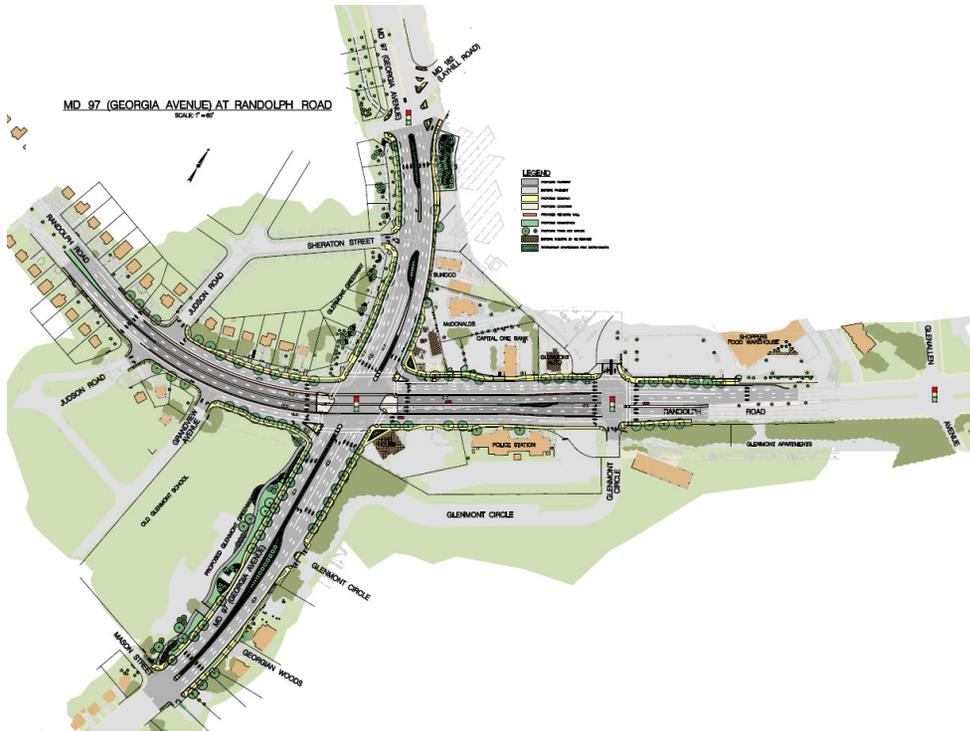


# MD 97 & Randolph Road

## Road Safety Audit (RSA)



Project Manager: Brett Deane  
RSA Engineer: William L. Haynes  
May 31, 2012

---

# Agenda

- Project Area
- Project Overview
- Road Safety Audit Process Overview
- Stakeholder Input

# Project Area

## Land Use



- Single-Family Residential Areas
- Glenmont Metro Station
- Shopping Center
- Fire & Police Facilities
- High-Density Residential Areas

# Project Area

## *Three-Year Crash Data (2009 through 2011)*

- MD 97: Glenallan Ave to Mason St
  - 138 Total Crashes
  - Significantly exceeds statewide averages for:
    - Total Crashes
    - Rear end, Sideswipe, Angle, **Truck-Related**
    - **Pedestrian (HIA)**
  - Notable Vehicle Types
    - **Emergency Vehicles (10)**
    - **School Buses (10)**
    - **Passenger Bus (15)**
- Randolph Road: Judson Rd to Glenallen Ave
  - 84 Total Crashes
  - Highest Occurrence of Crash Types:
    - **Rear end, Sideswipe, Angle**
    - **Pedestrian (HIA)**
  - Notable Vehicle Types
    - **Emergency Vehicles (5)**
    - **School Buses (5)**
  - Notable Probable Causes
    - **Driver Inattention, Fail to Yield, Too Fast, Following Too Closely**

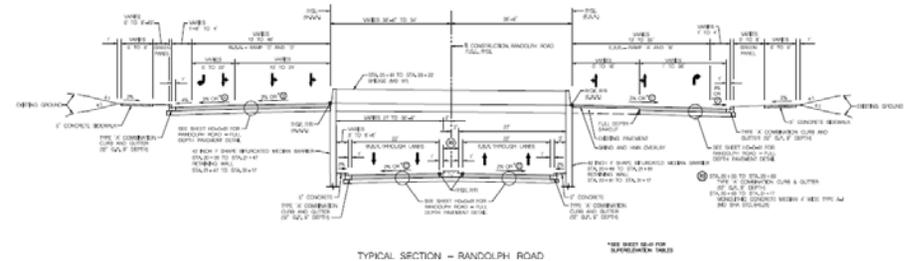
---

# Project Overview

- Three-year Project
- Seven Construction Phases
- MD 97 South of Randolph Road
  - 2015 ADT = 47,925
  - 2030 ADT = 52,100
- Randolph Road - East of MD 97
  - 2015 ADT = 38,950
  - 2030 ADT = 40,575

