

Road Diet Feasibility Study

Smoketree Drive & Gordon School Road

Chesterfield County, Virginia

May 2022



Prepared For:

Chesterfield County Transportation Department



Road Diet Feasibility Study

Smoketree Drive – N. Courthouse Road to Gordon School Road Gordon School Road – Smoketree Drive to Spirea Road

Chesterfield County, Virginia

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TABLE OF CONTENTS

TABLE OF CONTENTS.....	I
APPENDICES	II
LIST OF TABLES.....	III
EXECUTIVE SUMMARY	IV
1 INTRODUCTION.....	1-1
1.1 PROJECT SCOPE.....	1-1
1.2 WHAT IS A ROAD DIET?	1-1
1.3 WHY IMPLEMENT A ROAD DIET?	1-2
2 DATA COLLECTION	2-1
2.1 48-HOUR VOLUME/CLASS/SPEED TUBE COUNTS.....	2-1
2.2 SPEED DATA ASSESSMENT	2-1
3 EXISTING DATA REVIEW.....	3-1
3.1 EXISTING CONDITIONS ASSESSMENT	3-1
3.2 HISTORICAL COUNT DATA COMPARISON	3-3
4 CRASH ANALYSIS	4-1
4.1 SMOKETREE DRIVE CRASH ANALYSIS.....	4-2
4.2 GORDON SCHOOL ROAD CRASH ANALYSIS.....	4-5
5 PROPOSED CORRIDOR IMPROVEMENTS	5-1
5.1 SMOKETREE DRIVE – COURTHOUSE ROAD TO YARROW LANE.....	5-1
5.2 SMOKETREE DRIVE – YARROW LANE TO GORDON SCHOOL ROAD	5-2
5.3 GORDON SCHOOL ROAD – SMOKETREE DRIVE TO SPIREA ROAD.....	5-3
6 CONCLUSIONS.....	6-1



APPENDICES

Appendix A – Traffic Counts

Appendix B – Existing Typical Sections

Appendix C – Short- and Long-Term Conceptual Typical Sections

Appendix D – Proposed Pavement Marking Plan

Appendix E – Proposed Shared-Use Path Alignment



LIST OF TABLES

TABLE 2-1: SMOKETREE DRIVE SPEED DATA.....2-1

TABLE 2-2: SMOKETREE DRIVE SPEED DATA.....2-2

TABLE 3-1: CRASH SUMMARY BY COLLISION TYPE.....3-2

TABLE 3-2: SMOKETREE DRIVE HISTORICAL COUNT DATA.....3-3

TABLE 3-3: GORDON SCHOOL ROAD HISTORICAL COUNT DATA.....3-4

TABLE 4-1: VIRGINIA STATEWIDE PERCENTAGE – CRASH SUMMARY BY COLLISION TYPE.....4-1

TABLE 4-2: VIRGINIA STATEWIDE PERCENTAGE – CRASH SUMMARY BY SEVERITY TYPE4-1

TABLE 4-3: SMOKETREE DRIVE – CRASH SUMMARY BY COLLISION TYPE4-2

TABLE 4-4: SMOKETREE DRIVE – CRASH SUMMARY BY SEVERITY4-3

TABLE 4-5: SMOKETREE DRIVE – CRASH SUMMARY BY SURFACE CONDITIONS4-4

TABLE 4-6: SMOKETREE DRIVE – CRASH SUMMARY BY LIGHT CONDITIONS4-4

TABLE 4-7: GORDON SCHOOL ROAD – CRASH SUMMARY BY COLLISION TYPE.....4-5

TABLE 4-8: GORDON SCHOOL ROAD – CRASH SUMMARY BY SEVERITY4-6

TABLE 4-9: GORDON SCHOOL ROAD – CRASH SUMMARY BY SURFACE CONDITIONS4-7

TABLE 4-10: GORDON SCHOOL ROAD – CRASH SUMMARY BY LIGHT CONDITIONS4-7



EXECUTIVE SUMMARY

At the request of the Chesterfield County Transportation Department, a road diet feasibility study was performed for Smoketree Drive (Route 2770), from N. Courthouse Road to Gordon School Road, and for Gordon School Road (Route 2776), from Smoketree Drive to Spirea Road. These locations were chosen for potential installation of bicycle infrastructure based on their inclusion as future routes with either on-road or separated shared use facilities within the Chesterfield County Bikeways and Trails Plan, as well as providing connection to the existing bike lanes on Courthouse Road.

Depending on the roadway configuration and available pavement width, a road diet may consist of reducing the number of travel lanes dedicated to vehicles and instead accommodating other modes of transportation, primarily bicyclists and pedestrians, or a road diet may involve restriping the pavement to narrow existing vehicular travel lanes and dedicate the excess pavement width to other users. A road diet improves safety by (1) providing a dedicated pedestrian/bicyclist area, (2) reducing the crossing distance for pedestrians and bicyclists, (3) reducing travel speeds and crash severity, and (4) reducing the number of lanes for left turning vehicles to cross.

In regard to road diet implementation criteria, VDOT literature recommends a corridor be reviewed for vehicular lane removal if it has more than 3 lanes and less than 16,000 vpd. The FHWA notes that the road diet lane reconfiguration must show no significant impacts to the corridor at major intersections, with Level of Service (LOS) D or better for the mainline approaches and LOS E or better for critical movements/approaches.

A list of the tasks associated with the road diet feasibility study are included below.

- Collection of 48-hour directional traffic volume/class/speed counts at four (4) locations
- Assessment of the existing roadway conditions
- Comparison of historical count data
- Analysis of the crash history on each segment
- Identification of short-term and long-term improvements for each segment

Based on the existing roadway conditions, the two study area roadways were divided into three typical sections for consideration of road diet implementation. For each typical section, the information gathered from the speed data assessment and existing data review were utilized to determine whether a road diet should be implemented, and if so, whether by vehicular lane removal or lane narrowing. Short-term and long-term concepts were developed for each roadway segment.

The short-term improvements include installation of a road diet through restriping the existing pavement on Smoketree Drive and Gordon School Road to narrow the existing travel lanes and install a dedicated bike lane.

The long-term improvements for Smoketree Drive from Courthouse Road to Yarrow Lane will be the same as the short-term improvements. For the remaining section of Smoketree Drive, from Yarrow Lane to Gordon School Road, the recommended long-term improvement is installation of a 10-foot wide shared-use path along the northern side of the roadway. For all of Gordon School Road within the study area, the recommended long-term improvement is installation of a 10-foot wide shared-use path along the southern side of the roadway, along the frontage of the school property.



1 INTRODUCTION

At the request of the Chesterfield County Transportation Department, a road diet feasibility study was performed for Smoketree Drive and Gordon School Road in Chesterfield County, VA. The roadway segments include the following:

- Smoketree Drive (Route 2770) – N. Courthouse Road to Gordon School Road
- Gordon School Road (Route 2776) – Smoketree Drive to Spirea Road

Existing conditions review and safety analyses were completed for each roadway segment. The FHWA *Road Diet Information Guide* (2014) and the VDOT *Roadway Reconfiguration Guidance* (2020) documents were consulted to determine the criteria to review for feasibility of a road diet.

