Stafford County
Board of Supervisors Meeting
Agenda Item Report
Meeting Date: December 11, 2018
UNFINISHED BUSINESS

Subject:	
PUBLIC WORKS (TRANSPORTATION); COMPREHENSIVE ROAD EVALUATION UPDATE - Keith Dayton, Project Manager	
Recommended Action:	
Following input from the Board during the December 11, 2018 meeting, staff is prepared to conduct additional analysis, and schedule opportunities for public input into the preliminary results of the study.	
Committee/Commission Recommendation:	
Board of Supervisors - See Attached Memo	
Fiscal Impact:	**District:**
N/A	N/A
Overview:	
The Board authorized a comprehensive review of the roads in Stafford County at the March 20, 2018 meeting to prioritize road improvement projects and allocate scarce transportation funding. Staff presented an analysis of 114 roads/road segments to the Board at the November 27, 2018 meeting. The Board directed staff to conduct further analysis on 63 roads/road segments, to include recommended improvements and cost estimates for those improvements. This will provide the results of that additional analysis. At its March 20, 2018 meeting, the Board authorized a comprehensive review of the roads in Stafford County to prioritize road improvement projects and allocate transportation funding. The analysis has progressed since that time such that staff will provide a briefing on the progress to date, and seek direction from the Board on the roads selected for more detailed analysis.	
Discussion/Analysis:	
See Attachment 1	

Attachments:

1. Attachment 1 - Memorandum Dated 12-03.18
2. Attachment 2 - Memorandum Dated 10-24-18
3. Attachment 3 - Evaluation Summary Roads over 1700vpd-1 12-11-18
4. Attachment 4 - Evaluation Summary Roads under 1700vpd-1 12-11-18

Summary/Conclusion:

Following input from the Board during the December 11, 2018 meeting, staff is prepared to conduct additional analysis, and schedule opportunities for public input into the preliminary results of the study.

Reviewed By:

Rysheda McClendon, County Attorney (Legal Review Only)
Thomas C. Foley, County Administrator

STAFFORD Virginia

Attachment 1

Board of Supervisors
Meg Bohmke, Chairman
Gary F. Snellings, Vice Chairman
Jack R. Cavalier
Thomas C. Coen
L. Mark Dudenhefer
Wendy E. Maurer
Cindy C. Shelton

Thomas C. Foley
County Administrator

MEMORANDUM

To: Thomas C. Foley
County Administrator

From: Keith C. Dayton
Project Manager

Subject: **Comprehensive Road Evaluation Update**

Date: December 3, 2018

The Board of Supervisors authorized a comprehensive road evaluation (Evaluation) at the meeting on March 20, 2018, and established an ad hoc committee of two Board members, Supervisors Wendy Maurer and Mark Dudenhefer, to consult with staff at various stages to ensure the direction of the Evaluation was consistent with Board intentions. Staff has engaged with the ad hoc committee, Infrastructure Committee, individual Board members, and the full Board in the preparation of a draft Evaluation.

During the November 27, 2018 Board meeting, staff presented the results of the first phase of the evaluation which included analysis of 114 roads/road segments, along with a recommendation to conduct more detailed analysis of 63 roads/road segments. The recommendation included 38 roads/road segments with traffic counts over 1,700 vehicles per day per lane (vpd/l), and 25 roads with traffic counts less than 1,700 vpd/l. Staff was requested to conduct the additional analysis of the recommended roads and report back to the Board at the December 11, 2018 Board meeting.

Second Phase Evaluation Process

An explanation of the process used during the first phase of the Evaluation was provided at the November 27, 2018 Board meeting and included with this memorandum. The second phase began with a review of the first phase results, and a few scoring corrections made. The injury rate threshold to receive a score of 500 for both primary and secondary roads on the list was then adjusted from three times the state average to two times the state average.

A new scoring criteria was added for accidents per mile to recognize roads with a higher density of accidents, since the accident rate previously applied didn't distinguish this important factor.

Accidents/Mile	Score
0-5	**0**
5.1-10	**100**
10.1-20	**200**
>20	**300**

Staff then incorporated operational criteria into the evaluation using a road rating based on the typical scale of A through F. Use of time-of-delay operational evaluation methods would not accurately characterize the rural roads being evaluated, so the "free flow" evaluation methodology used in the Countywide Impact Fee Study (Study) was applied. During this Study, roads characteristics were analyzed based on such factors as number of lanes, road width and geometry, number of cross streets and driveway entrances, and then assigned a vehicle capacity for each road segment. Staff used this capacity for the roads in the Evaluation, and then applied the updated vehicle counts. This produced a capacity in vehicles per hour for each road segment. The ratio of volume of traffic per hour to the road capacity in vehicles per hour translated into a road operational rating and scores assigned as follows:

Traffic Volume/Road Capacity	Operational Rating
0.01 - 0.04	A
0.05 - 0.17	B
0.18 - 0.31	C
0.32 - 0.49	D
0.49 - 0.96	E
$\geq$ 0.97	F

Operational Rating	Score
A,B	**0**
C,D	**200**
E,F	**400**

The additional scoring criteria was added to the Phase 1 analysis, and the roads/road segments reordered based on the revised scoring.

Staff then examined accident summaries to determine the nature of the accidents on each of the roads being analyzed. This allowed accident patterns to be segregated based upon intersection/congestion related accidents, and those more likely to be caused by narrow, winding roads and lack of shoulder/recovery area. Of course, many roads demonstrated both general types of accidents. Using this information, along with current vehicle counts, staff was able to identify general upgrades to improve road conditions. For the roads with traffic counts above 1, vpd/l, staff used recent County road construction experience, along with input from the Virginia Department of Transportation (VDOT), to develop per-mile improvement costs for six types of road improvements. For this phase of the Evaluation it was assumed that the entire segment would be improved to a similar standard, although subsequent analysis may indicate that a more cost effective combination of improvements may be feasible to lower project cost. These improvements and the associated cost per mile are provided below. Costs include an inflation factor of 30% from today's pricing.

Description of Improvement		
4 to 6 lane widening urban area (e.g. Garrisonville Road)	$25,000,000	per mile
2 to 4 lane widening suburban/rural area (e.g. Courthouse Road)	$21,000,000	per mile
2 to 3 lane widening (continuous 2-way left turn lane like Plantation Dr.)	$17,000,000	per mile
2 lane reconstruction (e.g. Mountain View, Truslow & Poplar Roads)	$11,000,000	per mile
2 lane improvement to 3R standard (e.g. Brooke Road)	$6,500,000	per mile

Certain roads were felt to be cost-prohibitive to address with a construction project, while others recently had improvements completed, or have the necessary improvements under design. In these cases, no structural improvements are recommended at this time.

For roads less than 1,700 vpd/l, staff assumed that the addition of 2' of paved shoulder per lane would allow wider travel lanes with a small recovery area, provide sufficient width for the installation of edge lines to improve visibility where none are present, and prevent the scouring of the shoulder area immediately adjacent to the travel lane from storm events. Recent costs for this type of improvement were provided by VDOT, and applied to the entire segment of road. More in depth evaluation may indicate that a reduced scope of improvement can achieve satisfactory results for less cost. VDOT has indicated the less expensive 4" thick wedge improvement can be performed if the shoulder hardening is coordinated with a full pavement overlay. Staff has estimated these costs based on the shoulder improvements being performed in conjunction with pavement overlay to allow a more comprehensive road improvement in the most cost effective manner. This results in costs of approximately $110,000/mile when placing a 4" thick, 2' wide shoulder wedge along both lanes. This would be the total cost if this process is coordinated with VDOT's schedule for routine overlay of the roadway using state funding for asphalt repaving. Whereas repaving funds are somewhat limited, proceeding in this manner will result in delaying the completion of all roads on the list.

The updated Evaluation summaries for roads over and under 1,700 vpd/l are attached. For improved readability, some data from the earlier phase of the Evaluation presented to the Board on November 27, 2018 has been removed. Although staff believes further analysis of the recommended improvements is warranted in an effort to refine the estimated costs, these refinements are not expected to substantially reduce the total cost. Subject to additional input from Board members, the Evaluation has progressed to where the roads most in need of improvement have been identified, and provides a reasonable estimate of project costs for the highest priority projects. The Evaluation schedule has been accelerated from that presented on November 27, 2018 and allows the Board additional time to solicit input from the public if it so chooses. The next steps and schedule presented below have been adjusted accordingly.

Next Steps and Schedule

Presentation of the Draft Evaluation Summary	December 11, 2018
Solicitation of Public Input	January 2019
Incorporate Input and Present Final Report	February 5, 2019
Board Considers Final Priority List for Approval	March 19, 2019
Board Considers Funding Strategies for Road Improvements	March 19, 2019

TCF:kd

Attachments (as noted)

STAFFORD Virginia

Board of Supervisors
Meg Bohmke, Chairman
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Cindy C. Shelton

Thomas C. Foley
County Administrator

MEMORANDUM

To: Thomas C. Foley
County Administrator

From: Keith C. Dayton
Project Manager

Subject: **Comprehensive Road Evaluation Update**

Date: October 24, 2018

The Board of Supervisors authorized a comprehensive road evaluation (Evaluation) at their meeting on March 20, 2018. They also established an ad hoc committee of two Board members, Supervisors Wendy Maurer and Mark Dudenhefer, to consult with staff at various stages to ensure the direction of the Evaluation was consistent with Board intentions. Since that meeting, staff has made significant progress on the Evaluation, and met with the ad hoc committee and the Infrastructure Committee. This update provides information on the evaluation criteria and process used for the Evaluation to date, initial results, schedule update, and next steps. Staff will also require direction from the Board regarding limiting the roads selected for more detailed Evaluation during the next phase.

