

# Road Safety Audit

**East 9<sup>th</sup> Street and  
Carnegie Avenue  
Intersection  
City of Cleveland,  
Ohio**

**November 2008**

**Prepared By  
Northeast Ohio Areawide  
Coordinating Agency  
1299 Superior Avenue  
Cleveland Ohio 44114**





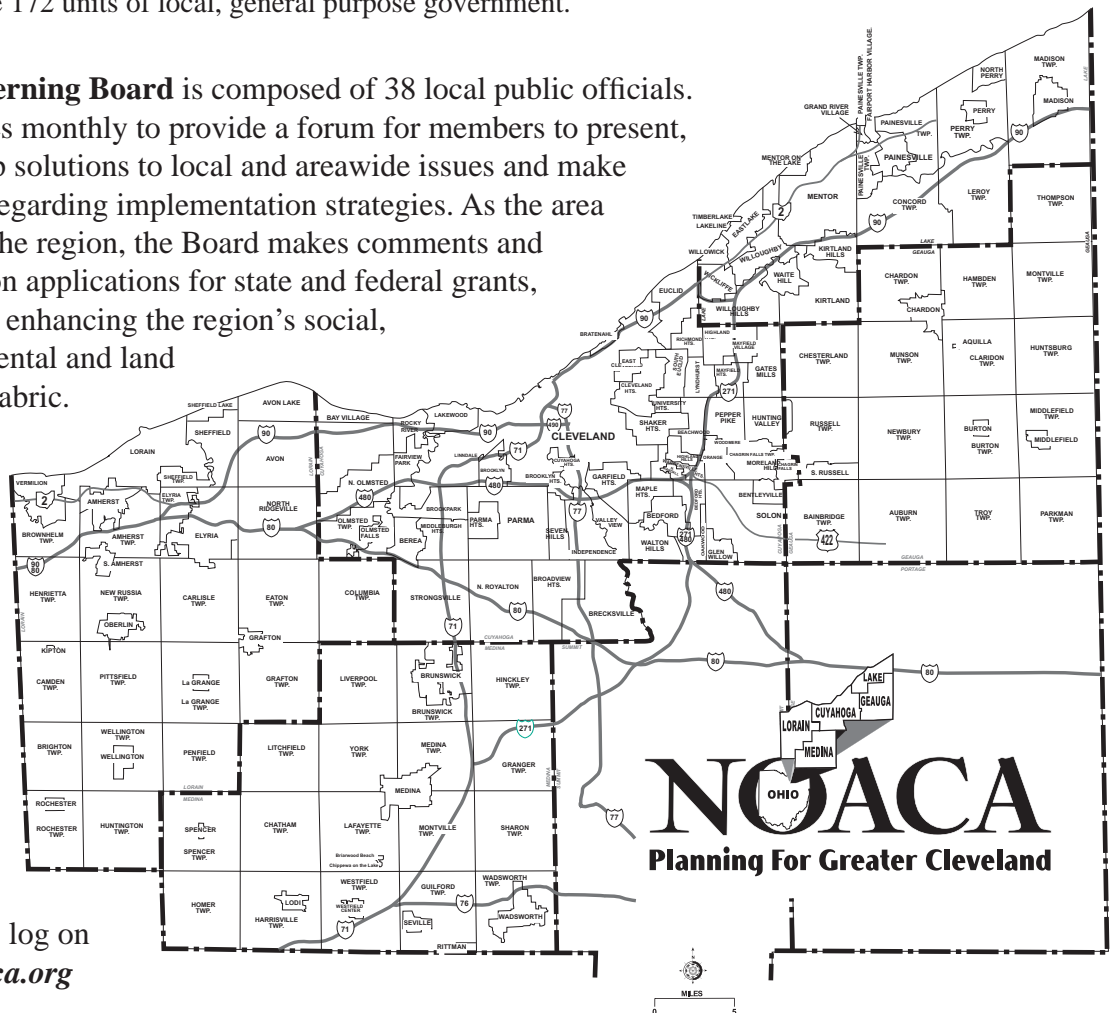
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- Perform continuous water quality, transportation-related air quality and other environmental planning functions.
- Administer the area clearinghouse function, which includes providing local government with the opportunity to review a wide variety of local or state applications for federal funds.
- Conduct transportation and environmental planning and related demographic, economic and land use research.
- Serve as an information center for transportation and environmental and related planning.
- At NOACA Governing Board direction, provide transportation and environmental planning assistance to the 172 units of local, general purpose government.

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**Road Safety Audit**  
**East 9<sup>th</sup> Street and Carnegie Avenue Intersection**  
**City of Cleveland, Ohio**

**November 2008**

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This report does not constitute a standard or regulation.

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# Executive Summary

This Road Safety Audit (RSA) is one of the 13 to be conducted in the Northeast Ohio Areawide Coordinating Agency (NOACA) region as part of the safety study program for Fiscal Year 2009. The locations selected for the audits received high rankings in a crash-data analysis that NOACA performed for each of NOACA's five counties.

The purpose of an RSA is to examine the location by an independent audit team and to evaluate the opportunities for low-cost, short-term safety improvements.

The audit team included representatives from NOACA, Federal Highway Administration (FHWA), Ohio Department of Transportation (ODOT) District 12 and the city of Cleveland Division of Traffic Engineering.

The recommendations included in this report range from 23 low-cost, short-term actions to four intermediate- to high-cost improvements to increase

the level of safety at the intersection studied. The main recommendations are summarized below:

- Address the conflict at the ramps to I-90 and I-77 south of Carnegie Avenue by installing repeated advance directional information to emphasize lane assignment, including advanced lane assignment overhead signs, upgraded pavement markings, ground-mounted sign at the gore area and mountable raised island separation to define the ramps' entrances.
- Upgrade the interstate signs on all approaches and adjust the location of the sign on East 9<sup>th</sup> Street for better visibility.
- Develop an access management plan to reduce the number of current access points.
- Improve the visibility of traffic signals by using a signal head for each lane and adding backplates.
- Remove unnecessary signs and obstructions.
- Annually trim trees and shrubs to ensure the visibility of signs.



## Background

This Road Safety Audit (RSA) was conducted for the intersection of East 9<sup>th</sup> Street and Carnegie Avenue in Cleveland on August 19 and 20, 2008. This audit is part of the Northeast Ohio Areawide Coordinating Agency (NOACA) safety studies program and Ohio Department of Transportation (ODOT) Central's requirement for the District 12 (Cuyahoga, Geauga, and Lake counties) area.

