



Date of Work Session: June 22, 2015

**TOWN OF LEESBURG
TOWN COUNCIL WORK SESSION**

Subject: Congestion Relief Efforts at Intersection of Route 15 North Bypass and Battlefield Parkway

Staff Contact: Keith Markel, Deputy Town Manager
Thomas A. Mason, P.E., Director of Public Works
Renée M. LaFollette, P.E., Director of Capital Projects
Joe Price, Chief of Police

Council Action Requested: Work session discussion.

Staff Recommendation: None. Update only at this time.

Commission Recommendation: Not Applicable.

Fiscal Analysis: The Virginia Department of Transportation (VDOT) has initiated a congestion relief study in the amount of \$50,000 for this intersection. The Town has issued a contract with VDOT's consultant in the amount of \$19,000 to consider additional options outside the scope of work being performed by VDOT.

Work Plan Impact: Not Applicable.

Executive Summary: Council requested a work session to discuss potential improvements to reduce congestion and increase traffic safety on the Route 15 North Bypass at the intersection of Battlefield Parkway. As a result, staff will present current cooperative efforts with the County of Loudoun and the Virginia Department of Transportation.

Background: The frequent afternoon traffic backup on the Route 15 North Bypass is due to inadequate roadway capacity of U.S. Route 15 north of the Leesburg town limits. This section of roadway has only one lane in each direction. A presentation was given to the Town Council at the Work Session on September 22, 2014 to explain and discuss an operational analysis of alternatives to reduce congestion on the Route 15 Bypass.

The following is a chronology of what has occurred on this issue:

- On September 22, 2014, the Town staff presented the findings of an operational study the Town had commissioned through Wells and Associates to look into congestion relief and safety enhancements on the Route 15 By-Pass within the Town of Leesburg. Several alternatives were suggested in the study.
- On September 23, 2014, the Mayor of the Town of Leesburg sent a letter to Chairman York requesting the County's assistance and requested that County transportation staff be authorized to work together with the Town staff and Virginia Department of Transportation (VDOT) on developing an improvement plan since the alternatives involved improvements outside the corporate limits of the Town.

- On November 17, 2014, a meeting was held with VDOT, Town, and County staffs to review the findings in the Wells and Associates study. At that meeting, County staff expressed concerns that the results of the study only included alternatives that would possibly benefit the Route 15 By-Pass within the Town limits, but did not include analysis of the impact of those potential improvements on traffic flow up to White's Ferry Road and Route 15. At that meeting, the three staffs determined the Wells and Associates study needed to be expanded with an increased scope of study to look at impacts of various alternatives on roads north of the Town's corporate limits. It was agreed the three staffs would meet again on January 14, 2015, and VDOT would report at that meeting if State funds were available to expand the project analysis as well as providing information on the potential use of the Route 15 Safety funds – earmark funding for future improvements.
- On January 14, 2015, the Town and County staffs met again. Due to a snow event, VDOT staff was unable to attend. Joe Kroboth sent a letter of request to VDOT (dated January 14, 2015) asking VDOT staff to prepare a revised scope of work using the Wells and Associates Operational analysis as the base document and analyze options for congestion relief on the Route 15 Bypass that would include a detailed analysis of the impacts to the Route 15 Corridor north of the Town of Leesburg limits into the County.
- On February 15, 2015, VDOT reported they obtained \$50,000 in VDOT pre-scoping funds to perform a more rigorous traffic study.
- On March 26, 2015, VDOT and Town of Leesburg staff were provided with a scope of work for the study prepared by Vanasse Hangen Brustlin, Inc. (VHB) – a VDOT on-call traffic consultant. The firm's objective is to identify potential traffic congestion mitigation alternatives, and to evaluate the most promising alternatives through a traffic analysis study using microsimulation to quantify the severity of the existing and forecasted conditions. The goal is to advance the development of an improvement concept that will help alleviate congestion in the northbound and westbound lanes during the evening peak. This study is not intended to be a detailed design. Instead, the intent of the study is to identify lower-cost short term congestion relief improvements that can be implemented within the study limits. This is defined by the subject intersection and its approaches and receiving lanes. There is no expectation of looking at the entire corridor to Maryland or the design of the major interchange. The study is also limited in scope because the Loudoun County Transportation Plan only includes widening on Route 15 to approximately Tutt Lane.
- Town and County staff's reviewed the scope of work and provided comments.
- During the scoping process, Town staff identified possible enhancements to the Battlefield intersection that may work to reduce congestion for motorist inside the Town limits especially those motorists on Battlefield wanting to cross the Route 15 by-pass at peak travel times. To leverage VDOT funds already being spent on studying this corridor, the Town will fund additional analysis for the Battlefield intersection in the amount of \$19,000 with VDOT's consultant. This Task Order will include northbound direction associated with vehicles turning right onto eastbound Battlefield Parkway; turning left onto westbound Battlefield Parkway; and westbound direction of Battlefield Parkway associated with vehicles turning right onto northbound US 15 Bypass.
- In the last month, the Town has also installed additional traffic signal monitoring equipment at the Battlefield intersection to help alleviate congestion. The programming of these enhancements is ongoing. The police department has also increased their enforcement of traffic rules in this

area to reduce the number of motorists who make illegal right turns onto Route 15 from the left travel lane.

- On May 27, 2015, VDOT issued a Notice To Proceed to VHB. Because of delays in VDOT signing the contract with VHB, the firm was not able to collect traffic data while the schools were still in session. This means that the VHB will have to wait until the start of the new school year to collect the traffic data along this corridor. Per the contract, a report will be issued for review by VDOT, Loudoun County, and the Town in the Fall of 2015.

Attachments: (1) Memo to Town Council dated September 22, 2014
(2) Letter to Loudoun County dated September 23, 2014
(3) Letter from Loudoun County to VDOT dated January 14, 2015
(4) Task Order 105 – US 15 Congestion Relief Analysis
(5) Task Order – Town of Leesburg study component at Battlefield Parkway



Date of Work Session: September 22, 2014

**TOWN OF LEESBURG
TOWN COUNCIL WORK SESSION**

Subject: Route 15 Bypass Congestion Relief Study

Staff Contact: Thomas A. Mason, P.E., Director of Public Works
Calvin K. Grow, Transportation Engineer

Recommendation: The Department of Public Works recommends that this information be forwarded to the Town Council.

Fiscal Analysis: This item may impact the Department of Public Work's operating budget. This impact can be determined after a decision is made regarding the issue of this memo.

Issue: What improvements can be made to reduce congestion and increase traffic safety on the Route 15 Bypass and Route 15 north of Leesburg.

Route 15 Bypass Northbound Congestion: The frequent afternoon traffic backup on the Route 15 Bypass is due to inadequate roadway capacity of U.S. Route 15 north of Leesburg. This roadway has only one lane in each direction. The traffic engineering firm of Wells and Associates was hired to prepare a model of the existing roadway and traffic conditions and perform an analysis to evaluate improvements that will reduce the traffic congestion and backup caused by the limited road capacity on Route 15 north of Battlefield Parkway. Wells and Associates will provide the Town Council a presentation on an operational analysis completed for Route 15 Bypass that includes the following alternatives:

Alternative 1A – Northbound (NB) traffic merge south of Battlefield Parkway.

- This alternative moves the existing Route 15 Bypass merge point located north of the Battlefield Parkway intersection, south about 1,250 feet or approximately 1/3 of the distance toward the Edwards Ferry Road intersection.

Alternative 1B – NB merge with right-turn lane drop south of Battlefield Parkway.

- This alternative is similar to Alternative 1A except the merge would occur along and with a mandatory right-turn lane movement. The outside through lane from Edwards Ferry Road would turn into a mandatory right-turn lane.

Alternative 2A – N. King Street (Route 15 Business)/Route 15 Bypass weave section lengthened to Tutt Lane.

- This alternative keeps the NB merge point north of Battlefield Parkway and lengthens the weaving section of the N. King Street northbound on-ramp by extending a second lane to Tutt Lane.

Alternative 2B – NB weave lane from N. King Street (Route 15 Business) extended to Tutt Lane with weave area lengthened.

- This alternative is similar to Alternative 2A except the N. King Street northbound on-ramp is configured in a manner that further lengthens the weave section between the northbound on and off ramps. The ramp connection would be configured similar to a loop ramp.

Alternative 3A – NB Lane Extended to Tutt Lane.

- This alternative provides a second through lane from Battlefield Parkway to Tutt Lane.

Alternative 3B – NB weave lane extended to Tutt Lane and weave area lengthened.

- This alternative combines Alternative 3A and Alternative 2B. The alternative provides two northbound through lanes from Battlefield to Tutt Lane and reconfigures the northbound on-ramp to lengthen the weave section between the northbound on and off ramps of N. King Street.

Alternative 4 – NB Lanes extended north of Whites Ferry/Raspberry Falls.

- This alternative provides two through lanes from Battlefield Parkway to just north of Whites Ferry/Raspberry Falls intersection along Route 15.

Alternative 5 – (No drawing or analysis included) Roundabout at the Intersection of Route 15 and Whites Ferry Road.

