

**BROOKE-HANCOCK-JEFFERSON  
TRANSPORTATION STUDY**

*TECHNICAL MEMORANDUM 2008-6*

**BHJ REGIONAL 2030 TRANSPORTATION PLAN  
REGIONAL TRAVEL PATTERNS  
CONGESTION, SAFETY & SECURITY**

**JUNE 2008**



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## **BHJ REGIONAL 2030 TRANSPORTATION PLAN REGIONAL TRAVEL PATTERNS CONGESTION, SAFETY & SECURITY TECHNICAL MEMORANDUM 2008-6**

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# REGIONAL TRAVEL PATTERNS – CONGESTION, SAFETY & SECURITY

## DEFINING CONGESTION

Since traffic congestion is subject to the perception of people living in a certain area and the tolerance for varying amount of congestion is dependent upon the area, the people, and the nature of travel, it becomes difficult to formulate a universal definition. The U.S. Department of Transportation offers a broad definition of congestion as:

*“The level at which transportation system performance is no longer acceptable due to traffic interference. The level of acceptable system performance may vary by type of transportation facility, geographic location, and/or time of day.”*

As defined above, the level of congestion and the tolerance for it, whether real or perceived, varies between large and small urban areas. Five elements that transportation engineers and planners generally consider when defining traffic congestion are:

1. Duration, or how long the congestion lasts,
2. Space that defines what highway segment of area that is affected,
3. Intensity or severity of congestion,
4. Extent of congestion (e.g., if it extends across modes, or affects the length of a corridor or only specific locations), and
5. Variability of congestion on a daily basis, that is, recurring or nonrecurring congestion

Recurring and nonrecurring congestion takes place daily. Moreover, recurring congestion is usually predictable and happens regularly. This results when the transportation system deteriorates to an unacceptable level of operation generally in a morning or afternoon peak hour, but may emerge during holiday seasons or scheduled special events. Nonrecurring congestion is the consequence of random events such as a traffic accident, short-term highway construction or maintenance activity, emergency roadwork, or weather conditions. Some basic causes that may contribute to roadway congestion are:

- Insufficient road space (capacity) to accommodate traffic demands
- Trucks on up-grade blocking passenger cars or an increased start-up time from a stopped position
- Route convergence, lane drops, lane imbalances, and/or road narrowing resulting in increased traffic per lane (e.g., bridge or tunnel approach)
- Railroad grade crossing blocking traffic flow
- Pedestrian-bus-car conflicts at Central Business District intersections
- Ineffective traffic signal controls, uncoordinated signals, or long red-times and cycle lengths
- Double parking or frequent parking maneuvers along high-volume city streets
- Delays associated with left turns blocking through lanes, or long waits for left turns to clear

Congestion, as measured for the purpose of this Transportation Plan, is a specific threshold value when traffic volumes exceed the overall capacity calculated for a highway segment. Typically, BHJ may use computer-based software such as Cube Voyager Travel Demand Model, Highway Capacity Software™, or Trafficware® Synchro to calculate the volume-capacity (v/c) ratio. Surveys such as traffic counts, review of historic construction plans, straight-line diagrams, and others, provide the input values for the computation. The engineering software then assigns a Level of Service (LOS) ranking ranging from A that is ideal, to F, the worst-

case scenario to the v/c ratio calculation. The descriptions of LOS A to F as defined by the Institute of Transportation Engineers', Transportation Planning Book, 1992 follow as:

- LOS A ≡ Free flow with motorists virtually unaffected by the presence of others in the traffic stream
- LOS B ≡ Stable flow with a high degree of freedom to select speed and operating conditions but with some influence from other users
- LOS C ≡ Restricted flow that remains stable but with significant interactions with others in the traffic stream; The general level of comfort and convenience have declined even though flow remains stable
- LOS D ≡ High-density flow in which speed and freedom to maneuver is severely restricted and comfort and convenience have declined even though flow remains stable
- LOS E ≡ Unstable flow at or near capacity levels with poor levels of comfort and convenience
- LOS F ≡ Forced flow in which the amount of traffic approaching a point exceeds the amount that can be served, and queues form, characterized by stop-and-go waves, poor travel times, low comfort and convenience, and increased accident exposure