Evaluation Process

The first step in the Evaluation involved obtaining a list of major state maintained roads in Stafford County, along with recent traffic count data. Road count data included 2016 and 2017 VDOT traffic counts, along with updated counts from selected roads using County equipment. Excluded for the purposes of this evaluation were U. S. Routes 17 and 1, along with Interstate 95, and most subdivision streets.

This list was sorted by traffic count, with an initial cut-off made at an average of 1,000 vehicle trips per day (vpd). This left 94 roads for further evaluation, with certain roads having diverse characteristics and traffic patterns broken into smaller segments for more accurate analysis. The additional breakdown resulted in 114 roads or road segments for further analysis.

The selected roads were then evaluated and scored as follows: a) traffic count per lane, b) road width and the presence/absence of shoulders, c) crash, injury and fatality rates, d) potential for future growth. Evaluation criteria which were noted but not scored included: a) whether improvements were recently completed, funded, or under design or construction, b) were the recipient of motorist complaints, c) or had special traffic conditions which might warrant additional analysis. Examples of special conditions included a higher percentage of truck and trailer traffic, abnormally high peak traffic periods, and a higher percentage of youth drivers.

The comprehensive list was then broken into two groups, using a traffic count per lane of 1,700 vpd to segregate

roads for comparison. Staff felt that roads above 1,700 vpd per lane would be more likely to require major improvements and compete for similar funding sources. Scoring was applied using the methodology as summarized below.

Vehicle Use: Traffic counts were adjusted to vehicles per day per lane to assess the congestion factor of each road, with more congested roads receiving higher scores

VPD/Lane	Score
≥ 10,000	**500**
≥ 7,500< 10,000	**400**
≥ 5,000< 7,500	**300**
≥2,000< 5,000	**200**
≤ 2,000	**100**

Road Structural Characteristics: road construction characteristics were scored, with narrower roads receiving a higher score

Road Character Description	Score
No centerline, edge lines or shoulders	**300**
Centerline with no edge lines or shoulders	**200**
Centerline and edge lines, but no shoulders	**100**
Has centerline, edge lines and shoulders	**0**

Safety Record: 3-year crash, injury and fatality rates were entered for each road and road segment, where listed separately. These rates were compared against statewide averages and scores assigned as noted below

Crash Rates Relative to State Average (=126)	Score
≥ State Average	**300**
≥ .6X < 1X State Average	**200**
≥ .4X < .6X State Average	**100**
< .4X State Average	**0**

Injury Rates Relative to State Average (=67)	Score
≥ 3X State Average	**500**
≥ 1X <3X State Average	**300**
≥ .5X <1X State Average	**100**
< .5X State Average	**0**

Fatality Rates Relative to State Average (=1.11)	Score
≥ State Average	**300**
≥ .5X < State Average	**100**
< .5X State Average	**0**

The scoring system weighted injury statistics more heavily, as this data identifies roads with a history of generating more serious crashes, and provides a higher number of incidents for sampling accuracy. Fatalities, while felt to be a significant concern, could be the result of factors which have little to do with the safety of a road, and a single fatal accident could have undue influence on the overall score, particularly on lesser traveled roads.

Potential for Growth: categorizes roads on the basis of their use for accessing the major transportation corridors (Route 1 & I-95), location in areas experiencing greater growth and/or cut through pressures

Characteristics	Score
Major east-west route providing access to Route 1 and I-95 from eastern or western Stafford County, or parallel road to Route 1 and I-95 serving as an alternative for motorists to these roads	**300**
Major secondary route within an area of the County experiencing significant growth pressures; will serve a planned future infrastructure improvement (e.g. park, school); or a road with a demonstrated use for cut through traffic	**200**
Road with expected increase in traffic typical of a developing locality	**100**

The initial list, along with the scoring for each road and road segment as presented to the Infrastructure Committee, is attached. During the next phase of the Evaluation staff will conduct a more detailed examination of each road, including a more detailed analysis of accident patterns, identification of road projects funded or underway, operational evaluation, recommendations for improvements, as well as cost estimates for the recommended improvements. As noted above, the list presented to the Infrastructure Committee includes 114 roads and road segments. Detailed analysis of this number of roads would involve significant staff commitment and greatly extend the study period.

The Infrastructure Committee, at the October 2nd meeting, recommended reducing the number of roads to about 20 each for roads above and below the 1,700 vpd per lane threshold (40 total), plus a few others which may be identified by Board members as worthy of additional analysis. Based on more detailed analysis following the Infrastructure Committee meeting, staff identified additional roads and road segments which should be included as well. For instance, staff identified crash patterns on certain roads which were deemed significant enough to warrant additional segmentation to allow proper analysis. Also, some roads had been previously identified in the Youth Driver Task Force study but were just below the 20 road cut off. This has resulted in staff recommending further analysis of 38 roads or road segments for roads above 1,700 vpd per lane, and 25 roads below 1,700 vpd per lane. The roads and road segments recommended for further study are listed below and are identified by the yellow cells in the attached spreadsheet which was first provided at the October 16, 2018 Infrastructure Committee meeting. One additional segment was added to the roads greater than 1,700 vpd per lane for Mountain View Road (Kellogg Mill Road to Choptank Road). The current recommendations for road segments to be studied are correctly identified in the list below. The listing order below is not intended to signify ranking of the recommended projects, as the addition of new segments and the incorporation of new data will alter the ranking shown in the preliminary Evaluation.

It is believed that conducting the analysis in this way will result in a more accurate identification of those roads which merit a higher priority for improvement, as well as providing better information on the type of improvement required.

Next Steps and Schedule

Presentation of Road List for Further Analysis	November 7, 2018
Board Consideration of Road List for Further Analysis	November 27, 2018
Presentation of Additional Analysis Results by Staff	February 5, 2019
Incorporation of Board Input and Presentation of Final Priority List	March 5, 2019
Board Considers Final Priority List for Approval	March 19, 2019
Board Considers Funding Strategies for Road Improvements	March 19, 2019

TCF:kd

Attachments (as noted)

RECOMMENDED ROAD LIST FOR FURTHER ANALYSIS

Roads ≥ 1,700 VPD/Lane

BUTLER ROAD - Falmouth Intersection to Castle Rock Drive
BUTLER ROAD/WHITE OAK ROAD - Castle Rock Drive to Baron Park Road
RAMOTH CHURCH ROAD
ONVILLE ROAD
MORTON ROAD
LAYHILL ROAD
GARRISONVILLE ROAD - Joshua Road to Arrowhead Drive
GARRISONVILLE ROAD - I-95 to Onville Road
GARRISONVILLE ROAD – Arrowhead Drive to Fauquier County Line
GARRISONVILLE ROAD - Eustace Road to Shelton Shop Road
GARRISONVILLE ROAD - Onville Road to Eustace Road
GARRISONVILLE ROAD - Shelton Shop Road to Joshua Road
SHELTON SHOP ROAD
HARTWOOD CHURCH ROAD
COURTHOUSE ROAD - (West) Winding Creek Road to Shelton Shop Road
JOSHUA ROAD
ANDREW CHAPEL ROAD
DOC STONE ROAD
POPLAR ROAD - Route 17 to Stefaniga Road
PRIMMER HOUSE ROAD
MINE ROAD
WHITE OAK ROAD - Baron Park Road to Ferry Road
ENON ROAD - Rt.1 to Stafford Indians Lane
FERRY ROAD
TELEGRAPH ROAD
WHITE OAK ROAD - Ferry Road to King George County Line
BEREA CHURCH ROAD
EUSTACE ROAD
HOPE ROAD
LEELAND ROAD - Deacon Road to Morton Road
ENON ROAD - Stafford Indians Lane to Truslow Road
MOUNTAIN VIEW ROAD – Centreport Parkway to Kellogg Mill Road
MOUNTAIN VIEW ROAD - Kellogg Mill Road to Choptank Road
WINDING CREEK ROAD - Courthouse Rd to Embrey Mill Road
WINDING CREEK ROAD - Embrey Mill Road to Shelton Shop Road
PLANTATION DRIVE
POPLAR ROAD – Kellogg Mill Road to Hartwood Road
BARRETT HEIGHTS ROAD