- A preliminary roundabout study at the intersection of Route 15 and Whites Ferry Road shows that the total traffic volumes are too high for a single-lane roundabout and the traffic flow of the intersection is not conducive for a multi-lane roundabout since most traffic is travelling straight on the mainline with few turning vehicles. Since Route 15 is only two-lane throughout this area, having a multi-lane roundabout would require a merge area immediately beyond the roundabout causing back-ups through the intersection. Additionally, the major/minor percentage split of 94/6 was greater than the generally accepted upper threshold limit of 90/10 which would allow few gaps for side street vehicles to enter the intersection especially during the peak hours.

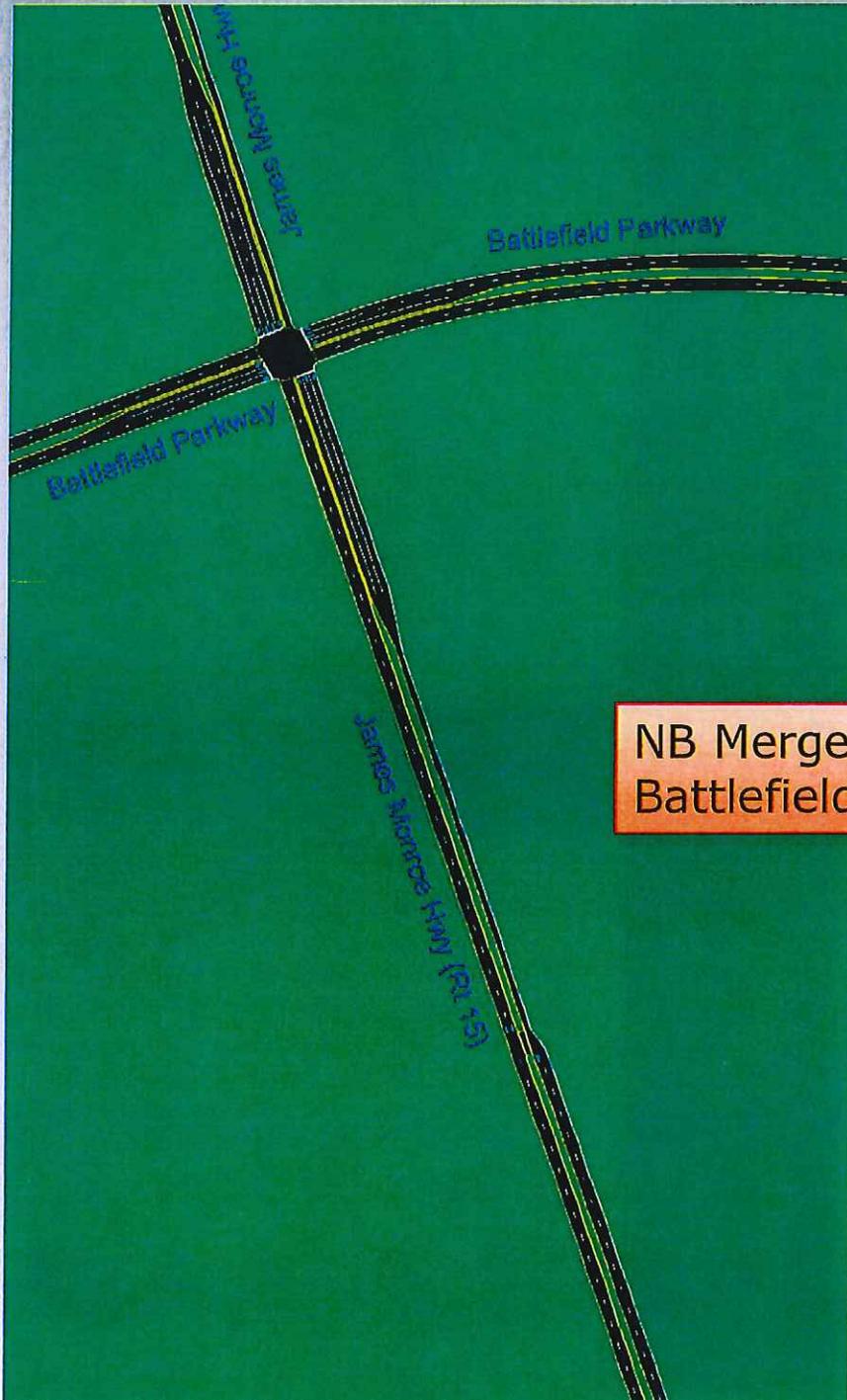
Conclusion: The analysis show that Alternatives 2A, 3A, 3B and 4 decrease the delay per vehicle on the Route 15 Bypass at Battlefield Parkway and move the end of the backup to an area north of this intersection. Alternative 4 will be difficult to pursue because it does not comply with the adopted County Transportation Improvement Plan. Alternatives 2A, 3A and 3B should be studied further. Alternatives 2A and 3A could be phased with 2A first followed by 3A and almost all of 2A can be used if 3A is implemented.

Most of the studied improvements are located outside the Leesburg Corporate Limits on VDOT maintained roads. Further study and analysis should be performed by VDOT with cooperation and assistance by the Town and Loudoun County