1.1 PROJECT SCOPE

Per the scope of services, the following steps were taken to assess the suitability of each of the roadway segments for a road diet within the existing footprint of the roadway:

- Data Collection – 48-hour volume/class/speed tube counts were completed at 4 locations the week of April 26, 2021.
- Existing Conditions Assessment – Timmons Group evaluated the existing roadway infrastructure to understand the constraints that would impact implementation of a road diet.
- Historical Count Data Comparison – Timmons Group compared VDOT traffic count data between the years 2000 and 2021, with the exception of 2020.
- Crash Analysis – Using publicly available crash data from VDOT, Timmons Group reviewed and compiled the relevant data within the study area for the period of January 31, 2016 through January 31, 2021.
- Conceptual Design – Timmons Group prepared several typical sections for each roadway segment. After coordination with County staff, Timmons Group finalized two (2) conceptual designs for each roadway segment, one (1) focused on short-term and one (1) focused on long-term improvements.

1.2 WHAT IS A ROAD DIET?

A road diet involves modifying the existing roadway pavement striping such that the space can be reallocated for other uses and/or modes of travel. Depending on the roadway configuration and available pavement width, a road diet may consist of reducing the number of travel lanes dedicated to vehicles and instead accommodating other modes of transportation, primarily bicyclists and pedestrians, or a road diet may involve restriping the pavement to narrow existing vehicular travel lanes and dedicate the excess pavement width to other users. Hence, road diets encourage a more community-focused, “Complete Streets” environment, allowing all users of the roadway “space” within available right-of-way.



1.3 WHY IMPLEMENT A ROAD DIET?

Per Chapter 2 of the FHWA *Road Diet Informational Guide* (2014), a road diet should be considered when attempting to improve safety, convenience, and quality of life for all road users. Road diets provide low-cost safety solutions that address multiple needs along a corridor.

A road diet improves safety by (1) providing a dedicated pedestrian/bicyclist area, (2) reducing the crossing distance for pedestrians and bicyclists, (3) reducing travel speeds and crash severity, and (4) reducing the number of lanes for left turning vehicles to cross. By converting a 4-lane undivided cross section to a 3-lane cross section with a TWLTL, a road diet will improve safety by reducing vehicle speeds and vehicle-to-vehicle, vehicle-to-bicycle, and vehicle-to-pedestrian conflicts.

Road diets have been found to reduce speeds on a corridor by 4-7 MPH, thereby encouraging more pedestrian and bicycle activity. This reduction in operating speeds improves safety two-fold – (1) by reducing speed differentials between vehicles, which in turn reduces the number of crashes and (2) by reducing crash severity when crashes do occur.

The FHWA reports that a road diet can reduce crashes by up to 47%; reducing the number of travel lanes simplifies road scanning and gap selection for vehicles. A road diet should be considered when there are crash types present that can be mitigated by the installation of a road diet.

With respect to convenience and quality of life, a road diet can provide improved connections between various points of interest and can improve the comfort level for all users.

The FHWA recommends that roadways with an Average Daily Traffic (ADT) of 20,000 vehicles per day (vpd) or less are good candidates for reduction of lanes. VDOT literature on roadway reconfiguration recommends a corridor be reviewed for a road diet if it has more than 3 lanes and less than 16,000 vpd.



2 DATA COLLECTION

2.1 48-HOUR VOLUME/CLASS/SPEED TUBE COUNTS

Data collection was completed with 48-hour tube counts at 4 locations during the week of April 26, 2021. This data collection effort included vehicle classification, direction, speed, volume, and pedestrian/bicycle counts within the study area:

- Smoketree Drive between:
 1. Courthouse Road and Coralberry Drive
 2. Coralberry Drive and Gordon School Road
- Gordon School Road between:
 3. Smoketree Drive and Pleasanthill Drive
 4. Pleasanthill Drive and Spirea Road

A copy of the collected traffic data is contained in Appendix A.

2.2 SPEED DATA ASSESSMENT

The collected tube count data was assessed to determine whether drivers are speeding in the study area and to what extent they are speeding. A summary of the vehicle speeds is shown in Table 2-1 and Table 2-2. Each roadway in the study area has a posted speed limit of 25 MPH. The *VDOT Road Design Manual* classifies roadways with speeds of 45 MPH or less as low-speed roadways that are typically designed for speeds equal to the posted speed limit.

Table 2-1: Smoketree Drive Speed Data

Location	Courthouse Rd to Coralberry Dr		Coralberry Dr to Gordon School Rd	
	EB	WB	EB	WB
85th Percentile Speed	36 MPH	34 MPH	32 MPH	33 MPH
95th Percentile Speed	39 MPH	38 MPH	35 MPH	37 MPH
Average Speed	32 MPH	31 MPH	28 MPH	29 MPH
10 MPH Pace Speed	26-35 MPH	26-35 MPH	21-30 MPH	26-35 MPH
Percent of Vehicles in Pace	75.2%	78.9%	69.0%	71.2%
Percent of Vehicles >25 MPH	96.5%	91.5%	69.9%	80.3%

As shown in Table 2-1, in both directions of Smoketree Drive from Courthouse Road to Gordon School Road, the 85th percentile speed is more than 5 MPH above the posted speed limit of 25 MPH. In the section between Courthouse Road and Coralberry Drive, over 90% of drivers are traveling faster than 25 MPH with an average speed of 31 MPH. While the section between Coralberry Drive and Gordon School Road experiences a slightly lower average speed of 28 to 29 MPH, 70% to 80% of drivers are still traveling faster than the posted speed limit.

Table 2-2: Gordon School Road Speed Data

Location	Smoketree Dr to Pleasanthill Dr		Pleasanthill Dr to Spirea Rd	
	NB	SB	NB	SB
85th Percentile Speed	31 MPH	31 MPH	30 MPH	29 MPH
95th Percentile Speed	34 MPH	34 MPH	33 MPH	33 MPH
Average Speed	27 MPH	27 MPH	27 MPH	26 MPH
10 MPH Pace Speed	21-30 MPH	21-30 MPH	21-30 MPH	21-30 MPH
Percent of Vehicles in Pace	75.6%	74.0%	76.6%	79.8%
Percent of Vehicles >25 MPH	64.8%	64.5%	62.9%	59.9%

As shown in Table 2-2, speeding is not as substantial on Gordon School Road in comparison to Smoketree Drive; however, the 85th percentile speed is above the posted speed limit of 25 MPH in both directions and within both sections of Gordon School Road. Approximately 60% to 65% of drivers travel faster than the posted speed limit.

As previously stated, all project roadways assessed are classified as low-speed roadways (45 MPH or less), indicating that drivers travelling above the posted speed limit are likely exceeding the design speed of the roadway, and thereby increasing potential safety risks. Most of the roadway segments analyzed exhibit an 85th percentile speed that is more than the speed limit in at least one direction; however, it is generally understood that drivers have difficulty maintaining the exact posted speed limit and will likely travel up to 5 MPH over the speed limit.



3 EXISTING DATA REVIEW

Existing conditions and historical count data were assessed to determine the efficacy of repurposing or restriping vehicular travel lanes for incorporation of bicycle accommodations within the available curb to curb pavement area.

3.1 EXISTING CONDITIONS ASSESSMENT

The roadway segments in the study area were assessed in the field to understand various design constraints inclusive of existing geometry, speed limits, parking allowances, and presence of bus stops or bicycle accommodations. Due to variance in conditions along each roadway segment including changes in the curb-to-curb pavement width, the segments were split into seven typical sections:

1. Smoketree Drive – Courthouse Road to Yarrow Lane
2. Smoketree Drive – Yarrow Lane to Gordon School Road
3. Gordon School Road – Smoketree Drive to Spirea Road

Smoketree Drive is primarily a 2-lane, undivided facility with a posted speed limit of 25 MPH. There is a short segment, approximately 560 feet long, on approach to the intersection of Courthouse Road where two travel lanes are available in each direction and a median is present. Bus stops are not present along Smoketree Drive, and parking is prohibited. This urban, local roadway services primarily residences and provides access to Monacan High School and W.W. Gordon Elementary School. The majority of the properties surrounding Smoketree Drive appear to be fully built-out and any future vehicle generators are not expected to transform the roadway usage.