RECOMMENDED ROAD LIST FOR FURTHER ANALYSIS

Roads < 1,700 VPD/Lane

BRENT POINT ROAD - Quarry Road to Arkendale Road
WOODSTOCK LANE (S.R. 646)
TACKETTS MILL ROAD
HEFLIN ROAD
TACKETTS MILL ROAD (S.R. 612)
FALLS RUN DRIVE
LEELAND ROAD - Morton Road to End of State Maintenance
SPOTTED TAVERN ROAD
BRENT POINT ROAD - Arkendale Road to End
BROOKE ROAD - New Hope Church Road to Eskimo Hill Road
LICHFIELD BOULEVARD
MCWHIRT LOOP
STEFANIGA ROAD
TRUSLOW ROAD – Cambridge Street to Plantation Drive
LITTLE WHIM ROAD
HOLLY CORNER ROAD
POTOMAC RUN ROAD
ROCK HILL CHURCH ROAD
WEST CAMBRIDGE STREET
CROPP ROAD
KELLOGG MILL ROAD
BROOKE ROAD - Eskimo Hill to End
DECATUR ROAD
RICHARDS FERRY ROAD
HARTWOOD ROAD

COMPREHENSIVE ROAD EVALUATION MATRIX - ROADS > 1,700 VPD/L

	No#	Road Segment	Route Number	Number of Lanes	Facility Type	Safety						Operational Considerations					Implementation				
						Subtotal Score	Total # of Crashes	Length (Miles)	Initial review Comments	Crashes per Mile	Score	Cap/hr	veh/hr	vol/cap ratio	Rating	Score	Recommended Improvement	Total Cost	Total Score	Running Total	COMMENTS
1	3a	BUTLER RD Falmouth Int to Castle Rock	218	2	Minor Collector	1800	45	0.9	Congested 2-lane rural section sandwiched between improved 4-lane sections. 37 intersection caused crashes and 7 road width; 3 fatalities.	50.0	300	2100	2174	1.04	F	400	2 to 4-lane widening (urban)	$ 22,500,000	2500	$ 22,500,000	
2	1a	GARRISONVILLE RD I-95 to Onville Road	610	6	Minor Arterial	1700	269	1.36	269 crashes on this 1.36 mi section, overwhelmingly congestion related	197.8	300	7800	6480	0.83	E	400	STARS Study	TBD	2400		
3	11	SHELTON SHOP RD	648	2	Minor collector	1400	83	1.9	This is a heavily traveled, rural style road in a developing area with high schools on either end. 48 of the 80 crashes are intersection related, with most of the rest road width caused.	43.7	300	2100	1380	0.66	E	400	2 to 3 lane widening	$ 32,300,000	2100	$ 54,800,000	
4	9a	BUTLER/WHITE OAK RD Castle Rock to Baron Pk Rd	218	4	Major Collector	1600	46	0.86	36 crashes intersection related with 4 others sideswipe-same direction (4-lane road). 1 fatality,20 injuries	53.5	300	5000	1438	0.29	C	200	STARS Study	TBD	2100		
5	15	MORTON RD	624	2	Minor collector, major local	1500	11	0.38	8 crashes appear intersection related and 3 road width related (run off & head on)	28.9	300	2100	864	0.41	D	200	2 to 3 lane widening	$ 6,460,000	2000	$ 61,260,000	
6	1c	GARRISONVILLE RD Eustace Road to Shelton Shop	610	4	Major Collector	1300	82	1.38	Vast majority of crashes were congestion/intersection related.	59.4	300	4800	2970	0.62	E	400	4 to 6 lane widening (urban)	$ 34,500,000	2000	$ 95,760,000	
7	38	RAMOTH CHURCH RD	628	2	Major local	1600	38	4.45	36 crashes including 17 run off road spread along entire 4.5 mile segment. High number (24) with injuries.	8.5	100	1400	378	0.27	C	200	2 lane reconstruction	$ 8,800,000	1900	$ 104,560,000	Encourage use of Woodcutters Road by improving Kellogg Mill/Ramoth Church Rds (0.8 mi.) to connect to Woodcutters
8	18	ONVILLE RD	641	2	Minor collector	1300	36	1.2	36 crashes distributed along road with increase at intersections. Multiple run off road accidents.	30.0	300	2000	846	0.42	D	200	2 to 3 lane widening/2 lane reconstruction	$ 15,700,000	1800	$ 120,260,000	
9		WHITE OAK RD Baron Park to Ferry Rd	218	2	Major Collector	1200	31	1.82	31 crashes, 19 injuries with most intersection related	17.0	200	2500	1412	0.56	E	400	2 to 4 lane widening (rural)	$ 38,220,000	1800	$ 158,480,000	
10	1b	GARRISONVILLE RD Onville Rd to Eustace Rd	610	6	Major Collector	1300	97	0.64	Very high number of congestion and intersection related crashes. Project recently completely that should improve situation.	151.6	300	7000	3420	0.49	D	200	COMPLETED		1800		
11	14	LAYHILL RD	624	2	Major local	1200	17	0.5	9 crashes appear intersection related with 7 width related (run-off and sideswipe)	34.0	300	2100	873	0.42	D	200	2 to 3 lane widening	$ 8,500,000	1700	$ 166,980,000	
12		MOUNTAIN VIEW RD Kellogg Mill to Choptank Road	627	2	Major local	1100	33	3.13	Numerous accidents, combination of intersection and road geometry	10.5	200	1400	996	0.71	E	400	2 lane reconstruction	$ 34,430,000	1700	$ 201,410,000	
13	46	BEREA CHURCH RD	654	2	Major local	1400	10	1.33	Combination of intersection and road geometry related crashes. A project to resolve problems with Berea Church Road is fuinded and under design.	7.5	100	1200	306	0.26	C	200	UNDERWAY		1700		
14	35	ANDREW CHAPEL RD	629	2	Major local	1200	11	0.9	11 accidents including 5 off road spread along .9 mile section	12.2	200	1400	405	0.29	C	200	2 lane reconstruction	$ 9,900,000	1600	$ 211,310,000	
15	31a	POPLAR RD Rt 17 to Stefaniga	616	2	Major local	1200	47	3.6	While 9 crashes occurred in the recently imroved section, there were many more crashes north of the improved area with intersection and rum off road prevalent.	13.1	200	1400	450	0.32	D	200	2 lane reconstruction	$ 19,800,000	1600	$ 231,110,000	0.5 miles 2-lane reconstruction to Kellogg Mill road; then 2.2 miles 2-lane improvement (3R) to Stephaniga Rd
16	39c	WINDING CREEK RD Embrey Mill to Shelton Shop	628	2	Major local	1200	15	1.3	Mix of intersection crashes and road geometry related	11.5	200	1200	399	0.33	D	200	2 lane reconstruction	$ 14,300,000	1600	$ 245,410,000	
17	24a	ENON RD Rt.1 to Stafford Indians Ln	753	2	Major Local	1000	24	0.68	Preponderance of intersection related crashes. Calculation at right adds crashes on Enon to those counted on rt 1 at intersection with Enon	35.3	300	2200	969	0.44	D	200	2 to 3 lane widening	$ 8,000,000	1500	$ 253,410,000	In case Smart Scale application is unsuccessful.
18	13a	LEELAND Jilian Dr to Portland Dr	626		Major Local	900	5	0.4	Intersection type crashes. HSIP project funded and under design.	12.5	200	1300	900	0.69	E	400	2 to 3 lane widening	$2,000,000	1500	$ 255,410,000	Suggest supplemental funding to support VDOT HSIP effort.
19	29	DOC STONE RD	659	2	Major local	1200	9	1.44	Of the 9 crashes reported, all but 1 occurred between Rt. 610 and roundabout. These appear congestion related in the commercial sector of road.	6.3	100	1200	459	0.38	D	200			1500		Not recommended-most accidents in the congested commercial area near Doc Stone Commons
20	9b	WHITE OAK RD Ferry Rd to K.G County	218	2	Minor Collector	1100	46	4.14	46 crashes, 21 injuries with about half intersection related and the others road width/lack of shoulders	11.1	200	2200	917	0.42	D	200			1500		A 2-lane reconstruction along this road would cost approximately $46 million
21	42	HARTWOOD CHURCH RD	705	2	N/A	1300	2	0.4	2 accidents; 1 rear end (at Rt. 17 intersection and 1 run off road at Rt. 17	5.0	0	1400	342	0.24	C	200			1500		intersection with Route 17. No reconstruction efforts are
22	6	MINE RD	684	4	Major and minor collector	1100	43	2.46	Of the 43 crashes, 27 were intersection related and 6 were sideswioe same direction. Many in congested area near Rt 610.	17.5	200	4000	1440	0.36	D	200			1500		A 4 to 6 lane widening would cost approximately $60 million
23	36	TELEGRAPH RD	637	2	Minor collector, major local	1100	35	3.55	Mix of intersection and road geometry crashes including 2 involving pedestrians	9.9	100	2100	396	0.19	C	200			1400		
24	10	PLANTATION DR	1706	2	Major and minor collector	1000	25	1.6	Primarily intersection related crashes. The two way left turn lane extends the entire distance.	15.6	200	4000	1080	0.27	C	200			1400		
25	32	JOSHUA RD	643	2	Major local	1000	23	2.3	23 crashes & 7 injuries; 6 are intersection and 12 road geometry related.	10.0	100	1400	441	0.32	D	200			1300		
26	24b	ENON RD Staff Ind Ln to Truslow Rd	753	2	Major local	1000	11	1.31	Preponderance of crashes near water tank. May be opportunity for localized safety improvement.	8.4	100	2200	773	0.35	D	200			1300		
27	2b	COURTHOUSE RD (West) Winding Cr to Shelton Shop	630	2	Minor Collector	900	22	1.57	5 injuries in 22 crashes; most are intersection related with a few road geometry related	14.0	200	2100	766	0.36	D	200			1300		
28	12	FERRY RD	606	2	Minor collector	900	36	2.69	Of the 36 crashes, 16 were at Rt 3 in area of planned improvements. Balance spread out, with more intersection related	13.4	200	2100	900	0.43	D	200			1300		
29	39a	WINDING CREEK RD Courthouse Rd to Embrey Mill	628	2	Major local	1000	9	1.12	Few crashes between Rt 630 & Embrey Mill. Higher rate after Embrey Mill	8.0	100	1200	399	0.33	D	200			1300		
30	40	BARRETT HEIGHTS RD	642	2	Major local	1000	9	1.1	Primarily intersection related crashes.	8.2	100	1100	351	0.32	D	200			1300		
31	31b	POPLAR RD Kellogg Mill to Hartwood Rd	616	2	Major local	1000	41	6.22	41 accidents, with a few intersection, but mostly road geometry related	6.6	100	1400	315	0.23	C	200			1300		
32	25	EUSTACE RD	751	2	Major local	900	16	2.08	All 16 crashes appear intersection related, many clustered near Rt 610.	7.7	100	1200	522	0.44	D	200			1200		
33	1d	GARRISONVILLE RD Shelton Shop to Joshua	610	4	Major Collector	700	51	1.75	Crashes are mainly intersection and congestion related.	29.1	300	5000	1440	0.29	C	200			1200		
34	20a	MOUNTAIN VIEW RD Centreport to Kellogg Mill	627	2	Major local	900	10	3.26	Lower rate and fewer crashes on this section of road.	3.1	0	1400	315	0.23	C	200			1100		
35	16	PRIMMER HOUSE RD	624	2	Minor collector, major local	700	6	0.56	6 crashes, 4 were intersection related and none road geometry related.	10.7	200	2200	864	0.39	D	200			1100		
36	33	HOPE RD	687	2	Minor collector, major local	800	16	3.23	5 intersection, 9 road geometry caused crashes, with only 3 past Walker Way	5.0	0	1200	441	0.37	D	200			1000		
37	1e	GARRISONVILLE RD Joshua to Lk Arrowhead	610	2	Minor Collector	600	42	3.65	Significant number of crashes spread along the entire stretch of road, but closer review indicates a lower priority overall.	11.5	100	2200	900	0.41	D	200			900		
38	1f	GARRISONVILLE RD Lk Arrowhead to Fauquier	610	2	Minor Collector	700	7	1.98	Relatively few crashes past the Lake Arrowhead turn off, but 1 fatality on a low volume road increased overall score.	3.5	0	2200	531	0.24	C	200			900		