Attachments: Route 15 Bypass Operational Analysis Summary Table and Maps



Route 15 By-Pass Operational Study



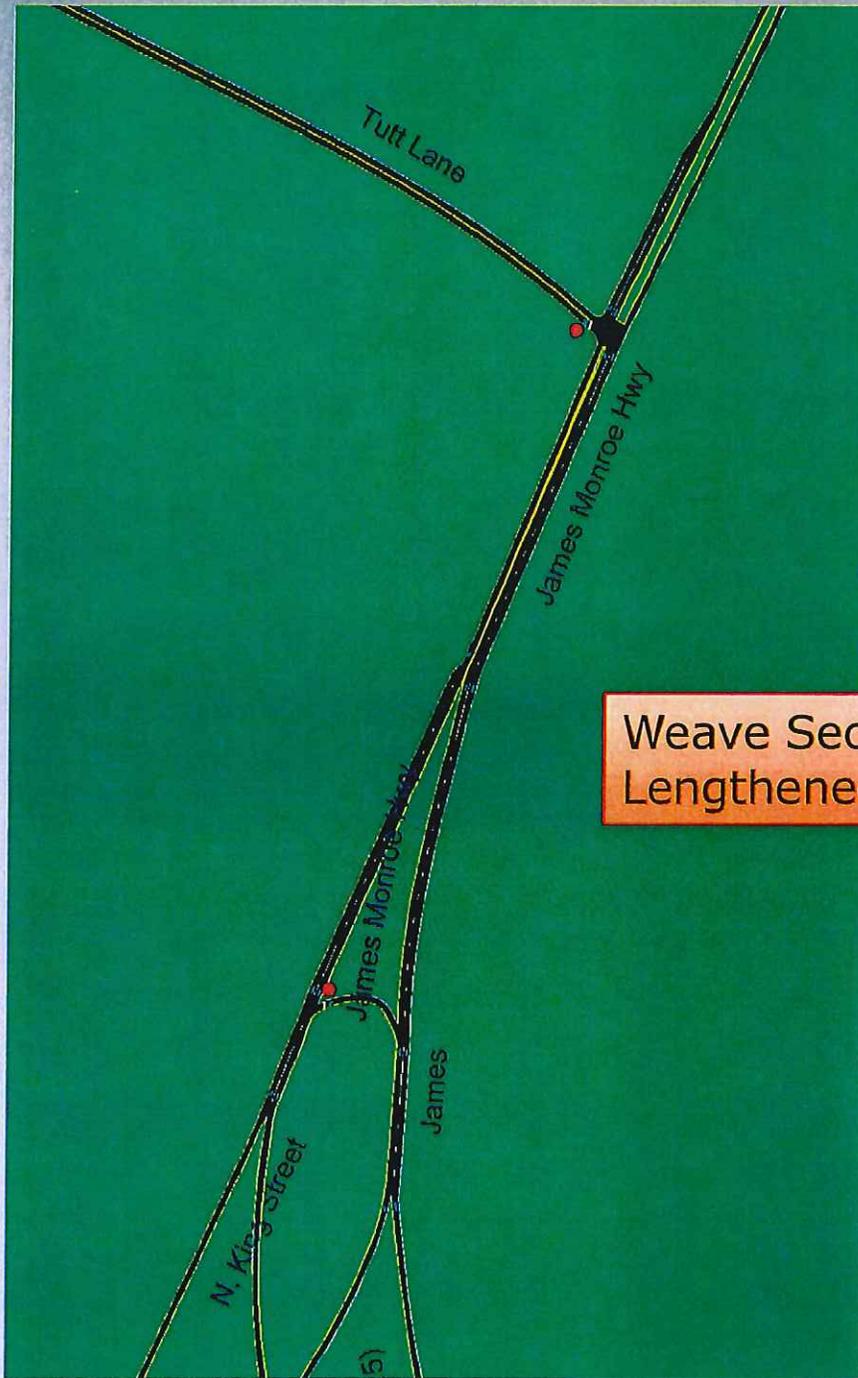
NB Merge South of
Battlefield Parkway

Alternative 1A



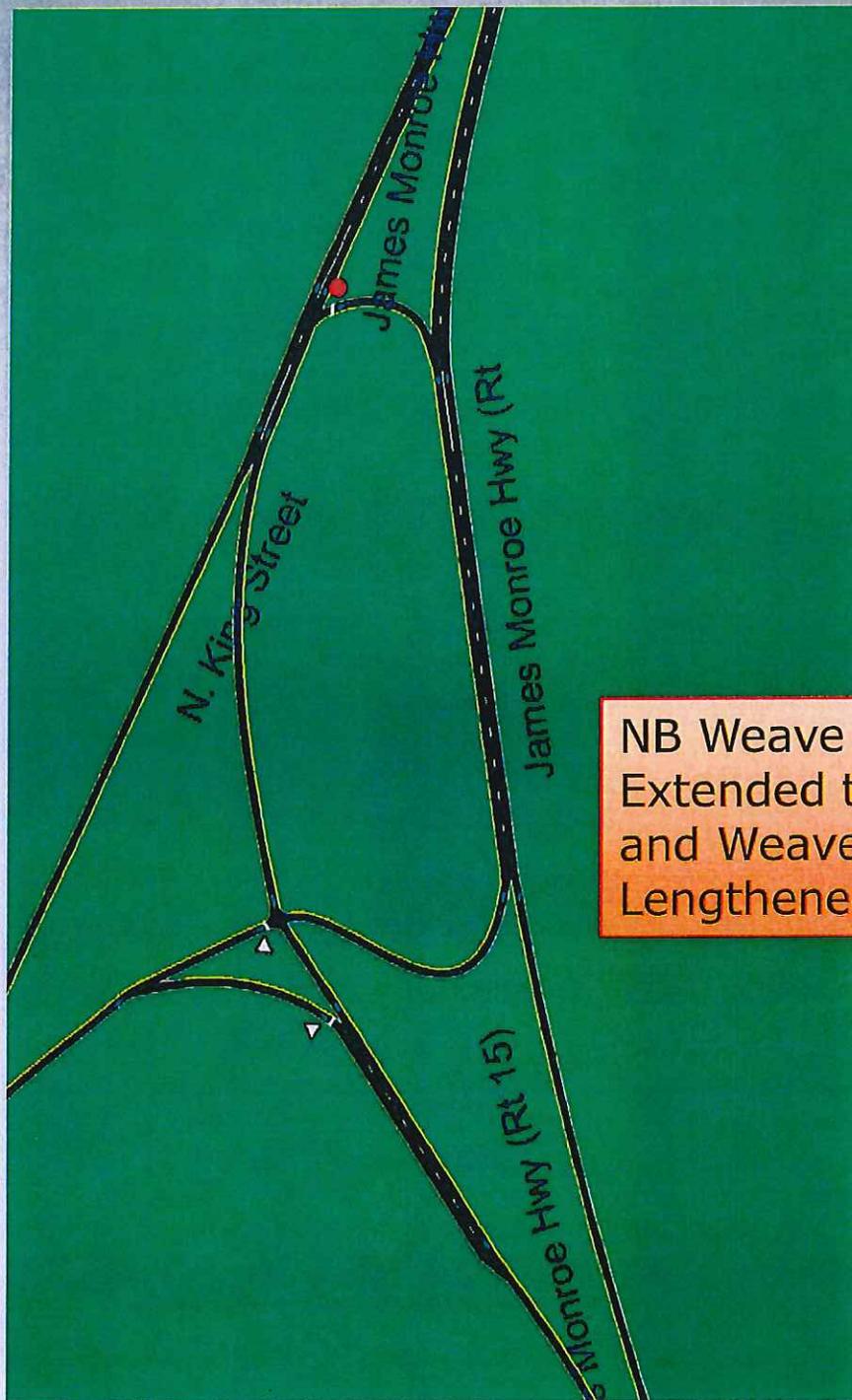
NB Merge with
Right Turn Lane
Drop South of
Battlefield Parkway

Alternative 1B



Weave Section
Lengthened to Tutt Ln

Alternative 2A



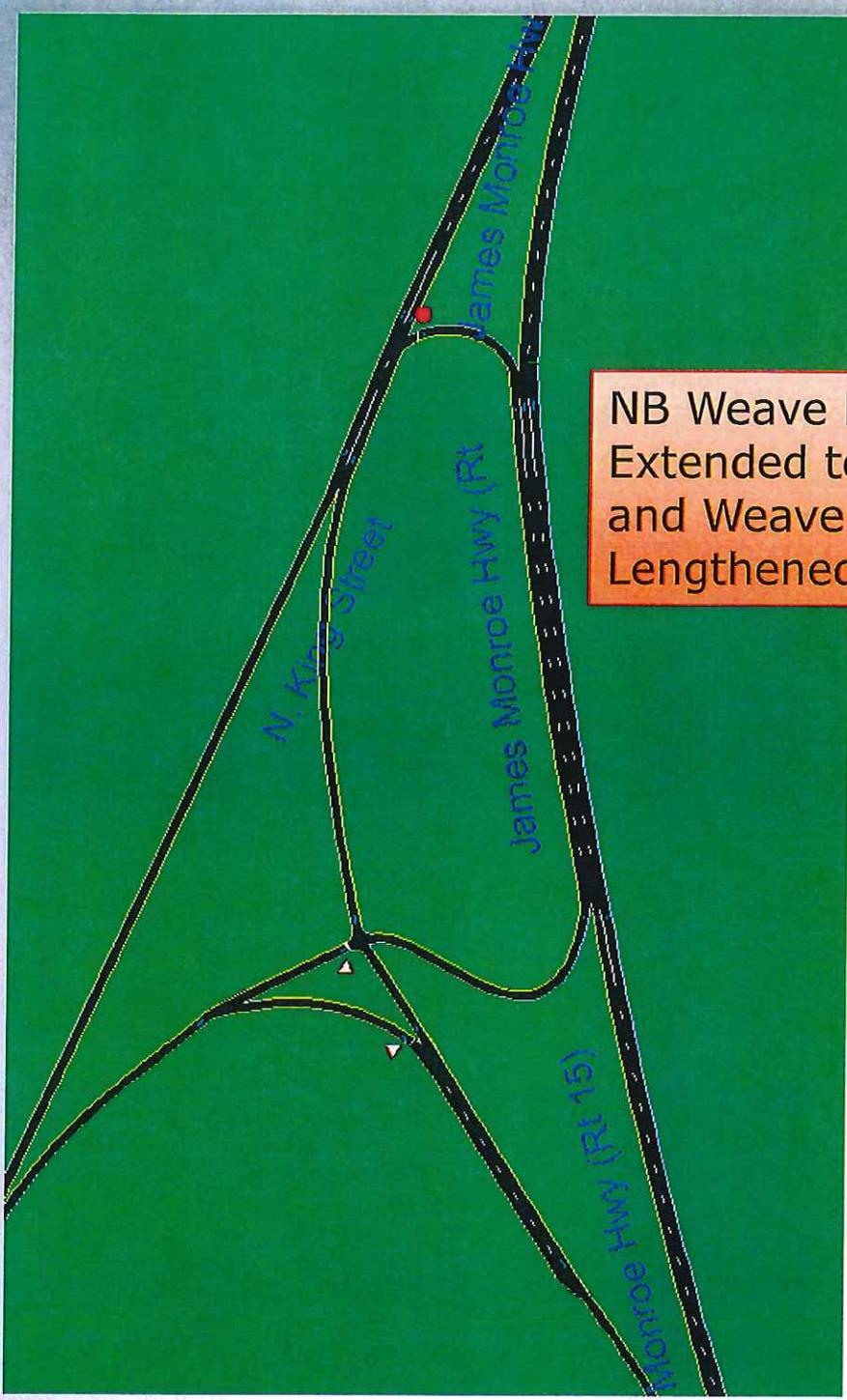
NB Weave Lane
Extended to Tutt Lane
and Weave Area
Lengthened