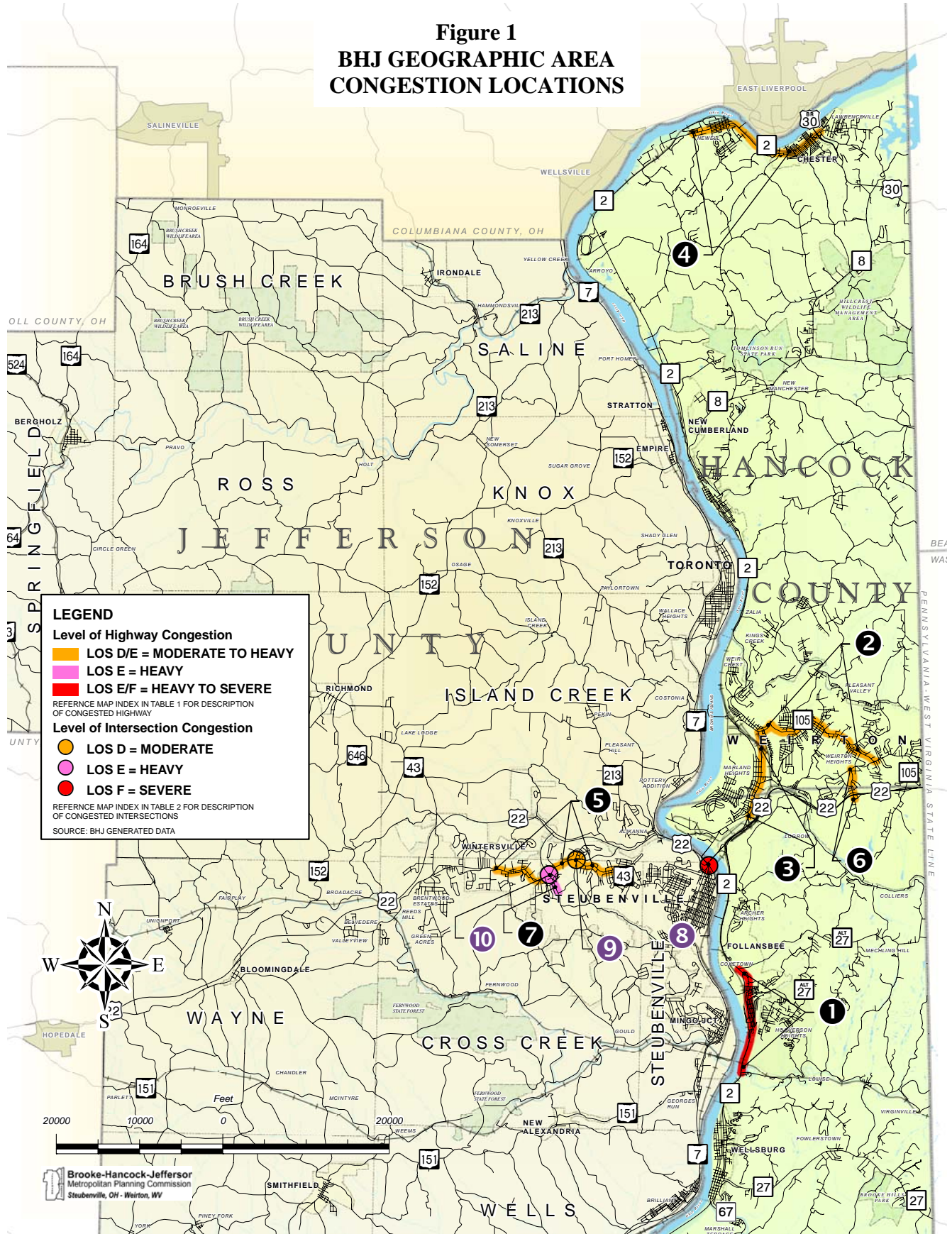
When ranking the relative level of congestion, as shown in Table 1 for highway locations and Table 2 for intersections identified within the Brooke-Hancock-Jefferson Metropolitan, in terms of the Level of Service, LOS D is moderate congestion; LOS E equals heavy congestion; and LOS F refers to severe congestion.

**Table 1**  
**Congested Highways Identified in Brooke-Hancock-Jefferson Counties**

<b>Map Index<sup>1</sup></b>	<b>Highway Description</b>	<b>Level of Congestion</b>
<b>1</b>	WV-2 (Main Street) in Follansbee, WV from CR-7 (Bruin Drive) to CR-1/1 (Mahans Lane)	LOS E/F ≡ Heavy to Severe
<b>2</b>	WV-105 (Pennsylvania Avenue) in Weirton, WV from WV-2 (County Road) to CR-507 (Cove Road)	LOS D/E ≡ Moderate to Heavy
<b>3</b>	WV-2 (Main Street) in Weirton, WV from CR-507 (Freedom Way) to WV-105 (Pennsylvania Avenue)	LOS D/E≡ Moderate to Heavy
<b>4</b>	WV-2 in Northern Hancock County from CR-1 (Sixth Street) in Newell to US-30 in Chester	LOS D/E≡ Moderate to Heavy
<b>5</b>	OH-43 (Sunset Blvd/Main St) from Pico Street in Steubenville, OH to Canton Road in Wintersville, OH	LOS D/E≡ Moderate to Heavy
<b>6</b>	CR-13 (Three Springs Drive) in Weirton, WV from CR-507 (Cove Road) to US-22	LOS D/E≡ Moderate to Heavy
<b>7</b>	Lovers Lane Road in Steubenville, OH from Ft. Steuben Drive to OH-43 (Sunset Boulevard)	LOS E ≡ Heavy