COMPREHENSIVE ROAD EVALUATION MATRIX - ROADS < 1,700 VPD/L

	No#	Road Segment	Route Number	Number of Lanes	Facility Type	Safety						Operations					Implementation				
						Score	Total # of Crashes	Length (Miles)	Initial review Comments	Crashes per Mile	Score	Cap/hr	veh/hr	vol/cap ratio	Rating	Score	Recommended Improvement	Total Cost	Total Score	Running Total	Comments
1	70	WOODSTOCK LN	639	2	N/A	**1400**	**5**	0.18	**Five crashes and one injury resulted in the scoring. These occurred near the intersection with Route 1, which is being improved.**	27.8	**300**	800	162	0.20	C	**200**	2' Shoulder Wedge w/ Overlay	$ 19,569	**1900**	$ 19,569	Although the intersection is scheduled for improvement as a Smart Scale project, widening the remaining section would be an improvement.
2	57	FALLS RUN DR	618	2	Minor collector	**1300**	**8**	0.45	**Both the description and location of these crashes indicate intersection related accidents.**	17.8	**200**	2000	216	0.11	B	**0**	2' Shoulder Wedge w/ Overlay	$ 48,923	**1500**	$ 68,492	This is a rural road section in an urbanized area of the County
3	47a	BROOKE RD New Hope to Eskimo Hill	608	2	Major local	**1100**	**37**	5.45	**Of the 37 crashes, over half were road geometry related**	6.8	**100**	1400	297	0.21	C	**200**	2' Shoulder Wedge w/ Overlay	$ 396,821	**1400**	$ 465,313	Minus the portion improved as a safety enhancement
4	45	KELLOGG MILL RD	651	2	Major local	**1000**	**40**	4.66	**Multiple rear end and run off road**	8.6	**100**	1400	306	0.22	C	**200**	2' Shoulder Wedge w/ Overlay	$ 506,626	**1300**	$ 971,939	
5	43	LICHFIELD BLVD	700	3	Minor collector	**1000**	**17**	0.63	**Majority of intersection related crashes, mainly in the commercial area**	27.0	**300**	2000	333	0.17	B	**0**		$ -	**1300**	$ 971,939	Shoulder wedge would not improve this urban/residential road section
6	95a	BRENT POINT RD Quarry Rd to Arkendale Rd	658	2	Minor Local	**1300**	**1**	1.68	**While the rate is very high, there was only a single accident, which resulted in an injury, on a road with a very low traffic count. This unpaved road is programmed for hard surfacing under the SSYP.**	0.6	**0**	1400	10	0.01	A	**0**		$ -	**1300**	$ 971,939	This road section is programmed for funding under the rural paving program
7	85	TACKETTS MILL RD	646	2	Major local	**1200**	**14**	1.5	**4 angle crashes (intersection related),1 sideswipe and 6 run off road on 1.5 mile section.**	9.3	**100**	1400	126	0.09	B	**0**	2' Shoulder Wedge w/ Overlay	$ 182,646	**1300**	$ 1,154,585	
8	60	HEFLIN RD	612	2	Major local	**1200**	**2**	1.34	**2 run off road with 2 injuries**	1.5	**0**	1200	198	0.17	B	**0**	2' Shoulder Wedge w/ Overlay	$ 145,682	**1200**	$ 1,300,267	
9	95b	BRENT POINT RD Arkendale Rd to End	658	2	Minor Local	**1200**	**6**	3.2	**Six crashes; 3 were road geometry, 2 train related.**	1.9	**0**	1400	48	0.03	A	**0**	2' Shoulder Wedge w/ Overlay	$ 282,667	**1200**	$ 1,582,934	Includes only that portion to the state park
10	59	MCWHIRT LOOP	700	2	Major and minor collector	**1000**	**9**	0.56	**All crashes occurred near intersections**	16.1	**200**	2100	207	0.10	B	**0**		$ -	**1200**	$ 1,582,934	Shoulder wedge would not improve this commercial/industrial road section
11	63	STEFANIGA RD	648	2	Major local	**1100**	**18**	3.48	**Crashes spread out along road**	5.2	**100**	1400	189	0.14	B	**0**	2' Shoulder Wedge w/ Overlay	$ 378,339	**1200**	$ 1,961,273	
12	90	WEST CAMBRIDGE ST	607	2	Major local	**1000**	**2**	0.1	**1 bicyclist & 1 sideswipe**	20.0	**200**	700	99	0.14	B	**0**		$ -	**1200**	$ 1,961,273	Shoulder wedge would not improve this urban/residential road section
13	49b	TRUSLOW RD Cambridge to Berea Church	652	2	Minor Collector	**1100**	**25**	4.22	**Preponderance of road geometry related crasshes**	5.9	**100**	2100	189	0.09	B	**0**	2' Shoulder Wedge w/ Overlay	$ 546,218	**1200**	$ 2,507,491	Minus the portion improved as a 2-lane reconstruction
14	66	TACKETTS MILL RD	612	2	Major local	**1000**	**15**	1.76	**4 angle crashes (intersection related),2 head-on and 7 run off road on 1 3/4 mile section. Clustered near southern end.**	8.5	**100**	1400	180	0.13	B	**0**	2' Shoulder Wedge w/ Overlay	$ 191,344	**1100**	$ 2,698,834	
15	*	HARTWOOD ROAD	612	2	Major Local	**900**	35	7.0	**5 rear end and 9 angle crashes related to intersections; 1 head-on, 2 sideswipe, and 13 run off road road width related**	5.0	**0**	1400	306	0.22	C	**200**	2' Shoulder Wedge w/ Overlay	$ 761,026	**1100**	$ 3,459,860	
16	91	SPOTTED TAVERN RD	614	2	Major local	**1000**	**4**	2.33	**All 4 crashes run off road and spread out**	1.7	**0**	1400	99	0.07	B	**0**	2' Shoulder Wedge w/ Overlay	$ 253,313	**1000**	$ 3,713,173	
17	69	DECATUR RD	635	2	Major local	**900**	**8**	3.59	**6 of 8 crashes caused by narrow road**	2.2	**0**	1400	162	0.12	B	**0**	2' Shoulder Wedge w/ Overlay	$ 390,298	**900**	$ 4,103,471	
18	64	LITTLE WHIM RD	669	2	Major local	**900**	**4**	1.2	**Road geometry related**	3.3	**0**	1300	189	0.15	B	**0**	2' Shoulder Wedge w/ Overlay	$ 130,462	**900**	$ 4,233,932	
19	74	HOLLY CORNER RD	655	2	Major local	**900**	**13**	4.02	**Road geometry related**	3.2	**0**	1300	153	0.12	B	**0**	2' Shoulder Wedge w/ Overlay	$ 437,046	**900**	$ 4,670,979	
20	83	POTOMAC RUN RD	626	2	Major local	**900**	**6**	2.33	**Road geometry related**	2.6	**0**	1200	135	0.11	B	**0**	2' Shoulder Wedge w/ Overlay	$ 253,313	**900**	$ 4,924,292	
21	68	ROCK HILL CHURCH RD	644	2	Minor collector	**800**	**16**	2.74	**Even split, intersection and road geometry**	5.8	**100**	2200	171	0.08	B	**0**	2' Shoulder Wedge w/ Overlay	$ 297,887	**900**	$ 5,222,179	
22	87	CROPP RD	615	2	Major local	**800**	**4**	2.23	**All 4 crashes run off road towards north end**	1.8	**0**	1400	108	0.08	B	**0**	2' Shoulder Wedge w/ Overlay	$ 242,441	**800**	$ 5,464,620	
23	13b	LEELAND RD Morton Rd to End St Maintenance	625		Minor Collector	**800**	**3**	0.9	**Run-off road accidents**	3.3	**0**	1300	153	0.12	B	**0**	2' Shoulder Wedge w/ Overlay	$ 97,846	**800**	$ 5,562,466	
24	47b	BROOKE RD Eskimo Hill to End	608	2	Major local	**700**	**18**	5.79	**12 of 18 apparently road width related crashes**	3.1	**0**	1400	198	0.14	B	**0**	2' Shoulder Wedge w/ Overlay	$ 629,477	**700**	$ 6,191,944	
25	92	RICHARDS FERRY RD	752	2	Major local	**700**	**4**	2.93	**All 4 crashes related to narrow road width**	1.4	**0**	1400	90	0.06	B	**0**	2' Shoulder Wedge w/ Overlay	$ 318,544	**700**	$ 6,510,487	