# Project Overview

- **Grade separation** of the MD 97/Randolph Road intersection by constructing a **MD 97 bridge** over a depressed Randolph Road.
- MD 97 Limits = Mason Street to Layhill Road (MD 182)
- Randolph Road Limits = 200 ft west of Judson Road to 500 ft east of Glenmont Circle
- Goal = **Improve LOS** by reducing congestion



---

# Project Overview

## ■ Project Area

- ❑ Heavy transit reliance and usage
- ❑ Heavy pedestrian activity
- ❑ Montgomery County HIA for pedestrian crashes
- ❑ Nearby Glenmont Metro Station
- ❑ First responder (i.e., police, fire, EMS) operations

## ■ Notable Design Elements

- ❑ New weave and merge areas
- ❑ No merge areas for right turns from Randolph Rd
- ❑ Bike lanes
- ❑ Changes in access management (Commercial & Residential)
- ❑ Randolph Rd WB triple left
- ❑ Bus transit routing and operations
- ❑ Significant traffic signal improvements

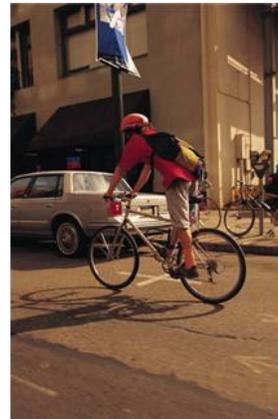
# What is a Road Safety Audit?



A road safety audit is a formal safety performance examination of an existing or future road or intersection by an independent audit team.

# What is a Road Safety Audit?

- An RSA is a **tool** that:
- Is a formal process
- Focuses on safety issues
- Considers all road users
- Proactive review of observed and potential safety issues to reduce risk
- Considers all environmental conditions
- Qualitative analysis, **not a quality control of design. Why?.....**



# What is a Road Safety Audit?



Compliance with design standards, while important, does not necessarily result in optimally safe road design and, conversely, failure to achieve compliance with standards does not necessarily result in a design that is unacceptable from a safety perspective.

# What is a Road Safety Audit?



- Effective and cost beneficial proactive safety improvement tool.
- Often identifies safety concerns **not typically discovered in a traditional safety review.**
- Safety improvement recommendations can be achieved at a **relatively low cost with minimal project delay.**
- Conducting RSAs and implementing their improvements in design estimated to typically cost **5% of the overall engineering design fees.**

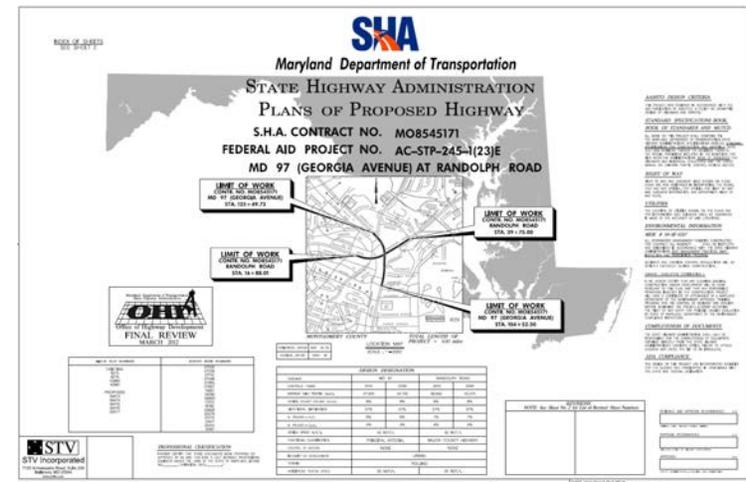
- Helps reduce throwaway costs and reconstruction costs
- Reduced lifecycle costs → lower maintenance costs
- Societal costs of collisions
- Liability claims