Gordon School Road is a 2-lane, undivided facility with a posted speed limit of 25 MPH. Bus stops are not present along Gordon School Road, and parking is prohibited. This urban, local roadway services residences and provides direct access to Monacan High School and W.W. Gordon Elementary School. The properties surrounding Gordon School Road appear to be fully built-out and any future vehicle generators are not expected to transform the roadway usage.

A summary of the existing conditions on each of the seven roadway typical sections is shown in Table 3-1. Appendix B includes typical cross section schematics for each of the three roadway segments identified

Table 3-1: Existing Conditions

Roadway Typical Section	Number of Lanes	Posted Speed (mph)	Minimum Pavement Width (ft)	Gutter Pan Width (ft)	Median	Parking	Bus Stops	Sidewalk	Bicycle Accommodations?
Smoketree Drive (From Courthouse Road To Yarrow Lane)	2	25	29	2 (one side only)	At Courthouse Rd only	No	No	No	No
Smoketree Drive (From Yarrow Lane To Gordon School Road)	2	25	27	2 (one side only)	No	No	No	No	No
Gordon School Road (From Smoketree Drive to Spirea Road)	2	25	23.5	2 (one side only)	No	No	No	No	No

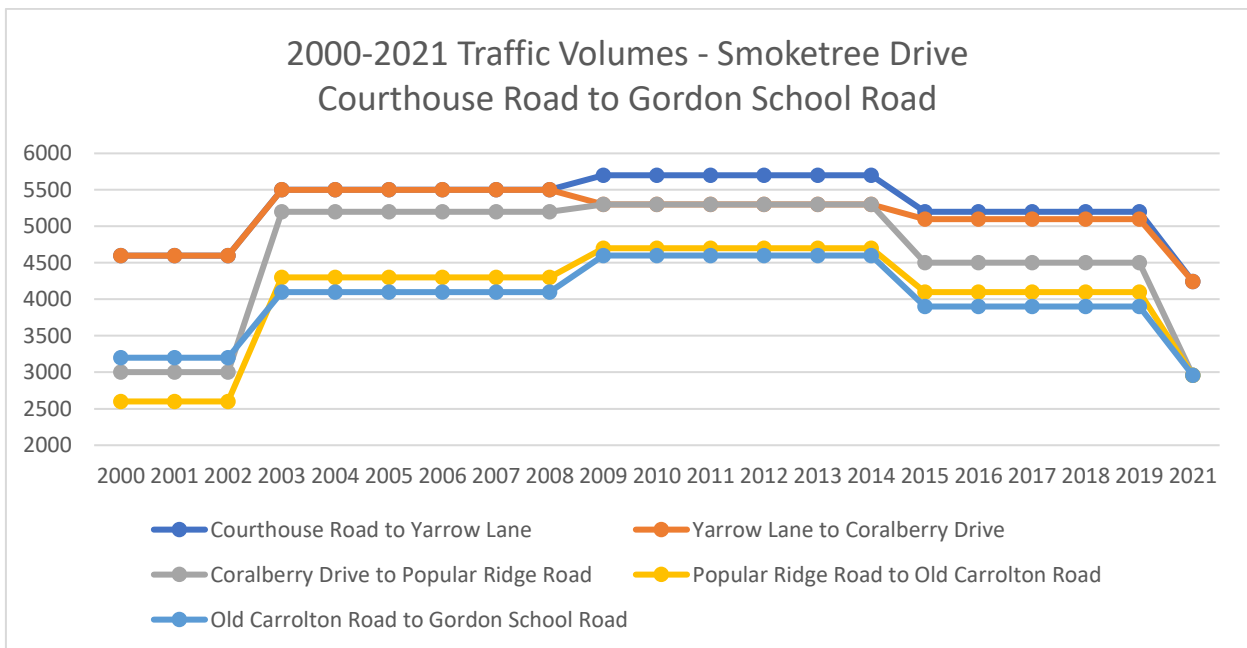
3.2 HISTORICAL COUNT DATA COMPARISON

A review of the historical traffic volumes along the study area roadway segments was completed using annual VDOT count data that is available from 2000 to 2019. Due to reductions in traffic volumes associated with the COVID-19 pandemic, VDOT data was not reported for the year 2020. To compare historical traffic volumes with existing conditions, the collected 48-hour tube count data was used to calculate the ADT for 2021.

VDOT’s Annual Average Daily Traffic (AADT) counts were reported in five segments along Smoketree Drive. The AADT values from 2000 to 2019 and the calculated ADT for 2021 are shown in Figure 3-2 by each of the five segments.

Over the past 20 years, the traffic volumes have ranged from a minimum AADT of 2,600 to a maximum AADT of 5,700. Each segment has maintained similar traffic volumes with minimal change from year to year. These volumes are well within FHWA’s 20,000 vpd threshold and VDOT’s 16,000 vpd threshold for an ideal road diet candidate. Additionally, there is only one vehicular lane in each direction of Smoketree Drive (aside from at Courthouse Road intersection), so a road diet would occur via reduction of vehicular lane width, not via lane reallocation, which is what the thresholds are intended for.

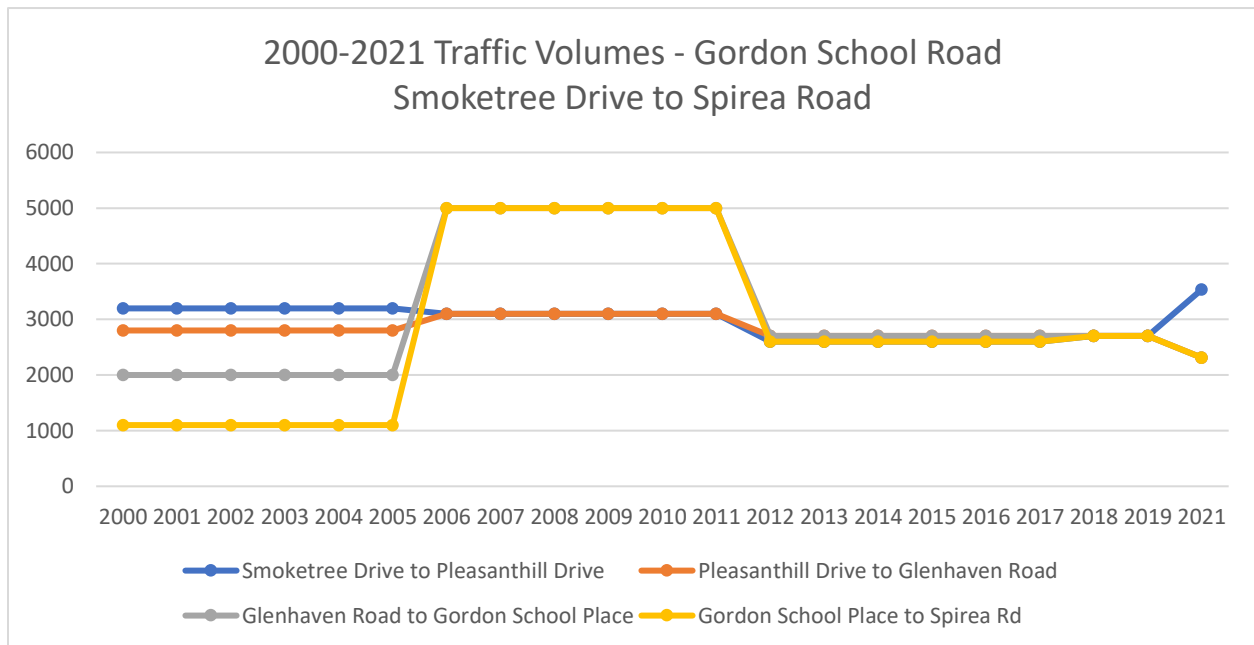
Table 3-2: Smoketree Drive Historical Count Data



VDOT’s AADT counts were reported in four segments along Gordon School Road. The AADT values from 2000 to 2019 and the calculated ADT for 2021 are shown in Figure 2 by each of the four segments.

