

# Traffic Forecasting Diagram

## **Description**

The purpose of this procedure is to develop a Traffic Forecast Diagram that fulfills the following requirements:

- Provides a clearly labeled and simplified depiction of the roadway links that are part of the forecast.
- Includes all required traffic data.
- Utilizes all of the standard font, color, and other symbol attributes required.

## **Responsibility**

The *TPB Assigned Forecaster (AF)* is responsible to create appropriate Traffic Forecast Diagrams for each project assigned.

## **Scheduling and Time Constraints**

None.

## **Procedure**

Step	Action
1	<p>A variety of template layouts are available at S:\Traffic Forecast Tools\Forecast Standard Figures. PDF, Visio and ArcMap versions are available. Use the Standard Traffic Forecast Diagram Templates for all Traffic Forecast Diagrams.</p> <p>The amount of space required for the Traffic Forecast Diagram and the Traffic Forecast Location Map will vary depending upon the complexity and size of the traffic forecast and is a major consideration when selecting a Standard Traffic Forecast Diagram Template to use with the forecast diagrams.</p> <p>The Standard Traffic Forecast Diagram Templates are designed to use 8.5" x 11" Letter and 11" x 17" Tabloid paper sizes. Either landscape or portrait orientation may be used.</p> <ul style="list-style-type: none"><li>○ Multiple Traffic Forecast Scenarios may be shown on the same template if the diagram consists of only a few roadway links (such as a Simple Bridge forecast). See step 6 for special instructions concerning where this is applicable.</li></ul>
2	<p><b>Update the Traffic Forecast Diagram Title Block(s)</b></p> <p>Update the title block on each sheet of the forecast diagram with the Year, Alternative and sheet number. See Figure 1 – Title Block.</p>



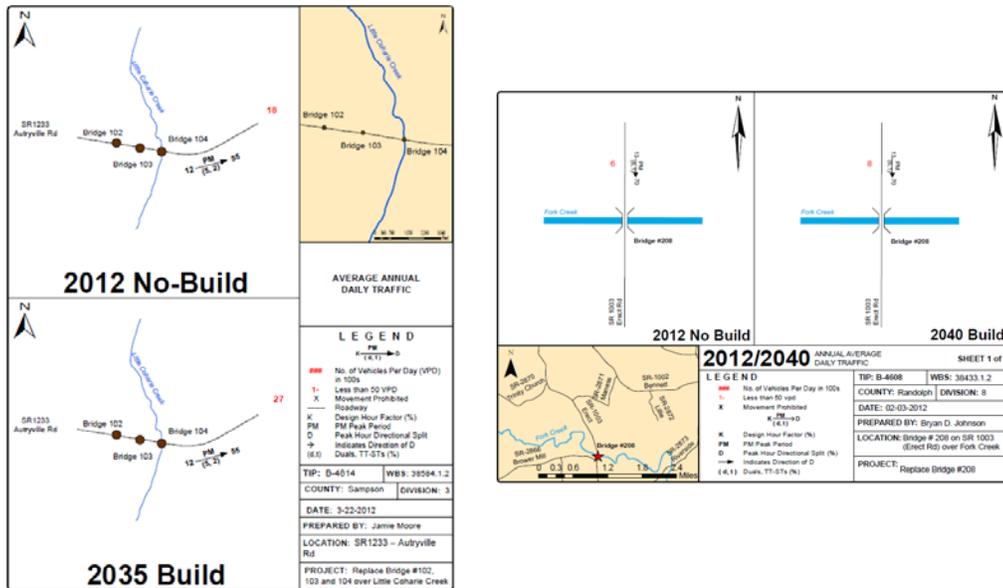
<p><b>3</b></p>	<p><b>Update the Project Information Block</b></p> <p>Update the project information block on each sheet of the forecast diagram. See Figure 3 – Project Information Block.</p> <div style="text-align: center;"> <table border="1"> <tr> <td><b>TIP:</b> FS-0514A</td> <td><b>WBS:</b> 34263.1.1</td> </tr> <tr> <td><b>COUNTY:</b> Cherokee</td> <td><b>DIVISION:</b> 14</td> </tr> <tr> <td colspan="2"><b>DATE:</b> 10-19-2009</td> </tr> <tr> <td colspan="2"><b>PREPARED BY:</b> Keith Dixon</td> </tr> <tr> <td colspan="2"><b>LOCATION:</b> US 19-64-74-129 from US 19-Hiwassee St to east of Woodside Acres Dr</td> </tr> <tr> <td colspan="2"><b>PROJECT:</b> Modify 5-lane section to a 4-lane, divided section</td> </tr> </table> <p><b>Project Information Block</b></p> <ul style="list-style-type: none"> <li>○ Font size and color should match the font sizes and colors used in the Standard Traffic Forecast Template. Font: Arial</li> <li>○ <b>TIP:</b> Enter the TIP number including any sub sections like A or AB.</li> <li>○ <b>WBS:</b> Enter the WBS number including extensions.</li> <li>○ <b>COUNTY:</b> Enter the county name. If more than one county is involved, each should be listed in alphabetical order.</li> <li>○ <b>DATE:</b> Enter the date. The date on the diagram should match the date on the cover letter. Use the format: MM-DD-YYYY (e.g. 03-24-2013).</li> <li>○ <b>PREPARED BY:</b> The name or Firm of the forecaster.                         <ul style="list-style-type: none"> <li>● If prepared by TPB staff: First Name or First Initial, Last Name (e.g. Great Forecaster -or- G. Forecaster).</li> <li>● If prepared by a consultant, then the Firm’s name should be used. Logos and contact information are not permitted.</li> </ul> </li> <li>○ <b>LOCATION:</b> The name of the route involved, and project limits.</li> <li>○ <b>PROJECT:</b> The type of action, such as widening, new location or bridge replacement.</li> </ul> </div>	<b>TIP:</b> FS-0514A	<b>WBS:</b> 34263.1.1	<b>COUNTY:</b> Cherokee	<b>DIVISION:</b> 14	<b>DATE:</b> 10-19-2009		<b>PREPARED BY:</b> Keith Dixon		<b>LOCATION:</b> US 19-64-74-129 from US 19-Hiwassee St to east of Woodside Acres Dr		<b>PROJECT:</b> Modify 5-lane section to a 4-lane, divided section	
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<p><b>4</b></p>	<p>Create the Traffic Forecast – Location Map. The Traffic Forecast Location Map is a required section of the standard Traffic Forecast Diagram. Place this map into the diagram section labeled “Location Map” on each sheet of the Traffic Forecast Diagram.</p> <p>See the <a href="#">Traffic Forecast – Location Map</a> procedure for more information on creating the Traffic Forecast Location Map.</p>												
<p><b>5</b></p>	<p><b>The Legend Block</b></p> <p>The legend block is included as part of the Standard Traffic Forecast Diagram Template.</p>												