# RSA Scope

## *Detailed Design Stage*



- Roadway Plans (sh. 17 – 21)
- Roadway Profiles (sh. 22 – 28)
- Temporary Roadway Plans (sh. 35 – 60)
- Maintenance of Traffic (sh. 65 – 108)
- Temporary Traffic Controls (sh. 162 – 189)
- Landscape Plans & Details (sh. 203 – 211)
- Traffic Signal Plans (sh. 280 – 285)
- Signing & Marking Plans (sh. 287 – 293)
- Lighting Plans (sh. 300 – 306)



# RSA Scope

## *Purpose of Detailed Design RSA*

- Identify and address any design issue prior to construction.
- Will departure from standards significantly impact safety?
- Evaluate safety of road features (i.e., signage, markings, clear zone, roadside protection, landscaping).
- Determine needs of all road users.
- Identify issues “missed” in a previous audit.
- Follow-up on issues identified in a previous audit.



# RSA Process

## Typical RSA Steps



# RSA Process

*Where are we?*



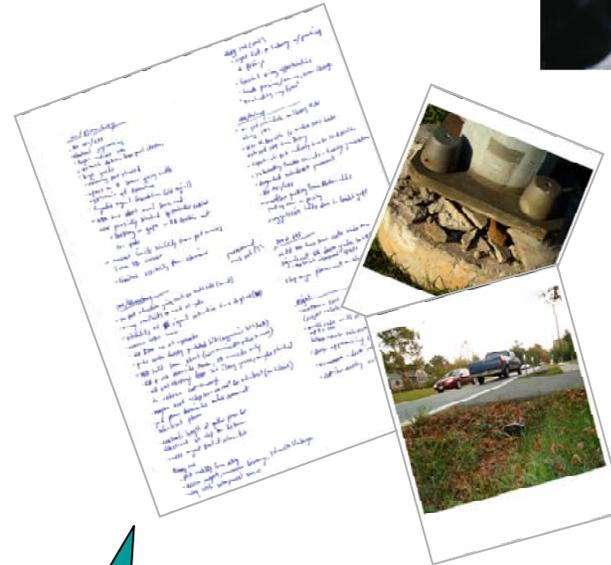
RSA team will conduct Steps 3-6 over 4 days

Review relevant data to include:

- Stakeholder / Community input
- Design/MOT Plans
- Crash data
- Traffic volumes (pedestrians and vehicles)
- Signal phasing

## 4. Field Review

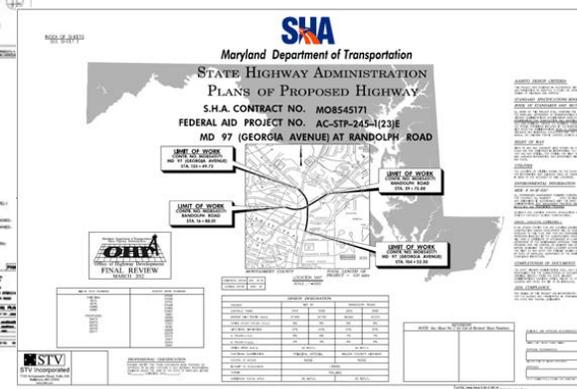
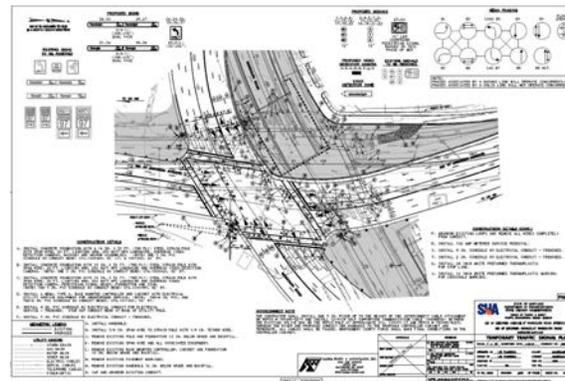
- Observe road user characteristics
- Observe surrounding land uses
- Observe link points to the adjacent transportation network