The NOACA safety audit study program for FY 2009 includes 13 RSAs for different locations throughout the NOACA region. The selected locations received the highest ranking in a crash-data analysis that NOACA performed for each of NOACA's five counties. Locations that have already been studied by ODOT and NOACA or have been improved since the analysis were excluded from consideration for an RSA.

The methodology NOACA used to rank the intersections is described in Appendix B.

## The Audit

A Road Safety Audit is a formal safety performance examination of an existing or future road or intersection by an independent audit team. The RSA team considers the safety of all road users, qualitatively estimates and reports on road safety issues, and evaluates opportunities for safety improvements.

The steps for a road safety audit <sup>1</sup> are:

1. Identify the project or the road-in-service to be audited.
2. Select the RSA team.
3. Conduct a pre-audit meeting.
4. Perform field observations under various conditions.
5. Conduct an audit analysis.
6. Present the audit findings to the project owner/design team.
7. Project owner/design team prepares a formal response.
8. Incorporate findings within the project when appropriate.

1 FHWA Road Safety Audit Guidelines



## Team Members

The team for this audit included members from Federal Highway Administration (FHWA), ODOT District 12, the City of Cleveland, law enforcement and NOACA staff. Appendix C lists the team members.

## Pre-Audit Meeting

A pre-audit meeting was conducted on August 19, 2008. An aerial photo of the intersection area (Appendix D) was presented to team members so they could share their experiences and knowledge of the location. The team discussed the two main characteristics of the intersection, the presence of the I-90 West and I-77 South ramps located on the southwest quadrant, and the baseball stadium located on the northwest quadrant. The traffic leaving the intersection through the south leg of East 9<sup>th</sup> Street goes in three different directions: to either the I-90 West ramp, to the I-77 South ramp, or continues on East 9<sup>th</sup> Street to Broadway Avenue. There is also a high likelihood that traffic on these ramps would be backed up into the intersection during the evening peak.

The audit team reviewed the 2005-2007 crash-data analysis (Appendix E). The following is a summary of the main characteristics of crash data:

- Sixty-six percent of the crashes were on East 9<sup>th</sup> Street and 34 percent were on Carnegie Avenue.
- Fifty-three percent of crashes occurred between noon and 7 p.m.
- The crashes were highest during the months of April (10 crashes), September (12 crashes) and December (11 crashes).
- Forty-seven percent were rear end, 17 percent were angle, and 17 percent were sideswipe same direction crashes.
- Twenty-nine percent were injury crashes, and 62 percent were property damage only.
- There were no pedestrian, bicycle or fatal crashes during the crash-analysis period.

The audit team reviewed 2006 factored Average Daily Traffic (ADT) values and 2000 turning movement counts for the morning and afternoon peaks (see Appendix F).

Four field observations were conducted on August 19 and 20, 2008. An afternoon visit at 1:00 p.m., evening peak at 5:00 p.m. and an after-dark visit at 9:00 p.m. were conducted on Tuesday, August 18. The morning peak was conducted on Wednesday, August 19. Both the evening peak and the after-dark visits coincided with the baseball game. The audit team formed two groups for the field observations due to the large number of participants. A post-audit meeting to discuss the findings and recommendations of the audit team was held at NOACA's offices on Wednesday, August 20.



# Findings and Recommendations

## Vehicular Movement

The major complication at the intersection is the presence of the two ramps (I-77 South and I-90 West/I-71 South) off East 9<sup>th</sup> Street, south of Carnegie Avenue (picture 1). Southbound drivers, leaving the intersection from any approach, have multiple options. Confusion and lane switching at the gore area between the two ramps (picture 2) is evident and may be the main factor that caused the side swipe same direction crashes during the crash analysis period (17 percent of all crashes). This confusion is aggravated by the

width of the I-90 ramp. From field observations, it was evident that some southbound traffic in the left East 9<sup>th</sup> Street through-lane was merging with traffic in the right through-lane that is assigned to traffic heading to the I-90 ramp. During the after-dark visit, when people started leaving the baseball game, the field team noticed merging again; vehicles in the lane assigned to the I-90 ramp were merging into the lane heading to the I-77 South ramp.



Picture 1: East 9th Street southbound at Carnegie Avenue



Picture 2: Gore area between the two ramps on East 9<sup>th</sup> Street south of Carnegie Avenue

## Identified Issues

The audit team identified the following issues.

### Issue 1: Signage

- The “Keep Left” sign for I-77 and I-90 West on the Carnegie Avenue westbound approach is not clearly visible because it is on the side next to on-street parked vehicles (picture 3).



Picture 3: Carnegie westbound approach

- There is no sign on the Carnegie Avenue eastbound approach for I-77. The sign for I-90 East is erected on an unused telephone post (picture 4) and may not draw sufficient driver attention as a result of its location.



Picture 4: Carnegie eastbound approach

- The traffic signal mast arm obscures the interstate sign on the East 9<sup>th</sup> Street southbound approach (picture 5).



Picture 5: East 9<sup>th</sup> Street southbound approach

- The overhead signs on the East 9<sup>th</sup> Street southbound approach are small and insufficiently labeled (picture 6).



Picture 6: East 9<sup>th</sup> Street southbound approach

- The interstate sign on the East 9<sup>th</sup> Street southbound approach at the intersection is blocked by a tree (picture 7).

- Hilton Garden Inn sign does not direct traffic to the hotel's main entrance off Carnegie Avenue (picture 9).

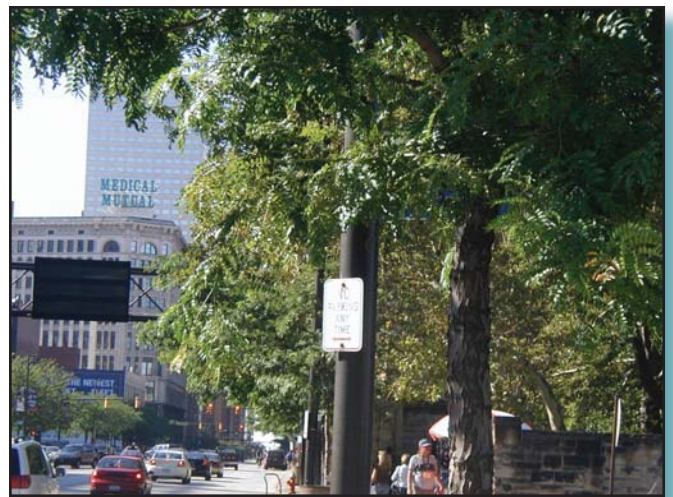


Picture 7: Tree obstructing the view of the interstate sign on East 9<sup>th</sup> Street southbound approach

Picture 9: East 9th northbound approach improper hotel sign

- Insufficient signs on the East 9<sup>th</sup> Street northbound approach (picture 8).

