorization for a Speed Zone requires a traffic engineering study/investigation and, insofar as is applicable, shall be accomplished in the same manner in which it was established. **Form 1296-7a** (Withdrawal of Issued Speed Zone Authorization) is used to document the withdrawal of any Speed Zone approved by ODOT. **Form 1296-7b** is used for withdrawal of work zone speed zones.