# 5. RSA Analysis

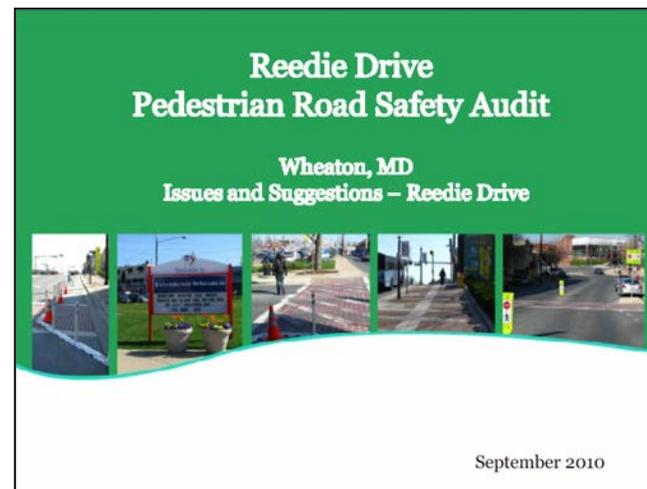


- Workshop setting
- Review background reports and design criteria
- Systematically review drawings and other information/data
- Identify, prioritize, and mitigate safety issues



## 6A. Preliminary Findings Meeting

- RSA team, design team, owner
- Discuss preliminary findings and possible solutions
- Use results to write RSA report



# 6B. RSA Report

- Documents the results of the RSA
- Identifies and prioritizes safety issues
- Includes suggestions for improvements



Feb 27 Draft

**Road Safety Audit Report  
MD 166: Frederick Road to Selford Road  
Baltimore County**

**Project Location and Description:** The section of MD 166 from Frederick Road (MD 144) to Selford Road is a principal arterial traversing a mostly residential community in Baltimore County. It is known as South Rolling Road for the majority of the study area, but becomes Selford Road south of US 195. This 2.67-mile segment of MD 166 consists of predominantly "straight" segments with several minor horizontal curves and one significant horizontal curve at its intersection with Hilton Avenue. Modest vertical curves (often combined with horizontal curves) exist at several locations along the corridor, which limit visibility, although not appearing to impact throughput. This section of MD 166 is an undivided two-lane roadway, with the exception of the section between Bloomsbury Avenue and Valley Drive, where the roadway temporarily expands to an undivided, four-lane cross-section. This section is adjacent to Caltonville High School.

A relatively short segment of sidewalk is provided along the east side of MD 166 between Frederick Road and Chelton Avenue (425 feet). However, no sidewalk is provided on the east side of MD 166 from this point until Newburg Avenue, which represents approximately a 3,300-ft stretch of roadway. The next section of sidewalk on the east side extends from Newburg Avenue, past Caltonville High School to Campus Drive/Valley Road. No additional sidewalk is provided on the east side of MD 166 for the remaining section of the study area (i.e., over 4000 feet).

A sidewalk is provided along the west side of the roadway for the majority of the study corridor, from Frederick Road to Wilkens Avenue (i.e., 1.76 miles). However, there are segments of sidewalk on the west side where the sidewalk is narrower than current standards (particularly ADA standards). After Wilkens Avenue, no sidewalk is provided along either side of the roadway.

There are no designated bicycle facilities; however the shoulder width along certain sections of the roadway may accommodate any existing bicycle demand. Much of the shoulder area (north of Bloomsbury Avenue) appears to be designated for residential parking.

Exclusive turn-lane capacity is provided at Columbia Court and Valley Road/Campus Drive, which both provide access to Caltonville High School. Exclusive left-turn lane capacity is also provided at Collegegate Drive, which provides access to the Community College of Baltimore County to the west and the Caltonville Center for Alternative Studies to the east (also both educational institutions). Lastly, exclusive left-turn capacity is also provided at Wilkens Avenue, Fonthal Farm Road, and Higfield Drive, all on the southern end of the study area.

The study area included several educational institutions, including Hillcrest Elementary School on the northern end and Caltonville High School in the "mid-section" of the corridor. Both schools have significant, well-controlled pick-up/drop-off operations. However, Caltonville High School (given the age of the student population) has significantly more "unsupervised" students who walk to the school. Observations revealed that the walking students exhibited a myriad of "unsafe" behaviors (most notably jaywalking). This is attributable to both pedestrian behavior and infrastructure/operational deficiencies