Comprehensive Road Evaluation Board Update

December 11, 2018

Background

- Following the staff update at the November 27, 2018 Board meeting, staff was directed to focus additional analysis on 63 roads/road segments
- These included 38 roads/road segments with traffic counts greater than 1,700 vehicles per day per lane (vpd/l), and 25 roads/road segments with traffic counts less than 1,700 vpd/l

RECOMMENDED ROAD LIST FOR FURTHER ANALYSIS

Roads ≥ 1,700 VPD/Lane

BUTLER ROAD - Falmouth Intersection to Castle Rock Drive
BUTLER ROAD/WHITE OAK ROAD - Castle Rock Drive to Baron Park Road
RAMOTH CHURCH ROAD
ONVILLE ROAD
MORTON ROAD
LAYHILL ROAD
GARRISONVILLE ROAD - Joshua Road to Arrowhead Drive
GARRISONVILLE ROAD - I-95 to Onville Road
GARRISONVILLE ROAD – Arrowhead Drive to Fauquier County Line
GARRISONVILLE ROAD - Eustace Road to Shelton Shop Road
GARRISONVILLE ROAD - Onville Road to Eustace Road
GARRISONVILLE ROAD - Shelton Shop Road to Joshua Road
SHELTON SHOP ROAD
HARTWOOD CHURCH ROAD
COURTHOUSE ROAD - (West) Winding Creek Road to Shelton Shop Road
POPLAR ROAD – Kellogg Mill Road to Hartwood Road
PLANTATION DRIVE
MOUNTAIN VIEW ROAD – Centreport Parkway to Kellogg Mill Road
BARRETT HEIGHTS ROAD
JOSHUA ROAD
ANDREW CHAPEL ROAD
DOC STONE ROAD
POPLAR ROAD - Route 17 to Stefaniga Road
PRIMMER HOUSE ROAD
MINE ROAD
WHITE OAK ROAD - Baron Park Road to Ferry Road
ENON ROAD - Rt.1 to Stafford Indians Lane
FERRY ROAD
TELEGRAPH ROAD
WHITE OAK ROAD - Ferry Road to King George County Line
BEREA CHURCH ROAD
EUSTACE ROAD
HOPE ROAD
LEELAND ROAD - Deacon Road to Morton Road
ENON ROAD – Stafford Indians Lane to Truslow Road
WINDING CREEK ROAD - Embrey Mill Road to Shelton Shop Road
WINDING CREEK ROAD - Courthouse Rd to Embrey Mill Road
MOUNTAIN VIEW ROAD - Kellogg Mill Road to Choptank Road

RECOMMENDED ROAD LIST FOR FURTHER ANALYSIS

Roads < 1,700 VPD/Lane

BRENT POINT ROAD - Quarry Road to Arkendale Road
WOODSTOCK LANE (S.R. 646)
TACKETTS MILL ROAD
HEFLIN ROAD
TACKETTS MILL ROAD (S.R. 612)
FALLS RUN DRIVE
LEELAND ROAD - Morton Road to End of State Maintenance
SPOTTED TAVERN ROAD
BRENT POINT ROAD - Arkendale Road to End
BROOKE ROAD - New Hope Church Road to Eskimo Hill Road
LICHFIELD BOULEVARD
MCWHIRT LOOP
STEFANIGA ROAD
TRUSLOW ROAD – Cambridge Street to Plantation Drive
LITTLE WHIM ROAD
HOLLY CORNER ROAD
POTOMAC RUN ROAD
ROCK HILL CHURCH ROAD
WEST CAMBRIDGE STREET
CROPP ROAD
KELLOGG MILL ROAD
BROOKE ROAD - Eskimo Hill to End
DECATUR ROAD
RICHARDS FERRY ROAD
HARTWOOD ROAD

Phase 2 Evaluation Process

- The threshold to receive 500 points for injury rate statistics was reduced from 3 times state average to 2 times state average
- Evaluation criteria was added to account for variations in the density of accidents, instead of only the accident rate
  - Use of the accident rate alone failed to separate roads which were more lightly traveled, and influenced by a low number of accidents
- Also added a scoring category for operational performance
- The new scores were added to previous the previous scoring subtotal
- Reviewed accident descriptions and mapping for every road, allowing identification by the nature of the accidents (congestion, intersection & road geometry

Phase 2 Scoring Methodology

- **Accident Density (accidents/mile)**: Divided the total number of reported accidents over the 3-year study period by the length of the road segment to generate the number of accidents per mile

Accidents/Mile	Score
≥ 20	**300**
> 10.1; <20	**200**
>5.1; ≤ 10	**100**
<5	**0**

- Reportable accidents are defined as those causing injury, fatality, or property damage over $1,500

Scoring Methodology (cont.)

- **Operational Rating**: categorizes roads based on a ratio of road capacity in vehicles/hour versus road use in vehicles per hour
- Used methodology and road capacity assessment from our County-wide Road Impact Fee Analysis
- The Impact Fee Analysis reviewed the primary and secondary roads in the County, divided them into multiple segments, and assigned a capacity for each segment, based on multiple factors
  - Number of lanes
  - Lane width
  - Shoulders (presence/absence)
  - Horizontal and vertical curvature
  - Density of driveway entrances
  - Intersections
  - Commercial entrances
- This generated a capacity per hour, which was divided by the peak hourly road use to provide a volume to capacity ratio

Scoring Methodology (cont.)

Peak Hourly Volume/Road Capacity	Operational Rating
0.01 - 0.04	A
0.05 - 0.17	B
0.18 - 0.31	C
0.32 - 0.49	D
0.49 - 0.96	E
≥ 0.97	F