Over the past 20 years, the traffic volumes have ranged from a minimum AADT of 1,100 to a maximum AADT of 5,000. Each segment has maintained similar traffic volumes with minimal change from year to year. These volumes are well within FHWA’s 20,000 vpd threshold and VDOT’s 16,000 vpd threshold for an ideal road diet candidate. Additionally, there is only one vehicular lane in each direction of Gordon School Road, so a road diet would occur via reduction of vehicular lane width, not via lane reallocation, which is what the thresholds are intended for.

Table 3-3: Gordon School Road Historical Count Data



4 CRASH ANALYSIS

A crash analysis was completed using publicly available VDOT crash data for a five-year period from January 31, 2016 through January 31, 2021. A summary of the crash data for Smoketree Drive and Gordon School Road is presented herein. In order to assess crash patterns that would suggest a specific improvement, the crashes were summarized by collision type, severity, surface conditions, and light condition.

For each roadway analyzed, the total number of crashes on that roadway were compared to the Virginia statewide percentages for roadways of the same functional classification to understand if the roadway experiences a similar composition for a certain collision type or crash severity. Note that both Smoketree Drive and Gordon School Road are considered urban, local roadways. Table 4-1 shows the percentage of each collision type in Virginia for the January 31, 2016 to January 31, 2021 timeframe for urban, local roadways. Table 4-2 shows the percentage of each crash severity under the same conditions.

Table 4-1: Virginia Statewide Percentage – Crash Summary by Collision Type

Collision Type	Statewide %
Rear End	17%
Fixed Object - Off Road	16%
Fixed Object - In Road	1%
Angle	40%
Head On	4%
Animal	1%
Sideswipe - Same Direction	7%
Sideswipe - Opposite Direction	3%
Backed Into	2%
Other	5%
Pedestrian	3%
<i>Total Crashes</i>	100%

Table 4-2: Virginia Statewide Percentage – Crash Summary by Severity Type

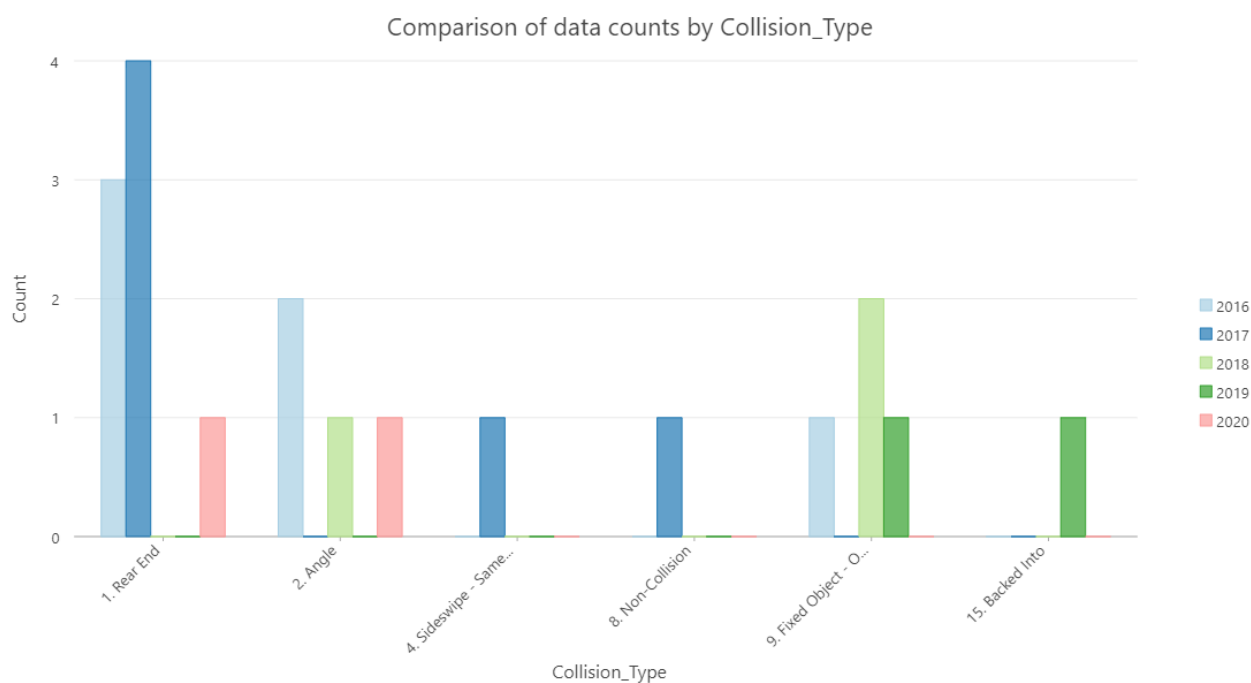
Crash Severity	Statewide %
Fatal Crashes	0%
Injury Only Crashes	27%
Prop. Damage Only Crashes	72%
<i>Total Crashes</i>	100%

4.1 SMOKETREE DRIVE CRASH ANALYSIS

The data set indicated that 19 crashes occurred on Smoketree Drive during the five-year study period. Of the 19 crashes, none were identified to involve drivers who had been drinking or using drugs. Additionally, none of the crashes involved pedestrians or bicyclists.