<sup>1</sup> MAP FIGURE 1: BJJ GEOGRAPHIC AREA CONGESTION LOCATIONS

**Figure 1  
BHJ GEOGRAPHIC AREA  
CONGESTION LOCATIONS**



**Table 2**  
**Congested Intersections Identified in Brooke-Hancock-Jefferson Counties**

<b>Map Index<sup>1</sup></b>	<b>Intersection Description</b>	<b>Level of Congestion</b>
<b>8</b>	OH-7 (Dean Martin Boulevard) & University Boulevard in Steubenville, OH	LOS F ≡ Severe
<b>9</b>	OH-43 (Sunset Boulevard) & John Scott Highway in Steubenville, OH	LOS D ≡ Moderate
<b>10</b>	OH-43 (Sunset Boulevard) & Lovers Lane Road in Steubenville, OH	LOS E ≡ Heavy

<sup>1</sup> MAP FIGURE 1: BHJ GEOGRAPHIC AREA CONGESTION LOCATIONS

**DEFINING ACCIDENT PROBLEM LOCATIONS**

Defining accident problem locations is an important factor from which to work toward improving the safety of the regional transportation system. The objective of the safety program is to:

- Identify and critically evaluate high crash locations through sound engineering principles that justify, at first, low-cost capital improvements ,
- Enforce traffic laws and promote safe driving habits through public education, and
- Measure the effectiveness of implemented projects and programs intended to reduce crashes

Annually through its Highway Safety Program (HSP), the Ohio Department of Transportation identifies the top 200 Non-Freeway Locations and the top 50 Freeway Locations for crashes throughout Ohio. The ODOT chooses these locations based on a crash rate (crashes per volume of traffic), density (crashes per length of road), severity, and other analytical factors. Through this process, the department also develops a list of Hot Spot Locations defined as any two-mile segment of freeway with more than 250 crashes or a non-freeway location with more than 250 crashes over a three-year period. The process has identified several locations in Steubenville, Jefferson County, Ohio:

HSP Non-Freeway Sections

1. OH-43 (Sunset Boulevard): Steel Avenue to Argonne Street
2. OH-43 (Sunset Boulevard): Cunningham Lane to Wintersville Corp Limit

HSP Non-Freeway Intersection

1. OH-43 (Sunset Boulevard) & John Scott Highway
2. OH-7 (Dean Martin Boulevard) & University Boulevard

In response, the BHJMPO has prepared a Safety Engineering Study for each of these locations for review by the ODOT District 11 Safety Review Team (DSRT). Each report recommends several safety low-cost and high-cost safety measures to improve highway safety. The City has implemented several of each report’s recommendations with either financial assistance from the ODOT Highway Safety Program or at the City’s expense. A typical project may include better roadway signage and pavement marking, minor geometric

improvements, or improved traffic signalization and timing. BHI keeps these reports on file and are available for review upon request.

In addition to the Highway Safety Program, ODOT, the Ohio Department of Public Safety (ODPS), and BHI sponsored Roadway Safety Workshop on April 19, 2007 in Steubenville, Ohio. The meeting’s purpose was to provide community stakeholders an opportunity to identify high crash areas in Jefferson County, discuss potential solutions, and learn more about available state funding to address local safety problems. Table 3 is an inventory of high-crash locations as well as issues identified by workshop attendees listed by order of priority, the top as the highest priority to the bottom as the lowest.

