REEDY CREEK ROAD DESIGN STUDY
from North Harrison Avenue to Northeast Maynard Road
Roadway Safety Review Report
to supplement the

**Reedy Creek Road Design Study**
from North Harrison Avenue to Northeast Maynard Road

Wake County, NC

TIP Project: U-5501
Federal Aid Project No. STPDA-1650(5)
WBS Element No. 45488.1.1
Town Of Cary Project ST1207

Prepared by:
Kimley-Horn and Associates, Inc.
NC License #F-0102

Prepared for:
**Town of Cary**

KHA Project #011775042

June 2013
### Table of Contents

Purpose of the Road Safety Review ........................................................................................................ 1
Study Area Description ............................................................................................................................. 3
Existing Corridor Characteristics ............................................................................................................ 4
Traffic Conditions ..................................................................................................................................... 6
Information Used in the Roadway Safety Review .................................................................................... 7
Corridor Crash Analysis .......................................................................................................................... 8
Intersection Crash Analysis .................................................................................................................... 10
  N Harrison Avenue Intersection Crash Summary .............................................................................. 10
  NE Maynard Road Intersection Crash Summary ................................................................................ 11
Identification of Crash Hot Spots .......................................................................................................... 13
  Hot Spot 1 – Smokehouse Lane .......................................................................................................... 14
  Hot Spot 2 – E Dynasty Drive/Electra Drive ...................................................................................... 16
Other Corridor Issues/Recommendations ............................................................................................... 19
  Overall Corridor Observations .......................................................................................................... 19
Conclusions ............................................................................................................................................. 30
Table of Figures

Figure 1: Roadway Safety Review Study Area ................................................................. 1
Figure 2: Proposed Roadway Cross-Section for the Reedy Creek Road Corridor ................ 2
Figure 3: Morning Traffic Entering and Exiting the Entrance to the Two Schools ................ 3
Figure 4: Sidewalk Near Fallen Elm Avenue ................................................................. 5
Figure 5: ADA-Compliant Pedestrian Ramp ................................................................. 5
Figure 6: Narrow Shoulders on Reedy Creek Road ..................................................... 5
Figure 7: Corridor Crash Types .................................................................................. 9
Figure 8: Corridor Light Condition ............................................................................ 9
Figure 9: N Harrison Avenue Crash Type ..................................................................... 10
Figure 10: N Harrison Avenue Crash Type ................................................................. 11
Figure 11: NE Maynard Road Crash Type ................................................................. 12
Figure 12: NE Maynard Road Light Condition .......................................................... 12
Figure 13: Corridor Hot Spot Histogram ..................................................................... 13
Figure 14: Horizontal Roadway Curves at Smokehouse Lane .................................... 15
Figure 15: Shoulder Condition at Smokehouse Lane ................................................ 15
Figure 16: Electra Drive: Poor Sight Distance Looking Left ....................................... 18
Figure 17: Electra Drive: Right Turn Rutting ............................................................. 18
Figure 18: Reedy Creek Road at N Harrison Avenue: Poor Sight Distance Looking West . 20
Figure 19: Reedy Creek Road at N Harrison Avenue: Consider Staggering Left-Turn Stop Bar . 20
Figure 20: Dublin Woods Drive: Two Object Markers ............................................. 22
Figure 21: Dublin Woods Drive: Poor Pavement Condition ..................................... 22
Figure 22: Melody Lane: Vertical Curve ................................................................. 23
Figure 23: Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Morning Peak Operations .... 25
Figure 24: Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Afternoon Peak Operations . 25
Figure 25: Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Sidewalk Termination .... 25
Figure 26: Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Resulting “Desire Lines” .... 25
Figure 27: Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Pedestrian Crossing Operations 1 26
Figure 28: Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Pedestrian Crossing Operations 2 26
Figure 29: Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Pedestrian Crossing Operations 3 26
Figure 30: Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Sight Distance to North .... 26
Figure 31: Rutting on the South Side of Indigo Drive ................................................ 28
Figure 32: Rutting on the North Side of Indigo Drive .............................................. 28
Figure 33: NE Maynard Road: Lack of Pedestrian Accommodations ...................... 29
Figure 34 NE Maynard Road: Southbound Left-Turn Lane Queuing in the PM Peak Hour .... 29
# Table of Tables

Table 1: Hot Spot 1 – Reedy Creek Road from MP 1.15 to MP 1.20 .................................................. 14
Table 2: Summary of Safety Issues and Recommendations – Hot Spot 1 (Smokehouse Ln) .............. 16
Table 3: Hot Spot 2 – Reedy Creek Road from MP 1.25 to MP 1.30 .................................................... 17
Table 4: Summary of Safety Issues and Recommendations – Hot Spot 2 (E Dynasty Dr/Electra Dr) .... 18
Table 5: Summary of Safety Issues and Recommendations – N Harrison Avenue .................................. 21
Table 6: Summary of Safety Issues and Recommendations – Dublin Woods Drive ............................ 22
Table 7: Summary of Safety Issues and Recommendations – Melody Lane ......................................... 23
Table 8: Summary of Safety Issues and Recommendations – Wyatt’s Pond Lane/Schools Drive ........... 27
Table 9: Summary of Safety Issues and Recommendations – Indigo Drive .......................................... 28
Table 10: Summary of Safety Issues and Recommendations – NE Maynard Road ............................. 30
Purpose of the Road Safety Review

The Town of Cary plans to widen Reedy Creek Road (SR 1650) between N Harrison Avenue (SR 1652) and NE Maynard Road (NC 54) from a two-lane roadway with shoulders and intermittent sidewalks on one side of the roadway to a three-lane roadway with curb and gutter, bike lanes, and continuous sidewalk on both sides of the roadway. For the purpose of this report, Reedy Creek Road will refer to the north-south route as highlighted in Figure 1.