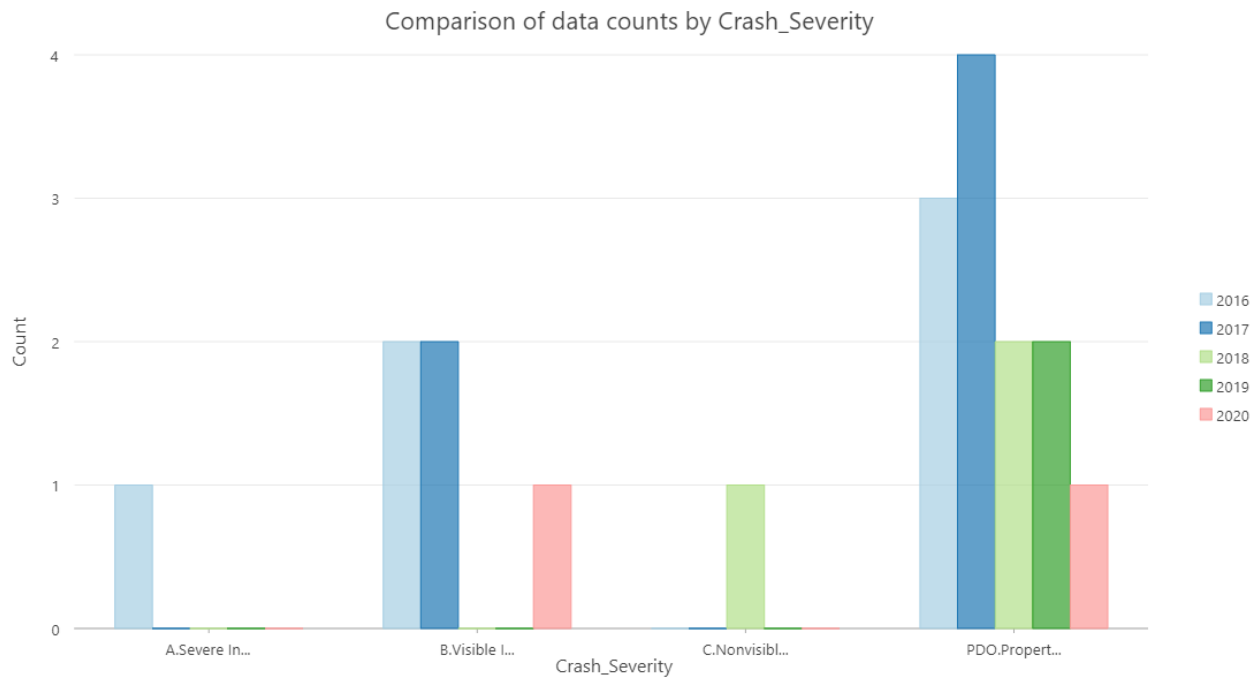
Rear ends were the most common crash type during the study period, comprising approximately 42% of all reported crashes, while angle crashes followed with approximately 21% of all crashes. Compared to the statewide percentages, angle crashes are typically the highest collision type on average for urban, local roadways, followed by rear ends. The higher proportion of rear ends may be attributed to speeding along Smoketree Drive. It is also noted that 37% of the reported crashes involved distracted driving. Table 4-3 shows the summary by collision type.

Table 4-3: Smoketree Drive – Crash Summary by Collision Type



During the study period, there were no fatalities and 63% of the crashes involved property damage only. Based on the statewide percentages, one would anticipate at least 72% of crashes to involve only property damage. Table 4-4 shows the summary by crash severity.

Table 4-4: Smoketree Drive – Crash Summary by Severity



Regarding the driving conditions, approximately 74% of crashes occurred in the daylight and approximately 68% occurred on a dry roadway surface. One could therefore infer that poor lighting or roadway surface conditions are likely not attributed to the crashes. Tables 4-5 and 4-6 show the summary of crashes by surface and lighting conditions.

Table 4-5: Smoketree Drive – Crash Summary by Surface Conditions

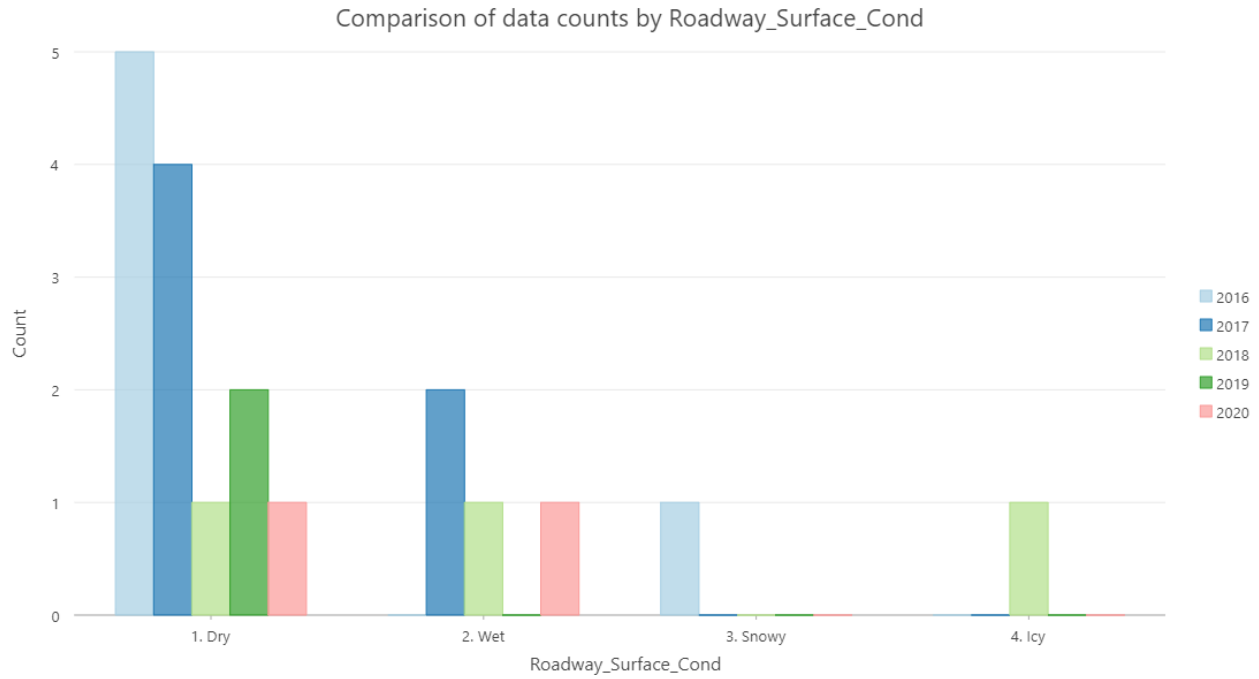
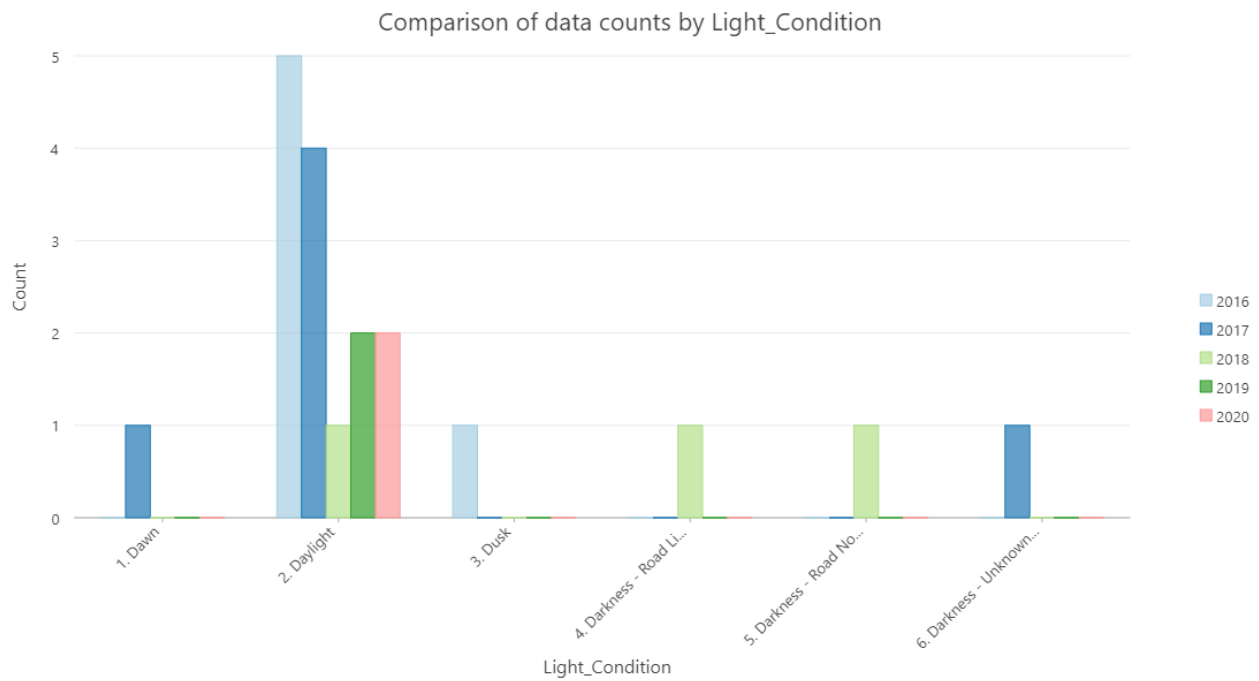