- The Sumner Court name sign is obscured by tree branches (picture 10).



Picture 8: East 9<sup>th</sup> Street northbound approach signs

Picture 10: Tree obscuring the view of Sumner Court name sign on East 9<sup>th</sup> northbound, north of Carnegie Avenue

Signage Recommendations	Cost Category <sup>1</sup>	Implementation Time	CRF <sup>2</sup>
<p>➤ Upgrade the interstate signs on all approaches:</p> <ul style="list-style-type: none"> <li>• <b>Carnegie Avenue westbound and eastbound approaches</b> <ul style="list-style-type: none"> <li>- Install new overhead signs. The new signs should clearly indicate the lane assignment using arrows of different curvatures to indicate different ramp alignments.</li> <li>- Remove the unused telephone pole, on the eastbound approach, and relocate the I-90 East sign after the slip ramp to I-90 West/I-71 South. The sign should also include I-77 South on the east approach, which is missing on the existing sign.</li> <li>- Remove the Amtrak sign on the westbound approach.</li> </ul> </li> <li>• <b>East 9<sup>th</sup> Street northbound approach</b> <ul style="list-style-type: none"> <li>- Change the Hilton Garden Inn sign to indicate the main entrance from Carnegie Avenue.</li> <li>- Remove the unused truss-mounted changeable sign.</li> <li>- Remove the Webster Street sign.</li> </ul> </li> <li>• <b>East 9<sup>th</sup> Street southbound approach</b> <ul style="list-style-type: none"> <li>- Upgrade size and labeling of the overhead sign to indicate lane assignment with arrows.</li> <li>- Add advanced signs for lane assignment.</li> <li>- Trim trees obstructing the view of the signs on the East 9<sup>th</sup> southbound approach.</li> </ul> </li> </ul>	<p>Low</p>	<p>Short term</p>	<p>10% reduction for rear-end crashes 20% reduction for sideswipe crashes</p>
<p>➤ Add a ground-mounted post with shields and arrows in the gore area between I-77 and I-90 West /I-71 South ramps south of Carnegie to clearly direct vehicles to the available three options which are I-77 South, I-90 West /I-71 South and East 9<sup>th</sup> South.</p> <p>➤ Replace existing over grown trees with less than 4 inch diameter trees.</p> <p>➤ Ensure that speed limit signs are installed.</p>	<p>Low</p>	<p>Short term</p>	<p>22% reduction for all types of crashes</p>

<sup>1</sup> ODOT classification (Appendix G)

<sup>2</sup> Crash Reduction Factor: The percentage of crash reduction expected after implementing the recommended countermeasure.  
U.S. Department of Transportation, FHWA-SA-07-015

## Issue 2: Marking

- Faded pavement markings.
- Pavement marking not in compliance with OMUTCD (picture 11).



Picture 11: Crosswalk marking not in compliance with OMUTCD

- Missing or no crosswalks markings (picture 12).



Picture 12: Missing crosswalk and edge lines markings

<b>Marking Recommendations</b>	<b>Cost Category<sup>1</sup></b>	<b>Implementation Time</b>	<b>CRF<sup>2</sup></b>
➤ Upgrade pavement markings, using more durable material.	Low	Short term	Unavailable
➤ Consider larger size arrows.	Low	Short term	Unavailable
➤ Add arrows with different curvatures to emphasize lane assignment to different ramps for East 9 <sup>th</sup> Street southbound approaches.	Low	Short term	Unavailable
➤ Replace the hatched islands at the entrances of the two ramps to I-77 and I-90 West/I-71 South by mountable raised islands.	Low	Short term	10% reduction for all types of crashes
➤ Consider adding dashed lines through the intersection for the turning movements to the ramps from the westbound and southbound approaches.	Low	Short term	Unavailable
➤ Consider increasing the length of channelizing lines for the southbound approach.	Low	Short term	Unavailable
➤ Ensure that all crosswalks and edges of driveways are marked and in compliance with the OMUTCD.	Low	Short term	Unavailable
➤ Consider adding transverse lines to the marked island on Carnegie Avenue eastbound approach.	Low	Short term	Unavailable

1 ODOT classification (Appendix G)

2 Crash Reduction Factor: The percentage of crash reduction expected after implementing the recommended countermeasure.  
U.S. Department of Transportation, FHWA-SA-07-015

### Issue 3: Uncontrolled Access

- USA Parking on the northeast quadrant of the intersection has two driveways on Carnegie Avenue, one on East 9<sup>th</sup> Street and two on Sumner Court. The curb cuts on Carnegie Avenue are very wide extending beyond the actual entrance (picture 13).



Picture 13: USA Parking, two driveways on Carnegie Avenue

- The driveway to The Hilton Garden Inn on the northbound approach of East 9<sup>th</sup> Street is in the vicinity of I-90 (picture 16).

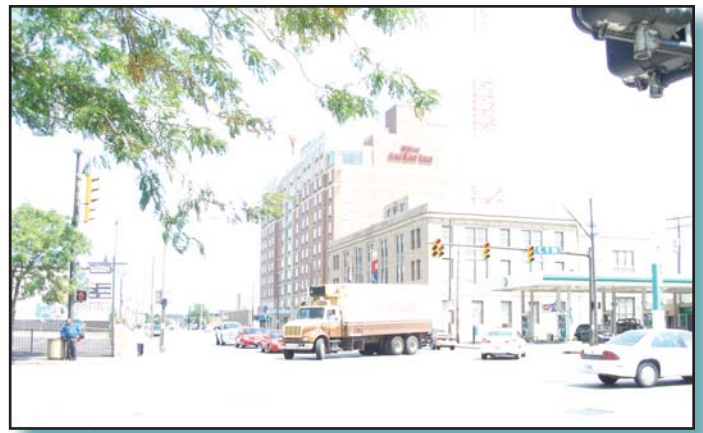


Picture 16: Hilton Garden Inn Driveway, on East 9<sup>th</sup> Street

- Two access points to the BP gas station, in the southeast quadrant of the intersection, on Carnegie Avenue and East 9<sup>th</sup> Street (pictures 14 and 15).