Figure 1
Roadway Safety Review Study Area
The new cross section, shown in Figure 2, will fit within a 71-foot right-of-way with a 49-foot roadway width, including a 12-foot, two-way left-turn lane. Due to the current crash experience in the corridor, the Town is interested in conducting a roadway safety review to identify potential safety improvements that could be immediately implemented as well as improvements that should be taken into account during the design phase of the project.

![Figure 2: Proposed Roadway Cross-Section for the Reedy Creek Road Corridor](image)

The purpose of this roadway safety review is threefold:

- To identify existing and potential safety issues for vehicles, pedestrians, and bicycles along the study corridor;
- To develop spot and corridor-wide safety recommendations to be incorporated into the roadway widening design concept; and
- To develop recommendations that may fall outside the design process.

Recommendations are summarized in tabular form to show how they are related to different types of crashes.
Study Area Description

The 1.25-mile Reedy Creek Road study area extends from N Harrison Avenue to the north and NE Maynard Road to the south. Reedy Creek Road is a two-lane roadway with the exception of short, three-lane sections at Wyatt’s Pond Lane, Mickey Lane, and Fallen Elm Avenue. At Wyatt's Pond Lane, left-turn lanes are provided in both directions and a northbound right-turn lane is provided into the entrance to Reedy Creek Elementary School and Reedy Creek Middle School as shown in Figure 3. In the other two locations, a southbound left-turn lane is provided at Fallen Elm Avenue and a northbound left-turn lane is provided at Mickey Lane. The posted speed limit on Reedy Creek Road is 35 mph with a posted 25 mph school zone with flashing lights on both sides of Wyatt’s Pond Lane.

Reedy Creek Road is bounded on both ends by five-lane roadways. On the northern end of the corridor, Reedy Creek Road intersects N Harrison Avenue at a traffic signal with three approaches. On the southern end of the corridor, Reedy Creek Road intersects NE Maynard Road at a traffic signal with four approaches. The fourth leg of this intersection serves as the entrance to a commercial development. The posted speed limits on both N Harrison Avenue and NE Maynard Road are 45 mph.

The intersections in the Reedy Creek Road corridor that consist of one or more roadways that provide access to other routes are:

- Melody Lane (three approaches)
- Wyatt’s Pond Lane/School Driveway (four approaches)
- E Dynasty Drive/Electra Drive (four approaches)
- Indigo Drive (three approaches)

![Image](image_url)

**Figure 3**
Morning Traffic Entering and Exiting the Entrance to the Reedy Creek Elementary and Middle Schools
Existing Corridor Characteristics

Prior to conducting a preliminary field review of the corridor on Monday, March 18, 2013, the study team conducted the analysis of five years of crash data in the corridor to determine locations within the corridor in need of a more detailed review. The detailed crash analysis is described in a later section of this report. The study team verified existing conditions along the corridor and at intersections, such as intersection sight distance, travel speeds during off-peak and peak travel conditions, and the operations of traffic control devices. The team also observed traffic conditions and motorist behavior during off-peak and peak travel conditions.

Some of the study team’s key observations of the corridor character are summarized below:

- The study corridor is bounded by traffic signals on each end as shown in Figure 1. The signalized intersection at NE Maynard Road requires additional capacity for traffic leaving Reedy Creek Road as evidenced by queues in excess of 300 feet on a consistent basis during the PM peak hour.
- Corridor contains intersection approaches with varying uses such as private driveways, subdivision streets, public streets, school entrances, and commercial entrances.
- The primary land use in the corridor is residential.
- Two schools, one elementary and one middle school, across from Wyatt’s Pond Lane require safe and efficient school bus access to and from Reedy Creek Road and pedestrian mobility along and across Reedy Creek Road.
- Reedy Creek Road is a route frequently used by Town of Cary fire trucks from Fire Station #1 located near the north end of the corridor.
- Reedy Creek Road is used as a cut-through route between N Harrison Road and NE Maynard Road.
- The horizontal and vertical curves in the corridor create multiple intersection sight distance deficiencies.
- There are multiple residential roads in the corridor that connect Reedy Creek Road to N Harrison Avenue.
- Lighting is only present at the school entrance, the NE Maynard Road intersection, and the N Harrison Avenue intersection.
- Through trucks are prohibited in the corridor as evidenced by several ‘No Trucks’ signs located along the corridor.
- Pedestrians from schools were observed crossing the road at various points as well as walking along the road in the travel lanes.
- There is a signed bike route between E Dynasty Drive and Wyatt’s Pond Lane. Currently, bicyclists using this route must share the road.
- The pavement on the route is in fair condition.
Pavement markings, especially turn arrows, are in poor condition except where recent land development projects have allowed for repaving and restriping.