**Table 3**  
**ROADWAY SAFETY PROGRAM HIGH-CRASH LOCATIONS**  
**JEFFERSON COUNTY, OH<sup>1</sup>**

MAP #	LOCATION	JURISDICTION	ISSUES IDENTIFIED
①	Sunset Blvd (SR 43) Steele Blvd to WCL Main Street (SR 43) ECL to Canton Road	City of Steubenville Village of Wintersville	<ul style="list-style-type: none"> <li>• Excessive speed</li> <li>• Red Light Running</li> <li>• Permissive left turns fail to Yield Right of Way at various intersections</li> <li>• Left turn traffic at numerous commercial driveways</li> <li>• Antiquated directional signage</li> </ul>
②	Sunset Blvd (SR 43) & John Scott Highway	City of Steubenville	<ul style="list-style-type: none"> <li>• Project funded PID# 82135</li> </ul>
③	Lovers Lane Road – Sinclair Ave to Sunset Blvd (SR43)	City of Steubenville	<ul style="list-style-type: none"> <li>• Narrow roadway</li> <li>• Inadequate turn radius at intersections</li> <li>• Short turn lane at Sunset Blvd intersection</li> <li>• No pedestrian walkways</li> <li>• Recurring congestion</li> </ul>
④	State Route 7 & University Blvd	State City of Steubenville	<ul style="list-style-type: none"> <li>• High number of left turn related crashes</li> </ul>
⑤	County Hwy 39 & State Hwy 646	County State	<ul style="list-style-type: none"> <li>• State Highway has Stop Sign</li> <li>• High speeds on County Highway</li> <li>• Parked vehicles at intersection blocking sight line</li> </ul>
⑥	State Route 7 Logan Ave NB Entrance Ramp in Mingo Jct.	State Village of Mingo Jct.	<ul style="list-style-type: none"> <li>• Short sight distance at ramps entering SR 7</li> <li>• Signage for “Through Traffic Use Left Lane” posted on southbound SR 7 only</li> <li>• Excessive speed</li> </ul>
⑦	State Route 7 Lincoln Ave SB Entrance Ramp in Steubenville	State City of Steubenville	<ul style="list-style-type: none"> <li>• Short sight distance at ramps entering SR 7</li> </ul>
⑧	Sunset Blvd (SR 43) & Rosemont Avenue	City of Steubenville	<ul style="list-style-type: none"> <li>• East bound approach on hilly grade with vertical curve creating sight distance problem identifying oncoming traffic signal</li> <li>• Possible Red Light Running</li> </ul>
⑨	County Hwy 34 (Two Ridge Rd) & County Hwy 22 A (Cadiz Rd)	County	<ul style="list-style-type: none"> <li>• Excess roadway capacity</li> <li>• Stopped vehicles blocking sight distance at intersection</li> </ul>
⑩	SR213 & TR382	State	<ul style="list-style-type: none"> <li>• Limited Sight Distance</li> </ul>
	US-22 & OH-7	State	<ul style="list-style-type: none"> <li>• Inconsistent crash location identification</li> </ul>
	Urban-Wide guardrail replacement	MPO Urban Area	<ul style="list-style-type: none"> <li>• Deficient guardrail identified on City, Village, or County federal-aid routes in MPO area</li> </ul>
	System-Wide Low Cost Safety Improvements at Multiple Locations	MPO Urban Area	<ul style="list-style-type: none"> <li>• Review/improve signage, delineators, and roadway striping</li> </ul>

<sup>1</sup> REVISED NOVEMBER 1, 2007; BHI GENERATED TABLE; MAP # REFER TO FIGURE 2 BHI GEOGRAPHIC AREA HIGH-CRASH LOCATIONS