Picture 14: BP gas station, two driveways on Carnegie Avenue



Picture 15: Vehicles turning left on Carnegie from BP Gas Station

Uncontrolled Access Recommendations	Cost Category <sup>1</sup>	Implementation Time	CRF <sup>2</sup>
<ul style="list-style-type: none"> <li>➤ Develop an access management plan for both USA Parking and the BP gas station.               <ul style="list-style-type: none"> <li>- Limit the access points to the parking lots to the driveways on Summer Ct.</li> <li>- Consolidate BP access points on Carnegie to one right-only entrance and exit.</li> </ul> </li> </ul>	Low	Short term	Unavailable
<ul style="list-style-type: none"> <li>➤ Check the location of The Hilton Garden Inn driveway and sign on East 9<sup>th</sup> Street for violation of I-90 limited access.</li> </ul>	Low	Short term	Unavailable

<sup>1</sup> ODOT classification (Appendix G)

<sup>2</sup> Crash Reduction Factor: The percentage of crash reduction expected after implementing the recommended countermeasure.  
U.S. Department of Transportation, FHWA-SA-07-015

# Findings and Recommendations

## Pedestrian Movement

The intersection, which is in the vicinity of the baseball stadium and the basketball arena, encounters heavy pedestrian traffic.

### Identified Issues

The audit team identified the following issues.

#### Issue 1: Pedestrian signals are operated on recall without a countdown signal.

Pedestrian Movement Recommendations	Cost Category <sup>1</sup>	Implementation Time	CRF <sup>2</sup>
➤ Upgrade pedestrian crossing to countdown signals.	Medium	Medium term	25% reduction for pedestrian crashes
➤ Apply periodic enforcement to discourage jaywalking.	Low	Short term	Unavailable

#### Issue 2: Uneven landscaping grates and sidewalks are tripping hazards.



Picture 17: Landscaping grate on East 9th Street sidewalk



Picture 18: Damaged sidewalk

Pedestrian Movement Recommendations	Cost Category <sup>1</sup>	Implementation Time	CRF <sup>2</sup>
➤ Replace trees to overcome the problem of root overgrowth; less than 4 inches in diameter trees are recommended.	Low	Short term	Unavailable
➤ Repair sidewalks.	Low	Short term	Unavailable

<sup>1</sup> ODOT classification (Appendix G)

<sup>2</sup> Crash Reduction Factor: The percentage of crash reduction expected after implementing the recommended countermeasure. U.S. Department of Transportation, FHWA-SA-07-015

**Issue 3: The curb ramps, at the slip ramp to I-90 West and I-71 South, on Carnegie Avenue eastbound approach are not in compliance with The American Disability Act (ADA).**



*Picture 19: Curb ramps at the slip ramp on Carnegie Avenue eastbound approach*

<b>Pedestrian Movement Recommendation</b>	<b>Cost Category<sup>1</sup></b>	<b>Implementation Time</b>	<b>CRF<sup>2</sup></b>
➤ Consider applying truncated domes.	Low	Short term	Unavailable

1 ODOT classification (Appendix G)

2 Crash Reduction Factor: The percentage of crash reduction expected after implementing the recommended countermeasure.  
U.S. Department of Transportation, FHWA-SA-07-015

# Findings and Recommendations

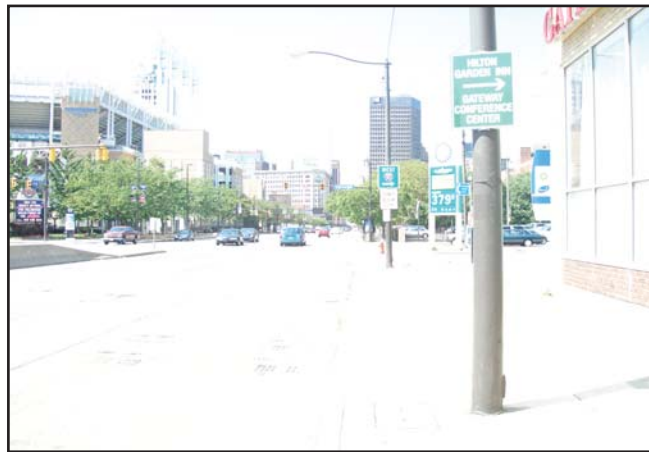
## Intersection Operation

### Identified Issues

The audit team identified the following issues.

#### Issue 1: Unused green time for some movements.

Intersection Operation Recommendations	Cost Category <sup>1</sup>	Implementation Time	CRF <sup>2</sup>
➤ Add detectors for Carnegie east and west bound left turn signal phases.	Medium	Medium term	8% reduction for all types of crashes
➤ Review clearance intervals.	Low	Short term	Unavailable



Picture 20: Signal heads on East 9<sup>th</sup> Street northbound approach

#### Issue 2: Inadequate traffic signal heads.

Intersection Operation Recommendations	Cost Category <sup>1</sup>	Implementation Time	CRF <sup>2</sup>
➤ Install backplates on all traffic signal heads. Backplates should not obstruct other signs, especially the interstate signs for the southbound approach.	Low	Short term	13% reduction for all types of crashes  50% reduction for right-angle crashes
➤ Consider using a signal head for each traffic lane.	Medium	Short term	10% reduction for all types of crashes

1 ODOT classification (Appendix G)

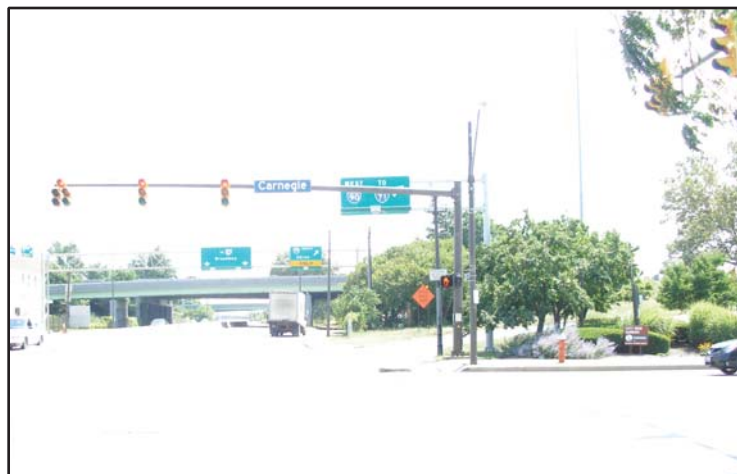
2 Crash Reduction Factor: The percentage of crash reduction expected after implementing the recommended countermeasure.