The study team also identified several pedestrian and bicycle safety-related observations and concerns as described below:

- Other than at N Harrison Avenue, there is an overall lack of pedestrian facilities, such as crosswalks, at key intersections along Reedy Creek Road, especially near the school entrance and at NE Maynard Road. The traffic signal at the NE Maynard Road intersection also does not include push buttons. The sidewalk that is present in the corridor is only on one side of the corridor and is not continuous throughout the corridor (as shown in Figure 4), which is not conducive to pedestrian activities.

- Pedestrian “desire lines” located on the west side of the road especially close to the entrance to the schools, are evidence of frequent pedestrian traffic.

- Many side street sidewalks terminate once they reach Reedy Creek Road. Installing sidewalks along Reedy Creek Road would significantly increase walkability and connectivity in the area.

- ADA-compliant ramps are located at the intersection of Fallen Elm Avenue (at the Retreat at Reedy Creek Road), which was newly developed and at the two signalized intersections (Figure 5).

- The East Ridge bicycle route along Reed Creek Road from E Dynasty Drive to Wyatt’s Pond Lane consists of narrow shoulders with pot holes and drop-offs (Figure 6).
Traffic Conditions

The TIP# U-5501 Traffic Capacity Report for the project was performed and submitted to the North Carolina Department of Transportation in May 2013 to analyze the Build and No Build scenarios for the existing year (2013), opening year (2016), and the design year (2035). Analyses were also performed to evaluate potential roundabouts at the intersections with Wyatt’s Pond Lane/School Driveway and E Dynasty Drive/Electra Drive.

The report recommends a number of roadway improvements along the corridor to provide adequate levels-of-service for traffic operations under existing and future conditions. Many of these improvements, such as adding turn lanes, will positively impact safety along the corridor. The following sections provide a description of each roadway recommendation and the accompanying safety implications of each recommendation.

Reedy Creek Road at E Dynasty Drive/Electra Drive

The traffic capacity analysis included an evaluation of conditions for two types of intersection geometry at the intersection of Reedy Creek Road and E Dynasty Drive/Electra Drive. The first analysis evaluated the need for improvements to the existing two-way, stop-controlled intersection. This analysis resulted in the following recommendation:

- Construct exclusive left-turn lanes on northbound and southbound Reedy Creek Road.

By providing exclusive left-turn lanes on Reedy Creek Road for access to both Electra Drive and E Dynasty Drive, vehicles turning left can be stored in the left-turn lane instead of in the through lane, thereby reducing the potential for rear-end crashes due to left turning vehicles.

The second analysis evaluated the geometry required for a roundabout at this location. This analysis resulted in the following recommendations:

- Single-lane roundabout with single-lane approaches on all four legs of the intersection.

Roundabouts have been shown to effectively reduce the number and severity of crashes at unsignalized intersections, while calming traffic speeds at the same time. Constructing a roundabout at the E Dynasty Drive/Electra Drive intersection can help to improve safety at this intersection by slowing traffic and reducing the number of conflict points, which can help reduce the number and severity of crashes at the intersection. Roundabouts also provide safe crossing opportunities for pedestrians.
Reedy Creek Road at Wyatt’s Pond Lane/School Driveway

The intersection of Reedy Creek Road at Wyatt’s Pond Lane/School Driveway was also evaluated to determine the geometry required for a roundabout. This analysis resulted in the following recommendations:

- Single-lane roundabout with single-lane approaches on southbound Reedy Creek Road and Wyatt’s Pond Lane.
- A right-turn slip lane with a minimum of 100 feet of storage on northbound Reedy Creek Road.
- A right-turn slip lane on the school driveway.

As previously mentioned, a roundabout at this intersection could calm traffic, thereby providing more efficient and safety turning movements into and out of the school driveway. In addition, children and teachers crossing Reedy Creek Road at this intersection both before and after school would be provided much safer crossing opportunities compared to the existing condition.

In addition to the previously identified roadway improvements, other improvements were required to achieve levels of service required by the Town for the 2035 Build condition. In an effort to discourage cut-through traffic on Reedy Creek Road, it was noted in the traffic report that the improvements identified below should not be constructed with this project, but they should instead be reevaluated in the future once traffic has stabilized.

Reedy Creek Road at N Harrison Avenue

- Construct an additional northbound right-turn lane on Reedy Creek Road to provide dual right-turn lanes on this approach.

Reedy Creek Road at NE Maynard Road

- Construct an additional southbound left-turn lane on Reedy Creek Road to provide dual left-turn lanes on this approach.