	LEGEND	DHV $\xrightarrow{PM}$ D (d, t)
<p><b>Legend Block</b></p> <p>Font size and color should match the font sizes and colors used in the Standard Traffic Forecast Template. Font: Arial</p>	<p>### No. of Vehicles Per Day (VPD) in 100s</p> <p>1- Less than 50 VPD</p> <p>X Movement Prohibited</p> <p>— Roadway</p>	<p>DHV Design Hourly Volume</p> <p>PM PM Peak Period</p> <p>D Peak Hour</p> <p>Directional Split Indicates Direction of D</p> <p>(d,t) Duals, TT-STs (%)</p>

**6 Forecast Diagrams Showing Multiple Scenarios**

Base Year No Build and Horizon Year Build Scenarios may be shown on the same sheet for very simple forecasts (example: bridge replacement).

- o Multiple scenarios should be separated with a dark line or border.
- o Each section of the diagram should be clearly labeled with the year depicted.
  - Font: Arial. Size: 18 to 22, Color: Black, Style: Bold.
- o The Title Block should list both Base Year and Horizon Year. Use the format: [Base Year] / [Horizon Year] (e.g. 2009 / 2035). In this case, the size of the Year text within the title block may be reduced to fit as necessary.
- o Each Diagram and Location Map should have its own North Arrow.



**7 Create the roadway lines diagram(s)**

- o For each alternative, depict the roadways that are included in a clear and simplified line diagram.
  - The roadway line diagram does not have to be to scale, however the line diagram should generally symbolize the curvature of the roadway and spacing of intersecting roads.
  - The roadway line diagram may be broken into multiple sections in order to fit

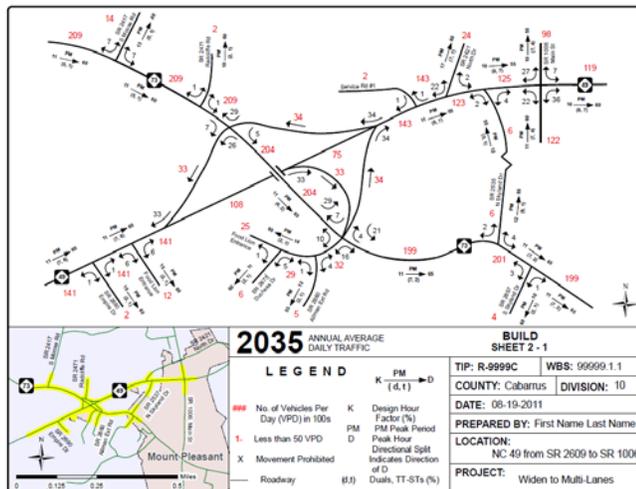
onto a single sheet as long as the clarity of the diagram is not compromised.