U.S. Department of Transportation, FHWA-SA-07-015

**Issue 3: Overflow of the left turning lane on Carnegie Avenue westbound approach during the evening peak.**

Intersection Operation Recommendations	Cost Category <sup>1</sup>	Implementation Time	CRF <sup>2</sup>
<ul style="list-style-type: none"> <li>➤ Consider using two lanes for the left turning movement with overhead signs dedicating the median lane to I-77 South and East 9<sup>th</sup> southbound and the second to I-90 West and I-71 South. This suggested treatment will entail reevaluating the capacity of the intersection.</li> </ul>	Medium to High	Medium term	Unavailable

**Issue 4: Shrubs and tree at the southwest corner of the intersection limit drivers' sight distance.**



Picture 21: Southwest corner of the intersection

Intersection Operation Recommendations	Cost Category <sup>1</sup>	Implementation Time	CRF <sup>2</sup>
<ul style="list-style-type: none"> <li>➤ Trim shrubs and trees annually.</li> </ul>	Low	Short term	Unavailable

1 ODOT classification (Appendix G)

2 Crash Reduction Factor: The percentage of crash reduction expected after implementing the recommended countermeasure.  
U.S. Department of Transportation, FHWA-SA-07-015

# Conclusion

The recommendations in this report include 23 low-cost, short-term actions and four intermediate- to high-cost improvements to increase the level of safety at this intersection. The main recommendations are summarized below:

- Address the conflict at the ramps to I-90 and I-77 south of Carnegie Avenue by installing repeated advance directional information to emphasize lane assignment through:
  - Advanced lane assignment overhead signs,
  - Upgraded pavement markings,
  - Ground-mounted sign at the gore area, and
  - Mountable raised island separation to define the ramps' entrances.
- Lane changing restrictions should be reinforced to discourage interference and help control undesirable human behavior.
- Upgrade the interstate signs on all approaches and adjust the location of the sign on East 9<sup>th</sup> Street for better visibility.
- Develop an access management plan to reduce the number of current access points, and consider opportunities to consolidate adjacent access points to reduce the number of conflict points.

- Improve the visibility of traffic signals by using a signal head for each lane and adding backplates.
- Remove unnecessary signs and obstructions.
- Annually trim the trees and shrubs to ensure the visibility of signs.

Since the RSA was conducted, the unused post on Carnegie Avenue eastbound approach was removed and the sign was relocated. Also, ODOT District 12 is currently looking into any interstate highway right-of-way violations.

These recommendations will be sent to the city of Cleveland for comments and accommodation as appropriate; the city is asked to comment on all recommendations, and their response will be appended to this report.

The city of Cleveland may use this report to request safety funding from the ODOT Central Office to address some or all the recommendations included in this report.



## Appendices

A: Glossary

B: High Crash Locations Ranking Methodology

C: Road Safety Audit Team Members

D: Intersection Layout

E: Crash Analysis (2005 - 2007 Crash Data)

F: Turning Movement Counts (Innerbelt Study)

G: ODOT Cost-Range Categories



# Appendix A: Glossary

**Backplates:** A thin strip of material that extends outward from and parallel to a signal face on all sides of a signal housing to provide a background for improved visibility of the signal indications.<sup>1</sup>

**Capacity:** Traffic carrying ability of a facility over a range of defined operational conditions. Capacity analysis provides tools to assess facilities and to plan and design improved facilities.<sup>2</sup>

**Clearance Interval:** The yellow plus all-red interval that occurs between the phases of a traffic signal to provide for clearance of the intersection before conflicting movements are released.

**Crash Reduction Factor:** The percentage of crash reduction expected after implementing the recommended countermeasure.

**Detector:** A device that detects the presence of a vehicle and actuates the demand for a green signal.

**Gore:** A location where one or more lanes of the road diverge away from their direction of travel.

**Green Time:** The duration of the green indication for a given movement at a signalized intersection.

**Hatched Island:** An island that is designated by pavement markings.

**Island:** Area between traffic lanes used for the control of vehicular movements or for pedestrian refuge. Within an intersection area, a median or an outer separation shall be an island. An island may be designated by pavement markings, channelizing devices, curbs, pavement edges, or other devices.<sup>1</sup>

**Pedestrian Crossing Countdown Signal:** Displays flashing numbers that countdown the time remaining until the end of the flashing “DON’T WALK” (FDW) interval.

**Signal Phasing:** The way in which the right of way is allocated among conflicting traffic movements that seek to use the same space.

**Truncated Domes:** Detectable warning system aids the visually impaired, which comply with the detectable warnings on the walking surfaces section of the Americans with Disabilities Act.

1 Manual on Uniform Traffic Control Devices

2 Highway Capacity Manual



# Appendix B: High Crash Locations Ranking Methodology

The crashes were ranked according to three different aspects:

## 1. Frequency of crashes

Rank 1 means the location has the highest crash frequency.

## 2. Equivalent Property Damage Only Index (EPDO)

This index uses a formula to convert crashes of all severities to the equivalent of property damage-only crashes. ODOT uses this formula in their accident analysis and it is similar to NOACA's severity index. The formula is as follows:

**EPDO** = (# of fatal crashes x 90.14) + (# of injury crashes x 5.50) + property damage only crashes + unknown severity crashes

Rank 1 means the location has the highest EPDO.

## 3. Crash Rate (Crashes per million entering vehicles)

$(\# \text{ of crashes} \times 1,000,000) / [(\text{years of data}) \times (365) \times (\text{approach volume})]$

Rank 1 means the location has the highest crash rate.

**Composite ranking** = Frequency Rank + EPDO rank + Crash rate rank

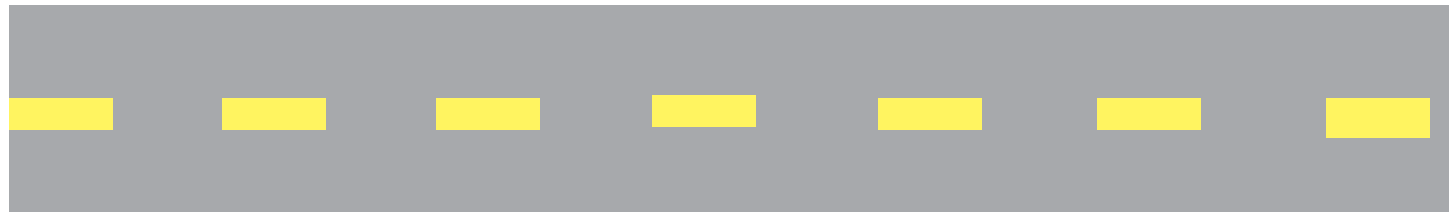


# Appendix C: Road Safety Audit Team Members

<b>Name</b>	<b>Title</b>	<b>Organization</b>
1. Joe Glinski	Safety Program Engineer	FHWA
2. Michael Armstrong	Senior Transportation Engineer	FHWA
3. Ron Chesla	Planning Traffic Engineer	ODOT District 12
4. Brian Blayney	Traffic Engineer	ODOT District 12
5. Travis Bonnett	Traffic Engineer	ODOT District 12
6. Erika Kenzig	Intern	ODOT District 12
7. Andrew Cross	Traffic Engineer	City of Cleveland
8. Mahmoud Al-Lozi	Principle Planning Engineer	NOACA
9. Jim Armaline	Senior Planning Engineer	NOACA
10. Mona Aziz	Senior Transportation Engineer	NOACA
11. Maher Holozadah	Senior Transportation Engineer	NOACA
12. Gary Grano	Senior Transportation Planner	NOACA
13. Sara Maier	Transportation Planner II	NOACA
14. Michelle Johnson	Transportation Planner II	NOACA
15. Sahar Tawfiq	Transportation Engineer	NOACA