Alternative 2B



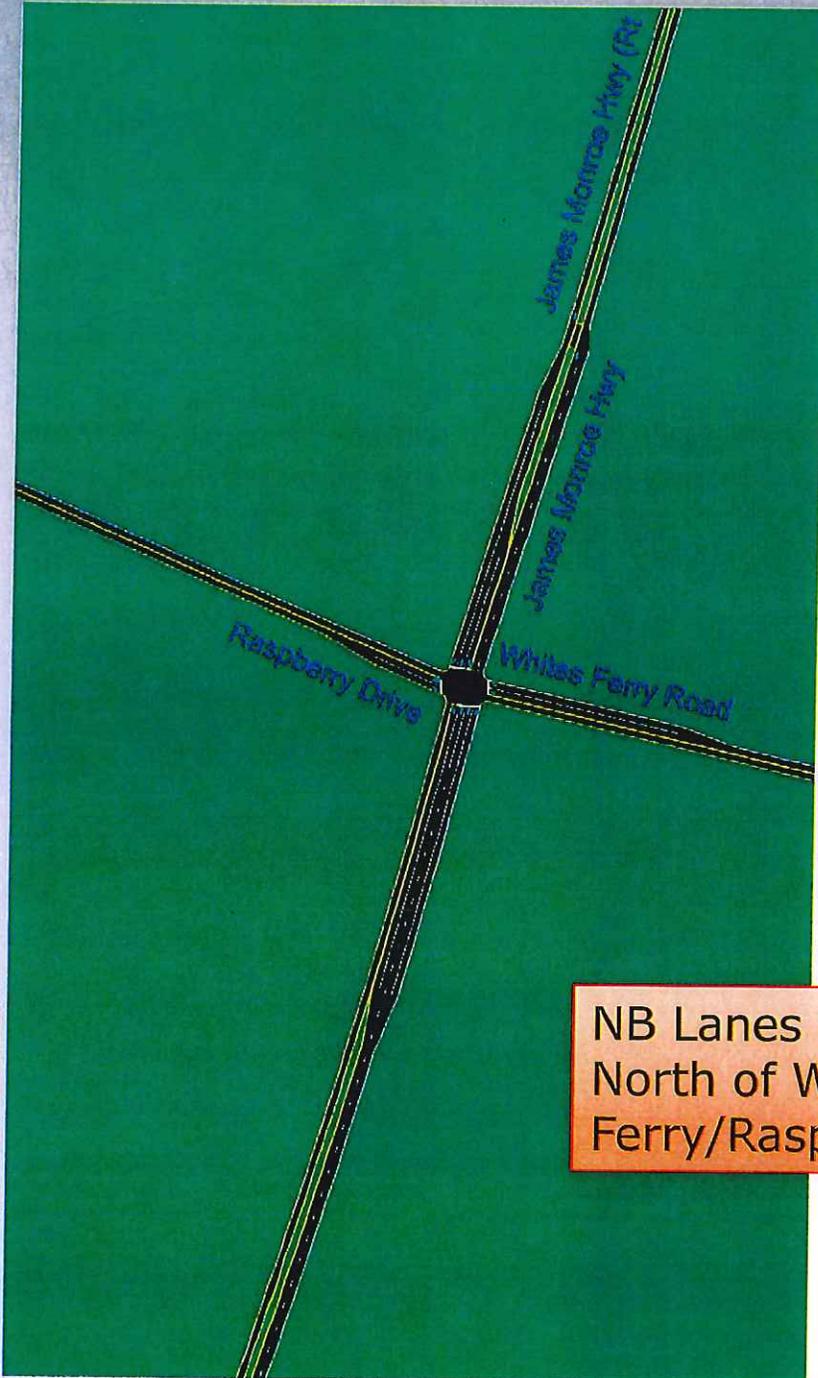
NB Lanes Extended to Tutt Lane.

Alternative 3A



NB Weave Lane
Extended to Tutt Lane
and Weave Area
Lengthened

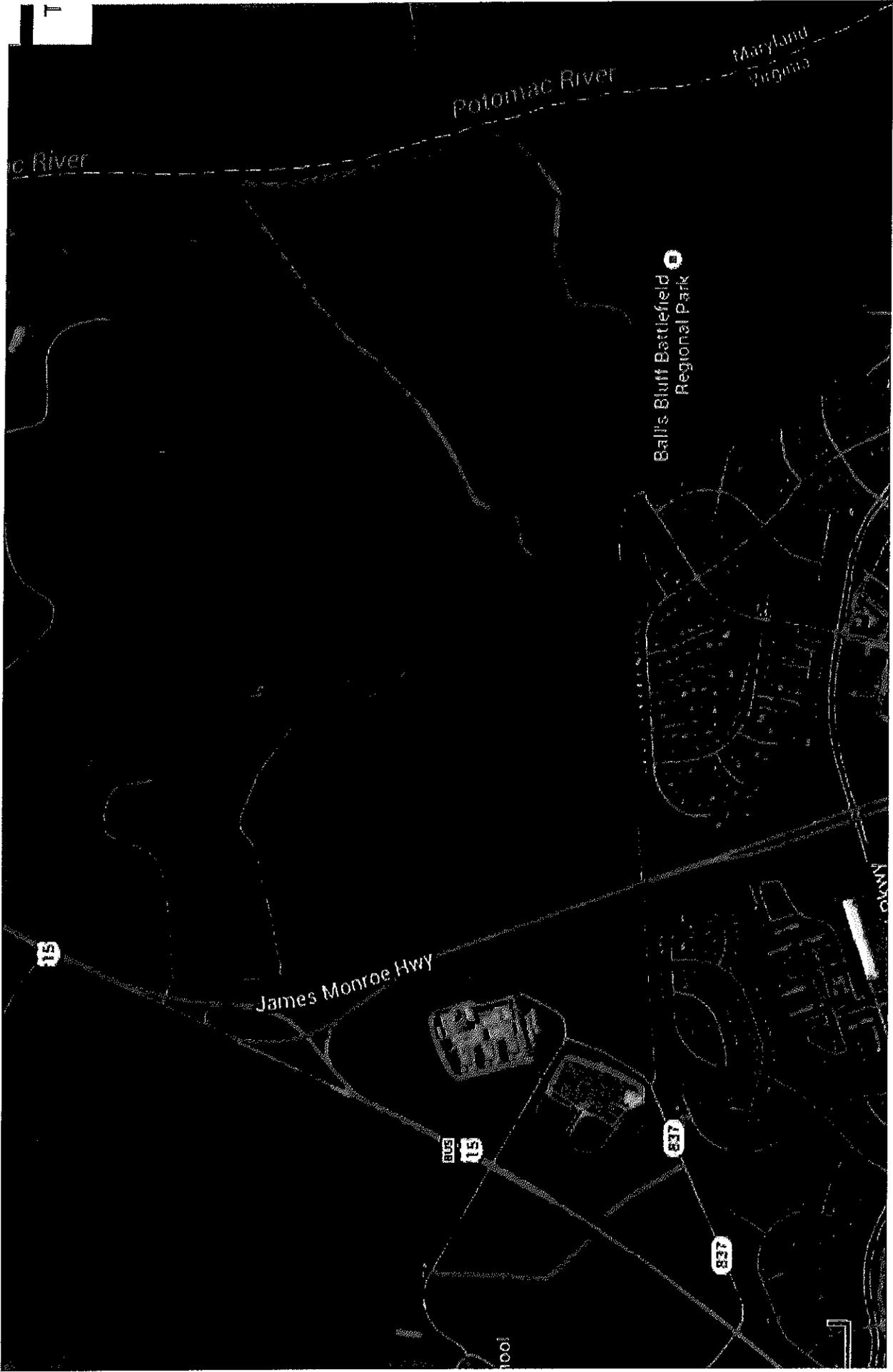
Alternative 3B



NB Lanes Extended
North of Whites
Ferry/Raspberry Falls

Alternative 4





Route 15 Operational Analysis
MOE Summary Table

Node #	Location	Available Distance	Exist.	Alt 1A	Alt 1B	Condition					
						Alt 2A	Alt 2B	Alt 3A	Alt 3B	Alt 4	
1	<u>Whites Ferry</u>										
	Delay/Veh (sec)		271	233	220	237	234	221	214	483	
	Avg Speed (mph)		15	14	15	13	14	13	14	6	
	Density (ft/veh)		150	140	149	139	139	136	144	76	
	Max Queue	4,400	4,420	4,420	4,420	4,420	4,420	4,420	4,420	4,420	
2	<u>Tutt Lane</u>										
	Delay/Veh (sec)		11	15	11	25	23	24	22	31	
	Avg Speed (mph)		20	17	19	12	13	12	13	10	
	Density (ft/veh)		131	110	124	84	88	84	88	93	
	Max Queue	580	600	600	600	640	625	625	662	600	
9	<u>North King St</u>										
	Delay/Veh (sec)		118	97	98	81	8	259	189	32	
	Avg Speed (mph)		8	9	9	10	16	4	7	18	
	Density (ft/veh)	- / 2B,3B	35	41	39	46	134	35	61	141	
	Max Queue	1,355 / 940	1,370	1,370	1,370	1,375	960	1,440	1,020	1,190	
10	<u>Route 15</u>										
	Delay/Veh (sec)		98	91	78	101	161	186	189	3	
	Avg Speed (mph)		12	13	14	12	8	7	7	41	
	Density (ft/veh)		53	58	61	50	41	65	61	324	
	Max Queue	2,935	3,140	3,096	3,115	3,150	3,110	3,150	2,343	0	
16	<u>Battlefield Pkwy</u>										
	Delay/Veh (sec)		112	(1)	(1)	185	91	424	30	34	27
	Avg Speed (mph)		17	5	4	20	6	31	30	32	
	Density (ft/veh)		355	93	68	402	142	639	594	632	
	Max Queue	4,615	2,150	4,500	4,500	1,434	4,320	605	610	430	
Arterial											
	Travel Time (sec)		1,194	1,531	1,369	1,315	1,681	1,458	1,558	1,261	
	Travel Time (minutes)		20	26	23	22	28	24	26	21	
	Avg Speed (mph)		14	11	10	13	9	11	11	14	
14	<u>N. King St (EB)</u>										
	Delay/Veh (sec)		57	58	60	64	24	37	38	55	
	Avg Speed (mph)	N/A	-	-	-	-	-	-	-	-	
	Density (ft/veh)		25	25	25	25	43	34	30	25	
	Max Queue	3,670	3,780	3,790	3,760	3,780	950	2,830	2,860	3,780	

Notes:

(1) Merge point located south of intersection approximately 1,255'. Max Que estimated based on static display in SimTraffic.