Information Used in the Roadway Safety Review

Several pieces of information were collected during the project, including turning movement traffic counts, police crash reports, and field data as described below:

- Police crash reports (from 01/01/2008 through 12/31/2012)
- Summary of crash statistics (from 01/01/2008 through 12/31/2012)
- Field review and photos taken along corridor on Monday, March 18, 2013
- Turning movement counts collected from 6:00 AM to 10:00 PM in early to mid-January for the following intersections along the Reedy Creek Road study corridor:
— N Harrison Avenue
— Wyatt’s Pond Lane / School Driveway
— E Dynasty Drive / Electra Drive
— NE Maynard Road
— 24-hour tube counts south of the Wyatt’s Pond Lane / School Driveway intersection

**Corridor Crash Analysis**

The crash analysis for the corridor served as the basis for the determining the critical crash locations in the corridor. Crash data for the Reedy Creek Road study corridor was obtained from the Town of Cary for the five-year period between January 2008 and December 2012. Town staff continues to monitor crashes along the corridor that have occurred in 2013. Those crashes were not included in the statistical crash analysis but are being considered as project recommendations are developed.

**Crash Summary**

The crash summary results provided below also do not include the crashes at the two signalized intersections on both ends of the corridor as they are discussed in the next section.

- The total number of reported crashes in this corridor is: 31 crashes
- The total number of reported injuries in this corridor is: 3 injuries
- The total number of reported fatalities in this corridor is: 0 fatalities

A pedestrian fatality crash in 2007 that occurred in the corridor along with the motor vehicle crashes that have occurred since then were motivating factors in identifying this corridor for improvement.

Summaries of crashes for the corridor by type and light condition are provided in Figure 7 and Figure 8, respectively. Roadway departure crashes (Ran off Road) are the most prominent incidents and account for 35% of total crashes along the corridor during the study time period. According to the Federal Highway Administration, a roadway departure crash is defined as a non-intersection crash that occurs after a vehicle crosses an edge line or a center line, or otherwise leaves the traveled way. Angle crashes were the second most prevalent crash type accounting for 16% of total crashes.

Crashes occurring in low light conditions accounted for 42% of the total crashes for the corridor. There is currently no lighting along Reedy Creek Road except for the school entrance and the intersections with N Harrison Avenue and NE Maynard Road.
Figure 7
Corridor Crash Types

Figure 8
Corridor Light Condition
Intersection Crash Analysis

The crash data for the two signalized intersections bounding the Reedy Creek Road study corridor was obtained from the Town of Cary for the same five-year period between 01/01/2008 and 12/31/2012 using a 100-foot radius, which meets NCDOT requirements.

**N Harrison Avenue Intersection Crash Summary**

- The total number of reported crashes at this intersection is: 7 crashes
- The total number of reported injuries at this intersection is: 1 injury
- The total number of reported fatalities at this intersection is: 0 fatalities

Summaries of crashes for the intersection by type and time of day is provided in Figure 9 and Figure 10, respectively. There were three angle and three rear-end crashes accounting for 86% of total crashes at the intersection during the study time period.

Left-turn traffic during the permissive left-turn phase from N Harrison Avenue onto Reedy Creek Road accounted for all three angle crashes during the five-year study period. Sight distance is not an issue. After field observations only minor safety improvements were identified. The seven crashes in five years at the N Harrison Avenue/Reedy Creek Road intersection with only one minor injury further validates the safety of the intersection.

---

**Figure 9**
N Harrison Avenue Crash Type
The total number of reported crashes at this intersection is: 20 crashes
The total number of reported injuries at this intersection is: 5 injuries
The total number of reported fatalities at this intersection is: 0 fatalities

A summary of crashes for the intersection by time of day and by type is provided in Figure 11 and Figure 12, respectively. There were seven angle and seven rear-end crashes accounting for 70% of the twenty crashes at the intersection during the study time period.

Left-turn traffic during the permissive left-turn phase from NE Maynard Road onto Reedy Creek Road and into the shopping center accounted for five out of the seven angle crashes. Sight distance is not an issue in either direction. Right-turn traffic accounted for 25% of the total crashes. High speed turns from westbound traffic entering onto Reedy Creek Road accounted for three out of the five right-turn crashes while the other two were attributed to vehicles turning right on red.

When approximately 40% of the crashes occur under dark or dusk conditions, intersection lighting may be a safety benefit, especially at intersections with permissive left-turn phases. During the field review with the Town of Cary staff, it was noted that lighting at this intersection only consists of one lighting fixture in the northwest quadrant; however, roadway lighting does existing on NE Maynard Road.
Figure 11
NE Maynard Road Crash Type

Figure 12
NE Maynard Road Light Condition
Identification of Crash Hot Spots

Figure 13 summarizes the crash by 0.05-mile segments of roadway, or crash density, in the northbound and southbound directions between 2008 and 2012.

The crash density by segment was compared to the statistical mean, or average, crash density for all of Reedy Creek Road. The segments with crashes near or above the average crash density for all of Reedy Creek Road are considered to be crash “hot spots” for which more detailed attention was placed during the field review and for the crash analysis. The average crash density on Reedy Creek Road is 5.05 crashes per 0.05-mile segment.