- All roadways for which traffic data is being presented should be shown as a dark solid line. Divided highways should generally be symbolized with a single line.
- Proposed roadways within the context of the Traffic Forecast Scenario should be presented with dashed lines.
- Show **Line Breaks** wherever detailed information, which is deemed beyond the scope of the forecast, is omitted. When and where to show line breaks depends largely upon the scope of the forecast and the specific forecast request being considered.



**Line Break Symbol**

- Freeway ramps are not usually symbolized on the traffic forecast diagram. Freeway ramp movement volumes should generally be summarized and shown as quadrant movement volumes at freeway interchanges. See Figure 7 – Quadrant Movements. However, freeway ramps should be shown if the following conditions exist:
  - Significant directional traffic imbalances exist that need to be clarified by showing specific ramp movements.
  - The forecast requestor specifically requests ramp traffic volumes.

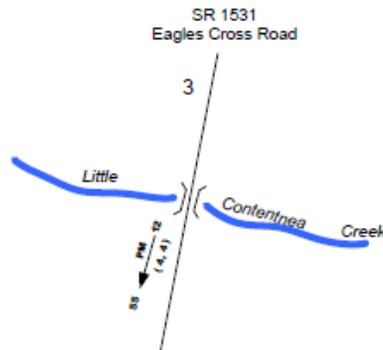


**Freeway Ramp Example**

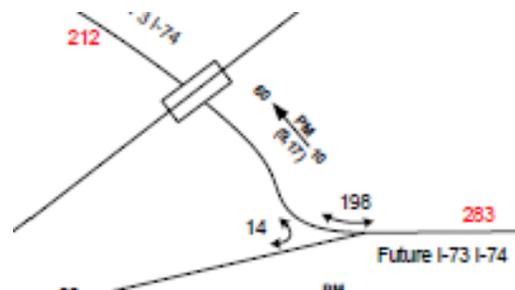
- Symbolize bridges and overpasses in the following three cases:
  - All bridge forecasts
  - At freeway interchanges whenever freeway ramps are shown where there is a grade separation.
  - Wherever an overpass exists where there is a grade separation between roads included in the forecast but no access ramps.
  - Do not symbolize the freeway overpass if quadrant movements are shown

instead of freeway ramp movements.

- See examples below:

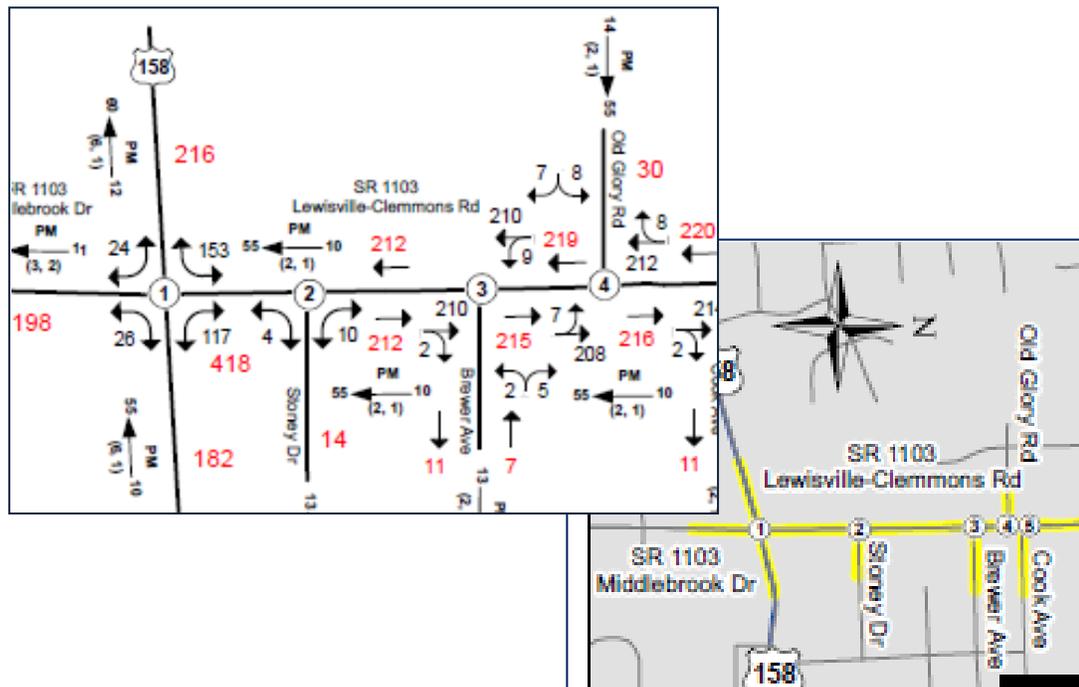


Bridge



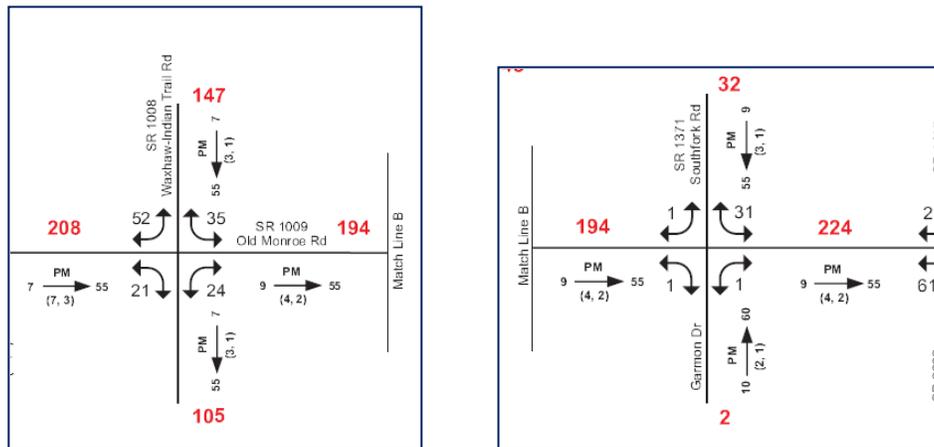
Overpass

- Intersections may be numbered on the Traffic Forecast Diagram with a circular shield and number placed at the center of each intersection ONLY if shown on both the Traffic Forecast Location Map and the Traffic Forecast Diagram.
  - Font: Arial; Size: 8 to 10 pt, Color: black



- 8 ○ Use **Match Lines** to identify roadway connections between different forecast diagram sheets, or where roadway line diagrams have been broken in order fit onto a single sheet. See Figure 6 – Match Lines.
  - Label each matching pair of match lines with matching labels that are unique to each traffic forecast scenario.

- The traffic volumes and factors on each side of a matching pair of match lines will be the same.



Match Lines

**9 Add the Road Names, Road Numbers and Road Shields**

Label all roadways shown on the forecast diagram.

- Font: Arial. Size: 9 to 11 pt, Color: black
- Label all state and local roads with the SR number, if applicable, the direction/orientation, if applicable, and the road name and type.
- Use the format: SR (SR number) (direction) (name) (type)
  - Example: "SR 1525 Union Hill Road"
  - Example: "N Edgewood Dr"
- Abbreviate the road direction (N, S, E, W) and type (Rd, Ln, St, etc) with no period.
  - Example: "S Main St"
- Place road labels parallel and adjacent to the road line.
- Road labels may utilize one or multiple lines. (See Match Line diagrams in Step 8 above for example of each).
- Label Interstates, US Highways and NC Highways with the appropriate highway shield and number.
  - Align the road shield horizontally and centered it on the road line.
  - Highway shield sources:
    - ArcMap – Interstate and US highway shield symbols are included with the ESRI default markers that come with ArcMap. These shields can be applied as a marker text background and scaled to match the highway number text.
    - Visio – Shield shapes are included with Visio. They can be found by searching for "Highway" within the shapes window.