Density is the average distance per vehicle over the simulation period.

Coded for Critical NB Nodes only

 Better Operation compared to Existing (20% or more decrease in delay/veh, increase in density and/or 5 mph increase in speed)

 Worse Operation compared to Existing (20% or more increase in delay/veh, decrease in density and/or 5 mph decrease in speed)



Kristen C. Umstatted
Mayor

David S. Butler
Vice Mayor

Council Members

Kevin D. Wright Thomas S. Dunn, II
Katie Sheldon Hammler Kelly Burk
Fernando "Marty" Martinez

25 West Market Street, Leesburg, VA 20175 · (703) 771-2733 / (703) 771-2727 fax · council@leesburgva.gov · www.leesburgva.gov

September 23, 2014

The Honorable Scott K. York
Chairman At-Large
Loudoun County Board of Supervisors
1 Harrison Street SE, 5th Floor, Mailstop #01
PO Box 7000
Leesburg, VA 20177-7000

Re: Route 15 Bypass and Route 15 North of Leesburg

Dear Chairman York:

The frequent afternoon traffic backup on the Route 15 Bypass is due to inadequate roadway capacity of U.S. Route 15 north of Leesburg. This roadway has only one lane in each direction. The traffic engineering firm of Wells and Associates was hired by the Town of Leesburg to prepare a model of the existing roadway and traffic conditions and perform an analysis to evaluate improvements that will reduce the traffic congestion and backup caused by the limited road capacity on Route 15 north of Battlefield Parkway. Wells and Associates provided the Town Council with a presentation on this operational analysis for the Route 15 Bypass at the September 22, 2014 Work Session. Most of the studied improvements are located outside the Leesburg Corporate Limits on Route 15, a VDOT maintained road. Further study and analysis will need to be performed by VDOT with cooperation and coordination from the Town and Loudoun County.

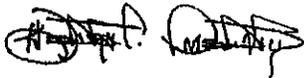
The Town needs the assistance and support of Loudoun County because the improvements to reduce congestion and improve safety will be outside the corporate limits. We request that County Transportation staff be authorized to help refine the operational analysis that has been performed by the Town's Consultant and work together with the Town and VDOT. Through this joint effort an improvement plan can be identified and a transportation project defined and implemented.

We greatly appreciate past support of safety improvement projects and your willingness to address Leesburg and Loudoun County transportation issues. The Council wishes to thank Chairman York, Supervisors Higgins and Reid, who represent the Town of Leesburg, and the rest of the Board of Supervisors for securing \$2 million for the interchange study of the Rt. 15 Bypass at Battlefield Parkway. We hope that these funds will be moved from FY 2018 to FY 2016 to accelerate the overall safety effort at that intersection.

The Honorable Scott K. York
September 23, 2014
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If you need information, or if we can assist in any way, please do not hesitate to contact me or the Director of Public Works, Thomas A. Mason, P.E., at 703-771-2790 or Transportation Engineer, Calvin Grow, at 703-771-2791.

Very sincerely yours,



Kristen C. Umstatt
Mayor

cc: Loudoun County Board of Supervisors
Tim Hemstreet, County Administrator
Leesburg Town Council
John Wells, Town Manager
Kaj Dentler, Deputy Town Manager
Thomas A. Mason, P.E., Director of Public Works
Calvin K. Grow, Transportation Engineer



Loudoun County, Virginia

www.loudoun.gov

Department of Transportation and Capital Infrastructure

1 Harrison Street, S. E., MSC# 69, Fourth Floor, Leesburg, VA 20175

Telephone (703) 737-8624 • Fax (703) 737-8513

January 14, 2015

Mr. Farid Bigdeli
Assistant District Engineer
Virginia Department of Transportation
4975 Alliance Drive
Fairfax, VA 22030

RE: Route 15 Bypass Congestion Relief Study

Dear Farid:

You will recall representatives of VDOT, the Town of Leesburg and the County staffs met on November 17, 2014 to discuss options to provide congestion relief on the Route 15 Bypass. At that meeting, Tom Mason brought everyone up to date on an operational analysis Wells and Associates prepared on behalf of the Town of Leesburg. A follow up meeting was scheduled for January 14, 2015. The purpose of that meeting was to hear a report from VDOT on various funding options to possibly further the analysis and for the County to consider the scope of the analysis.

Unfortunately, VDOT staff was unable to attend the meeting. The purpose of this letter is to make specific requests for information from VDOT.

The Town and County staff request the following:

- VDOT staff prepare a scope of work, using the Wells and Associates Operational Analysis as a base document, analyzing options for congestion relief on the Route 15 Bypass that would include a detailed analysis of impacts to the Route 15 Corridor north of the Town of Leesburg limits into the County;
- An estimated cost to prepare a study based on the scope of work;
- Funding options for the study to include a) funding from VDOT pre-scoping sources; b) funding from VDOT planning funds; and c) funding and an accounting of the balance of funds remaining from the Route 15 Improvements federal earmark obtained by Congressman Frank Wolf

Mr. Farid Bigdeli

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Please let Terrie Laycock and I know when this information can be available and we will schedule a follow up meeting with VDOT, County and Town of Leesburg staffs.

Thank you for your assistance.

Sincerely,



**Joe Kroboth
Director, DTCI**

**Cc: Terrie Laycock, DTCI
Kathleen Leidich, DTCI
Susan Glass, DTCI
Lou Mosurak, DTCI
Keith Markel, Town of Leesburg
Tom Mason, Town of Leesburg
Renee LaFollette, Town of Leesburg**



TASK ORDER 105
US 15 Congestion Relief Analysis
Loudoun County, North of Leesburg

March 26, 2015

REV. 3/27/15

VDOT CHARGE CODE: UPC 99580, Activity 712

SCOPE OF WORK

Objective

The Town of Leesburg and Loudoun County have expressed concern to VDOT about traffic congestion at the northern intersection of James Monroe Highway (US Route 15) and North King Street (US 15 Business). The Town is most concerned by congestion in the northbound direction and suggests that the reduction in capacity on James Monroe Highway north of the Town is the root of the spillback. With the objective of identifying low cost congestion mitigation improvements along northbound US 15, the Town performed a cursory study of measures that might ease congestion during the evening peak period. Some lower scale improvements including the lengthening of merge/weave lanes and extending a northbound lane to Tutt Lane (VA Rte. 749) were given preliminary consideration. The Town presented the findings of their study to Loudoun County and VDOT and officials and requested consideration of implementing the mitigation measures identified by the Town's study.

VDOT has requested that VHB further evaluate the concepts developed previously by the Town's consultant in greater detail. Specifically, VHB will perform a more rigorous traffic study including microsimulation analysis to determine the severity of the current congestion and evaluate the Town's findings – will the Town alternatives perform as prognosticated and what is the impact of those alternatives on the operation of the VDOT-maintained roads beyond the Town limits in Loudoun County. This study will also identify other similar types of measures that might help alleviate the congestion in the northbound lanes during the evening peak. The objective of this task order is to perform a planning-level study to further advance the development of an improvement concept; this effort is not intended to be a detailed design or analysis. The goal is to identify low-cost short term congestion relief improvements that can be implemented within the study limits defined by Battlefield Parkway to the south and Whites Ferry Road (Rte. 655) to the north. There is no expectation of evaluating major capacity improvements in recognition of the County's desire to maintain US 15 north of the Town as a two-lane facility.

Tasks

Task 1. Data Collection

Traffic Data

Upon review of the Town's previous study, it was determined that the traffic data used in the analysis was compiled from multiple sources over multiple years. The Town's consultant was asked to perform its study as a "quick analysis" in order to respond to a concern raised by the Town Council; their study was not envisioned to be a comprehensive study for network improvements/impacts. For this reason, the Town's consultant did not perform traditional counts across the study area and instead used a variety of old and new sources with no specific counts at the intersection. The counts they started with are from different days and years and balanced through the network. VDOT concurred that more current traffic data is needed to accurately evaluate the conditions and potential for improvement.

Separate requests have been made by VDOT for turn traffic count data collection. VDOT will process the data collection requests through a separate contract with another consultant/vendor and will provide the data to VHB for use in the VHB analysis. VHB will not conduct any traffic volume data collection under this task order.

VDOT's contracted vendor will perform turn movement counts (TMC) at the two locations listed below on a "typical day" – a non-holiday Thursday while local public schools are in session and under normal weather conditions (i.e., not during a snow or ice event that would deteriorate normal operating conditions).