Two 0.05-mile segments exceeded this value, which resulted in 2 crash hot spots. The hot spot with the highest crash density is located at Smokehouse Lane intersection, closely followed by the E Dynasty Drive/Electra Drive intersection. Both hot spots are located at intersections within horizontal roadway curves and include a variety of crash types.

![Figure 13](image-url)
Hot Spot 1 – Smokehouse Lane

As shown in the Figure 13, Hot Spot 1 is between milepost 1.15 and 1.20. Smokehouse Lane is the intersection where a majority of the crashes have occurred.

Crash Analysis

Crashes within Hot Spot 1 are summarized in Table 1. The major conclusions that can be drawn from the information in this table are:

- Half of the six crashes at this location were roadway departure crashes.
- Four out of six crashes occurred during off-peak times.

<table>
<thead>
<tr>
<th>Crash Characteristic</th>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>Total</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Fatal</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Injury</td>
<td></td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Property Damage</td>
<td></td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>67%</td>
<td></td>
</tr>
</tbody>
</table>

By Severity:

- Total Injury: 2
- Type A Injury: 0
- Type B Injury: 0
- Type C Injury: 0

By Type of Collision:

- Rear End: 0
- Ran Off Road: 0
- Angle: 0

By Number of Vehicles Involved:

- One: 0
- Two: 0
- Three and Greater: 0

By Time of Day:

- AM Peak (7 - 9): 0
- PM Peak (4 - 6): 0
- Off Peak: 0

Table 1: Hot Spot 1 – Reedy Creek Road from MP 1.15 to MP 1.20
Safety Issues

- Sight distance to the right impaired by superelevation of the curve as shown in Figure 14

- Combination of horizontal and vertical curves
  - 3 out of 6 crashes ran off road

- Poor shoulder conditions as shown in Figure 15

- 2 out of 6 crashes involved injuries
  - 1 Type A injury, 1 Type C injury

Figure 14
Horizontal Roadway Curves at Smokehouse Lane

Figure 15
Shoulder Condition at Smokehouse Lane
**Proposed Recommendations**

The following proposed improvements are documented in Table 2 with respect to crash types.

- Install curb and gutter to reduce the likelihood of vehicle departure crashes.
- Increase radii on horizontal and vertical curves as much as possible to improve sight distance.

**Table 2: Summary of Safety Issues and Recommendations – Hot Spot 1 (Smokehouse Ln)**

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Issue</th>
<th>Improvement</th>
<th>Addressed by Roadway Design?</th>
</tr>
</thead>
</table>
| Ran Off Road | Vehicles striking fixed objects off the road within the curve to the north | - Increase the horizontal curve radius to the north of Smokehouse Lane  
- Install curb and gutter in curve  
- Improve reverse superelevation through the curve | Yes |
| Angle | Intersection sight distance looking north | - Increase the radius of the horizontal curve to the north of Smokehouse Lane | Yes |

**Hot Spot 2 – E Dynasty Drive/Electra Drive**

As shown in Table 3, Hot Spot 2 is between milepost 1.25 and 1.30. The E Dynasty Drive/Electra Drive intersection is the location of where the crashes occur within this hot spot.

**Crash Analysis**

Crashes within Hot Spot 2 are summarized in Table 3. The major conclusions that can be drawn from the information in this table are:

- Two out of the five crashes at this location were rear-end crashes.
- Three out of five crashes occurred during off peak periods.

**Safety Issues**

- Intersection sight distance, which is approximately 300 feet looking to the left from Electra Drive, is impaired by a horizontal curve (390 feet is the minimum distance for 35 mph posted speed) as shown in Figure 16.
- Rutting for right turns out of Electra Drive as shown in Figure 17.
- Poor shoulder conditions  
  - 1 out of 5 crashes ran off road
**Proposed Recommendations**

The following proposed improvements are documented in Table 4 with respect to crash types.

- Install curb and gutter to reduce the likelihood of vehicle departure crashes.
- Improve sight distance, especially looking to the south, to reduce the potential for angle crashes by increasing radii at horizontal curves.
- Improve turning radii into and out of Electra Drive in both directions to accommodate school buses.
- Construct left-turn lanes in both directions to reduce the potential for rear-end crashes.
- A single-lane roundabout at this intersection would promote slower vehicle speeds, would safely accommodate pedestrian and bicycle movements, and would have the potential for reducing angle crashes.

### Table 3: Hot Spot 2 – Reedy Creek Road from MP 1.25 to MP 1.30

<table>
<thead>
<tr>
<th>Crash Characteristic</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fatal</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Injury</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Property Damage</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>By Severity:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Injury</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Type A Injury</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Type B Injury</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Type C Injury</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>By Weather:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear &amp; Cloudy</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Rain</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All Other (Mist/Sleet/Hail)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>By Roadway Surface Conditions:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Wet</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>By Light Conditions:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dawn/Dusk</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dark</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>By Type of Collision:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear End</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Run Off Road</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Pedalcyclist</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Angle</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>By Number of Vehicles Involved:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Two</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Three and Greater</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>By Time of Day:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM Peak (7 - 9)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PM Peak (4 - 6)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Off Peak</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 4: Summary of Safety Issues and Recommendations – Hot Spot 2 (E Dynasty Dr/Electra Dr)