Table 4-6: Smoketree Drive – Crash Summary by Light Conditions

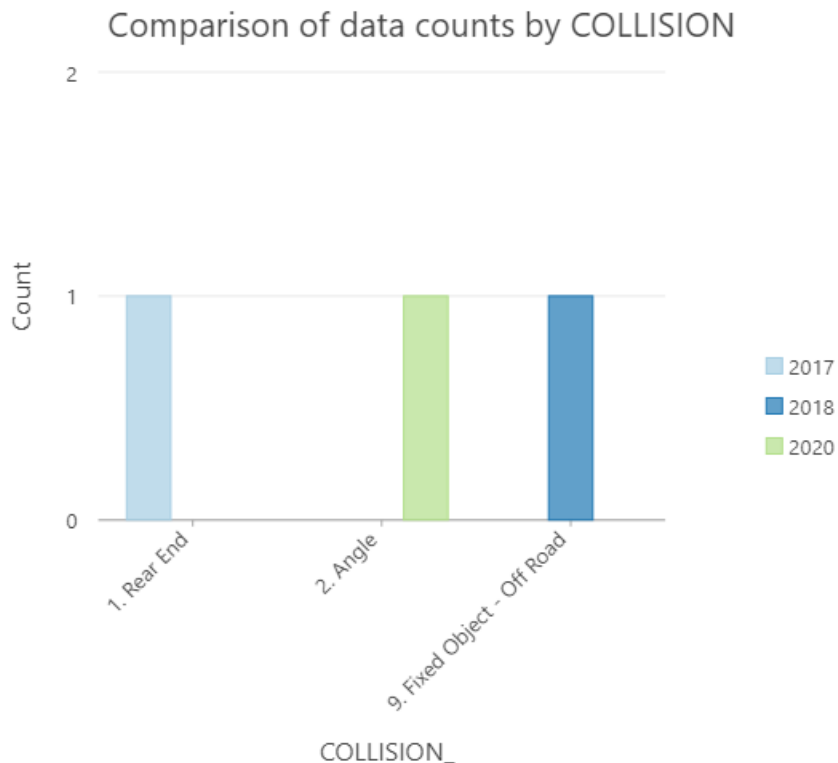


4.2 GORDON SCHOOL ROAD CRASH ANALYSIS

The data set indicated that 3 crashes occurred on Gordon School Road during the five-year study period. Of the 3 crashes, none were identified to involve drivers who had been drinking or using drugs. Additionally, none of the crashes involved pedestrians or bicyclists.

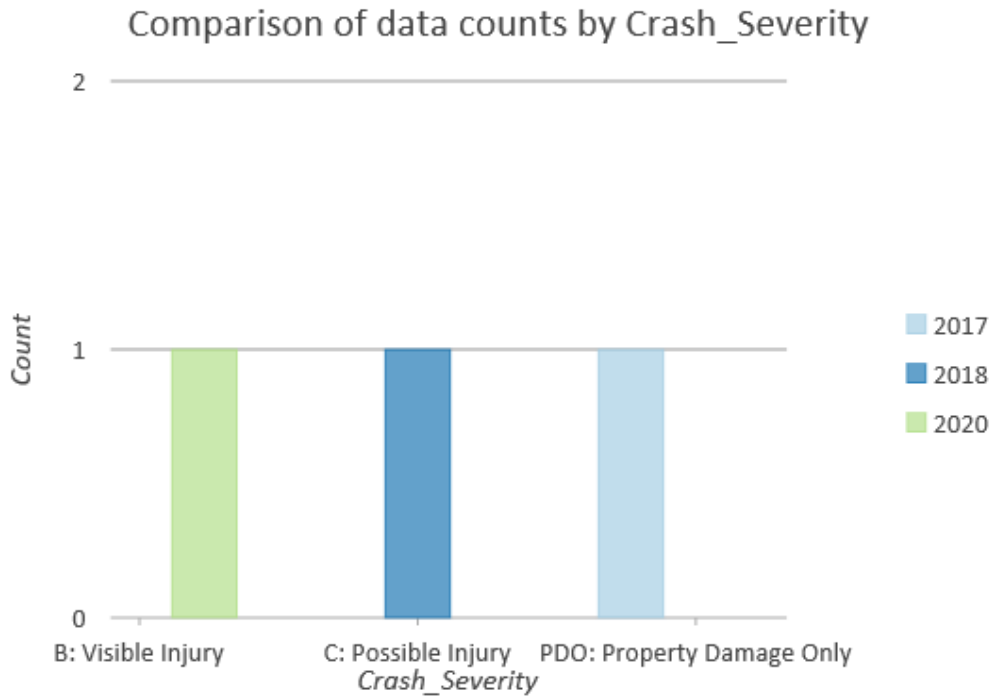
Crash types during the study period consisted of one angle crash, one rear end, and one fixed object – off road. Thus, there is no pattern that would suggest a specific improvement. It is noted that 2 of the 3 reported crashes involved distracted driving. Table 4-7 shows the summary by collision type.

Table 4-7: Gordon School Road – Crash Summary by Collision Type



During the study period, there were no fatalities, 2 of the 3 crashes resulted in either visible or possible injury, while the third crash resulted in only property damage. Based on the statewide percentages, one would anticipate at least 72% of crashes to involve only property damage. The crash results on this roadway would suggest higher than normal injuries, but this is based on minimal crash numbers. Table 4-8 shows the summary by crash severity.

Table 4-8: Gordon School Road – Crash Summary by Severity



Regarding the driving conditions, all of the crashes occurred in the daylight on a dry roadway surface. One could therefore infer that poor lighting or roadway surface conditions are not attributed to the crashes. Tables 4-9 and 4-10 show the summary of crashes by surface and lighting conditions.