Turn movement count ("TMC") locations:

1. Leesburg Bypass (US 15) and Battlefield Parkway (NIS)
2. James Monroe Highway (US 15) and Tutt Lane

VDOT's contracted vendor will also perform a 72-hour automatic count, speed, and classification collection at the four locations listed below starting on the same Thursday that the turn movement count data collection is to be performed. The Town's original study featured a Friday PM analysis, which was considered by the Town to be the "worst case" traffic scenario. Typically, the worst case traffic conditions is not necessarily the best period to base future design and investment decisions. In order to have an understanding of how the traffic may vary, the data collection period will span the 72-hour period to cover a typical weekday, the perceived worst-case scenario, and the anecdotally-reported congested non-commuter period. But the analysis period for simulation purposes will be the Thursday evening peak.

Automatic count/speed/classification ("tube") locations:

1. Leesburg Bypass (US 15) south of the merge from North King Street (US 15 Business)
2. James Monroe Highway (US 15) just south of the Maple View Lane median crossover
3. North King Street (US 15 Business) just south of the split to US 15 North / Leesburg Bypass (US 15)
4. North King Street (US 15 Business) / Leesburg Bypass (US 15) at the center stop-controlled junction

A map is attached showing the data collection locations. The VDOT traffic data collection vendor/consultant shall provide VDOT/VHB with the raw data summarized in 15-minute increments.

VHB will request VDOT Synchro files with signal operations data for the AM and PM analysis periods. VHB will use these files as a basis for evaluation of alternatives and will incorporate the timing/phasing information into the simulation modeling described in a subsequent task.

Mapping Data

VHB will coordinate with VDOT NoVA Traffic Engineering Dan Wiegand to obtain aerial photograph files in electronic format for use in report graphics and measurements needed for simulation, including GIS data indicating the right-of-way limits within the study area.

Site Reconnaissance

VHB will observe traffic conditions during the evening peak hours during a "typical" day, as described previously. Digital photographs of the area will be taken. Informal notes will be prepared documenting the field observations. In particular, the following items will be observed:

- Merging and weaving patterns on US Route 15 where US Route 15 Business and the Leesburg Bypass merge;
- Queuing and spillback conditions along northbound US Route 15 south of the merge with the Leesburg Bypass; and
- Southbound flow on US Route 15 north of Tutt Lane through the intersection of US Route 15 and US Route 15 Business.

The site reconnaissance will include a windshield survey of the study corridor with video footage. This footage will serve as a documentation of conditions during the field reconnaissance for calibration of the model, historical documentation of observations, and as a tool for communicating the observations and geometric features to stakeholders. Photos taken of key features in the field will also be used for these purposes. There is also a VDOT CCTV camera on Route 15 at the Town/County border on US 15. As part of the site reconnaissance effort, VHB will reach out to Nhan Vu to determine see if there is any recent information available or archived footage.

Traffic Controls

VHB will observe the physical and operating condition of traffic controls within the study area, including signs, markings, and signals. These will not be formally documented or incorporated into graphics; rather, this observation is for the study team's understanding of operations.

Task 2. Develop Final Analysis Volumes

VHB will compile the traffic data provided by the VDOT vendor to create balanced network volumes for the key analysis period. The objective is to identify "near-term" congestion relief improvements. For this reason, existing conditions will be used for the analysis; no future year forecasts will be developed to reflect approved developments, future planned highway improvements, or projected traffic volume growth in the area. While recent network changes around Leesburg, including the Sycolin overpass south of Town and Battlefield Pkwy opening SE of Town, generally impact travel patterns getting around Leesburg and that part of Loudoun County, neither of these is anticipated to have a major effect on the volume of traffic heading north on Route 15 out of Town. Similarly, the anticipated impact of the future Fort Evans/Edwards Ferry improvements on traffic volumes will not be considered.

Task 3. Model Development - No-Action Scenarios

VHB proposes using VISSIM microsimulation as the analysis tool. VISSIM will more accurately reflect the behavior of the motorists in the weaving/merging areas through the US 15 / North King Street / Leesburg Bypass junction. The resulting queuing will be more accurately forecast using the VISSIM model. Using

VISSIM as the analysis tool, VHB will develop an analytic and simulation model of the US Route 15 from Battlefield Parkway to Whites Ferry. Battlefield Parkway and Whites Ferry are included in the study area only to accurately reflect traffic flow from the southern and northern signal-controlled intersections, not necessarily for the purpose of developing improvements at those intersections. The network will include traffic volume and traffic control data provided by VDOT and highway geometric data determined from aerial photography and corroborated during the site reconnaissance.

VHB will calibrate the existing conditions model using the field observations from the site reconnaissance in Task 1, including spot checks of queuing on the three legs of the junction and an assessment of simulated throughput compared to the collected traffic volumes provided on the surrounding roadway network.

Only one model scenario is anticipated corresponding to the Weekday Evening Peak Hour. At this stage, weekday morning analysis and weekend period analysis is not envisioned since the critical improvements would be identified by problems revealed in the evening peak as previously described. Analysis of interim (i.e., 2020) and long-term (i.e., 2030) scenarios are not included in this task order. Should analysis of the existing morning peak period, weekend peak period, or interim/long term future scenarios be beneficial to VDOT, a supplemental task order will be prepared to complete these analyses.

VHB will provide the VISSIM model to VDOT for review prior to using the model for analysis of alternatives. It is assumed that the VDOT review will take one week.

Upon acceptance of the VISSIM model by VDOT, VHB will review the previously reported congestion and operational problems and use the site reconnaissance and No-Action model measures of effectiveness (MOEs) to quantify the severity of the anecdotally reported congestion. VHB will prepare a one-page technical memo summarizing the calibration steps and documenting the findings of the operations analysis for the existing conditions scenarios for model validation. The contents of this technical memo will later be used in a final technical memorandum.

Task 4: Past Study Critical Review and Alternatives Development

Through communication with the Town's consultant, which was confirmed by County contacts, the previous Town study was not formally documented. Instead, the findings of the initial Town study was reported orally in front of the Town council. VHB does have access to the two-page brief provided by the Town's Director of Public Works to the Town Council for use at its work session on September 22, 2014. The two-page brief provides a brief description of eight transportation projects identified by the Town's consultant as having potential for improving congestion on US 15 on the Town's north border. The brief also contains a paragraph concluding that three of those eight potential improvements show the most promise for improving conditions with a recommendation that those three alternatives be studied further. No metrics for the anticipated improvement to the network were provided in the brief.

VHB will first perform an initial, critical review of the potential improvements identified by the Town's consultant and determine which of the eight preliminary potential improvements should be modeled and evaluated more thoroughly as part of this study. This review will also determine if those preliminary potential improvements should be modified before inclusion in the model for alternatives analysis. VHB will review the earlier suggested improvements as well as develop alternative improvements to mitigate the congestion.

During this task, VHB may identify additional and/or alternative potential improvements to be considered

for further analysis. These alternatives may include a variety of geometric and traffic control alternatives to address operational issues identified in the previous tasks. VHB will document and illustrate these alternatives using aerial photography bases. VHB will also develop a set of preliminary screening criteria to evaluate the impact/benefits of the alternatives, as well as very general indication of cost (in terms of low, medium, high, not actual estimated costs) and limitations associated with the proposed alternatives. No benefit-cost analysis will be performed. At this stage, the alternatives will not be analyzed in detail using the traffic analysis and simulation model.

Task 5: Alternatives Consensus Meeting

VHB will present and discuss its findings and recommendations on which alternatives to advance forward through the microsimulation analysis and the screening criteria to be used for evaluation. Part of this step will be to meet with VDOT and other stakeholders (i.e., representative(s) from the Town and from the County) to agree on the alternatives to further investigate. VHB will report on the No Action Scenario model, improvement alternatives, and screening criteria. The purpose of the meeting will be to reach consensus among the stakeholders on the most promising alternatives to move forward to microsimulation and further analysis and the metrics by which those alternatives shall be evaluated.

Task 6: Alternatives Analysis

Following consensus building and decisions reached in task 5, VHB will perform the microsimulation analysis of the alternatives agreed upon in task 5. It is assumed that VHB will model up to four alternatives for the evening peak analysis period. An improvement scenario may include multiple spot improvements. If additional combinations of improvements, horizons and time periods be required, these analyses will be included in a supplemental task order.

Task 7. Meeting to Discuss Findings

VHB will meet with VDOT and other stakeholders to review the findings of the operations analysis, agree upon conclusions, and to finalize the evaluation of alternatives. No formal documentation will be prepared for this step, although VHB will prepare slides/handouts illustrating the improvements along with bullet-points on the effectiveness according to the MOEs/screening methodology agreed upon in Task 5.

Task 8. Documentation of Findings

Following the meeting in Task 7, VHB will prepare a technical memorandum summarizing the findings. Summary tables will be prepared for the operational results (LOS, Delay, etc.). A summary of the pros and cons will also be included, in addition to relevant summary graphics of the corridor. All graphics and summary documents will be prepared to a level appropriate with the proposed budget, and are not envisioned for the purpose of public communication purposes. VHB will transmit a draft document in PDF format for VDOT review. We anticipate one combined set of VDOT comments (after discrepancies or differences have been flushed out by VDOT) and we will then transmit one final PDF of the memorandum.