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Issue</th>
<th>Improvement</th>
<th>Addressed by Roadway Design?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ran Off Road</td>
<td>Vehicles striking fixed objects off the road within the curve</td>
<td>• Flatten horizontal curve to the south of Electra Drive</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Install curb and gutter near intersection</td>
<td></td>
</tr>
<tr>
<td>Rear-End</td>
<td>Stopped vehicles in the through lane waiting to make a left turn</td>
<td>• Construct left-turn lanes in both directions</td>
<td>Yes</td>
</tr>
<tr>
<td>Angle</td>
<td>Sight distance deficiency to the south</td>
<td>• Clear shrubbery in the southeast quadrant of the intersection</td>
<td>Clearing to be determined during final design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Constructing a roundabout reduces the potential for angle crashes (optional)</td>
<td>Roundabout is optional</td>
</tr>
</tbody>
</table>

**Figure 16**  
Electra Drive: Poor Sight Distance Looking Left

**Figure 17**  
Electra Drive: Right Turn Rutting
Other Corridor Issues/Recommendations

Overall Corridor Observations

- Inconsistent use of stop bars on side streets – the westbound approach at E Dynasty Drive is the only approach in the entire corridor with a stop bar. Install stop bars on the side street approaches at the four intersections discussed in the introduction to this report.

- Advance curve warning signs are in place, but additional speed advisory plaques may be needed when the new curves are designed. Check the safe curve speeds based on the new curve design.

- Converting the shoulder to a curb and gutter design will help to reduce the number of run-off-the-road crashes. The new typical section will provide a much more consistent section throughout the corridor, which will help to reduce driver confusion.

- Pedestrian safety issues related to the lack of sidewalk connectivity will be improved by the new design with continuous sidewalks on both sides of Reedy Creek Road.

- Bicycle safety issues related to sharing the road with poor shoulders will be improved by the new design with the accommodation of separate, four-foot bicycle lanes in both directions.

N. Harrison Avenue Intersection

- Safety Issues
  - Shrubbery in the southwest quadrant of the intersection hinders sight distance for right turns from Reedy Creek Road as shown in Figure 18.
  
  - Westbound left turns from N Harrison Avenue cut across the Reedy Creek Road northbound approach as shown in Figure 19.
  
  - Westbound left turns from N Harrison Avenue have also lost control and ran off the road on the west side of Reedy Creek Road due to the curvature at the intersection.
  
  - Pedestrian signals and push buttons are not present.

- Recommended Improvements
  The following proposed improvements are documented in Table 5 with respect to crash types, if applicable.
  
  - Clear/cut back shrubbery (not part of Reedy Creek Road improvements).
  
  - Move left-turn lane stop bar on Reedy Creek Road back between 7 and 10 feet to reduce conflicts with westbound left-turn movements from N Harrison Avenue and improve sight distance for northbound right-turn movements.
  
  - Realign Reedy Creek Road so that it intersects N Harrison Avenue perpendicularly rather than in its current skewed configuration to help reduce the potential for run off road crashes.
  
  - Add pedestrian signals and push buttons on the approaches with existing crosswalks (crossing Reedy Creek Road and crossing the east approach of N Harrison Avenue).
Figure 18
Reedy Creek Road at N Harrison Avenue: Poor Sight Distance Looking West

Figure 19
Reedy Creek Road at N Harrison Avenue: Consider Staggering Left-Turn Stop Bar
Table 5: Summary of Safety Issues and Recommendations – N Harrison Avenue

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Issue</th>
<th>Improvement</th>
<th>Addressed by Roadway Design?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ran Off Road</td>
<td>Vehicles striking fixed objects off road after turning onto Reedy Creek Rd</td>
<td>• Improve turn from N Harrison Road onto Reedy Creek Road by realigning Reedy Creek Road to intersect N Harrison Road perpendicularly</td>
<td>Yes</td>
</tr>
<tr>
<td>NA</td>
<td>Northbound right-turn sight distance and potential conflicts with westbound left turns</td>
<td>• On Reedy Creek Road, stagger the northbound left-turn stop bar to improve sight distance for vehicles making right-turns-on-red and to reduce potential conflicts with westbound left turns from N Harrison Ave.</td>
<td>Yes (final design)</td>
</tr>
<tr>
<td>NA</td>
<td>Sight distance deficiency to the south</td>
<td>• Clear shrubbery in the southwest quadrant of the intersection</td>
<td>No (maintenance issue)</td>
</tr>
<tr>
<td>NA</td>
<td>Pedestrian crossing safety</td>
<td>• Add pedestrian signals and push buttons</td>
<td>Can be added to proposed improvements (need signal modification)</td>
</tr>
</tbody>
</table>

NA – not applicable. This improvement was not identified from previous crash experience, but the potential for crashes was identified during the field.

Dublin Woods Drive Intersection

- **Safety Issues**
  - Two object marker signs (which will be removed during construction) currently partially block the view for the left-turn movement out of Dublin Woods Drive as shown in Figure 20.
  - Poor pavement condition at connection to Reedy Creek Road as shown in Figure 21.
  - Shoulder rutting on right turn out of Dublin Woods as well as right in off of Reedy Creek Road.