Operational Rating	Score
A,B	**0**
C,D	**200**
E,F	**400**

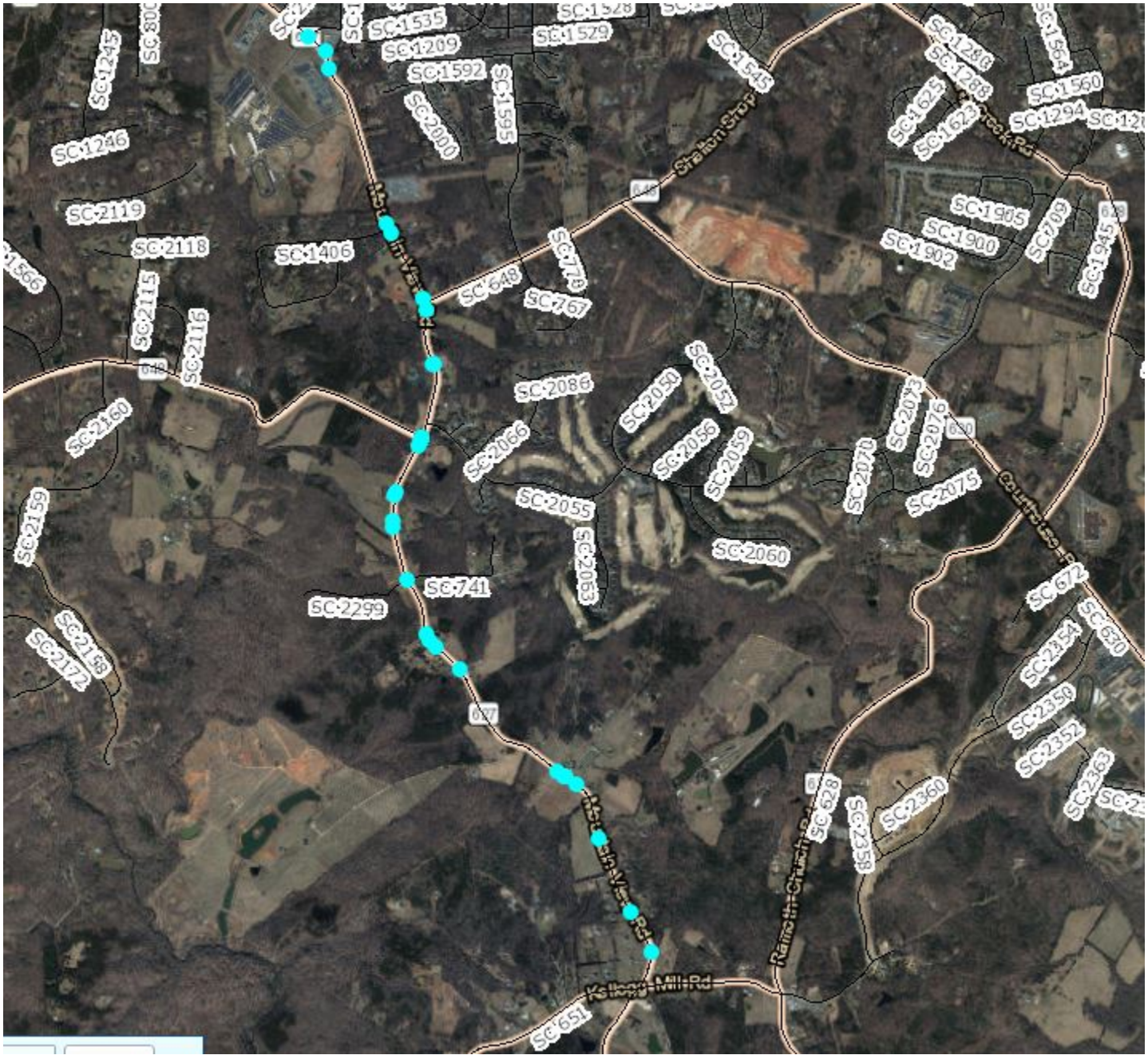
Accident Review

- VDOT provided detailed information related to the nature of the accidents on a road segment including description, location, and diagrams
- These were reviewed for each segment
- Accidents were segregated into two general categories

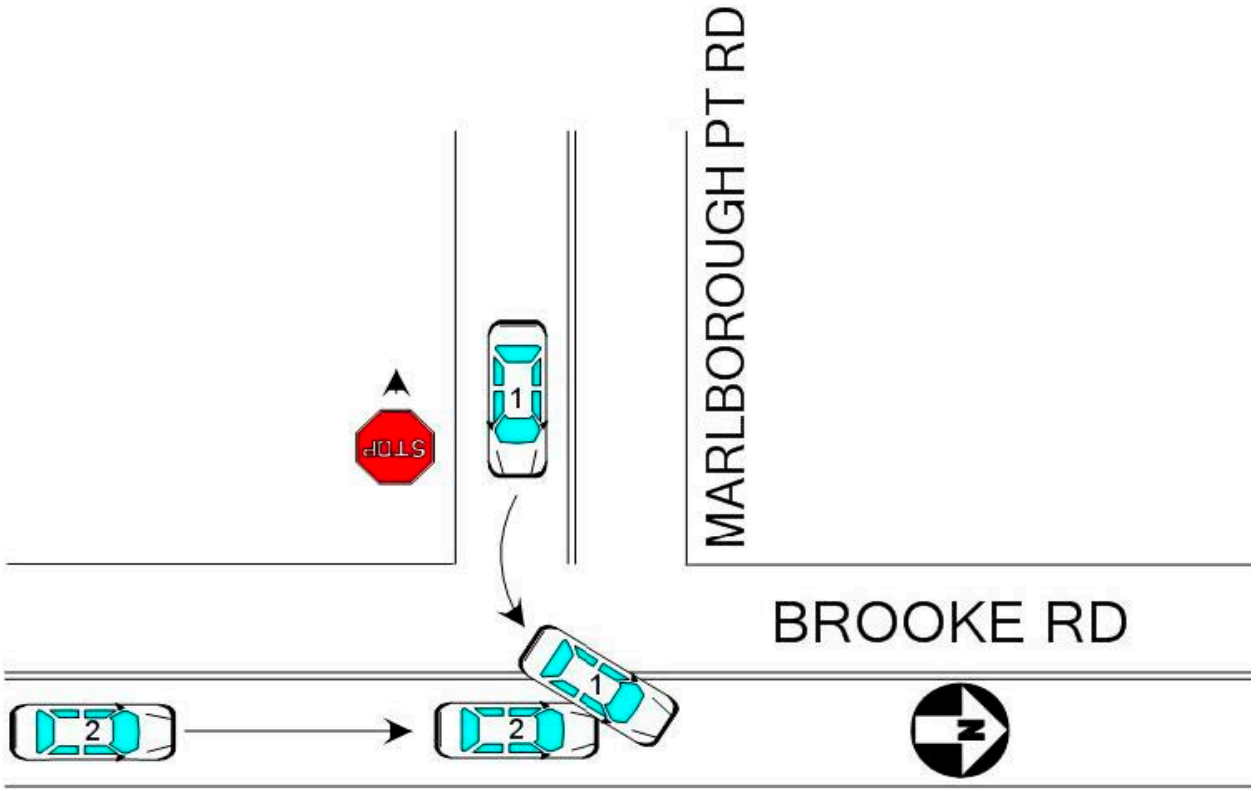
Accident Category	Accident Description
Congestion & Intersection	Rear end, side swipe (same direction) & angle
Road Geometry (width, curvature)	Run-off road, side swipe (opp. dir.) & head-on

- This information was summarized and used to identify a recommended road improvement

Crash Map Example



Crash Diagram Example



Roads Over 1,700 VPD/Lane (Page 1)