**Figure 2**  
**BHJ GEOGRAPHIC AREA**  
**HIGH-CRASH LOCATIONS**

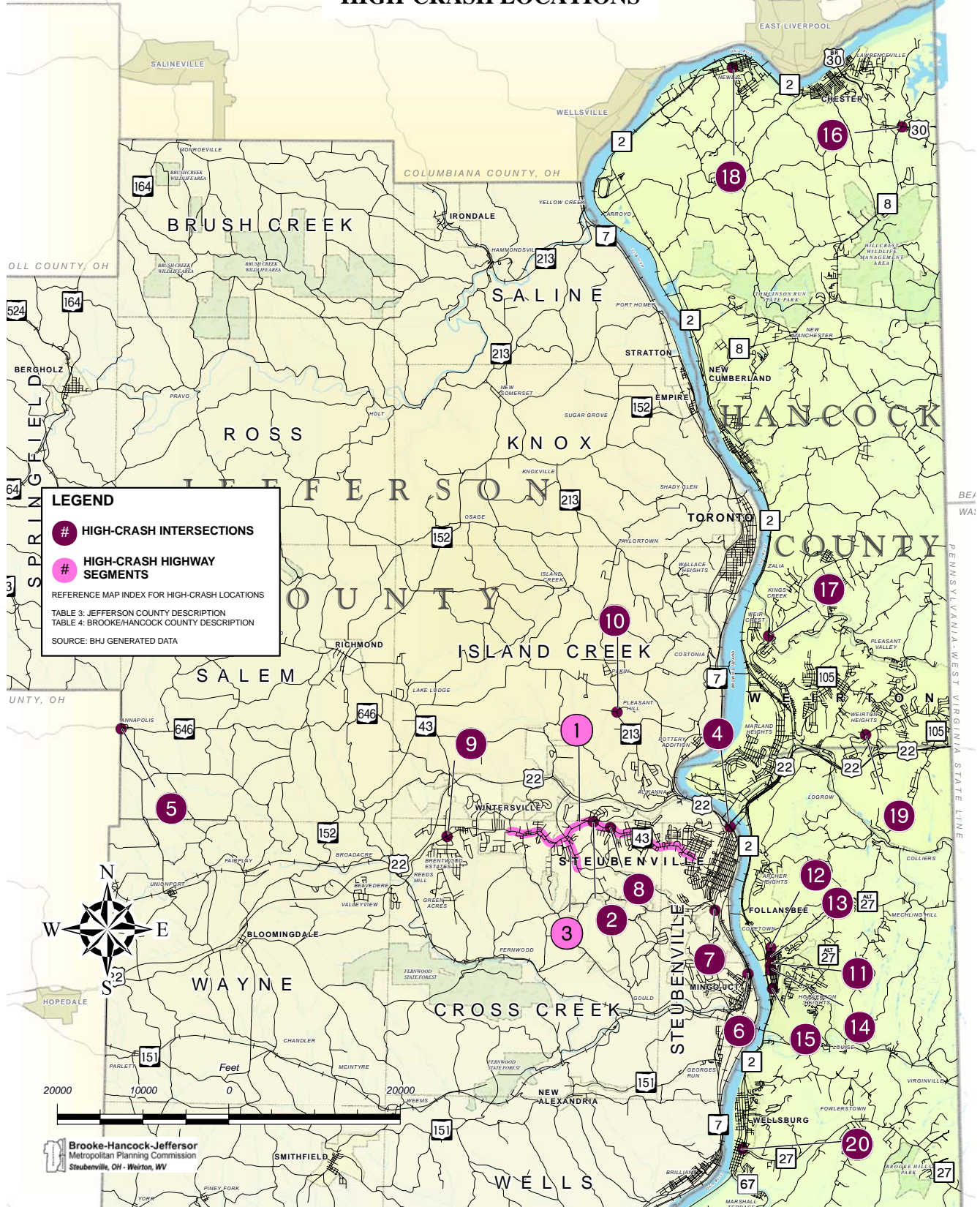


Table 4 below lists High Accident Locations in Brooke and Hancock counties, West Virginia BHJ has identified according to the following criteria:

- A minimum total of nine crashes at an intersection during a three-year review period
- An accident rate greater than or equal to 1.25 crashes per one million vehicles entering the intersection

**Table 4  
HIGH-CRASH LOCATIONS  
BROOKE/HANCOCK COUNTY, WV**

MAP #	LOCATION	JURISDICTION
⑪	Main St & Allegheny St	Follansbee
⑫	State Hwy 2 & Brooke Plaza	Follansbee
⑬	Main St & Mark Ave	Follansbee
⑭	Main St & Raymond St	Follansbee
⑮	Main St & State St	Follansbee
⑯	US Hwy 30 & State Hwy 8	Hancock County
⑰	State Hwy 2 & Kings Creek Rd	Hancock County
⑱	State Hwy 2 & 6th Avenue	Newell
⑲	Cove Rd & Potomac Ave	Weirton
⑳	Commerce St & 10th St	Wellsburg

**SYSTEM-WIDE SECURITY OF THE TRANSPORTATION NETWORK**

The three-county transportation system is a complex network of railroads (active and abandoned), water ports, highways, transit (public, private, and human-service), and pedestrian facilities. Throughout the plan development process, Policy Committee representatives established a primary goal of “Maintain and construct a safe, secure, and flexible **Ohio River Bridge System** that is reliable for existing industry, their employees, and all residents, and provides enhanced access within and outside the metropolitan area for retention of existing business and promotion of future economic growth and activity”. Further speaking, comments received and subsequently written this Plan’s Goals and Objectives include:

- Create and maintain a bridge and highway system that permits efficient and safe deployment of emergency services during times of accident, flooding, other natural disaster, or national emergency, and
- Preserve, at minimum, two highway and one pedestrian Ohio River Bridge crossings as contingency options for National Guard, safety, security, and emergency services between Jefferson County, Ohio and Brooke and Hancock counties, West Virginia.