- **Recommended Improvements**
  The following proposed improvements are documented in Table 6 with respect to crash types, if applicable.
  - Curb and gutter will be installed during design with a closed drainage system to remove the current hole, signs, and improve the current rutting issues.
In the short term, schedule regular pavement maintenance at this location until such time as the connection to Dublin Woods Drive is repaved as part of the construction phase of this project.

Table 6: Summary of Safety Issues and Recommendations – Dublin Woods Drive

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Issue</th>
<th>Improvement</th>
<th>Addressed by Roadway Design?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>Object markers obstructing view of oncoming vehicles</td>
<td>- Construct a closed drainage system to eliminate drainage area; thereby removing the signs</td>
<td>Yes</td>
</tr>
<tr>
<td>NA</td>
<td>Poor pavement conditions</td>
<td>- Regular maintenance paving operations will fix this issue</td>
<td>No (maintenance issue)</td>
</tr>
</tbody>
</table>

NA – not applicable. This improvement was not identified from previous crash experience, but the potential for crashes was identified during the field.

Figure 20
Dublin Woods Drive: Two Object Markers

Figure 21
Dublin Woods Drive: Poor Pavement Condition
Melody Lane Intersection

- Safety Issues
  - Vertical curve to the north of the intersection hinders sight distance looking to the left from Melody Lane as shown in Figure 22.

- Recommended Improvements
  The following proposed improvements are documented in Table 7 with respect to crash types, if applicable.
  - Flatten the vertical curve to meet current intersection sight distance requirements to remove the potential for angle crashes.

![Figure 22](image)

Figure 22
Melody Lane: Vertical Curve

Table 7: Summary of Safety Issues and Recommendations – Melody Lane

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Issue</th>
<th>Improvement</th>
<th>Addressed by Roadway Design?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>Vertical curve limiting sight distance to the north</td>
<td>Flatten curve to improve sight distance</td>
<td>Yes (final design)</td>
</tr>
</tbody>
</table>

NA – not applicable. This improvement was not identified from previous crash experience, but the potential for crashes was identified during the field.
**Wyatt’s Pond Lane/Reedy Creek Road School Driveway Intersection**

**Safety Issues**
- Congestion occurs during school drop-off and pick-up times as shown in Figure 23 and Figure 24 for the AM and PM peak hours, respectively, resulting in vehicle-pedestrian conflicts.
- Sidewalk on east side of the roadway is not continuous to the south of the school entrance as shown in Figure 25, which creates conditions where children are walking along the roadway (see worn path in Figure 26), and in some cases, in the roadway.
- No designated crossing location(s) for pedestrians are identified, so children run across the road as shown in Figures 27, 28, and 29, since there is no refuge area.
- Intersection sight distance for the Wyatt’s Pond Lane left-turning movement is questionable in the southbound direction, especially with summer foliage as shown in Figure 30.

**Recommended Improvements**
The following proposed improvements are documented in Table 8 with respect to crash types, if applicable.

- There are multiple options that could be deployed at this intersection to improve accessibility for pedestrians crossing Reedy Creek Road from the school entrance to the residences across the street, including:
  - A striped crosswalk on the south side of the intersection supported by the associated advanced warning pedestrian crossing signs on both Reedy Creek Road approaches.
  - A more visible and effective alternative would be a striped crosswalk equipped with roadside Rectangular Rapid Flash Beacons (RRFB) that would include pedestrian-activated push buttons and the associated advanced warning pedestrian crossing signs on both Reedy Creek approaches. This improvement has proven to be an effective treatment at another location in the Town.
  - If a roundabout design option is chosen at this intersection, it would provide safe crossing opportunities for pedestrians.
  - If none of the previous options are deemed feasible, then the use of a crossing guard may need to be considered.
- Connect the sidewalk to the south of the school entrance on the east side of Reedy Creek Road to give pedestrians a viable option of traveling along Reedy Creek Road without walking in the mud during rainy conditions or in the roadway.
- Congestion at this intersection during the peak school hours could be improved through the construction of a roundabout, which would also serve as a traffic calming measure during the non-peak hours.
Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Morning Peak Operations

Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Afternoon Peak Operations

Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Sidewalk Termination and Resulting “Desire Lines”
Figures 27, 28, & 29
Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Pedestrian Crossing Operations

Figure 30
Wyatt’s Pond Lane/Reedy Creek Schools Driveway: Sight Distance to North
Table 8: Summary of Safety Issues and Recommendations – Wyatt’s Pond Lane/Schools Drive

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Issue</th>
<th>Improvement</th>
<th>Addressed by Roadway Design?</th>
</tr>
</thead>
</table>
| NA         | Provide a safety pedestrian crossing at the intersection | • Install a painted crosswalk on the north side of the intersection with roadside Rectangular Rapid Flash Beacons (RRFB) that would include pedestrian-activated push buttons and associated advanced warning pedestrian crossing signs on both Reedy Creek approaches  
• Another viable, but more costly, option is the construction of a one-lane roundabout at this intersection. This feature would provide safe crossing opportunities for pedestrians crossing Reedy Creek Road while, at the same time, allowing buses and passenger cars to enter and exit the school entrance. | To be determined |
| NA         | Sight distance deficiency to the north | • In the short term, clear shrubbery in the southwest quadrant of the intersection  
• In the long-term, the proposed typical section will provide adequate sight distance | Short Term – No  
(maintenance issue)  
Long Term – Yes |

NA – not applicable. This improvement was not identified from previous crash experience, but the potential for crashes was identified during the field.