**FHWA:** Federal Highway Administration

**ODOT:** Ohio Department of Transportation

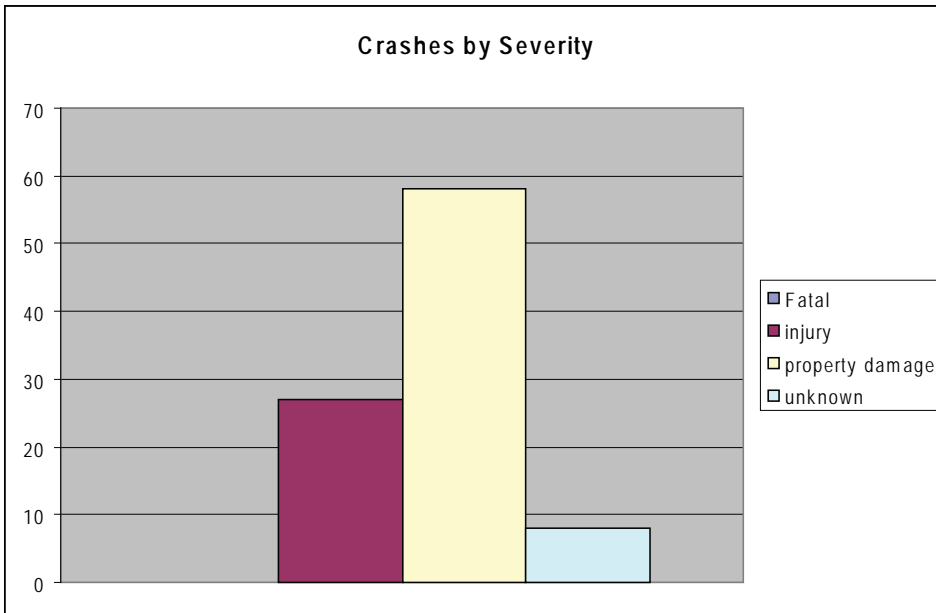


# Appendix D: Intersection Layout

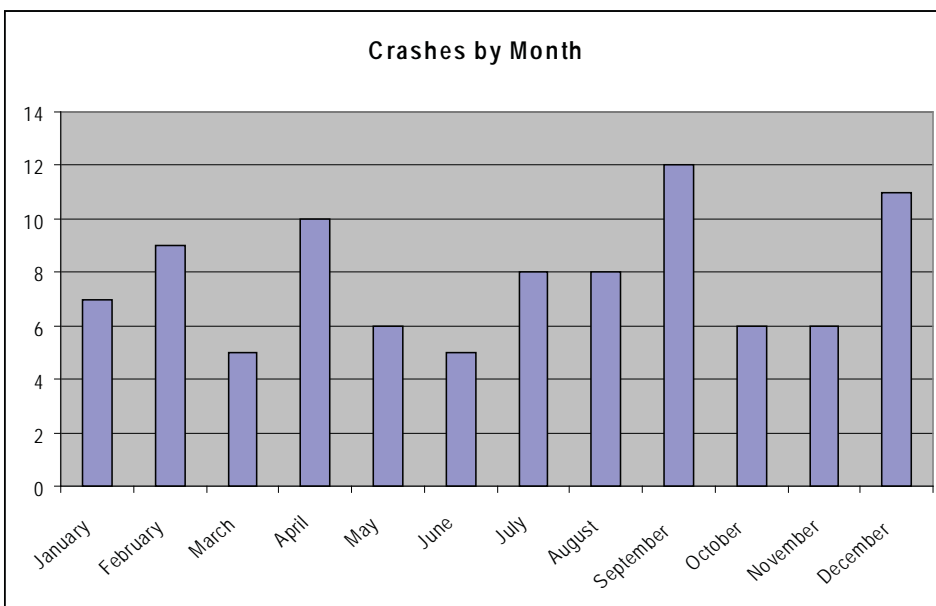




# Appendix E: Crash Analysis (2005 – 2007 Crash Data)

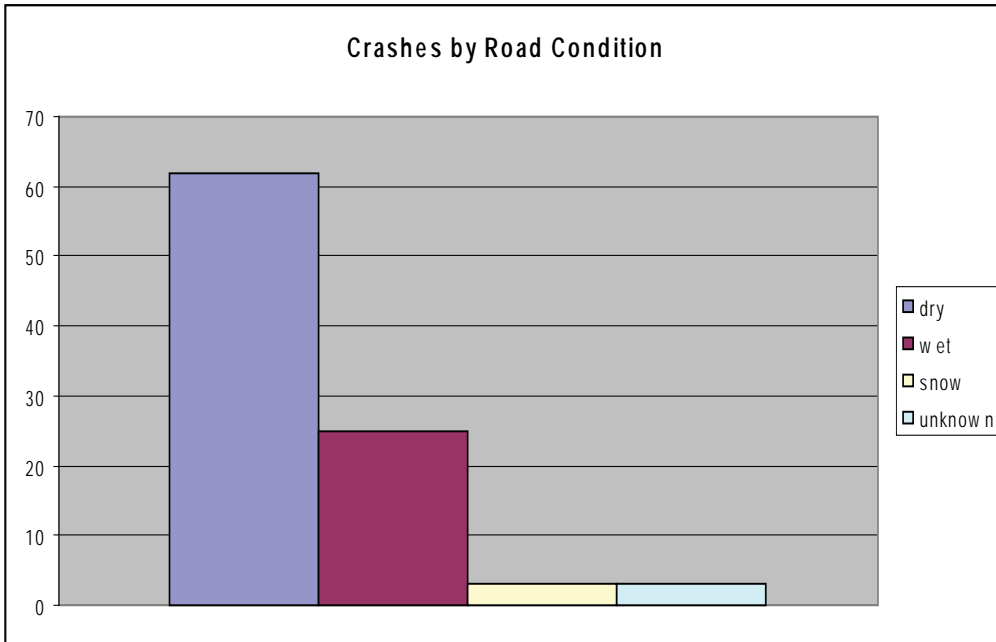


Crash Severity	
Fatal	0
Injury	27
Property damage	58
Unknown	8
<b>Total</b>	<b>93</b>