Task 9. Cost Estimate and Funding Plan

After acceptance of the final technical memo, VHB will develop a planning level cost estimate in accordance with the typical VDOT breakdown: Preliminary Engineering (PE), right of way acquisition (R/W) including

relocation of utilities, and Construction/Inspection. No benefit-cost analysis will be performed. As part of the last step, VHB will work with VDOT to identify a funding plan. That "plan" would identify various pools of money outside of VDOT's normal operating budget.

SCHEDULE

VHB estimates the above activities can be completed per the schedule of subtasks as follows. The approximate dates shown assume Notice to Proceed (NTP) on or before April 10, 2015, and receipt of TMC and 72-hour count data from VDOT no later than one week following NTP.

<u>Task Activities</u>	<u>Expected Completion Date</u>
1. Data Collection (performed by VHB under this scope)	One week following NTP
2. Final Analysis Volumes	Two weeks following NTP*
3. Model Development – No Action Scenarios	Four weeks following NTP**
4. Critical Review & Alternatives Development	Five weeks following NTP
5. Alternatives Consensus Meeting	Five weeks following NTP
6. Alternatives Analysis	Seven weeks following NTP
7. Meeting to Discuss Findings	Seven weeks following NTP
8. Documentation of Findings	Eight weeks following NTP
9. Cost Estimate and Funding Plan	Ten weeks following NTP

* Assumes receipt of raw data from VDOT no later than one week from NTP.

** Assumes a one-week review period by VDOT of VHB's model.

STAFFING

The following key staff will be assigned to this task order.

Person	Project Role	Billing Labor Category
Michelle Smith, P.E.	Principal-In-Charge – Contract management. Oversight, technical guidance on alternatives development and screening, quality assurance.	Managing Engineer II
Christopher Daily, P.E.	Task Order Project Manager – technical direction, coordination of technical analysis, management of information from all parties into single cohesive final product.	Managing Engineer I
Niraja Chandrapu, P.E.	Lead Engineer, Microsimulation Analysis	Engineer/Planner 3

SUMMARY OF ITEMS TO BE PROVIDED BY VDOT

- GIS aerial photography (digital files) including right-of-way limits for the subject interchange.
- Synchro files for US Route 15 and US Route 15 Business for the Weekday AM and PM peak period, and weekend peak period.
- TMC and automated counts performed by VDOT's vendor, as described above.

LEVEL OF EFFORT

Please see Table 1 for a summary of proposed hours and cost estimate for this task order, which is proposed on a cost-not-to-exceed basis up to **\$40,000**.

The cost estimate was developed under the key assumptions listed in this scope of work. As the task order progresses, if any changes from these assumptions are revealed, a supplemental task order will be needed to complete the objectives of this study.

TABLE 1. PROPOSED STAFFING, ESTIMATED LABOR AND COSTS
Task Order 105: US 15 Congestion Relief in Loudoun County North of Leesburg

STAFF CATEGORY	1 Data Collect.	2 Analysis Volumes	3 Model Develop.	4 Alternatives Develop.	SUBTASK				8 Final Document	9 Cost & Funding	TOTAL HOURS	Year 1 LABOR RATE	LABOR COSTS
					5 Consensus Meeting	6 Alternatives Analysis	7 Findings Meeting	8 Final Document					
Sr. Technical Specialist											0	\$272.73	\$0.00
Managing Engineer 2	1			2	2	1	1	1	2		10	\$192.22	\$1,922.20
Managing Engineer 1	4	1	12	12	4	16	4	10	12		75	\$167.76	\$12,582.16
Engineer/Planner 4											0	\$134.69	\$0.00
Engineer/Planner 3	8	2	40	16	4	48	4	32	8		162	\$107.40	\$17,398.45
Engineer/Planner 2				4				4	6		32	\$76.82	\$2,458.11
Engineer/Planner 1	8	3	4	4				4			0	\$56.98	\$0.00
Technician/Support											0	\$142.98	\$0.00
IT/Applications Developer											46	\$106.21	\$4,885.61
Junior CAD/Graphics				8	8	8	6	16			0	\$72.48	\$0.00
Survey Manager											0	\$144.86	\$0.00
Survey Party Chief											0	\$78.36	\$0.00
Survey Instrument Operator											0	\$50.11	\$0.00
Contract/Finance Management			2			1		1			4	\$148.96	\$593.82
Total Hours	21	6	58	42	18	74	18	64	28		329		

OTHER DIRECT COSTS

Postage / Delivery 2 @ \$25 per Courier or Fed Ex
Mileage 156 Miles @ \$0.575 per mile
Reprographics 150 B/W pages at \$0.08 per page
12 Color pages at \$0.50 per page

Subtotal Labor \$39,842.36

Subtotal ODCs \$157.70

TASK ORDER GRAND TOTAL \$40,000.06



Phone 703.847.3071
 Fax 703.356.0663
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 Engineers | Scientists | Planners | Designers

8300 Boone Boulevard
 Suite 700
 Vienna, VA 22182

Client Authorization

New Contract Date **June 10, 2015**

Amendment No. Project No. **TBD**

Project Name **US 15 Bypass / Battlefield Parkway Congestion Relief Study**

	Cost Estimate	
	Amendment	Contract Total
To: Ms. Renee LaFollette and Mr. Tom Brandon, Town of Leesburg Office of Capital Projects		

E-mail: rlafollette@leesburgva.gov Lump Sum Time & Expenses
 Cost + Fixed Fee Labor Multiplier

Phone No: (703) 779-0813 Estimated Date of Completion: **AUGUST 17, 2015**

Scope of Services:

The Town of Leesburg has expressed concern about traffic congestion at the intersection of Battlefield Parkway and Leesburg Bypass (US 15 Bypass). The Town is most concerned by congestion in the northbound direction associated with vehicles turning right onto eastbound Battlefield Parkway and turning left onto westbound Battlefield Parkway, as well as congestion in the westbound direction of Battlefield Parkway associated with vehicles turning right onto northbound US 15 Bypass. VHB is currently conducting a similar and somewhat related study for VDOT of the adjacent junction to the north at the confluence of US 15 Bypass and North King Street (US 15 Business). To take advantage of VHB's investigation of the corridor, the Town has requested that VHB prepare a scope of services to perform a planning-level study to investigate the congestion concerns at the US 15 Bypass / Battlefield Parkway intersection. VHB's objectives is to identify potential traffic congestion mitigation alternatives and evaluate the most promising alternatives through a traffic analysis study using microsimulation to quantify the severity of the existing and forecasted conditions. The goal is to advance the development of an improvement concept that will help alleviate congestion in the northbound and westbound lanes during the evening peak. This study is not intended to be a detailed design, rather the intent of the study is to identify lower-cost short term congestion relief improvements that can be implemented within the study limits, which is defined by the subject intersection and its approaches and receiving lanes. There is no expectation of evaluating major network wide capacity improvements or travel demand management strategies.

Tasks

Task 1. Data Collection

Traffic Data

A VDOT vendor has already collected count information and delivered to VHB traffic volume data at the subject intersection and at the US 15 Business / US 15 Bypass junction to the north. These data were collected in May 2015, to be used in the VHB analyses being conducted under VDOT contract for the US 15 corridor north of the study limits for this study.

Separate turn movement counts are being conducted through a separate VDOT study for a nearby interchange justification report that the Town will provide to VHB.

For the VDOT study, turn movement counts and 72-hour automatic count, speed, and classification information was collected and provided to VHB over a three-day period from Thursday through Saturday. Typically, the worst case traffic conditions are not necessarily the best period to base future design and investment decisions. In order to have an understanding of how the traffic may vary, the data was collected over the 72-hour period to cover a typical weekday, the perceived worst-case scenario, and the anecdotally-reported congested non-commuter period. Similarly, VHB proposes that the analysis period for simulation purposes correspond to the Thursday evening peak.

VHB will request VDOT Synchro files with signal operations data for the AM and PM analysis periods. VHB will use these files as a basis for evaluation of alternatives and will incorporate the timing/phasing information into the simulation modeling described in a subsequent task. The Town also has Synchro files for the US 15 Bypass / Battlefield intersection. VHB will determine which files reflect the actual timing parameters reflected in the field, presumed to be the most recent VDOT files, and if/how the Town files shall be incorporated for various alternatives and/or future scenarios.

Mapping Data

If necessary (i.e., if not already made available by VDOT), VHB will coordinate with the Town to obtain aerial photograph files in electronic format for use in report graphics and measurements needed for simulation, including GIS data indicating the right-of-way limits within the study area.

Site Reconnaissance

VHB will observe traffic conditions during the evening peak hours during a "typical" day, as described previously. Digital photographs of the area will be taken. Informal notes will be prepared documenting the field observations. In particular, the following items will be observed:

- Northbound queuing, lane changing, and phase failures (i.e., vehicles waiting through more than one signal cycle to be processed through the intersection) on northbound US Route 15 at Battlefield Parkway, specifically for northbound right turning and left turning vehicles;
- Queuing and spillback to the adjacent intersections, particularly southbound to Edwards Ferry Road;
- Westbound queuing, lane changing, and phase failures (i.e., vehicles waiting through more than one signal cycle to be processed through the intersection) on westbound Battlefield Parkway, specifically for westbound right turning vehicles;

The site reconnaissance will include a windshield survey of the study corridor to observe conditions during the field reconnaissance for calibration of the model. Photos taken of key features in the field will serve as historical documentation of the observations.