Table 4-9: Gordon School Road – Crash Summary by Surface Conditions

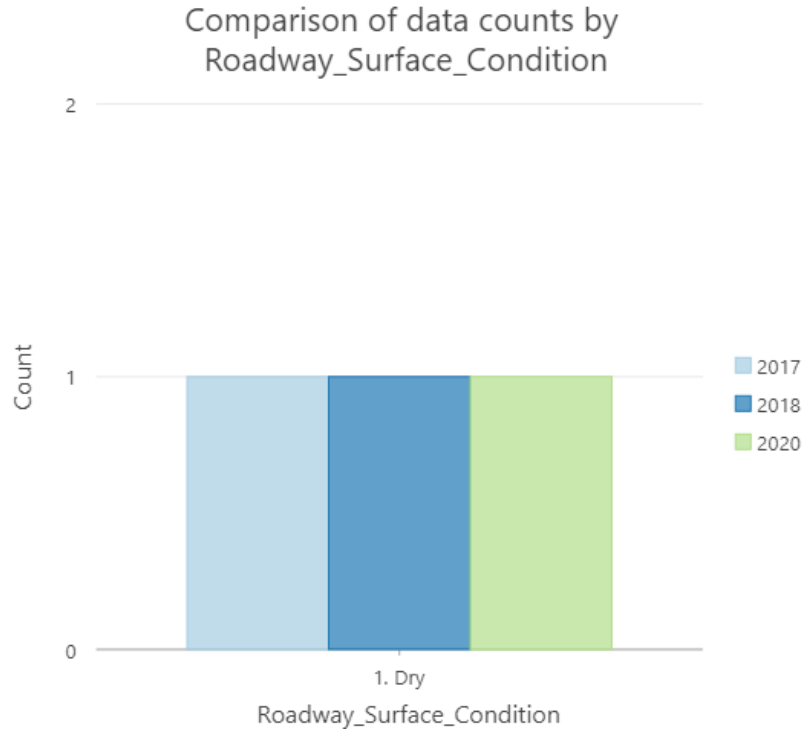
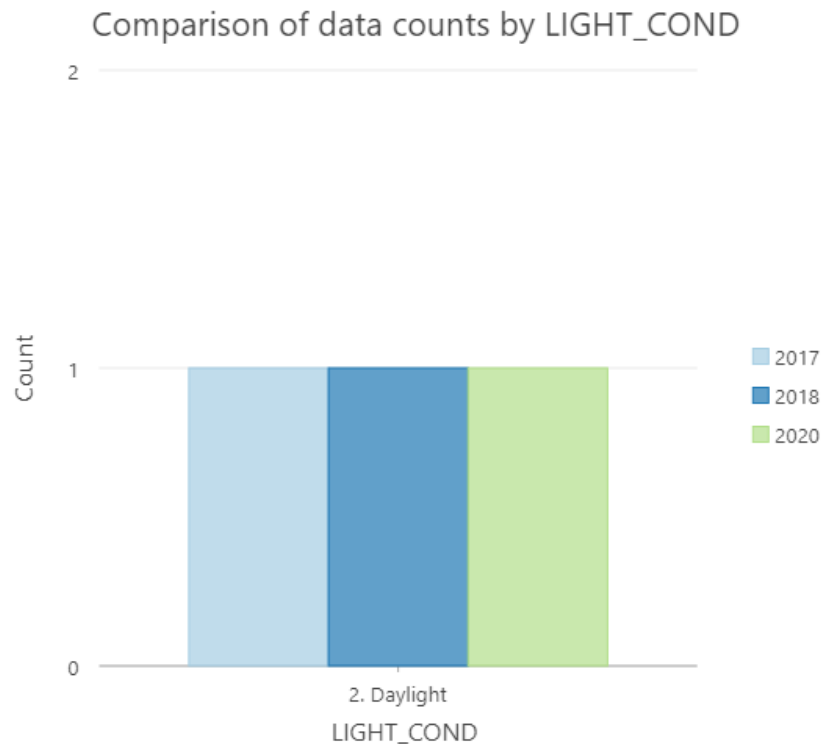


Table 4-10: Gordon School Road – Crash Summary by Light Conditions



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5 PROPOSED CORRIDOR IMPROVEMENTS

The following section describes the proposed road diet improvements for each of the typical cross sections (shown in Table 3) based on the information gathered from the speed data assessment, existing conditions assessment, historical count data comparison, and crash analysis. All typical section illustrations in this report were produced using StreetPlan.net and are intended to be conceptual in nature. Approved pavement marking plans are recommended to be produced before the improvements herein are implemented.

A short-term and long-term concept were assessed for each roadway segment and are described herein. Note that this study did not include right-of-way surveying; any right-of-way widths discussed originate from the County GIS parcel mapper. Unless right-of-way acquisition is a viable option, long-term improvements recommended outside of the existing roadway (sidewalk, shared-use path, etc.) will require survey before performing design efforts.

Appendix C shows the short- and long-term conceptual typical section for each roadway segment. Appendix D shows a possible pavement marking plan to convert the existing pavement for each roadway segment into having on-street bicycle infrastructure. Appendix E shows an overall view of the location of a shared-use path along the project corridor.

5.1 SMOKETREE DRIVE – COURTHOUSE ROAD TO YARROW LANE

A road diet via lane width reduction is recommended on Smoketree Drive from Courthouse Road to Yarrow Lane in order to encourage slower driving speeds and to improve connectivity for bicyclists. Based on the fact that the 5-year crash history shows rear ends as the most common crash type and that the speed data assessment indicated that approximately 70% to 80% of drivers travel faster than the posted speed limit, Smoketree Drive would likely benefit from narrower vehicular lanes.

The proposed short-term improvements for this section of Smoketree Drive can be accomplished via restriping the existing pavement width. Although this section of Smoketree Drive has two travel lanes in each direction that could be considered for lane reallocation for bicyclists, the second lane ends quickly, transitioning to one lane like the remainder of the corridor. To maintain consistency with the remainder of proposed improvements on Smoketree Drive, the area with multiple directional lanes will be restriped to narrow the vehicular travel lanes and incorporate a bicycle lane on each side. With an available pavement width of 29 feet and a 2-foot gutter pan on each side of the roadway, a 4-foot dedicated bicycle lane can be accommodated in both directions. The width of the bike lane and travel lanes may be reduced/expanded slightly along the Smoketree Drive corridor depending upon gradual changes in pavement width.

There are not any proposed developments in the area that would necessitate supplementary roadway capacity or geometric reconfigurations. It is noted that the FHWA and VDOT AADT thresholds for an ideal road diet candidate are satisfied by this roadway's traffic volumes over the past 20 years; however, the thresholds are not applicable as they apply to lane reallocation scenarios.

The long-term improvements for Smoketree Drive from Courthouse Road to Yarrow Lane are the same as that of the short-term improvements. Because this section of roadway is wide enough to accommodate dedicated bicycle lanes on both sides, and a sidewalk already exists for pedestrians on the north side of the roadway, a shared-use path is not deemed necessary. Where the sidewalk west of Yarrow Lane ends, pedestrians can transition to the northern sidewalk via the existing crosswalk at Yarrow Lane and eastbound bicyclists can transition from sidewalk to a dedicated bicycle lane.



5.2 SMOKETREE DRIVE – YARROW LANE TO GORDON SCHOOL ROAD

A road diet via lane width reduction is recommended on Smoketree Drive from Yarrow Lane to Gordon School Road in order to encourage slower driving speeds and to improve connectivity for bicyclists, especially since this roadway provides access to two nearby schools via Gordon School Road. Based on the fact that the 5-year crash history shows rear ends as the most common crash type and that the speed data assessment indicated that approximately 70% to 80% of drivers travel faster than the posted speed limit, Smoketree Drive would likely benefit from narrower vehicular lanes.

Because this segment of Smoketree Drive has only one vehicular lane in each direction, lane width reduction via restriping is the only solution for road diet implementation (as opposed to lane reallocation for other users). There are not any proposed developments in the area that would necessitate supplementary roadway capacity or geometric reconfigurations. It is noted that the FHWA and VDOT AADT thresholds for an ideal road diet candidate are satisfied by this roadway's traffic volumes over the past 20 years; however, the thresholds are not applicable as they apply to lane reallocation scenarios.