	No#	Road Segment	Route Number	Number of Lanes	Facility Type	Safety					Operational Considerations					Implementation				
						Subtotal Score	Total # of Crashes	Length (Miles)	Initial Review Comments	Crashes per Mile	Score	Cap/hr	veh/hr	vol/cap ratio	Rating	Score	Recommended Improvement	Total Cost	Total Score	Running Total	COMMENTS
1	3a	BUTLER RD Falmouth Int to Castle Rock	218	2	Minor Collector	1800	45	0.9	Congested 2-lane rural section sandwiched between improved 4-lane sections. 37 intersection caused crashes and 7 road width; 3 fatalities.	50.0	300	2100	2174	1.04	F	400	2 to 4-lane widening (urban)	$ 18,900,000	2500	$ 18,900,000	
2	1a	GARRISONVILLE RD I-95 to Onville Road	610	6	Minor Arterial	1700	269	1.36	269 crashes on this 1.36 mi section, overwhelmingly congestion related	197.8	300	7800	6480	0.83	E	400	STARS Study	TBD	2400		
3	11	SHELTON SHOP RD	648	2	Minor collector	1400	83	1.9	This is a heavily traveled, rural style road in a developing area with high schools on either end. 48 of the 80 crashes are intersection related, with most of the rest road width caused.	43.7	300	2100	1380	0.66	E	400	2 to 3 lane widening	$ 32,300,000	2100	$ 51,200,000	
4	9a	BUTLER/WHITE OAK RD Castle Rock to Baron Pk Rd	218	4	Major Collector	1600	46	0.86	36 crashes intersection related with 4 others sideswipe-same direction (4-lane road). 1 fatality,20 injuries	53.5	300	5000	1438	0.29	C	200	STARS Study	TBD	2100		
5	15	MORTON RD	624	2	Minor collector, major local	1500	11	0.38	8 crashes appear intersection related and 3 road width related (run off & head on)	28.9	300	2100	864	0.41	D	200	2 to 3 lane widening	$ 6,460,000	2000	$ 57,660,000	
6	1c	GARRISONVILLE RD Eustace Road to Shelton Shop	610	4	Major Collector	1300	82	1.38	Vast majority of crashes were congestion/intersection related.	59.4	300	4800	2970	0.62	E	400	4 to 6-lane widening (urban)	$ 34,500,000	2000	$ 92,160,000	
7	38	RAMOTH CHURCH RD	628	2	Major local	1600	38	4.45	36 crashes including 17 run off road spread along entire 4.5 mile segment. High number (24) with injuries.	8.5	100	1400	378	0.27	C	200	2 lane reconstruction	$ 8,800,000	1900	$ 100,960,000	Encourage use of Woodcutters Road by improving Kellogg Mill/Ramoth Church Rds (0.8 mi.) to
8	18	ONVILLE RD	641	2	Minor collector	1300	36	1.2	36 crashes distributed along road with increase at intersections. Multiple run off road accidents.	30.0	300	2000	846	0.42	D	200	2 to 3 lane widening/2 lane reconstruction	$ 15,700,000	1800	$ 116,660,000	
9		WHITE OAK RD Baron Park to Ferry Rd	218	2	Major Collector	1200	31	1.82	31 crashes, 19 injuries with most intersection related	17.0	200	2500	1412	0.56	E	400	2 to 4 lane widening (rural)	$ 38,220,000	1800	$ 154,880,000	
10	1b	GARRISONVILLE RD Onville Rd to Eustace Rd	610	6	Major Collector	1300	97	0.64	Very high number of congestion and intersection related crashes. Project recently completely that should improve situation.	151.6	300	7000	3420	0.49	D	200	COMPLETED		1800		
11	14	LAYHILL RD	624	2	Major local	1200	17	0.5	9 crashes appear intersection related with 7 width related (run-off and sideswipe)	34.0	300	2100	873	0.42	D	200	2 to 3 lane widening	$ 8,500,000	1700	$ 163,380,000	
12		MOUNTAIN VIEW RD Kellogg Mill to Choptank Road	627	2	Major local	1100	33	3.13	Numerous accidents, combination of intersection and road geometry	10.5	200	1400	996	0.71	E	400	2 lane reconstruction	$ 34,430,000	1700	$ 197,810,000	
13	46	BEREA CHURCH RD	654	2	Major local	1400	10	1.33	Combination of intersection and road geometry related crashes. A project to resolve problems with Berea Church Road is funded and under design.	7.5	100	1200	306	0.26	C	200	UNDERWAY		1700		
14	35	ANDREW CHAPEL RD	629	2	Major local	1200	11	0.9	11 accidents including 5 off road spread along .9 mile section	12.2	200	1400	405	0.29	C	200	2 lane reconstruction	$ 9,900,000	1600	$ 207,710,000	
15	31a	POPLAR RD Rt 17 to Stefaniga	616	2	Major local	1200	47	3.6	While 9 crashes occurred in the recently imroved section, there were many more crashes north of the improved area with intersection and run off road prevalent.	13.1	200	1400	450	0.32	D	200	2 lane reconstruction/ 2 lane improvement	$ 19,800,000	1600	$ 227,510,000	0.5 miles 2-lane reconstruction to Kellogg Mill road; then 2.2 miles 2-lane improvement (3R) to Stephaniga Rd
16	39c	WINDING CREEK RD Embrey Mill to Shelton Shop	628	2	Major local	1200	15	1.3	Mix of intersection crashes and road geometry related	11.5	200	1200	399	0.33	D	200	2 lane reconstruction	$ 14,300,000	1600	$ 241,810,000	
17	24a	ENON RD Rt.1 to Stafford Indians Ln	753	2	Major Local	1000	24	0.68	Preponderance of intersection related crashes. Calculation at right adds crashes on Enon to those counted on rt 1 at intersection with Enon	35.3	300	2200	969	0.44	D	200	2 to 3 lane widening	$ 8,000,000	1500	$ 249,810,000	In case Smart Scale application is unsuccessful.
18	13a	LEELAND Jilian Dr to Portland Dr	626		Major Local	900	5	0.4	Intersection type crashes. HSIP project funded and under design.	12.5	200	1300	900	0.69	E	400	2 to 3 lane widening	$5,270,000	1500	$ 255,080,000	VDOT recently raised the estimated cost of this project to $9 million, requiring $5.3 million in supplemental County funding.

Roads Over 1,700 VPD/Lane (Page 2)

	No#	Road Segment	Route Number	Number of Lanes	Facility Type	Safety					Operational Considerations					Implementation				
						Subtotal Score	Total # of Crashes	Length (Miles)	Initial Review Comments	Crashes per Mile	Score	Cap/hr	veh/hr	vol/cap ratio	Rating	Score	Recommended Improvement	Total Cost	Total Score	Running Total	COMMENTS
19	29	DOC STONE RD	659	2	Major local	1200	9	1.44	Of the 9 crashes reported, all but 1 occurred between Rt. 610 and roundabout. These appear congestion related in the commercial sector of road.	6.3	100	1200	459	0.38	D	200			1500		Not recommended-most accidents in the congested commercial area near Doc Stone Commons
20	9b	WHITE OAK RD Ferry Rd to K.G County	218	2	Minor Collector	1100	46	4.14	46 crashes, 21 injuries with about half intersection related and the others road width/lack of shoulders	11.1	200	2200	917	0.42	D	200			1500		A 2-lane reconstruction along this road would cost approximately $46 million
21	42	HARTWOOD CHURCH RD	705	2	N/A	1300	2	0.4	2 accidents; 1 rear end (at Rt. 17 intersection and 1 run off road at Rt. 17	5.0	0	1400	342	0.24	C	200			1500		intersection with Route 17. No reconstruction efforts are
22	6	MINE RD	684	4	Major and minor collector	1100	43	2.46	Of the 43 crashes, 27 were intersection related and 6 were sideswioe same direction. Many in congested area near Rt 610.	17.5	200	4000	1440	0.36	D	200			1500		A 4 to 6 lane widening would cost approximately $60 million
23	36	TELEGRAPH RD	637	2	Minor collector, major local	1100	35	3.55	Mix of intersection and road geometry crashes including 2 involving pedestrians	9.9	100	2100	396	0.19	C	200			1400		
24	10	PLANTATION DR	1706	2	Major and minor collector	1000	25	1.6	Primarily intersection related crashes. The two way left turn lane extends the entire distance.	15.6	200	4000	1080	0.27	C	200			1400		
25	32	JOSHUA RD	643	2	Major local	1000	23	2.3	23 crashes & 7 injuries; 6 are intersection and 12 road geometry related.	10.0	100	1400	441	0.32	D	200			1300		
26	24b	ENON RD Staff Ind Ln to Truslow Rd	753	2	Major local	1000	11	1.31	Preponderance of crashes near water tank. May be opportunity for localized safety improvement.	8.4	100	2200	773	0.35	D	200			1300		
27	2b	COURTHOUSE RD (West) Winding Cr to Shelton Shop	630	2	Minor Collector	900	22	1.57	5 injuries in 22 crashes; most are intersection related with a few road geometry related	14.0	200	2100	766	0.36	D	200			1300		
28	12	FERRY RD	606	2	Minor collector	900	36	2.69	Of the 36 crashes, 16 were at Rt 3 in area of planned improvements. Balance spread out, with more intersection related	13.4	200	2100	900	0.43	D	200			1300		
29	39a	WINDING CREEK RD Courthouse Rd to Embrey Mill	628	2	Major local	1000	9	1.12	Few crashes between Rt 630 & Embrey Mill. Higher rate after Embrey Mill	8.0	100	1200	399	0.33	D	200			1300		
30	40	BARRETT HEIGHTS RD	642	2	Major local	1000	9	1.1	Primarily intersection related crashes.	8.2	100	1100	351	0.32	D	200			1300		
31	31b	POPLAR RD Kellogg Mill to Hartwood Rd	616	2	Major local	1000	41	6.22	41 accidents, with a few intersection, but mostly road geometry related	6.6	100	1400	315	0.23	C	200			1300		
32	25	EUSTACE RD	751	2	Major local	900	16	2.08	All 16 crashes appear intersection related, many clustered near Rt 610.	7.7	100	1200	522	0.44	D	200			1200		
33	1d	GARRISONVILLE RD Shelton Shop to Joshua	610	4	Major Collector	700	51	1.75	Crashes are mainly intersection and congestion related.	29.1	300	5000	1440	0.29	C	200			1200		
34	20a	MOUNTAIN VIEW RD Centreport to Kellogg Mill	627	2	Major local	900	10	3.26	Lower rate and fewer crashes on this section of road.	3.1	0	1400	315	0.23	C	200			1100		
35	16	PRIMMER HOUSE RD	624	2	Minor collector, major local	700	6	0.56	6 crashes, 4 were intersection related and none road geometry related.	10.7	200	2200	864	0.39	D	200			1100		
36	33	HOPE RD	687	2	Minor collector, major local	800	16	3.23	5 intersection, 9 road geometry caused crashes, with only 3 past Walker Way	5.0	0	1200	441	0.37	D	200			1000		
37	1e	GARRISONVILLE RD Joshua to Lk Arrowhead	610	2	Minor Collector	600	42	3.65	Significant number of crashes spread along the entire stretch of road, but closer review indicates a lower priority overall.	11.5	100	2200	900	0.41	D	200			900		
38	1f	GARRISONVILLE RD Lk Arrowhead to Fauquier	610	2	Minor Collector	700	7	1.98	Relatively few crashes past the Lake Arrowhead turn off, but 1 fatality on a low volume road increased overall score.	3.5	0	2200	531	0.24	C	200			900		