**Indigo Drive Intersection**

- **Safety Issues**
  - Narrow connection to Reedy Creek Road compared to other intersections in the corridor requires slower speeds exiting Reedy Creek Road, which could correlate to potential rear-end crashes.
  - Rutting occurring on the shoulder due to both right turn movements into and out of Indigo Drive as shown in Figure 31 and Figure 32.
  - Recent reports of run-off-the-road crashes into the northwest quadrant of the intersection.

- **Recommended Improvements**
  The following proposed improvements are documented in Table 9 with respect to crash types, if applicable.
  - Widen the Indigo Drive connection to Reedy Creek Road by increasing the radii on both sides of Indigo Drive.
— Curb and gutter will be installed during the construction phase of the project, which will help to reduce the impact of rutting at the entrance to Indigo Drive, and will reduce the impacts of run-off-the-road crashes to the properties adjacent to Indigo Drive.

![Figure 31](image1.png)
Figure 31
Rutting on the South Side of Indigo Drive

![Figure 32](image2.png)
Figure 32
Rutting on the North Side of Indigo Drive

**Table 9: Summary of Safety Issues and Recommendations – Indigo Drive**

<table>
<thead>
<tr>
<th>Crash Type</th>
<th>Issue</th>
<th>Improvement</th>
<th>Addressed by Roadway Design?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ran off road</td>
<td>Vehicles striking fixed objects off the road within the curve to the north</td>
<td>• Install curb and gutter</td>
<td>Yes</td>
</tr>
<tr>
<td>NA</td>
<td>Poor pavement conditions</td>
<td>• Regular maintenance paving operations will fix this issue</td>
<td>No (maintenance issue)</td>
</tr>
<tr>
<td>NA</td>
<td>Narrow connection</td>
<td>• (None recommended at this time.) Depending on the future justification, widen Indigo Drive entrance or add right-turn lane on Reedy Creek Road.</td>
<td>NA</td>
</tr>
</tbody>
</table>
NE Maynard Road

- **Safety Issues**
  - Angle crashes in the intersection.
  - Crosswalks, pedestrian signals and push buttons are not present as shown in Figure 33.
  - Significant left-turn queuing, especially during PM peak hour on southbound Reedy Creek Road as shown in Figure 34.

- **Recommended Improvements**

  The following proposed improvements are documented in Table 10 with respect to crash types, if applicable.

  - Check warrants for removing the permissive signal phasing for the Reedy Creek Road approach and replacing it with a protected left-turn phase from southbound Reedy Creek Road onto NE Maynard Road. This improvement will also positively impact the angle crashes at this intersection.

  - Add crosswalks, pedestrian signals and push buttons on all approaches. An ADA-compliant ramp will need to be constructed in the northwest quadrant.
Conclusions

A majority of the safety issues identified during this roadway safety review are correctable during the design phase of this project, including the pedestrian accommodations, such as crosswalks, pedestrian signals, pedestrian push buttons, and ADA-compliant ramps, at the signalized intersections on both ends of the corridor. The current intersection sight distance deficiencies identified at a few intersections within the corridor will be correctable by incorporating the wider cross section, including bicycle lanes and sidewalks on both sides of the roadway. The bicycle lanes will also provide a tremendous improvement over the current travel conditions for bicyclists in this corridor, especially for those individuals interested in using the East Ridge bike route.

Continuous sidewalks provided on both sides of the roadway will greatly improve pedestrian safety, especially for those children walking to and from school along Reedy Creek Road. One or more locations for safe access across Reedy Creek Road will be identified and constructed with this project.

The solution to minimizing the crash-related impacts of the s-curves in the southern half of the corridor poses the biggest challenge for the roadway designers primarily due to apparent right-of-way constraints. Current (functional) roadway designs are mapped with GIS-based aerials. When final surveys are available later in the design process, horizontal and vertical alignments will be refined for the final roadway design plans.

Strategies to reduce speeds in this section of the roadway between Smokehouse Lane to E Dynasty Drive should be investigated, whether it is speed-activated flashing lights or possibly a roundabout at the E. Dynasty Drive/Electra Drive intersection. The curve near Indigo Drive also creates challenges for
motorists as evidenced by multiple run-off-the-road crashes in the vicinity of this intersection. Oftentimes, strategies to improve safety in the corridor cannot rely solely on engineering countermeasures. The impact of regular speed enforcement in this corridor could make a difference, especially in the vicinity of the horizontal curves.

As the design process proceeds beyond the preliminary stages, strategies to improve safety in the corridor for the future for all modes of travel should remain a top priority.