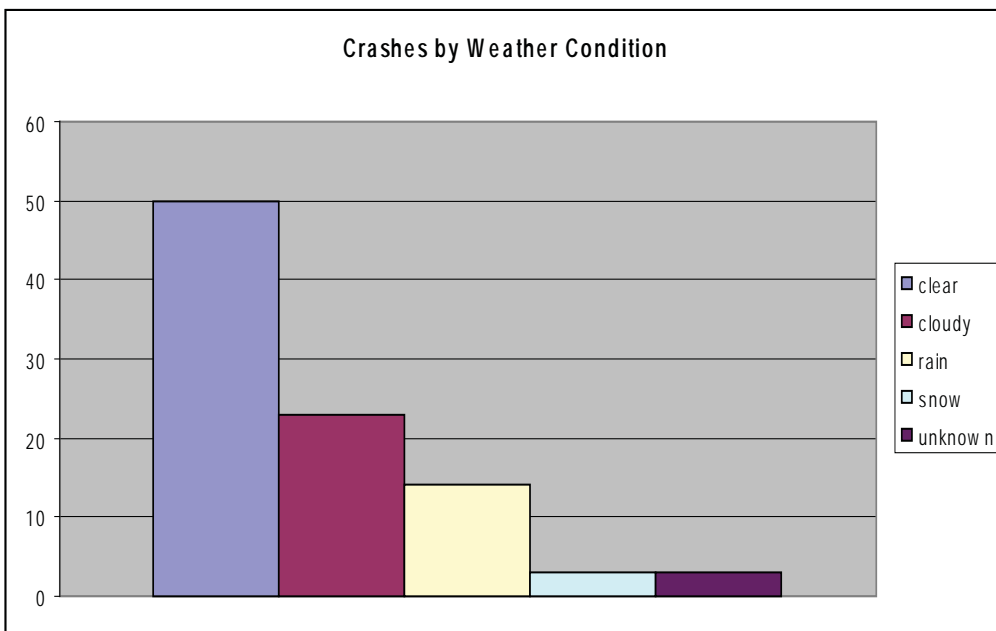


Month	
January	7
February	9
March	5
April	10
May	6
June	5
July	8
August	8
September	12
October	6
November	6
December	11
<b>Total</b>	<b>93</b>

# Appendix E: Crash Analysis (2005 – 2007 Crash Data)



Road Condition	
Dry	62
Wet	25
Snow	3
Unknown	3
<b>Total</b>	<b>93</b>



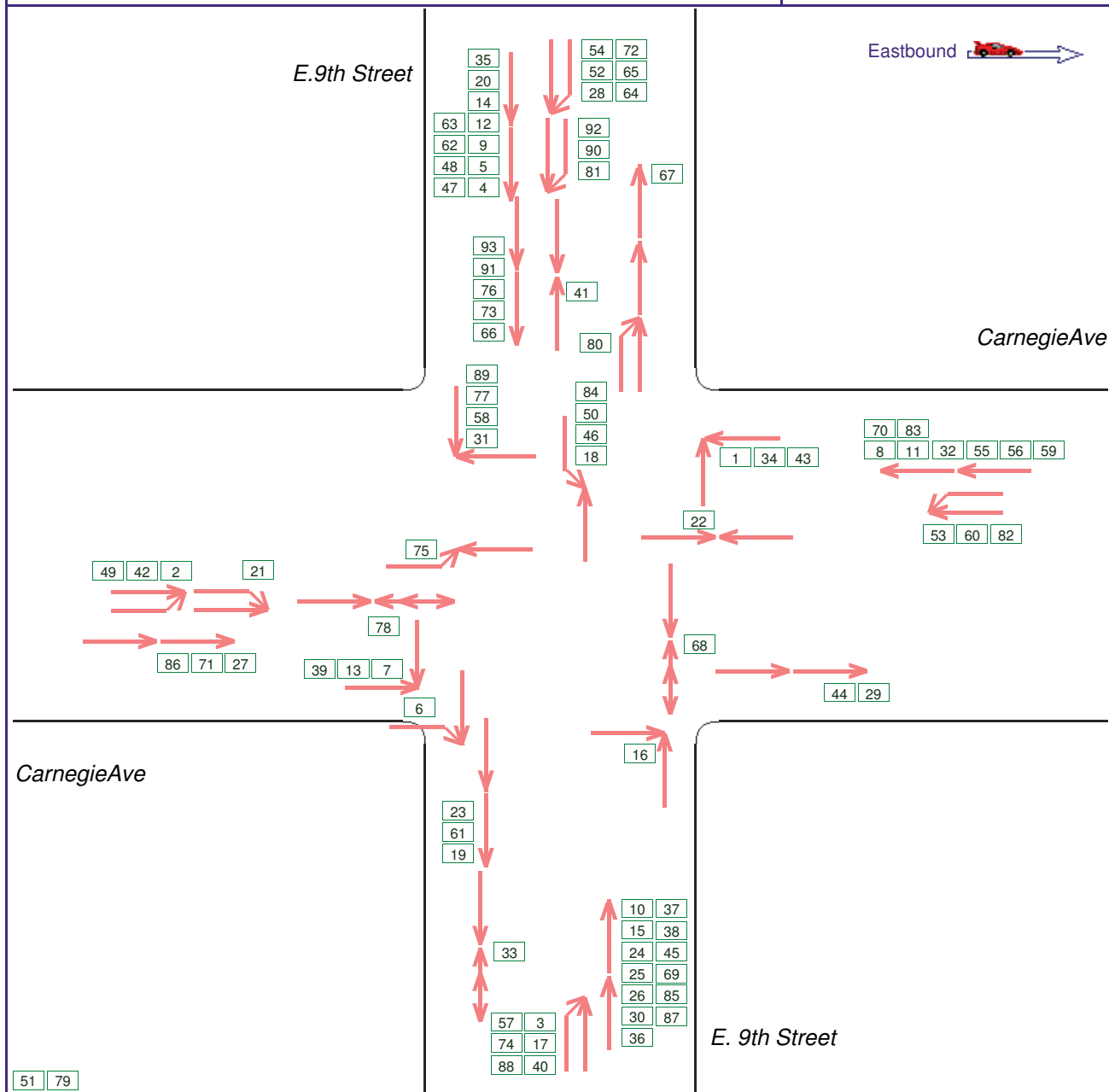
Weather	
Clear	50
Cloudy	23
Rain	14
Snow	3
Unknown	3
<b>Total</b>	<b>93</b>