Roads Under 1,700 VPD/Lane (Page 1)

	No#	Road Segment	Route Number	Number of Lanes	Facility Type	Safety						Operations					Implementation				
						Score	Total # of Crashes	Length (Miles)	Initial review Comments	Crashes per Mile	Score	Cap/hr	veh/hr	vol/cap ratio	Rating	Score	Recommended Improvement	Total Cost	Total Score	Running Total	Comments
1	70	WOODSTOCK LN	639	2	N/A	1400	5	0.18	Five crashes and one injury resulted in the scoring. These occurred near the intersection with Route 1, which is being improved.	27.8	300	800	162	0.20	C	200	2' Shoulder Wedge w/ Overlay	$ 19,569	1900	$ 19,569	Although the intersection is scheduled for improvement as a Smart Scale project, widening the remaining section would be an improvement.
2	57	FALLS RUN DR	618	2	Minor collector	1300	8	0.45	Both the description and location of these crashes indicate intersection related accidents.	17.8	200	2000	216	0.11	B	0	2' Shoulder Wedge w/ Overlay	$ 48,923	1500	$ 68,492	This is a rural road section in an urbanized area of the County
3	47a	BROOKE RD New Hope to Eskimo Hill	608	2	Major local	1100	37	5.45	Of the 37 crashes, over half were road geometry related	6.8	100	1400	297	0.21	C	200	2' Shoulder Wedge w/ Overlay	$ 592,513	1400	$ 661,005	Minus the portion improved as a safety enhancement
4	45	KELLOGG MILL RD	651	2	Major local	1000	40	4.66	Multiple rear end and run off road	8.6	100	1400	306	0.22	C	200	2' Shoulder Wedge w/ Overlay	$ 506,626	1300	$ 1,167,631	
5	43	LICHFIELD BLVD	700	3	Minor collector	1000	17	0.63	Majority of intersection related crashes, mainly in the commercial area	27.0	300	2000	333	0.17	B	0		$ -	1300	$ 1,167,631	Shoulder wedge would not improve this urban/residential road section
6	95a	BRENT POINT RD Quarry Rd to Arkendale Rd	658	2	Minor Local	1300	1	1.68	While the rate is very high, there was only a single accident, which resulted in an injury, on a road with a very low traffic count. This unpaved road is programmed for hard surfacing under the SSYP.	0.6	0	1400	10	0.01	A	0		$ -	1300	$ 1,167,631	This road section is programmed for funding under the rural paving program
7	85	TACKETTS MILL RD	646	2	Major local	1200	14	1.5	4 angle crashes (intersection related),1 sideswipe and 6 run off road on 1.5 mile section.	9.3	100	1400	126	0.09	B	0	2' Shoulder Wedge w/ Overlay	$ 163,077	1300	$ 1,330,708	
8	60	HEFLIN RD	612	2	Major local	1200	2	1.34	2 run off road with 2 injuries	1.5	0	1200	198	0.17	B	0	2' Shoulder Wedge w/ Overlay	$ 145,682	1200	$ 1,476,390	
9	95b	BRENT POINT RD Arkendale Rd to End	658	2	Minor Local	1200	6	3.2	Six crashes; 3 were road geometry, 2 train related.	1.9	0	1400	48	0.03	A	0	2' Shoulder Wedge w/ Overlay	$ 347,898	1200	$ 1,824,288	Includes only that portion to the state park
10	59	MCWHIRT LOOP	700	2	Major and minor collector	1000	9	0.56	All crashes occurred near intersections	16.1	200	2100	207	0.10	B	0		$ -	1200	$ 1,824,288	Shoulder wedge would not improve this commercial/industrial road section
11	63	STEFANIGA RD	648	2	Major local	1100	18	3.48	Crashes spread out along road	5.2	100	1400	189	0.14	B	0	2' Shoulder Wedge w/ Overlay	$ 378,339	1200	$ 2,202,627	
12	90	WEST CAMBRIDGE ST	607	2	Major local	1000	2	0.1	1 bicyclist & 1 sideswipe	20.0	200	700	99	0.14	B	0		$ -	1200	$ 2,202,627	Shoulder wedge would not improve this urban/residential road section
13	49b	TRUSLOW RD Cambridge to Berea Church	652	2	Minor Collector	1100	25	4.22	Preponderance of road geometry related crasshes	5.9	100	2100	189	0.09	B	0	2' Shoulder Wedge w/ Overlay	$ 458,790	1200	$ 2,661,417	Minus the portion improved as a 2-lane reconstruction

Roads Under 1,700 VPD/Lane (Page 2)

	No#	Road Segment	Route Number	Number of Lanes	Facility Type	Safety					Operations					Implementation				
						Score	Total # of Crashes	Length (Miles)	Initial review Comments	Crashes per Mile	Score	Cap/hr	veh/hr	vol/cap ratio	Rating	Score	Recommended Improvement	Total Cost	Total Score	Running Total	Comments
14	66	TACKETTS MILL RD	612	2	Major local	**1000**	**15**	1.76	**4 angle crashes (intersection related),2 head-on and 7 run off road on 1 3/4 mile section. Clustered near southern end.**	8.5	**100**	1400	180	0.13	B	**0**	2' Shoulder Wedge w/ Overlay	$ 191,344	**1100**	$ 2,852,760	
15	*	HARTWOOD ROAD	612	2	Major Local	**900**	35	7.0	**5 rear end and 9 angle crashes related to intersections; 1 head-on, 2 sideswipe, and 13 run off road road width related**	5.0	**0**	1400	306	0.22	C	**200**	2' Shoulder Wedge w/ Overlay	$ 761,026	**1100**	$ 3,613,786	
16	91	SPOTTED TAVERN RD	614	2	Major local	**1000**	**4**	2.33	**All 4 crashes run off road and spread out**	1.7	**0**	1400	99	0.07	B	**0**	2' Shoulder Wedge w/ Overlay	$ 253,313	**1000**	$ 3,867,099	
17	69	DECATUR RD	635	2	Major local	**900**	**8**	3.59	**6 of 8 crashes caused by narrow road**	2.2	**0**	1400	162	0.12	B	**0**	2' Shoulder Wedge w/ Overlay	$ 390,298	**900**	$ 4,257,397	
18	64	LITTLE WHIM RD	669	2	Major local	**900**	**4**	1.2	**Road geometry related**	3.3	**0**	1300	189	0.15	B	**0**	2' Shoulder Wedge w/ Overlay	$ 130,462	**900**	$ 4,387,858	
19	74	HOLLY CORNER RD	655	2	Major local	**900**	**13**	4.02	**Road geometry related**	3.2	**0**	1300	153	0.12	B	**0**	2' Shoulder Wedge w/ Overlay	$ 437,046	**900**	$ 4,824,905	
20	83	POTOMAC RUN RD	626	2	Major local	**900**	**6**	2.33	**Road geometry related**	2.6	**0**	1200	135	0.11	B	**0**	2' Shoulder Wedge w/ Overlay	$ 253,313	**900**	$ 5,078,218	
21	68	ROCK HILL CHURCH RD	644	2	Minor collector	**800**	**16**	2.74	**Even split, intersection and road geometry**	5.8	**100**	2200	171	0.08	B	**0**	2' Shoulder Wedge w/ Overlay	$ 297,887	**900**	$ 5,376,105	
22	87	CROPP RD	615	2	Major local	**800**	**4**	2.23	**All 4 crashes run off road towards north end**	1.8	**0**	1400	108	0.08	B	**0**	2' Shoulder Wedge w/ Overlay	$ 242,441	**800**	$ 5,618,546	
23	13b	LEELAND RD Morton Rd to End St Maintenance	625		Minor Collector	**800**	**3**	0.9	**Run-off road accidents**	3.3	**0**	1300	153	0.12	B	**0**	2' Shoulder Wedge w/ Overlay	$ 97,846	**800**	$ 5,716,392	
24	47b	BROOKE RD Eskimo Hill to End	608	2	Major local	**700**	**18**	5.79	**12 of 18 apparently road width related crashes**	3.1	**0**	1400	198	0.14	B	**0**	2' Shoulder Wedge w/ Overlay	$ 629,477	**700**	$ 6,345,870	
25	92	RICHARDS FERRY RD	752	2	Major local	**700**	**4**	2.93	**All 4 crashes related to narrow road width**	1.4	**0**	1400	90	0.06	B	**0**	2' Shoulder Wedge w/ Overlay	$ 318,544	**700**	$ 6,664,413	

Additional Analysis

- Assimilate Board input into study
- Further refine the major recommended road improvements
- Evaluate possibility of improving heavier traveled roadways using shoulder wedge improvements
- Coordinate wedge improvement priorities with VDOT repaving schedule
- Complete windshield survey of listed roads with VDOT personnel to ensure feasibility of wedge improvements

Next Steps and Schedule

Presentation of Additional Analysis Results by Staff	December 11, 2019
Solicit Public Involvement	January, 2019
Board Considers Final Priority List for Approval	February 5, 2019
Board Considers Funding Strategies for Road Improvements	February 19, 2019

Comprehensive Road Evaluation Board Update

Questions?