1

SUMMARY OF FINDINGS AND POTENTIAL IMPROVEMENT SUGGESTIONS		
Issue	Potential Cause	Suggestion
<b>A. High or notable proportion of left turn and angle crashes (Note: corridor exceeds statewide averages for left turn crashes).</b> <b>1. At Campus Drive/Valley Road (LM 1.47).</b> <b>2. At American Court (LM 1.34).</b> <b>3. At Bloomsbury Avenue (LM 1.74).</b> <b>4. At Newburg Avenue (LM 1.99).</b> <b>5. At Park Drive (LM 2.37).</b>	<b>1.a.</b> Limited NB sight distance of WB traffic, and limited WB sight distance of NB traffic. <b>1.b.</b> WB traffic making aggressive movements during "short gaps" in EB traffic during concurrent side-street phase.	<b>1.a.1.</b> Consider trimming foliage in SE quadrant. [P1] <b>1.a.2.</b> Evaluate the ability to adjust the stop bar placement on WB approach with respect to SBL and NBR turning radii. [P3]
	<b>2.a.</b> Limited sight distance to the north due to foliage and the crest of hill. <b>2.b.</b> Limited gaps in MD 166 traffic for EB traffic coupled with relatively high MD 166 speeds.	<b>1.a.3.</b> Determine the feasibility and constructability of modifying the geometry of the WB approach to allow for wider turning radii to provide greater visibility of the WB approach. [P2]
	<b>2.c.</b> No stop bar on American Court (EB) approach.	<b>1.b.1.</b> Evaluate the capacity impacts of providing concurrent protected left turn phases for the EB & WB approaches. [P2]
	<b>3.a.</b> The NB movement has a "tight" turning radius due to east leg geometry, coupled with limited peak-period gaps and high speeds on MD 166.	<b>2.a.1.</b> Consider trimming foliage in NW quadrant. [P1]
	<b>3.b.</b> WB sight distance to south blocked by traffic signal controller cabinet, coupled with short acceleration lane.	<b>2.b.1.</b> Consider installing intersection warning signs (with a supplemental road name plaque and/or supplemental pavement markings) on NB and SB approaches to intersection. [P1]
<b>4.a.</b> EB sight distance to north limited due to trees and foliage and set-back of stop sign. <b>4.b.</b> Mound in SE quadrant blocking sight distance to south from WB approach. <b>4.c.</b> Intersection at Newburg Avenue at crest of hill. <b>4.d.</b> Narrow NB passing area to the right of stopped vehicle, where passing motorist may not be expected by side-street traffic.	<b>2.c.1.</b> Consider installing a stop bar and crosswalk on the EB approach at American Court. [P2]	
<b>5.a.</b> Limited visibility from WB approach due to intersection geometry (offset and skew) and foliage.	<b>3.a.1.</b> Determine the feasibility and constructability of modifying the geometry (i.e., median) on east leg to allow for an "easier" turning maneuver. [P3]	
	<b>3.a.2.</b> Evaluate the capacity impacts of providing a lagged protected left turn phase for SB traffic. [P3]	<b>3.a.3.</b> Determine the feasibility and constructability of allocating the unused area along the east side of MD 166 to provide a SBL turn bay. [P3]
	<b>3.b.1.</b> Consider evaluating the sight distance for the WB movement. [P1]	<b>3.b.2.</b> Evaluate the feasibility of reconstructing the traffic signal in order to relocate traffic signal equipment outside