**Highway Shield Examples**

	 <p><b>Highway Shield Examples</b></p>
<p><b>10</b></p>	<p><b>Add Mainline AADT Volumes</b></p> <p>Label all roadway segments shown on the forecast diagram with the Mainline AADT Volume estimate.</p> <ul style="list-style-type: none"> <li>○ Font: Arial; Size: 10 to 12 pt, Color: <b>black</b> or <b>red</b></li> <li>○ Represent all Mainline AADT Volumes in units of 100 of vehicles per day.             <ul style="list-style-type: none"> <li>● Example: An AADT estimate of 18,300 vpd is represented as “183” on the Traffic Forecast Diagram.</li> <li>● Represent all AADT estimates that are less than 50 vpd with “1-” on the Traffic Forecast Diagram.</li> </ul> </li> <li>○ Depict the AADT as two-way traffic volumes. A 50/50 <u>daily</u> directional split is automatically assumed unless significant daily directional traffic imbalances exist, or directional movements are specifically requested.             <ul style="list-style-type: none"> <li>● Significant daily directional traffic imbalances need to be clarified by showing one-way directional traffic volumes. Depict one-way directional traffic volumes with a matching arrow that indicates the direction of traffic flow.</li> </ul> </li> <li>○ Align the Mainline AADT Volume labels horizontally and place them adjacent to the roadway.</li> </ul>
<p><b>11</b></p>	<p><b>Add Turning Movement Volumes</b></p> <p>Summarize turning movement volumes and represent them as Quadrant Movements at all intersections unless:</p> <ul style="list-style-type: none"> <li>● Significant directional traffic imbalances exist that must be clarified by showing one-way directional turning movement volumes.</li> <li>● The forecast requestor specifically requests one-way directional turning movement volumes.</li> </ul> <p style="text-align: center;"><b>Quadrant Movements</b></p>



	<ul style="list-style-type: none"> <li>○ Font: Arial; Size: 8 to 9 pt; Color: black</li> </ul> <div style="text-align: center; margin: 20px 0;"> <math display="block">K \xrightarrow[\text{(d, t)}]{\text{PM}} D</math> </div> <p style="margin-left: 40px;"> <b>K</b> Design Hour Factor (%)  <b>PM</b> PM Peak Period  <b>D</b> Peak Hour Directional Split   Indicates Direction of D  <b>(d, t)</b> Duals, TT-STs (%)         </p> <p style="text-align: center;"><b>Figure 1 - Traffic Factors</b></p> <ul style="list-style-type: none"> <li>○</li> </ul>
<p><b>13</b></p>	<p><b>Add Other Symbols and Labels</b></p> <ul style="list-style-type: none"> <li>○ Indicate the general orientation of North with a north arrow on all forecast diagram sheets and the Location Map. See Figure 12 – North Arrows.</li> </ul> <div style="text-align: center; margin: 20px 0;"> </div> <p style="text-align: center;"><b>Figure 2 - North Arrows</b></p> <ul style="list-style-type: none"> <li>○ Symbolize major streams, rivers, lakes and other water features on bridge forecast diagrams.             <ul style="list-style-type: none"> <li>• Label water features shown with the water body name.                 <ul style="list-style-type: none"> <li>○ Font: Arial</li> <li>○ Size: 8 to 10 pt, Color: dark blue, Style: Italics</li> </ul> </li> <li>• Symbolize all water features with an appropriate hydrology pattern that is significantly differentiated from the symbology of the roadway lines.</li> <li>• Symbolize water features with an approximation of the water features topography or a simplified symbology.</li> </ul> </li> </ul>
<p><b>14</b></p>	

***Policy, Regulatory, and Legal Requirements***

None

***Resources***

- Standard Traffic Forecast Diagram Templates (S:\Traffic Forecast Tools\Forecast Standard Figures)

## **Background**

The Traffic Forecast Diagram is a required component of every traffic forecast produced by the NCDOT Transportation Planning Branch. A Traffic Forecast Diagram, prepared in accordance with this procedure, will consist of a clear and simplified line diagram of the roads that are included in the forecast, and will include all road names, shields and numbers; AADT estimates; DHV percentage estimates; Peak Hour Directional Split percentage estimates; and truck percentage estimates.

The AF is required to utilize the Standard Traffic Forecast Diagram Templates for all Traffic Forecast Diagrams. It is expected that the AF will use appropriate business practices and judgment as required of engineering level staff. This procedure is intended to augment training given by the supervisor and does not cover all possible circumstances.

## **Record of Revision**

*The information contained in this procedure is deemed accurate and complete when posted. Content may change at any time without notice. We cannot guarantee the accuracy or completeness of printed copies. Please refer to the online procedure for the most current version.*

<b>Version</b>	<b>Section Affected</b>	<b>Description</b>	<b>Effective Date</b>
1.1	Warnings & Precautions	Added statement to this section.	02/23/2010
1.2	Entire Procedure	Formatting and wordsmithing. Updated DHV to K, replaced some of the figures that showed up funky with new figures.	09/02/2011
2	Entire Procedure	New template, no content changes.	2/5/2013

## **Flowchart**