# Appendix E: Crash Analysis (2005 – 2007 Crash Data)

## COLLISION DIAGRAM

Key Number = \_\_\_\_\_

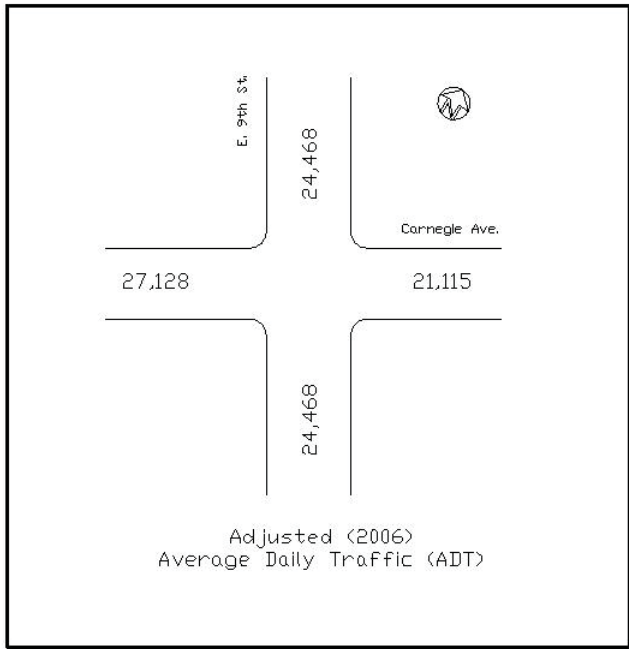
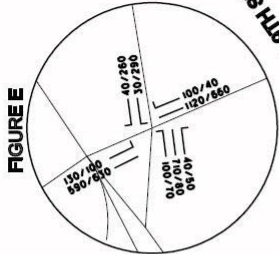
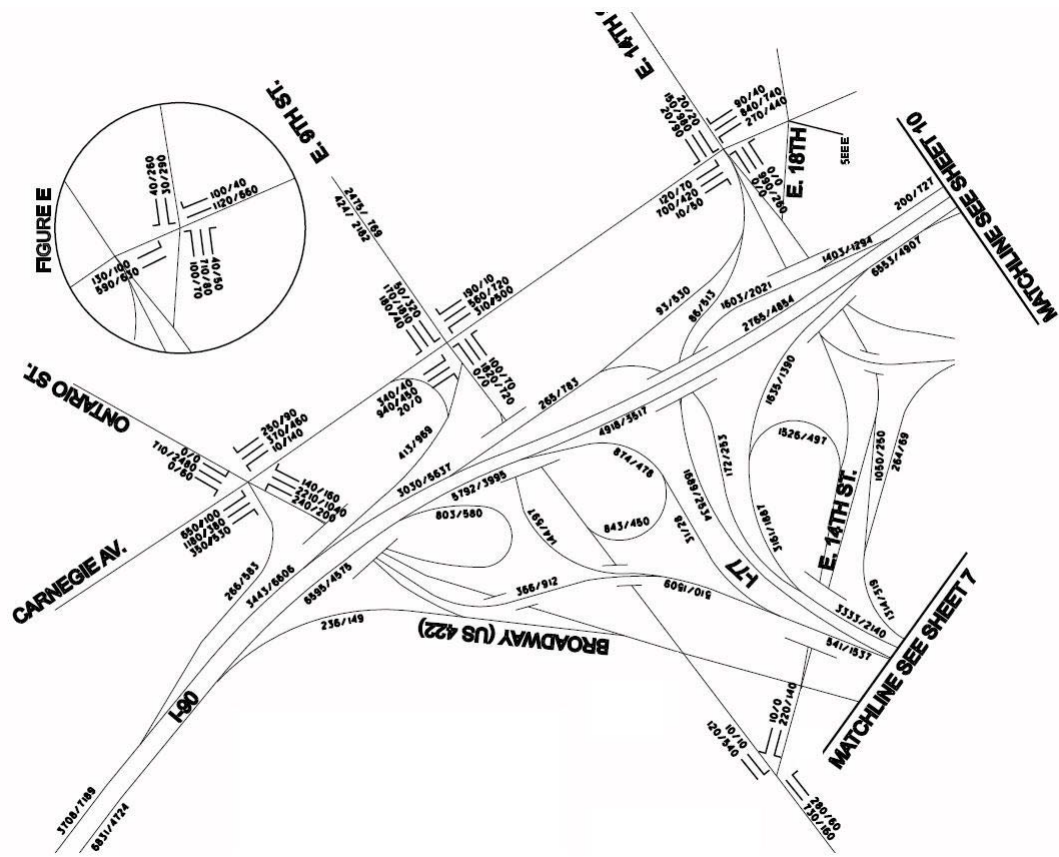
MUNICIPALITY: <u>City of Cleveland</u>	COUNTY: <u>Cuyahoga</u>	FILE: <u>CarnegieE9th</u>
INTERSECTION: <u>CarnegieAve/E9thSt</u>		CASE #: <u>RSA1</u>
PERIOD: <u>3</u> YEARS <u>0</u> MONTHS	FROM <u>1/1/2005</u> TO <u>12/31/2007</u>	BY: _____ DATE: <u>9/10/2008</u>



SYMBOLS		MANNER OF COLLISION	
MOVING VEHICLE	<b>P</b> PEDESTRIAN	REAR END	HEAD ON
TURNING VEHICLE	<b>B</b> BICYCLIST	LEFT TURN	RIGHT TURN
BACKING VEHICLE	<b>A</b> ANIMAL	LEFT TURN	RIGHT TURN
PARKED VEHICLE	FIXED OBJECT	OVERTAKE	RIGHT ANGLE
RECORD NUMBER	Fatal	OUT OF CONTROL	SIDE SWIPE

HSA Software 3.0

# Appendix F: Turning Movement Counts (Innerbelt Study 2000/Burgess & Niple)



# Appendix G: ODOT Cost-Range Categories

Category	Cost	Time Required
Low	Less than \$100,000	One year or less
Medium	\$100,000 – \$5 million	One year - 5 years
High	More than \$5 million	More than 5 years