5

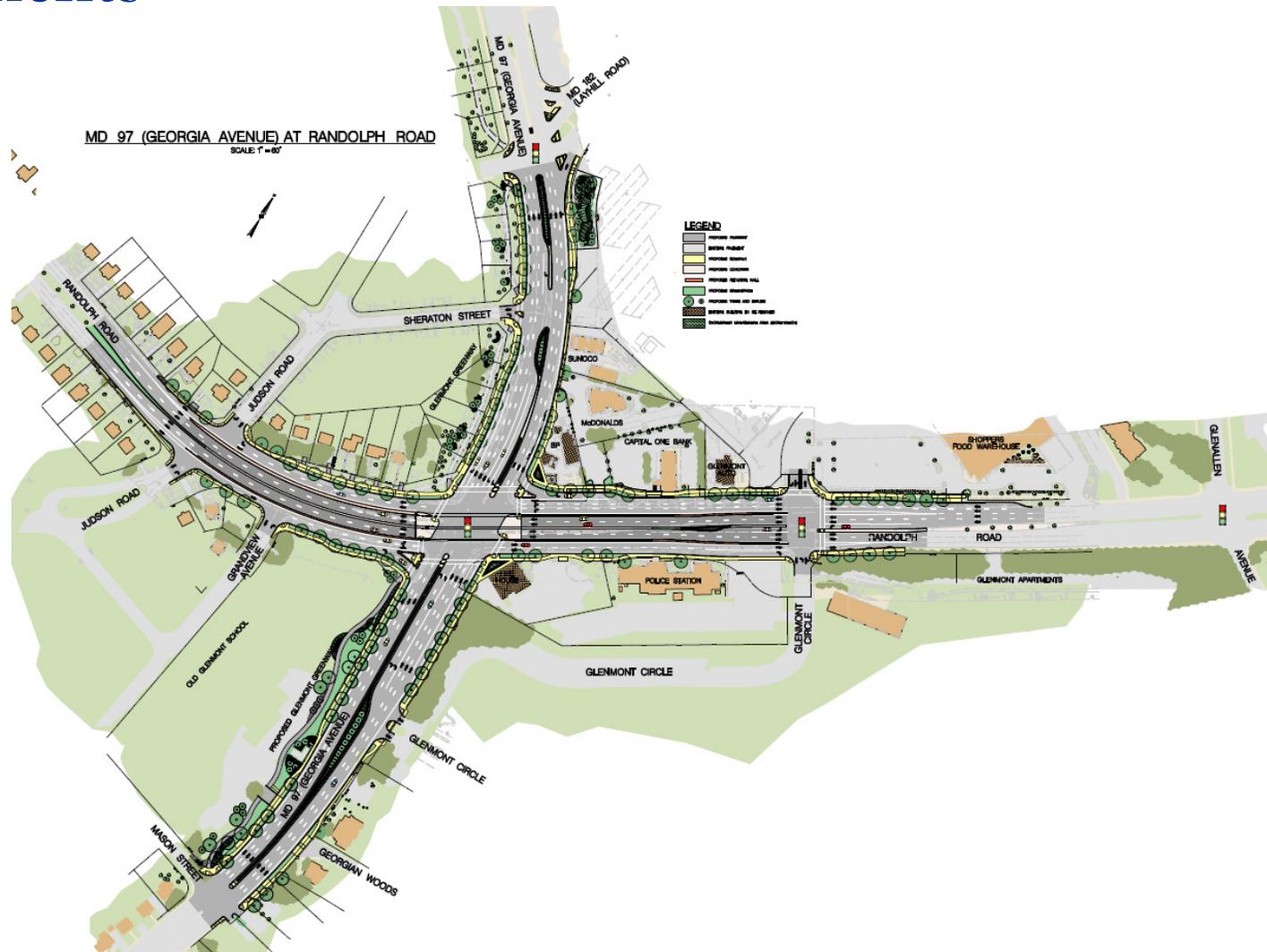
# RSA Team Members



- Maryland SHA (Roadway, MOT, ADA, Bike/Ped, Traffic Signal Operations)
- Montgomery County DOT (Roadway, Traffic Operations)
- Fairfax County Police Department (Emergency Operations)
- Sabra, Wang & Associates (Human Factors)



# Comments



We appreciate your feedback!

---

# Discussion Topics

## *Safety*

- How does proposed design influence:
  - Conflicts and Speeds
  - Transit Operations
  - Bicycle Safety & Accessibility
  - Pedestrian Safety & Accessibility
  - Access Management
  - Weaving & Merging
    - East of Glenmont Cir
    - EBR & WBR from Randolph Rd
    - EB from Grandview Ave

---

# Discussion Topics (cont')

## *Safety*

- How is land-use impacted by proposed design
  - Commercial Access
  - Residential Driveways
  - Emergency Management (Access & Breakdowns)
- Maintenance of Traffic
- Human Factors
  - How would various road users interact with interchange?
  - Driver Expectancy
  - Driver & Pedestrian Behavior
- Project Elements
  - Landscaping
  - Structures
  - Roadside/Shoulders/Medians
  - Lighting

---

# Discussion Topics (cont')

## *Safety*

- Georgia Avenue
  - South Section: Mason Street - Glenmont Circle
  - North Section: Sheraton Street – Layhill Road
- Traffic Signals
  - Georgia Ave & Randolph Rd
  - Randolph Rd & Glenmont Cir
  - Georgia Ave & Layhill Rd
- Randolph Road
  - West Section: Judson Road – Grandview Ave
  - East Section: Glenmont Cir – Glenallen Ave