The proposed short-term improvements for this section of Smoketree Drive can be accomplished via restriping the existing pavement width. With an available pavement width of only 27 feet and a 2-foot gutter pan, a dedicated bicycle lane cannot be accommodated in both directions. Therefore, two 10-foot vehicular lanes are recommended with a 7-foot dedicated bicycle lane on the northern side of the roadway, opposite of the existing sidewalk. In this manner, bicyclists traveling westbound would ride in the direction of traffic in a buffered bicycle lane, while bicyclists traveling eastbound would ride on the existing sidewalk, yielding to pedestrians. The width of the bike lane and travel lanes may be reduced/expanded slightly along the Smoketree Drive corridor depending upon gradual changes in pavement width.

The long-term improvements for Smoketree Drive from Yarrow Lane to Gordon School Road consist of installing a 10-foot wide, shared-use path along the northern side of the roadway and curb and gutter with a 4-foot paved shoulder to match the southern side. This long-term alternative will provide narrower travel lanes to reduce speeds, improve drainage via the gutter pan, and provide connectivity for pedestrians and bicyclists via the shared-use path.



5.3 GORDON SCHOOL ROAD – SMOKETREE DRIVE TO SPIREA ROAD

A road diet via lane width reduction is recommended on Gordon School Road from Smoketree Drive to Spirea Road in order to encourage slower driving speeds and to improve connectivity for bicyclists, especially in an area that has two schools nearby. While there was no historic crash pattern that would suggest the need for a specific improvement, the speed data assessment indicated that approximately 60% to 65% of drivers travel faster than the posted speed limit.

Because Gordon School Road has only one vehicular lane in each direction, lane width reduction via restriping is the only solution for road diet implementation (as opposed to lane reallocation for other users). There are not any proposed developments in the area that would necessitate supplementary roadway capacity or geometric reconfigurations. It is noted that the FHWA and VDOT AADT thresholds for an ideal road diet candidate are satisfied by this roadway's traffic volumes over the past 20 years; however, the thresholds are not applicable as they apply to lane reallocation scenarios.

The proposed short-term improvements for Gordon School Road can be accomplished via restriping the existing pavement width. With an available pavement width of only 24 feet and a 2-foot gutter pan, a dedicated bicycle lane cannot be accommodated in both directions. Therefore, one 10-foot vehicular lane and one 9-foot vehicular lane are recommended with a 5-foot dedicated bicycle lane on the northern side of the roadway, opposite of the existing sidewalk. In this manner, bicyclists traveling westbound would ride in the direction of traffic in a dedicated bicycle lane, while bicyclists traveling eastbound would ride on the existing sidewalk, yielding to pedestrians. Per the VDOT Road Design Manual, vehicular lanes may be as narrow as 9 feet in residential areas. This 9-foot travel lane would be adjacent to the 2-foot gutter pan, thereby providing additional clearance from the curb. The width of the bike lane and travel lanes may be reduced/expanded slightly along the Gordon School Road corridor depending upon gradual changes in pavement width.

The long-term improvements for Gordon School Road from Smoketree Drive to Spirea Road consist of installing a 10-foot wide, shared-use path adjacent to the roadway and curb and gutter to match the southern side. The County will evaluate which is the preferred side of the roadway for the shared-use path based on feedback from the community. As such, one long-term alternative recommends replacement of the existing sidewalk on the southern side with a shared use path while the second long-term alternative proposes maintaining the existing sidewalk and placing the shared-use path on the northern side of the roadway. Both long-term alternatives will provide narrower travel lanes to reduce speeds, improve drainage via the gutter pan, and provide connectivity for pedestrians and bicyclists via the shared-use path. Since the southern side has already been graded and a sidewalk installed, construction of a shared-use path would likely be less expensive on the southern side.

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6 CONCLUSIONS

The key findings of the intersection analysis are summarized below:

- Traffic volumes along Smoketree Drive and Gordon School Road have remained consistent over the past 20 years, with minor fluctuations. Traffic volumes have never risen above 6,000 vehicles per day on either roadway. Based on this data, there is no need to assume significant traffic growth along the corridor over the next 10 years.
- Overall, the average travel speeds in both directions are 5 to 10 MPH above the posted speed of 25 MPH on both roadways. More than 60% of all vehicles travel at speeds greater than 25 MPH on Gordon School Road and more than 70% of vehicles travel at speeds greater than 25 MPH on Smoketree Drive, which indicates a speeding issue within the study area.
- The data set indicated 22 crashes occurred along both roadway sections during the five-year study period; an average of approximately 4 crashes per year. There were zero (0) reported fatalities in the study period. There were zero (0) pedestrian related crashes and zero (0) bicycle related crashes on the either Smoketree Drive or Gordon School Road during the study period.

Based on research and improvements realized from other road diet projects, the following conclusions and recommendations are offered:

- A major benefit associated with a road diet is a 4-7 MPH reduction of travel speeds on a corridor. This reduction improves safety first by reducing speed differentials between vehicles, which in turn reduces the number of crashes, and second by reducing crash severity when crashes do occur. A reduction of 4-7 MPH along Smoketree Drive and Gordon School Road will reduce vehicle speeds closer to the posted 25 MPH and encourage more pedestrian and bicycle activity.
- The FHWA recommends that roadways with an ADT of 20,000 vehicles per day or less are good candidates for a reduction of lanes. VDOT recommends a corridor be considered for a road diet if it carries less than 16,000 vehicles per day. A review of the traffic data shows that volumes along both roadways are less than 6,000 vehicles per day, which is well below the cited thresholds.
- With respect to quality of life, road diets improve connection for local residents to schools, commercial areas, and safer, more accessible neighborhood streets. The Smoketree Drive and Gordon School Road corridors are neighborhood residential areas with an elementary school located in the center of the study area. The introduction of additional bicycle infrastructure and a road diet through lane narrowing will improve safety and mobility.
- Smoketree Drive and Gordon School Road were chosen for potential installation of bicycle infrastructure based on their inclusion as future routes with either on-road or separated shared use facilities within the Chesterfield County Bikeways and Trails Plan. In addition, these routes provide a connection to the existing bike lanes on Courthouse Road.



It is recommended to implement a road diet through lane narrowing on Smoketree Drive, between Courthouse Road and Gordon School Road, and on Gordon School Road, between Smoketree Drive and Spirea Road. These proposed improvements will fulfill a section of the Bikeways and Trails Plan, as well as connecting to the larger overall network through the existing bike lanes on Courthouse Road.

The short-term improvements include installation of a road diet through restriping the existing pavement on Smoketree Drive and Gordon School Road to narrow the existing travel lanes and install a dedicated bike lane.

The recommended long-term improvement for Smoketree Drive, from Yarrow Lane to Gordon School Road, is installation of a 10-foot wide shared-use path along the northern side of the roadway, with a 4-foot wide bike lane on both sides of the road. For Gordon School Road within the study area, the recommended long-term improvement involves replacing the existing sidewalk with a 10-foot wide shared-use path along the southern side of the roadway, along the frontage of the school property, and eliminating the bike lane on the north side of the road from Smoketree Drive to Glenhaven Road. The proposed Gordon School Road shared-use path will allow for future extension/connection through the Gordon Elementary School property to Lucks Lane, in conformance with the County Bikeways & Trails Plan. A connection is shown between the existing sidewalk on Gordon School Road west of Glenhaven Road. The remaining bike lane installed as a short-term improvement on Gordon School Road from Glenhaven Road to Spirea Lane will remain, long-term.