VHB will also conduct limited visual reconnaissance during the periods identified as the worst conditions to understand the problem described by the Town; however, the analysis and improvements will be based upon the typical peak PM period and not the absolute worst conditions (which may occur on a Friday or weekend). Calibration of the model will correspond to the time periods in which the TMCs were collected, which may not be the absolute worst case periods.

Traffic Controls

VHB will observe and photograph the physical and operating condition of traffic controls within the study area, including signs, markings, and signals. These will not be formally documented or incorporated into graphics; rather, this observation is for the study team's understanding of operations.

Task 2. Develop Final Analysis Volumes

VHB will compile the traffic data provided by VDOT to create balanced traffic network volumes for the key analysis period. The objective is to identify "near-term" congestion relief improvements; however, some alternatives may take longer to fund/construct. For this reason, the alternatives will be evaluated under existing traffic conditions and under conditions forecasted for a ten year horizon – 2025. VHB will rely on other sources to estimate 2025 volumes to account for changing traffic demand as a result of approved developments, future planned highway improvements, and projected traffic volume growth in the area. While recent network changes around Leesburg, including the Sycolin overpass south of Town and Battlefield Pkwy opening SE of Town, generally impact travel patterns getting around Leesburg and that part of Loudoun County, neither of these is anticipated to have a major effect on the volume of traffic heading north on Route 15 out of Town. Similarly, the anticipated impact of the future Fort Evans/Edwards Ferry improvements on traffic volumes will not be considered. VHB will consult with VDOT, Loudoun County, and Town of Leesburg to determine the projects that are anticipated to impact travel patterns in the study area and will incorporate those impacts into the forecasted 2025 volumes at the study junctions. This is intended to be a limited effort to help in assessing the alternatives.

Task 3. Model Development - No-Action Scenarios

VHB proposes using the VISSIM microsimulation model developed for the VDOT study as the analysis tool for this study. VISSIM will more accurately reflect the behavior of the motorists and will more accurately forecast queuing for the design alternatives. VHB will extend the limits of the model developed for the VDOT study to include the US 15 Bypass corridor farther south to Edwards Ferry Road and to include the Battlefield Parkway corridor to the nearest signalized intersection to the east and to the west of the subject intersection. Edwards Ferry Road is included in the study area only to accurately reflect traffic flow from the southern signal-controlled intersection and determine its potential metering effect on traffic approaching Battlefield Parkway; it is not necessarily included for the purpose of developing improvements at that intersection. The network will include traffic volume and traffic control data provided by VDOT and highway geometric data determined from aerial photography and corroborated during the site reconnaissance.

VHB will calibrate the existing conditions model using the field observations from the site reconnaissance in Task 1, including spot checks of queuing on the three legs of the junction and an assessment of

simulated throughput compared to the collected traffic volumes provided on the surrounding roadway network.

Two model scenarios are anticipated for this study, which correspond to the Weekday Evening Peak Hour for existing traffic conditions and for 2025 forecasted volumes. At this stage, weekday morning analysis and weekend period analysis is not planned since the critical improvements would be identified by problems revealed in the evening peak as previously described. Should analysis of the existing morning peak period, weekend peak period, or longer term future scenarios (e.g., 2030) be beneficial to the Town, an amendment can be prepared to complete these analyses.

Task 4: Alternatives Development

VHB will first perform an initial, critical review of any potential improvement concepts identified previously by the Town or its representatives and determine which, if any, preliminary potential improvements should be modeled and evaluated more thoroughly as part of this study. This review will also determine if those preliminary potential improvements should be modified before inclusion in the model for alternatives analysis. VHB will further develop alternative improvements to mitigate the congestion. During this task, VHB may identify additional and/or alternative potential improvements to be considered for further analysis. These alternatives may include a range of geometric and traffic control modifications to address operational issues identified in the previous tasks. VHB will document and illustrate these alternatives using aerial photography bases.

VHB will also develop a set of preliminary screening criteria to evaluate the impact/benefits of the alternatives and any foreseen limitations associated with the proposed alternatives. One of these screening criteria constraints will be a planning-level cost estimate. VHB will use accepted VDOT planning-level costs prepared by the Transportation Mobility Planning Division, or suitable substitute estimating values provided by the Town, to prepare rough order-of-magnitude cost estimates for the alternatives. No benefit-cost analysis will be performed. At this stage, the alternatives will not be analyzed in detail using the traffic analysis and simulation model.

Task 5: Alternatives Consensus Meeting

This proposal covers two meetings. At the first, VHB will present and discuss its findings and conclusions on which alternatives to advance forward through the microsimulation analysis and the screening criteria to be used for evaluation. Part of this step will be to meet with the Town and other stakeholders (i.e., representative(s) from VDOT and/or from the County) to agree on the alternatives to further investigate. VHB will report on the No Action Scenario model, improvement alternatives, and screening criteria. The purpose of the meeting will be to reach consensus among the stakeholders on the most promising alternatives to move forward to microsimulation and further analysis and the metrics by which those alternatives shall be evaluated.

Task 6: Alternatives Analysis

Following consensus building and decisions reached in task 5, VHB will perform the microsimulation analysis of the alternatives agreed upon in task 5. It is assumed that VHB will model up to four alternatives for the evening peak analysis period. An improvement scenario may include multiple spot improvements. If additional combinations of improvements, horizons and time periods are determined to be required for further evaluation of alternatives, these analyses will be included in a supplemental task order.

Task 7. Meeting to Discuss Findings

At the second meeting, VHB will meet with the Town and other stakeholders to review the findings of the operations analysis, agree upon conclusions, and to finalize the evaluation of alternatives. No formal documentation will be prepared for this step, although VHB expects to prepare slides/handouts illustrating the improvements along with bullet-points on the effectiveness according to the MOEs/screening methodology agreed upon in Task 5. To be clear, VHB will not be generating preliminary design level plans. Our services will be focused on development of concept level improvements.

Task 8. Documentation of Findings

Following the meeting in Task 7, VHB will prepare a technical memorandum summarizing the findings. Summary tables will be prepared for the operational results (LOS, delay, queues, etc.). A summary of the pros and cons will also be included, in addition to relevant summary graphics of the corridor. Graphics and summary documents will be prepared to a level appropriate with the proposed budget, and are not envisioned to be used in public presentation or forum. VHB will transmit a draft document in PDF format for Town review. We anticipate one set of comments (after internal discrepancies or differences have been flushed out by the Town) and we will then transmit one final PDF of the memorandum.

SCHEDULE

VHB estimates the above activities can be completed per the schedule of subtasks as follows. The approximate dates shown assume Notice to Proceed (NTP) on or before June 12, 2015.

<u>Task Activities</u>	<u>Expected Completion Date</u>
1. Data Collection (performed by VHB under this scope)	One week following NTP
2. Final Analysis Volumes	Two weeks from receipt of TMC*
3. Model Development – No Action Scenarios	Three weeks from receipt of TMC*
4. Alternatives Development	Four weeks from receipt of TMC*
5. Alternatives Consensus Meeting	Five weeks from receipt of TMC*
6. Alternatives Analysis	Seven weeks from receipt of TMC*
7. Meeting to Discuss Findings	Seven weeks from receipt of TMC*
8. Documentation of Findings	Eight weeks from receipt of TMC*

* Based on Town's comment that summarized turning movement count data will be provided by the Town to VHB within one month from NTP.

SUMMARY OF ITEMS TO BE PROVIDED BY THE TOWN

- GIS aerial photography (digital files) including right-of-way limits for the subject interchange, if not already provided by VDOT for the VDOT study nearby.
- Synchro files for US 15 Bypass corridor, including the intersections with Battlefield Parkway and Edwards Ferry Road, for the Weekday AM and PM peak period, and weekend peak period.

- Turn movement counts at the US 15 Bypass / Battlefield Parkway and US 15 Bypass / Edwards Ferry Road that are being conducted in early June by VDOT's consultant for another project.

LEVEL OF EFFORT

VHB proposes to perform this study for a lump sum cost-not-to-exceed basis of **\$19,000**. The cost estimate was developed under the key assumptions listed in this scope of work. As the work progresses, if any changes from these assumptions are revealed, a supplemental amendment will be needed to complete the objectives of this study.

Prepared By: _____

Department Approval: _____

Please execute this Client Authorization for VHB to proceed with the above scope of services at the stated estimated costs. No services will be provided until it is signed and returned to VHB.

Subject to attached terms & conditions.

Subject to terms & conditions in our original agreement dated

Vanasse Hangen Brustlin, Inc. Authorization

Client Authorization *(Please sign original and return)*

By _____

By _____

Print _____

Print _____

Title _____

Title _____

Date _____

Date _____